Not Official.

FUCUS VESICULOSUS.

Bladder-wrack collected from rocks by the seaside and dried.

Medicinal Properties.—Given to reduce obesity.
Smelling fresh seaweed is said to relieve hay asthma.

Foreign Pharmacopœias.—Official in Mex. (Encina de Mar); Port. (Bodelha). Not in the others.

Descriptive Notes.—This seaweed is of a blackish colour, flat, forked, about half an inch broad and a foot or more long. From other British species it is distinguished by having a mid-rib, and oval air bladders in the frond, usually in pairs, one on each side of the mid-rib. When dried it has often a white efflorescence of Mannite on the surface. It is said to be most active if collected in September and dried in the shade.

Tests.—Bladder-wrack leaves about 15 p.c. of ash when ignited with free access of air. Two specimens examined in the author's laboratory showed 15·0 and 15·6 p.c. of ash.

EXTRACTUM FUCI VESICULOSI.—Prepared by percolation with Alcohol (45 p.c.), and evaporation to a stiff extract.—*B.P.C. Formulary* '01, incorporated in the *B.P.C.* under the title **Extractum Fuci.**

Dose.—3 to 10 grains = 0·2 to 0·65 gramme, in **pills.**

Test.—It leaves about 18 p.c. of ash on ignition.

EXTRACTUM FUCI VESICULOSI LIQUIDUM.—Dissolve 1 of Extract of Fucus Vesiculosus in Alcohol (45 p.c.) to make 5.—*B.P.C. Formulary* '01, incorporated in the *B.P.C.* under the title **Extractum Fuci Liquidum.**
The fluid extract has been given in *Companion* since 1867, and was included in *B.P.C. Formulary* '01.

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

Tests.—Liquid Extract of Fucus Vesiculosus has a specific gravity of about 1·044; contains about 8 p.c. w/v of total solids and about 50 p.c. w/v of Absolute Alcohol.

GALBANUM.

GALBANUM.

Fr., Galbanum; Ger., Galbanum; Ital., Galbano; Span., Galbano.

A Gum-resin obtained from *Ferula galbaniflua*, Boiss. and Buhse, and probably from other species.

Galbanum contains about 9·5 p.c. of ethereal Oil, 63·5 p.c. of Gum-resin soluble in Alcohol, and 27 p.c. of impurities. The pure Gum-resin contains Umbelliferone Galbaresinotannol Ester, 20 p.c.; Galbaresinotannol, about 50 p.c.; and about 0·25 p.c. of free Umbelliferone, 0·5 to 30 p.c. of ash.

Medicinal Properties.—Internally similar to Asafetida, but less energetic; externally as a plaster in chronic inflammatory swellings.

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

Official Preparation.—Pilula Galbani Composita.

Not Official.—Emplastrum Galbani and Unguentum Galbani Compositum.

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

Descriptive Notes.—Galbanum is much scarcer in commerce than formerly. Two principal varieties of the drug are recognised in commerce, which are called respectively Levant and Persian, although both are the products of Persia. The Levant Galbanum, which comes by way of Egypt and Turkey, occurs in two forms: (1) small yellowish-brown tears, yellowish-white and opaque internally, and possessing a musky odour and bitter and somewhat acrid taste, and probably obtained from the stem; (2) a tough, pasty mass, consisting of slices of root with bluish-green, almost translucent, pieces, mixed with yellowish-brown pieces, and also possessing a musky odour, and evidently obtained from the root. Both of these probably come from near Shiraz, *viâ* the Persian Gulf. The Persian Galbanum occurs also in two forms: (1) a turpentiny, sticky mass, having a turpentiny rather than a musky odour, and containing fruit stalks, but no slices of roots; (2) a treacly liquid, of a reddish colour, often containing fruits of the plant. These apparently come from the Demawend mountains in the north of Persia, by way of Astrakhan and Orenburg, and are apparently the produce not of *F. galbaniflua* but another species. African Ammoniacum, the only Gum-resin that at all resembles Galbanum, does not yield Umbelliferone. Persian Galbanum gives a yellowish-red colour with Hydrochloric Acid, whilst the Levant gives different shades of violet. As the former possesses a musky odour, and the latter a turpentiny one, they are probably derived from different species. The *P.G.* directs Galbanum to be dried over quicklime and submitted to a low temperature in order to powder it.

Tests.—Galbanum yields about 50 p.c. of substances soluble in Alcohol (90 p.c.). If a portion is heated to redness in a dry test-tube, the residue, when cooled and boiled with Water, yields a solution which, largely diluted, produces a strong blue fluorescence when rendered alkaline with Ammonia Solution. This test is known as the Umbelliferone test, and remarks upon its application will be found under Ammoniacum. The ash should not exceed 10 p.c. The volatile Acid value is 73·5 to 114·0; the Acid value, 21·2 to 63·5; the total Saponification value, 116·2 to 135·8.

Ammonia.—If finely powdered Galbanum be boiled with fuming Hydrochloric Acid for a quarter of an hour, filtered through a previously moistened filter, and the filtrate carefully saturated with Ammonia Solution, the mixture shows a blue fluorescence in reflected light.—*P.G.*

Residue from Alcohol (90 p.c.).—After completely exhausting 100 parts of Galbanum with boiling Alcohol (90 p.c.), a residue is obtained which, after drying, should amount to at most 50 p.c. of the original mass.—*P.G.*

Ash.—100 parts of Galbanum should yield on incineration not more than 10 parts of ash, *P.G.*

Preparation.

PILULA GALBANI COMPOSITA.—Compound Pill of Galbanum. *B.P.Syn.*—Compound Pill of Asafetida.

Asafetida, 1; Galbanum, 1; Myrrh, 1; Syrup of Glucose, *a.s.* Mix together on a water-bath.

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

The following modification will be found convenient for dispensing: powder the Myrrh, mix it with the Asafetida and Galbanum melted on a water-bath, allow the mixture to cool, and after chilling it by artificial means reduce it to powder with one-sixth of its weight of Light Magnesium Carbonate. This powder will keep well, and can be made into pills as required with the aid of Alcohol (60 p.c.).

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

Not Official.

EMPLASTRUM GALBANI.—Galbanum, 1; Ammoniacum, 1; melt together and strain; then add them to Yellow Beeswax 1, Lead Plaster 8, previously melted together. Mix. (1 in 11)

Was official in *B.P.* 1885, but omitted in *B.P.* 1898; it has been incorporated in the *B.P.C.* using 7 of Lead Plaster instead of 8 so as to make the total 10.

A plaster more or less resembling this is **Official** in all the Foreign Pharmacopœias except Hung. and U.S. Fr. has Emplâtre diachylon gommé. Mex. Emplasto de Galbano Azafranado. Dutch Emplastrum Gummosum.

UNGUENTUM GALBANI COMPOSITUM.—Galbanum Plaster, 4 oz.; Lead Plaster, 4 oz.; White Beeswax, 4 oz.; soft Extract of Opium, 1 drm.; Olive Oil, 20 fl. oz. Melt together.

It is used for boils and carbuncles, and for sore nipples and inflamed breasts.

GALLA.

GALLS.

Fr., Galle d'Alep; Ger., Gallapfel; Ital., Noci di Galla; Span., Agalla de Alepo.

Excrescences on *Quercus infectoria*, Oliv., resulting from punctures and deposited eggs of *Cynips Gallæ tinctoriæ*, Oliv.

This description occurs in *B.P.* and *U.S.P.* *Fr. Codex* gives it as a pathological product due to the puncture of *Cynips Gallæ tinctoriæ*, Oliv., on the young shoots of the oak of the dyers, *Quercus lusitanica*, Lamk., var. *infectoria*, Oliv.

Chiefly from Turkey, Persia and Greece.

Galls contain 60 to 70 p.c. of Gallo-tannic Acid, and 3 to 5 p.c. of Gallic Acid, to which their therapeutic qualities may be attributed.

Solubility.—All the soluble matter of Galls is taken up by forty times their weight of boiling Water, and the residue is tasteless.

Medicinal Properties.—Astringent. Chiefly used locally in form of lotion or injection to suppress hæmorrhage from the gums, nose, etc.; to lessen the discharge from mucous membranes, as in gleet, leucorrhœa, etc.; both Ointments are useful in painful hæmorrhoids.

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

Incompatibles.—The mineral Acids, Iron and Lead salts, Copper Sulphate, Silver Nitrate, Potassium and Sodium Carbonates and Alkalis, Lime Water, Tartar Emetic, Ipecacuanha and Opium; Infusions of Cinchona, Calumba and Cusparia.

Official Preparations.—Unguentum Gallæ and Unguentum Gallæ cum Opio. Used in the preparation of Acidum Gallicum and Acidum Tannicum.

Not Official.—Decoctum Gallæ, Suppositoria Gallæ, and Tinctura Gallæ.

Foreign Pharmacopœias.—Official in Austr., Dan., Dutch, Fr. (Galle d'Alep), Ger., Hung., Ital. (Noci di Galla), Jap., Mex. (Agallas de Levante), Norw., Port. (Galha), Russ., Span. (Agalla de Alepo), Swiss and U.S.

Descriptive Notes.—The galls of *Quercus infectoria* are known in commerce as Aleppo galls, and are met with in three varieties, blue, green, and white. The blue-green are considered the best, the dark green second, and the white galls are of very inferior quality. The last named, besides the pale yellowish-brown colour, are noticeable for the fact that each shows a perforation whence the gall insect has escaped. They are also lighter in weight, and are excluded from use by the official description, according to which Aleppo galls are spherical, averaging $\frac{1}{2}$ to $\frac{3}{4}$ in. (12 to 18 mm.) in diameter, and have a smooth surface, are dark green or olive green externally, are furnished in the upper half with small pointed tubercles, and ridges widely separated, the lower half, being usually smooth; are yellowish or brownish white internally, with a small central cavity. They have an astringent and slightly acid taste, followed by a slight sweetness. The characteristic features of powdered galls are the raphides, angular fragments of Tannin, the parenchymatous cells, with intercellular spaces, the sclerenchymatous cells with stratified walls, and starch grains with a stellate hilum. English oak galls, from *Quercus pedunculata*, Willd., resemble Aleppo galls in size, but have no prominences, and contain less than a third of the amount of Gallo-tannic acid (15 to 20 p.c.) contained in the Aleppo galls (70 p.c.). Other oak galls, under the name of Morea galls, are occasionally imported from Greece. These are about $\frac{1}{3}$ in. in diameter, and have a crown of small tubercles. The Japanese and Chinese galls, from Hiogo and Canton, which are largely imported, are irregularly fig-shaped, hollow, and downy externally, from 1 to 2 in. long, $\frac{3}{4}$ to 1 in. broad, the shell being only $\frac{1}{16}$ to $\frac{1}{12}$ in. in thickness. They are formed on *Rhus semialata*, Murr., and other species by *Aphis chinensis*, Bell., the skeletons of which are usually found within the galls. They yield up to 78 p.c. of Gallo-tannic Acid, and are therefore of considerable technical value. The plum-shaped Chinese galls are formed on *Distylium racemosum*, S. et Z., Tamarisk galls, formed on *Tamarix orientalis*, L., and other species, are from the size of a pea up to $\frac{1}{2}$ in. in diameter, and are occasionally imported; they contain about 40 p.c. of Tannin.

ACIDUM GALLICUM.—*See* ACIDUM GALLICUM.

ACIDUM TANNICUM.—*See* ACIDUM TANNICUM.

Preparations.

UNGUENTUM GALLÆ.—GALL OINTMENT.

Galls, 1; Benzoated Lard, 4. (1 in 5)

Foreign Pharmacopœias.—Official in U.S., 1 in 5. Not in the others.

UNGUENTUM GALLÆ CUM OPIO. GALL AND OPIUM OINTMENT.

Opium, 7½ grains; Gall Ointment, 92½ grains. (about 1 in 13)

The ointment might be made direct by mixing 15 grains of Opium and 37 grains of Galls with 148 grains of Benzoated Lard.

Not Official.

DECOCTUM GALLÆ.—Bruised Galls, 2½; Distilled Water, 40; boil to 20, and strain. (1 in 8)

B.P.C. Decoction is 1 in 16.

SUPPOSITORIA GALLÆ.—5 grains powdered Galls and 1 grain Opium in each, with a basis of Cocoanut Stearin.

TINCTURA GALLÆ.—1 of Galls percolated with Alcohol (60 p.c.) to yield 8. (1 in 8)

Dose.—½ to 2 fl. drm. = 1·8 to 7·1 c.c.

B.P.C. Tincture is 1 in 10, also with Alcohol (60 p.c.).

Foreign Pharmacopœias.—Official in Austr., Dan., Dutch, Ger., Hung., Jap., Mex., Norw., Russ., Swiss and U.S., 1 in 5. All by weight, except U.S. Not in the others.

Not Official.

GARCINIA PURPUREA, Roxb.

KOKUM BUTTER TREE.

Grows in the forests of Malabar, the Concans, and other parts of the Madras Peninsula.

The Oil of the seeds (*Kokum Butter*) is obtained by first exposing the seeds for some days to the action of the sun to dry; they are then bruised and boiled in Water; the Oil collects on the surface, and on cooling contracts into a solid cake. It melts at 98° F. (36·6° C.). The seeds yield about 10 p.c. of Oil.

It is used in India in the preparation of ointments, suppositories, etc.

Not Official.

GAULTHERIÆ OLEUM.

OIL OF WINTERGREEN.

Three nearly allied substances are sold as Oil of Wintergreen, and they are all official in U.S.

Oil of Gaultheria (Wintergreen).—A volatile Oil distilled from the leaves of *Gaultheria procumbens*, L., consisting almost entirely of Methyl Salicylate, and nearly identical with Volatile Oil of Betula. A colourless or yellow liquid, with a strong characteristic odour, and a pungent taste.

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

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

It contains, according to Power and Kleber, about 99 p.c. of Methyl Salicylate, with a small amount of a paraffin, probably Triacontane, an aldehyde or ketone, an apparently secondary Alcohol and an Ester.

Tests.—Oil of Gaultheria has a sp. gr. of 1·175 to 1·185. It is slightly lævogyrate, the optical rotation being not below − 0·25° nor more than − 1° in a 100 mm. tube. It boils at 218° to 221° C. (424·4° to 429·8° F.). It should form a perfectly clear solution at about 20° C. (68° F.) with 5 parts of Alcohol (70 p.c.). It should yield the tests and be free from the impurities mentioned under Methyl Salicylate. It may be distinguished from Oil of Betula by its optical rotation, the latter being optically inactive. Foreign oils or Petroleum, if present, may be determined by the sp. gr.

Volatile Oil of Betula (Sweet Birch).—A volatile Oil obtained by distillation from the bark of *Betula lenta*, L. It is identical with Methyl Salicylate, and nearly identical with Oil of Gaultheria.

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

It is produced by the action of the ferment Betulase on the glucoside Gaultherin.

According to Power and Kleber, the Oil consists, to the extent of about 99·8 p.c., of Methyl Salicylate, and in its unrectified state of a paraffin, probably Triacontane and an Ester, but does not contain the secondary Alcohol found in Gaultheria Oil.

Tests.—Oil of Sweet Birch has a sp. gr. of 1·180 to 1·187. It is optically inactive. It boils between 218° and 221° C. (424·4° and 429·8° F.). It should form a perfectly clear solution at about 20° C. (68° F.) with 5 parts of Alcohol (70 p.c.).

Foreign Oils or Petroleum, if present, may be detected by a lowering of the sp. gr. In other respects it resembles Oleum Gaultheriæ, and conforms to the tests and should be free from the impurities mentioned under that Oil.

Methyl Salicylas ($CH_3C_7H_5O_3$, eq. 150·92) is produced synthetically. A colourless or slightly yellowish liquid, with a characteristic odour and taste. A large proportion of the Oil in commerce is synthetic Methyl Salicylate, or Artificial Oil of Wintergreen.

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

Solubility.—Readily soluble in Alcohol (90 p.c.), Ether, Chloroform, and Glacial Acetic Acid; only slightly soluble in Water.

Medicinal Properties.—A valuable remedy in acute rheumatism, internally; also externally, applied directly over joints and limbs and covered with oiled silk or gutta-percha tissue, to prevent evaporation; thus applied is specially useful in acute muscular rheumatism; also mixed with equal parts of Olive Oil. Used largely as a flavouring agent in America, more particularly in dentifrices. It is a good antiseptic.

Methyl Salicylate is better for external application than the Oil of Wintergreen as it does not produce an eruption. In all cases it was applied according to the process, become classic, of 50 to 100 drops poured upon a double fold of aseptic gauze, and covered by an impermeable material, applied for some hours, either to the forearm or to the leg, and renewed twice every twenty-four hours. The part treated with natural essence of Wintergreen, was more or less red, painful, and covered sometimes with a rubeoliform eruption; pure Methyl Salicylate produced no such reaction.—*L.* '98, i. 52; *B.M.J.E.* '00, i. 56.

As a dressing in the treatment of chorea, 6 to 10 grammes of the Oil either pure or mixed with Vaseline and covered with oiled silk to prevent evaporation.—*T.G.* '99, 240; *B.M.J.E.* '99, i. 8.

In subacute and chronic rheumatism it is stated to be of great advantage, employed either alone or in conjunction with Sodium Salicylate.—*T.G.* '99, 612; *B.M.J.E.* '99, i. 63.

Dose.—5 to 15 minims = 0·3 to 0·9 c.c. every four hours, when given as a substitute for Sodium Salicylate, but the taste is rather pungent.

Prescribing Notes.—*When required to be made into an emulsion or pills, the same general rules would apply as for other Essential Oils, see 'Mucilago Acaciæ' and 'Pilulæ,' or it may be given in Capsules, containing 5 or 10 minims in each.*

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

Tests.—Methyl Salicylate has a sp. gr. of 1·185 to 1·190. It is optically inactive. It has a boiling point of 219° to 221° C. (426·2° to 429·8° F.). It is readily soluble in Alcohol (90 p.c.), the solution being neutral or only slightly acid to Litmus paper. *Fr. Codex* gives the sp. gr. as 1·1819 at 16° C. (60·8° F.), and the boiling point as 224° C. (435·2° F.).

The saturated aqueous solution yields with Ferric Chloride T.S. a deep violet coloration. It should form a perfectly clear solution at about 20° C. (68° F.) with 5 parts of Alcohol (70 p.c.). If the Oil be saponified with Sodium Hydroxide Solution and the alkaline liquid be diluted with about three times its volume of Water, and acidified with diluted Sulphuric Acid, a white crystalline precipitate is formed, which, collected on a filter, washed with a little Water and recrystallised from hot Water, should possess a melting point of 156° to 157° C. (312·8° to 314·6° F.) and should otherwise answer the tests of identity and be free from the impurities mentioned under Acidum Salicylicum. It may be determined volumetrically with Normal Volumetric Potassium Hydroxide Solution, using Phenolphthalein Solution as an indicator. A weighed quantity of 5 grammes of the Oil is dissolved in 25 c.c. of the Normal Volumetric Solution and the mixture is boiled for five minutes to effect saponification. It is cooled, and the excess of alkali is titrated with Normal Volumetric Sulphuric Acid Solution. 1 c.c. of Normal Volumetric Potassium Hydroxide Solution corresponds to 0·15092 gramme of Methyl Salicylate. The number of c.c. of Normal Solution absorbed multiplied by 0·15092 and the product multiplied by 20, yields the percentage w/w of absolute Methyl Salicylate present in the sample. The percentage of Methyl Salicylate may also be determined by saponification with Normal Volumetric Potassium Hydroxide Solution, adding sufficient Normal Volumetric Hydrochloric Acid Solution to produce a faintly acid reaction, removing the liberated Salicylic Acid by Ether, washing till free from mineral acid and titrating the ethereal solution of Salicylic Acid with Normal Volumetric Potassium Hydroxide Solution, using Phenolphthalein Solution as an indicator; 1 c.c. of Normal Volumetric Potassium Hydroxide Solution corresponds to 0·15092 gramme of absolute Methyl Salicylate. A good specimen contains not less than 99 p.c. w/w of Methyl Salicylate.

The more generally occurring impurities are Alcohol or Chloroform, other volatile oils or Petroleum, and Methyl Benzoate. Alcohol or Chloroform may be detected by placing the specimen in a flask provided with a suitable condenser and heating on a water-bath, the distillate should not have the characters of Alcohol or Chloroform. The presence of volatile oils or Petroleum is indicated by the separation of oily drops either on the surface or at the bottom of the liquid, when 1 c.c. of Methyl Salicylate contained in a capacious test-tube is agitated with 5 c.c. of Potassium Hydroxide Solution. Methyl Benzoate is indicated by the m.p. of the acid, obtained after saponification and the decomposition of the Salicylate as described above.

SPIRITUS GAULTHERIÆ.—Oil of Gaultheria, 5; Alcohol (95 p.c.), 95; both by measure.—*U.S.P.*

Average Dose.—30 minims. This has been incorporated in the *B.P.C.* using Alcohol *B.P.* in place of Alcohol *U.S.P.*

SANOFORM (Di-iodomethylsalicylate).—A white crystalline powder, almost odourless and tasteless. It contains 62·7 p.c. of Iodine.

The m.p. of the powder is 110·5° C. (230·9° F.), and it therefore may be sterilised at 100° C. (212° F.) without decomposition. It may be employed (*B.M.J.E.* '05, i. 80) in all cases where Iodoform is used, chiefly as a dressing in minor surgical operations, in cases of senile and diabetic gangrene and in gynæcology.

Solubility.—Insoluble in Water and Glycerin; slightly soluble in cold Alcohol (90 p.c.), and readily in Ether.

MESOTAN (Salicylic Acid Methoxymethylester).—A yellow, oily liquid, possessing a slight aromatic odour. Insoluble in Water, readily soluble in Alcohol (90 p.c.), Ether and Chloroform. It is stated to be readily absorbed by the skin, and to be useful as a local application in all forms of rheumatic and gouty affections. It may be used as a 50 p.c. solution in Olive Oil, or by itself.—*B.M.J.E.* '03, i. 44.

Applied externally as an antirheumatic it is stated (*L.* '04, ii. 1293; *B.M.J.E.* '05, i. 20) to have afforded distinct relief. Is stated (*L.* '05, i. 84) to afford relief in the after-treatment of acute rheumatism, but to be of no service during the fever. Not the slightest effect followed its employment in gonorrhœal rheumatism, and in one case well-marked local irritation followed its use.

There can be little doubt (*B.M.J.* '05, i. 715) of the value of Mesotan in the treatment of rheumatism, but its use requires caution and careful supervision. An embrocation consisting of equal parts of Mesotan and oil very gently applied to the feet and ankles caused a rash in about 10 or 12 days, not only on the parts to which the embrocation had been applied, but also on the arms. It should be painted on where the skin is specially delicate (*M.P.* '05, i. 452), and the skin should be previously dried and not covered with any impervious material afterwards.

Methyl-acetyl-salicylate is a crystalline powder, insoluble in Water, soluble in Alcohol (90 p.c.) and in Chloroform. Has been recommended in rheumatic affections.—*C.D.* '03, ii. 90.

Amyl Salicylas.—A colourless or slightly yellowish liquid, with a characteristic odour and taste. It is not nearly so pungent as Oil of Gaultheria, and therefore has been suggested as a substitute for the latter.

GELATINUM.

GELATIN.

The purified air-dried product of the hydrolysis of certain animal tissues as skin, ligaments and bones by the action of boiling Water.

Commercial Gelatin varies considerably in its gelatinising power, and it is advisable to keep to the same brand to avoid alteration in formulas.

Medicinal Properties.—Hæmostatic. Used for increasing the coagulability of the blood in aneurisms.

A sterilised 1 to 2 p.c. solution in normal saline has been used with considerable success in the treatment of aortic aneurism.—*L.* '02, ii. 169, 558; '03, i. 591, 1810; *B.M.J.* '03, i. 1493: *B.M.J.E.* '02, i. 16, 91; *Pr.* lxvii. 577; *P.J.* '99, ii. 213; *C.D.* '01, ii. 442.

A method of preparing the sterilised solution in flasks, and a description of a suitable apparatus for its use.—*B.M.J.* '01, 1415.

Each flask contains the requisite quantity of sterile Gelatin solution ready for use without further dilution and consequent risk of contamination. 100 c.c. of a 2 p.c. solution are introduced (*L.* '05, i. 1169) into the subcutaneous tissue over an interval of from ten to twelve minutes in order to avoid discomfort and over-distension of the skin. The inner aspect of the thigh is found to be the most convenient place for the injection. Potassium Iodide in 10-grain doses three times a day is given concurrently with the Gelatin injection.

Rectal injection of 250 c.c. of a 5 p.c. sterilised aqueous solution of Gelatin in the treatment of hæmoptysis.—*L.* '03, i. 578.

Six samples of Gelatin examined, and tetanus spores found in four of them.—*L.* '03, i. 579.

Cases of tetanus terminating fatally following the subcutaneous injection of Gelatin solution.—*B.M.J.* '01, ii. 638, 741; *L.* '03, ii. 33; *C.D.* '01, ii. 382.

In melæna neonatorum.—*B.M.J.* '02, i. 28.

Contra-indicated in nephritis.—*B.M.J.E.* '00, ii. 71.

In hæmoptysis as a rectal injection, ½ pint (*B.M.J.* '05, i. 68) three times daily.

Following frequent references to the use in aneurism of a 2 p.c. solution in normal saline injected into the gluteal region, a further note appears. A popliteal aneurism was cured by seven injections, into the gluteal region, of a serum containing 2 p.c. of Gelatin. Each dose was 200 grammes, and the injections extended over seven months.—*L.* '05, i. 1169.

Preferable to begin with 50 c.c. of 2 p.c. solution and gradually to increase the quantity to 100 c.c. and the strength to 4 p.c. Treatment to continue over three to six months.—*B.M.J.E.* '06, ii. 76.

Official Preparations.—Used in the preparation of the various Lamellæ, and Suppositoria Glycerini, p. 569.

Not Official.—Gelatin Basis for Pessaries and Suppositories, Glyco-gelatin, Gelato-glycerin and Gelatinum Glycerinatum.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Jap., Mex., Port., Russ., Span., Swed., Swiss and U.S. Not in the others. Fr. has Gelatine, and Gelatine officinale. Swed. includes a white and an ordinary Gelatin.

Tests.—Gelatin, when immersed in cold Water, swells up and softens, taking up from 5 to 10 times its weight of Water, without undergoing solution to any appreciable extent. It dissolves readily in hot Water. It is officially stated to form, in 50 parts of the latter liquid, a solution which is inodorous and which solidifies to a jelly on cooling. The *U.S.P.* states also that a solution 1 in 50 of boiling Water should solidify on cooling and form a transparent jelly; the *P.G.* states that a 1 in 100 solution will form a jelly on cooling. A useful test for comparing the gelatinising power of commercial Gelatins is to place 5 grains in a test-tube ($\frac{3}{4}$ in. in diameter) with 250 grains of Water for half an hour, warm gently until dissolved, then place the test-tube in Water at 15·5° C. (60° F.), and leave it undisturbed for 30 minutes, by which time a jelly should be formed of such consistence that it will remain in position if the test-tube be inverted. The aqueous solution affords a whitish precipitate with Tannic Acid Solution; *U.S.P.* specifies the strength of Solution as 1 in 5000, the *P.G.* says 'very dilute solutions.' Mercuric Chloride also affords a precipitate in an aqueous solution; neither Ferric Chloride T.S., Lead Acetate Solution, nor Alum Solution produces a precipitate. Potassium Bichromate Solution added to a Solution of Gelatin in hot Water, forms, *on cooling*, a jelly, which becomes insoluble in warm Water after exposure to light. This latter reaction is made use of in photo-lithography. The *U.S.P.* and *P.G.* require that when incinerated it shall not leave more than 2 p.c. of ash.

Not Official.

GELATIN BASIS FOR PESSARIES AND SUPPOSITORIES.—Soften 1 oz. of Gelatin by allowing it to soak in 1 fl. oz. of Water until it is absorbed, then dissolve in $3\frac{1}{2}$ fl. oz. of Glycerin by the heat of a water-bath and allow it to cool and solidify. It can be medicated by melting it over a water-bath and suspending or dissolving in it substances in fine powder, and then pouring the mixture into moulds.

See also Glycerin.

GLYCO-GELATIN.—Refined Gelatin, 1 oz.; Glycerin (by weight), $2\frac{1}{2}$ oz.; Ammoniacal Solution of Carmine, a sufficiency; Orange-flower Water, $2\frac{1}{2}$ fl. oz.—*Throat.*

Soak the Gelatin in the Water for 2 hours, then heat in a water-bath till dissolved; add the Glycerin and stir well together. Let the mixture cool, and when nearly cold add the Carmine solution; mix till uniformly coloured, and set aside to solidify.

This mass is used for making the various medicated **Pastils**; the various substances are rubbed with an equal quantity of Glycerin, and added to the mass when melted over a water-bath.

Glyco-gelatinum.—Gelatin, 12; Glycerin, 40; Distilled Water, 20; Orange-flower Water, 20; Sugar, 5; Citric Acid, 2; Oil of Lemon, 0·10; Solution of Carmine, a sufficient quantity.—*B.P.C.*

This mass is stated to be of an unsatisfactory consistence; the following is an improvement (*P.J.* '07, ii. 804, 813):—

Gelatin, 20; Glycerin, 30; Distilled Water, 56; Orange-flower Water (undiluted), 7; Citric Acid, 2·50; Absolute Alcohol, 1; Oil of Lemon, 0·20; Solution of Carmine, 1.

GELATO-GLYCERIN.—Refined Gelatin (by weight), 5 oz.; Glycerin (by weight), 6 oz.; Water (by weight), 6 oz. Soak the Gelatin in the Water for 12 hours, with occasional stirring, add the Glycerin, dissolve in a water-bath, and evaporate to produce 15 oz. by weight of the Gelato-glycerin.—*Throat.*

(For preparing Nasal Bougies.)

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

GELATINUM GLYCERINATUM.—Gelatin, 1; Glycerin, 1; Water, quantity sufficient to make 2 (all by weight).—*U.S.P.*

Cover the Gelatin with boiled and Distilled Water, and after one hour drain the excess of Water away; transfer to a tared dish, add the Glycerin, and heat on a water-bath until solution is effected; strain whilst hot, and evaporate to 2.

GELSEMII RADIX.

GELSEMIUM ROOT.

Fr., Gelsemium; Ger., Gelsemiumwurzel; Ital., Gelsemio; Span., Gelsemio.

The dried Rhizome and Roots of *Gelsemium nitidum*, Michaux.

The plant, Carolina Jasmine, grows in the Southern States of North America.

The root contains two alkaloids: Gelsemine and Gelseminine. It also contains B-methylæsculetin, which is identical with Gelsemic Acid.

Excellent papers on the alkaloidal content of Gelsemium Root and Rhizome appear in *Proc. Amer. Pharm. Assoc.*, liii. 282; liv. 383.

Medicinal Properties.—Antispasmodic and analgesic. Has been used in dental neuralgia, migraine, and especially in tic-douloureux (neuralgia of fifth nerve); also in uterine and ovarian pain, spasmodic and asthmatic cough, and in chorea.

This drug should be used with care, and in the event of toxic symptoms presenting themselves, artificial respiration should be carried on.—*Pr.* li. 50.

Official Preparation.—Tinctura Gelsemii.

Not Official.—Extractum Gelsemii Alcoholicum, Fluidextractum Gelsemii.

Antidotes.—Emetic of Mustard and Water, Atropine, Aromatic Spirit of Ammonia, Brandy, Nitroglycerin, and Digitalis. Artificial respiration should be kept up very steadily for at least three hours.

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

Descriptive Notes.—Gelsemium Root consists mostly of the underground stem or rhizome, with occasional pieces of the root. The rhizome is easily distinguished by the presence of a small, usually dark, pith; it has a purplish-brown longitudinally-fissured bark, which is thin (about 1 mm. *U.S.P.*) and shows when fractured a few silky fibres. The root is yellowish-brown and tortuous, but has no pith; both root and stem have a radiate woody structure with numerous medullary rays; the bark has a bitter taste and a faint, slightly aromatic, odour. The pieces vary in diameter from $\frac{1}{4}$ to $\frac{3}{4}$ of an inch (6 to 18 mm.), and about 6 to 8 inches (20 or even 30 cm.

U.S.P.) in length. According to Sayre, the root contains less of the active principle than the rhizome, but it resides almost entirely in the bark, and the tincture is therefore likely to vary in strength according to the proportion of bark present; it also varies in different samples, and a tincture made from the fresh rhizome is more active as a heart depressant. Under the microscope the structure of the root is remarkable for the thick medullary rays, which are about 6 to 8 cells in thickness, the cell walls being thick and pitted, but as they approach the cortical zone, the cells become larger, thinner walled, and many of the cells contain octahedral prisms of Calcium Oxalate. The cortical parenchyma has no stone cells nor laticiferous vessels; the liber has no lignified fibres; and the numerous vessels in the wood are isolated, not in groups.

Tests.—Although numerous processes have been published from time to time for the assay of the preparations of Gelsemium, very few give accurate or uniform results, and those which yield uniform results are too complicated for ordinary usage. A process which gives very satisfactory and concordant results, and which, when tried in the author's laboratory, was found to justify the claims made for it, is recorded, *Proc. Amer. Pharm. Assoc.* lv. (1907), 357. As carried out on the fluid extract, the details are as follows:—A measured quantity of 15 c.c. is evaporated at 60° C. (140° F.) to a soft extract, or sufficiently to dissipate the Alcohol. A measured quantity of 5 c.c. of Normal Volumetric Sulphuric Acid Solution, which has been previously diluted with an equal volume of Water, is added and the resulting mass allowed to disintegrate, when this is accomplished it is transferred to a 15 c.c. graduated cylinder and diluted to 15 c.c., it is thoroughly mixed, the precipitate allowed to settle and a measured quantity of 10 c.c. is filtered or decanted off into a separator, the acid solution is washed with Chloroform, using three separate portions each of 10 c.c., 5 c.c. and 5 c.c. The chloroformic washings are in each instance separated, mixed and in turn washed with about 5 c.c. of slightly acidulated Water, the acid aqueous washings being mixed with the main acid solution. The mixture is rendered alkaline with Ammonia Solution and the liberated alkaloids are shaken out with three successive quantities each of 15 c.c., 10 c.c. and 5 c.c. of Chloroform. A further quantity of 10 c.c. of Chloroform may occasionally be necessary to extract the whole of the alkaloids, their complete extraction may be determined by allowing a few drops of the chloroformic solution to evaporate, acidifying with dilute Sulphuric Acid and testing with a drop or two of Potassio-mercuric Iodide (Mayer's) Solution. The chloroformic liquids are in each instance separated, mixed, transferred to a tared flask, the Chloroform is evaporated and the residue dried until constant in weight, the weight of alkaloids multiplied by 20 and the product divided by 3 yields the percentage w/v of Chloroform-soluble Gelsemium alkaloids present in the specimen operated upon. The alkaloidal residues remaining from the above process were of a bright yellow colour, and were comparatively pure products. A sample of fluid extract of Gelsemium prepared in

the author's laboratory in 1885 by the then official process of the *U.S.P.*, when recently examined gave the following figures: specific gravity, 0·865; total solids, 8·74 p.c. w/v; Absolute Alcohol, 81·11 p.c. w/v; and when assayed according to the process described above yielded 0·37 p.c. w/v of Chloroform-soluble Gelsemium alkaloids.

The following constituents of Gelsemium have been described:

Gelsemin.—A name given to a resinoid and eclectic remedy, resembling the alcoholic extract.

Dose.—$\frac{1}{2}$ to 2 grains = 0·032 to 0·13 gramme.

Gelsemine, Gelsemine.—The crystallisable alkaloid forming crystalline salts, described by Gerrard (*P.J.* (3) xiii. 641) as having the formula $C_{24}H_{28}N_2O_4$, eq. 405·24 and the melting point 45° C. (113° F.). Spigel says that experiments intended to establish the formula for Gelsemine (known in Germany as **Gelseminine**) as between $C_{24}H_{28}N_2O_4$ (Gerrard) and $C_{22}H_{26}N_2O_3$ have not led to a decisive conclusion, yet the results of analyses agree more closely with the latter formula.

A brittle transparent solid, crystallising with difficulty from Alcohol. It is only sparingly soluble in Water, more readily in Alcohol (90 p.c.), and readily in Ether and Chloroform. It dissolves in strong Nitric Acid with little or no colour. When the liquid is allowed to evaporate spontaneously in porcelain, a permanent bluish-green colour is obtained. The pure alkaloid dissolves without change of colour in concentrated Sulphuric Acid, even on warming, but if not perfectly pure, a reddish or brownish colour is obtained, which gradually becomes pinkish, and on heating becomes chocolate or purple. When treated with strong Sulphuric Acid and an oxidising agent, *e.g.*, Potassium Bichromate, a fine reddish-purple or cherry-red coloration is produced, rapidly changing to a bluish-green or blue tint.

Dose.—$\frac{1}{120}$ to $\frac{1}{32}$ grain = 0·0005 to 0·002 gramme.

Care must be taken to ascertain the intention of the prescriber when any doubt exists as to whether the alkaloid or resinoid is required.

When quite free from Gelseminine, with which all early specimens were probably mixed, **Gelsemine** is stated (*Pr.* li. 38) to be without action on *mammals*, even when injected intravenously up to $\frac{1}{2}$ gramme = 7$\frac{1}{2}$ grains. Gelseminine, on the other hand, is intensely poisonous, causing a descending paralysis of the central nervous system, $\frac{1}{2}$ grain = 0·032 gramme being the calculated lethal dose for an adult. Applied locally it produces dilatation of the pupil, and it is to the action of this alkaloid, modified by the various acid resins, that the action of Gelsemium Tincture is mainly due.

Gelseminæ Hydrochloridum.—Colourless crystals, soluble in Water. Known in Germany as **Gelsemininum Hydrochloricum Cryst.**

Dose.—$\frac{1}{120}$ to $\frac{1}{32}$ grain = 0·0005 to 0·002 gramme.

Gelseminine.—A white amorphous powder, which softens at 105° C. (221° F.), and melts at 120° C. (248° F.) with partial decomposition. Insoluble in Water, soluble in Alcohol (90 p.c.), Ether and in Chloroform. With dilute Nitric Acid it yields a brown coloration, with concentrated Nitric Acid a green coloration, and with Sulphuric Acid a yellow coloration, changing on the addition of an oxidising agent, *e.g.*, Potassium Bichromate, to violet and, finally, green. It is intensely bitter and poisonous.

Gelsemic Acid is not known to have any medicinal properties, but affords reactions, which to some extent serve as a test for Gelsemium preparations, particularly the blue fluorescence which it produces in alkaline solutions.

Colourless, odourless and nearly tasteless groups or tufts of prisms, or in minute scales and plates. It is not distinctly acid to Litmus paper. It is soluble in hot Water, readily soluble in Alcohol (90 p.c.), and in Ether and Chloroform. It dissolves in solutions of the fixed alkalis and in Ammonia

Solution, forming a solution having an intensely yellow colour by transmitted light, but which by reflected light exhibits a strong green fluorescence, which is readily destroyed by free acids. It dissolves in Nitric Acid with the production of a yellow or orange colour, changing, on the addition of an excess of Ammonia Solution, to a blood-red coloration.

Preparation.

TINCTURA GELSEMII. TINCTURE OF GELSEMIUM.

1 of Gelsemium Root, in No. 40 powder, percolated with Alcohol (60 p.c.) to yield 10. (1 in 10)

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

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

Foreign Pharmacopœias.—Official in Mex., 1 in 5; Swiss and U.S., 1 in 10; Jap., 1 in 8. All by weight except U.S. Not in the others.

A girl 9 years old was killed in two hours by 2 fl. drm. = 7·1 c.c. of the Tincture.

Tests.—Tincture of Gelsemium has a sp. gr. of 0·920 to 0·925; it contains about 1·5 p.c. w/v of total solids and about 58 p.c. w/v of Absolute Alcohol. When assayed according to the process described under Gelsemii Radix the *B.P.* Tincture yielded 0·043 p.c. w/v of Chloroform-soluble Gelsemium alkaloids. A specimen of the *U.S.P.* Tincture prepared and examined in the author's laboratory had a specific gravity of 0·913, it contained 1·8 p.c. w/v of total solids. When assayed according to the process recommended under Gelsemii Radix it yielded 0·048 p.c. w/v of Chloroform-soluble Gelsemium alkaloids.

A standard of 0·025 p.c. w/v of Gelsemine has been suggested for the Tincture, but a standard of total alkaloids is suggested as a safer basis.—*Y.P.B.* '04, 279.

The Rhizome contains from 0·38 to 0·7 p.c. of total alkaloids, so that 0·5 p.c. might be regarded as a suitable standard, equal to 00·5 p.c. of total alkaloids for the Tincture.

The percentage of alkaloids in the Tincture may vary between 00·2 and 0·076 p.c. w/v, but standardisation, according to total alkaloids without the ratio of the two alkaloids, may be of doubtful value.

Not Official.

EXTRACTUM GELSEMII ALCOHOLICUM.—Gelsemium in No. 60 powder percolated with Rectified Spirit and evaporated to an extract.—*B.P.* '85.

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

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

FLUIDEXTRACTUM GELSEMII.—Percolate 100 of Gelsemium in No. 60 powder with Alcohol (95 p.c.) until exhausted, reserve the first 90 of percolate and evaporate the remainder to a soft extract, which mix with the reserved portion and make up to 100.—*U.S.P.*

Average dose.—One minim = 0·06 c.c.

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

GENTIANÆ RADIX.

GENTIAN ROOT.

Fr., Racine de Gentiane; Ger., Enzianwurzel; Ital., Genziana; Span., Genciana.

The dried Rhizome and Roots of *Gentiana lutea*, L.

Collected in the mountainous districts of central and southern Europe.

The active principle **Gentiopicrin** is a neutral crystalline body, soluble in Water and diluted Alcohol, insoluble in Ether.

Medicinal Properties.—Bitter tonic; used in cases of atonic dyspepsia; the infusion is recommended in the vomiting of pregnancy, along with a mineral acid, or when a general tonic is required, as in convalescence from acute diseases or in nervous debility.

For the ordinary phthisical patient nothing is better in the way of drugs to promote appetite and aid digestion than the time-honoured Mistura Gentianæ Alkalina of the Brompton Hospital Pharmacopœia.—*L.* '04, ii. 1827.

The extract has been largely used as an excipient to form powders into pills.

Official Preparations.—Extractum Gentianæ, Infusum Gentianæ Compositum, and Tinctura Gentianæ Composita.

Not Official.—Extractum Gentianæ, Fluidextractum Gentianæ; Infusum Gentianæ Compositum Concentratum, Aromatic Infusion of Gentian, Mistura Gentianæ, Mistura Gentianæ Alkalina, Mistura Gentianæ cum Soda, Mistura Gentianæ Acida, Tinctura Gentianæ.

Incompatibles.—Ferrous Sulphate, Silver Nitrate, and Lead salts.

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

Descriptive Notes.—The official Gentian Root is that of *Gentiana lutea*. As met with in commerce, Gentian Root consists of more or less rootstock continuous with the root; the rootstock being marked with crowded rings of leaf scars, but the root is longitudinally wrinkled. It varies much in length and thickness; seldom exceeding an inch (2½ cm.) in diameter, *B.P.*; 5 to 35 mm. (⅕ to 1½ inch), *U.S.P.*; Gentian Root is usually somewhat flexible and tough, with a soft fracture showing no woody tissue or medullary rays, but when recently dried is harder and brittle. Externally it is of a yellowish-brown colour, but internally more of an orange tint or reddish-yellow. The reddish colour, which causes it to be distinguished on the Continent as Red Gentian Root, is partly the result of fermentation before the root is dried, by which the characteristic odour is also more developed. The taste is sweet at first, but soon afterwards bitter. There is occasionally met with in English commerce a root with a paler fracture, known as White Gentian, which is disagreeably bitter, and should therefore not be substituted for the Official kind. It is imported from Bordeaux, and is probably derived from *Gentiana Burseri*, Lapeyr., and is not fermented before drying. Under the microscope the tissue is seen to be devoid of sclerenchymatous cells; contains minute Calcium Oxalate crystals, and rarely a few simple starch grains. The wood possesses sieve-tubes besides reticulated

vessels, *P.G.* and Jap. The *B.P.* requires that it should not yield any definite reactions with the tests for Starch. It has been found to be adulterated with 20 p.c. of ground olive stones, and a conviction obtained, *P.J.* (4) xxiv. 339. The *P.G.* permits the use of other species besides *G. lutea*, L., including *G. Pannonica*, Scop., *G. purpurea*, L., and *G. punctata*, L. The root of *Gentiana purpurea* has a branched appearance at the apex, due to several stems arising from the crown of one root, but is even more bitter than that of *G. lutea*. The roots of *G. punctata* have a similar appearance, but are a brighter reddish-brown internally. That of *G. Pannonica* is more slender, rarely exceeding 10 mm. in diameter, and has few slender branches. It is likely to occur in root imported from Austria, since it occurs abundantly in the Austrian Alps, where *G. lutea* does not occur.

Tests.—Gentian Root yields about 4 p.c. of ash. Samples examined in the author's laboratory gave from 2·2 to 5·6 p.c., with an average of 3·5 p.c.

Preparations.

EXTRACTUM GENTIANÆ. Extract of Gentian.

An aqueous Extract of Gentian Root; made by maceration with cold Water for 2 hours, boiling for 15 minutes, and evaporation of the strained liquid.

Dose.—2 to 8 grains = 0·13 to 0·52 gramme.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ital., Jap., Mex., Port., Russ., Span., Swed. and U.S., with cold Water; Hung., with hot Water; Ger., Norw. and Swiss, with cold Water, and purified with Alcohol; Dan. and U.S., also **Fluid Extract**, 1 in 1.

INFUSUM GENTIANÆ COMPOSITUM. Compound Infusion of Gentian.

Gentian Root, $\frac{1}{4}$; Dried Bitter-Orange Peel, $\frac{1}{4}$; Fresh Lemon Peel, $\frac{1}{2}$; boiling Distilled Water, 20. Infuse 15 minutes. (1 in 80)

Dose.—$\frac{1}{2}$ to 1 fl. oz. = 14·2 to 28·4 c.c.

Foreign Pharmacopœias.—Official in Fr. (Tisane), Gentian Root 1, cold Water 200; Swed., similar to Brit. Not in the others.

TINCTURA GENTIANÆ COMPOSITA. Compound Tincture of Gentian.

Gentian Root, 2; Dried Bitter-Orange Peel, $\frac{3}{4}$; Cardamom Seeds, $\frac{1}{4}$; macerated with 20 of Alcohol (45 p.c.). (1 in 10)

Dose.—$\frac{1}{2}$ to 1 fl. drm. = 1·8 to 3·6 c.c.

Tests.—Compound Tincture of Gentian has a sp. gr. of 0·965 to 0·970; it contains about 5 p.c. w/v of total solids and about 43 p.c. w/v of Absolute Alcohol.

Foreign Pharmacopœias.—Official in Jap., Mex. and U.S., similar to Brit.; Port., twice as strong as Brit. Not in the others.

Tinctura Gentianæ Composita.—Gentian, 10; Bitter-Orange Peel, 4; Cardamom, 1; Alcohol (95 p.c.), 60 and 40 of Water (mixed). Percolate slowly until exhausted and make up with menstruum to 100.—*U.S.P.*

A simple tincture is official in most Foreign Pharmacopœias, *see* below.

Not Official.

EXTRACTUM GENTIANÆ (*U.S.P.*)—Macerate 100 of Gentian in No. 20 powder with 40 of cold Water for 24 hours, exhaust by percolation with more Water, reduce the liquid to three-fourths of its bulk by boiling, strain; then by means of a water-bath evaporate to a pilular consistence.

FLUIDEXTRACTUM GENTIANÆ (*U.S.P.*).—Exhaust 100 of Gentian in No. 30 powder with Alcohol (49 p.c.), reserve the first 80 of percolate, and evaporate the remainder to a soft extract, which dissolve in the reserved portion, and make up with Alcohol (49 p.c.) to 100.

INFUSUM GENTIANÆ COMPOSITUM CONCENTRATUM.—Gentian Root in No. 10 powder, 10; Dried Bitter-Orange Peel in No. 10 powder, 10; Tincture of Lemon, 10; Tincture of Orange, 5; Alcohol (90 p.c.), 17·5; Dilute Chloroform Water (1 in 1000) sufficient to make 100. Mix the tinctures with the Alcohol, and repercolate the drugs with dilute Chloroform Water, adding the mixed tinctures to the reserved portion.

Dose.—½ to 1 fl. drm.—*Farr* and *Wright*, *P.J.* '06, i. 165 and '07, i. 622; *C.D.* '06, i. 252; *Y.B.P.* '07, 250.

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

MISTURA GENTIANÆ.—Gentian Root, sliced, ¼ oz.; Bitter-Orange Peel cut small, 30 grains; Coriander Fruit, bruised, 30 grains; Proof Spirit, 2 fl. oz. Distilled Water, 8 fl. oz.—*B.P.* '67.

Macerate the ingredients first in the Proof Spirit for two hours, then add the Water, macerate again for two hours, and strain through calico.

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

Gentian Root, sliced, 2·50; Bitter-Orange Peel, cut small, 0·75; Coriander Fruit, bruised, 0·75; Alcohol (60 p.c.), 20; Distilled Water, 100.—*B.P.C.*

Same directions as above.

Mistura Amaro-alkalina (Gentian Mixture) is official in Dan.

MISTURA GENTIANÆ ALKALINA.—Sodium Bicarbonate, 15 grains; Diluted Hydrocyanic Acid, 3 minims; Aromatic Infusion of Gentian, to 1 fl. oz.—*Brompton.*

Aromatic Infusion of Gentian (*Brompton*).—Gentian, 2 oz.; Lemon Peel, 6 drm.; Orange Peel, 3 drm.; Boiling Water, 1 gallon.

MISTURA GENTIANÆ CUM SODA.—Sodium Bicarbonate, 15 grains; Compound Infusion of Gentian, to 1 fl. oz.—*St. Thomas's.*

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

MISTURA GENTIANÆ ACIDA.—Diluted Nitro-hydrochloric Acid, 10 minims; Spirit of Chloroform, 5 minims; Compound Infusion of Gentian, to 1 fl. oz.—*Royal Free.*

Diluted Nitro-Hydrochloric Acid, 10 minims; Spirit of Chloroform, 10 minims; Compound Infusion of Gentian, to 1 fl. oz.—*B.P.C.*

TINCTURA GENTIANÆ (*Ger.*).—Gentian Root, 1; Alcohol (90 p.c.), 5; by weight.

This is also official in Austr., Belg., Dan., Dutch, Fr., Ger., Ital., Jap., Mex., Norw., Port., Russ., Span. and Swiss; 1 in 5. All by weight.

Gentian Root, 1; Alcohol (45 p.c.), 10; by maceration.—(*B.P.C.*).

Not Official.

LIQUID GLUCOSE.

As met with in commerce, it is clear, almost colourless, devoid of smell, and resembles in consistence Canada Balsam. It should be free from Arsenic.

In exhausting diseases, subcutaneous injection of 25 grammes in 24 hours, of a 5 p.c. solution.—*B.M.J.* '02, i. 770.

It forms an excellent excipient for pills, more particularly when diluted with Syrup.

DILUTED GLUCOSE.—Glucose, 3 oz.; Syrup, 1 fl. oz.; mix.
A good excipient for pills.
The following, which is apparently introduced for this purpose, does not answer so well, as it is not sufficiently adhesive.

Official Preparation.

SYRUPUS GLUCOSI. SYRUP OF GLUCOSE.
Liquid Glucose, 1; Syrup, 2. Mix at a gentle heat.

GLUSIDUM.

GLUSIDE.

$C_7H_5NSO_3$, eq. 181·77.

BENZOYL SULPHONIMIDE.

B.P.Syn.—GLUCUSIMIDE.

FR., SACCHARINE; GER., BENZÖESÄURESULFINID; ITAL., SACCARINA; SPAN., SACARINA.

A white crystalline powder, possessing an exceedingly sweet characteristic taste.

Gluside is the anhydride of Ortho-sulphamide-benzoic Acid.

Although the *B.P.* formula $C_6H_4COSO_2NH$ is attached to the synonym Benzoyl sulphonimide, it is not to be inferred that, commercially, Saccharin is sufficiently pure to allow of its representation by this or any other formula.

Commercial Saccharin is not a pure product, but is 'standardised' to 300 times the sweetening power of Cane Sugar, the pure chemical (Saccharin puriss.) to 500 times its weight of Sugar. The proportion of impurity may be estimated by treatment with Acetone, in which the pure salt is completely soluble.

Orthobenzoicsulphinide (commercial Saccharin) is put on the market as a white micro-crystalline powder containing a considerable proportion of Para-sulphaminebenzoic Acid.

Commonly known as 'Saccharin.'

The Saccharin Corporation supplies Saccharin of the following strengths:—330, 450, 500, 550. The last corresponds with Glusidum, *B.P.*

Solubility.—1 in 400 of cold Water; 1 in 28 of boiling Water; 1 in 38 of Alcohol (90 p.c.); 1 in 100 of Ether; 1 in 500 of Chloroform; 1 in 48 of Glycerin.

It is also readily soluble in all alkaline solutions, either of Hydroxide, Carbonate, or Bicarbonate, acting the part of an acid and displacing Carbonic Acid when present. *See* 'Soluble Saccharin.'

Medicinal Properties.—It is used as a substitute for Sugar in diabetes and hepatic diseases and corpulence, and to cover the taste of nauseous drugs. It is eliminated as Gluside in the urine and saliva.

1 grain sweetens 6 to 8 oz. of fluid.

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

Not Official.—Saccharinum Solubile, Elixir Glusidi and Tabellæ Saccharini (Saccharin Discs), Sucrol.

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

Tests.—The m.p. of pure Benzoyl sulphinide is 224° C. (435·2° F.), 223·5° C. (434·3° F.) is given in the *Fr. Codex*. The *B.P.* m.p. for the substance recrystallised from warm Water is between 218° and 219° C. (424·4° and 426·2° F.); the *U.S.P.* gives 219° to 220° C. (426·2° to 428° F.). It possesses an intensely sweet taste, which is perceptible in solutions up to 1 in 100,000 of Water. When moistened with an excess of Potassium Hydroxide Solution, dried, the residue gently fused for several minutes, cooled, dissolved in Water and the solution is faintly acidified with diluted Hydrochloric Acid, it yields with Ferric Chloride T.S. a purple-violet coloration. When fused with a mixture of Potassium and Sodium Carbonates and Potassium Nitrate, the residue dissolved in Water, and the solution filtered, the filtrate yields with Barium Chloride Solution, after acidification with diluted Hydrochloric Acid, a copious white precipitate insoluble in Hydrochloric Acid. 0·01 gramme, heated with an equal weight of Resorcin and a few drops of Sulphuric Acid, yields a mixture at first yellowish-red and then greenish-brown. If the residue is dissolved in cold Water and an excess of Sodium Hydroxide (15 p.c.) added, the mixture assumes a strong green fluorescence. It dissolves with effervescence in warm Sodium Bicarbonate Solution forming 'soluble Gluside' or 'soluble Saccharin,' 100 parts of Gluside yielding nearly 113 parts of neutral 'soluble Gluside.'

The more generally occurring impurities are organic impurities, readily charred by Sulphuric Acid, Glucose, and other reducing Sugars, *e.g.* Milk Sugar, Ammonium salts, Benzoic or Salicylic Acid, and inorganic impurities. The *B.P.* is content with a Sulphuric Acid test for Sugar, and does not include tests, other than the m. p. for any of the remaining impurities. It states that no blackening should occur even when the mixture is gently warmed with Sulphuric Acid. The *U.S.P.* gives the respective quantities of substance and reagent to be employed, the temperature at which the mixture is to be maintained, and the time allowed for the test. Glucose may be detected by Potassium Hydroxide Solution; a test for Milk Sugar and a supplementary test for Glucose is afforded by Potassio-cupric Tartrate (Fehling's) Solution; the substance should not evolve an odour of Ammonia when warmed with Calcined Magnesia and Water; Benzoic or Salicylic Acid are detected in a saturated aqueous solution by the Ferric Chloride test described below, and inorganic impurities by the ash left on ignition, which should amount at the highest to 0·5 p.c.

Alkali Hydroxide and Sodium Bicarbonate.—Gluside is readily soluble in T.S. of Ammonia, *B.P.* and *U.S.P.*; in Alkali Hydroxide solutions, *U.S.P.*; in T.S. of Sodium Bicarbonate with evolution of Carbon Dioxide, *B.P.* and *U.S.P.*

Sulphuric Acid.—If 0·2 gramme of Benzosulphinide be dissolved with agitation in 10 c.c. of pure Sulphuric Acid, and the solution kept at a temperature of from 48° to 50° C. (118·4° to 122·2° F.) on a water-bath, it should not within 10 minutes show a brown colour, *U.S.P.*

Potassium Hydroxide.—The solution of 0·2 gramme in 5 c.c. of T.S. of Potassium Hydroxide should be clear even after prolonged heating, *U.S.P.*

Cupric Tartrate.—A solution of Benzosulphinide in T.S. of Potassium

Hydroxide similar to the above should not, on heating with 5 c.c. of Volumetric Solution of Alkaline Cupric Tartrate, deposit any red Cuprous Oxide, *U.S.P.*

Ferric Chloride.—No precipitate or violet colour should appear when T.S. of Ferric Chloride is added drop by drop to a hot aqueous solution of Benzosulphinide, *U.S.P.*

Not Official.

SACCHARINUM SOLUBILE ('SOLUBLE GLUSIDE').—A soluble Sodium Gluside, containing about 90 p.c. of Gluside. It is much more palatable than ordinary Gluside, which leaves a disagreeable after-taste.

This powder is soluble 1 in 15 of Water.

ELIXIR GLUSIDI. *Syn.* ELIXIR SACCHARINI.—Dissolve 5 of Gluside with 3 of Sodium Bicarbonate in 80 of Distilled Water, add 12½ of Alcohol, filter, and wash the filter with Distilled Water to produce 100.—*B.P.C.*

This is a modification of *B.P.C. Formulary* '01.

Dose.—5 to 20 minims.

TABELLÆ SACCHARINI (SACCHARIN DISCS).—Contain ½ grain = 0·032 gramme Saccharin in each. Should be readily soluble in Water, and should not contain Starch or Sugar.

Sucrol (Dulcin).—Paraphenetol Carbonide is a powerful sweetening agent which occurs in small glistening crystals; it is said to possess about 200 times the sweetening power of Sugar.

GLYCERINUM.

GLYCERIN. GLYCEROL.

FR., GLYCERINE OFFICINALE; GER., GLYCERIN; ITAL., GLICERINA; SPAN., GLYCERINA.

A Trihydric Alcohol, $C_3H_8O_3$, eq. 91·37, containing a small percentage of Water; obtained during the saponification of fats and fixed oils by the action of alkalis, or by their hydrolysis by means of superheated steam.

Glycerin is always produced during the alcoholic fermentation of Sugar to the extent of 3 p.c. of the Sugar employed, and consequently is present in all fermented liquids.

A clear, colourless and odourless thick syrupy hygroscopic liquid, possessing a characteristically sweet taste and producing a sense of warmth in the mouth. It should be kept in well-closed vessels.

Solubility.—Mixes in all proportions with Water and Alcohol, but insoluble in Chloroform, Ether and Oils.

It possesses great powers as a solvent, and is an excellent excipient for many medicinal substances.

Medicinal Properties.—Undiluted it is an irritant, but diluted with aqueous menstrua it is emollient. It is a mild laxative. Internally it is given in irritating cough; it is recommended as a **rectal injection** for constipation, 1 to 2 drm., or the same diluted with an equal quantity of Water produces an evacuation very soon after the injection; also combined with Gelatin or Cocoa-nut Stearin to form a **suppository** for the same purpose; it is very convenient, but may aggravate hæmorrhoids if present.

Externally, a useful addition to lotions and other applications in skin diseases, as pityriasis, eczema, psoriasis, prurigo and lichen.

Used for chilblains and chapped hands, and dryness of the skin or mucous membranes, but it should be diluted with 3 parts of Water for these purposes, or applied in the form of Glycerin of Starch. Used in poultices ($\frac{1}{14}$ or $\frac{1}{16}$) it keeps them soft for a long time.

It is useful in fermentative dyspepsia, when taken in 1 or 2 drm. doses, and does not hinder digestion.—*L.* '80, ii. 6; '96, ii. 25.

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

Smaller doses are usually prescribed.

Prescribing Notes.—*It is much employed as a sweetening agent in the place of Syrup, and is better for covering the unpleasant astringent taste of Iron Perchloride; it is largely used in pharmaceutical preparations as a solvent, and, being an antiseptic, it also acts as a preservative. Mixed with equal volumes of Syrup, Alcohol and Mucilage, it forms a good pill excipient. It is too hygroscopic to be used alone.*

Official Preparation.—Suppositoria Glycerini. Used in the preparation of Extractum Cinchonæ Liquidum, Extractum Sarsæ Liquidum, of all the Glycerina and Lamellæ, Linimentum Potasii Iodidi cum Sapone, Liquor Ethyl Nitritis, Liquor Thyrodei, Lotio Hydrargyri Nigra, Mel Boracis, Pilula Ferri, Pilula Quininæ Sulphatis, Syrupus Pruni Virginianæ, Tinctura Kino, Tinctura Rhei Composita, Unguentum Acidi Carbolici, Unguentum Iodi, and Unguentum Suphuris Iodidi.

Not Official.—Dispensing Syrup, Glycerin with Rose Water, Suppositoria Glycerini, Suppositoria Glycerini cum Stearino.

Foreign Pharmacopœias.—Official in Austr., sp. gr. 1·250; Belg., sp. gr. 1·240; Dan., Ger., Hung., Jap., Norw., Russ. and Swed., sp. gr. 1·225 to 1·235; Dutch, sp. gr. 1·230 to 1·235; Fr., sp. gr. 1·264; Ital., sp. gr. 1·226 to 1·260; Mex., Port. and Span., sp. gr. 1·260; Swiss, sp. gr. 1·224 to 1·235; U.S., not less than 1·246 at 25° C. (77° F.).

Tests.—Glycerin has a sp. gr. of 1·260, which figure is given in the *B.P.*; the *U.S.P.* gives not less than 1·246 at 25° C. (77° F.); the *P.G.* 1·225 to 1·235. The aqueous solution is neutral to Litmus paper. When heated in an open capsule it yields irritating acrid vapours of Acrolein. Dilute aqueous solutions are slowly volatilised with the vapour of Water, whilst stronger solutions rapidly volatilise at boiling temperatures. A loop of Platinum Wire, containing a fused bead of Borax moistened with Glycerin, imparts to the edge of a non-luminous flame a transient vivid green colour. When boiled with Potassium or Sodium Hydroxide and Potassium Permanganate Solution, the latter is immediately reduced. The filtered liquid, when made faintly acid with Acetic Acid, yields with Calcium Chloride Solution a white precipitate, insoluble in Acetic Acid, soluble in Hydrochloric Acid. This reaction with alkaline Permanganate forms the basis of a method for the determination of Glycerin which, in the absence of foreign bodies yielding Oxalic Acid on oxidation, has been proved to give very accurate results.

The more generally occurring impurities are those of an inorganic nature, *e.g.*, Arsenic, Copper, Lead, Iron, Calcium, Potassium, Sodium, Ammonium, Chlorides and Sulphates, and mineral impurities, those of an organic nature, Sugars, *e.g.*, Grape and Cane Sugar, foreign organic matter, *e.g.*, Acrolein, Formic Acid or Formates, Butyric Acid, Oxalic Acid or Oxalates, and organic impurities readily charred by Sulphuric Acid. The *B.P.* employs Siebold's modification of the

Gutzeit's test for the detection of Arsenic, which approximately indicates 1 part of Arsenic in 250,000 of Glycerin. The *P.G.* employs the Bettendorf's test, the *U.S.P.* their modified Gutzeit's test, which indicates less than 1 in 100,000. A standard of not less than 2 parts of Arsenic per million is suggested (*C.D.* '08, i. 796). A very great majority of about 450 samples mentioned in this reference showed less than this figure; 4 parts per million, however, may be considered by some to be a sufficiently low limit. Copper, Lead and Iron are detected by Hydrogen Sulphide Solution, the two former in slightly acid, the latter in alkaline solution; Calcium by Ammonium Oxalate Solution; Potassium and Sodium in the residual liquid after separation of the other metals; Ammonium by boiling with Potassium or Sodium Hydroxide Solution. The three latter, however, are unlikely impurities. Chlorides and Sulphates are detected by Silver Nitrate and Barium Chloride or Nitrate solutions respectively.

The *B.P.* and the *U.S.P.* employ Potassio-cupric Tartrate (Fehling's) Solution as a test for Cane and Grape Sugars, the *B.P.* requiring that no precipitate shall be produced even after previous acidification and boiling. The *U.S.P.* specifies quantities of substance and reagent to be used for the inversion, quantity of reagent to be used for precipitation, and time limit within which no cloudiness or precipitate is permitted. Acrolein, Formic Acid or Formates, classed by the *B.P.* as foreign organic matter, may be detected by Silver Ammonio-nitrate Solution. With regard to this test more explicit directions are contained in the *P.G.* monograph than in either the *B.P.* or the *U.S.P.*; the quantities and temperature to which the mixed solutions are to be heated are given, and a definite interval of time (5 minutes), during which neither coloration nor brownish-black deposit should appear, are given. The test for Butyric Acid is, save for the difference in the strengths of the Alcohol, virtually the same in the *B.P.* and the *U.S.P.* The *U.S.P.* and *P.G.* include a test for Oxalic Acid with Calcium Chloride T.S., but no test appears in the *B.P.* The *U.S.P.* adopts a time limit of one hour during which, in testing for readily charred organic impurities, the mixture of Glycerin and Sulphuric Acid is required to develop a colour not darker than yellow. The *B.P.* adopts no time limit. Glycerin should be entirely dissipated when heated at a high temperature, and on ignition should leave no fixed residue. Each of the above tests appears in small type below, with a further detailed comparison between the pharmacopœial methods of application.

Potassio-cupric Tartrate.—Even after it has been acidified with a dilute mineral acid and boiled, Glycerin should give no red precipitate when boiled with excess of T.S. of Potassio-cupric Tartrate, *B.P.*; 5 c.c. of Glycerin mixed with 50 c.c. of Water and 10 drops of Hydrochloric Acid in a small flask, and heated for half an hour on a water-bath, 10 c.c. of this hot liquid mixed with 2 c.c. of Sodium Hydroxide T.S. and 1 c.c. of Alkaline Cupric Tartrate Volumetric Solution should show no yellowish-red cloudiness or precipitate within 6 hours, *U.S.P.*

Sulphuric Acid.—It is officially required to yield either no coloration at all, or at the most a very pale straw coloration when 5 c.c. of Glycerin is shaken with 5 c.c. of Sulphuric Acid, care being taken to keep the mixture well cooled.

A mixture of 5 c.c. each of Glycerin and Sulphuric Acid should acquire, on standing for 1 hour, a colour not darker than yellow, *U.S.P.*

Diluted Sulphuric Acid.—1 c.c. of Glycerin, warmed gently with 1 c.c. diluted Sulphuric Acid, should not give off an unpleasant rancid odour, *P.G.*

Alcohol (90 p.c.) and diluted Sulphuric Acid.—It is officially required that no fruity odour should be produced when equal volumes of Glycerin and a mixture of Alcohol (90 p.c.) and diluted Sulphuric Acid are gently heated together. 5 c.c. of Glycerin mixed with an equal volume of Alcohol (94·9 p.c.) and diluted Sulphuric Acid and gently heated, no fruity odour should be recognisable, *U.S.P.*

Barium Nitrate or Chloride.—A portion of an aqueous solution (1–5 *P.G.*, 1–10 *U.S.P.*) should be unaffected by T.S. of Barium Nitrate. *P.G.*, by T.S. of Barium Chloride, *U.S.P.*

Ammonium Oxalate.—A portion of an aqueous solution, as above, should be unaffected by T.S. of Ammonium Oxalate, *P.G.* and *U.S.P.*

Calcium Chloride.—A portion of an aqueous solution, as above, should be unaffected by T.S. of Calcium Chloride, *P.G.* and *U.S.P.*

Silver Nitrate.—A portion of an aqueous solution, as above, should yield no colour, cloudiness or precipitate with T.S. of Silver Nitrate, *U.S.P.*; should yield not more than an opalescent turbidity, *P.G.*

Ammonia and Silver Nitrate.—It is officially required that at the ordinary temperature no darkening in colour should be produced when a few drops of Silver Nitrate Solution are added to a mixture of Glycerin and Ammonia Solution in equal volumes. 1 gramme of Glycerin and 1 c.c. of Ammonia T.S. warmed on a water-bath to 60° C. (140° F.) and then mixed with 3 drops of Silver Nitrate T.S., there should be neither coloration nor a brownish-black deposit in the mixture within 5 minutes, *P.G.*; no colour, cloudiness or precipitate should appear when an aqueous solution of Glycerin (1–10) is treated in a test-tube with Ammonio-Silver Nitrate T.S., the tube being loosely stoppered to protect it from impurities, and allowed to stand, protected from light, for at least 5 minutes, *U.S.P.*

Sodium Hydroxide.—1 c.c. of Glycerin warmed with Sodium Hydroxide T.S. should neither become coloured nor evolve ammonia or any odour resembling that of glue, *P.G.*

Stannous Chloride.—A mixture of 1 c.c. of Glycerin and 3 c.c. of Stannous Chloride T.S. should not assume a dark colour in the course of an hour, *P.G.*

Hydrogen Sulphide.—An aqueous solution (1–5) should not be affected by T.S. of Hydrogen Sulphide, *P.G.*; an aqueous solution (1–20), acidified with Hydrochloric Acid, should not respond to the time-limit test for heavy metals, *U.S.P.*

Gutzeit's Test.—5 c.c. of an aqueous solution (1 in 10) should not respond to the modified Gutzeit's test for Arsenic, *U.S.P.* It is officially required that within 15 minutes no yellow stain should be produced on a piece of filter paper which has been previously moistened with a drop or two of Mercuric Chloride T.S. and dried, and which is supported over the mouth of a test-tube containing 1 gramme of Arsenic-free Zinc, 5 c.c. of an aqueous 12½ p.c. solution of Hydrochloric Acid (*B.P.*) and 2 c.c. of Glycerin.

Preparations.

SUPPOSITORIA GLYCERINI. GLYCERIN SUPPOSITORIES.

Using a tared basin, ½ oz. of Gelatin, cut small, is covered with Distilled Water, which after two minutes is poured away. When the Gelatin is quite soft, dissolve in 2½ oz. of Glycerin (by weight) on a water-bath, and then evaporate the excess of Water until the product weighs 1563 grains. The mass will contain about 70 p.c. w/w of

Glycerin. It may be moulded into any convenient size when required.

A similar preparation has been in use for many years (*Companion* 1877) as a basis for medicated Pessaries and Suppositories. The formula in the *Companion* arrives at the same result (70 p.c.) *without* evaporation. It is easy by evaporation to obtain a product containing 80 p.c. of Glycerin. The consistency of the mass will vary somewhat with the quality of the Gelatin, *see* p. 556.

Foreign Pharmacopœias.—Official in Austr., Jap. and U.S., Glycerin, Sodium Carbonate and Stearin; Belg., Fr., Mex., and Swiss.

Glycerin Suppositories are much more convenient to use when made with **Cocoa-nut Stearin**, *see* below.

Not Official.

DISPENSING SYRUP.—Glycerin, Syrup, Alcohol (90 p.c.), and Mucilage of Acacia, equal volumes.

An **excipient for pills.** Glycerin by itself is too hygroscopic.

GLYCERIN WITH ROSE WATER.—Glycerin, 1; Rose Water, 3; mix.

SUPPOSITORIA GLYCERINI (*U.S.P.*).—Dissolve 1 of Monohydrated Sodium Carbonate in 10 of Water and add to it 60 of Glycerin (by weight) and 4 of Stearic Acid, heat carefully on a water-bath until effervescence ceases and the liquid is clear. This quantity is for 20 rectal suppositories, which must be kept in tightly-covered glass vessels.

The *B.P.C.* describes it as using equal parts of Monohydrated Sodium Carbonate and Water, but this is due to the omission of a decimal point.

SUPPPOSITORIA GLYCERINI C. STEARINO.—Glycerin, 20 grains; Cocoa-nut Stearin, 40 grains; melt the Stearin, and when just fluid stir in the Glycerin and continue the stirring until the mixture becomes solid. Melt the mass with the least possible heat, and pour into moulds.

They can be used without any lubricant.

UNGUENTUM GLYCERINI. *See* GLYCERINUM AMYLI.

GLYCYRRHIZÆ RADIX.

LIQUORICE ROOT.

FR., RÉGLISSE; GER., SÜSSHOLZ; ITAL., LIQUIRIZIA; SPAN., REGALIZ.

The Root and subterranean Stem, both peeled, of *Glycyrrhiza glabra*, L., and other species.

In the *U.S.P.* the unpeeled Spanish and the peeled Russian root are both official; in the *P.G.* the Russian peeled root is ordered.

The principle **Glycyrrhizin** is comparatively tasteless, the characteristic sweetness being only developed by combination with alkali. It exists in the drug as a combination with Ammonium.

Medicinal Properties.—A demulcent and expectorant in bronchial catarrh and cough. The **liquid extract** helps to disguise the taste of nauseous medicines, but many persons object to the taste of Liquorice. In the form of **extract** and its solution it is a domestic remedy for cough. The **compound powder** is chiefly valuable on account of the Senna and Sulphur it contains, and is an agreeable and mild purgative, well adapted for weak persons and for cases of hæmorrhoids.

Official Preparations of Liquorice.—Of the **Root,** Extractum Glycyrrhizæ, Extractum Glycyrrhizæ Liquidum, Liquor Sarsæ Compositus Concentratus, Pilula Hydrargyri, and Pulvis Glycyrrhizæ Compositus; of the **Extract,** Confectio Sennæ and Decoctum Aloes Compositum; Extractum Glycyrrhizæ Spirituosum, of the **Liquid Extract,** Mistura Sennæ Composita and Tinctura Aloes.

Not Official.—Elixir Adjuvans, Elixir e Succo Glycyrrhizæ *seu* Elixir Pectorale, Glycyrrhizinum Ammoniatum, Mistura Glycyrrhizæ Composita, Pulvis Amygdatæ Laxativus, Syrupus Glycyrrizhæ, and Trochisci Glycyrrhizæ.

Foreign Pharmacopœias.—Official in all the Pharmacopœias; Austr., Belg., Dan., Dutch., Fr. (Réglisse), Hung., Ital. (Liquirizia), Jap. and Ger. (Liquiritia), Mex. (Orozuz), Port. (Alcacus), Russ., Span. (Regaliz), Swiss and U.S.; all *G. glabra.*

Descriptive Notes.—The Liquorice Root of commerce exists in several forms. The English root is never sold in the decorticated form, but either fresh or dried. Some of the fresh Liquorice Root of commerce also comes from France. The dried Liquorice Root consists of the product of at least two plants.

That derived from France, Spain and Sicily is the product of *G. glabra*; but that from Russia, Asia Minor and Persia is chiefly the product of *G. glandulifera*, and is recognisable by its redder tint, more scaly surface, and slight acridity and bitterness. As a rule the Liquorice Root of commerce consists of a larger proportion of underground stem than of root. As the root is sweeter than the stem, samples richest in root are of greater value. The root of *G. glabra* has a thin brown bark, marked here and there with short transverse scars, is yellowish within and has a radiate and porous woody structure and a fibrous fracture, a sweet taste and characteristic odour and flavour when chewed. The underground stem does not exhibit transverse scars, but at the cut ends shows a small central depression caused by shrinkage of the pith.

French Liquorice Root is usually of good quality, and is also sold in the decorticated or peeled form. Spanish Liquorice Root from Tortosa occurs in trimmed bundles of uniform size and length and of fairly uniform pieces; that from Alicante in loosely packed bales, the root being of varying size and quantity. Sicilian Liquorice is usually peeled and, like the French, often cut up into short pieces 1 inch or less in length. Russian Liquorice is sold both in the unpeeled and in the peeled state. It is often in very large tapering pieces, sometimes blackened and hollowed near the crown of the root. It gives a paler powder than the French and Sicilian, and is somewhat acrid and bitter. Persian or Bussorah root is in long cylindrical pieces, an inch or more in diameter, and is not sold in the peeled state. The official root is limited to peeled root and peeled subterranean stem of *Glycyrrhiza glabra*, Linn., and other species The last three words seem superfluous, since the character given evidently excludes that of *G. glandulifera*, Waldst. and Kit., which affords the Liquorice Root of Eastern Europe and Western Asia, some of the characters of the official drug being that it should be free from bitterness, and that it should be dark brown in colour, longitudinally wrinkled, but not scaly, which are the distinctive characters of the root of *G. glandulifera.*

It is not stated how these characters are to be ascertained from the root which is already peeled as purchased in commerce, and directions for peeling the dried root are not given. The acridity of Eastern Liquorice Root is due to a resin contained principally in the bark, and the bitterness to a principle named Glycamarin; the sweetness is due to Glycyrrhizic Acid which exists partly in combination with Ammonia in the fresh root, in which state it is sweeter, since it is then more soluble in Water.

Tests.—The ash of Liquorice Root amounts to from 3 to 4 p.c., and should not much exceed the latter figure.

Samples of fine English root examined in the author's laboratory yielded on an average 1·5 p.c. of ash; samples of the English decorticated powdered root left from 3·4 to 4·95 p.c. of ash, with an average of 3·76 p.c.

Preparations.

EXTRACTUM GLYCYRRHIZÆ. Extract of Liquorice.

An aqueous extract, prepared by cold maceration, coagulation of Albumen at 212° F. (100° C.), and the subsequent evaporation to a soft extract.

Dose.—5 to 30 grains = 0·32 to 2 grammes.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr. (Ext. Réglisse), Hung., Ital., Jap., Mex., Port., Russ. and Span., from root with cold Water; U.S. (Extractum Glycyrrhizæ Purum), from root with Water and Ammonia. The **Crude Extract in sticks** (*Succus Liquiritiæ*) is official in Austr., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Norw., Russ., Swed. and Swiss; U.S. (Extractum Glycyrrhizæ); **Depuratum** from Crude Extract is official in Austr., Ger., Hung., Norw., and Swed.

Under the name **Liquorice Juice**, an aqueous extract, prepared by boiling the root with Water, is commercial in the form of sticks; **Solazzi Juice** is the best known brand.

EXTRACTUM GLYCYRRHIZÆ LIQUIDUM. Liquid Extract of Liquorice.

An aqueous fluid extract, treated the same as for the extract, but evaporated to sp. gr. 1·2; to this is added ¼ of its volume of Alcohol (90 p.c.).

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

The finished product is usually acid.

Ammonia is used for preserving the sweet principle; so long as the alkalinity is maintained there is no falling of the dirty-looking deposit which is often seen at the bottom of the Fluid Extract of Liquorice bottle.

Fluidextractum Glycyrrhizæ (*U.S.P.*).—1 in 1 Fluid extract, obtained by treating 100 of the Liquorice Root with boiling Water until exhaustion, evaporating the liquid to 45, when cold adding 45 of Alcohol (95 p.c.); after 3 days filter, and evaporate to 50, and add Glycerin 25, Ammonia Water 5, Alcohol (95 p.c.) 20, and Water *q.s.* to make 100.

Foreign Pharmacopœias.—Belg., with Alcohol (30 p.c.); Mex., Ammonia and Alcohol; Swed., Ammonia and diluted Alcohol; Swiss, with Chloroform Water and Alcohol (90 p.c.).

Test.—Liquid Extract of Liquorice varies very considerably in its character. A good liquid extract prepared from fresh English

root had a sp. gr. of 1·130 to 1·135; contained from 33·6 to 37·6 p.c. w/v of total solids and about 18 p.c. w/v of Absolute Alcohol.

The palatability of commercial liquid extracts also manifests considerable variation, some being almost bitter in taste, and few bearing any comparison with a liquid extract made from fresh English root.

EXTRACTUM GLYCYRRHIZÆ SPIRITUOSUM.

Dissolve 10 of Extract of Liquorice in a small quantity of Distilled Water, add 5 of Alcohol (90 p.c.) and make up with Distilled Water to 20.

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

This is official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

Extracta Liquida.—Any Liquid Extract, defined in the Text of the Pharmacopœia, containing less than one-fourth of its weight of Alcohol (90 p.c.), may have the proportion of Alcohol (90 p.c.) increased, to an extent not exceeding one-fourth of the weight of the Extract, in India and other tropical countries where otherwise the preparation would be liable to ferment.

PULVIS GLYCYRRHIZÆ COMPOSITUS. Compound Powder of Liquorice.

N.O.Syn.—Pulvis Liquiritiæ Compositus, Pulvis Pectoralis Kurellæ.

Senna, 2; Liquorice Root, 2; Fennel Fruit, 1; Sublimed Sulphur, 1; Refined Sugar, 6.

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

As a mild aperient, a teaspoonful or more for adults, less in proportion for children.

For diabetic patients the late Balmanno Squire suggested that the Sugar and Liquorice should be replaced by Almond-meal and Powdered Gum Acacia. It can be ordered as **Pulvis Amygdalæ Laxativus.** *See* p. 574.

Tests.—Compound Liquorice Powder usually contains from 3·0 to 5·0 p.c. and should not contain more than 6·0 p.c. of moisture, the ash ranges from 4 to 6 p.c., and the soluble ash from 2 to 3 p.c., averaging about 2·5 p.c. The percentage of Sulphur may be determined by extracting the sample with Carbon Bisulphide, filtering, evaporating off the solvent, treating with Fuming Nitric Acid, a little Bromine, and a few crystals of Potassium Chlorate, removing the Nitric Acid by evaporating to a small bulk with Hydrochloric Acid, moistening with Hydrochloric Acid, and again evaporating to a small bulk. The Sulphur is oxidised to Sulphuric Acid, which may be determined in the usual manner by precipitation with Barium Chloride Solution. It is generally present to the extent of about 8 to 9 p.c. Ground Olive stones, Maize Starch, exhausted drugs, etc., have been used in the adulteration of Liquorice Powder. Ground Olive stones and Maize Starch may be detected by the microscopical appearance of the specimen. A criterion of exhausted drugs is afforded by a joint determination of the percentage w/v of the total extractive matter yielded to Alcohol (70 p.c.) and the percentage of Sugar, the difference between the determinations should be from 10·5 to 13·0 p.c. A specimen of compound Liquorice powder prepared in the author's laboratory from the finest English decorticated

root gave the following figures, when examined as above: Moisture, 5·9 p.c.; Ash, 5·8 p.c.; Soluble Ash, 3 p.c.; Extracted by Alcohol (70 p.c.), 59·2 p.c.; Sugar, 49 p.c.; Sulphur, 9 p.c.; Extractive Matter, less Sugar, 10·2 p.c.

Foreign Pharmacopœias.—Official in Mex. and Russ., formula the same; Austr., Belg., Dan., Dutch, Fr., Ger., Jap., Norw., Swed. and U.S., almost the same. Span. Not in the others.

Not Official.

ELIXIR ADJUVANS.—Fluid Extract of Liquorice, 12; Aromatic Elixir, 88.—*U.S.P.*

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

ELIXIR E SUCCO GLYCYRRHIZÆ, *seu* ELIXIR PECTORALE, LIQUOR PECTORALIS (*Dan., Ger., Norw., Russ., Swed.* and *Swiss*).—Purified Extract of Liquorice, 1; Fennel Water, 3; Anisated Liquid Ammonia (p. 135), 1; (all by weight); mix.

GLYCYRRHIZINUM AMMONIATUM.—Dark brown or brownish-red odourless scales, possessing a sweet taste. They are readily soluble in Water, and are also soluble in Alcohol (90 p.c.).

An elegant substitute for Liquorice in mixtures which are neither acid nor alkaline.

A scale preparation made by treating Liquorice Root with Water containing 5 p.c. of Water of Ammonia, and adding Sulphuric Acid to the liquor so long as a precipitate is produced; collect this and wash it with cold Water until free from acid; redissolve in dilute Ammonia and put it through the precipitation process for a second time, wash it and redissolve in dilute Ammonia and spread on glass plates to dry.—*U.S.P.*

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

Tests.—When dissolved in Water and boiled with Potassium Hydroxide Solution, an evolution of Ammonia gas occurs. A piece of moistened red Litmus paper held over the tube is immediately turned blue, and a glass rod moistened with Hydrochloric Acid held in its vicinity yields dense white fumes of Ammonium Chloride. The aqueous solution yields, on the addition of an acid, a precipitate of Glycyrrhizin which, when washed with diluted Alcohol until free from acid and dried, forms an amorphous yellow powder. Glycyrrhizin Ammoniatum should not leave more than a trace of ash when ignited with free access of air.

MISTURA GLYCYRRHIZÆ COMPOSITA.—Pure Extract of Glycyrrhiza, 3; Syrup, 5; Acacia, granulated, 3; Camphorated Tincture of Opium, 12; Wine of Antimony, 6; Spirit of Nitrous Ether, 3; Water *q.s.* to make 100.—*U.S.P.*

Average Dose.—2 fl. drm. = 7·1 c.c.

This has been incorporated in the *B.P.C.*, employing the same quantities but using the corresponding preparations of the *B.P.*

PULVIS AMYGDALÆ LAXATIVUS.—Senna, 2; Fennel, 1; Sublimed Sulphur, 1; Almond-meal, 7; Powdered Gum Acacia, 1. Mix. It is also known as 'Balmanno Squire's Powder.'

SYRUPUS GLYCYRRHIZÆ.—Liquorice Root 4 is extracted with a mixture of Ammonia solution 1, and Distilled Water 20, for twelve hours, pressed, and the expressed liquid evaporated on the water-bath to 2, mixed with Alcohol (90 p.c.) 2; and, after standing twelve hours, filtered, and the filtrate made up to 20 with simple Syrup. (All parts by weight.)

Foreign Pharmacopœias.—Official in Ger., Russ., Swed. and Swiss; Dutch does not use Ammonia.

The *U.S. National Formulary* Syrup is prepared by dissolving pure Extract of Liquorice 1 in Distilled Water 4, adding Sugar 5, straining, adding Glycerin 1 and sufficient Water to produce 8.

TROCHISCI GLYCYRRHIZÆ.—Extract of Liquorice, 18; Anise Oil, 3; Acacia Lozenge Mass, 60, to make six lozenges.—*Brompton*, and *City Chest*.

This has been incorporated in *B.P.C.* giving the synonym 'Brompton Cough Lozenge.'

U.S.P. has a Trochiscus Glycyrrhizæ et Opii, containing 15 grammes of Extract of Glycyrrhiza, 0·5 gramme of Powdered Opium, and 0·2 c.c. of Oil of Anise in 100.

Fr. has Pâte de Réglisse officinale containing about 0·02 p.c. of Extract of Opium.

GOA POWDER. *See* ARAROBA.

GOSSYPIUM.

COTTON.

B.P.Syn.—COTTON-WOOL.

FR., COTON HYDROPHILE; GER., GEREINIGTE BAUMWOLLE; ITAL., COTONE ASSORBENTE; SPAN., ALGODON HIDROFILO.

The Hairs of the Seed *Gossypium Barbadense*, L., and of other species of Gossypium, from which, by suitable treatment, the fatty matter has been removed. This is commonly known as **Absorbent Cotton-Wool.**

Cotton-Wool is medicated with Carbolic Acid, Salicylic Acid, Boric Acid, Eucalyptol, Thymol, Iron salts, Mercuric Chloride, Double Cyanide, Sal Alembroth, Iodine, Iodoform, and other substances.

Official Preparation.—Used in the preparation of Pyroxylin.

Foreign Pharmacopœias.—Austr., Dutch, Ger., Jap., Russ., Swed. and Swiss (Gossypium Depuratum), Ital. (Cotone Assorbente), Mex. (Algodon and Algodon hydrofilo), Port. (Algodoeiro), Span. (Algodon), U.S. (Gossypium Purificatum), Fr. (Coton Hydrophile), not washed, Belg. (Coton hydrophile). Not in the others. Medicated Cottons have been inserted in Dutch and Mex.

MOUTH AND NOSE PROTECTOR.—For use in poisonous and injurious trades. Squire and Sons exhibited this respirator at the International Health Exhibition (1884) and obtained for it a bronze medal. It consists of layers of washed and sterilised Cotton-Wool placed between layers of Perforated Zinc and Perforated Cardboard, formed into a pliable respirator which covers the mouth and nose.

Gamgee Tissue or Absorbent Gauze and Cotton-Wool Tissue, which consists of layers of absorbent Cotton-Wool enclosed in absorbent Gauze, is a favourite dressing, and is convenient for applying lotions.

Tela Depurata. Purified Mull (*Ger.*).—This mull should have a breadth of 100 centimetres, and each square metre should weigh at least 30 grammes, and each square centimetre should contain at least 24 threads, when not otherwise ordered.

Not Official.

GOSSYPII RADICIS CORTEX.

The Bark of the Root *Gossypium herbaceum*, L., and of other species of Gossypium.

It is official in the *Ind.* and *Col. Add.* for India and the Eastern, North American and West Indian Colonies.

Medicinal Properties.—The Tincture and Fluid Extract have been used in America, and occasionally in Europe, as a substitute for Ergot in labour, and to check metrorrhagia.—*L.* '94, ii. 1298.

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

Descriptive Notes.—The bark of the root as met with in commerce occurs in the form of thin, flat or slightly quilled strips more or less curled in drying, dark brown externally, with a thin outer layer which, when abraded, shows a reddish-brown coloured layer beneath. The inner surface is of a yellowish-white colour when recently dried, but darkens into brownish-red when the bark is kept; it is finely striated with projecting medullary rays. The transverse section shows the bast in radiating lines which are broader at the base. The transverse fracture is laminate and fibrous, and although the bark is easily split longitudinally, it is only broken transversely with difficulty. It has very little odour and an astringent and faintly acid taste.

A spurious cotton bark is sometimes met with which has a dark brown inner surface and is more easily broken transversely.

DECOCTUM GOSSYPII RADICIS CORTICIS. (*Ind.* and *Col. Add.*).—Boil 4 of Cotton Root Bark with 40 of Distilled Water until reduced to 20, strain and make up to 20.

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

For India and the Eastern, North American and West Indian Colonies.

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

EXTRACTUM GOSSYPII RADICIS CORTICIS LIQUIDUM. (*Ind.* and *Col. Add.*).—A 1 in 1 fluid extract of Cotton Root Bark prepared by percolation, using as a menstruum first Alcohol (90 p.c.), containing 25 p.c. Glycerin, and finally Alcohol (90 p.c.).

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

For India and the Eastern, North American and West Indian Colonies.

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

TINCTURA GOSSYPII.—Dried Bark of the Root of the Cotton Plant in powder, 1; percolate with sufficient Alcohol (60 p.c.) to produce 4.

Dose.—1 fl. drm. = 3·6 c.c.

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

GRANATI CORTEX.

POMEGRANATE BARK.

Fr., Écorce de Grenadier; Ger., Granatrinde; Ital., Melograno; Span., Corteza de Granado.

The dried Bark of the Stem and Root of *Punica Granatum*, L.

Neither the *B.P.* nor the *U.S.P.* requires the Bark to yield any definite percentage of alkaloids. The *P.G.* requires it to yield 0·4 p.c. w/w of alkaloids when determined by the process given below. The *Fr. Codex* (1908) requires the dried bark to yield not less than 0·25 p.c. of alkaloids.

The Pomegranate-root alkaloids are Pelletierine (Punicine), Isopelletierine (Isopunicine), Methylpelletierine (Methylpunicine) and Pseudopelletierine (Pseudopunicine, Granatonine). The first two constitute the **Pelletierine** of medicine, the last two are inactive. Pelletierine is a volatile liquid, but forms stable salts.

Medicinal Properties.—Astringent and anthelmintic. It is considered effective in killing tapeworm; the dose should be preceded and followed by a purgative. Pelletierine Sulphate is used for the same purpose.

Incompatibles.—Alkalis, Lime Water, Metallic salts, Gelatin.

Official Preparation.—Decoctum Granati Corticis.

Not Official.—Extractum Granati, Pelletierinæ Sulphas and Pelletierinæ Tannas.

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

Descriptive Notes.—The commercial article consists chiefly of the stem bark, which can be distinguished by the presence of lichens and of a dark green phelloderm layer from that of the root, which has conchoidal depressions and is more or less curved or twisted, that of the stem being straight. The colour is yellowish-grey externally and brownish-yellow on the inner surface. The fracture is short and of a pale yellow, and presents under a lens a tesselated or latticed appearance, from the presence of numerous fine radial lines crossed by fine tangential lines. It is about $\frac{1}{12}$ in. in thickness. The official bark is stated to be 2 to 4 in. ($\frac{1}{2}$ to 1 dcm.) in length, and $\frac{1}{2}$ to 1 in. (12 to 25 mm.) in width. The taste is very astringent, with a slight bitterness, but it has no distinctive odour. As the root bark may contain six times as much alkaloid as the stem bark, the drug is more valuable in proportion to the amount of root bark it contains.

When examined under the microscope the powdered bark should contain no other ingredients except round, single starch grains with a diameter of 0·0025–0·008 mm., rarely compound starch grains, characteristic cork cells, sclerenchymatous cells, cells containing single or clustered crystals of Oxalate, parenchymatous cells and sieve tubes.—*P.G.* and *Jap.*

Tests.—Pomegranate Bark when allowed to macerate for an hour in slightly acidified Water, yields a yellowish solution. The addition of a few drops of Ferric Chloride Test-solution to a portion of this liquid affords a bluish-black coloration, which is changed to a yellowish-red on the addition of five times the volume of Lime Water, and on standing an orange-red flocculent precipitate is thrown out. The process for the determination of the alkaloids officially adopted by the *P.G.* is as follows:—A weighed quantity of 12 grammes of Pomegranate Root dried at 100° C. (212° F.), in a fairly fine powder, is introduced into a stoppered vessel and vigorously shaken with 90 grammes of Ether and 30 grammes of Chloroform. A measured quantity of 10 c.c. of a mixture of 2 parts by weight of Sodium Hydroxide Solution (15 p.c. w/w) and 1 part by weight of Water is then added, and the mixture allowed to stand with intervals of frequent shaking. A measured quantity of 10 c.c. of Water, or a sufficient quantity to cause the powdered root to agglomerate when vigorously shaken and the Chloroform-ether solution to separate completely, is added. A weighed quantity of 100 grammes of the clear Chloroform-ether solution is filtered (after an interval of one hour's rest), through a dry, well-covered filter into a separator, and the alkaloids are extracted from this solution by agitation with 50 c.c. of Hundredth-normal Volumetric Hydrochloric Acid Solution. After complete separation the latter is filtered through a small filter paper moistened with Water into a flask of 100 c.c. capacity, and the extraction is repeated with 3 separate quantities each of 10 c.c. of Water, the aqueous shakings being filtered through 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 stoppered flask of about 200 c.c. capacity, and about 50 c.c. of Water and sufficient Ether to form a layer of about 1 cm. added. After the addition of 5 drops of Iodeosin Solution, Hundredth-normal Volumetric Potassium Hydroxide Solution is added until the lower aqueous layer assumes a pale rose-red coloration, the mixture being well shaken after each addition; not more than 11 c.c. of the solution should be necessary to produce this coloration. The amount of Pelletierine corresponding to this titration figure is 0·395 p.c. w/w. Using the mean molecular weights of Pelletierine and Methyl-pelletierine in the calculation the percentage amounts to not less than 0·41 p.c. w/w. The *Fr. Codex* (1908) process is a volumetric one, the result of the titration being calculated from a factor based on the mean molecular weights of Pelletierine and Methyl-pelletierine. The process is carried out on the bark dried at 100° C. (212° F.), which is required to yield not less than 0·25 p.c. of alkaloids. The percentage of alkaloid varies between 0·5 to 0·7 p.c. w/w, and may even be as high as 1·0 p.c. w/w. The percentage of ash varies between 5·0 and 13·0 p.c., and should not exceed 15·0 p.c.

Preparation.

DECOCTUM GRANATI CORTICIS. Decoction of Pomegranate Bark.

Boil 4 oz. of Pomegranate Bark with 24 fl. oz. of Distilled Water for ten minutes, strain and wash the residue with Distilled Water, *q.s.* to yield 20 fl. oz. (1 in 5)

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

Foreign Pharmacopœias.—Official in Belg., 1 and 6, boil to 4; Fr. (Apozème), 1 and 12½, boil to 9; Ital., 1 in 50; Port., 1 and 7½, boil to 5; Span., 1 in 10. Not in the others.

Not Official.

An excellent remedy for tapeworm is as follows:—

Bruised Root-bark of Pomegranate, 2 oz.; Boiling Water, 24 fl. oz.; macerate for 24 hours, and then boil till reduced to 18 fl. oz. A third part early in the morning, a third part again in half an hour, and the remainder in another half-hour. A dose of Castor Oil should have been taken the previous morning, and solid food abstained from on that day. This rarely fails to bring away the entire worm in two hours, and the head (at the thinnest end) should be diligently sought for. This form was given in *Companion* 1873.

EXTRACTUM GRANATI.—Exhaust Pomegranate Root-bark with Alcohol (60 p.c.), distil off the Alcohol and evaporate to the consistence of an Extract.

10 of Root-bark yield 3½ of Extract.

Foreign Pharmacopœias.—Official in Austr., Dutch, Hung., Port. and Russ. Not in the others.

Fluidextractum Granati is official in U.S.; is prepared by percolating 100 grammes of Pomegranate in No. 30 powder with a mixture of Glycerin 10 c.c. and Alcohol (49 p.c.) *q.s.* to make 100 c.c. of Fluidextract.

PELLETIERINA. Pelletierine, $C_8H_{15}NO$, eq. 140·10.—A colourless, oily liquid, having an aromatic odour, and becoming brown on exposure to the air.

It should be kept in well-stoppered glass bottles of a dark amber tint and in a cool atmosphere.

Tests.—Pelletierine has a sp. gr. at 0° C. (32° F.) of 0·988, and a boiling point of 195° C. (383° F.), at which temperature it distils.

It is soluble in Water, and readily soluble in Alcohol (90 p.c.), Ether and Chloroform.

PELLETIERINÆ SULPHAS.—A white, crystalline, non-hygroscopic mass, which should be preserved from the light. It is official in *Fr. Codex* (1908).

Dose.—6 grains = 0·4 gramme, prescribed with 7 grains = 0·46 gramme of Tannic Acid.

The **Pelletierine de Tanret** has been improperly called Pelletierine Tannate, on account of its being a mixture of Pelletierine Sulphate and Tannin, but it is quite distinct from the true Tannate.

PELLETIERINÆ TANNAS. Pelletierine Tannate, Punicine Tannate.—A yellowish, amorphous, odourless powder, prepared from Pomegranate Bark. It possesses an astringent taste.

Solubility.—1 in about 700 of Water, 1 in 80 of Alcohol.

Dose.—5 to 8 grains = 0·32 to 0·52 gramme.

Foreign Pharmacopœias.—Official in Ital. and U.S.

Tests.—Pelletierine Tannate, dried over Sulphuric Acid and heated, turns brown at 150° C. (302° F.) and softens at about 165° C. (329° F.). It is faintly acid in reaction towards blue Litmus paper. The aqueous solution affords a precipitate with Mercuric-potassium Iodide (Mayer's) Solution, the precipitate becoming granular and yellow coloured. It yields a white precipitate with Lead Acetate Solution, Mercuric Chloride T.S., and Zinc Chloride Solution, but no precipitate with Platinic Chloride T.S. Ammonia Solution produces a white precipitate soluble in Chloroform or in an excess of the reagent, the latter producing a yellowish-red Solution. The aqueous solution yields a black precipitate of reduced metallic Silver when heated with Silver Nitrate Solution. Sulphuric Acid produces a yellow colour, turning slowly to green on warming, and finally to purple. Sulphuric Acid containing a trace of Selenious Acid gives a light bluish-green coloration, gradually becoming dark green.

Not Official.

GRINDELIA.

The Leaves and Flowering Tops of *Grindelia squarrosa*, Dunal, and *Grindelia robusta*, Nutt., from California.

It is now official in the *Ind.* and *Col. Add.* for the Australasian and the North American Colonies.

Medicinal Properties.—Antispasmodic, expectorant, slightly diuretic. Has been recommended in asthma, hay fever, bronchitis, whooping-cough, laryngismus stridulus, and cystitis.

Prescribing Notes.—*The Liquid Extract, whether made by U.S.P. or Ind. and Col. Add., has a peculiar, bitter, persistent taste, which requires a good deal of covering. The addition of Spirit of Chloroform, Syrup of Orange and Glycerin, is useful for this purpose. The so-called 'Alkaline Fluid Extract of Grindelia,' which is now introduced into the Ind. and Col. Add. as Extractum Grindeliæ Liquidum, mixes more readily with Water, and makes a better-looking and more palatable draught than either of the others.*

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

Descriptive Notes.—The dried Leaves of *G. squarrosa*, Dunal, and *G. robusta*, Nuttall, are given. There is some difficulty in distinguishing these two species, since both have reflexed phyllaries. But as a rule the upper leaves of *G. squarrosa* taper towards the base, whilst those which are referred in the *P.B.* to *G. robusta* are broader towards the base and are somewhat shorter in proportion. The specific distinction depends on the nature of the achenes, which in *G. squarrosa* are 4-angled and without distinct auricular appendages, whilst those of *G. robusta* are bidentate. The species of the genus are very

variable, and it has been shown by Perrédès (*Ph. Jour.* (4) 23, p. 433) that the plant recognised in commerce as *G. robusta*, Nuttall, is really the *G. camporum* of Greene. It is this species that is now almost exclusively imported. When Grindelia was first introduced into this country it consisted of *G. squarrosa*. The Leaves of *G. squarrosa* are officially described in the *Ind.* and *Col. Add.* as alternate, pale green, smooth, coriaceous, brittle, oblanceolate or oblong lanceolate or elongate lanceolate, the lower leaves tapering considerably below. But these Leaves are no longer in commerce. The leaves of *G. robusta* are described as similar in texture and colour, but shorter and more oblong, with a cordate amplexicaul base, are furnished with a few glandular hairs, and are sharply serrate at the margin. But these characters are those of the *Grindelia camporum* of Greene. In both species the relaxed bracts of the involucre and the leaves are more or less covered with glossy patches of exuded resin. The taste is pungently aromatic and bitter, and the odour is balsamic.

Preparation.

EXTRACTUM GRINDELIÆ LIQUIDUM. LIQUID EXTRACT OF GRINDELIA.

Percolate 20 of Grindelia with Alcohol (90 p.c.) until exhausted, distil off the Alcohol, and add to the residue 10 of Distilled Water and 2 of Sodium Bicarbonate; stir together, and after the Extract is dissolved and the effervescence is over, add Distilled Water to make 15, and finally Alcohol (90 p.c.), *q.s.* to yield 20 of product.

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

This is official in the *Ind.* and *Col. Add.* for the Australasian and the North American Colonies.

The official text directs the Sodium Bicarbonate to be previously added to the Distilled Water, but as it will not dissolve there is no point in it. This preparation deposits on keeping.

U.S. Fluidextract (1 in 1 w/v) by percolation with a mixture of Alcohol (95 p.c.) 3, Water, 1; Fr. Fluid Extract (1 in 1 w/w) with Alcohol (75 p.c.).

Not Official.

EXTRACTUM GRINDELIÆ.—An Alcohol (90 p.c.) percolate, distilled and evaporated to an Extract. 100 of Grindelia yield 15 of Extract.

Dose.—3 grains = 0·2 gramme, three times a day.

GUAIACI LIGNUM.

GUAIACUM WOOD.

FR., GUAJACUM GER., GUAJAKHOLZ; ITAL., LEGNO GUAJACO; SPAN., LENO DE GUAYACO.

The Heart-wood of *Guaiacum officinale*, L., or of *Guaiacum sanctum*, L.

It yields about 26 p.c. of Resin, consisting of Guaiacic, Guaiaconic and Guaiacinic Acid. It also contains two Saponins, a neutral Guaiac-saponin and Guaiacsaponic Acid.

Imported from St. Domingo and Jamaica.

Medicinal Properties.—*See* 'Guaiaci Resina.'

Foreign Pharmacopœias.—Official in all except Belg., Dan., Dutch, Fr., Hung. and Swed.

Descriptive Notes.—The official Guaiacum Wood consists of the dark-coloured heart-wood only, but in commerce it is usually met with in the form of turnings, containing more or less of the yellowish

sapwood, and sometimes of boxwood, or other woods used in turning. The turnings often require sifting to free them from powder. As Guaiacum Wood is heavier than Water and sinks in it, such admixtures can generally be separated by this means. The Wood is distinguished from other similar heavy dark greenish-brown wood by the medullary rays being one-cell broad, and four, or sometimes three to six cells high (*P.G.*); by the usually solitary vessels with small pits, the numerous sphæraphides of Calcium Oxalate, and the thick-walled parenchyma with narrow lumen. It has a slightly acrid taste, and when heated a faintly aromatic odour. Although the use of the wood of *G. sanctum* is also permitted by the *P.B.*, no distinctive characters are given for it.

Test.—Guaiacum Wood, when digested with Alcohol (90 p.c.) and filtered, yields a filtrate which gives, on the addition of diluted Ferric Chloride Test-solution, a blue coloration. The ash varies from 1 to 2 p.c.

GUAIACI RESINA.

GUAIACUM RESIN.

Fr., Résine de Gaïac; Ger., Guajakharz; Ital., Resina de Guajaco; Span., Resina de Guayaco.

The Resin obtained from the Stem of *Guaiacum officinale*, L., or of *Guaiacum sanctum*, L.

On dry distillation it yields Guaiacol similar to that found in Creosote.

Solubility.—About 90 p.c. is soluble in Absolute Alcohol, Ether, Chloroform, Aromatic Spirit of Ammonia, and alkaline solutions; almost insoluble in Petroleum Spirit.

Medicinal Properties.—Stimulant, diaphoretic, and alterative. It is employed in chronic forms of rheumatism and gout, especially in old people. It is used in acute tonsillitis, also in dysmenorrhœa, amenorrhœa, and syphilitic affections.

Generally prescribed in combination with other medicines.

It is innocuous, and might be taken for an indefinite period of time, and looked upon as a condiment rather than as a drug, as harmless as Ginger or any other condiment. Guaiacum possesses a considerable power, but less than Colchicum, in directly relieving patients suffering from gouty inflammation of any part; it might be given whenever there was but little fever. Guaiacum taken in the intervals of gouty attacks has a considerable power of averting their recurrence; in fact, it is a very powerful prophylactic. Guaiacum does not appear to lose its prophylactic power by long-continued use.—*L.* '96, i. 1494; *B.M.J.* '96, ii. 1325.

In sub-acute or chronic gout, in addition to Colchicum, 5 to 10 grains of the resin may very usefully be given in cachets two or three times daily. The cachets are far preferable to the tincture in a mixture, as the latter is nauseous and the precipitated resin tends to cling obstinately to the tongue and fauces.—A. P. Luff, *Pr.* '07, i. 166.

Confidence expressed in the efficacy of Guaiacum in many forms of chronic gout, in irregular gout, and also as a prophylactic of gout. It is best administered in the form of tablet, or as a cachet.—*B.M.J.* '00, i. 843.

10 grains in a tablespoonful of Malt Extract two or three times a day, beginning a week before menstruation is expected, given to relieve the pain.—*B.M.J.* '02, i. 1195.

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

Prescribing Notes.—*Tragacanth is better for the powder of Guaiacum Resin in Mixtures; Mucilage of Acacia is best for the Ammoniated Tincture:—Mucilage of Acacia, ½ fl. oz.; Ammoniated Tincture, 6 fl. drm.; Water, to 6 fl. oz.*

Incompatibles.—Mineral Acids, Spirit of Nitrous Ether.

Official Preparations.—Of the **Wood,** used in the preparation of Liquor Sarsæ Compositus Concentratus; of the **Resin,** Mistura Guaiaci, Tinctura Guaiaci Ammoniata, Trochiscus Guaiaci Resinæ; used in the preparation of Pilula Hydrargyri Subchloridi Composita.

Not Official.—Confectio Guaiaci Composita, Pulvis Guaiaci Composita, Tinctura Guaiaci, and Trochiscus Guaiaci.

Foreign Pharmacopœias.—Official in Austr., Fr. (Résine de Gaïac), Hung., Ital., Jap. and Norw. (Resina Guajaci), Mex. (Resina de Guayacan), Port., Span., Swed., Swiss and U.S. Not in the others.

Descriptive Notes.—The Resin occurs in commerce in irregular masses, or in nearly globular tears varying in size from ½ to 1 inch or more in diameter. The splinters of the Resin should be transparent, and of a yellowish-green or reddish-brown tint. The tear is the purest form, the Guaiacum in mass varying considerably in purity, the purest being obtained by heating the logs over a fire, and the inferior by boiling the chips in a solution of salt; some specimens of Guaiacum Resin in mass contain much woody matter and other impurities.

Tests.—Guaiacum Resin emits a balsamic odour when warmed, and possesses a slightly acrid taste. A solution of the Resin in Alcohol (90 p.c.) yields on the addition of diluted Ferric Chloride Test-solution a blue coloration, and if the mixture be shaken with Chloroform the blue colour passes into the chloroformic layer. Paper moistened with the alcoholic solution becomes blue when exposed to the fumes of Nitric Acid. The percentage of matter insoluble in Alcohol (90 p.c.) should not amount to more than 10 p.c. The impurities insoluble in Alcohol (90 p.c.) in good block Resin amount to 2·9 to 10 p.c. The Acid value of crude lump Guaiacum varies from 90 to 95, the Alcohol-purified Resin from 90 to 100, the natural tears from 70 to 75. The *U.S.P.* gives the limits as not less than 70 nor more than 80. The *B.P.* gives neither the Acid value, the limit of matter insoluble in Alcohol (90 p.c.), nor the percentage of ash. The *U.S.P.* limit of matter insoluble in Alcohol (94·9 p.c.) is 15 p.c. and the ash not more than 4 p.c. The ash of good commercial samples of the Resin varies from 1 to 4 p.c., and should average 3·0 p.c.

A standard of not less than 90 p.c. of matter soluble in Alcohol (90 p.c.) and not more than 3 p.c. of ash has been recommended.

The more generally occurring impurities are Colophony Resin, the similar but yellowish-brown Peruvian Guaiacum, and excess of woody fibre; Colophony may be detected by the very high Acid value. The *U.S.P.* macerates the powder with 4 or 5 times its weight of Petroleum Benzin, and requires that the filtrate should be colourless

and that it should not give a green coloration on the addition of an equal volume of a 1 in 1000 Cupric Acetate Solution. Colophony and Peruvian Guaiacum may also be detected by dissolving the Resin in Chloroform and adding Bromine Solution. A blue coloration is yielded by the pure Resin, a red coloration by adulterated specimens. Excess of woody matter is indicated by the solubility in Alcohol (90 p.c.).

Preparations.

MISTURA GUAIACI. GUAIACUM MIXTURE.

Guaiacum Resin, ½ oz.; Refined Sugar, ½ oz.; Tragacanth, in powder, 35 grains; mix these together intimately, then add gradually 20 fl. oz. of Cinnamon Water. (1 in 40)

Tragacanth now used instead of Gum Acacia. As stated in previous editions of the *Companion*, not only does Tragacanth give a more diffusible mixture, but the colour does not change so rapidly, nor to the same extent as it does when Acacia is used.

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

TINCTURA GUAIACI AMMONIATA. AMMONIATED TINCTURE OF GUAIACUM.

Add 4 oz. of Guaiacum Resin in powder to 1½ fl. oz. of Strong Solution of Ammonia, mixed with 16 fl. oz. of Alcohol (90 p.c.). After 48 hours, with occasional agitation, filter and add 30 minims of Oil of Nutmeg and 20 minims of Oil of Lemon. Wash the filter with Alcohol (90 p.c.) to make 20 fl. oz. of total product. (1 in 5)

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

Foreign Pharmacopœias.—Official in U.S., 1 in 5 of Aromatic Spirit of Ammonia; Swed., Guaiacum Resin 3, Aqua Ammoniæ (sp. gr. 0·960) 5, and Spirit 10; Port., Guaiacum Resin 3, Liquid Ammonia (sp. gr. 0·916) 3, Spirit 14; by weight. Not in the others.

Tests.—Ammoniated Tincture of Guaiacum has a sp. gr. of 0·895 to 0·900; contains about 15 p.c. w/v of total solids and about 70 p.c. w/v of Absolute Alcohol.

TROCHISCUS GUAIACI RESINÆ. GUAIACUM RESIN LOZENGE.

3 grains of Guaiacum Resin in each, with Fruit Basis.

Not Official.

CONFECTIO GUAIACI COMPOSITA (*Syn.* 'Chelsea Pensioner').—Guaiacum, in powder, 1; Rhubarb, 2; Bitartrate of Potassium, 8; Sulphur, 16; one Nutmeg; Honey, 96 or *q.s.*—*Pharm. Form.*

Guaiacum Resin, 1; Rhubarb, in powder, 2; Acid Potassium Tartrate, 7½; Nutmeg, in powder, 1; Sublimed Sulphur, 14½; Clarified Honey, 74.—*B.P.C.*

Guaiacum Resin, in powder, ½ oz.; Mustard, 1 oz.; Potassium Nitrate, in powder, ¼ oz.; Rhubarb Root, in powder, ¼ oz.; Sublimed Sulphur, 1 oz.; Treacle, to 16 oz. Dose.—1 drm.—*London.*

PULVIS GUAIACI COMPOSITUS ('Chelsea Pensioner').—Powdered Guaiacum Resin, Precipitated Sulphur, Heavy Magnesium Carbonate, Gum Acacia, Potassium Bicarbonate, of each equal parts. Dose.—20 to 40 grains.—*St. George's.*

TINCTURA GUAIACI.—Guaiacum Resin, 1; Alcohol (90 p.c.), 5.

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

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

Foreign Pharmacopœias.—Official in Austr., Hung. and U.S. (Resin), 1 in 5; Jap., Port. and Swiss (Wood), 1 in 5; Fr., 1 in 10 (Resin); all by weight except U.S. Not in the others.

Along with Ozonic Ether it is employed as a test for the presence of blood.

TROCHISCUS GUAIACI.—2 grains of Guaiacum Resin in each with Black Currant Paste.—*Throat.*

Not Official.

GUAIACOL.

A colourless, highly refractive liquid obtained by fractional distillation of Wood Creosote. It has a characteristic aromatic odour. It can also be obtained from Guaiacum Resin.

It forms the fraction of Wood Creosote (usually Beechwood) distilling between 200° and 205° C. (392° and 401° F.). Synthetic Guaiacol is described below. *Fr. Codex* (1908) describes it as in colourless rhomboid prisms, having an aromatic odour, which points to synthetic Guaiacol being intended as the official variety.

It should be preserved in well-closed glass bottles of a dark amber tint and protected as far possible from the light.

Solubility.—About 1 in 80 of Water; mixes in all proportions with Alcohol (90 p.c.), Ether, Glycerin, and the fixed Oils (Almond and Olive).

Medicinal Properties.—Antiseptic; used in place of Creosote in the internal treatment of phthisis, in which it is better tolerated. Also given in Olive Oil as an intralaryngeal injection. Has also been used in erysipelas, neuralgia, painful rheumatic joint affections, sciatica, orchitis, and pleurisy. Disadvantages from continued use are great exhaustion and profuse diaphoresis. Applied externally is antipyretic and analgesic.

Hypodermic injection of Guaiacol (undiluted) in phthisis.—*B.M.J.* '96, i. 586.

Large doses (60 minims) in phthisis without toxic effects.—*L.* '98, i. 993.

A 10 to 20 p.c. Ointment made with a Lanolin or Vaseline basis, in gonorrhœal epididymitis.—*T.G.* '00, 145; *B.M.J.E.* '00 i. 92; '02, ii. 20.

Guaiacol vapour baths in bronchiectasis.—*L.* '99, ii. 210.

Guaiacol (or the carbonate) of much service in tuberculous cystitis.—*T.G.* '07, 313.

Dose.—1 to 5 minims = 0·06 to 0·3 c.c.

Prescribing Notes.—*It is generally given (mixed with Almond Oil) in* **capsules,** *but it has also been given in* **Mixtures** *with Glycerin and Water, and flavoured with either Compound Tincture of Lavender, Oil of Cinnamon, or Compound Tincture of Gentian. But it can be treated in the same way as Creosote both as regards Mixtures and Pills.*

Foreign Pharmacopœias.—Official in Belg., Dutch, Fr. (Gaiacol), Ital., Jap., Russ., Span., Swiss and U.S. Not in the others.

Tests.—Guaiacol has a sp. gr. of 1·116 to 1·120. It boils at 205° C. (401° F.) and distils between 200° and 205° C. (392 and 401° F.). *Fr. Codex* (1908) gives the sp. gr. at 15° C. (59° F.) as 1·143, and the boiling point 205° C. (401° F.). It is optically inactive. A drop of Ferric Chloride T.S. added to a 1 in 100 solution in Alcohol (90 p.c.) produces a blue colour fading to green. It dissolves in twice its volume of Potassium Hydroxide Solution (15 p.c.) on heating without material change in colour, and when cooled the mixture sets to a nearly white mass, which forms a clear solution with 20 volumes of Water.

The more generally occurring impurities are oily hydrocarbons, Creosote and Phenol. As a general test for impurities, the sample may be shaken with twice its volume of Petroleum Ether; the mixture should separate into two clear layers, any turbidity or failure to separate may be taken as an indication of the presence of impurities. In the same way a coloured solution or failure to set to a solid mass when examined by the Potassium Hydroxide Solution test described above, also indicates the presence of impurities. The failure of the solid mass to

produce a clear solution with 20 times its volume of Water indicates the presence of oily hydrocarbons. Creosote may be detected by the reddish colour produced when the specimen is treated with 10 times its volume of Sulphuric Acid. Guaiacol develops a pure yellowish colour. It should leave no residue on volatilisation.

NEBULA GUAIACOL ET MENTHOL.—Guaiacol, 10 minims; Menthol, 60 grains; Paraffin Liquid, to 1 fl. oz.—*A. Ph. F.*

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

VASOLIMENTUM GUAIACOLI.—Guaiacol, 20; Liquid Vasoliment, 80.—*Hager.*

Parogen Guaiacolis. *Syn.* Guaiacol Vasoliment.—Guaiacol, 20; Parogen, 80.—*B.P.C.*

GUAIACOL (Synthetic) $C_7H_8O_2$, eq. 123·13.—A crystalline substance which melts at about 28° C. (82·4° F.), but frequently remains liquid much below this temperature. It is said to yield more uniform results than the ordinary medicinal liquid Guaiacol, which is not so definite in composition. Soluble 1 in 50 of Water.

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

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

Tests.—Synthetic Guaiacol melts at 28° C. (82·4° F.), and when melted should answer the tests and be free from the impurities mentioned under Guaiacol.

GUAIACOL BENZOATE. Benzosol. $C_7H_7O \cdot C_7H_5O_2$, eq. 226·38.—A white crystalline powder, having an aromatic taste and odour. It contains theoretically 54·39 p.c. of Guaiacol. Almost insoluble in Water. A non-irritating form of Guaiacol, recommended in phthisis and in diabetes.—*M.P.* '94, i. 269; *L.* '96, ii. 551.

Dose.—5 to 10 grains = 0·32 to 0·65 gramme; usually given in **cachets** or **tablets.**

Tests.—Guaiacol Benzoate melts at about 56° C. (132·8° F.) and when prepared from synthetic Guaiacol at 59° C. (138·2° F.). It is decomposed by Alcoholic Potassium Hydroxide Solution (Semi-normal) and may be volumetrically determined by means of this solution. A weighed quantity of 1 gramme is dissolved in 25 c.c. of Alcohol (90 p.c.) mixed with 25 c.c. of Semi-normal Volumetric Alcoholic Potassium Hydroxide Solution, and saponified under a reflux condenser. The excess of Semi-normal Alkali Solution is titrated with Semi-normal Volumetric Hydrochloric Acid Solution, and the amount of Semi-normal Volumetric Alkali Solution absorbed is calculated into Guaiacol Benzoate; 1 c.c. of Semi-normal Volumetric Potassium Hydroxide Solution is equivalent to 0·11319 gramme of the pure salt. A solution in Alcohol (90 p.c.) should yield no appreciable coloration with Ferric Chloride T.S. It leaves no weighable residue when ignited with free access of air.

GUAIACOL CAMPHORATE (Guacamphol).—Colourless needles or a white or nearly white powder, having an aromatic odour. Insoluble in Water; soluble in cold, readily soluble in hot Alcohol (90 p.c.), and in Chloroform.

Used with success in the night sweats of phthisis.—*C.D.* '01, ii. 344.

Dose.—5 grains = 0·32 gramme.

GUAIACOL CARBONATE. Duotal. $(C_7H_7O)_2CO_3$, eq. 272·05.—A white crystalline powder, inodorous and tasteless. It contains theoretically 90·5 p.c. of Guaiacol.

Solubility.—Insoluble in Water; about 1 in 70 of Alcohol (90 p.c.).

A non-irritating form of Guaiacol in phthisis.—*B.M.J.E.* '92, i. 8; '93, ii. 83; '95, i. 8; *L.* '96, ii. 1374; '98 i. 222, 960.

Dose.—3 to 10 grains = 0·2 to 0·65 gramme, which may be gradually increased to 60 grains = 4 grammes.

Rheumatoid arthritis, whether acute or chronic, is of infective origin, and

infection is believed to take place from the alimentary tract. Intestinal antiseptics, *e.g.*, Guaiacol Carbonate, are stated to possess a high value. The great value of the drug is corroborated, but not attributed to its antiseptic action in the intestine.—*L.* '05, i. 718.

It has the advantage of being less disagreeable than Creosote, and practically tasteless, but is much more expensive.—*Edin. Med. Jour.* '05, 463.

The most convenient form of administering Guaiacol is the Carbonate in cachets. In rheumatoid arthritis, at first from 5 to 10 grains should be given three times a day, and the dose should be increased by 1 to 2 grains each week until from 15 to 20 grains are being taken in each dose. It is essential that this treatment should be continued for at least twelve months. The beneficial effects of the Guaiacol are very much increased by administering at the same time a mixture containing Potassium Iodide; the depressing effect of the Iodide should be counteracted by its combination with tonics.—A. P. Luff, *B.M.J.* '07, ii. 1143.

Foreign Pharmacopœias.—Official in Austr., Belg., Fr., Ital., Jap., Russ., Swiss and U.S.

Tests.—Guaiacol Carbonate melts at about 84° C. (183·2° F.). When heated with Alcoholic Potassium Hydroxide Solution (about 3 p.c. w/v) it is decomposed, yielding Guaiacol when the liquid is acidified. No bluish-green coloration should be produced on the addition of one or two drops of Ferric Chloride T.S. to its solution in Alcohol (90 p.c.). It should leave no weighable residue on ignition.

GUAIACOL CINNAMATE. Styracol. $C_7H_7O \cdot C_9H_7O_2$, eq. 252·20.—Colourless, crystalline needles, almost insoluble in Water; soluble in Alcohol (90 p.c.) and in Chloroform. It contains theoretically 48·8 p.c. of Guaiacol. Recommended in phthisis, and also in cystitis and gonorrhœa.

It is tasteless, and does not split up into its constituents until it has passed through the pylorus. Very useful where intestinal tubercle is suspected, or where there is troublesome diarrhœa. Most serviceable in large cavities, with offensive sputum and fetid breath. Appears to be more beneficial than Guaiacol. Employed in form of powder or tablets, the latter to be bitten into minute particles lest they pass through the intestine unchanged.—*F.T.* '07, 90.

Dose.—5 grains = 0·32 gramme, 3 times daily.

Tests.—Guaiacol Cinnamate melts at 130° C. (266° F.). It should yield no weighable residue when heated with free access of air.

GUAIACOL PHOSPHATE.—A white crystalline powder, insoluble in Water; soluble in Alcohol (90 p.c.) and in Chloroform.

Useful in tuberculosis and in typhoid fever.—*L.* '02, i. 1711.

Dose.—1½ to 3 grains = 0·1 to 0·2 gramme three or four times daily.

There is also a crystalline **Guaiacol Phosphite**, dose, 5 to 10 grains = 0·32 to 0·65 gramme.

GUAIACOL VALERIANATE (Geosote).—A yellowish, oily liquid, almost insoluble in Water. Used in tuberculosis, bronchial affections and diarrhœa.—*L.* '97, ii. 932; *B.M.J.E.* '98, i. 75; *P.J.* '97, i. 425.

Dose.—2 to 3 minims = 0·12 to 0·18 c.c. or more.

Tests.—Guaiacol Valerianate has a sp. gr. of about 1·037. It boils at 245° to 265° C. (473° to 509° F.). It should leave no weighable residue when ignited with free access of air.

GUAIACETIN (Sodium Pyrocatechin-monoacetate).—A white crystalline powder, having a faint odour and taste of Guaiacol. Soluble in Water; insoluble in Alcohol (90 p.c.). Recommended in tuberculosis.—*Pr.* lxii. 704.

Dose.—4 to 8 grains = 0·25 to 0·5 gramme three or four times daily.

GUAIACYL (Calcium Ortho-guaiacol-sulphite).—A greyish or greyish-mauve powder. Readily soluble in Water and in Alcohol (90 p.c.). A 5 to 10 p.c. solution is useful as a local anæsthetic.

Dose.—0·5 to 1·5 c.c. of a 5 p.c. solution; 1 c.c. of a 10 p.c. solution.

GUAIAFORM (Geoform).—A yellow or brownish-yellow, tasteless powder, insoluble in Water, soluble in Alcohol (90 p.c.), and in Ether. Stated to be a

non-irritating preparation, and likely to be of use in pulmonary tuberculosis and typhoid fever. The Tannic Acid compound is known as '**Tannoguaiaform.**'—*L.* '02, i. 912; *P.J.* '02, i. 61.

THIOCOL (Potassium-Guaiacol-Sulphonate).—White, glistening crystals. Readily soluble in Water; insoluble in Alcohol (90 p.c.). Recommended in phthisis; stated not to irritate.—*L.* '99, i. 240; *B.M.J.E.* '01, i. 16; *P.J.* '01, ii. 645.

Dose.—10 to 20 grains = 0·65 to 1·3 gramme three times a day.

The somewhat bitter taste of Thiocol may be disguised by Syrup of Orange. A Syrup containing 5 grammes of Thiocol in each 100 grammes is known under the name of '**Sirolin.**'

Aphthisin is stated to be a mixture of Potassium-Guaiacol-Sulphonate and Ammonium Sulphichthyolate.—*P.J.* '02, ii. 137.

Among the various other compounds containing Guaiacol which have received attention in medical literature are: **Euguform** (Acetyl-methylene-diguaiacol), a greenish-white powder, insoluble in Water, antiseptic and anæsthetic, recommended as a dusting powder; also a 50 p.c. solution in Acetone; **Guaiacol Cacodylate,** a dangerously unstable salt, recommended subcutaneously in ½ to ¼ grain doses in tuberculosis; **Guaikinol** (Quinine-di-bromo-guaiacolate), yellow crystals, readily soluble in Water, recommended for external use in erysipelas; **Quaiaquin** (Quinine Guaiacol-bi-sulphonate), a yellow powder, readily soluble in Water, introduced as a substitute for Guaiacol; **Guaiamar** (Glycerol-ester of Guaiacol), a white, non-hygroscopic crystalline powder, used as an antiseptic (**dose,** 5 to 10 grains); **Guaiasanol** (Diethylglycocoll-Guaiacol), a white crystalline powder, readily soluble in Water, used as an antiseptic; **Guaiacol Salol** (Guaiacol Salicylate), a white crystalline powder, insoluble in Water, soluble in Alcohol (90 p.c.), recommended in phthisis.

Not Official.

GUARANA.

The Seeds of *Paullinia Cupana*, H. B. and K., dried in the sun, and then roasted and reduced to a fine powder; this is moistened with a little Water, exposed to the night dew, and when it has become a hard paste is rolled into cylinders; these are further dried in the sun or in the chimneys of the huts. It is exported from Brazil.

True Guarana is very hard, heavy, and, when powdered, is reddish-grey, whilst the sophisticated is much lighter in colour; it contains about 4 p.c. of an alkaloid **Guaranine** (dose, 1 to 5 grains = 0·06 to 0·32 gramme), generally considered to be identical with Caffeine.

The *U.S.P.* requires that it shall yield, when assayed by the process outlined below, not less than 3·5 p.c. of its alkaloidal principles.

Medicinal Properties.—Nervine tonic. It is used chiefly for curing sick headache, but is also useful in diarrhœa, dysentery, and as a tonic and stomachic in convalescence.

Dose.—10 to 60 grains = 0·65 to 4 grammes infused in boiling Water and sweetened, and repeated if necessary in two hours.

Foreign Pharmacopœias.—Official in Austr., Hung., Ital., Mex., Port., Span., Swiss and U.S.

Tests.—Guarana is required by the *U.S.P.* to yield a definite percentage of alkaloidal principles. The following is an outline of the *U.S.P.* method of determination:—A weighed quantity of 6 grammes of the specimen in No. 60 powder is shaken in an Erlenmeyer flask, at intervals, for half an hour, with 120 c.c. of Chloroform and 6 c.c. of Ammonia Solution. The mixture is allowed to stand for four hours, and is then filtered, a measured quantity of 100 c.c. (= 5 grammes Guarana) is collected, and the Chloroform distilled off in a water-bath. The residue is dissolved in a mixture of 2 c.c. of Normal Volumetric Sulphuric Acid Solution and 20 c.c. of warm Water. The cooled liquid is filtered into a separator, the flask and filter are washed with Water and the washings transferred

to the separator, 2 c.c. of Ammonia Solution added, and the alkaloids extracted by shaking the solution with 20 c.c. of Chloroform, the extraction being repeated with two separate portions each of 10 c.c. of Chloroform. The separated chloroformic solutions are mixed, the Chloroform distilled, 2 c.c. of Ether is added to the dry residue, the Ether carefully evaporated on a water-bath, and the residue dried at this temperature till constant in weight. The weight of residue multiplied by 20 gives the percentage w/w of alkaloids.

Preparations.

ELIXIR GUARANÆ.—Guarana, in No. 60 powder, 4 oz.; Light Magnesia, ½ oz.; Oil of Cinnamon, 6 minims; Syrup, 2 fl. oz.; Alcohol (60 p.c.), *q.s.* to produce 20 fl. oz.—*B.P.C. Formulary* 1901 incorporated in the *B.P.C.*

Dose.—30 to 120 minims = 1·8 to 7·1 c.c.

The *B.P.C. Supplement* has altered the Light Magnesia to 'Purified Talc or Kaolin.'

FLUIDEXTRACTUM GUARANÆ (*U.S.*).—Guarana, in No. 60 powder, percolated with Alcohol (49 p.c.), and treated in the usual manner to make 100 c.c. of Fluidextract.

Average Dose.—30 minims (about 2 c.c.).

Fluidextractum Guaranæ *U.S.P.* is required to contain 3·5 grammes of the alkaloids from Guarana in 100 c.c..

This has been incorporated in the *B.P.C. Supplement*, using Alcohol (45 p.c.).

Tests.—The *U.S.P.* method of determining the alkaloids in this Fluidextractum may be briefly outlined as follows:—A measured quantity of 5 c.c. of the Fluid Extract is well shaken in a separator with 15 c.c. of Chloroform and 1 c.c. of Ammonia Solution, the shaking being repeated with two separate portions each of 10 c.c. of Chloroform. The chloroformic liquids are separated, mixed, and evaporated to dryness. The residue is dissolved in a mixture of 2 c.c. of Normal Volumetric Sulphuric Acid Solution and 20 c.c. of warm Water. The cooled solution is transferred to a separator, the vessel and filter washed with Water, and the alkaloids are extracted from the mixed solution and washings by shaking with 20 c.c. of Chloroform and 2 c.c. of Ammonia Water. The extraction is repeated with two separate portions each of 10 c.c. of Chloroform. The separated chloroformic liquids are mixed, the Chloroform removed by evaporation, the dry residue mixed with 2 c.c. of Ether, and this in turn is carefully removed by evaporation. The residue is dried till constant in weight at the water-bath temperature, and weighed when cool. This weight, multiplied by 20, yields the percentage w/v of alkaloids in the Fluid Extract.

TINCTURA GUARANÆ.—Guarana, in fine powder, 1; Alcohol (60 p.c.), *q.s.* to produce 4.

Dose.—30 to 120 minims = 1·8 to 7·1 c.c.

This has been incorporated in the *B.P.C.*, employing Alcohol (90 p.c.); but in the *B.P.C. Supplement* this has been altered to Alcohol (60 p.c.).

Not Official.

GUMMI INDICUM.

INDIAN GUM.

A gummy exudation from the Wood of *Anogeissus latifolia*, Wall., is official in *Ind.* and *Col. Add.* for India and the Eastern Colonies, and may be there used in making the official preparations for which Gum Acacia is directed to be used, one part of the former being taken for every two parts ordered of the latter.

GUMMI RUBRUM.—*See* EUCALYPTI GUMMI.

Not Official.

GUTTA PERCHA.

Tough, somewhat flexible pieces, of a light brown or chocolate colour, which become hard and brittle on keeping, but can be softened again in warm Water.

The concrete Juice of *Dichopsis Gutta*, and of several other trees of the natural order Sapotaceæ.

It was official in *B.P.* '85, but is replaced in *B.P.* '98 by Caoutchouc, a solution of which is now used for Charta Sinapis.

Solubility.—Almost entirely soluble in Chloroform, yielding a more or less turbid solution. Entirely soluble in Oil of Turpentine, Carbon Bisulphide, and Benzol. Insoluble in Water, Alcohol, alkaline solutions, or dilute acids.

Medicinal Properties.—Used for making **splints**; as Gutta Percha **tissue** for keeping surgical dressings moist; as a **solution** for mixing with medicaments for chronic skin diseases, and applying like Collodion.

Foreign Pharmacopœias.—Official in Belg., Fr., Ger. (also Percha Lamellata), Hung., Jap. (also Gutta Percha Depurata), Port., Span., Swed. (also Gutta Percha Laminata), and Swiss, which has also Percha Lamellata.

LIQUOR GUTTA PERCHA.—Gutta Percha, in thin slices, 1; Chloroform, 8; Lead Carbonate, in fine powder, 1. Add the Gutta Percha to 6 of the Chloroform in a stoppered bottle, and shake them together frequently until solution has been effected. Then add the Lead Carbonate previously mixed with the remainder of the Chloroform, and having several times shaken the whole together, set the mixture aside, and let it remain at rest until the insoluble matter has subsided. Lastly, decant the clear liquid, and keep it in a well-stoppered bottle.—*B.P.* '85.

Traumaticine.—A solution of 1 of Gutta Percha tissue in 10 (by weight) of Chloroform. It produces a thin delicate film when painted on the skin, and causes neither tension nor pain. It is used for medicated applications.—*P.J.* (3) xiv. 341. A vehicle for the administration of Mercury in syphilis.—*L.* '94, ii. 590.

B.P.C. uses 1 of Gutta Percha in 10 of Chloroform by weight, the same as **Traumaticine,** and the directions for making the solution are those of *B.P.* '85.

Foreign Pharmacopœias.—Official in Austr., Belg., Dutch, Fr., Mex., Span. and Swiss, Gutta Percha 1, Chloroform 9 (by weight); all have Traumaticine either as a title or as a synonym. Jap. (Liquor Guttaperchæ) 1 and 10, with Lead Carbonate.

UNNA'S PLASTER MULLS consist of a very thin sheet of Gutta Percha coated on one side with an adhesive substance (Aluminium Oleinicum) containing one or more medicinal substances, and backed on the other side with Mull (undressed muslin).—*L.* '86, ii. 575.

Not Official.

GYNOCARDIÆ OLEUM.

Prior to 1900 it was supposed that the Chaulmoogra Oil of commerce was obtained from the seeds of Gynocardium odorata, but it was pointed out by Holmes, on the authority of Dr. Prain, that Chaulmoogra Seeds and Oil are the produce of *Taraktogenos Kurzii*, King. Power and Barrowcliff have extracted and examined the Oil from seeds of *Gynocardia odorata* supplied to them by Mr. David Hooper.

Gynocardia Oil consists, according to the above-named authors, of the glyceryl esters of the following Acids: (1) Linolic or isomerides of the same series, (2) Palmitic Acid in considerable amount, (3) Linolenic and Isolinolenic Acids, the latter preponderating, and (4) Oleic Acid in relatively small amount. The seeds also contain 5 p.c. of a crystalline glucoside, Gynocardin ($C_{13}H_{19}O_9N$, $1\frac{1}{2}H_2O$, eq. 357·51) and a hydrolytic Enzyme, Gynocardase.

Tests.—Gynocardia Oil has, according to Power and Barrowcliff, a sp. gr. of 0·925 at 25° C. (77° F.). It is optically inactive. It has an Acid value of 4·9, a Saponification value of 197·0, and an Iodine value of 152·8. The oil extracted from the seeds by Ether has a sp. gr. of 0·927 at 25° C. (77° F.); an Acid value of 5; a Saponification value of 199·6; and an Iodine value of 152.

CHAULMOOGRA OIL.—Chaulmoogra Oil of commerce is obtained from the Seeds of *Taraktogenos Kurzii*, King, a plant which is a native of Burma. The shells, which were separated from the fresh Chaulmoogra seeds by Power and Gornall, represented 34 p.c. of their weight; the kernels yielded, by expression, an amount of fixed oil corresponding with 30·9 p.c. of the entire seeds. A portion of the kernels, when completely extracted with Ether, yielded 55 p.c. of their weight of fixed oil, corresponding with 38·1 p.c. of the entire seed (having 30·7 p.c. of shells). It is a soft solid, having a faintly yellow colour and a characteristic odour.

The Oil prepared by these authorities from the Seeds yielded, on hydrolysis, a substance having the formula and m.p. of Phytosterol, Glycerol, and a mixture of fatty acids having a m.p. of 44° to 45° C. (111·2° to 113° F.), an optical rotation in Chloroform Solution of + 52·6°, an Acid value of 215, and an Iodine value of 103·2. Palmitic and Chaulmoogric Acid were identified in this mixture.

The Oil has been long known and used in India; it has a disagreeable taste and smell, and can be readily melted by a gentle heat.

Oleum Gynocardiæ is official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies, with the synonym Chaulmoogra Oil.

Medicinal Properties.—Recommended in leprosy; also as an external application in psoriasis, obstinate eczema, and other skin diseases, chronic rheumatism and gout, and in phthisis.

In leprosy.—*B.M.J.E.* '93, ii. 4; '01, ii. 79; *L.* '07, ii. 1515.

4 minims in capsule three times daily in leprosy, dose increased until 50 capsules per diem were taken.—*L.* '02, ii. 1196.

Dose.—5 to 10 minims = 0·3 to 0·6 c.c., gradually increased to 30 to 60 minims = 1·8 to 3·6 c.c. three or four times a day; should be given after meals in Milk or emulsion with Gum Acacia, or better still in **capsules.**

Tests.—The Oil has, according to the above-named authors, a sp. gr. of 0·951 at 25° C. (77° F.), or of 0·940 at 45° C. (113° F.). It is dextrogyrate, the optical rotation being + 52° in a tube of 100 mm. The m.p. is 22° to 23° C. (71·6° to 73·4° F.). It has an Acid value of 23·9, a Saponification value of 213·0, and an Iodine value of 103·2.

The Ether-extracted oil has a sp. gr. of 0·952 at 25° C. (77° F.), or of 0·942 at 45° C. (113° F.). It is dextrogyrate, the optical rotation being + 51·3° in a tube of 100 mm. The m.p. is 22° to 23° C. (71·6° to 73·4° F.). It has an Acid value of 9·5; a Saponification value of 208; and an Iodine value of 104·4.

A specimen of Chaulmoogra Oil, which had been in stock for some considerable time, examined in the author's laboratory, gave an Acid value of 29·4, an Ester value of 168, a Saponification value of 197·4, and an Iodine value of 99·06; the oil yielded 99·56 p.c. of fatty acids, having a combining weight of 288.

Chaulmoogric Acid ($C_{18}H_{32}O_2$, eq. 214·38), isolated by Power and Gornall from the Chaulmoogra Oil described above, has a m.p. of 68° C. (154·4° F.). It is dextrogyrate, the optical rotation being + 56°. It is readily oxidised by cold Potassium Permanganate or by Nitric Acid. It is also readily attacked by concentrated Sulphuric Acid, with much decomposition and the evolution of Sulphur Dioxide.

Magnesium Gynocardate.—A granular powder.

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

UNGUENTUM GYNOCARDIÆ (*Ind.* and *Col. Add.*).—A 10 p.c. Ointment of Gynocardia Oil in a mixture of 4 of Hard and 5 of Soft Paraffin.

For India and the Eastern Colonies.