insoluble in Ammonia Solution, but readily soluble in Potassium Cyanide. It is liable to contain the same impurities as the Sulphate, and the methods adopted for their detection in the latter may be also applied here. The *U.S.P.* includes a test for Morphine; no colour should be produced on the addition of Nitric Acid to a mixture of Hyoscyamine Hydrobromide and Sulphuric Acid.

**Hyoscyamine Discs** (for hypodermic injection).—$\frac{1}{80}$ and $\frac{1}{20}$ grain of Hyoscyamine Sulphate.—*St. Bartholomew's.*

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Not Official.

## ICHTHYOCOLLA.

ISINGLASS.

Fr., Colle de Poisson; Ger., Hausenblase; Ital., Colle di Pesce; Span., Ictiocola.

The swimming bladder or sound of various species of *Acipenser*, prepared and cut into fine shreds.

This well-known substance was in the early London Pharmacopœias, and called Ichthyocolla or Fish Glue; it was used in medicine as a nutrient. It is still to be found in most of the Continental Pharmacopœias. It is used for fining Wine, for which purpose Gelatin does not answer. Russian Isinglass is reckoned the best quality. Isinglass is used for Court Plaster and Gold-beater's Skin.

Isinglass, 15 grains to the fl. oz. of Glycerin is useful in some skin diseases.

This is included among the Tests of the *B.P.*, its solution being used for Tannic Acid, with which it forms an insoluble compound.

**Foreign Pharmacopœias.**—Official in Austr., Belg., Fr., Hung., Jap., Norw. and Russ. (Colla Piscium); Ital. (Colla de Pesce); Mex. (Cola de Pescada); Port. (Gelatina de Peixe); Span. (Ictiocola). Not in the others.

**Descriptive Notes.**—There are many varieties of Isinglass in commerce differing in shape and quality. It consists of the swimming bladder of various fishes washed and freed more or less from the lining membranes. The kind preferred for use in medicine is derived from various species of Sturgeon (*Acipenser Huso*, etc.) and is imported from Russia. It is prepared in the form of leaf Isinglass, *i.e.*, the swimming bladder is cut open, cleaned and pressed flat, or twisted when soft into various shapes or folded and known as long and short staple or book Isinglass, but in retail commerce is offered cut up into slender threads, which can be distinguished from Gelatin by its laminated structure.

**Tests.**—Isinglass is not soluble in cold Water, but the best qualities dissolve almost entirely in boiling Water. On treating Russian Isinglass with hot Water the substance swells uniformly, producing a whitish opaline jelly which gradually dissolves entirely; Gelatin, under similar conditions, swells irregularly and gives a nearly transparent solution. The best Russian Isinglass usually leaves from 0·4 to 1·0 p.c. of ash.

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Not Official.

## ICHTHYOL.

AMMONIUM ICHTHYOLSULPHONATE.

A reddish-brown, syrupy liquid, with igneous bituminous odour and taste. Obtained by the action of Sulphuric Acid on a Sulphur-containing mineral oil distilled from peculiar fossil deposits, principally fish, and subsequent neutralisation with Ammonia.

**Solubility.**—Entirely soluble in Water, partly soluble in Alcohol (90 p.c.) and Ether, entirely in a mixture of both.

It mixes readily with Glycerin, Fats, Oils, Soft Paraffin, and Lanolin.

**Medicinal Properties.**—Used both internally and externally for chronic eczema, psoriasis, and also for chronic rheumatism; as an application in pruritus and prurigo. Useful in chilblains, 10 to 20 per cent in Lanolin.

The following formula is recommended for eczema: Litharge, 10; Diluted Acetic Acid, 30; boil down to 20, add Olive Oil, Lard, and Ichthyol of each 10, all by weight, to make an **Ointment.**—*L.* '83, i. 334. It is better to boil down to 13, as Water separates from the Ointment if evaporated only to 20 as directed.

For uterine affections it is used with Glycerin as a tampon.—*L.* '90, i. 1142; '91, i. 55.

As a **gargle** in acute pharyngitis.—*L.* '94, ii. 1113. As a **paint** (20 p.c. sol.) for foot blisters.—*T.G.* '95, 56. As 10 p.c. antiseptic injection in vesical catarrh, *M.A.* '95, 139; and in gonorrhœa, *T.G.* '93, 349; *Pr.* lii. 370. 1 to 2 p.c. aqueous solution used as irrigations in gonorrhœa.—*L.* '97, i. 1165; *T.G.* '96, 350.

Given to a limited extent and has been sometimes beneficial in some hyperæmic diseases like acne rosacea.—*L.* '03, i. 785.

As an ointment composed of Ichthyol, 1; Vaseline, 1; applied to the pustules and surrounding skin in smallpox.—*B.M.J.E.* '03, ii. 24.

In pruritus vulvæ, as a 15 p.c. ointment made with Lard.—*T.G.* '99, 319.

In 3-grain doses in urticaria.—*B.M.J.E.* '95, i. 16. Internally in phthisis.—*L.* '94, i. 1521; *B.M.J.E.* '95, i. 51; '95, ii. 28; *P.J.* '95, ii. 51; '96, ii. 484; *B.M.J.E.* '99, i. 60.

Applied so as to cover the healthy skin beyond the affected part modifies, and distinctly shortens the duration of, erysipelas; 30 to 60 p.c. Ointment, or 10 p.c. **Collodion** for sensitive skins.—*T.G.* '91, 862; '92, 294, 684; *M.A.* '95, 249; *B.M.J.E.* '94, i. 24, 43; as a 5 to 10 grain suppository in prostatitis.—*B.M.J.E.* '93, ii. 24.

It is not without danger, as an application of 1 Ichthyol and 5 Vaseline to a child four years old produced stupor for twelve hours, but it completely recovered.—*B.M.J.* '84, ii. 1013.

Zinc Oxide, 20; Magnes. Carb., 10; Ichthyol, 1 to 2; useful for burns of the first degree. Calcii Carb., 10; Zinci Oleatis, 10; Aq. Calcis, 10; Ichthyol, 1 to 3; for extensive burns.—*B.M.J.E.* '95, ii. 92.

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

**Prescribing Notes.**—*In* **pill** *made with a mixture of Althæa* 3, *Liquorice Powder* 3, *and Compound Tragacanth Powder* 2; 4 *of this powder to* 2 *of Ammonium Ichthyol or to* 4 *of Sodium Ichthyol. Also given in* **capsules**, *and Compressed Tablets.*

*The Oils of Citronella, Eucalyptus, and Pinus Sylvestris have been suggested for disguising the odour of Ichthyol in external applications. For internal use, Milk, Chocolate, or Oil of Peppermint have been used. Essence of Almonds is also very good.*

*When Ichthyol is ordered, the Ammonium salt is generally understood; the Sodium salt has similar properties, is more of a solid, and makes a smaller pill.*

*Diluted with Vaseline or Lanolin to form a* 10 *to* 50 *p.c.* **Ointment**; *also used as a* 10 *to* 20 *p.c.* **Collodion.**

**Lithium, Magnesium** *and* **Zinc Ichthyolsulphonates** *have been employed medicinally. The Magnesium salt makes a suitable pill-mass, and may be prepared by making* 120 *grains of the Ammonium salt and* 15 *grains of light Calcined Magnesia into a paste with Water, and evaporating to dryness on a water-bath. This brown powder,* 2 *parts of which are equal to* 3 *of the Ammonium salt, will make nice pills with a drop or two of Water.*

*When dispensed with Potassium Bromide, a turbid brown precipitate settling to a sticky mass is thrown out, and adheres to the bottle; the addition of Mucilage of Acacia does not prevent this.*

*For* **pessaries** *a Gelatin basis with Ichthyol after a time becomes hard and insoluble. They keep best when made with Cocoa-butter alone.* 3 *grains of Ichthyol with* 12 *grains of Oil of Theobroma make a good suppository.*

**Incompatibles.**—Alcohol, Alkali Hydroxides and Carbonates, mineral acids and Potassium Bromide. Alkaloids are incompatible with Ammonium Ichthyolsulphonate, and decompose it with formation of an Ichthyolsulphonate of the

alkaloid, and liberation of Ammonia. With alkaloidal salts a double decomposition takes place.

**Foreign Pharmacopœias.**—Belg., Ital. (Ittiolo), Jap., Ammonium Sulphoichthyolate, Russ. and Span. (Ictiol).

**Tests.**—Ammonium Ichthyolsulphonate, when warmed with Potassium or Sodium Hydroxide Solution, evolves Ammonia gas, readily recognised by its odour and by its action upon moistened red Litmus paper; if the mixture be evaporated to dryness and ignited a carbonaceous mass is left, which evolves an odour of Hydrogen Sulphide when acidified with Hydrochloric Acid. When evaporated on a water-bath it usually loses about 45 p.c. of its weight, and should lose at the most not more than 50 p.c. The clear aqueous solution is slightly alkaline in reaction towards red Litmus paper. A 10 p.c. aqueous solution, when mixed with Hydrochloric Acid, throws down a dark resinous precipitate, which is soluble in Ether and in Water, but is reprecipitated from the latter liquid by Hydrochloric Acid or Sodium Chloride. When evaporated and ignited with free access of air it should leave no weighable residue.

**GELATUM ICHTHYOL.**—Gelatin, 1; Distilled Water, 2½; Ichthyol, 1; Glycerin, 6; all by weight.—*Pharm. Form.*

This has been incorporated in the *B.P.C.* under the title **Pasta Ichthamolis.**

**INJECTIO ICHTHYOL.**—2 to 5 p.c.—*Lock.*

**PASTA ICHTHYOL** (Unna).—Ammonium Ichthyolate, 2 scruples to 2 drm.; Powdered Dextrin, 1 oz.; Distilled Water, 1 oz.; Glycerin, 6 drm. Dissolve the Ichthyol in the Water and Glycerin, mix with the Dextrin and heat on a water-bath until uniform.—*Pharm. Form.*

Ammonium Ichthyol, 25; Carbolic Acid, 2½. Dissolve in warm Water 22½ and Starch 50.—*B.M.J.E.* '91, i. 102.

This has been incorporated in the *B.P.C.* under the title **Pasta Ichthamolis Composita.**

Dr. Unna considers that for certain purposes a waterless **Ichthyol varnish** possesses advantages over the usual preparations, and gives the following formula: Ichthyol, 40; Starch, 40; Solution of Albumen, 1 to 1½, Water, to 100. The Starch is first moistened with the Water, then the Ichthyol well rubbed up with it, and lastly the solution of Albumen is added.—*L.* '91, i. 622; *B.M.J.E.* '91, i. 102.

**UNGUENTUM ICHTHYOL.**—Ichthyol, 1; Paraffin Ointment, 9; Mix.—*King's.*

Recommended in the treatment of chilblains.—*B.M.J.* '91, i. 503.

**Unguentum Ichthamolis.**—Ammonium Ichthyosulphonate, 10; Hydrous Wool Fat, 90; Mix.—*B.P.C.*

**UNGUENTUM ICHTHYOLIS.**—Ichthyol, 40 grains; Salicylic Acid, 8 grains; Soft Paraffin, to 1 oz.—*London.*

**UNGUENTUM ICHTHYOLIS COMPOSITUM.**—Ichthyol, 1; Solution of Lime, 9; Hydrous Wool Fat, 5; Soft Paraffin (yellow), 10; Zinc Ointment, 5.—*Guy's.*

**VASOLIMENTUM ICHTHYOLI.**—Ammonium Ichthyol, 10; Liquid Vasoliment, 90.—*Hager.*

**Parogen Ichthamolis.** *Syn.* Ichthamol Vasoliment.—Ammonium Ichthyosulphonate, 10; Parogen, *q.s.* to produce 100.—*B.P.C.*

**NATRIUM SULPHO-ICHTHYOLICUM** (Sodium Ichthyolsulphonate).—A brownish-black tar-like mass, with a bituminous odour.

**Solubility.**—It makes a somewhat turbid solution with Water; dissolves in a mixture of equal weights of Alcohol and Ether. It is soluble in Benzol.

**Medicinal Properties.**—The same as the Ammonium salt.

**Tests.**—Sodium Ichthyol dissolves in Water, forming a solution which is only faintly alkaline in reaction towards red Litmus paper. When ignited it

leaves a residue possessing an alkaline reaction, which colours a non-luminous flame intensely yellow, and which, when dissolved in Water and acidified with diluted Nitric Acid yields, with Barium Chloride Solution, a white precipitate insoluble in Hydrochloric Acid. The aqueous solution, when acidified with Hydrochloric Acid, precipitates a dark resinous mass which, when separated from the supernatant liquid, is soluble in Ether and in Water, but is again precipitated from the latter fluid by the addition of Hydrochloric Acid or Sodium Chloride. It contains from 25 to 30 p.c. of moisture, which may be determined by drying over Sulphuric Acid, preferably in a vacuum desiccator. It should not evolve Ammonia when heated with Potassium or Sodium Hydroxide Solution, indicating the absence of Ammonium Ichthyolsulphonate.

**ICHTHOFORM** (Formaldehyde Ichthyosulphonate).—A blackish-brown powder, possessing a bituminous odour, insoluble in Water, and in Alcohol (90 p.c.). Introduced as an intestinal antiseptic.

**Dose.**—10 to 20 grains = 0·65 to 1·3 gramme.

**FERRICHTHOL** (Iron Ichthyolsulphonate).—A dark, blackish-brown, non-hygroscopic, amorphous powder. Has been given in anæmia.

**ANYTIN.**—Under this title a 33 p.c. aqueous solution of Ichthyolsulphonic Acid has been introduced into medicine. It possesses the property of rendering soluble in Water substances which are otherwise insoluble, or nearly so. The compounds so produced are known as **Anytols**, and **Meta-Cresol, Guaiacol, Camphor** and **Iodine-Anytols** have received some attention as medicinal agents, chiefly as antiseptics.

**THIOL.**—An artificial substitute for Ichthyol, prepared by the action of Sulphur on gas oil, and subsequent treatment with Sulphuric Acid. It is supplied in two forms, a **powder** and a **liquid**; it is soluble in Water and almost odourless.

Useful in acute forms of erythema, in erysipelas, and in inflammatory diseases of women, also in pruritus of the female genitals.—*Pr.* lvi. 565.

A 20 to 40 p.c. solution is used for erysipelas in same manner as Ichthyol.—*B.M.J.E.* '94, i. 103; *T.G.* '94, 627.

**ICHTHALBIN** (Albumen Ichthyolsulphonate).—A greyish-brown powder, almost odourless and tasteless. Insoluble in Water, decomposed by alkalis.

**Dose.**—7½ to 30 grains = 0·5 to 2 grammes per diem.

**Tumenol.**—A similar body to Ichthyol, is a thick dark brown liquid. It is a mixture of Tumenolsulphone (**Tumenol Oil**) and Tumenolsulphonic Acid (**Tumenol Powder**).

Tumenol Ammonium is a compound introduced to overcome the difficulty with which ordinary Tumenol is miscible with various diluents. It contains more Water than Tumenol. It is practically neutral, fairly soluble in Water, is miscible with slight turbidity to the extent of 1 to 5 in mixtures of equal parts of Alcohol, Water and Ether, and in Alcohol, Glycerin and Ether. The formulas for various lotions and ointments are also given.—*P.J.* '05, ii. 399.

**Petrosulfol.**—A dark brown thick syrupy substance. Soluble in Water. Similar in its therapeutic properties to Ichthyol.

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**Not Official.**

## IGNATIA AMARA.

The Seed of *Strychnos Ignatii*, Berg.

**Medicinal Properties.**—Similar in action to Nux Vomica.

**Foreign Pharmacopœias.**—Official in Fr. (Fève de St. Ignace); Mex. (Cabalonga); Port. (Fava de S. Ignacio); Span. (Haba de S. Ignacio).

**EXTRACTUM IGNATIÆ AMARÆ.**—Prepared by percolating Ignatia Beans with Alcohol (90 p.c.), and evaporation.

Tonic, given in debility of the digestive organs.

**Dose.**—$\frac{1}{8}$ to 1 grain = 0·008 to 0·065 gramme in a pill three times a day.

**Official in** Mex.

**TINCTURA IGNATIÆ AMARÆ.**—1 of Ignatia Beans, percolated with Alcohol (70 p.c.) to yield 10.

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

**Foreign Pharmacopœias.**—Official in Mex. (Tintura de Cabalongas), 1 in 5.

**TEINTURE DE FÈVE DE SAINT-IGNACE COMPOSÉE** (Fr.).—St. Ignatius Beans (rasped), 100; Potassium Carbonate, 2·5; Prepared Soot, 0·5; Alcohol (70 p.c.), 500; macerate for 10 days, and filter.

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# INFUSA.

## INFUSIONS.

Fr., Apozèmes, Tisanes; Ger., Aufgüsse; Ital., Infusi; Span., Infusiones.

Infusions, though generally made with boiling Water, are in some cases ordered to be made at a lower temperature, as Infusum Calumbæ, the starch of which would be dissolved by boiling Water. The mucilage and vegetable albumen present are, however, dissolved by cold Water, and these render the Infusion liable to change.

When the Infusion is to be made with boiling Water the pot or vessel should be first rinsed with boiling Water. The ingredients should be suspended immediately under the surface of the Water, or otherwise should be stirred from time to time during infusion.

There is a very large demand for so-called Concentrated Infusions; but although very convenient and comparatively economical they have not the same characters as the freshly-made Infusions. *B.P.* '98 has included some Liquores Concentrati which are intended to represent Concentrated Infusions; they are fluid extracts, prepared with weak spirit (Alcohol 20 p.c.).

There are no General Directions given in the British Pharmacopœia for the preparation of Infusions.

*General Directions given in German Pharmacopœia.*—For the preparation of Infusions boiling Water is poured on the medicament, which must be finely cut if necessary; heat for five minutes, with frequent shaking, on a water-bath, and strain after cooling. Infusions for which the amount of the respective substances is not specified, are prepared so that 10 parts of strained product are obtained from 1 part of substance. In the case of powerful substances for which a limit of dose is given, the quantity of substance is to be specified by the physician.

*Directions in United States Pharmacopœia.*—An ordinary Infusion, the strength of which is not directed by the physician nor specified by the Pharmacopœia, shall be prepared as follows: Put 10 of the substance into a suitable vessel, provided with a cover, pour upon it 200 of boiling Water, cover the vessel lightly, and let it stand half an hour in a warm place; then strain and pass enough Water through the strainer to make the Infusion measure 200 parts. The strength of Infusions of energetic or powerful substances should be specially prescribed by the physician.

Two general methods are recommended by *E. H. Farr* and *R. Wright* for the preparation of **Concentrated Infusions.** They employ dilute Chloroform Water (1 in 1000) and Alcohol as a preservative, and the finished product when diluted in the proportion of 1 part to 7 parts of Water is fairly approximate to

the corresponding fresh Infusion. In the first process, **Repercolation**, half the drug is moistened with the menstruum and percolated, the remainder is then moistened and percolated with the first percolate until completely exhausted. The weak portions are evaporated and added to the stronger and made up to volume. By the second method, that of **Macero-Expression**, the quantity of drug ordered per 20 fl. oz. is macerated in 15 oz. of the menstruum in a covered earthenware vessel for 24 hours, pressing slightly when the drug is not completely covered with the menstruum, strain and press the marc; to the resulting liquid add any other ingredients specified, and reserve; repeat the maceration a second and third time for 6 hours each, and evaporate the resulting mixed liquors, add them to the reserved portion and make up to 20 fl. oz., set aside for 7 days and filter. When diluted Alcohol is used the third maceration may be omitted, and only enough menstruum used in the second to make the expressed united liquids measure 20 fl. oz.—*P.J.* '06, 163, 166, 169, 226; *C.D.* '06, i. 252, 253; *P.J.* '07, 1, 621; *Y.B.P.* '07, 247.

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**Not Official.**

## INULA.

ELECAMPANE.

The Root of *Inula Helenium*, L. It contains large quantities of Inulin, a body allied to Starch; also a crystalline bitter substance, Helenin or Alantcamphor.

**Foreign Pharmacopœias.**—Official in Mex. and Port. Not in the others.

**HELENIN** ($C_6H_8O$).—Colourless, acicular crystals, almost insoluble in Water, but readily soluble in hot Absolute Alcohol, Ether, and Volatile Oils. Has been found to possess powerful antiseptic properties, and has been given in broncho-pneumonia, tuberculosis, and diphtheria.

**Dose.**—$\frac{1}{4}$ to 2 grains = 0·016 to 0·13 gramme.

**Official in** Mex.

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## IODOFORMUM.

IODOFORM. TRI-IODOMETHANE.

**$CHI_3$**, eq. 390·61.

FR., IODOFORME; GER., IODOFORM; ITAL., IODOFORMIO; SPAN., YODOFORMO.

The shining, lemon-yellow, small hexagonal crystals are official; but for dispensing purposes it is supplied as a fine crystalline **Powder.** There is also a **Precipitated Iodoform**, which, however, has a tendency to agglomerate. Iodoform has an unpleasant characteristic odour and taste, and is somewhat unctuous to the touch.

It should be kept in well-stoppered glass bottles of a dark amber tint in a cool atmosphere and should be protected as far as possible from the light.

It is chemically a Tri-iodomethane and may be prepared by the action of Iodine and an alkali or alkali Carbonate upon Ethylic Alcohol.

**Solubility.**—Very sparingly soluble in Water; 1 in 7 of Ether; 1 in 14 of Chloroform; 1 in 120 of Alcohol (90 p.c.). It is also soluble in the fixed and volatile Oils, and about 1 in 100 of Glycerin;

1 in 30 of Olive Oil; 1 in 3⅓ of Carbon Bisulphide; sparingly in Petroleum Spirit.

Precipitated Iodoform frequently gives a turbid solution in Chloroform and Carbon Bisulphide, owing to the dampness of the powder, the adhering Water being insoluble in those fluids. It rapidly dries on free exposure to air, and will then form a clear solution.

The above figures for solubility have been incorporated in the *B.P.C.* The note respecting the solubility of Precipitated Iodoform in Chloroform and Carbon Bisulphide appeared in the 15th edition of the *Companion* and is aptly paraphrased in the *B.P.C.* as follows:—In the form of powder it sometimes contains a trace of moisture, consequently the solutions in Chloroform and Carbon Bisulphide may be turbid; a short exposure to the air, however, will quickly free it from the adherent moisture, when bright solutions may be obtained.

**Medicinal Properties.**—Antiseptic, deodorant and local anæsthetic. Useful in cleansing foul ulcers, buboes, soft chancres, or syphilitic sores, the **powder** being applied, or an **ointment** (1 drm. to 1 oz.), or a solution in Oil of Eucalyptus. Used as a deodorant, and to relieve the pain of cancer and abate the progress of the disease; as a soothing application to burns; also to relieve neuralgia, goitre, and glandular enlargements; as a **suppository** in chronic prostatitis, in hæmorrhoids and anal fissure.

A solution of Iodoform in Ether, containing about 40 p.c. of Liquid Paraffin in the proportion of ½ grain to 10 minims is used (*B.M.J.* '05, i. 67) as an intravenous injection in pulmonary tuberculosis. The Iodoform is placed in the syringe, the Ether drawn in and shaken till the powder is dissolved. A few minims of Liquid Paraffin may be drawn up and the whole well shaken.

Intravenous injections arrest pulmonary tuberculosis.—*L.* '05, i. 1341.

A mixture of:—Iodoform, 60; Spermaceti and Sesame Oil, of each, 40; has been used as a filling for chronic bone cavities.—*B.M.J.E.* '05, i. 70.

An Ointment of:—Iodoform, 5 to 10 grains; Vaseline, 2½ drm.; or Hydrarg. Ox. Flav., 1 to 5 grains; Vaseline, 2½ drm.: applied in keratitis.—*M.P.* '05, ii. 303.

A case of presumably tuberculous meningitis successfully treated (*L.* '05, ii. 964) with an ointment containing 15 grains in an oz. of Vaseline thoroughly rubbed into the scalp and the back of the neck every 8 hours.

As an antiseptic, Iodoform in fine powder, alone or mixed with Boracic Acid or Bismuth, is used as an **insufflation** for ulcerated throat or for ozœna, and as a packing in bone cavities.—*L.* '93, ii. 131.

**Whitehead's Varnish** is Compound Tincture of Benzoin, in which Ether (sp. gr. 0·735) has been substituted for Alcohol (90 p.c.), and contains 10 p.c. of Iodoform.

To prevent pitting in smallpox (*L.* '86, ii. 889); injections of Iodoform in goitre (*Pr.* lvi. 334); in tuberculous disease of the knee joint.—*B.M.J.* '97, ii. 397.

A stopping for bone cavities; Iodoform, 30 to 60; Spermaceti, 40; Sesame Oil, 20.—*B.M.J.* '01, ii. 46.

Daily hypodermic injections of 0·05 gramme of a mixture consisting of Iodoform, 1·5; Eucalyptol, 10; Liquid Vaseline, 0·5; in recurrent hæmoptysis in the early stage of tuberculosis.—*Pr.* lxii. 705.

**Dose.**—½ to 3 grains = 0·032 to 0·19 gramme.

*Ph. Ger.* maximum single dose, 0·2 gramme; maximum daily dose, 0·6 gramme.

**Prescribing Notes.**—*The Iodoform should be finely powdered, or still better, precipitated Iodoform should be used, and suspended with Mucilage of Acacia for a* **mixture** *or* **lotion**; *or it may be given in* **pills** *made with Glucose or one-sixth of its weight of Compound Powder of Tragacanth and Dispensing Syrup, or Diluted Glucose, q.s. to mass.*

*To cover the smell of Iodoform, Oil of Geranium* (5 *minims to* 2 *drm.*) *answers*

*very well, as does also Menthol, 2 to 98. Both of these are good, and next after them comes Coumarin, 2 to 98.*

*The odour of Iodoform can be removed from the hands by rubbing them with Oil of Turpentine; rubbing with Orange-flower Water is also useful.*

**Incompatible.**—Iodoform is incompatible with Calomel.

**Official Preparations.**—Suppositoria Iodoformi and Unguentum Iodoformi.

**Not Official.**—Iodoform Antiseptic Gauze, Iodoformum Aromatisatum, Iodoform Lint, Iodoform Ointment, Iodoform Varnish, Liquid Iodoform, Bougies of Iodoform and Eucalyptus, Collodium Iodoformi, Emulsio Iodoformi, Glycerinum Iodoformi, Gossypium Iodoformi, Injectio Iodoformi, Insufflatio Iodoformi, Insufflatio Iodoformi et Morphinæ Composita, Nebula Iodoformi, Parogenum Iodoformi, Pastillus Iodoformi, Pulvis Iodoformi Compositus, Pigmentum Iodoformi, Unguentum Iodo Paraffini, Unguentum Iodoformi et Eucalypti, Unguentum Iodoformi cum Atropina, Vasolimentum Iodoformi, Whitehead's Varnish, Eka-Iodoform, Iodoformin, Iodoformogen, Di-iodoform, Iodol, Iodolene, Europhen, *see* p. 43, Loretin, *see* p. 990, Iodo-Salicylic Acid, *see* p. 79.

**Foreign Pharmacopœias.**—Official in Austr., Belg., Dan., Dutch., Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S. Iodoform Solution in Ether 1 in 20 by weight is official in Belg.

**Tests.**—Iodoform melts at about 115° C. (239° F.) to a brown liquid, which evolves at a higher temperature brown and violet vapours of Iodine, and leaves a black carbonaceous residue. The *U.S.P.* gives the m.p. as about 115° C. (239° F.); *P.G.* as about 120° C. (248° F.). It is slowly volatile at the ordinary temperature of the air, and distils slowly with the vapour of Water. When warmed with an Alcoholic Potassium Hydroxide Solution it is decomposed into Potassium Formate and Potassium Iodide. If the Alcoholic Potassium Hydroxide Solution be evaporated to dryness and the residue be dissolved in Water, the solution yields, on the addition of an excess of Nitric Acid, a brown coloration, and if the mixture be shaken with a little Carbon Bisulphide Solution the latter assumes an intense violet colour. The *B.P.* omits the evaporation to dryness, acidifying the alcoholic solution with Nitric Acid and testing the liquid for Iodine with Starch Mucilage. Its solutions in neutral solvents are neutral to Litmus.

The more generally occurring impurities are fixed impurities, soluble yellow colouring matters, *e.g.*, Picric Acid, etc.; free acid, soluble Iodides, and excess of moisture. Iodoform should leave no fixed residue when ignited with free access of air, and when treated with Water and filtered the filtrate should be free from colour, should possess no bitter taste, and should yield only a faint opalescence with Silver Nitrate Solution. The *U.S.P.* states that upon full combustion it should leave not more than 0·2 p.c. of residue; the *P.G.* that 0·1 of a gramme of Iodoform shall leave no weighable residue upon ignition. The neutrality of the sample towards Litmus ensures the absence of free acid. The *B.P.* states that it shall not yield any reaction with the tests for Iodides. The *U.S.P.* states that when dried over Sulphuric Acid the loss of weight should not exceed 1 p.c. Neither the *B.P.* nor the *P.G.* adopts a limit of moisture.

**Water.**—If Iodoform be shaken with Water (1–10 *P.G.*; 1–5 *U.S.P.*) and the mixture filtered the filtrate should be colourless, *P.G.*, and free from bitter taste, *B.P.* and *U.S.P.*

**Silver Nitrate.**—The filtrate obtained after agitation with Water, as above, should not be rendered more than faintly opalescent by T.S. of Silver Nitrate, *P.G.* and *U.S.P.*

**Barium Nitrate.**—Another portion of a filtrate obtained as above should be unaffected by T.S. of Barium Nitrate, *P.G.*

### Preparations.

**SUPPOSITORIA IODOFORMI.**—Iodoform Suppositories.
3 grains of Iodoform in each, with Oil of Theobroma.

**UNGUENTUM IODOFORMI.**—Iodoform Ointment.
Iodoform, in fine powder, 1; Yellow Paraffin Ointment, 9.
(1 in 10)

**Foreign Pharmacopœias.**—Official in Dutch, Fr. and U.S., 1 in 10; Mex., Pomada de Yodoformo; Iodoform 1, Ether 1, Vaseline 9. Not in the others.

### Not Official.

**IODOFORMUM AROMATISATUM.**—Iodoform, 96; Coumarin, 4; Mix intimately.—*U.S.N.F.*

*Note.*—Should Coumarin not be available, or should it be objectionable to the patient, the odour of Iodoform may also be more or less masked by many essential oils; for instance, those of Peppermint, Cloves, Cinnamon, Citronella, Bergamot, Sassafras, Eucalyptus, etc. Another efficient covering agent is freshly roasted and powdered Coffee.

The odour of Iodoform may be removed from the hands, or any utensils with which it has come in contact, by washing them with an aqueous solution of Tannic Acid.

*See* also *Prescribing Notes.*

**IODOFORM OINTMENT** (Deodorised).—Lanolin, 20; Iodoform, 2·2; Roasted Coffee (powdered), 1·25; Lard, 2·5.—*C.D.* '07, ii. 382.

**IODOFORM ANTISEPTIC GAUZE.**—Containing 10 and 20 p.c., *Fr.* (Gaze Iodoformée), and *Ital.*, 10 p.c., *Jap.* 5·5 p.c., and *Mex.* 11 p.c.

Iodoform Gauze wrung out of Adrenalin Solution has been used (*B.M.J.*, '04, ii. 1054) as a packing for the apex of the vagina in treatment of accidental hæmorrhage.

**WHITEHEAD'S VARNISH.**—Compound Tincture of Benzoin, in which Ether (sp. gr. 0·735) has been substituted for Alcohol (90 p.c.), and contains 10 p.c. of Iodoform.

This has been incorporated in the *B.P.C.* under the title **Pigmentum Iodoformi Compositum**. *Syn.* Whitehead's Varnish, as follows: Benzoin, 10; Prepared Storax, 7·50; Balsam of Tolu, 5; Socotrine Aloes, 2; Iodoform, 10; Methylated Ether (0·720), *q.s.* to produce 100.

**BOUGIES OF IODOFORM AND EUCALYPTUS FOR GONORRHŒA** (*Cheyne*).—Iodoform, 5 grains; Oil of Eucalyptus, 10 minims; Oil of Theobroma, 35 grains in each bougie, which should be 4 inches long and the diameter of No. 10 catheter.

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

*Treatment.*—The patient to pass water, then lie on his back. Introduce the bougie (first dipped in Eucalyptus Oil or Carbolic Oil 1 in 20), close the orifice with a pad of Boracic Lint covered with Gutta-percha tissue, secure in position with strapping. The patient should refrain from passing water for four or five hours. If the case be severe the introduction of the bougie is repeated after passing water. The next day use an injection of Zinc Sulphocarbolate, 2 grains to 1 fl. oz., for two or three days; and on the third or fourth day, when the symptoms have entirely subsided, use an injection of Zinc Sulphate, 2 grains to 1 fl. oz. The treatment can be commenced as early as the first day or as late as the seventh day of the disease. The patient must abstain from Alcohol.—*B.M.J.* '80, ii. 125; *L.* '82, ii. 176, 213.

**COLLODIUM IODOFORMI.**—Iodoform, 1; Flexible Collodion, 9.—*Guy's.*

**Official in** Belg., Fr. and Jap., 1 in 10 by weight.

**EMULSIO IODOFORMI.**—Iodoform, in fine powder, 10 parts; Glycerin, 70 parts; Water, 20 parts. Rub the Iodoform to a smooth paste with the Glycerin, then add the Water.—*University.*

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

Iodoform, 1; Alcohol (90 p.c.), *q.s.* to moisten; Boiling Distilled Water, 2; Glycerin, 7.—*Great Northern* and *Guy's.*

**GLYCERINUM IODOFORMI.**—Iodoform (washed with 1 in 20 solution of Phenol to sterilise), 1; Glycerin, 9.—*King's.*

**GOSSYPIUM IODOFORMI.**—Iodoform, 70 grains; Glycerin, 10 minims; Cotton-Wool, 60 grains; Ether and Absolute Alcohol are used as solvents. Contains about 50 p.c. of Iodoform.

**Iodoform Wool** can also be obtained containing 10 p.c. and 20 p.c. **Iodoform Lint** 10 p.c.

**Official in** Austr. 10, 20, and 30 p.c.; Belg., Dutch and Span. 10 p.c.; Jap. 5 p.c.

**INJECTIO IODOFORMI.**—Iodoform, 1; Mucilage of Tragacanth, 2; Water, 7.—*University.*

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

Saturated Solution of Iodoform in Ether, ½ fl. oz.; Olive Oil, to 1 fl. oz.—*Central Throat.*

**INSUFFLATIO IODOFORMI.**—(For throat) Iodoform, 2; Dried Starch, 1; both in fine powder. (Aural) Iodoform, 1; Boric Acid, 3; both in fine powder.—*Throat.*

Iodoform, in fine powder, 1; Subnitrate of Bismuth, 1.—*Throat* (1894).

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

**INSUFFLATIO IODOFORMI ET MORPHINÆ COMPOSITA.**—Iodoform, 1 grain; Boric Acid, 1 grain; Morphine Acetate, ½ grain; Starch, to make 5 grains.—*Guy's.*

**NEBULA IODOFORMI.**—Iodoform, 40 grains; Ether (sp. gr. 0·735), 1 fl. oz.; dissolve. A strong antiseptic and detergent.

Iodoform, 8; Ether, *q.s.* to produce 100.—*B.P.C.*

**LIQUID IODOFORM.**—Caustic Potash, 35; Water, 25; dissolve, shake well, and add Oleic Acid, 50; Alcohol (95 p.c.), 30; then add with continuous agitation Sublimed Iodine, 30; decolorise by the addition of a few drops of solution of Caustic Potash. Set aside for several days in the dark, and decant the supernatant liquid. A yellowish liquid, with the odour of Iodoform, miscible with Water, Alcohol, Ether, and Chloroform, is thus obtained (*Blanchi*).—*P.J.* '07, ii. 509; '06, i. 668; *C.D.* '07, ii. 382; '06, i. 163.

**PASTILLUS IODOFORMI.**—Iodoform, in fine powder, 1 grain; Glycerin, 1 minim; Glyco-gelatin, 18 grains. For one pastille.

**PIGMENTUM IODOFORMI.**—Iodoform, 1; Ether, 8.—*Central Throat.*

**PULVIS IODOFORMI COMPOSITUS.** *Syn.* Naphthalin Iodoform.—Iodoform, 20; Boric Acid, 30; Naphthalene, 50; Oil of Bergamot, 2·5. This powder is used in many cases where a *diluted* preparation of Iodoform, for external purposes, is desired.—*U.S.N.F.*

Iodoform, in fine powder, 1; Boric Acid, 3. For external use only.—*East London for Children* and *St. Thomas's.*

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

**UNGUENTUM IODOFORMI CUM ATROPINA.**—Precipitated Iodoform, 60 grains; Atropine, 2 grains; Soft Paraffin, 1 oz.; heat the Atropine and Paraffin till dissolved; stir, and while cooling add the Iodoform.—*London Ophthalmic* and *St. Mary's.*

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

**UNGUENTUM IODO-PARAFFINI.**—Iodoform, 1; Eucalyptus Oil, 8; Soft Paraffin, 27; Hard Paraffin, 6.

Dissolve the Iodoform in the Oil at a slightly raised temperature, and mix with the other ingredients previously melted together.—*University* (1899).

**Unguentum Iodoformi et Eucalypti.**—Iodoform, 2; Oil of Eucalyptus, by weight, 19; Hard Paraffin, 64·50; Soft Paraffin, 14·50.—*B.P.C.*

**VASOLIMENTUM IODOFORMI.**—Iodoform, 1·5; Liquid Vasoliment, 98·5.—*Hager.*

**Parogenum Iodoformi.** *Syn.* Iodoform Vasoliment.—Iodoform, 3; Parogen, *q.s.* to produce 100.—*B.P.C.*

Iodoform, 1·5; Parogen, 98·5.—*P.J.* '06, i. 619; *Y.B.P.* '06, 147.

**VASOLIMENTUM IODOFORMI DESODORATUM.**—Iodoform, 1·5; Eucalyptol, 1·5; Liquid Vasoliment, 97.—*Hager.*

**Parogenum Iodoformi Deodoratum.** *Syn.* Deodorised Iodoform Vasoliment. Iodoform, 3; Eucalyptol, 3; Parogen, *q.s.* to produce 100.—*B.P.C.*

Iodoform, 1·5; Eucalyptol, 1·5; Parogen, 97.—*P.J.* '06, i. 619; *Y.B.P.* '06, 147.

Dissolve the Iodoform in the Parogen by warming cautiously, and add the Eucalyptol.

**EKA-IODOFORM.**—A yellow-lemon crystalline lustrous powder, insoluble in Water. Soluble 1 in 75 of Alcohol (90 p.c.); 1 in 8 of Ether; 1 in 13½ of Chloroform. Stated to be a mixture of Iodoform and Paraformaldehyde. Introduced as a substitute for Iodoform.

**Iodofan.**—A reddish crystalline powder without taste or smell, possessing anti-bacterial and deodorising properties, introduced as a dressing.—*B.M.J.E.* '07, ii. 63.

**IODOFORMIN.**—A combination of Iodoform and Hexamethylenetetramine containing about 75 p.c. of the former. A white or pale yellow powder, insoluble in Water; soluble in 1 in 170 of Alcohol (90 p.c.); 1 in 350 of Ether; 1 in 72 of Chloroform; also soluble in Acetone. Boiling Water, Acids, and Alkalis decompose it. Introduced as an Iodoform substitute.—*J.S.C.I.* '95, 820; '96, 469; '97, 757; *C.D.* '95, ii. 438; *P.J.* '95, ii. 455; '97, ii. 82; *L.* '96, i. 856.

**Iodoformal** (Iodoformin Ethyl Iodide).—In yellow crystals or powder, insoluble in Water. Antiseptic.

**IODOFORMOGEN** (Iodoform Albuminate).—A pale lemon-yellow powder, possessing a faint odour of Iodoform. Insoluble in Water, Alcohol (90 p.c.), Ether or Chloroform. Used as a dusting powder. Introduced as an Iodoform substitute.—*B.M.J.* '98, ii. 1066; *B.M.J.E.* '98, i. 63.

**DI-IODOFORM** (Ethylene Periodide).—Yellow prismatic needles. Insoluble in Water, soluble in Chloroform. Introduced as a substitute for Iodoform.—*L.* '93, ii. 1355; *Pr.* lii. 126; *P.J.* (3) xxiv. 622. It is official in *Fr. Codex* (1908).

**IODOL** Tetraiodpyrrol $C_4I_4NH$, eq. 566·18.—A light brown microcrystalline powder, without taste, having a faint odour, and containing 90 p.c. of Iodine. It should be kept in well-closed glass bottles of a dark amber tint in a cool place and protected as far as possible from the light.

**Solubility.**—Nearly insoluble in Water; 1 in 18 of Alcohol (90 p.c.), 1 in 150 of Chloroform, 1 in 1½ of Ether, 1 in 155 of Glycerin. It is stated to be soluble 1 in 3 in Absolute Alcohol, but the sample we examined gave 1 in 6½.

**Medicinal Properties.**—Antiseptic; used for the same purposes as Iodoform, but it is free from the objectionable odour of the latter, and is stated not to be so poisonous. 1 p.c. of Menthol is added in nasal diseases to cover the odour of Iodol.

**Foreign Pharmacopœias.**—Official in Ital., Mex., Russ., Span., and U.S.; not in the others.

**Pomada de Yodol** (Mex.), Iodol, 1; Vaseline, 9.

**Tests.**—Iodol does not undergo decomposition when heated to temperatures up to 100° C. (212° F.), but at about 150° C. (302° F.) it is decomposed, yielding violet coloured vapours of Iodine. When warmed with Potassium or Sodium Hydroxide Solution and Zinc foil, it evolves vapours of Pyrrol, which impart a bright red to a deep carmine-red colour to a splinter of pine wood moistened with Hydrochloric Acid.

A weighed quantity of 0·5 gramme should leave no weighable residue when ignited with free access of air. The *U.S.P.* states that, when ignited, it should leave not more than 0·1 p.c. of residue, indicating the limit of inorganic impurities or mineral residue. When shaken with Water and filtered the filtrate should yield not more than the slightest opalescence with Silver Nitrate Solution, indicating the limit of Hydrochloric Acid and soluble Iodides, nor any coloration with Hydrogen Sulphide, indicating the absence of heavy metals, *e.g.*, Copper, Lead. When Water, which has been shaken with the sample is in turn shaken with Carbon Bisulphide, the latter should be coloured at the most a pale yellow, but not a violet.

**IODOLENE** (Iodol Albuminate).—A light yellow powder, insoluble in Water and in Alcohol (90 p.c.). It occurs in two forms, one for internal use containing 10 p.c. Iodol, the other for external use containing 36 p.c. Antiseptic. Introduced as an Iodoform substitute. Has been used internally in syphilis, but has sometimes caused iodism.—*B.M.J.E.* '02, i. 91.

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

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## IODUM.

IODINE.

I, eq. 125·90.

Fr., Iode Sublimé; Ger., Jod; Ital., Jodo; Span., Yodo.

Heavy, greyish-black, rhombic plates or prisms, possessing a metallic lustre and a characteristic peculiar odour. Commercial resublimed Iodine, if in large dry scales, may be reckoned at 100 p.c. It is prepared from 'kelp' (the ashes of sea-weeds), and also from naturally occurring Iodides and Iodates. It should be kept in well-stoppered glass bottles and in a cool atmosphere, as it volatilises considerably at ordinary temperatures.

**Solubility.**—1 in 7000 of Water; 1 in 12 of Alcohol (90 p.c.); 1 in 4 of Ether; 1 in 30 of Chloroform; 1 in 6 of Carbon Bisulphide; 1 in 65 of Glycerin; soluble in an aqueous solution of Potassium Iodide.

**Medicinal Properties.**—Antiseptic, alterative, deodoriser, disinfectant; locally it is irritant or vesicant according to the strength employed. Internally, largely used in form of Iodide, seldom as Iodine, in chronic rheumatism and in chronic inflammation of various kinds; to promote absorption in hepatic and splenic enlargements, and in dropsies (pleuritic effusion, hydrocele, etc.). In the form of Potassium Iodide (10 to 30 grains three times a day), it is specific in the later stages of syphilis; and in 30-grain doses three times a day it is very useful in aneurism, its most striking effect being the relief of the aneurismal pain; valuable in actinomycosis. Efficacious in all chronic inflammatory conditions; caution, however, is required, as it may, when given in very large doses, occasionally cause wasting

of healthy glands, such as the mammæ and testes. 1 of the Tincture with 50 of Water forms an antiseptic lotion for washing out cysts. Externally the **solution, ointment,** and **tincture** are applied in chronic and parasitic skin diseases, in phthisis, pleurisy, pericarditis and bronchitis as a counter-irritant, and for chilblains; the Tincture, either neat or diluted with an equal quantity of Water, is injected into the scrotal sac to cure hydrocele; Morton's Fluid is injected into the sac of spina bifida. A few drops of the Tincture in half a pint of hot Water may, along with Creosote or volatile Oils, be **inhaled** in some forms of chronic bronchitis and phthisis, and in the throat affection of scarlatina and measles. It is employed as a **gargle,** 1 or 2 of Tincture in 32 of Water for ulceration of the throat. One or two drops of the Tincture in a tablespoonful of Water every 30 minutes are often successful in checking vomiting, including that of pregnancy. *See* also under 'Potassii Iodidum.'

Half a syringeful of a solution of Iodine 1, Potassium Iodide 2, and Water 50, injected into the genital region in tuberculous peritonitis.—*B.M.J.E.* '99, ii. 44.

Stated (*P.J.* '04, ii. 967) to form an excellent general tonic before meals in tuberculosis, a teaspoonful of the following mixture being recommended: Tincture of Iodine (*Fr. Codex*), 20; Potassium Iodide, 2; Glycerin, 40; Syrup of Orange, 50; Water, to 1000. 1 minim doses of the Tincture (*B.M.J.* '04, ii, 1405), very successful in sea-sickness.

For the relief of troublesome cough of phthisis Dr. Coghill's famous formula (*Edin. Med. Jour.* '05, i. 465) is useful:—Tincture of Iodine (Ethereal), 2 drm.; Acid Carbolic, 2 drm.; Creosote or Thymol, 1 drm.; Alcohol (90 p.c.) to 1 oz.

Equal parts of the liniment and tincture applied as a paint in pleurisy of phthisis.—*Edin. Med. Jour.* '05, i. 468.

A case of acute poisoning with fatal result caused by drinking 4 oz. of Liniment of Iodine.—*L.* '05, i. 793.

In form of tincture, strongly recommended in carbolic acid poisoning; in large doses, possibly up to drm. doses and more in severe cases.—*L.* '07, ii. 293.

Graves' disease treated with marked success by parenchymatous injections of Iodine and Ergotine.—*B.M.J.E.* '06, ii. 87. If employed from the beginning in typhoid, it acts almost like a specific, shortening the duration of the illness, and modifying favourably most of the symptoms. Given as *B.P.* tincture 3 to 15 minims in 1 or 2 fl. drm. of Rum or Cognac in 1 or 2 oz. of Water with Sugar, 3 or 4 times in 24 hours.—*B.M.J.* '07, ii. 143.

**Dose.**—$\frac{1}{16}$ to $\frac{1}{4}$ grain = 0·004 to 0·015 gramme.

*Ph. Ger.* maximum single dose, 0·02 gramme; maximum daily dose, 0·06 gramme.

**Prescribing Notes.**—*Very rarely given internally in the solid form, except when loosely combined as in the alkaloidal Periodides, see p. 276. Occasionally administered as Tincture, which should be well diluted. The Pasta Iodi et Amyli is less irritating than many of the other Iodine preparations.*

*Iodine and solutions containing free Iodine stain the skin a yellowish-brown; this can be removed by Caustic or Carbonated Alkali or Sodium Thiosulphate. Several so-called colourless and non-staining preparations of Iodine have been suggested, but their medicinal action cannot be due to free Iodine, but to the compound of Iodine which is produced in each case, e.g., combinations of Iodine and Oleic Acid and the fixed and volatile Oils; also the Decolorised Tincture of Iodine (B.P.C.) which is practically a solution of Ammonium Iodide and Iodate.*

*In all the galenical preparations containing Iodine, Potassium Iodide is a constant ingredient, presumably with the intention of assisting the solution of the Iodine. In the case of aqueous solutions this is necessary, and an excess of Iodide is advantageous. In spirituous solutions, however, where the Iodide is scarcely more soluble than the Iodine, a much smaller quantity (if any) is required.*

**Incompatibles.**—Alkalis, Metallic salts, Alkaloids.

**Official Preparations.**—Liquor Iodi Fortis, Tinctura Iodi and Unguentum Iodi. Used in the preparation of Syrupus Ferri Iodidi. Arsenic, Mercury, Potassium, Sodium, and Sulphur, Iodides are official.

**Not Official.**—Causticum Iodi, Chloroform Iodi, Collodion Iodi, Collodium Iodatum, Gossypium Iodatum, Coghill's Inhalation Fluid, Inhalatio Iodi cum Conio, Glycerinum Iodi, Injectio Iodi, Lugol's Solution, Lugol's Caustic, Liquor Ammoniæ Iodidi, Liquor Iodi, Liquor Iodi Compositus, Liquor Iodi Carbolatus, Liquor Iodi Glycerinus, Nebula Iodi Co., Nebula Iodi et Mentholis, Parogenum Iodi also Dilutum, Pasta Iodi et Amyli, Pigmentum Iodi, Pigmentum Iodi cum Aconito Mite, Pigmentum Iodi cum Aconito Forte, Pigmentum Iodi Oleatum, Pigmentum Iodi Carbolisatum, Pigmentum Mandl, Pigmentum Picis cum Iodo, Sirop Iodotannique, Sirop Iodotannique Phosphaté, Tinctura Iodi, Tinctura Iodi Decolorata, Unguentum Iodi Denigrescens, Vapor Iodi, Vapor Iodi Compositus, Vapor Iodi Etherealis, Vapor Iodi et Acidi Carbolici, Vasolimentum Iodi, Iodine Leaf, Iodi Trichloridum, Iodipin and Iothion.

**Antidotes.**—Emetics aided by demulcent drinks, Starch, Flour, etc., diffused in Water; Hypodermic Injection of Morphine to relieve pain.

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

**Tests.**—Iodine when heated evolves violet coloured vapours, which again condense on cooling to crystals having a metallic lustre.

It has a sp. gr. of about 4·948 and a m.p. of 114° to 115° C. (237·2° to 239° F.). Its aqueous solution affords with Starch Mucilage a dark blue coloration, disappearing on heating the solution and reappearing as the solution cools. It is decolorised by Sodium Thiosulphate Solution and by Sulphurous Acid. When a small quantity is dissolved in Alcohol (90 p.c.) and the solution is almost decolorised with Potassium or Sodium Hydroxide Solution, leaving a sufficient quantity of Iodine to form a slight but distinct excess, the mixture when warmed to about 60° C. (140° F.) yields the characteristic penetrating odour and a pale yellow precipitate of Iodoform. When boiled with Potassium Hydroxide Solution, cooled and acidified with Nitric Acid, it yields with Silver Nitrate Solution a curdy yellow precipitate, insoluble in Nitric Acid, practically insoluble in Ammonia Solution, soluble in Potassium Cyanide Solution. The *B.P.* only includes the Starch Mucilage test for Iodine. It is officially required to contain at least 98·7 p.c. of pure Iodine, as determined by titration with Volumetric Sodium Thiosulphate Solution. The *U.S.P.* requires that it should contain not less than 99·0 p.c. of pure Iodine and the *P.G.* at least 98·94 p.c.

The more generally occurring impurities are fixed matter, excess of moisture, Iodine Cyanide, Chloride or Bromide. The production of a perfectly bright solution when the Iodine is dissolved in Chloroform is officially taken to indicate the absence of moisture. The *B.P.* requires that it shall sublime without residue, and that no slender, colourless prisms, emitting a pungent odour, shall accompany the first portions of the sublimate; indicating the absence of Iodine Cyanide. Both *U.S.P.* and *P.G.* include a specific test for Cyanogen compounds, extracting with Water, decolorising the filtrate and applying the Ferrous Sulphate and Sodium Hydroxide Solution test; the *U.S.P.* employs Tenth-normal Volumetric Sodium Thiosulphate Solution to

decolorise the free Iodine, the *P.G.* Sulphurous Acid; the *U.S.P.* uses Ferrous Sulphate Solution and Sodium Hydroxide Solution (5 p.c.), the *P.G.* a crystal of Ferrous Sulphate, a drop of Ferric Chloride Solution, and Sodium Hydroxide Solution (15 p.c.) both Pharmacopœias require that no blue coloration should be produced on the addition of a slight excess of Hydrochloric Acid; Chloride and Bromide would appear in the aqueous extract, and are precipitated with Silver Nitrate Solution; the precipitated Iodide remains insoluble when treated with Ammonia Solution, the Chloride and portion of the Bromide if present passing into the ammoniacal solution; the latter is required to yield not more than a slight opalescence, and certainly no precipitate when rendered slightly acid with Nitric Acid.

**Ferrous Sulphate and Sodium Hydroxide.**—Triturate 0·5 gramme of finely-powdered Iodine with 20 c.c. of Water and filter the solution. To one half of this solution in a test-tube carefully add Tenth-normal Volumetric Sodium Thiosulphate Solution, until the solution is just decolorised. Then add a few drops of Ferrous Sulphate T.S. and subsequently a little Sodium Hydroxide T.S. and heat the mixture gently. On now adding a slight excess of Hydrochloric Acid the liquid should not assume a blue colour (absence of Iodine Cyanide), *U.S.P.*; triturate ½ gramme of the sample with 20 c.c. of Water, filter and decolorise a portion of the filtrate with Sulphurous Acid. Warm a portion of the decolorised liquid with a crystal of Ferrous Sulphate, a drop of Ferric Chloride T.S. and Sodium Hydroxide Solution (15 p.c.). This mixture shall yield no blue coloration on the addition of an excess of Hydrochloric Acid, *P.G.*

**Silver Nitrate and Ammonia Solution.**—To the other half of the aqueous filtered solution obtained in the preceding *U.S.P.* test add a slight excess of Silver Nitrate T.S., shake the liquid actively, allow the precipitate to subside, and having poured off the supernatant liquid completely, shake the precipitate with a mixture of 1 c.c. of Ammonia Water and 9 c.c. of Water, and filter. Upon the addition of a slight excess of Nitric Acid to the filtrate not more than a slight opalescence should make its appearance, *U.S.P.*; add to the portion of the filtrate remaining from the above *P.G.* test an excess of Ammonia Solution and of Silver Nitrate Solution, and filter. The filtrate when acidified with Nitric Acid shall yield at most an opalescence, but not a precipitate, *P.G.*

**Volumetric Determination.**—A solution of 1 gramme of Iodine and 2 grammes of Potassium Iodide in 50 c.c. of Water should require for decolorisation at least 78·4 c.c. of Volumetric Solution of Sodium Thiosulphate, *B.P.*; 0·2 gramme of Iodine and 1 gramme of Potassium Iodide dissolved in 20 c.c. of Water should require for decolorisation at least 15·6 c.c. of Tenth-normal Volumetric Solution of Sodium Thiosulphate, *P.G.* About 0·5 gramme of Iodine is accurately weighed and dissolved with 1 gramme of Potassium Iodide in 50 c.c. of Water and titrated with Tenth-normal Volumetric Sodium Thiosulphate Solution until the solution is decolorised. The number of c.c. of the Volumetric Solution required when multiplied by 1·259 and divided by the weight of Iodine taken gives the percentage of pure Iodine present, *U.S.P.*

### Preparations.

**LIQUOR IODI FORTIS.** Strong Solution of Iodine. Liniment of Iodine, *B.P.* '85.

Iodine, 1¼; Potassium Iodide, ¾; Distilled Water, 1¼; Alcohol (90 p.c.), 9. (about 1 of Iodine in 8½)

Formerly called Linimentum Iodi. Alcohol (90 p.c.) and Distilled Water replace the Rectified Spirit and Glycerin. The Potassium Iodide is increased.

**Foreign Pharmacopœias.**—Official in Dutch (Solutio Lugoli), Iodine 1, Potassium Iodide 2, Water 497; Norw. (Solutio Superiodeti Kalici), Iodine 1, Potassium Iodide 2, Distilled Water 97; Port. (Soluto Iodo-iodetado), Tincture of Iodine 6, Potassium Iodide 1, Water 13; U.S. (Liquor Iodi Co.), Iodine 1, Potassium Iodide 2, Distilled Water 17. All by weight. Not in the others.

**Tests.**—Strong Solution of Iodine has a sp. gr. of 1·008 to 1·012; contains 11·7 p.c. w/v of Iodine as determined by titration with Volumetric Sodium Thiosulphate Solution; about 6·8 p.c. w/v of total solids and 65 p.c. w/v of Absolute Alcohol as determined by the distillation method given under Tinctura Iodi.

**TINCTURA IODI.** Tincture of Iodine.

Iodine, ½; Potassium Iodide, ½; Distilled Water, ½; Alcohol (90 p.c.), *q.s.* to yield 20. (1 of Iodine in 40)

The Iodine and Iodide are first dissolved in a small quantity of Water, as suggested in previous editions of the *Companion*.

**Dose.**—2 to 5 minims = 0·12 c.c. to 0·3 c.c.

*Ph. Ger.* maximum single dose, 0·2 gramme; maximum daily dose, 0·6 gramme of the 1 in 10 Tincture.

**Tinctura Iodinei** (*Ph. Edinburgh*).—1 of Iodine in 16 of Alcohol (90 p.c.). It resembles the Tinctures of the Foreign Pharmacopœias in being *without* Potassium Iodide.

**Tinctura Iodi Ætherea** (*Sawyer*).—1 of Iodine in 40 of pure Ether.

**Foreign Pharmacopœias.**—Official in Austr., Belg., Dan. (Solutio Iodi Spirituosa Concentrata), Dutch (Solutio Iodii Spirituosa), Fr., Port. and Swiss, 1 and 9. Ital., Jap. and Mex., 1 and 12; Mex. has also (Tintura de Yodo Yodurado), Potassium Iodide 1, Tincture of Iodine 9. Norw. and Swed. (Sol. Iodi Spirituosa) 1 in 20; Swed. also includes Solutio Iodii Concentrata 1 in 10. Ger., Hung., Russ. and Span. 1 and 10. U.S., Iodine 7, Potassium Iodide 5, Alcohol to 100.

**Tests.**—Tincture of Iodine has a sp. gr. of 0·875 to 0·880. It is officially required to contain 2·47 p.c. w/v of Iodine as determined by titration with Volumetric Sodium Thiosulphate Solution. It contains about 2·5 p.c. w/v of total solids and about 86·0 p.c. w/v of Absolute Alcohol. Before determining the Alcohol by distillation it is necessary to fix free Iodine. This may be accomplished by the addition of Sodium Hyposulphite Solution (50 p.c.), the liquid being then neutralised with Potassium or Sodium Hydroxide.

**UNGUENTUM IODI.** Iodine Ointment.

Iodine, 20 grains; Potassium Iodide, 20 grains; Glycerin, 60 grains; Lard, 400 grains. (1 of Iodine in 25)

*B.P.* 1885 was 1 in 31.

**Foreign Pharmacopœias.**—Dutch, Iodine 2, Potassium Iodide 3, Water 5, Ointment 90; Fr. (Pommade d'Iodure de Potassium Iodurée), Iodine 1, Potassium Iodide 5, Benzoated Lard 40, Water 4; Hung., Tincture of Iodine 1, Simple Ointment 9; Mex. (Pomada de Yodo), Iodine 1, Lard 30; Port. (Pomada de Iodeto de Potassio Iodada), Iodine 1, Potassium Iodide 4, Water 5, Lard 40; Span. (Pomada de Ioduro Potasico Iodado), Iodine 2, Potassium Iodide 2, Glycerin 6, Lard 40; U.S., Iodine 4, Potassium Iodide 4, Glycerin 12, Benzoinated Lard 80. Mix. Not in the others.

## Not Official.

**CAUSTICUM IODI.**—Iodine, 180 grains; Potassium Iodide, 60 grains; Alcohol (90 p.c.), 1 fl. oz.

Used in cases of lupus and of indolent (*i.e.* non-phagedænic) tertiary syphilitic ulcers.

**CHLOROFORMUM IODI.**—Iodine, 1; Chloroform, *q.s.* to produce 10.—*Martindale.*

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

**COLLODIUM IODATUM** (*U.S.N.F.*).—Iodine, 1; Flexile Collodion, 19.

**Collodium Iodi.**—Iodine, 6·50; Acetone Collodion, *q.s.* to produce 100.—*B.P.C.*

**GOSSYPIUM IODATUM.**—Dry white wool impregnated with Iodine, and containing about 8 p.c. of the latter (Coton Iodé, *Fr. Codex*, at least 4 p.c.).

**INHALATIO IODI C. CONIO.**—½ to 1 fl. drm. of Succus Conii added to Vapor Iodi.

**GLYCERINUM IODI** (Morton's Fluid).—Iodine, 10 grains; Potassium Iodide, 30 grains; Glycerin, 1 fl. oz.—*Guy's.*

For spina bifida, inject 30 minims, without allowing the fluid contents of the tumour to escape.—*B.M.J.* '85, i. 1098; '86, i. 874; '87, ii. 1275.

**Liquor Iodi Glycerinus** (Morton's).—Iodine, 10 grains; Potassium Iodide, 30 grains; Glycerin, 1 oz. Dissolve.—*Pharm. Form.*

*Note.*—It is advisable to dissolve the Iodine and Iodide in about ½ drm. of Water before adding the 7½ drm. of Glycerin.—*Pharm. Form.*

This has been incorporated in the *B.P.C.*, as follows:—Glycerinum Iodi. *Syn.* Injectio Iodi; Morton's Fluid.—Iodine, 2; Potassium Iodide, 6; Distilled Water, 5; Glycerin, *q.s.* to produce 100.—*B.P.C.*

**INJECTIO IODI.**—Solution of Iodine, 1 fl. drm.; Water, to 20 fl. oz.—*Samaritan.*

**PHENOL IODATUM.** *See* p. 36.

**LUGOL'S CAUSTIC.**—Iodine, 1; Potassium Iodide, 1; Water, 2.

**LUGOL'S SOLUTION.**—Iodine, 20 grains; Potassium Iodide, 30 grains; Water, 1 oz. This was official as Liquor Iodi in *B.P.* '85, but omitted in '98. The proportions are about equal to 1, 1½, and 22. *See* also Liquor Iodi Fortis.

**LIQUOR IODI** (*B.P.* '85).—Iodine, 10; Iodide of Potassium, 15; Distilled Water, *q.s.* to produce 200.

This has been incorporated in the *B.P.C.* under the title **Liquor Iodi Dilutus.**

**LIQUOR IODI COMPOSITUS** (*U.S.P.*).—Iodine, 5; Potassium Iodide, 10; Distilled Water, *q.s.* to make 100 by weight.

**LIQUOR IODI CARBOLATUS.** *Syn.* Boulton's Solution; French Mixture.—Compound Solution of Iodine (*U.S.P.*), 15; Carbolic Acid, liquefied by gentle heat, 5·5; Glycerin, 165, Water, *q.s.* to make 1000.—*U.S.N.F.*

**NEBULA IODI COMPOSITA.**—Iodine, 1 grain; Carbolic Acid, 4 grains; Spray Oil, 1 fl. oz.—*Bournemouth Formulary.*

Iodine, 1; Carbolic Acid, 1; Liquid Paraffin, *q.s.* to produce 100.—*B.P.C.*

**NEBULA IODI ET MENTHOLIS.**—Iodine, 1 grain; Menthol, 1 drm.; White Petroleum Oil, *q.s.* to make 1 fl. oz.—*A.Ph.F.*

Iodine, 2; Menthol, 4; Liquid Paraffin, *q.s.* to produce 100.—*B.P.C.*

**PASTA IODI ET AMYLI.**—Starch, 1 oz.; Glycerin, 2 fl. oz.; Water, 6 fl. oz.; boil together, and when nearly cold add Solution of Iodine, *B.P.* '85, 1 fl. oz.—*University.*

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

**PIGMENTUM IODI.**—Iodine, 2; Potassium Iodide, 1; Glycerin, 4. Used to destroy vegetable parasites.

Tincture of Iodine, 1; Strong Solution of Iodine, 1.—*Great Northern, Middlesex, University.*

This is equivalent to 1 in 24 of Iodine; most of the Hospitals have a Pigmentum, varying in strength from 1 in 3 to 1 in 34, some with Glycerin, others without. Pigmentum Mandl is 1 in 73.

Iodine, 100; Potassium Iodide, 100; Water, to 1 fl. oz.—*St. Thomas's.*

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

**PIGMENTUM IODI CUM ACONITO MITE.**—Tincture of Iodine, 1; Tincture of Aconite, 1.—*R.D.H.*

**PIGMENTUM IODI CUM ACONITO FORTE.**—Strong Solution of Iodine, 1; Liniment of Aconite, 1.—*R.D.H.*

**PIGMENTUM IODI CARBOLISATUM.**—Iodine, 4 grains; Iodide of Potassium, 4 grains; Carbolic Acid, 4 grains; Glycerin, 4 fl. drm.; Water, to 1 fl. oz.

Dissolve the Iodine and the Iodide of Potassium in the Water, and then add the Carbolic Acid dissolved in the Glycerin.

*Note.*—This is sometimes employed at half strength.—*Central Throat.*

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

**Pigmentum Iodi Oleatum.**—Iodine, 50 grains; Oleic Acid, to 1 fl. oz.—*Central Throat.*

**PIGMENTUM MANDL.**—Iodine, 6 grains; Potassium Iodide, 20 grains; Oil of Peppermint, 5 minims; Glycerin, to 1 fl. oz.—*Throat.* Use, in granular pharyngitis.

In answer to an inquiry for the correct composition of Mandl's solution, several formulas were given. That given in *Hager* is Carbolic Acid and Iodine, of each, 1; Potassium Iodide, 2; Glycerin, 100, but all the formulas sent in reply omitted the Carbolic Acid.—*P.J.* '02, i. 156, 181, 184, 200.

**PIGMENTUM PICIS CUM IODO** (Coster's Paste).—Iodine, 120 grains; Rectified Oil of Tar, 1 fl. oz.—*Middlesex;* dissolve cautiously, applying a gentle heat as required. The Oil of Tar is inflammable.

Specially recommended in ringworm.

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

**SIROP IODOTANNIQUE** (Fr.).—Iodine, 2; Tannin, 4; Distilled Water, 360; Refined Sugar, 640; all by weight.

Powder the Iodine and introduce it, with the Tannin and Water, into a flask, which heat on a water-bath at a temperature of 60° C. until a drop of the solution ceases to give a blue colour with starch paper; then dissolve the Sugar in the solution.

**SIROP IODOTANNIQUE PHOSPHATÉ** (Fr.).—Monocalcic Phosphate, 2; Iodotannic Syrup, 98.

**TINCT. IODI** (*P.E.*).—Iodine, 2½; Rectified Spirit, 40. Dissolve the Iodine in the Spirit with the aid of a gentle heat and agitation.

**TINCTURA IODI DECOLORATA.**—Iodine, 250 grains; Alcohol (90 p.c.), 5½ fl. oz.; dissolve with a gentle heat; when cold add Stronger Solution of Ammonia, 10 fl. drm.; keep the mixture in a warm place until decolorised, after which dilute with Alcohol (90 p.c.) to make 20 fl. oz.—*B.P.C. Formulary* 1901 incorporated in *B.P.C.* as follows:—Iodine, 2·50; Strong Solution of Ammonia, 6·25; Alcohol, *q.s.* to produce 100.

**Liquor Ammoniæ Iodidi** (Simpson).—Liq. Ammon. Fortis, 2 fl. oz.; Iodine, 10 grains; Potassium Iodide, 20 grains; Alcohol (90 p.c.), 1 fl. oz.; dissolve.

**Tinctura Iodi Decolorata.**—Iodine, 83; Sodium Thiosulphate (*U.S.P.*), 83; Water, 100; Stronger Ammonia Water (*U.S.P.*), 65; Alcohol (95 p.c.), *q.s.* to produce 1000.—*U.S.N.F.*

**UNGUENTUM IODI DENIGRESCENS.** *Syn.* Stainless Iodine Ointment.—Iodine, 1 oz.; Soft Paraffin, 19 oz. Powder the Iodine, melt the Paraffin by heat, add the Iodine and continue to heat the mixture, stirring until the Iodine

is combined. Remove the heat and stir the preparation until cold.—*Canadian Formulary*, also in *Pharm. Form.*

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

**VASOLIMENTUM IODI.**—Iodine, 10·5; Oleic Acid, 50; Alcoholic Ammonia, 25; Liquid Paraffin, 100; after solution is effected. The weight is then made up to 175 with Alcohol.—*Pharm. Centr. XLI.* 756; *Y.B.P.* '01, 212.

**Parogenum Iodi.** *Syn.* Iodine Vasoliment.—Iodine, 10; Oleic Acid, 40; Liquid Paraffin, 40; Ammoniated Alcohol (10 p.c.), 10.—*B.P.C.*

**VASOLIMENTUM IODATUM.**—Iodine, 6; Liquid Vasoliment, 94.—*Hager.*

**Parogenum Iodi Dilutum.** *Syn.* Diluted Iodine Vasoliment.—Iodine Parogen, 6; Parogen, 4.—*B.P.C.*

**VAPOR IODI** (Inhalation of Iodine).—Tincture of Iodine, 1 fl. drm.; Water, 1 fl. oz.; mix in a suitable apparatus, and having applied a gentle heat, let the vapour that arises be inhaled. This was official in *B.P.* '67 and '85, but omitted in '98, and has now been incorporated in the *B.P.C.*

Tincture of Iodine 10 drops for each dry inhalation, without the aid of heat.

**COGHILL'S INHALATION FLUID.**—Iodine, 33 grains; Ether, 8 fl. drm.; Carbolic Acid, 8 fl. drm.; Creosote (or Thymol), 4 fl. drm.; Rectified Spirit, to 4 fl. oz.—*Pharm. Form.* (1 in 53)

**VAPOR IODI ÆTHEREALIS.**—Iodine, 3 grains; Ether, 2 drm.; Carbolic Acid, 2 drm.; Creosote, 1 drm.; Alcohol (90 p.c.), 3 drm. Thymol may be substituted for Creosote.—*Martindale.* (1 in 146)

**Vapor Iodi Ethereals.**—Iodine, 0·05; Ether, 25; Carbolic Acid, 25; Creosote, 12·50; Alcohol, 37·50.—*B.P.C.* (1 in 2000)

Altered in *B.P.C. Supplement* from 0·05 of Iodine to 0·686; or prepared by mixing Ethereal Tincture of Iodine, 25; Carbolic Acid, 25; Creosote, 12½; and Alcohol (90 p.c.), *q.s.* to make 100.

**VAPOR IODI ET ACIDI CARBOLICI.**—Tincture of Iodine, 2 fl. drm.; Carbolic Acid, 2 drm.; Thymol, 1 drm.; Chloroform, 30 minims; Alcohol (90 p.c.), to produce 8 fl. drm. 10 to 20 drops twice or three times daily on a dry inhaler.—*King's.*

**VAPOR IODI COMPOSITUS.**—Tincture of Iodine, ½ oz.; Creosote, 1 fl. drm.; Liquefied Phenol, 1 fl. drm.; Rectified Spirit, ½ fl. oz. For dry inhalation.—*Great Northern.*

**IODINE LEAF.**—An ingenious method for the local application of Iodine as a counter-irritant, being two sheets of filter paper, one saturated with a solution of Potassium Iodide and Iodate, and the other with Acid Potassium Sulphate. When the papers are moistened and brought together, Iodine is liberated.—*L.* '02, i. 328.

**Sajodin.**—A white powder, free from smell or taste, stated to contain 26 p.c. of Iodine; Dose, 2 to 3 grammes daily in syphilis.—*B.M.J.E.* '07, 1, 64.

**Iodalbin.**—Iodine in combination with Albumen, stated to contain 21·5 p.c. of Iodine; a reddish powder, insoluble in Water and Alcohol; but is dissolved by alkaline solutions. Dose, 5 grains.

**IODI TRICHLORIDUM.** Iodine Trichloride. $ICl_3$, eq. 231·47.—Orange-yellow crystalline masses evolving a powerful penetrating chlorinous odour. It should be kept in well-stoppered glass bottles of a dark amber tint in a cool atmosphere and protected as far as possible from the light.

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

Powerful antiseptic and disinfectant.

**Tests.**—Iodide Trichloride melts at about 25° C. (77° F.). When heated with Oxalic Acid it yields violet coloured vapours of Iodine.

The 1 in 10 aqueous solution affords on the addition of a considerable excess of Sulphuric Acid a whitish precipitate, changing to yellow.

It contains theoretically 54·39 p.c. of Iodine. A weighed quantity of 0·1 gramme mixed with 2 grammes of Potassium Iodide, and dissolved in 30 c.c. of Water, requires at least 15·0 c.c. of Deci-normal Volumetric Sodium

Thiosulphate Solution for decolorisation. A weighed quantity of 0·1 gramme should leave no weighable residue when ignited with free access of air.

**IODIPIN.**—Under this title two Iodine addition-compounds of Sesame Oil are known: one containing 10 p.c. Iodine, a pale straw coloured transparent oily fluid; the other 25 p.c. a yellowish-brown viscid fluid. Both possess an oleaginous odour and taste, are insoluble in Water and in Alcohol (90 p.c.); soluble in all proportions of Ether and of Chloroform.

**Medicinal Properties.**—Recommended in syphilis, bronchitis, bronchial asthma, emphysema and pleuritis; also in syphilitic affections of the eye.—*B.M.J.E.* '00, ii. 80; '01, ii. 79; *M.A.* '02, 38.

As a test for the functional activity of the stomach.—*B.M.J.E.* '99, ii. 81.

In the treatment of fibroids growing at the menopause, Iodine by the mouth used to be successfully employed; the modern idea is in favour of the employment of hypodermic injections of Iodine in organic combination. Iodipin has been shown (*B.M.J.* '04, ii. 1085) to give relief of symptoms in some cases. The question of the originality of this hypodermic method has given rise to a good deal of correspondence (*M.P.* '04, ii. 476, *et seq.*). In gonorrhœal rheumatism (*B.M.J.E.* '04, ii. 75) 10 grammes have been injected every other day in the region of the affected parts.

No case of tertiary ulceration should be despaired of until Iodipin has been tried; its full therapeutic value can be secured by oral administration; is well borne; produces no iodism or depression.—*F.T.* '07, 45.

**Prescribing Notes.**—*May be given in* **capsules,** *each capsule containing 2 grammes = 30 grains of the 25 p.c. preparation; or in* **emulsion,** *made with Gum Acacia and flavoured with Oil of Cinnamon or Peppermint. It may also be administered* **subcutaneously,** *as in the treatment of syphilis, or by inunction.*

**Dose.**—1 to 6 fl. drm. = 3·6 to 21·0 c.c. of the 10 p.c. solution administered by the mouth. 150 to 300 grains = 10 to 20 grammes administered daily subcutaneously.

In cases of uterine fibroid, starting with 1 c.c. injected into the buttock and increasing up to 5 and 7 c.c. of the 25 p.c., injected into either buttock alternately, then 10 c.c. of the 10 p.c., and finally 10 c.c. of the 25 p.c., which latter is considered the full dose of Iodipin for ten consecutive days' use.—*L.* '03, i. 959.

**IOTHION.** $C_3H_5I_2OH$, eq. 309·41.—This substance forms a pale yellow syrupy liquid, insoluble in Water, soluble in Alcohol (90 p.c.), Chloroform and Ether, and mixes with most oils and fats. It contains about 80 p.c. of Iodine, and, being absorbed with facility by the skin, it forms a ready means of administering Iodine. Chemically it is Di-iodo-hydroxypropane. It is stated to have been used successfully in periostitis and in chronic inflammation of the joints. It may be painted on the skin, either pure or diluted with an equal quantity of oil, or may be used in the form of an ointment (25 to 50 p.c.). 30 to 60 grains per day is regarded as the average dose of pure Iothion.

For the gradual application of Iodine, it appears (*B.M.J.E.* '05, ii. 23) to be of great value. It may be applied in the form of a 25 p.c. to 50 p.c. ointment made with Lanolin and Vaseline.

Prescribers should have their attention drawn to the fact that it possesses a sp. gr. of about 2½, and consequently the strength of preparations will vary greatly, according to whether it is dispensed by weight or by measure.

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## IPECACUANHÆ RADIX.

IPECACUANHA ROOT.

Fr., Ipécacuanha Annelé; Ger., Brechwurzel; Ital., Ipecacuana; Span., Ipecacuana.

The dried Root of *Psychotria Ipecacuanha.*

The description of the Root given in the *B.P.* excludes the Carthagena variety, the *U.S.P.* includes both Rio and Carthagena

Ipecacuanha, the *P.G.* only the Rio variety. The Root official in the *B.P.* is not required to yield any definite percentage of alkaloids, that of the *U.S.P.* must contain not less than 1·75 p.c. of Ipecacuanha alkaloids, whilst that official in the *P.G.* is required to indicate at least 2·0 p.c. of total alkaloids.

The *Brussels Conference* agreed that only the root bark should be powdered, rejecting the woody portion. The powder should have an alkaloidal strength of 2 p.c. In the Brazilian Ipecacuanha Root the proportions of Emetine to Cephaëline are as 75 to 25, in the Carthagena Root as 45 to 55.

Umney and Swinton record (*C.D.* '99, ii. 203, 226; *P.J.* '99, ii. 89, 114, 123), the results of an examination of Johor Ipecacuanha. The total alkaloids amounted to 1·7, of which 1·24 p.c. represented Emetine, 0·39 p.c. Cephaëline, and 0·07 p.c. Psychotrine, the percentage proportion being 72·94 to 22·94 to 4·12. The results point to the conclusion that so far as the relative proportions of alkaloids are concerned, this root is practically identical with the Brazilian, but it contains a lower percentage of total alkaloids than the average Brazilian roots unmixed with stems.

The relative percentage composition of the alkaloids from Brazilian and Columbian Ipecacuanha is given by Paul and Cownley (*A.J.P.* '01, 115) as follows:—Brazilian, Emetine 72·14, Cephaëline 25·87, Psychotrine 1·99. Columbian, Emetine 40·5, Cephaëline 56·8, Psychotrine 2·7. The paper gives an exhaustive *résumé* of the chemistry of Ipecacuanha.

The active principle resides in the bark; the inner or woody part contains but little.

From the experiments by Paul and Cownley (*P.J.* (3) xxiv. 61), it would appear (1) that the percentage of *total alkaloids* in Brazilian Ipecacuanha root does not vary much from 2 p.c. Rio Ipecacuanha Root contains the three alkaloids in the following proportions as compared with Carthagena and Indian Ipecacuanha:—

Brazilian (root)—Emetine 1·45 p.c., Cephaëline 0·52 p.c., Psychotrine 0·04 p.c. Total 2·01 p.c.

Brazilian (stem)—Emetine 1·18 p.c., Cephaëline 0·59 p.c., Psychotrine 0·03 p.c. Total 1·80 p.c.

Columbian—Emetine 0·89 p.c., Cephaëline 1·25 p.c., Psychotrine 0·06 p.c. Total 2·20 p.c.

Indian—Emetine 1·39 p.c., Cephaëline 0·5 p.c., Psychotrine 0·09 p.c. Total 1·98 p.c.—Paul and Cownley, *P.J.* '96, i. 321; '02, ii. 256.

In 1893 it was stated by Paul (*P.J.* (3) xxiv. 212) that from so-called de-emetinised Ipecacuanha he had obtained nearly 0·5 p.c. of the ordinary alkaloids of Ipecacuanha; but it can now be obtained entirely free from Emetine (**Pulvis Ipecacuanhæ sine Emetina**).

**Medicinal Properties.**—Expectorant, diaphoretic, gastro-intestinal stimulant, cholagogue. Emetic, slow in action (20 to 30 minutes), and depressant in large doses. Used in emetic doses in whooping-cough and croup to expel exudation or membrane as well as for its depressing effects on the circulation. Used as an expectorant in acute and chronic bronchitis when the phlegm is thick and scanty, and in winter-cough and phthisis. Given in gouty dyspepsia and biliousness. It relieves some forms of vomiting, such as that of pregnancy or alcoholism, when given in small doses, 1 or 2

minims of the **Vinum** every half-hour. Applied to the bites and stings of insects. The diaphoretic effect is best obtained when given in the form of the Compound Powder. In small doses it is commonly added to aperient pills for chronic constipation. A **spray** of the Wine of Ipecacuanha has been strongly recommended by Ringer and Murrell for chronic bronchitis and asthma. Had been abandoned in many parts of the world in treatment of dysentery, but Manson has reintroduced it, with certain important improvements, in chronic dysentery of the amœbic variety. Beginning with 30 grains, preceded by laudanum, and taken in diminishing dose every night for a week, is successful in most cases. For details *see L.* '07, ii. 1591.

In pneumonia.—*L.* '02, i. 183.

10 to 40 minims of the Wine three times a day in epilepsy.—*L.* '98, ii. 751; *P.J.* '99, i, 293.

**Dose.**—As an expectorant, $\frac{1}{4}$ to 2 grains = 0·016 to 0·13 gramme; as an emetic, 15 to 30 grains = 1 to 2 grammes.

*Swiss*, maximum single dose, 0·1 gramme = 1½ grains; maximum daily dose, 0·5 gramme = 7½ grains; maximum dose as an emetic, 5 grammes = 77 grains.

**Prescribing Notes.**—*Prescribed in small doses as an auxiliary in alterative pills. The compound powder is frequently given in the form of a* **powder, pill, cachet,** *or Compressed Tablet. A good* **pill** *can be made by using Dispensing Syrup, q.s. Children tolerate large doses well.*

**Tablets** of **Compound** Ipecacuanha Powder may be obtained containing ½, 1, 2, 3 and 5 grains; of **Simple** Ipecacuanha, $\frac{1}{60}$, $\frac{1}{30}$, $\frac{1}{20}$, $\frac{1}{10}$, ¼ and 5 grains; **De-emetinised,** 5 grains; **Wine,** 1 and 5 minims; Ipecacuanha and Squill (*B.P.* pills), 4 and 5 grains.

**Incompatibles.**—Lead and Mercury salts, vegetable Acids, astringent Infusions.

**Official Preparations.**—Of the **Root,** Extractum Ipecacuanhæ Liquidum, Pulvis Ipecacuanhæ Compositus, Trochiscus Ipecacuanhæ, Trochiscus Morphinæ et Ipecacuanhæ; of the **Liquid Extract,** Acetum Ipecacuanhæ and Vinum Ipecacuanhæ; of the **Compound Powder,** Pilula Ipecacuanhæ cum Scilla.

**Not Official.**—Elixir Ipecacuanhæ, Extractum Ipecacuanhæ Liquidum Miscible, Glycerole of Ipecacuanha, Glycerinum Ipecacuanhæ, Linctus Ipecacuanhæ, Mistura Ipecacuanhæ Ammoniata, Mistura Ipecacuanhæ Salina, Mistura Ipecacuanhæ cum Soda, Oxymel Ipecacuanhæ, Pilula Ipecacuanhæ cum Urginea, Syrupus Ipecacuanhæ, Syrupus Ipecacuanhæ Aceticus, Tinctura Ipecacuanhæ, Tinctura Ipecacuanhæ et Opii, Emetine, Emetine Hydrobromide, Emetine Hydrochloride, Vinum Emetinæ, Vinum Emetinæ Cephaëline, Cephaëline Hydrochloride, Psychotrine.

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

Powder of Ipecacuanha in Austr., Belg., Dutch, Fr., Ger., Jap., Span., Swiss and U.S. contains 2 p.c. of alkaloids.

The *Brussels Conference* agreed that the powder should contain only the root-bark, rejecting the woody portion, also that the powder should have an alkaloidal strength of 2 p.c.

**Descriptive Notes.**—In the *B.P.* the name of the Ipecacuanha plant is given as *Psychotria Ipecacuanha*, Stokes; in the *P.G.* as *Uragoga Ipecacuanha*, Baill., and in the *U.S.P.* as *Cephaëlis Ipecacuanha*, A. Richard. The *P.B.* name is given on the ground that there is no good reason for separating the plant from the genus Psychotria. The *German* name is given apparently on a question of

priority, if kept distinct from Psychotria. Carthagena Ipecacuanha, official in the *U.S.P.* is stated to be derived from *Cephaëlis acuminata*, Karsten.

The Ipecacuanha Root of commerce is imported under the name of Rio, Matto Grosso, or Minas Geraes Ipecacuanha, from Brazil, where it is indigenous; and under the name of Johor or Selangor Ipecacuanha from the Federated Malay States, where it is cultivated. Ipecacuanha imported from the United States of Columbia, and known as Carthagena Ipecacuanha, is official in the *U.S.P.* but not in the *P.B.* or *P.G.* These kinds may be distinguished as follows:—The Brazilian Ipecacuanha is usually of a rusty dull brown colour but varies somewhat in tint, for a good deal of the Root arrives in a mouldy state, and after being washed it assumes a blackish-brown colour. The Root is about $\frac{2}{10}$ inch in diameter, and annulated or ringed to the extent of about 20 rings to the inch, much broken and rarely branched. It is officially described as occurring in tortuous pieces, not often exceeding 6 inches (15 cm.) and $\frac{1}{4}$ inch (6 mm.) in thickness, of a dark brick-red to very dark brown colour. The Selangor Root is similar, but as a rule there are more slender rootlets present and the root is branched. The bark is thick in proportion to the woody centre, horny and whitish in fracture (resinous but sometimes starchy, *B.P.*), and forms about 75 to 80 p.c. of the Root. Carthagena Ipecacuanha is larger, of a paler and more distinctly reddish-brown tint, has more distant rings, which take the form of thinner merging ridges, and the fracture of the bark is greyish. Ipecacuanha Root varies much in quality, according to the amount of woody rhizome or stem present. The latter is smooth, slender, and cylindrical, with a very thin bark, and as the active principles are chiefly contained in the bark, only a very small quantity (about 5 p.c. of the amount present) being contained in the woody centre, the medicinal value of the Root is less in direct proportion to the amount of stem present. Brazilian and Selangor Ipecacuanha contain more Emetine than Cephaëline; Carthagena Ipecacuanha contains more Cephaëline than Emetine.

In powder, Ipecacuanha is distinguished by the absence of vessels, sclerenchyma and bast fibres, and the presence of tracheids, porous parenchymatous cells and acicular raphides, and by starch grains which do not exceed 0·012 mm. (*P.G.*) and occur in groups of 3 to 5 grains. Several other roots have been offered as substitutes for Ipecacuanha, the histological distinctions of which are given in the *Pharm. Jour.* (3) xxxiv. 210. Powdered Ipecacuanha Root has been found adulterated with almond meal, which may be recognised by the presence of the granular albuminous matter, some of which exhibits a crystalloid aspect as seen under polarised light.

**Tests.**—Numerous methods have been suggested for the determination of the alkaloids in Ipecacuanha Root. The most complete research upon the chemistry of the alkaloids is undoubtedly that of Paul and Cownley. The method suggested by them (*A.J.P.*

'01, 116) is as follows:—A weighed quantity of 50 grammes of the Root is mixed with one-fifth of its weight of Lime moistened with Water and extracted with Amyl Alcohol. The Amyl Alcohol solution is extracted with dilute acid, and the acid liquid shaken with Ether and Ammonia Solution to remove the Emetine and Cephaëline, leaving the Psychotrine to be extracted from the ammoniacal liquid by Chloroform. The Ether residue is titrated with Semi-normal Volumetric Hydrochloric Acid Solution, 1 c.c of the Volumetric Acid Solution representing 0·123175 gramme of Emetine and 0·11622 gramme of Cephaëline. A separation of the Emetine and Cephaëline is then effected by treating the Hydrochloric Acid solution with Sodium Hydroxide in the presence of Ether and repeatedly shaking the ethereal solution with Sodium Hydroxide Solution until all the Cephaëline has been separated. The Ether solution of the Emetine is evaporated and the residue titrated with standard acid, the result being expressed as Emetine. The Sodium Hydroxide liquor is acidified, rendered alkaline with Ammonia Solution and shaken with Ether, the Ether residue of Cephaëline being titrated with Semi-normal Volumetric Acid Solution. The sum of the number of c.c. of Semi-normal Volumetric Hydrochloric Acid used in titrating the separated bases should equal the number required before their separation.

When a determination of the total alkaloidal content of a root alone is necessary, several good processes are available. That devised by Bird may be carried out fairly rapidly, and has the advantage that the difference between the gravimetric and the volumetric determinations is reduced to a minimum. A weighed quantity of 10 grammes of the Ipecacuanha Root in fine powder is mixed with 1 gramme of Sodium Bicarbonate, and is then rubbed to a uniform moist granular powder with another 1 gramme of Sodium Bicarbonate shaken with 5 c.c. of Water. The moistened powder is then added to 20 c.c. of a mixture of 1 volume of Amyl Alcohol, 1 volume of Chloroform, and 3 volumes of Ether, contained in a separator, the stem of which is plugged with a pledget of cotton-wool, and the neck of which can be connected with a pressure bellows. The maceration is allowed to proceed for half an hour, with occasional shaking. The liquid is forced out of the separator by the pressure bellows, and the powder is again extracted with 10 c.c. of the same menstruum. After a vigorous agitation it is allowed to stand for 15 minutes, the liquid is again forced out with pressure bellows. The exhaustion is repeated ten or a dozen times at 15 minutes' intervals, with successive quantities of the same menstruum, or until the powder is exhausted. The ethereal liquids are mixed and extracted successively, first, with 10 c.c. of a mixture of 4 c.c. of Volumetric Sulphuric Acid Solution, and then with three successive quantities, each of 5 c.c. of Water, the aqueous layers being separated in each instance. The acid and aqueous solutions are mixed, rendered alkaline by the addition of 0·5 gramme of Ammonium Bicarbonate, and the liberated alkaloids are shaken out, first with 20 c.c., subsequently with two successive quantities, each of 10 c.c. of Chloroform, containing one-sixth its volume of Ether, and lastly with 10 c.c. of the same mixture plus 1 drop of Strong Ammonia Solution,

the chloroformic solution being separated in each case; they are mixed and shaken with a saturated Sodium Chloride Solution containing 1 drop of Strong Ammonia Solution. The perfectly clear chloroformic solution is separated by forcing it through a very small plug of cotton-wool previously saturated with Chloroform and placed in the neck of the separator; the brine is washed by rotating it with a few c.c. more Chloroform mixture, the Chloroform solution separated, mixed with the first chloroformic solution, evaporated to about 1 or 2 c.c., 5 c.c. of Ether sp. gr. 0·717 added, and the evaporation continued, allowing the residue to form a thin film on the inner surface of the vessel. Dry below 80° C. (170° F.) and weigh. The residue is dissolved in a neutral mixture of 10 c.c. Amyl Alcohol, 10 c.c. of Ether sp. gr. 0·717, and 5 c.c. of a saturated Sodium Chloride Solution, and titrated with Tenth-normal Volumetric Sulphuric or Hydrochloric Acid Solution, using Methyl Orange Solution as an indicator of neutrality. 1 c.c. of Tenth-normal Volumetric Acid Solution may be taken as representing 0·024287 gramme of alkaloids. The factor 0·024287 is based upon the percentage composition of Rio Ipecacuanha Root recorded in the researches of Paul and Cownley, viz., practically 3 equivalents of Emetine to 1 of Cephaëline, using *B.P.* atomic weights. Where only approximate or comparative results are required, the following modification of the above process may be adopted:—A weighed quantity of 12 grammes of the finely-powdered Root is mixed with 1 gramme of Sodium Bicarbonate, rubbed in a small mortar to a uniform moist granular powder with 1·4 gramme of Sodium Bicarbonate, shaken with 6 c.c. of Water, and added to 120 c.c. of a mixture of 1 volume of Amyl Alcohol, 1 volume of Chloroform, and 3 volumes of Ether, contained in a similarly-fitted separator to that used in the previous determination. The mixture is shaken occasionally during 2 or 3 hours, 5 c.c. of brine added, agitated, and after aggregation of the powder 100 c.c. of the clear liquid, representing 10 grammes of the Root, is forced out by means of the pressure bellows into a graduated 100 c.c. flask. The alkaloids are then extracted by shaking with the acid mixture, and the process continued on the lines indicated above.

The method of determination adopted by the *U.S.P.* is essential as follows:—A weighed quantity of 15 grammes of the Root in No. 80 powder is shaken for 5 minutes in an Erlenmeyer flask, with a mixture of 115 c.c. of Ether and 35 c.c. of Chloroform, and, after the addition of 3 c.c. of Ammonia Water, is again shaken at intervals during half an hour. 10 c.c. of Water is added, and the liquid shaken until the powder agglomerates, when a measured quantity of 100 c.c. of the clear ethereal solution is transferred to a separator and the alkaloids extracted by shaking moderately for 2 minutes with a mixture of 10 c.c. of Normal Volumetric Sulphuric Acid Solution and 10 c.c. of Water. The acid aqueous liquid is separated, transferred to a second separator, and the extraction of the ethereal solution repeated, first with a mixture of 3 c.c. of Normal Volumetric Sulphuric Acid Solution and 5 c.c. of Water, and then with 10 c.c. of Water, the acid aqueous and the aqueous shakings being in each case separated and

transferred to the second separator. The mixed liquids in the second separator are now rendered alkaline by the addition of a sufficiency of Ammonia Water, and the alkaloids extracted by shaking for 1 minute, first with 25 c.c., then with 20 c.c., and lastly with 10 c.c. of Ether, separating the ethereal liquids in each case from the lower alkaline aqueous portion and transferring the ethereal solutions to a tared flask. The Ether is distilled off on a water-bath, and the residue is dissolved by gently warming it on a water-bath with 12 c.c. of Tenth-normal Volumetric Sulphuric Acid Solution, the excess of Volumetric Acid Solution being titrated with Fiftieth-normal Volumetric Potassium Hydroxide Solution, 5 drops of Cochineal Test Solution being used as an indicator of neutrality. The number of c.c. of Fiftieth-normal Volumetric Alkali Solution used is divided by 5, the quotient subtracted from 12, and the difference multiplied first by 0·0238, and then by 10, the result being the percentage w/w of Ipecacuanha alkaloids present in the sample. It will be noticed that the factor employed by the *U.S.P.* in calculating the result of the Volumetric Test represents the mean combining weights of Emetine and Cephaëline. The choice of Ether as a solvent is open to question. Bird has shown that Ether alone is not entirely satisfactory as a solvent, as it is very difficult to remove the last traces of alkaloid from an alkaline solution by this reagent. Psychotrine is, moreover, according to Paul and Cownley, not extracted by Ether. The *P.G.* employs a mixture of 3 parts by weight of Ether and 1 part by weight of Chloroform for the extraction of the alkaloids, the method of determination being also a volumetric one. Sodium Hydroxide Solution (15 p.c.) is employed to liberate the alkaloids from their combinations. Upon the solubility of Cephaëline in Sodium Hydroxide Solution is based the method for its separation from Emetine, and its incomplete extraction by the Ether-Chloroform solvent therefore renders the results obtained by the process below the truth. The method of determination is briefly as follows:—A weighed quantity of 12 grammes of the Root in fine powder dried at 100° C. (212° F.) is mixed in a well-stoppered bottle with 90 grammes of Ether and 30 grammes of Chloroform, and, after being well shaken 10 c.c. of a mixture of 2 parts by weight of Sodium Hydroxide Solution (15 p.c.) and 1 part by weight of Water is added, and the whole allowed to stand for 3 hours, with frequent intervals of vigorous shaking. 10 c.c. or sufficient Water to cause the powdered Root to agglomerate and the Ether-Chloroform solution to separate to a clear liquid is added, and, after being allowed to stand for 1 hour, a measured quantity of 100 grammes of the clear Ether-Chloroform solution is filtered through a dry, well-covered filter into a flask, and about one-half of the liquid is distilled. The residual liquid in the flask is transferred to a separator, the flask washed with three successive quantities, each of 5 c.c. of Ether, and the alkaloids thoroughly extracted with 12 c.c. of Tenth-normal Volumetric Hydrochloric Acid Solution. When the liquids have completely and clearly separated, and after the addition of sufficient Ether to cause the Ether-Chloroform solution to float on the surface of the acid liquid, the latter is filtered through a

small filter paper moistened with Water into a flask of 100 c.c. capacity. The Ether-Chloroform solution is shaken with three successive quantities, each of 10 c.c. of Water, which are separated and filtered through the same filter, the latter is washed with Water, and the mixed liquids are diluted with Water to 100 c.c. A measured quantity of 50 c.c. is transferred to a white glass-stoppered flask, having a capacity of 200 c.c., mixed with 50 c.c. of Water and sufficient Ether to form a layer of about 1 cm. After the addition of 5 drops of a 1 in 500 solution of Iodeosin in Alcohol (90 p.c.), sufficient Hundredth-normal Volumetric Potassium Hydroxide Solution is added to cause the lower aqueous layer to assume a pale rose-red tint; not more than 20 c.c. of the Hundredth-normal Volumetric Solution should be necessary. The number of c.c. of Hundredth-normal Volumetric Potassium Hydroxide used, divided by 10, the quotient multiplied by 2, the product subtracted from 12, and the remainder, multiplied first by 0·024475, and then by 10, gives the percentage of Ipecacuanha alkaloids present in the sample, using the *German* atomic weights, and the proportions of 3 of Emetine and 1 of Cephaëline. If the mean molecular weights of Emetine and Cephaëline are employed, the factor is 0·024125. No factor is given in the *P.G.*, but if the *P.G.* official limit is calculated with the factor 0·024475, it represents not less than 1·96 p.c. In the process given by Keller, Ammonia Solution is employed for the liberation of the alkaloid, consequently there is not the same liability to the retention of Cephaëline. The detail of the method is as follows:—A weighed quantity of 12 grammes of the powdered Root is shaken in a glass-stoppered bottle with 90 grammes of Ether and 30 grammes of Chloroform. After an interval, 10 c.c. of Ammonia Solution is added, the mixture shaken at intervals for half an hour, and, after the addition of 10 c.c. of Water, it is again shaken for a short time until the powder agglomerates. The clear Ether-Chloroform solution is filtered through a small filter paper, which has been moistened with Ether, and a weighed quantity of 100 grammes is introduced into a separator and shaken with three successive quantities, each of 25, 15, and 10 c.c. of a 1 p.c. Hydrochloric Acid Solution, the shakings being repeated if necessary so long as a few drops of the acid shakings yield a precipitate with Potassio-Mercuric Iodide (Mayer's) Solution. The acid aqueous solutions are separated, mixed, transferred to a separator, made alkaline with Ammonia Solution, and shaken with three successive quantities, each of 50, 30, and 20 c.c., of a mixture of 2 parts by weight of Ether to 3 parts by weight of Chloroform. The Ether-Chloroform solutions are separated in each case, mixed, filtered through a small filter paper moistened with Ether, into a tared flask, the Ether-Chloroform distilled, the residue dried on the water-bath till constant in weight, cooled and weighed. In the event of the titration of the alkaloidal residue being required, it may be dissolved in 5 c.c. of neutral Alcohol (90 p.c.), Water added until the liquid becomes faintly opalescent, and the titration effected with Tenth-normal Volumetric Hydrochloric Acid Solution, using Hæmatoxylin Solution (1 in 500 of Alcohol, 90 p.c.)

as an indicator. Keller states that each c.c. of Volumetric Acid is equivalent to 0·0254 gramme of alkaloids, which agrees with the $C_{30}H_{40}N_2O_5,2HCl$ formula of neutral Emetine Hydrochloride. If the 3:1 ratio of Emetine to Cephaëline factor is used, each c.c. of Tenth-normal Volumetric Acid will be equivalent to 0·024287 gramme of Ipecacuanha alkaloids.

Allen has studied the comparative colour reactions of the Ipecacuanha alkaloids and the Opium alkaloids (*see* also Tinctura Camphoræ Composita), and the results of his experiments are recorded (*Analyst*, '02, 349). The colour tests were made by taking up the alkaloidal solution in a pipette and allowing it to fall drop by drop on to the concave side of a porcelain crucible lid placed on a flask full of boiling Water. To the spot of alkaloidal residue thus obtained a drop of reagent was added by means of a glass rod, and the mixture cautiously stirred. With Ferric Chloride the Ipecacuanha alkaloids gave a blue coloration changing to green, as against a greenish-blue from a residue of Opium alkaloids; Sulphuric Acid containing 0·5 p.c. of Molybdic Acid (Frohde's reagent) gave colours varying from bluish-purple to violet, the colour resembling that given by Opium alkaloids, but not so bright as that yielded by pure Morphine; Starch and Iodic Acid gave, with some specimens of alkaloidal residue, an immediate blue coloration, but a negative or tardy result in other cases; Opium alkaloids gave an immediate blue colour; with Ferric Chloride and Potassium Ferricyanide, both the Ipecacuanha alkaloids and the Opium alkaloids gave an immediate Prussian blue coloration. In some cases the alkaloidal residues were purified by treatment with Lead Acetate. The isolated and purified alkaloids in some instances gave reactions less striking than those obtained with the mixed alkaloidal residue.

For a valuable means of detecting Ipecacuanha alkaloids, *see* Psychotrine, p. 693.

A determination of the total ash of powdered Ipecacuanha is stated (*Proc. Amer. Jour. Pharm.* 51, 771; *P.J.* '03, i. 387) to afford but little clue to the nature of the drug powdered. The presence of more than 1 p.c. of sand generally indicates a dusty or otherwise objectionable root.

### Preparations.

**ACETUM IPECACUANHÆ.** VINEGAR OF IPECACUANHA.

Liquid Extract of Ipecacuanha, 1; Alcohol (90 p.c.), 2; Diluted Acetic Acid, *q.s.* to make 20. (1 in 20)

**Dose.**—10 to 30 minims = 0·6 to 1·8 c.c.

**Tests.**—Vinegar of Ipecacuanha has a sp. gr. of about 0·990; contains about 0·75 p.c. w/v of total solids, about 12·0 p.c. w/v of Absolute Alcohol, and about 3·57 p.c. w/v of absolute Acetic Acid. A measured quantity of 10 c.c. requires about 6 c.c. of Normal Volumetric Sodium Hydroxide Solution for neutralisation, Phenolphthalein Solution being employed as an indicator of neutrality; this corresponding to about 3·57 p.c. w/v of absolute Acetic Acid. It is prepared with the official Fluid Extract, which is required to

contain not less than 2 and not more than 2·25 p.c. w/v of alkaloids; the Vinegar should therefore contain not less than 0·10 p.c. w/v nor more than 0·112 p.c. w/v. No official method of determination is given, but a convenient process has been suggested by Bird. A measured quantity of 100 c.c. is nearly neutralised with Potassium Hydroxide Solution, 2·5 c.c. of Lead Subacetate Solution added, and a few grains of washed Asbestos powder. The mixture is heated on the water-bath until a distinct separation of the precipitate is observed, transferred to a Buchner filter, and filtered under pressure. The nearly dry solid cake remaining on the filter is washed with 30 c.c. of Water, added in small portions at a time, the filtrate and washings are mixed with 25 c.c. of diluted Sulphuric Acid, and the precipitated Lead Sulphate separated by again filtering through a Buchner's filter, and washed with 15 c.c. of Water. 25 c.c. of Chloroform is added to the mixed filtrate and washings, and Ammonia Solution in excess. The flask is corked, agitated vigorously, and the contents transferred to a separator, which is plugged at the neck with a pledget of Cotton-Wool. The chloroformic solution and a portion of the aqueous liquid is forced out of the first separator into a second separator, by means of a pressure ball attached to the former, and the clear chloroformic liquid is separated and transferred to a tared basin or flask. The chloroformic extraction is repeated with four successive quantities, each of 25 c.c. of Chloroform, the aqueous liquid in the second separator being in each instance returned to the first separator previous to the addition of the Chloroform. The mixed chloroformic solutions are evaporated to dryness on a water-bath, the residue dried at a temperature below 80° C. (176° F.) and weighed.

**EXTRACTUM IPECACUANHÆ LIQUIDUM.** LIQUID EXTRACT OF IPECACUANHA.

A Liquid Extract standardised to contain 2 to 2¼ grains of Ipecacuanha alkaloids in 110 minims (2 to 2·25 grammes in 100 c.c.); prepared with Ipecacuanha Root, Calcium Hydroxide, and Alcohol (90 p.c.).

**Dose.**—As an expectorant, ½ to 2 minims = 0·03 to 0·12 c.c.; as an emetic, 15 to 20 minims = 0·9 to 1·2 c.c.

*Swiss*, maximum single dose, 0·05 gramme; maximum daily dose, 0·25 gramme.

**Foreign Pharmacopœias.**—Official in Dan., Swed., Swiss, and U.S., 1 in 1. Belg. (Ipecacuanha Extractum Fluidum Compositum) 3 of Tincture in 10. Fr., Mex. and Span. have solid extract. Swiss contains at least 2 p.c. of alkaloids and U.S. 1·75 p.c.

**Tests.**—Liquid Extract of Ipecacuanha has a sp. gr. of 0·885 to 0·910; contains from 6 to 12 p.c. w/v of total solids and about 78 p.c. w/v of Absolute Alcohol. The Fluid Extract official in the *B.P.* is required to contain not less than 2·0 p.c. w/v and not more than 2·25 p.c. w/v of alkaloids. The *B.P.* states 'alkaloid,' but, inasmuch as it refers immediately above to 'alkaloids,' this may be taken as a printer's error. The essential features of the official method of assay are as follows:—A measured quantity of 20 c.c. of the Fluid Extract is mixed with 20 c.c. of Water and evaporated on a

water-bath until the Alcohol is dissipated. The warm solution is precipitated with Lead Subacetate Solution, and is preferably allowed to remain on the water-bath until the precipitate becomes granular and commences to subside. It is then filtered off, washed with Water, and to the filtrate and washings sufficient Sulphuric Acid is added to precipitate the excess of Lead Subacetate. The precipitate is filtered off, washed with Water, and the mixed filtrate and washings are transferred to a separator. Sufficient Ammonia Solution to form an excess is added, and the liberated alkaloids are extracted by shaking with three successive quantities each of 25 c.c. of Chloroform. The chloroformic layers are removed in each case, mixed, transferred to a tared flask, evaporated on a water-bath, and the residue dried at a temperature below 80° C. (176° F.) till constant in weight, and weighed. This weight multiplied by 5 yields the p.c. w/v of total alkaloids present in the sample. This process has been subjected to severer and more adverse criticism than almost any other assay process in the British Pharmacopœia. The quantity of the Liquid Extract taken for the determination is too large and too wasteful of material. The Lead precipitate is bulky and unmanageable. Its nature renders the washing with Water a lengthy and troublesome operation. The chloroformic liquids have a tendency to obstinately emulsify, and they require a considerable time to separate, and over and above the inaccuracy due to the consequent unavoidable loss of alkaloid is the fact that the alkaloidal residue, when it is finally obtained, is impure.

Several processes of determination have been suggested with a view to devising an expeditious, accurate and readily-conducted method. The process devised by Wilson gives more accurate results than the *B.P.* method, and can, moreover, be almost completed whilst the first *B.P.* Lead precipitate is being filtered and washed. The method has been in general use in the author's laboratory, and has been found expeditious and accurate. Liquid Extracts which contain an exceptional amount of resinous substances are not suitable for assay by this process. In carrying out the process a measured quantity of 20 c.c. of the Liquid Extract is placed in a porcelain basin, diluted with 20 c.c. of Water, evaporated to somewhat less than half its bulk, and allowed to cool. It is mixed with 1 c.c. of dilute Sulphuric Acid, transferred to a separator, the dish washed with 20 c.c. of Water and the mixed liquids shaken with 10 c.c. of a mixture of equal parts of Chloroform and Ether, separation being promoted by gently warming; the Ether-Chloroform layer is separated and the shaking repeated with two successive quantities each of 10 c.c. of a similar mixture, the Ether-Chloroform layers being in each case separated and rejected. An excess of Ammonia Solution is now added and the liberated alkaloids are removed by agitation with 10 c.c. of Ether-Chloroform (equal volumes), the mixture warmed to promote separation, the Ether-Chloroform layer separated, and transferred to a tared flask. The extraction with Ether-Chloroform is repeated with two successive portions each of 10 c.c. of the Ether-Chloroform, the Ether-Chloroform layers being separated in each case as previously, and

transferred to the tared flask. The Ether-Chloroform is removed by distillation, the residue is dried at a temperature below 80° C. (176° F.) until constant in weight, cooled and weighed. It may then be dissolved in a measured quantity of Tenth-normal Volumetric Hydrochloric Acid Solution and the excess of acid titrated with Tenth-normal Volumetric Sodium Hydroxide Solution, using a few drops of a 1 in 500 Iodeosin Solution in Alcohol (90 p.c.) as an indicator of neutrality. The factor to be used in calculating the result of the volumetric determination is discussed under the tests for Ipecacuanha Root. Naylor, in his Presidential address to the British Pharmaceutical Conference on the Standardisation of Galenicals, claims that the process detailed by Naylor and Bryant (*Y.B.P.* '99, 345) and that of Farr and Wright (*Y.B.P.* '99, 340) are the only published methods of assay which in his hands have yielded uniformly accurate results with every type of Liquid Extract. The process which is described in the *Y.B.P.* '99, 345, consists in warming a measured quantity of 10 c.c. of the Liquid Extract in a basin over a water-bath until the Alcohol is dissipated. The residue is transferred to a 50 c.c. flask, the basin rinsed out with successive portions of a mixture of 2 c.c. of Diluted Sulphuric Acid and 30 c.c. of Water. The solution is filtered, and the filter washed with Water until the volume of the filtrate amounts to 50 c.c. A measured quantity of 25 c.c. (= 5 c.c. of the Liquid Extract) is transferred to a separator, the measure washed with Water, and the mixed liquids are shaken with 10 c.c. of Chloroform. The Chloroform layer is separated and rejected, the shaking being repeated with a further quantity of 10 c.c. of Chloroform, and the chloroformic layer again separated and rejected. The aqueous portion is then rendered alkaline with Ammonia Solution and the liberated alkaloids extracted by agitation with three successive quantities each of 10 c.c. of Chloroform. The chloroformic layer is in each case separated, transferred to a tared flask, the mixed chloroformic solutions evaporated to dryness, the residue dried till constant in weight, cooled and weighed. It may then be dissolved in a measured quantity of Tenth-normal Volumetric Hydrochloric Acid Solution and the excess of Volumetric Acid titrated as described above.

Bird is rightly of opinion that whatever the inaccuracies and imperfections of the Pharmacopœia process, the fact remains that it is the standard by which the Liquid Extract must be tested and judged, and in the event of another process being selected it is absolutely essential that the results obtained shall bear a constant relation to the result given by the *B.P.* method and be capable of accurate translation into the official figures. He has devised a process, the details of which are claimed to be quite in accordance with a close interpretation of the *B.P.* A measured quantity of 20 c.c. of the Liquid Extract is mixed with 20 c.c. of Distilled Water and a sufficient quantity of Acetic Acid to ensure a faintly acid reaction. The Alcohol is evaporated off, and 20 c.c. of Water and 10 c.c. of Liquor Plumbi Subacetatis added. The mixture is allowed to remain on the water-bath until the magma which first forms changes to a thin

liquid, and the precipitate assumes a finely granular condition. It is then transferred to a Buchner's funnel and filtered under pressure. The nearly dry solid cake remaining on the filter is washed with 30 c.c. of water added in successive small portions; 25 c.c. of diluted Sulphuric Acid is added to the filtrate and washings, and the precipitated Lead Sulphate removed by filtration on the Buchner's filter under pressure. The cake of Lead Sulphate is washed with 15 c.c. of Water, and to the filtrate and washings 5 c.c. of Chloroform and an excess of Ammonia Solution are added. The flask is cooled, the whole vigorously shaken, and the contents transferred to a separator, the neck of which is plugged with a pledget of Cotton-Wool, and the orifice of which is fitted with a cork and rubber bellows. The Chloroform layer and a portion of the aqueous layer is then forced out of the first separator into a second separator, from which the clear chloroformic layer is drawn off into a tared flask. The aqueous portion of the liquid in the second separator is transferred to the first separator, and the contents of the latter are shaken with two successive quantities, each of 25 c.c. of Chloroform, the chloroformic layers in each case being removed and transferred to the tared flask. The Chloroform is evaporated on a water-bath, the residue dried below 80° C. (176° C.) till constant. The alkaloidal residue is then dissolved in a neutral mixture of 10 c.c. Amyl Alcohol, 10 c.c. of Ether, and 5 c.c. of a saturated Sodium Chloride Solution, and titrated with Tenth-normal Volumetric Acid Solution, using Methyl Orange or Hæmatoxylin Solution as the indicator. The same factor as above mentioned may be employed in calculating the result of the volumetric determination.

The standard originally given for the Root was not less than 2 p.c. of Ipecacuanha alkaloids, whilst that for the Fluid Extract was 1·75 p.c. w/v; the present standard for the Root is 1·75 p.c., for the Fluidextractum 1·5 p.c.

The method adopted by the *U.S.P.* for the determination of the alkaloids is a volumetric one, the essential details being as follows:— The Alcohol is removed from a measured quantity of 10 c.c. of the Fluid Extract by evaporation in a porcelain evaporating basin on a water-bath, 5 c.c. of Normal Volumetric Sulphuric Acid Solution and 20 c.c. of Water being added when almost cool, and the liquid stirred intermittently for 3 minutes. It is filtered into a separator, the dish and filter paper are washed with successive quantities of 10 c.c. and 5 c.c. of Water, the filtrate and washings are rendered alkaline with Ammonia Solution and shaken for 1 minute with 20 c.c. of Ether. The aqueous layer is separated and the extraction of the alkaloids repeated with two successive quantities each of 10 c.c. of Ether, the ethereal solutions being in each case separated and added to the first ethereal solution. The Ether is evaporated at a gentle heat from the mixed ethereal liquids and the alkaloidal residue is dissolved in 10 c.c. of Tenth-normal Volumetric Sulphuric Acid Solution. When completely dissolved 5 drops of Cochineal Solution are added, and the excess of Volumetric Acid Solution is titrated with Fiftieth-normal Volumetric Potassium Hydroxide Solution. The number of c.c.

required is divided by 5, the quotient subtracted from 10, the remainder multiplied first by 0·0238, and then by 10, yields the percentage w/v of Ipecacuanha alkaloids present in the sample. The process has been tried in the author's laboratory, and works very satisfactorily. The separations are clean and sharp, the extracted alkaloids are of good colour, and in the volumetric determination no difficulty exists in determining the end-reaction. Ether being employed as a solvent, the residue consists naturally of Ether-soluble alkaloids only, Psychotrine being insoluble in Ether is not determined. In the case of an official preparation of Rio Ipecacuanha, according to Paul and Cownley the Psychotrine is hardly worth consideration. The process being a volumetric one yields lower results than are obtained by a gravimetric process, but returns the true alkaloidal percentage and not a percentage of alkaloids plus an indefinite amount of inert matter. A sample of *B.P.* Liquid Extract which yielded when examined by the *B.P.* process 2·0 p.c. w/v of total alkaloids, yielded when examined by the *U.S.P.* process 1·67 p.c. w/v of the alkaloids of Ipecacuanha.

The use of Ether, first, in a well-diluted decidedly-acid solution of the Liquid Extract, and then in ammoniacal solution, was suggested by Paul and Cownley, *Y.B.P.* '03, 100.

The Liquid Extract has been stated to deteriorate rapidly in alkaloidal content on keeping. Specimens of Liquid Extract prepared with both Rio and Carthagena Root are stated (*P.J.* '99, ii. 622) to have deteriorated in two months from 2·08 p.c. to 1·528 p.c., indicating a loss of 26·53 p.c. in the case of the Liquid Extract made from the Rio Root, and from 2·1 p.c. to 1·525 p.c. in the case of the Liquid Extract made from the Carthagena Root; the Wine made from the Rio Root from 0·10 p.c. to 0·025 p.c. Deterioration is also stated (*P.J.* '00, i. 8.) to take place in the alkaloidal value of the Liquid Extract and more rapidly in the case of the Wine. On the contrary, it has been stated (*P.J.* '99, ii. 633; '00, i. 54) that there is no reason for such depreciation, and it is shown that samples examined after the lapse of considerable intervals of time showed no depreciation in alkaloidal value. Such a marked depreciation as 26·53 p.c. in alkaloidal strength in two months is regarded (*P.J.* '00, i. 414) as still awaiting explanation, but will probably be found due to the presence of much free alkaloid in alkaline or insufficiently acid solution. From the result of an examination of samples of the Liquid Extract (*C.D.* '02, ii. 290; *P.J.* '02, ii. 134) it appears that the total amount of alkaloids lost during nine months amounted to 5·66 p.c., so that although a depreciation occurs, the amount is very small. The indications are distinctly in favour of loss of alkaloid by precipitation as opposed to loss of alkaloid by decomposition.

**PILULA IPECACUANHÆ CUM SCILLA.** PILL OF IPECACUANHA WITH SQUILL.

Compound Powder of Ipecacuanha, 3; Squill, in powder, 1; Ammoniacum, in powder, 1; Syrup of Glucose, *q.s.*

(about 1 of Opium in 20)

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

**Foreign Pharmacopœias.**—Official in Port., similar to Brit. Not in the others.

A corresponding preparation, Pilula Ipecacuanhæ cum Urginea, is Official in the *Ind.* and *Coll. Add.*, for India and the Eastern Colonies.

**PULVIS IPECACUANHÆ COMPOSITUS.** Compound Powder of Ipecacuanha. *B.P.Syn.*—Dover's Powder.

Ipecacuanha Root, 1; Opium, 1; Potassium Sulphate, 8. All in powder. (1 Opium, 1 Ipecac. in 10)

**Medicinal Properties.**—An admirable diaphoretic and anodyne; it is also most useful in gastric ulceration, dyspeptic vomiting, dysentery and diarrhœa; in the latter case it is combined with Calomel. In doses of 3 or 4 grains it will often relieve heartburn.

**Dose.**—5 to 15 grains = 0·3 to 1 gramme.

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

**Foreign Pharmacopœias.**—Official in all, and is the well-known Dover's Powder; Austr., Belg., Ger., Norw., Russ., Swed. and Swiss (Pulvis Ipecacuanhæ Opiatus); Hung. (Pulvis Doveri); Dan. (Pulv. Ipecac. Thebaicus); Dutch (Pulvis Opii Compositus); Fr. (Poudre d'Ipecacuanha Opiacée); Port. (Po de Ipecacuanha Composto); Jap. (Pulvis Doveri); and U.S. (Pulvis Ipecacuanhæ et Opii), with Milk Sugar; all same strength as Brit.; Span. (Polvo de Ipecacuana Opiado), 1 Opium, 1 Ipecacuanha, in 10; Ital. (Polvere del Dower), Opium 1, Ipecacuanha 1, Liquorice Powder 1, Nitre 2, Potassium Sulphate 2; Mex. (Polvo de Dower), Opium 1, Ipecacuanha 1, Nitre 4, Potassium Sulphate 4.

The *Brussels Conference* agreed for it to contain 10 p.c. of Pulvis Opii.

The original Powder of Dr. Dover was prepared by fusing together 4 parts of Potassium Nitrate with 4 of Potassium Sulphate, and reducing the product to fine powder; to this was added 1 of Ipecacuanha, 1 of Opium and 1 of Liquorice.

**TROCHISCUS IPECACUANHÆ.** Ipecacuanha Lozenge.

$\frac{1}{4}$ grain of Ipecacuanha in each, with Fruit Basis.

**Dose.**—1 to 3 lozenges.

**Foreign Pharmacopœias.**—Official in Austr., Belg. (Tabellæ), Dutch, Fr., Jap., Mex., Port., Russ. and Swiss, 0·01 gramme = about $\frac{1}{6}$ grain; Ital., 0·015 gramme = about $\frac{1}{4}$ grain. Not in the others.

**TROCHISCUS MORPHINÆ ET IPECACUANHÆ.** See p. 787.

**VINUM IPECACUANHÆ.** Ipecacuanha Wine.

Liquid Extract of Ipecacuanha, 1; Sherry, 19. (1 in 20)

**Dose.**—As an expectorant, 10 to 30 minims = 0·6 to 1·8 c.c.; as an emetic, 4 to 6 fl. drm. = 14·2 to 21·4 c.c.

**Foreign Pharmacopœias.**—Official in Swed., Fluid Extract 1, Marsala 10; U.S., Fluid Extract 1, Alcohol (95 p.c.) 1, White Wine 8; Dutch, Ipecacuanha 1, Diluted Spirit 1, Malaga 9; Ger., Jap., Norw. and Russ., 1 of Ipecacuanha and 10 of Sherry; Port., 1 of Ipecacuanha in 20 of Port. Not in the others.

**Tests.**—Ipecacuanha Wine has a sp. gr. of 0·985 to 1·000; contains about 5 p.c. w/v of total solids and about 20 p.c. w/v of Absolute Alcohol. It is prepared with the official Liquid Extract, which is required to contain not less than 2·0 p.c. w/v nor more than 2·25 p.c. w/v of total alkaloids. The Wine should, therefore,

contain not less than 0·1 p.c. w/v nor more than 0·1125 p.c. w/v of total alkaloids. No official method is given for the determination of the alkaloids. A convenient method is that suggested by Bird. A measured quantity of the Wine is mixed with 2·5 c.c. of Lead Subacetate Solution and a few grains of washed asbestos powder. The mixture is heated on a water-bath until a distinct separation of the precipitate occurs and is then filtered under pressure on a Buchner's filter, the process being completed as described in Bird's process for the assay of the Liquid Extract (*Y.B.P.* '99, 347).

The following process has been suggested by Naylor and Bryant:—A measured quantity of 100 c.c is evaporated to one-tenth its volume, a little Kieselguhr stirred in, the mixture transferred to a beaker, and the basin washed with a mixture of 2 c.c. of diluted Sulphuric Acid and 30 c.c. of Water. The solution is then filtered, and Water passed through the filter until the volume measures 50 c.c. A measured quantity of 25 c.c. of the filtrate (=50 c.c. of the Wine) is transferred to a separator and treated as described in Naylor's method for the assay of the Liquid Extract.

**Not Official.**

**ELIXIR IPECACUANHÆ.**—Liquid Extract of Ipecacuanha, 1; Rectified Spirit, 1; Simple Elixir, 1; Glycerin, 5; Water, *q.s.* to produce 20.—*Pharm. Form.*

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

**EXTRACTUM IPECACUANHÆ LIQUIDUM (MISCIBILE).**—Liquid Extract of Ipecacuanha, *B.P.*, 100; Distilled Water, *q.s.* to produce 100 of finished product; Acetic Acid *q.s.*

Mix the Liquid Extract of Ipecacuanha with 100 of Distilled Water, allow to stand in a cool place for 24 hours, filter, washing the residue on the filter paper until colourless, keeping the washings separate, acidify the filtrate with Acetic Acid to a slight acid reaction. Distil on a water-bath until the distillate (as shown by volume and sp. gr.) contains 40 absolute Alcohol. This will generally measure about 52. Reserve this portion of the distillate; continue distillation to recover remaining Alcohol. Evaporate the residue on the water-bath to about 42, allow to cool, pour off the bright liquid, add this to the reserve distillate. Rinse the dish with the washings obtained in the first part of the process, filter, and evaporate to make the total volume 100.—*F. C. J. Bird, C.D.* '99, ii. 220.

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

**GLYCEROLE OF IPECACUANHA.**—Liquid Extract of Ipecacuanha, 100; Distilled Water, 100. Mix as in Miscible Extract, allow to stand, filter, wash the residue, evaporate the washings separately, acidify the filtrate with Acetic Acid to a very faint acid reaction, distil off the Alcohol and evaporate on a water-bath (adding the evaporated washings towards the end) to 50; add Glycerin, 50. (1 in 1)

This forms a clear solution with detannated wine, syrups, or aqueous liquids. It contains the *B.P.* proportion of alkaloid, being the same strength as the Liquid Extract, and for many obvious purposes furnishes a convenient preparation of Ipecacuanha.—*F. C. J. Bird, C.D.* '99, ii. 220.

**Glycerinum Ipecacuanhæ.** *Syn.* Glycerol Ipecacuanhæ.—Vinegar of Ipecacuanha, 50; Glycerin, 50.—*B.P.C.*

This contains $2\frac{1}{2}$ of Liquid Extract in 100, and is, therefore, only $\frac{1}{10}$ of the strength of the above preparation.

**LINCTUS IPECACUANHÆ.**—Vinegar of Ipecacuanha, Syrup of Tolu, Glycerin, Mucilage of Tragacanth, of each equal parts.—*St. Thomas's.*

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

**MISTURA SCILLÆ ET IPECACUANHA** (*see* p. 1065).

**MISTURA IPECACUANHÆ AMMONIATA.**—Ipecacuanha Wine, 10 minims; Ammonium Carbonate, 5 grains; Peppermint Water, to 1 fl. oz.—*St. Mary's.*

**MISTURA IPECACUANHÆ SALINA.**—Ipecacuanha Wine, 6 minims; Spirit of Nitrous Ether, 20 minims; Paregoric Elixir, 20 minims; Solution of Ammonium Acetate, 1 drm.; Water, to 1 fl. oz.—*St. Mary's.*

**MISTURA IPECACUANHÆ CUM SODA.**—Sodium Bicarbonate, 15 grains; Ipecacuanha Wine, 10 minims; Aromatic Spirit of Ammonia, 15 minims; Peppermint Water, to 1 fl. oz.—*St. Thomas's.*

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

**OXYMEL IPECACUANHÆ.**—Liquid Extract of Ipecacuanha, 2·50; Oxymel, *q.s.* to produce 100.—*B.P.C.*

**PILULA IPECACUANHÆ CUM URGINEA.**—Compound Powder of Ipecacuanha, 3; Urginea, dried and in powder, 1; Ammoniacum, in powder, 1; Syrup of Glucose *q.s.* Dose.—4 to 8 grains. This Pill contains about 5 p.c. of Opium.—*Ind.* and *Col. Add.*

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

**SYRUPUS IPECACUANHÆ ACETICUS.**—Vinegar of Ipecacuanha, 20 fl. oz.; Refined Sugar, 36 oz.—*B.P.C. Formulary* 1901, incorporated in the *B.P.C.* under the title of **Syrupus Ipecacuanhæ.** Altered in the *B.P.C. Supplement* to 75 of refined sugar dissolved in 50 of Vinegar of Ipecacuanha, adding sufficient Distilled Water to produce 100.

**Dose.**—15 to 120 minims = 0·9 to 7·1 c.c.

**Syrupus Ipecacuanhæ.**—Tincture of Ipecacuanha, 1; Simple Syrup, 9.—Austr., Dutch, Jap., Span. and Swiss.

Belg.—Tincture of Ipecacuanha, 1; Simple Syrup, 10; evaporated to 10: also Ipecacuanha Syrupus Compositus. Compound Fluid Extract, 1; Simple Syrup, 20.

U.S.—Fluid Extract of Ipecacuanha, 7; Acetic Acid, 1; Glycerin, 10; Sugar, 70; Water, to 100.

Ger. and Hung.—Bruised Ipecacuanha, 1; Alcohol (90 p.c.), 5; Water, 40; digest 48 hours, filter, and to 40 of filtrate add 60 of Sugar, and dissolve to make 100 of Syrup.

Fr.—Alcoholic Extract of Ipecacuanha, 1; Alcohol (70°), 3; Simple Syrup 100. Fr. has also a Compound Syrup.

Mex.—Ipecacuanha, 1; Alcohol (60 p.c.), 4; Simple Syrup, 95.

All by weight except U.S.

The *Brussels Conference* agreed that the Syrup should be prepared with 10 p.c. of the tincture.

**TINCTURA IPECACUANHÆ.**—Bruised Ipecacuanha, 1; Alcohol (60 p.c.), 10.

**Foreign Pharmacopœias.**—Official in Austr., Belg., Dutch, Fr., Span. and Swiss, 1 in 10; Jap., 1 and 10; Hung., Mex. and Port., 1 in 5. All by weight. Not in the others.

Austr., Belg., Jap. and Swiss at least 0·2 p.c. of alkaloids.

The *Brussels Conference* agreed to a strength of 10 p.c. for the Tincture prepared by percolation with Alcohol (70 p.c.).

**TINCTURA IPECACUANHÆ ET OPII.** *Syn.* Fluid Dover's Powder.—Tincture of Deodorised Opium, 100; Fluid Extract of Ipecac., 10; Alcohol (49 p.c.), *q.s.* to produce 100. Evaporate the Tincture of Deodorised Opium in a tared dish on a water-bath until it weighs 80; when cold, add the Fluid Extract of Ipecac., filter, and pass enough Alcohol (49 p.c.) through the filter to make 100. Average Dose.—8 minims (0·50 c.c.).—*U.S.P.*

This has been incorporated in the *B.P.C.*, employing Extractum Ipecacuanhæ Liquidum, *B.P.*, and Alcohol (60 p.c.).

**EMETINA.** $C_{15}H_{22}NO_2$, eq. 245·35 or $C_{30}H_{44}N_2O_4$, 490·70.—A colourless amorphous base present in varying amount in Brazilian, Columbian and Indian Ipecacuanha Root, as given under Ipecacuanha. On exposure to light it rapidly

acquires a yellow colour. It is readily soluble in Alcohol, Ether, Chloroform and Benzene; but sparingly in Water.

The chief salts for medicinal purposes are the Hydrochloride and Hydrobromide.

The name 'Emetine' used to be applied to an impure extractive, containing the mixed alkaloids of Ipecacuanha, which is now listed as **Emetine (impure)** or **Emetine (extract)**.

**Tests.**—Emetine melts at about 68° C. (154·4° F.). It is strongly alkaline in reaction towards Litmus, and neutralises acids completely, forming salts which are neutral in reaction towards the ordinary indicators of neutrality. It may therefore be readily determined by titration with Normal Volumetric Hydrochloric Acid Solution, using either Methyl Orange Solution or Iodeosin Solution as an indicator. 1 c.c. of Normal Volumetric Hydrochloric Acid Solution is equivalent to 0·24535 gramme of Emetine. When precipitated from the solution of one of its salts by Potassium or Sodium Hydroxide Solution, Emetine is insoluble in an excess of the reagent. This test distinguishes Emetine from Cephaëline. When dissolved in sufficient Hydrochloric Acid to effect solution and to show a slight excess, it yields, with Platinum Chloride Solution, a buff-coloured amorphous precipitate, almost insoluble in Water or Alcohol. According to Allen (*Analyst*, xxvii. 349), it yields with Ferric Chloride an indefinite colour reaction, with Sulphuric Acid containing 0·5 p.c. w/v of Molybdic Acid (Frohde's reagent), a dirty green coloration, if obtained from Rio Ipecacuanha, and a bluish coloration if obtained from Carthagena root; with Frohde's reagent and Hydrochloric Acid a grass-green coloration, with Starch and Iodic Acid, a negative reaction, and with Ferric Chloride and Potassium Ferricyanide a gradual blue coloration. It should leave no residue when ignited with free access of air.

**EMETINÆ HYDROBROMIDUM.** $C_{15}H_{22}NO_2$, HBr, 2 $H_2O$, eq. 362·46.—Crystallises from Water in beautiful silky tufts of needles. Although readily soluble in Water, it is much less soluble than the Hydrochloride, difficultly so in Absolute Alcohol or in Chloroform. The commercial salt contains 67·95 p.c. of alkaloid. It is rendered anhydrous at 100° C. (212° F.).

**Tests.**—Emetine Hydrobromide dissolves in Water. The solution yields on the addition of Potassium or Sodium Hydroxide Solution a precipitate insoluble in excess of the reagent. It yields when faintly acidified with Nitric Acid a yellowish-white curdy precipitate, which when washed is almost insoluble in Ammonia Water and in Nitric Acid, but is readily dissolved by Potassium Cyanide Solution; on the cautious addition of a drop or two of Chlorine Water to the aqueous solution, it yields a yellowish coloration, and if the liquid be shaken with a few c.c. of Chloroform the yellowish coloration passes into the chloroformic layer. The separated alkaloid should answer the tests distinctive of Emetine given under Emetina. It should leave no residue when ignited with free access of air.

**EMETINÆ HYDROCHLORIDUM.**—Crystallises from Water in radiating groups of silky filaments. Very soluble in Water, and in Alcohol. Dried at 100° C. the salt is rendered anhydrous, and then has the composition $C_{15}H_{22}NO_2HCl$, eq. 282·54. When crystallised from an acid solution $C_{15}H_{22}NO_2$, HCl, $3H_2O$, eq. 336·18. Both salts are permanent, undergoing no alteration in colour after being kept for some months.

**Medicinal Properties.**—A powerful emetic and expectorant. For all the uses of Ipecacuanha where vomiting is not desired, Emetine in small doses seems likely to prove of considerable value; also as an emetic in larger doses of from $\frac{1}{6}$ to $\frac{1}{3}$ grain when a more depressing action is required. The powerful local constricting effect upon blood vessels may also prove useful in hyperæmic and inflammatory conditions. The emetic dose of Emetine is about double that of Cephaëline. Emetine caused a flow of watery mucus from the nasal mucous membrane when a full dose was given; this was not noticed after Cephaëline.—*L.* '95, ii. 1276; *P.J.* '95, ii. 435.

A further communication (*B.M.J.E.* '05, i. 19) on these interesting alkaliods shows that qualitatively the action of Cephaëline is the more intense. As expectorants the alkaloids rank with Senega and Squills.

**Dose.**—$\frac{1}{200}$ to $\frac{1}{50}$ grain = 0·0003 to 0·0013 gramme, as an expectorant; $\frac{1}{10}$ to $\frac{1}{3}$ grain = 0·0067 to 0·022 gramme, as an emetic.

**Tests.**—Emetine Hydrochloride dissolves readily in Water. The solution yields the distinctive tests with Potassium or Sodium Hydroxide Solution given under Emetinæ Hydrobromidum. The separated alkaloid should conform to the distinctive tests given under Emetina. The aqueous solution faintly acidified with Nitric Acid yields with Silver Nitrate Solution a white curdy precipitate, insoluble in Nitric Acid, but which, when washed, is soluble in Ammonia Solution and Potassium Cyanide Solution. The salt should leave no weighable residue when ignited with free access of air.

**VINUM EMETINÆ.**—This wine should contain $3\frac{1}{2}$ grains of Emetine Hydrochloride in 8 fl. oz. to be equal to Vinum Ipecacuanhæ, *B.P.*

**CEPHAËLINE.**—$C_{14}H_{20}NO_2$, eq. 232·44 or $C_{28}H_{40}N_2O_4$ 464·88, the alkaloid discovered by Paul and Cownley in both Brazilian and Columbian Ipecacuanha.

Colourless, crystallisable alkaloid which, like Emetine, is rapidly coloured by exposure to light. It is readily soluble in alcohol and in alkali Hydroxides; much less soluble in Ether than Emetine. It forms crystalline salts with acids.

The *B.P. Codex* differs from Paul and Cownley in stating that Cephaëline is more soluble in Ether than Emetine.

**Tests.**—Cephaëline, when crystallised from its concentrated solution in Ether in the presence of Water, melts at 96° to 98° C. (204·8° to 208·4° F.); when crystallised by the addition of Ammonia to a salt in the presence of Ether it melts at 102° C. (215·6° F.). It neutralises acids with the formation of salts which are neutral in reaction towards the ordinary indicators of neutrality. It may therefore be titrated with Normal Volumetric Hydrochloric Acid Solution, using either Methyl Orange, Hæmatoxylin or Iodeosin Solution as an indicator. 1 c.c. of Normal Volumetric Hydrochloric Acid Solution is equivalent to 0·23244 gramme of Cephaëline. Allen (*Analyst*, xxvii. 345) gives the following colour reactions for Cephaëline:—With Ferric Chloride, Cephaëline from Rio Ipecacuanha gives a bluish-green coloration, the alkaloid from Carthagena Ipecacuanha gives an indefinite reaction, with Sulphuric Acid containing 0·5 p.c. of Molybdic Acid (Frohde's reagent), Cephaëline from the Rio root gives a pink colour changing to green, that from the Carthagena root a reddish-purple colour; with Frohde's reagent and Hydrochloric Acid a Prussian blue colour; with Starch and Iodic Acid a negative reaction; with Ferric Chloride and Potassium Ferricyanide, Cephaëline from Rio root gives an almost immediate blue coloration, whilst that from Carthagena root yields an immediate blue.

**CEPHAËLINE HYDROCHLORIDE.**—Readily soluble in Water. In the dry state it has the formula $C_{14}H_{20}NO_2HCl$, eq. 268·63, but when crystallising from a slightly acid solution, it approximates to $C_{14}H_{20}NO_2HCl, 3H_2O$, eq. 322·27.

**Medicinal Properties.**—Cephaëline is more powerfully emetic than Emetine, and does not produce depressing effects in doses of $\frac{1}{12}$ to $\frac{1}{6}$ grain = 0·005 to 0·01 gramme, but is slow in action.—*L.* '95, ii. 1274.

**Tests.**—Cephaëline Hydrochloride dissolves readily in Water. The separated alkaloid should yield the distinctive tests given under Cephaëline. The aqueous solution faintly acidified with diluted Nitric Acid yields on the addition of Silver Nitrate Solution a white curdy precipitate, insoluble in Nitric Acid and, when washed, soluble in Ammonia Solution and in Potassium Cyanide Solution. The salt should leave no weighable residue when ignited with free access of air.

**PSYCHOTRINE.**—Pale lemon-yellow coloured, well-defined transparent prisms. Insoluble in Water, readily soluble in Alcohol or in Chloroform, the solutions becoming dark-coloured on exposure to light, and depositing a dark brown substance.

**Tests.**—Psychotrine melts at 138° C. (280·4° F.). It combines with acids to form salts which are neutral in reaction towards the ordinary indicators of neutrality. It may therefore be determined by titration with Normal Volumetric Hydrochloric Acid Solution, using either Methyl Orange, or Iodeosin Solution as an indicator. It appears to have a much higher molecular weight than either Emetine or Cephaëline.

According to Allen (*Analyst*, xxvii. 349), Pyschotrine gives the following colour reactions:—With Ferric Chloride the alkaloid from Rio root gives a pale cherry-red coloration, that from Carthagena root an indefinite reaction; with Sulphuric Acid containing 0·5 p.c. of Molybdic Acid (Frohde's reagent), Cephaëline from Rio root gives a pale pink coloration, that from Carthagena root a dull purple; with Frohde's reagent and Hydrochloric Acid the alkaloid from either variety gives a pale pink changing to pale green; with Starch and Iodic Acid a blue coloration is produced, the colour being more marked in the case of the alkaloid from Rio root than with that from Columbian root; with Ferric Chloride and Potassium Ferricyanide, the Psychotrine from either variety of root gives an immediate blue coloration. The most valuable means of detecting Ipecacuanha alkaloids consists in the production of Cephaëline in a crystalline form. It is readily obtained by shaking out an Amyl Alcohol or Chloroform solution of the alkaloid with a little dilute Acetic Acid. The acid liquids separated, concentrated, if necessary, and placed on a microscope slide furnished with a cell. A watch-glass or small beaker moistened with Ammonia Solution is inverted over the alkaloidal Acetate solution, when the absorbed Ammonia vapour liberates the alkaloid in characteristic crystals, which can be observed under the microscope.

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**Not Official.**

## IRIS.

The Rhizome and Roots of *Iris versicolor*, L.

**Medicinal Properties.**—The preparations **Iridin** and **Extractum Iridis** are purgative and diuretic. Emetic and cathartic in large doses. Used in biliousness, torpid liver and duodenal dyspepsia.

**IRIDIN.**—A dark brown powder, obtained from Iris.

**Dose.**—1 to 5 grains = 0·065 to 0·32 gramme. Given in **pill** with Extract of Henbane, but more usually combined also with Euonymin and other cholagogues.

'Diluted Glucose' is a good excipient for Iridin.

It has been known for many years as an eclectic remedy, under the names Iridin and Irisin.

**Extractum Iridis** of pilular consistence prepared with Alcohol (94 p.c.) was Official in *U.S.P.*, 1890, but was omitted in 1900, and a powdered extract prepared with Alcohol (60 p.c.) was included in *B.P.C. Formulary* 1901, with the synonym **Iridin**; this has been incorporated in the *B.P.C.*

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**Not Official.**

## ISPAGHULA.

The dried Seeds of *Plantago ovata*, Forsk.

Demulcent, and mildly astringent. They are given (whole) in protracted diarrhœa in India. In their passage through the alimentary canal they absorb Water, swell up and yield a bland demulcent mucilage. Official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

**Dose.**—50 to 150 grains = 3·2 to 10 grammes.

**DECOCTUM ISPAGHULÆ.**—Boil 120 grains of bruised Ispaghula with 24 fl. oz. of Distilled Water for 10 minutes, strain, and make up to 20 fl. oz. by rinsing contents of strainer with more of the Water, if necessary.

**Dose.**—½ to 2 fl. oz. = 14·2 to 56·8 c.c.

This is official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies. It has been incorporated in the *B.P.C.*

Not Official.

## IZAL.

A distilled product from coke, introduced as a non-poisonous disinfectant, and sold in three forms: (1) medical Izal; (2) an emulsion containing 40 p.c. of the refined oil; (3) ordinary Izal, an emulsion containing 40 p.c. of unrefined oil.

Izal in the treatment of phthisis. 10 minims = 0·6 c.c., mixed with Cod-liver Oil given internally, and as an inhalation by evaporation at the bedside, and as a solution in paroleine used as a spray.—*L.* '02, i. 146.

Intra-tracheal injection of Izal Oil in phthisis, 60 minims of a 10 p.c. solution of Izal Oil in Glycerin.—*B.M.J.* '02, i. 479; *Trans. Brit. Cong. Tub.*, iii. 413; also Izal, 20 minims in Glycerin, 1 oz.; with occasionally 10 minims Guaiacol added.—*B.M.J.* '03, i. 545.

Recommended (*B.M.J.* '04, ii. 1520) in the treatment of ringworm, the pure Izal being well rubbed into the scalp.

In dysentery.—*I.M.G.* '05, ii. 261. From 1 to 2 drm. in a pint of Water at 100–104° F. (37·7 to 40° C.). From 1 to 2 pints of the solution are run into the large gut, the injection being retained from 10 to 15 minutes. The treatment should be carried out twice daily in acute cases and once in subacute and chronic cases. Fifteen to 25 minims six or seven times a day in dysentery (*I.M.G.* '05, ii. 281), the drug being made up with Chloric Ether, Cardamoms and Glycerin or with Spirits of Chloroform and Peppermint.

**Izal Oil** as an intestinal disinfectant, given in doses of 1 to 3 capsules containing 2 minims = 0·12 c.c. of Izal Oil in each.

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# JABORANDI FOLIA.

JABORANDI LEAVES.

The dried Leaflets of *Pilocarpus Jaborandi*, Holmes.

The Jaborandi Leaves of commerce have been very variable, and are the produce of different varieties of Pilocarpus.

The principal alkaloid is Pilocarpine, a syrupy liquid, forming crystalline salts, the Hydrochloride and Nitrate are most used, *see* pp. 893, 895. They also contain Isopilocarpine, which possesses similar but weaker properties, and from 0·2 p.c. to 1·1 p.c. of an ethereal oil. Pilocarpine and Isopilocarpine are isomeric. The *B.P.* does not require the leaves to conform to any definite alkaloidal standard. They vary considerably in the amount of Pilocarpine they contain, generally about 0·5 p.c. It is still an open question whether in the present state of our knowledge of the alkaloids, the standardisation can be justified. Jowett (*Y.B.P.* '99, 435; *C.D.* '99, i. 203) is of opinion that it is possible to determine the amount of alkaloid with a fair degree of accuracy. The information is, however, of little value, for it gives no indication of the amount of Pilocarpine contained in the total alkaloids, and it must be assumed that on the Pilocarpine alone depends the therapeutic value of the preparation.

It has been recommended that, if the drug is retained, *Pilocarpus microphyllus* should be substituted for the present official variety, and that the galenical preparations be standardised. The limit suggested for the leaves is 0·5 to 0·75 p.c. of total alkaloid. The ratio of Pilocarpine to other alkaloids appears to be practically constant in this variety.

The Leaflets of *Pilocarpus Jaborandi*, Holmes, and of *Pilocarpus microphyllus*, Stapf, are official in the *U.S.P.*, and are required to yield not less than 0·5 p.c. of alkaloids.

**Jaborine is a mixture of Pilocarpine, Isopilocarpine, and, possibly, a trace of Pilocarpidine, with a trace of colouring matter.**

**Medicinal Properties.**—Powerful and prompt diaphoretic, sialagogue, and galactagogue. Useful in the dropsy, uræmia and thirst of Bright's disease. It is antagonistic in its action to Belladonna. The salts of Pilocarpine, owing to their more constant action, are more generally used than the galenical preparations of Jaborandi. *See* also Pilocarpinæ Nitras.

**Official Preparations.**—Extractum Jaborandi Liquidum and Tinctura Jaborandi. Used in the preparation of Pilocarpinæ Nitras.

**Foreign Pharmacopœias.**—Official in Austr., Belg., Fr., Ger., Ital., Jap., Mex., Port., Span. and Swiss; U.S. (Pilocarpus). Not in the others.

**Descriptive Notes.**—The Leaves of *Pilocarpus Jaborandi*, Holmes, official in the *B.P.*, are no longer obtainable in commerce. They are described as dull green, oval oblong or oblong lanceolate, from 2½ to 4 in. (6 to 10 cm.) in length (8 to 16, mostly 12, cm., *P.G.*), 12 cm. long and 3 to 4 in. broad, *U.S.P.*), obtuse and emarginate at the apex, and unequal and shortly petiolate at the base, with an entire, slightly revolute margin, of a coriaceous texture, glabrous, or with a few scattered hairs on the under surface, and with the lateral veinlets distinctly prominent on the upper surface, containing numerous oil glands, and having an aromatic odour, pungent taste, and increasing the flow of saliva when chewed.

The Leaves which are now in commerce are those of *Pilocarpus pennatifolius*, Lem., from Paraguay, which are very similar in size and shape, but have a greyish-green colour, the lateral veinlets are scarcely prominent on the upper surface, and the base of the leaf is usually equal and tapering. The leaves of *P. trachylophus*, Holmes, are similar in shape to those of *P. Jaborandi*, but rather smaller, with prominent veins on the upper surface and revolute margins, but are of a brownish-green tint, and covered on the under surface with curved simple hairs, and there are usually only two pairs of leaflets on the leaves besides the terminal one, whereas in *P. Jaborandi* and *P. pennatifolius* there are three or four pairs. The leaflets of *Pilocarpus microphyllus*, Staff., are very much smaller (1·2 to 3·7 cm. long, 0·8 to 1·6 cm. broad, *U.S.P.*), the lateral ones sessile, rhomboid oval, or obovate obtuse and emarginate, with pellucid glands, veins coarsely reticulated, but not very prominent, almost odourless, but resemble Jaborandi in taste. These leaves contain about the same quantity of Pilocarpine as those of *P. Jaborandi*, and are largely used for the preparation of the alkaloid; they are the only kind that can replace the official leaves of the *B.P.* so as to give a preparation of equal strength. Unfortunately, there is a spurious leaf very like it offered in the market at intervals, derived from *Swartzia decipiens*, Holmes, a leguminous plant, not possessing the properties of Jaborandi. These may be distinguished by having very short hairy stalks about 1 mm. long, by the veinlets being more or less translucent, and by the presence of smaller rounded leaflets mixed with the ovate or oval leaflets. *See P.J.* (4) iii. 2. Other varieties of Jaborandi which have appeared in the market, but not regularly, are described in *P.J.* (4) i. 501,

(4) xvii. 713. The last, which comes from Guadaloupe, contains as much Pilocarpine as the Paraguay Jaborandi. It is derived from *Pilocarpus racemosus*, Vahl. It has larger, broader, and somewhat obovate leaves. The *P.G.* gives as a distinguishing feature of Jaborandi Leaves that the palisade cells should be about one-fifth of the thickness of the leaf. In powder, Jaborandi may be recognised by polygonal epidermal cells with a strongly striated cuticle, thick-walled bast fibres, one-celled hairs, seriate cluster crystals and the palisade cells. The epidermal cells of *Swartzia decipiens* are very sinuous, and there are pluri-cellular hairs, the terminal cells being largest, on the nerves. Recently the leaves of a species of *Casearia*, Nat. Ord. Samydaceæ, have been offered as Jaborandi. They are oblong, elliptic, tapering towards both ends, thinner, and have linear, as well as round, oil receptacles in the leaves.

**Tests.**—The method adopted by the *U.S.P.* for the assay of the Leaves is essentially as follows:—A weighed quantity of 10 grammes of the Leaves in No. 60 powder is moistened with 2 c.c. of Ammonia Solution and 3 c.c. of Chloroform, and packed firmly in a small cylindrical percolator provided with a pledget of cotton-wool firmly packed in the neck, and slowly percolated with Chloroform containing about 2 p.c. of Ammonia Solution, until exhausted, about 100 c.c. usually being sufficient. The percolate is transferred to a separator, and the alkaloids removed by shaking with 15 c.c. of Normal Volumetric Sulphuric Acid Solution, the acid liquid being separated and transferred to a second separator, the extraction of the alkaloidal residue being continued with a second quantity of a mixture of 2 c.c. of Normal Volumetric Sulphuric Acid Solution and 8 c.c. of Water, followed by 10 c.c. of Water, the aqueous acid portion and the aqueous portion being separated in each instance and transferred to the second separator. After the addition of sufficient Ammonia Solution to render the liquid alkaline, the liberated alkaloids are extracted by shaking with three successive quantities of 20 c.c., 15 c.c. and 10 c.c. of Chloroform, the chloroformic solution separated in each instance, transferred to a beaker or flask, the Chloroform evaporated at a gentle heat, the alkaloidal residue dissolved in 7 c.c. of Tenth-normal Volumetric Sulphuric Acid Solution and the excess titrated with Fiftieth-normal Volumetric Potassium Hydroxide Solution, using Cochineal or Iodeosin Solution as an indicator of neutrality. The number of c.c. of Fiftieth-normal Volumetric Potassium Hydroxide Solution used divided by 5, the quotient subtracted from 7, the remainder multiplied first by 0·02 and then by 10, yields the percentage of total alkaloids in terms of Pilocarpine present in the sample. The Leaves yield from 1 to 7 p.c. of ash.

### Preparations.

**EXTRACTUM JABORANDI LIQUIDUM.** Liquid Extract of Jaborandi.

20 of Jaborandi Leaves, in No. 20 powder, percolated with Alcohol (45 p.c.), until 67 volumes have been obtained. Reserve the

first 17 and evaporate the remainder to a soft extract, which is dissolved in the first portion and made up with Alcohol (45 p.c.) to 20. (1 in 1)

The Liquid Extract of Jaborandi official in the *B.P.* is not a standardised preparation, though it has been recommended that, if retained, it should be standardised and a method of assay given. The *U.S.P.* Fluid Extract is required to contain 0·4 p.c. w/v of the alkaloids from Pilocarpus. The *P.G.* does not include a Fluid Extract.

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

**Foreign Pharmacopœias.**—official in U.S., Fluidextractum Pilocarpi, 1 in 1 and standardised; *B.P.* '85 had a solid **Extractum Jaborandi** prepared with Alcohol (57 p.c.), and *B.P.C.* have adopted this, using Alcohol (60 p.c.); *B.P.C.* have also **Infusum Jaborandi,** 1 in 20 of boiling Water, infused 15 minutes. Not in the others.

**Tests.**—Liquid Extract of Jaborandi has a sp. gr. of 1·010 to 1·040; contains from 12·0 to 22·0 p.c. w/v of total solids; and about 34 p.c. w/v of Absolute Alcohol. As mentioned above, the official preparation is not standardised, and no method is given for the determination of the total alkaloids. It may be conveniently assayed by the method suggested by Farr and Wright (*Y.B.P.* '99, 381; *C.D.* '99, ii. 205). A measured quantity of 10 c.c. is acidified with dilute Sulphuric Acid and evaporated on a water-bath to a syrupy consistence, 30 c.c. of Alcohol (90 p.c.) added, and the mixture well stirred and allowed to stand for an hour. The liquid portion is then separated by decantation or filtration, the mucilaginous deposit dissolved in a little acidulated Water, and the treatment with Alcohol repeated. The dish and filter are rinsed with a little Alcohol, the filtrates and rinsings bulked and evaporated over a water-bath, Water being added from time to time until all the Alcohol has been removed. The residual liquor is transferred to a separator, the dish washed with a few drops of Water, and the whole rendered alkaline with Ammonia Solution. The liberated alkaloids are shaken out with two successive quantities, each of 15 c.c., of Chloroform, the chloroformic solutions are separated in each case, mixed, and the alkaloids extracted by shaking with three successive quantities of 9 c.c. each of a mixture of 25 c.c. of Water and 2 c.c. of Semi-normal Volumetric Sulphuric Acid Solution. The acid solutions are separated in each case, mixed, rendered alkaline with Ammonia Solution, and the liberated alkaloids shaken out with two successive quantities each of 15 c.c. of Chloroform. The chloroformic layer is separated in each case, the liquids mixed, the Chloroform evaporated over a water-bath, the alkaloids dried and weighed. The residue is dissolved in a little Alcohol (90 p.c.), a calculated excess of Tenth-normal Volumetric Hydrochloric Acid Solution and some Water added, and the excess of Volumetric Acid titrated with Twentieth-normal Volumetric Sodium Hydroxide Solution, using Cochineal Solution as an indicator of neutrality. Specimens of the Liquid Extract examined in the author's laboratory by the above process gave gravimetrically 0·2, 0·39, and 0·26 p.c. w/v of total alkaloids, the volumetric determination giving 0·14, 0·3, and 0·16 p.c. w/v. In performing the volumetric determination, a small

deviation was made from Farr and Wright's method. The alkaloidal residue was dissolved in a measured excess of Tenth-normal Volumetric Hydrochloric Acid Solution, and the excess of Volumetric Acid determined by titration with Hundredth-normal Volumetric Sodium Hydroxide Solution, using Iodeosin Solution as an indicator of neutrality. Farr and Wright, in the examination of 12 specimens of the Liquid Extracts, found from 0·03 p.c. w/v to 0·24 p.c. w/v, and an average of 0·15 p.c. w/v of total alkaloids.

The method of determination adopted by the *U.S.P.* is essentially as follows:—A measured quantity of 10 c.c. is dropped on to a little clean sand, contained in a porcelain evaporating basin, and evaporated to dryness on a water-bath. The extract is mixed uniformly with the sand, transferred to an Erlenmeyer flask, the dish rinsed with a mixture of 25 c.c. of Chloroform and 2½ c.c. of Ammonia Solution, which is transferred to the flask, and the whole well shaken at intervals for an hour. The liquid is decanted into a separator, the residue washed with several portions of Chloroform, which are drawn off and filtered into the separator. The alkaloids are extracted from the chloroformic solution by shaking first with 15 c.c. of Normal Volumetric Sulphuric Acid Solution, then with a mixture of 5 c.c. of a similar Volumetric Acid solution and 5 c.c. of Water, and finally with 10 c.c. of Water. The acid, acid and aqueous, and aqueous shakings are separated, transferred to a second separator, rendered alkaline with Ammonia Solution, and the liberated alkaloids shaken out with three successive quantities of 20 c.c., 15 c.c., and 10 c.c. each of Chloroform. The chloroformic layer is separated in each case, the chloroformic solutions mixed, the Chloroform evaporated on a water-bath, and the alkaloidal residue is dissolved in 8 c.c. of Tenth-normal Volumetric Sulphuric Acid, the excess of Volumetric Acid being titrated with Fiftieth-normal Volumetric Potassium Hydroxide Solution. The number of c.c. required divided by 5, the quotient subtracted from 8, and the remainder multiplied first by 0·02 and then by 10, yields the percentage w/v of total alkaloids in terms of Pilocarpine present in the Fluid Extract. It may be noticed in this instance that an error appeared in the *U.S.P.*, 5 c.c. was mentioned as the quantity of Tenth-normal Volumetric Sulphuric Acid Solution to be used in dissolving the alkaloidal residue, whereas in the subsequent calculation of the volumetric result, the quotient obtained by dividing the number of c.c. of excess Fiftieth-normal Volumetric Potassium Hydroxide Solution 5, was directed to be subtracted from 8. This was corrected in the Additions and Corrections (1907).

In criticising a paper on standards of medicines, Jowett (*P.J.* '02, ii. 672) states that he, in conjunction with Professor Marshall, has shown, he trusts conclusively, that the galenical preparations of Jaborandi were unreliable, and, furthermore, unnecessary, as the whole therapeutic activity of Jaborandi Leaves can be obtained by Pilocarpine, which might, therefore, be used in place of any galenical preparation. They show the fallacy of attempting to standardise the Liquid Extract on a percentage of total alkaloids. Of two specimens of Liquid Extract yielding 0·21 p.c. and 0·25 p.c. of total alkaloid respectively, one

yielded no crystalline Pilocarpine Nitrate and the other 0·082 p.c. They claim that Pilocarpine Nitrate should be the official salt and all galenical preparations of Jaborandi abandoned.

Farr and Wright (*P.J.* '03, i. 9) do not admit Jowett's conclusions, and consider that they are not justified by the facts recorded in the paper referred to in his letter. The titration figures of the alkaloidal residues obtained in their research based on the molecular weight of Pilocarpine, were in close accord with the gravimetric results showing that the alkaloid was practically pure. They consider there is absolutely nothing in Jowett and Marshall's work to show that any one of the four samples of Liquid Extract used for the physiological experiments was the official article. Judging from the fact that two of them apparently contained little or no Pilocarpine, and the other two quite trifling proportions, it is tolerably certain that they were commercial products of a spurious Jaborandi, and not of the official variety. So long as the demand for galenicals exists, so long will standardisation be required. For the great majority of preparations of alkaloidal drugs the best, because the most natural standard, is one of total alkaloids. Jowett in reply (*P.J.* '03, i. 41) shows that the case for the expulsion of galenical preparations of Jaborandi does not rest only on two assumptions, but points out that the physiological action of Jaborandi is fully produced by pure Pilocarpine, the purity being assured by constancy of the m.p. and specific rotation after repeated crystallisation. Farr and Wright's statement that the titration figures based on the molecular weight of Pilocarpine were in close accord with the gravimetric results, showing that the alkaloid was practically pure, indicate that they ignore the existence of Isopilocarpine as well as that of Pilocarpidine. Isopilocarpine, although isomeric with Pilocarpine, possesses but one-eighth of the physiological activity of the latter, and would give precisely the same figures on titration. The alkaloid which Farr and Wright assume to have been practically pure might, therefore, from their results, have consisted entirely of Isopilocarpine and contained no Pilocarpine. With regard to the Liquid Extracts, the four preparations were guaranteed as such by three prominent wholesale druggists, and such as would be largely distributed to the pharmacists of this country. The object was to determine the therapeutic value of the preparations of Jaborandi such as would be used in dispensing, for which purpose the specimens referred to were purchased from three manufacturing houses of the highest repute.

Farr and Wright (*P.J.* '03, i. 71) still maintain that, as isolated by the process employed by them, the total alkaloids consist of almost pure Pilocarpine. They consider that the proportion of alkaloid, other than Pilocarpine is so small that it may be safely ignored, and quote the results of Jowett's examination of the genuine drug. With regard to the galenical preparations, they think that the explanations given in his letter have not improved his position. It is certain that the official Jaborandi is an exceedingly active drug, and equally certain that the same degree of activity will be manifested by a Liquid Extract if carefully prepared. They repeat that the research

does not justify the wholesale denunciation of the galenical preparations of the official drug.

**TINCTURA JABORANDI.** TINCTURE OF JABORANDI.

4 Jaborandi Leaves, in No. 40 powder, percolated with Alcohol (45 p.c.), to yield 20.

The Official Tincture is not a standardised preparation. The *U.S.P.* does not include a Tincture.

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

**Foreign Pharmacopœias.**—Official in Fr. and Mex., 1 in 5; Span., 1 in 10. Not in the others.

Wright and Farr (*P.J.* (3) xxii. 1) show an enormous variation in the strength of various samples of this tincture, viz., from 0·032 to 0·148 p.c. of alkaloid, and recommend a standard of 0·1 p.c.

**Tests.**—Tincture of Jaborandi has a sp. gr. of 0·950 to 0·960; contains from 2·5 to 3·5 p.c. w/v of total solids; and about 40 p.c. w/v of Absolute Alcohol. A standard of 0·048 p.c. w/v of total alkaloids has been suggested for the Tincture.

A convenient method for the determination of the total alkaloids is that of Farr and Wright. With the exception that a measured quantity of 50 c.c. of the Tincture is substituted for 10 c.c. of the Liquid Extract, the process may be conducted as described under the heading of Extractum Jaborandi Liquidum.

A Tincture prepared in the author's laboratory had a specific gravity of 0·955, contained 2·5 p.c. w/v of total solids and 40·3 p.c. w/v of Absolute Alcohol. When assayed according to the method mentioned above, it yielded gravimetrically 0·036 p.c. w/v of alkaloids, which on titration showed 0·036 p.c. w/v reckoned as Pilocarpine.

**PILOCARPINÆ NITRAS.** *See* p. 893.

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## JALAPA.

JALAP.

FR., JALAP; GER., JALAPENWURZEL; ITAL., GIALAPPA; SPAN., JALAPA.

The dried Tubercules of *Ipomœa Purga*, Hayne.

It contains, as its principal ingredient, a glucoside, **Convolvulin,** soluble in Alcohol, but insoluble in Ether, and constituting all but a small part of Resina Jalapæ, *B.P.*

The *B.P.* requires that Jalap should yield not less than 9·0 p.c., nor more than 11·0 p.c. of Resin answering the official requirements; the *U.S.P.* not less than 7 p.c. of total Resin, of which not more than 15 p.c. should be soluble in Ether; the *P.G.* at least 9·0 p.c. of Jalap Resin.

**Medicinal Properties.**—A brisk cathartic, operating sometimes painfully, producing copious watery discharges. From its hydragogue powers, it is especially serviceable in dropsy and cerebral

congestion, when it is usually prescribed in the form of the Compound Powder.

**Dose.**—5 to 20 grains = 0·32 to 1·3 gramme.

*Swiss*, maximum single dose, 1·0 gramme; maximum daily dose, 5·0 grammes.

**Prescribing Notes.**—*The powder can be given in* **cachets,** *or mixed with Confections. The Resin is given in* **pills** *made by adding 'Diluted Glucose,' q.s.*

**Official Preparations.**—Extractum Jalapæ, Pulvis Jalapæ Compositus, Jalapæ Resina, Tinctura Jalapæ; used in the preparation of Pulvis Scammonii Compositus. The **resin** is contained in Pilula Scammonii Composita.

**Not Official.**—Mistura Jalapæ cum Rheo, Pilula Jalapæ, Tinctura Jalapæ Composita, Sapo Jalapinus, Jalapin.

**Foreign Pharmacopœias.**—Official in Austr., Hung. and Swiss, at least 10 p.c. of Resin; Belg., Dutch and U.S., 8 p.c.; Dan., Fr., Norw. and Swed., 7 p.c.; Ger., Jap. and Russ., 9 p.c.; Ital. (Gialappa), 12 p.c.; Mex., 11 p.c.; Span., 15 to 18 p.c.

The Fr. Codex (1884) fixed the standard at 15 to 18 p.c. of Resin, lowered in 1908 to 7 p.c.; U.S. (1880 and 1890) at 12 p.c.; Ger. (1890) lowered the figure to 7 p.c., but (1900) increased it again to 'at least 9 p.c.'

**Descriptive Notes.**—The Jalap of commerce is usually imported from Vera Cruz. and consists of ovoid, or more or less broadly fusiform or subspherical roots, averaging about 1½ to 3 in. (1 to 3 in., 2½ to 7½ cm. *B.P.*), but is sometimes 4 to 5 in. or more in diameter. The larger roots are often incised to facilitate drying. Externally the roots are of a dark greyish-brown colour, furrowed and wrinkled, and marked with numerous short transverse paler scars or lenticels. A transverse section exhibits a yellowish-grey or brown tint with irregular darker concentric rings, consisting of Resin cells; it has a smoky odour, and at first a sweetish, then an acrid taste and a disagreeable flavour. There is considerable difference in the density of the roots as met with in commerce, the light pieces containing most Resin, the heavier pieces apparently owing their weight to sugar, which is difficult to entirely separate from the Resin. Jalap has been cultivated in India and Jamaica, and these roots differ from the Mexican in their paler and more starchy appearance internally. The Indian, which shows a tendency to a fusiform shape, is sometimes unusually rich in Resin; the Jamaica Jalap more frequently presents a sub-globular form; it has sometimes been imported in the form of transverse slices, but since the comparative disuse of the drug of late years and the consequent fall in price, the exportation from thence has apparently ceased. Powdered Jalap is characterised by the starch grains, often compound and sometimes amorphous from the action of heat, by the laticiferous cells and globules of resin escaped from them, the pitted vessels as well as tracheids, sphærocrystals of Calcium Oxalate often 2 to 5 in a parenchymatous cell, and sclerenchymatous cells. A variety of Jalap known in commerce as Tampico Jalap, derived from *Ipomœa simulans*, Hanbury, is occasionally imported. It is more fusiform, smaller, more shrunken, and does not exhibit pale transverse lenticels. The root of another species, *Ipomœa Orizabensis*, Ledan, has been recently imported in large quantities under the name of Mexican Scammony Root. This

root is spindle-shaped and about 2 feet long, and occurs in commerce under the name of Stalk Jalap, in irregularly rectangular pieces 1 or 2 inches in diameter and 2 to 3 inches long, which exhibit a radiate transverse section, and numerous thick bundles of vessels projecting as stiff fibres from the fractured surface.

**Tests.**—The Resin of Jalap is soluble in Alcohol (90 p.c.), and this solvent is officially employed for its determination. A weighed quantity of, say, 10 grammes of the Jalap in fine powder is digested at a gentle heat for 24 hours with twice its weight of Alcohol (90 p.c.), transferred to a percolator, and percolated with Alcohol (90 p.c.) until nothing further is dissolved. The alcoholic solution is precipitated by the addition of Water, the Alcohol distilled, the residue is transferred whilst hot to a dish, cooled, and the supernatant liquid removed, the Resin washed with hot Water, dried and weighed. It should weigh not less than 0·9 nor more than 1·1 gramme. This weight multiplied by 10 yields the p.c. w/w of Resin present in the sample.

The *U.S.P.* distinguishes between the Ether-soluble and the Ether-insoluble Resin. A weighed quantity of 10 grammes of Jalap in No. 60 powder is percolated in a well-covered percolator, with Ether [sp. gr. 0·716 at 25° C. (77° F.)] until 50 c.c. of percolate have been obtained. The percolate is transferred to a tared beaker, the Ether evaporated on a water-bath and the residue weighed. The weight multiplied by 10 gives the percentage of Ether-soluble Resin. The percolation is continued with Alcohol (94·9 p.c.) until 100 c.c. of percolate have been obtained. A measured quantity of 20 c.c. of this percolate is transferred to a separator, mixed with 20 c.c. of Chloroform, and shaken for 1 minute with 20 c.c. of Water. The Chloroform layer is separated, transferred to a tared beaker, the separator washed with 5 c.c. of Chloroform, and the mixed chloroformic liquids are evaporated to dryness on a water-bath, the residue dried till constant in weight and weighed. This weight multiplied by 50 gives the percentage of Resin insoluble in Ether. The sum of the two weights represents the total Resin. The *P.G.* exhausts 1 part by weight of coarsely-powdered Jalap Root for 24 hours at a temperature of 35° to 40° C. (95° to 113° F.), first with 4 parts by weight of the Alcohol (90 p.c.) and then with a further 2 parts by weight of the Alcohol. The Alcohol is distilled off, the residue of Resin is washed with warm Water, until it no longer colours the latter. The Resin is dried in the water-oven and weighed. The *French Codex* 1908 adopts a standard of 7 p.c. of Jalap Resin, which is lower than either the *B.P.* or *P.G.*; the *U.S.P.* standard of not less than 8 p.c. of total resin, of which not more than 1·5 p.c. should be soluble in Ether, was altered by the Additions and Corrections 1907 to not less than 7 p.c. of total resin, of which not more than 15 p.c. should be soluble in Ether.

The ash of Jalap varies from 4 to 6 p.c. and should not exceed the latter figure.

The retention of the present official standard for the percentage of Resin has been recommended.

Preparations.

**EXTRACTUM JALAPÆ.** EXTRACT OF JALAP.

Jalap, in coarse powder, 1; Alcohol (90 p.c.), 5; Distilled Water, 10. A solid Extract prepared by treating the Jalap first with the Alcohol and subsequently with the Water, and combining the two residues into one Extract.

100 lb. of Jalap yielded 50 lb. of Extract.

**Dose.**—2 to 8 grains = 0·13 to 0·32 gramme.

**PULVIS JALAPÆ COMPOSITUS.** COMPOUND POWDER OF JALAP.

Jalap, 5; Acid Potassium Tartrate, 9; Ginger, 1. (1 in 3)

**Dose.**—20 to 60 grains = 1·3 to 4 grammes.

**Foreign Pharmacopœias.**—Official in Russ., Jalap 1, Potassium Bitartrate 2; U.S., Jalap 35, Potassium Bitartrate 65; Mex. Not in the others.

**JALAPÆ RESINA.** JALAP RESIN.

Extracted from Jalap by exhausting with Alcohol (90 p.c.), and purified by washing with Water.

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

*Ital.*, maximum single dose, 0·3 gramme; maximum daily dose, 1·0 gramme.

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

**Tests.**—Jalap Resin, when powdered, is officially required to yield little or nothing to warm Water, and not more than 10 p.c. to Ether. It is readily soluble in Alcohol (90 p.c.), insoluble in Turpentine Oil. The *U.S.P.* requires that not more than 15 p.c. should be soluble in Ether, that it should be soluble in Alcohol (94·9 p.c.) in all proportions, and that the alcoholic solution should be only faintly acid to blue Litmus paper. It also requires that not more than 35 p.c. should be soluble in Chloroform. The *B.P.* mentions not more than 10 p.c. as the Ether-solubility limit. The *P.G.* says readily soluble in Alcohol (90 p.c.), and not more than 10 p.c. should be soluble in Chloroform, but makes no reference to Ether-solubility. The *U.S.P.* requires that it shall possess an Acid value of not more than 13·93 and a Saponification value of at least 139·35. The *U.S.P.* states that the Resin should not suffer material loss of weight when heated at 100° C. (212° F.), and that the anhydrous Resin melts about 150° C. (302° F.). Both the *U.S.P.* and *P.G.* require that the Resin should be completely soluble in 5 times its weight of Ammonia Solution, and when this solution is acidified only a slight turbidity at the most should be produced. The *P.G.* warms the Resin with the Ammonia Solution, and requires, in addition, that the solution shall not gelatinise on cooling. It uses Acetic Acid for acidification, whilst the *U.S.P.* employs Hydrochloric Acid. That the Resin should be soluble in 5 times its weight of Ammonia Water is a reasonable requirement, but few samples will be found to respond to the latter half of the test.

The more generally occurring impurities are Scammony Resin and the Resin of Tampico Jalap, Guaiacum Resin, Colophony, Water,

and soluble impurities. Scammony Resin and the Resin of Tampico Jalap are detected by the Ether-solubility test; Guaiacum Resin by Ferric Chloride T.S. failing to produce any greenish-blue coloration in the Alcohol (90 p.c.) solution; Colophony greatly increases the Acid value and is also readily detected by the Ammonia test. Water is detected by loss of weight at 100° C. (212° F.), and soluble impurities by evaporating a filtered aqueous trituration of the Resin to dryness; the filtered liquid should be colourless, and no solid residue should remain.

**Water.**—Jalap Resin when triturated with 10 parts of Water should give an almost colourless filtrate, *P.G.*; Water should not become coloured by it nor dissolve any portion of it, *U.S.P.*

**Chloroform.**—Not more than 35 p.c. of the Resin should be soluble in Chloroform, *U.S.P.*; if 1 gramme be warmed with 10 grammes of Chloroform and the product filtered, the filtrate after evaporation should not leave a residue of more than 0·1 gramme, *P.G.*

**Ammonia.**—If Jalap Resin be warmed in a well-closed vessel with 5 parts of Ammonia Solution, a solution should be obtained which, on cooling, is not gelatinous, and on evaporation leaves a residue soluble in Water, all but an insignificant resinous portion. On supersaturating the solution with dilute Acetic Acid a faint turbidity at most should be produced, *P.G.*; slowly but completely soluble in 5 parts (by weight) of Ammonia Water, and when this solution is acidified with Hydrochloric Acid only a slight turbidity should appear, *U.S.P.*

**Ferric Chloride.**—A few drops of Ferric Chloride T.S. added to some of the powdered Resin, moistened with Alcohol, should produce no greenish-blue colour, *U.S.P.*

**Acid Value.**—1 gramme of Jalap Resin dissolved in 50 c.c. of Alcohol containing 1 c.c. of Phenolphthalein T.S. should require not more than 0·5 c.c. of Semi-normal Alcoholic Potassium Hydroxide Volumetric Solution to produce a red colour (limit of acid resins), *U.S.P.*

**Saponification Value.**—If to 1 gramme of Jalap Resin dissolved in 50 c.c. of Alcohol in a flask, 25 c.c. of Semi-normal Alcoholic Potassium Hydroxide Volumetric Solution be added and the mixture be heated on a water-bath for one hour, and if the excess of Alkali be titrated with Semi-normal Volumetric Sulphuric Acid Solution, using 5 drops of Phenolphthalein T.S. as indicator, at least 20 c.c. of Semi-normal Sulphuric Acid Volumetric Solution should be required, *U.S.P.*

**TINCTURA JALAPÆ.** TINCTURE OF JALAP.

A Tincture obtained by treating Jalap with Alcohol (90 p.c.), and standardising it to contain 1·5 of the Resin in 100 cc., which is equal to 1 of Root in 6 or 7 of Alcohol (90 p.c.).

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

**Foreign Pharmacopœias.**—Official in Belg., 1 in 50 from Resin; Port., 1 and 5 by weight. Not in the others.

**Tests.**—Tincture of Jalap has a sp. gr. of 0·905 to 0·910; contains about 3·5 p.c. w/v of total solids, and about 68·0 p.c. w/v of Absolute Alcohol. It contains about 1·5 p.c. of Jalap Resin.

**Not Official.**

**MISTURA JALAPÆ CUM RHEO.**—Jalap Resin, ¼ grain; Compound Tincture of Rhubarb, 10 minims; Tragacanth, ¼ grain; Syrup of Ginger, 5 minims; Glycerin, 10 minims; Caraway Water, to 1 fl. drm.

Powder the Resin, mix with the Tragacanth, add the Tincture and then the

other ingredients in the order given. Dose.—1 fl. drm. for a child 1 year old.—*St. Thomas's.*

*Note.*—The official extract of Jalap varies considerably in strength, hence the Resin of Jalap is used, with Tragacanth to suspend it.

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

**TINCTURA JALAPÆ COMPOSITA.**—Jalap, 8; Scammony, 2; Turpeth,* 1; Alcohol (60 p.c.), to 100.

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

Official in the *Ind.* and *Col. Add.* for India, the Eastern Colonies and North American Colonies.

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

Fr., Mex., Port. and Span., similar to above; Belg., Jalap 1, Scammony 1·5, Tincture of Ginger, 2·5, Alcohol (80 p.c.) 950; Swiss, Jalap 10, Scammony 10, Diluted Spirit, to 100.

**PILULA JALAPÆ.**—Jalap Soap, 3; Powdered Jalap, 1.—*Ger.*

**SAPO JALAPINUS.**—Resin of Jalap, 1; Soap, 1.—*Ger., Jap.* and *Swiss.*

**JALAPIN.**—A purified Resin of Jalap, entirely soluble in Ether.

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

Tampico Jalap from *Ipomœa simulans*, Hanb., and Orizaba root (Woody Jalap), from *Ipomœa Orizabensis*, Ledan., also yield a glucoside Jalapin, soluble in Ether, and almost, if not completely, identical with Resina Scammonii, *B.P.*, from *Convolvulus Scammonia*, L.

It is unfortunate that the name Jalapin should have been applied to the resin of *spurious* Jalap, which is identical with the *true* Resin of Scammony, and which is quite distinct from the official Resin of Jalap.

During 1892 attention was again called to this misleading nomenclature (*P.J.* (3) xxii. 888), and considerable correspondence ensued. It appears that it has been customary in this country to apply the term 'Jalapin' to the true Jalap Resin, but the article imported from Germany under that name is invariably the Ether-soluble Resin from spurious Jalap or Scammony. Several suggestions were made, but none which seemed at all likely to be acceptable both in Britain and Germany. The most feasible proposal is that the term **'Scammonin'** should be used to designate the Ether-soluble Resin (shown, *P.J.* (3) xxiii. 86, to be identical from either of the previous-named sources), and that the earliest opportunity should be taken to make official, under the name **Jalapin**, an Ether-wholly-insoluble Resin from true Jalap.

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**Not Official.**

## JAMBUL.

The Seeds of *Eugenia Jambolana*, Lam., which have been used in India and this country for reducing the amount of sugar excreted in diabetes.—*P.J.* (3) xviii. 921; *B.M.J.* '91, ii. 1283; *B.M.J.E.* '92, i. 39; *T.G.* '93, 611; *Pr.* li. 138; *B.M.J.* '01, ii. 618.

The dose should be large, 1 drm. to 1 oz. daily.—*B.M.J.* '91, ii. 1284.

Two cases in which 2 oz. were given daily.—*Pr.* li. 139.

It can also be given in the form of **fluid extract** (1 in 1). Dose, 10 to 60 minims = 0·6 to 3·6 c.c.

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**Not Official.**

## JEQUIRITY.

The Seeds of *Abrus precatorius*, L.

**Infusum Abri**, 8 of the **seeds** to 100 of Water at 120° F., has been used in the treatment of granular lids; it sets up a purulent conjunctivitis, varying in

* Turpeth is the dried Root and Stem of *Ipomœa Turpethum* and is official in the *Ind.* and *Col. Add.* for India and the Eastern and North American Colonies.

intensity with the strength and frequency of the applications. A somewhat dangerous remedy. A very strong **infusion**, 1 to 4, was used by Dr. Shoemaker in the treatment of affections of the skin.—*Med. Bulletin*, Nov. 1884; *L.* '85, ii. 733; *L.M.R.* '86, 126; *T.G.* '87, 640; and *L.M.R.* '86, 541. Dr. Martin's researches show that the determining causes of the inflammation and the toxic properties in general are due to a globulin and an albumose, the activity of which it rapidly destroyed by a moist heat of 85° C. (185° F.).

Ehrlich has shown that the continuous use of Abrin produces tolerance to its toxicity.—*B.M.J.* '97, ii. 705.

**Foreign Pharmacopœias.**—Official in Span.

**Jequiritol.**—A substance allied to Abrin, supplied in sterile solution, containing 50 p.c. of Glycerin. It possesses, when applied locally, a distinctly marked curative action on inflamed conjunctiva; when controlled by Jequiritol Serum, it is the best means for the removal of nebulæ of the cornea.—*L.* '01, i. 1836.

The **root** has been used in many hot countries for the same purpose as liquorice-root, hence it is called Indian Liquorice, but considering the known poisonous character of the seed the title is dangerously misleading.

The **root** and an **extract** prepared from it are official in the Pharmacopœia of India.

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**Not Official.**

## JUGLANS.

The Root-bark of *Juglans cinerea* Linn. (Butternut), collected in autumn.

A mild cathartic, used in the form of **Extractum Juglandis**, prepared with Dilute Alcohol, dose, 5 to 10 grains = 0·32 to 0·65 gramme, and **Juglandin**, an eclectic remedy, used in doses of 5 to 10 grains.

Not now official in U.S.

**FOLIA JUGLANDIS.**—The Leaves of *Juglans regia* L. (Walnut) are Official in Austr., Belg., Ger., Mex. and Span. (Hoja de Nogal); Belg. has also a fluid extract.

**FLUIDEXTRACTUM JUGLANDIS.**—From the inner bark of the root. Made with Alcohol (49 p.c.), 1 c.c. of fluid extract represents 1 gramme of drug.—*U.S.N.F.* It is used as a cathartic. Average dose.—1 fl. drm. = 3·6 c.c.

**SPIRITUS NUCIS JUGLANDIS.**—A distilled preparation from the Walnut (*Juglans Regia*).

Aromatic bitter, astringent.

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

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## JUNIPERI OLEUM.

OIL OF JUNIPER.

Fr., Essence de Genièvre; Ger., Wacholderöl; Ital., Essenza di Ginepro.

A colourless, or pale yellow or yellowish-green oily liquid, having a characteristic odour, and balsamic, burning and somewhat bitter taste. It is the Volatile oil distilled from Fruit of *Juniperus communis* Linn. The Fruits should be full-grown and unripe.

It should be kept in well-closed glass bottles of a dark amber tint and protected as far as possible from air and light. The Oil has a tendency to resinify on keeping, and old Oil is more viscid, has an acrid reaction and has a somewhat rancid odour. The solubility is also affected, the Oil becoming less soluble in Alcohol (90 p.c.)

The Oil contains the terpene Pinene, boiling point 156° C. (312·8° F.), the sesquiterpene, Cadinene, boiling point 274° C. (525·2° F.) and Juniper Camphor, and an Ester, boiling point 180° C. (356° F.).

**Empyreumatic Oil of Juniper** is given under Cadini Oleum, p. 271.

**Solubility.**—1 in 20 of Alcohol (90 p.c.), but it does not become quite clear; it mixes with equal parts of Absolute Alcohol, but if more Alcohol be added it becomes milky.

**Medicinal Properties.**—Carminative, anti-spasmodic, and a stimulating diuretic, the latter property constituting its chief medicinal value. Used in cardiac and hepatic dropsical cases, either alone or combined with other diuretics; should not be used in acute Bright's disease.

**Dose.**—½ to 3 minims = 0·03 to 0·15 c.c.

**Official Preparation.**—Spiritus Juniperi; contained in Mistura Creosoti.

**Not Official.**—Spiritus Juniperi Compositus.

**Foreign Pharmacopœias.**—Official in Austr., Ger. and Jap., sp. gr. 0·865 to 0·880; Norw., sp. gr. 0·860 to 0·870; Hung., sp. gr. 0·840 to 0·900; Fr. (Genièvre) and Ital. (Essenza di Ginepro), sp. gr. 0·865 to 0·885; Port. (Essencia de Zimbro), sp. gr. 0·855 to 0·879; Swiss, sp. gr. 0·860 to 0·885; U.S., sp. gr. 0·860 to 0·880 at 25° C. (77° F.).

**Tests.**—Juniper Oil has a sp. gr. of 0·865 to 0·895, which figures are increased by exposure to air or by age. It is officially required to dissolve in 4 volumes of a mixture consisting of equal parts of Absolute Alcohol and Alcohol (90 p.c.), but the solubility of the Oil also depends greatly upon the length of time it has been kept. The *B.P.* gives no figures for optical rotation. It is usually lævogyrate, −3° to −12° in a tube of 100 mm. No indication is given in the *B.P.* as to the temperatures at which the various fractions of the Oil should distil. It is in the relative proportion of Pinene to Cadinene that English oils chiefly differ from foreign oils. An English oil examined by Bird (*C.D.* '07, ii. 172) showed a 12 p.c. fraction distilling between 155° to 160° C. (311° to 320° F.), as against 37 p.c. fraction in foreign oil; a 35 p.c. fraction between 160° to 180° C. (320° to 356° F.) as against 34 p.c. fraction in the foreign oil; a 19 p.c. fraction between 180° to 255° C. (356° to 491° F.) as against a 10 p.c. fraction in the foreign oil; and a 22 p.c. fraction at 255° to 280° C. (491° to 536° F.), as against a 10 p.c. fraction in the foreign oil. It has been recommended (*C.D.* '07, ii. 355) that the *B.P.* requirements with regard to fractionation should be, not less than 50 p.c. nor more than 60 p.c., should distil below 165° C. (329° F.), that the refractive index of the unfractionated oil should not be less than 1·4750 at 20° C. (68° F.), and the residue after distilling 80 p.c. should have a refractive index at 20° C. (68° F.) of not less than 1·4900 nor more than 1·4950.

The more generally occurring sophistications are Turpentine Oil, Juniper Wood Oil and Alcohol. Of these, Alcohol is the only one readily detected. It is contained in the first fractions of the Oil, and is identified by the formation of Iodoform on warming this fraction

with Potassium Hydroxide Solution and sufficient Iodine Solution to ensure a slight excess. Turpentine Oil is very difficult of detection except when present in large amount.

**Preparation.**

**SPIRITUS JUNIPERI.** SPIRIT OF JUNIPER.

Oil of Juniper, 1; Alcohol (90 p.c.), *q.s.* to yield 20. If not bright, filter through Talc. (1 in 20)

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

It is two and a half times stronger than *B.P.* '85.

**Foreign Pharmacopœias.**—Official in Jap., 1 in 50; by weight; U.S., 1 in 20; Austr., Ger. and Swiss, 1 fruit in 4, by distillation; Port. and U.S. have a compound spirit. Not in the others.

**Not Official.**

**SPIRITUS JUNIPERI COMPOSITUS.**—Oil of Juniper, 0·4; Oil of Caraway, 0·05; Oil of Fennel, 0·05; Alcohol (95 p.c.) 70; Water, *q.s.* to make 100.—*U.S.P.*

This has been incorporated in the *B.P.C.* using 75 of Alcohol (90 p.c.).

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**Not Official.**

## KALADANA.

*Syn.*—PHARBITIS NIL.

The dried Seeds of *Ipomœa hederacea*, Jacq. Cathartic, resembling Jalap in action.

Official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies, as are also the **Compound powder**, Kaladana, 5; Acid Potassium Tartrate, 9; Ginger, 1; dose, 20 to 60 grains = 1·3 to 4 grammes; the **Tincture**, 1 of seeds in 5 of Alcohol (70 p.c.); dose, 30 to 60 minims = 1·8 to 3·6 c.c.; and the **Resin**; dose, 2 to 8 grains = 0·13 to 0·52 gramme.

The Compound Powder, Tincture and Resin have been incorporated in the *B.P.C.*

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**Not Official.**

## KAMALA.

*Syn.*—GLANDULÆ ROTTLERÆ.

A fine, granular, mobile, brick-red powder, consisting of the minute glands and hairs obtained from the surface of the Fruits of *Mallotus Philippinensis*, Mull. Arg.

**Solubility.**—Almost insoluble in Water, but about 60 p.c. of a sample (containing 6 p.c. of ash) was soluble in Absolute Alcohol, in Chloroform, and in Ether; and was for the most part soluble in Liquor Potassæ.

Anthelmintic and purgative. Successfully given in tæ n i a, in doses in 30 to 120 grains = 2 to 8 grammes.

**Prescribing Notes.**—*The powder is usually given suspended in Gruel, Mucilage, Treacle, or Syrup; or it may be prescribed along with Liq. Ext. of Male Fern. A purgative should precede and, if need be, follow.*

**Foreign Pharmacopœias.**—Official in Austr. and Hung. (10 p c. of ash), Ger., Ital., Jap., Swed. and Swiss (6 p.c. of ash); Hung. has also Kamala Depuratum; Port., and Russ. (8 p.c. of ash), Mex. Not in the others.

**TINCTURA KAMALÆ.**—Kamala, 1; Alcohol (60 p.c.), 5.

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