FEL BOVINUM PURIFICATUM.

PURIFIED OX BILE.

Evaporate one pint (or 500 c.c.) of fresh Ox Bile to one quarter of its volume; shake it with half a pint (or 250 c.c.) of Alcohol (90 p.c.); set the mixture aside until the solid matter has subsided; decant the clear solution, and filter the remainder, washing the filter and contents with a little more Alcohol (90 p.c.). Distil off most of the Alcohol from the mixed liquids, and evaporate the residue in a porcelain dish, by the heat of a water-bath, until it acquires the consistence of a thick extract.

Solubility.—Soluble in Water and in Alcohol (90 p.c.). Insoluble in Ether.

Medicinal Properties.—Antiseptic and purgative. Used where there is a deficiency of bile, and assists the emulsification of fats.

Dose.—5 to 15 grains.

It is not desirable that it should come in contact with the stomach, hence the pills should be coated with Keratin Solution, p. 390.

8 fl. oz. Ox Bile, diluted with 8 fl. oz. Water and a few crystals of Sodium Carbonate, used as an **enema**, is sometimes useful in severe cases of intestinal obstruction.—*L.* '78, ii. 276, 316.

Foreign Pharmacopœias.—Official in Belg. (Fel Bovinum Depuratum), Swed. (Bilis Bovina Depurata), equal weights of Gall and Alcohol (90 p.c.); Ital. (Bile Crystallizzata di Platner); Port. (Extracto de Fel de Boi), Gall 1, Alcohol 1, Animal Charcoal $\frac{1}{10}$; U.S. (Fel Bovis Purificatum), Ox Gall 3, concentrated to 1, Alcohol 1; not in others. Fr. (Extrait de Fiel de Bœuf), Span. (Extracto de Hiel); Gall evaporated, without purification by alcohol. Mex. (Hiel de toro).

Description.—A yellowish-green hygroscopic substance, having a taste partly sweet and partly bitter.

Tests.—A solution in twenty or thirty times its weight of Water, when treated, first with a drop of freshly made syrup consisting of one part of Refined Sugar and four of Water, and then with Sulphuric Acid cautiously added until the precipitate at first formed is redissolved, gradually acquires a cherry-red colour, which changes in succession to carmine, purple, and violet. Its aqueous solution gives no precipitate on the addition of Alcohol (90 p.c.) (absence of unpurified Ox Bile).

FERRUM.

IRON.

Fe, eq. 55·60.

Annealed iron wire, having a diameter about ·005 inch (·1 millimetre) (about No. 35 wire gauge), or wrought iron nails; free from Oxide.

Sp. gr. 7·8; fuses about 2786° F. The use of Iron in medicine is of great anti-

quity; it is said to have been the first mineral used internally, more than 3000 years ago.

Iron Salts naturally divide into two groups; the Ferrous or Protosalts based upon the Oxide FeO, and the Ferric or Sesquisalts (Persalts) based upon the Oxide Fe_2O_3. Ferrous Salts have a strong tendency to pass into the Ferric condition by absorption of atmospheric Oxygen, a change which takes place very rapidly in presence of oxidising agents, as Chlorine, Nitric Acid, &c.

Medicinal Properties.—Hæmatinic, tonic, astringent. Ferrous Carbonate, in the form of pill (Pil. Ferri) or capsule, is now the most largely used salt of Iron. The Phosphates are much used, and the Tincture of Ferric Chloride is still a favourite and trustworthy preparation.

Of the salts of Iron, the Ferrous are more easily absorbed and tolerated, are less irritating and astringent than the Ferric, and are more suitable for prolonged administration. Salts of Iron are useful in diseases characterised by debility, especially in anæmia from whatever cause; dyspepsia and neuralgia, which so often depend on anæmia; also in convalescence from acute and febrile diseases. They are contra-indicated in apoplectic persons and in fever, producing, when injudiciously employed, headache, flushing, noises in the ears, and other symptoms of disturbed circulation. Ferric salts are also used as hæmostatics.

It is useless to prescribe Iron till constipation is relieved and a regular action of the bowels ensured.

Official Preparations.—Of metallic **Iron,** Ferri Sulphas, Liquor Ferri Pernitratis; of **Iron wire,** Liquor Ferri Perchloridi Fortior, Syrupus Ferri Iodidi, Syrupus Ferri Phosphatis, Syrupus Ferri Phosphatis cum Quinina et Strychnina, Vinum Ferri; of **Ferrous Sulphate,** Ferri Arsenas, Ferri Carbonas Saccharatus, Ferri Phosphas, Ferri Sulphas Exsiccatus, Ferrum Redactum, Liquor Ferri Persulphatis, Mistura Ferri Composita; of **Strong Solution of Ferric Chloride,** Liquor Ferri Perchloridi, Tinctura Ferri Perchloridi; of **Solution of Ferric Sulphate,** Ferri et Ammoniæ Citras, Ferri et Quininæ Citras, Ferrum Tartaratum, Liquor Ferri Acetatis; of **Exsiccated Ferrous Sulphate,** Pilula Ferri, Pilula Aloes et Ferri; of **Reduced Iron,** Troschiscus Ferri Redacti; of **Iron and Ammonium Citrate,** Vinum Ferri Citratis.

Not Official.—Extractum Pomi Ferratum, Tinctura Pomi Ferrati, Mistura Ferri Aromatica, Syrupus Ferri Subchloridi, and Iron Malate Wine.

Foreign Pharmacopœias.—Official in Austr., Dan., Dutch, Ger., Hung., Jap., Norw., Russ., Swed. and Swiss, Ferrum Pulveratum; Belg., Limatura Ferri, also ditto Porphyrisata; Fr., Fer Metallique; Ital. and Port., Ferro; Mex., Fierro; Span., Hierro; U.S., Ferrum.

Preparation.

VINUM FERRI. Iron Wine.

Iron, in wire, 1; Sherry, 20. Set aside for thirty days in a closed vessel, the Iron wire being almost, but not quite, immersed in the Sherry, the vessel being frequently shaken, and the stopper occasionally removed; filter.

The quantity of Iron dissolved seems to depend almost wholly upon the acidity of the Wine. We found that a good dinner Sherry containing Acids equal to ·396

p.c. of Acetic Acid, dissolved ·14 p.c. of Iron, and had its acidity reduced to ·09 p.c. It was treated as directed in the B.P., and the bottle was about half full.

Of such a Vinum Ferri, 3 fl. drm. would represent the Iron contained in 5 minims of Tinctura Ferri Perchloridi.

Commercial samples seem to lie between ·2 and ·3 p.c. of Iron, although occasionally samples are found much weaker.

According to *P.J.* (3) xxi. 641, the Iron strength increases for three weeks and then diminishes. Our experience does not agree with this. A gallon quantity was put on and examined after the first week and afterwards every month for four months with the following results, ·084, ·114, ·157, ·185, ·204 p.c. of Metallic Iron.

N.B.—The old Vinum Ferri, made with Malaga, is much sweeter than that of the B.P., and is sometimes ordered on that account.

(Not in the other Pharmacopœias.)

Medicinal Properties.—Useful in restoring the blood. Prescribed for children and delicate females with irritable stomach.

Dose.—1 to 4 fl. drm.

Not Official.

MISTURA FERRI AROMATICA.—Fine Iron Wire, 2; Red Cinchona Bark, in powder, 4; Calumba, in coarse powder, 2; Cloves, bruised, 1; Compound Tincture of Cardamoms, 12; Tincture of Orange Peel, 2; Peppermint Water, 48: macerate the first four ingredients in the last one for three days in a closed vessel, agitating occasionally, filter, and make up with Peppermint Water to 50; to this add the Tinctures, and preserve in a well-stoppered bottle.

Dose.—1 to 2 fl. oz.

Much valued, especially in Dublin, as a stomachic tonic and hæmatinic.

(Not in the other Pharmacopœias.)

EXTRACTUM POMI FERRATUM.—Sour Apples, 50; convert them into a pulp and express; to the expressed liquid add Iron Wire 1; heat the mixture on a water-bath until the evolution of gas ceases. Dilute the liquid with Water to make 50 parts, and set it aside for several days; then filter and evaporate to a thick extract. The extract should be a greenish-black, and should form a clear solution with Water.

Dose.—3 to 10 grains.

Foreign Pharmacopœias.—Official in Austr. and Hung., Ext. Malatis Ferri; Dan., Ext. Pomi Ferratum; Ger., Jap., Russ. and Swiss, Ext. Ferri Pomatum; Swed., Ext. Pomorum Ferratum. Swiss is prepared by dissolving freshly precipitated Peroxide of Iron in Apple Juice; all the others are with Metallic Iron and Apple Juice.

TINCTURA POMI FERRATA.—Ferrated Extract of Apples, 1; Alcohol (90 p.c.), 1; Cinnamon Water to make 10.

Dose.—30 to 90 minims.

Foreign Pharmacopœias.—Official in Austr., Dan., Hung., Norw. and Swed., 1 and 5; Ger., Jap., Russ. and Swiss, 1 and 9; not in the others.

SYRUPUS FERRI SUBCHLORIDI.—*B.P.* '85. It contains about 3½ grains of anhydrous Ferrous Chloride and is roughly half the strength in Iron of the Tinctura Ferri Perchloridi.

Dose.—½ to 1 fl. drm.

IRON MALATE WINE.—In Devonshire a quantity of Iron Wire or Nails is digested in a bottle of Cider for a week, and a wineglassful three times a day is the dose.

FERRI ACETATIS LIQUOR.

SOLUTION OF FERRIC ACETATE.

O.M.P.—Solution of Ferric Sulphate, 2½; Solution of Ammonia, 4, or a sufficient quantity; Glacial Acetic Acid, liquefied, 1½; Distilled Water, a sufficient quantity. Mix the Solution of Ammonia with 20 of Distilled Water; gradually add to this the Solution of Ferric Sulphate diluted with 20 of Distilled Water; stir well together, taking care that Ammonia is, even finally, in slight excess, as indicated by the odour of the mixture; let the whole stand for two hours, stirring occasionally; transfer it to a calico filter; wash the precipitated Ferric Hydroxide with Distilled Water until free from Sulphates; let it drain; squeeze it to remove superfluous moisture; dissolve it in the Glacial Acetic Acid; make the volume up to 20 with Distilled Water; allow any insoluble matter to subside; pour off the clear Solution.

Now made direct; Liquor Ferri Acetatis Fortior is deleted.

Medicinal Properties.—Has a diuretic in addition to its hæmatinic action, and being compatible with Potassium Acetate, is used in some cases of Bright's disease.

Dose.—5 to 15 minims.

Not Official.—Tinctura Ferri Acetici Ætherea.

Foreign Pharmacopœias.—Official in Ger., Russ. and Swiss, sp.gr. 1·087—1·091; U.S., sp. gr. 1·160; Swed., sp. gr. not given; not in the others.

Description.—A red liquid with a sour styptic taste and acetous odour. Miscible with Water and Alcohol (90 p.c.) in all proportions.

Tests.—Sp. gr. 1·031. It affords the reactions characteristic of Ferric salts and of Acetates. It should not yield any characteristic reaction with the tests for Lead, Copper, Arsenium, Zinc, Calcium, Sodium, Potassium, Ammonium, Nitrates, or Ferrous salts, and only very slight reactions with the tests for Sulphates.

This solution will not react with Potassium Sulphocyanide except in the presence of a free mineral acid (not Phosphoric); neither will it liberate Iodine from Potassium Iodide.

Not Official.

TINCTURA FERRI ACETICI ÆTHEREA—

Dutch, Solution of Acetate of Iron, 100; Strong Spirit, 12; Acetic Ether, 8.

Ger. and Swiss, Solution of Acetate of Iron (sp. gr. 1·087—1·091), 8; Alcohol, 1; Acetic Ether, 1.

Russ., Solution of Acetate of Iron (sp. gr. as above), 9; Alcohol (90 p.c.), 2; Acetic Ether, 1.

Swed., Solution of Acetate of Iron, 15; Alcohol (90 p.c.), 3; Acetic Ether, 2. All by weight.

Dose.—10 to 20 minims.

Not Official.

FERRI ALBUMINAS.

A liquor is official in the Dutch Pharmacopœia containing ·25 p.c. of Ferric Oxide, and several other formulas have been proposed, but it is more convenient

to use the commercial scale preparation, which is fairly soluble in Water, and contains 5 p.c. of Ferric Oxide.

Medicinal Properties.—Hæmatinic tonic. Given with success in anæmia and specially recommended in gastric ulcer.—*T.G.* '86, 399; *L.* '94, ii. 1113; '95, i. 1065; *B.M.J.E.* '94, i. 28; '94, i. 96; *Pr.* liii. 87.

Dose.—3 to 10 grains.

Foreign Pharmacopœias.—Official in Dan., Dutch, Ger., Russ. and Swiss, Liquor Ferri Albuminati, containing ·4 p.c. of Iron.

FERRATIN.—A brown tasteless powder containing 7 p.c. of Iron, prepared from egg Albumen and Tartarated Iron in alkaline solution. Daily dose for children 5 to 15 grains, and for adults 20 to 30 grains.—*Pr.* li. 427; *A.J.P.* '94, 500; *B.M.J.* '95, i. 985; *B.M.J.E.* '95, ii. 16; '96, i. 8; *T.G.* '96, 40; *L.* '96, ii. 1820.

FERRI ARSENAS.

IRON ARSENATE.

Arseniate of Iron.—*B.P.* '85.

Ferrous Arsenate, $Fe_3(AsO_4)_2$, $6H_2O$, with Ferric Arsenate and some Iron Oxide.

Medicinal Properties.—Similar to those of Arsenious Acid.

Dose.—$\frac{1}{16}$ to $\frac{1}{4}$ grain.

Prescribing Note.—Best given in **pill** well triturated with Milk Sugar and massed with a little Glucose.

Antidotes.—*See* Acidum Arseniosum.

Foreign Pharmacopœias.—Official in Belg. Fr., Ital., Mex. (Arseniato de Fierro), and Span.; not in the others.

O.M.P.—Ferrous Sulphate, $20\frac{3}{4}$; Sodium Arsenate, $26\frac{1}{2}$; Sodium Bicarbonate, $4\frac{1}{2}$; Distilled Water, boiling, a sufficient quantity. Dissolve the Sodium Arsenate in about 100, and the Ferrous Sulphate in about 120 of the Distilled Water; mix the solutions; add the Sodium Bicarbonate dissolved in a little cold Distilled Water; stir thoroughly; collect the resulting precipitate on a calico filter; wash until free from Sulphates; squeeze the washed precipitate between folds of strong linen in a screw-press; dry it on porous bricks in a warm air-chamber, the temperature of which does not exceed 100° F. (37·8° C.).

Description.—A tasteless amorphous powder, of a greenish colour; insoluble in Water, but readily dissolved by Hydrochloric Acid.

Tests.—It affords the reactions characteristic of Ferrous and Ferric salts and of Arsenates. Each gramme dissolved in an excess of Sulphuric Acid diluted with Water should not cease to give a blue precipitate with Solution of Potassium Ferricyanide until at least 6·7 c.c. of the Volumetric Solution of Potassium Bichromate have been added, corresponding to nearly $12\frac{1}{2}$ p.c. of Hydrous, or 10 p.c. of Anhydrous Ferrous Arsenate. It should yield no characteristic reaction with the tests for Sulphates.

Not Official.

FERRI BROMIDUM.

The Commercial salt is in greyish-white crystalline masses, coated with red insoluble Oxybromide, which amounts to about ·5 p. c.

It generally contains about 18 p. c. of Water, corresponding with the formula $FeBr_2.3H_2O$. When this is not allowed for, a Syrup or Liquor made from the solid Bromide will be proportionately weaker than when made from Iron Wire and calculated as if anhydrous, which is done in the preparations that follow.

Preparations.

LIQUOR FERRI BROMIDI FORTIS.—A clear green liquid. Sp. gr. 1·554.

Each fl. drm. contains 36 grains of Iron Bromide ($FeBr_2 = 214·3$).

This solution keeps well in a corked bottle, with bright Iron Wire immersed in it, and on filtration gives a clear green liquid.

A small quantity of Hypophosphorous Acid is now commonly used for the same purpose. With this addition the Liquor will keep without any precautions, and may even be exposed to the air for some days without depositing.

Foreign Pharmacopœias.—Official in Fr., 33 p.c.; Mex. (Bromuro Ferroso), and Port. (Brometo Ferroso), both solid, no solution; not in the others.

SYRUPUS FERRI BROMIDI.—Strong Solution of Iron Bromide (filtered), 1; Simple Syrup, 7: mix.

Contains 4½ grains of Iron Bromide in each fl. drm.

Medicinal Properties.—A tonic in anæmia and amenorrhœa.

(Not in the other Pharmacopœias.)

SYRUPUS FERRI BROMIDI (*B.P.C.*).—Iron Wire free from oxide, ½ oz.; Bromine 533 grains; Refined Sugar 14 oz.; Distilled Water a sufficiency. Dissolve the Sugar in 6 fl. oz. of the Water in a water-bath. Put the Iron Wire with 4 fl. oz. of the Water into a glass flask, having a capacity of at least 20 fl. oz., and surround it with cold water, and add the Bromine in successive quantities; shake occasionally until the froth becomes white and the reaction is complete. Filter the solution into the warm Syrup, and if necessary add sufficient of the Water to produce 20 fl. oz.

Each fluid drachm contains about 4½ grains of Iron Bromide.

Dose.—30 to 60 minims.

SYRUPUS FERRI ET QUININÆ HYDROBROMATUM (*B.P.C.*).—Acid Quinine Hydrobromide, 160 grains; Diluted Hydrobromic Acid, 1 fl. oz.; Distilled Water, 1 fl. oz.: mix the Acid and Water and dissolve the Quinine salt; then add Syrup of Iron Bromide to make 20 fl. oz.

1 fl. drm. = 1 grain Acid Quinine Hydrobromide, and about 4 grains Iron Bromide.

The acid solution must, however, be made warm, and if filtration is necessary, kept warm during the process, otherwise the salt will crystallise out (*see below*).

Dose.—30 to 60 minims.

SYRUPUS FERRI, QUININÆ ET STRYCHNINÆ HYDROBROMATUM (*B.P.C.*)—Strychnine in powder, 2½ grains; Acid Quinine Hydrobromide, 160 grains; Diluted Hydrobromic Acid 1 fl. oz.; Distilled Water 1 fl. oz.: mix the Acid and Water, and in this dissolve the Strychnine and Quinine salt by the aid of a gentle heat; then add Syrup of Iron Bromide to make 20 fl. oz.

In the case of this and the preceding formula, as we have previously pointed out (*C.D.* '93, i. 422), there is too great an excess of Acid. The Acid Quinine Hydrobromide is soluble 1 in 6 of cold Water, but its solubility is greatly reduced in

presence of free Hydrobromic Acid. With the full *B.P.C.* quantity of Acid, the Syrup is very prone to crystallise; with half the quantity a slight separation takes place during very cold weather; with no Acid at all the Syrup is absolutely permanent, except for a slight precipitation of Ferric Hydrate. It is obvious, therefore, that the proportion of Acid in the *B.P.C.* formula should be greatly reduced—say to a fourth of the quantity now prescribed.

1 fl. drm. = $\frac{1}{64}$ grain Strychnine, 1 grain Acid Quinine Hydrobromide and about 4 grains Iron Bromide.

Dose.—30 to 60 minims.

FERRI CARBONAS SACCHARATUS.

SACCHARATED IRON CARBONATE.

Ferrous Oxycarbonate, $x\mathbf{FeCO_3}, y\ \mathbf{Fe(OH)_2}$, more or less oxidised, mixed with sugar; the Ferrous salt, if reckoned as Carbonate, $\mathbf{FeCO_3}$, forming about one-third of the mixture.

Medicinal Properties.—An excellent chalybeate; readily taken and well borne. Not astringent. Useful in anæmic forms of amenorrhœa, neuralgia and sciatica.

Dose.—10 to 30 grains.

The above dose is equivalent to $3\frac{1}{3}$ to 10 grains of Ferrous Carbonate.

Prescribing Notes.—Given in **cachets**, **lozenges**, or **pills**. Sometimes ordered in the form of Powders to be taken on bread and butter. A good Pill can be made by adding Dispensing Syrup q.s.

Incompatibles.—Acids and Acidulous salts; all vegetable astringents.

Official Preparations.—Mistura Ferri Composita and Pilula Ferri. Although not actually prepared from the Saccharated Iron Carbonate, they are here grouped for comparison.

Not Official.—Trochisci Ferri Carbonatis Saccharati.

Foreign Pharmacopœias.—Official in Austr. Ferrum Carbonicum Saccharatum, contains about 40 p.c. of Carbonate of Iron, and Swiss 20 p.c.; Belg. Carbonas Ferri Saccharatus, 20 p.c.; U.S. contains 15 p.c.; Ger. and Russ., 9·5 to 10 p.c. of Iron equal to about 20 p.c. of Carbonate; Dan., Norw. and Swed. Hydratocarbonas Ferrosus Saccharatus. No sugar, Jap. Ferrum Subcarbonicum, and Mex. Carbonato de Fierro; not in the others.

O.M.P.—Ferrous Sulphate, 2; Ammonium Carbonate, $1\frac{1}{4}$; Distilled Water, boiling, 320; Refined Sugar, 1. Dissolve the Ferrous Sulphate and the Ammonium Carbonate each in one quarter of the Distilled Water; add the former to the latter with brisk stirring, in a deep cylindrical vessel; cover this so as to protect it as much as possible from the air; set the mixture aside for twenty-four hours; separate the supernatant liquid from the precipitate by means of a siphon; pour on the remainder of the Distilled Water; stir well; after subsidence remove the clear liquid; collect the precipitate on a calico filter; subject it to expression; triturate it with the Refined Sugar in a porcelain mortar; dry the mixture at a temperature not exceeding 212° F. (100° C.).

When cold or tepid Water is used in the place of boiling Water, the precipitate occupies much less bulk, and is more easily washed. To avoid the formation of basic salts, the Iron should always be added to the Alkali.

Description.—Small coherent lumps or powder, of a brownish-grey colour with a sweet feebly chalybeate taste.

It dissolves with effervescence in warm Hydrochloric Acid, diluted with half its volume of Water.

Tests.—Each gramme, dissolved in excess of warm Concentrated Phosphoric Acid and diluted with Water, should not cease to give a blue precipitate with Solution of Potassium Ferricyanide until at least 29 c.c. of the Volumetric Solution of Potassium Bichromate have been added. It should yield only the slightest characteristic reaction with the tests for Sulphates.

Warm Phosphoric Acid is now ordered in place of Phosphoric Acid, presumably from the experiments of Coull (*P.J.* (3), xxii., 805), but in September, 1897, Liversedge showed that correct results are only obtained with *cold* Phosphoric Acid; heating the acid on a water-bath, even for ten minutes, introduced an error of 25 p.c. The statement is based upon results obtained with a standard solution of Ferrous Sulphate, in the presence of sugar.—*C.D.* '97, ii. 492.

Preparations.

MISTURA FERRI COMPOSITA. Compound Mixture of Iron. *N.O.Syn.* —Griffith's Mixture. (Modified.)

Ferrous Sulphate, 25 grains; Potassium Carbonate, 30 grains; Myrrh, 60 grains; Refined Sugar, 60 grains; Spirit of Nutmeg, 50 minims; Rose Water, 10 fl. oz., or a sufficient quantity. Reduce the Myrrh to powder; add the Potassium Carbonate and Refined Sugar; triturate the mixture with a small quantity of the Rose Water so as to form a thin paste; gradually add more Rose Water and the Spirit of Nutmeg; continue the trituration and further addition of Rose Water until 7 fl. oz. of liquid result; dissolve the Ferrous Sulphate in 3 fl. oz. of the Rose Water; mix the liquids.

Spirit of Nutmeg reduced to 50 minims instead of 4 fl. drm.

It is convenient to keep this mixture without the Iron; the addition of the Ferrous Sulphate, as directed, can be made when required.

Dose.—½ to 1 fl. oz.

Foreign Pharmacopœias.—Official in Dan., similar to Brit., but with three times as much Sugar, and without Nutmeg; Norw. without Nutmeg, with Peppermint Water; Swed., with Peppermint Water and Tincture of Lavender in the place of Rose Water and Nutmeg; U.S. similar to Brit., but with Sp. of Lavender in the place of Nutmeg; not in the others.

PILULA FERRI. Iron Pill. (Altered).

Exsiccated Ferrous Sulphate, in fine powder, 150 grains; Exsiccated Sodium Carbonate, in fine powder, 95 grains; Gum Acacia, in powder, 50 grains; Tragacanth, in powder, 15 grains; Syrup, 150 grains; Glycerin, 10 grains; Distilled Water, 20 grains, or a sufficient quantity. To the Syrup, Glycerin, and Distilled Water, previously mixed, add the Ferrous Sulphate; mix; add quickly the Sodium Carbonate; mix; set aside for fifteen minutes, or until the reaction is complete; add the Gum Acacia and Tragacanth, and incorporate thoroughly.

If divided into five-grain pills, each pill will contain about 1 grain of Ferrous Carbonate.

Now made with Exsiccated Ferrous Sulphate and Exsiccated Sodium Carbonate instead of Ferri Sulphas and Potassii Carbonas.

Dose.—5 to 15 grains.

As the French Codex orders equal parts of the *dried* salts, the proportions are somewhat similar to the above.

Vallet's mass is made by precipitating and washing the Iron Carbonate, and mixing it with Honey and Milk Sugar to form a mass.

Blaud's Pills are made by mixing (in the pill mass) dried Ferrous Sulphate and dried Potassium or Sodium Carbonate.

Amount of Ferrous Carbonate in commercial samples of Blaud's pills.—*C. D.*, '95, ii. 923.

Foreign Pharmacopœias. — Official in Belg., Pilulæ Blaud and Pilulæ Vallet; Dan., Dutch, and Norw. Pilulæ Blaudii; Fr., Pilules de Carbonate Ferreux and Pilules Ferrugineuses de Blaud; Ger. and Jap., Pilulæ Ferri Carbonici; Ital., Pillole di Carbonato Ferroso (Pilole di Blaud) also (Pillole di Vallet); Mex., Pildoras de Blaud and Pildoras de Vallet; Port., Pilulas de Carbonato Ferroso; Span., Pildoras de Blaud and Pildoras Ferruginosas de Vallet; Swed., Pilulæ Myrrhæ Ferratæ; Swiss, Pilulæ Ferratæ Kalinæ (Pil. Blaudii) and Pilulæ Ferri Carbonici (Pil. Valleti); U.S., Pilulæ Ferri Carbonatis (Blaud's Pills), also Massa Ferri Carbonatis (Vallet's Mass); not in the others.

Not Official.

TROCHISCI FERRI CARBONATIS SACCHARATI—These are now largely used, containing 3 grains of Saccharated Carbonate in each.

Dose.—1 to 3 lozenges.

FERRI ET AMMONII CITRAS.

IRON AND AMMONIUM CITRATE.

Solubility.—10 in 5 of water; 2 dissolved in 3 of water measure 4; almost insoluble in Alcohol (90 p.c.).

Medicinal Properties.—As a hæmatinic, it is a very effectual salt, and it possesses scarcely any astringency or tendency to cause constipation; it may often be given when the stomach will not bear the more astringent preparations of Iron. It becomes moist if kept in paper.

Dose.—5 to 10 grains.

Prescribing Notes. — Generally prescribed in Solution with Tincture of Orange which covers the taste well. If ordered to be taken during effervescence, care must be taken to put the Iron salt into the *Acid* Solution,—*not* the alkaline.

An **Aqueous Solution** may be made and kept for dispensing, 2 fl. oz. representing 480 grains of the scale preparation; it is quite permanent.

Incompatibles.—Mineral acids, vegetable astringents, and fixed alkalis.

Official Preparation.—Vinum Ferri Citratis.

Foreign Pharmacopœias.—Official in U.S.; Austr. and Swiss, Ferrum Citricum Ammoniatum; Belg., Citras Ferri; Fr., Citrate de Fer Ammoniacal; Mex., Citrato de Fierro Amoniacal; Norw., Citras Ferrico-Ammonicus; Port., Citrato de Ferro Ammoniacal; Russ. and Swiss, Ferrum Citricum Oxydatum Ammoniatum; Span., Citrato Ferrico-Amonico; not in the others. Ger. has Ferrum Citricum Oxydatum; Ital., Citrato di Ferro.

O.M.P.—Solution of Ferric Sulphate, 10, or a sufficient quantity; Solution of Ammonia, 23, or a sufficient quantity; Citric Acid, 4; Distilled Water, a sufficient quantity. Prepare Ferric Hydroxide as follows: mix 16 of Solution of Ammonia with 40 of Distilled Water; gradually add to this the Solution of Ferric Sulphate, previously diluted with 40 of Distilled Water; stir constantly and briskly, taking care that Ammonia is, finally, in slight excess as indicated by the odour; set aside the mixture for two hours, stirring it occasionally; pour it on a calico filter; when the liquid has drained away, wash the precipitated Ferric Hydroxide with Distilled Water until free from Sulphates.

Dissolve the Citric Acid in its own weight of Distilled Water; warm the mixture on a water-bath; add the Ferric Hydroxide, previously well drained; stir them together until nearly the whole of the Hydroxide has dissolved, or until the Citric Acid is saturated with Ferric Hydroxide (prepared, if necessary, from more of the Solution of Ferric Sulphate); let the solution cool; add 5½ of Solution of Ammonia; filter through flannel, adding some Distilled Water if necessary; evaporate to the consistence of syrup, the presence of a very slight excess of Ammonia being maintained; dry in thin layers on flat porcelain or glass plates at a temperature not exceeding 100° F. (37·8° C.); remove the dry flakes of Iron and Ammonium Citrate.

Description.—In thin transparent scales of a deep red colour, slightly sweetish and astringent in taste.

Tests.—It feebly reddens Litmus. When incinerated with free access of air, it leaves 31 to 32 p.c. of Ferric Oxide which is not alkaline to Litmus (absence of fixed alkali). Heated with Solution of Potassium Hydroxide, it evolves Ammonia and deposits Ferric Hydroxide. The alkaline solution from which the Iron has separated does not, when slightly supersaturated with Acetic Acid, give any crystalline precipitate (absence of Tartrates). It should not yield more than the slightest characteristic reactions with the tests for Sulphates.

In commercial samples the ash is almost always alkaline, owing to fixed alkali being used for the precipitation of the Iron; as in the case of Ferrum Tartaratum, some Magnetic Oxide (Fe_3O_4) is also formed during the ignition.

Of seven commercial samples examined (*P.J.* (3) xviii. 425 and 777), four contained 30 p.c. of ash, and the others 33, 38, 43 p.c.; only one of the seven was free from Tartaric Acid.

It has been pointed out (*P.J.* (3) xx. 246) that commercial samples frequently contain Sulphuric Acid, presumably from basic Ferric Sulphate precipitated with the Hydrate, also that part of the Iron was reduced to the ferrous condition.

Preparation.

VINUM FERRI CITRATIS. Wine of Iron Citrate.

Iron and Ammonium Citrate, 160 grains; Orange Wine, a sufficient quantity. Dissolve the Iron and Ammonium Citrate in sufficient Orange Wine to form 20 fl. oz. Agitate occasionally for three days; filter.

Dose.—1 to 4 fl. drm. =(1 grain in each fl. drm.).

Foreign Pharmacopœias.—Official in Jap., Vinum Ferri, 1 in 50; Mex., Vino de Fierro, 1 in 150; U.S., Tincture of Orange, Syrup, and stronger White Wine, 1 in 25; Fr. Vin Chalibé, 1 and 200 of Malaga; not in the others.

FERRI ET QUININÆ CITRAS.

IRON AND QUININE CITRATE.

Solubility.—2 in 1 of Water.

Medicinal Properties.—Bitter stomachic, astringent and tonic, combining the properties of both Iron and Quinine.

6⅔ grains contain 1 grain of Quinine.

Dose.—5 to 10 grains.

Prescribing Notes.—Generally given in Mixture or in Pills made with Alcohol (90 p.c.) q.s. Compressed Tablets are also prepared.

For dispensing purposes, an aqueous **solution**, 2 fl. oz. = 480 grains of the salt.

Incompatibles.—Alkalis and their Carbonates, Tannic Acid, and vegetable astringents. Incompatible with Potassium Citrate.—*P.J.* '97, i. 344.

Foreign Pharmacopœias.—Official in Austr., Ger. and Russ., Chininum Ferro-Citricum; Port., Citrato de Ferro et de Quinina; Span., Citrato Ferrico-Quinico; Swed., Citras Ferrico-Chinicus; Swiss, Chinino-Ferrum Citricum; U.S.; not in the others.

O.M.P.—Prepare Ferric Hydroxide from 9 of Solution of Ferric Sulphate as directed under 'Ferri et Ammonii Citras.' Mix 2 of Quinine Sulphate with eight times its weight of Distilled Water; add 3 of Diluted Sulphuric Acid; when the Salt is dissolved precipitate the Quinine with a slight excess of Solution of Ammonia; collect the precipitate on a filter; wash it with 60 of Distilled Water.

Dissolve 6⅔ of Citric Acid in its own weight of Distilled Water; warm the solution on a water-bath; add the Ferric Hydroxide, previously well-drained; stir them together; when the Hydroxide has dissolved, add the precipitated Quinine; continue the agitation until this also has dissolved; let the solution cool; add, in small quantities at a time, 3 of Solution of Ammonia diluted with 4 of Distilled Water; stir briskly, allowing the Quinine which separates with each addition of Ammonia to dissolve before the next addition is made; filter the solution; evaporate it to the consistence of a thin syrup; dry the latter in thin layers on flat porcelain or glass plates at a temperature of 100° F. (37·8° C.); remove the dry flakes of Iron and Quinine Citrate.

Description.—In thin scales of a greenish golden-yellow colour, somewhat deliquescent. It has a bitter chalybeate taste.

Tests.—The aqueous solution is very slightly acid, and yields precipitates which are reddish-brown with Solution of Potassium Hydroxide, white with Solution of Ammonia, blue with Solution of Potassium Ferrocyanide and with Solution of Potassium Ferricyanide, and greyish-black with Solution of Tannic Acid. The salt when incinerated with free access of air, leaves a residue which when moistened with Water is not alkaline to Test-paper (absence of fixed alkali). 5 grammes dissolved in 45 c.c. of Water and treated with a slight excess of Solution of Ammonia should yield a white precipitate, which, when dissolved out by repeated treatment of the liquid with Ether, and the latter evaporated, and the residue completely dried at 248° F. (120° C.), weighs ·75 gramme.

This precipitate is almost entirely soluble in a little Purified Ether; when burned it leaves but a minute residue; neutralised by Sulphuric Acid, it should answer to the characters of and tests for Quinine Sulphate.

According to Allen, the scales may be expected to contain 8 p.c. of Water, but not more than 12 p.c. The Ferric Oxide left on ignition should be 18 to 20 p.c. In shaking out with Chloroform or Ether a *considerable* excess of Ammonia should be present, and the volume of solvent should equal that of the ammoniacal liquid. The alkaloidal residue should be dried at 110—120° C., a constant weight being difficult to obtain at water-bath temperature.

Not Official.

FERRI HYPOPHOSPHIS.

There are two Iron Hypophosphites, the Ferrous or Protosalt which is the basis of all the *B.P.C.* preparations, and the Ferric or Persalt used in most of the American and other proprietary Syrups of the Hypophosphites.

FERROUS HYPOPHOSPHITE when freshly prepared is a greenish crystalline powder, soluble about 1 in 10 of Water, but the commercial salts are so insoluble as to be practically useless for Pharmaceutical purposes.

FERRI HYPOPHOSPHITIS LIQUOR FORTIS (*B.P.C.*).—Ferrous Sulphate, 760 grains; Barium Hypophosphite (containing not less than 95 p.c. of Ba. $2(PH_2O_2)\,H_2O$), 830 grains; Diluted Sulphuric Acid 100 minims; Distilled Water, 20 fl. oz.: put the Ferrous Sulphate with 5 fl. oz. of the Water in a tall 24-oz. bottle and shake till dissolved. Dissolve the Barium Hypophosphite in the remainder of the Water, 15 fl. oz., and add slowly to the former solution: shake and add the Diluted Sulphuric Acid, again shake and set aside for two days, then syphon off the clear liquid. Keep it in bottles quite full and in a dark place.

Each fl. drm. = about 5 grains of Ferrous Hypophosphite.

The Solution has an acid reaction, and it should not give more than a faint precipitate, if any, with either Diluted Sulphuric Acid or solution of Barium Chloride.

Dose.—10 to 30 minims.

In Churchill's original formula for the Compound Solution, the Ferrous Hypophosphite was prepared by double decomposition between Calcium Hypophosphite and Ferrous Sulphate. This was improved upon (*B.P.C.* '87) by dissolving precipitated Ferrous Carbonate in Hypophosphorous Acid, and afterwards (*B.P.C.* '88) exchanged for the Barium method described above; but the solution is readily made (as described by Everson, *P.J.* (3) xviii. 517), and without the use of Barium salts which are always objectionable, by dissolving with the aid of heat, 153 grains of Iron Wire in 3 fl. oz. of Hypophosphorous Acid, with sufficient Water to make at the finish 20 fl. oz. The product having been filtered through Cotton Wool, it will contain 5 grains per fl. drm. of the Hydrated salt ($FeP_2H_4O_4.6H_2O$), to which all the *B.P.C.* formulas are calculated.

LIQUOR HYPOPHOSPHITUM COMPOSITUS (*B.P.C.*).—Calcium Hypophosphite, 320 grains; Sodium Hypophosphite, 320 grains; Magnesium Hypophosphite, 160 grains; Strong Solution of Ferrous Hypophosphite, 6 fl. oz.; Hypophosphorous Acid (30 p. c.), ½ fl. oz.; Distilled Water, a sufficiency. Dissolve the Calcium, Sodium, and Magnesium Hypophosphites in 12 fl. oz. of the Water; add the solution of Ferrous Hypophosphite and the Hypophosphorous Acid. Filter, and add Distilled Water to make 20 fl. oz.

Each fl. drm. = 2 grains each of Sodium and Calcium Hypophosphites, 1 grain Magnesium Hypophosphite, and 1½ grain of Ferrous Hypophosphite.

Dose.—½ to 2 fl. drm.

SYRUPUS FERRI HYPOPHOSPHITIS (*B.P.C.*).—Strong Solution of Ferrous Hypophosphite, 4 fl. oz.; Syrup, 16 fl. oz.: mix.

Each fl. drm. = about 1 grain of Ferrous Hypophosphite.

Dose.—½ to 2 fl. drm.

SYRUPUS HYPOPHOSPHITUM COMPOSITUS (*B.P.C.*).—Quinine (alkaloid), 20 grains; Strychnine, 1 grain; Hypophosphorous Acid (30 p.c.), 2 fl. drm.; Strong Solution of Ferrous Hypophosphite, 3 fl. oz.: dissolve and add Calcium Hypophosphite, 80 grains; Manganese Hypophosphite, 40 grains; Potassium Hypophosphite, 40 grains: dissolve, filter, and add Syrup to produce 20 fl. oz.: mix.

All these Syrups oxidise on exposure to air with precipitation of Ferric Hypophosphite. It is stated (*Y.B.P.* '90, 501) that this may be prevented to a great extent by addition of a small quantity (¼ grain per fl. oz.) of Citric Acid; but in our experience even larger proportions are of little or no use.

Each fl. drm. contains $\frac{1}{150}$ grain Strychnine and ⅛ grain of Quinine.

Dose.—½ to 2 fl. drm.

The odour occasionally emitted by this syrup is due to Sulphuretted Hydrogen derived from Sulphites present as an impurity in the Hypophosphites used. Most samples of Hypophosphites contain Phosphites. An addition of 80 grains of Potassium Citrate to 20 fl. oz. of the Syrup, will prevent it becoming turbid for some time. *P.J.* '95, ii. 144.

FERRIC HYPOPHOSPHITE.—This compound is obtained as a white precipitate on adding a solution of a soluble Hypophosphite to one of Ferric Chloride containing as little free Acid as possible.

It is fairly insoluble in Water, but with the addition of Potassium Citrate it dissolves readily to a green solution which forms with Sugar a pale yellow *neutral* Syrup permanent and unalterable by exposure to air, which may be combined with other soluble Hypophosphites, Quinine Hydrochloride, and Strychnine without the addition of Acid, and is free from all the pharmaceutical objections attaching to Hypophosphite Syrups containing Iron in the ferrous condition.

It is usually sold as **Compound Syrup of Hypophosphites,** and is also made without Quinine to suit those who are peculiarly susceptible to that drug, it is then prescribed 'sine Quinina.'

Not Official.

FERRI IODIDUM.

IODIDE OF IRON.

FeI_2. eq. 307·40.

In reddish-brown dense masses, easily soluble in Water, with a slight residue, and forming a reddish-yellow solution owing to partial oxidation. The solution may be made green by either hot or cold digestion over bright Iron Wire.

A volumetric process (Mercuric Chloride) for estimating Ferrous Iodide in either purely aqueous or saccharine solution is given *P.J.* (3) xii. 268. A good process with Silver Nitrate is given in U.S.P.

Medicinal Properties.—It combines the properties both of Iodine and Iron, and is a most valuable tonic and alterative in the treatment of scrofulous and syphilitic diseases.

Prescribing Notes.—Best given in the form of the official Syrup of Ferrous Iodide; it is also given in the form of pills massed with powdered Gum Acacia and Dispensing Syrup *q.s.* In some cases Liquorice Powder must be used instead of Dispensing Syrup.

Official Preparation.—Syrupus Ferri Iodidi.

Foreign Pharmacopœias.—Official in Belg., Mex., Yoduro Ferroso, Port., Span. and Swiss; not in the others.

Preparations.

LIQUOR FERRI IODIDI FORTIS.—A clear greenish liquid. Sp. gr. 1·511. Each fl. drm. contains 34 grains of Ferrous Iodide (FeI_2 = 307·40).

The solution keeps well in a corked bottle, with bright Iron Wire immersed in it, and on filtration gives a clear green liquid. A small quantity of Hypophosphorous Acid is now commonly used for the same purpose; with this addition the Liquor will keep well, and may be exposed to the air without depositing.

Foreign Pharmacopœias.—Official in Ger. (Liquor Ferri Iodati) and Russ. (Ferrum Iodatum Solutum), containing 50 p.c. of Ferrous Iodide; Mex., 20 p.c.

FERRI IODIDUM SACCHARATUM.—U.S.P.; a solution of Ferrous Iodide evaporated to dryness and mixed with Milk Sugar and Reduced Iron; 5 parts contain about 1 of Iodide.

Incompatibles.—Acids, Acid salts, Alkalis and their Carbonates, Lime Water, vegetable astringents.

PILULÆ FERRI IODIDI, U.S.P.—Reduced Iron, 4 grammes; Iodine, 5 grammes; Glycyrrhiza, in No. 60 powder, 4 grammes; Sugar, in fine powder, 4 grammes; Extract of Glycyrrhiza, in fine powder, 1 gramme; Acacia, in fine powder, 1 gramme; Water, a sufficient quantity. To the Reduced Iron, contained in a small mortar, add 6 c.c. of Water, and then, gradually, the Iodine, constantly triturating, until the mixture ceases to have a reddish tint. Then add the remaining powders, previously well mixed together, and mix the whole thoroughly. Transfer the mass to a porcelain capsule, and evaporate the excess of moisture, on a water-bath, with constant stirring, until the mass has acquired a pilular consistence. Coat with Balsam of Tolu dissolved in Ether. To make 100 pills.

Foreign Pharmacopœias.—Official in Belg., Dan., Dutch, Fr., Ital., Mex., Norw., Port., Span., Swed., and Swiss, each pill contains about ¾ grain Iodide of Iron, Hung. about 1 grain, and all coated with Bals. Tolu dissolved in Ether, except the Swiss; not in the others.

Official Preparation.

SYRUPUS FERRI IODIDI. Syrup of Ferrous Iodide. (Altered.)

Iron, in wire, ½ oz.; Iodine, 726 grains; Refined Sugar, 16½ oz.; Distilled Water, a sufficient quantity. Add the Refined Sugar to 6 fl. oz. of boiling Distilled Water and heat until dissolved. Dilute ½ fl. oz. of the resulting syrup with an equal volume of Distilled Water and set aside. Digest the Iodine and the Iron wire in a flask with 2½ fl. oz. of Distilled Water; heat gently, and finally boil slightly, until the froth loses its yellow colour; filter the liquid while still hot into the syrup, washing the flask and the filter with the diluted syrup previously set aside and now heated to boiling. Pass sufficient boiling Distilled Water through the filter to produce, when cold, 20 fl. oz. Mix. The Syrup should have a sp. gr. of 1·380 to 1·387.

Now about 25 p.c. stronger than the B.P. '85 Syrup.

Dose.—30 to 60 minims.

11 minims of this Syrup contain 1 grain of Ferrous Iodide.

This Syrup is very liable to become discoloured. It may be due to one or other of two causes. (1.) Oxidation of Iron, which may be prevented by careful manipulation or removed by Hypophosphorus Acid. (2.) Slight caramelisation of the Sugar by overheating; this cannot be removed by reducing agents.

A good process for determining the Iodine is given in the U.S.P.

The assay of Syrup of Ferrous Iodide.—*C.D.* '98, i. 837.

Foreign Pharmacopœias.—Official in Brit. 5·7 p.c. of Iodide of Iron; Austr., Dutch, Ger., Jap., and Russ., 5 p.c.; Belg., Fr., Ital. and Port., 0·5 p.c.; Dan., Norw., Swed. and U.S., 10 p.c.; Hung., 12 p.c.; Span., ·67 p.c.; Mex. and Swiss, 1 p.c.; all by weight.

Test.—Dissolve 1 gramme of dried Sodium Carbonate in 10 c.c. of Water, in a flask of which the capacity to a mark on the neck is 100 c.c.; pour into the flask 10 c.c. (or 13·87 grammes) of the Syrup, and agitate the mixture occasionally until the precipitation of the iron is complete; then add more Water to make the whole measure 100 c.c.; mix and filter. 25 c.c. of the filtrate, neutralised with Diluted Nitric Acid, should require not less than 16 and not more than 16·5 c.c. of the Volumetric Solution of Silver Nitrate for complete precipitation of the Iodine, Solution of Potassium Chromate being used as an indicator.

Not Official.

FERRI LACTAS.

$Fe(C_3H_5O_3)_2.3H_2O$, eq. 285·98.

Small greenish crystals, with a tendency to oxidise on exposure to air.

Solubility.—1 in 300 of Water.

Medicinal Properties.—Given in anæmia.

Dose.—2 to 10 grains given in lozenge, pill, or syrup.

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

Not Official.

FERRI PERCHLORIDUM.

The Anhydrous Chloride of Iron (Fe_2Cl_6 eq. 322·34), prepared by sublimation, is in black metallic-looking plates. It deliquesces rapidly on exposure to the air, and then solidifies again to a Hydrate ($Fe_2Cl_6.12H_2O$), containing 40 p.c. of Water. Another Hydrate ($Fe_2Cl_6.5H_2O$), containing 21·7 p.c. of Water (Official in the Portuguese Pharmacopœia), can be obtained by evaporating an acid solution until syrupy, and then cooling it.

The commercial solid or crystalline Ferric Perchloride approximates to the formula $Fe_2Cl_6.12H_2O$; it occurs in yellow or yellowish-brown crystalline masses, deliquescing in air. It is soluble in Water, Alcohol, Ether, and Glycerin.

Foreign Pharmacopœias.—Official in Austr., Ger. and Hung., Ferrum Sesquichloratum Crystallisatum; Belg., Chloruretum Ferricum Anhydricum; Dan., Dutch, Norw., and Swed., Chloretum Ferricum; Mex., Cloruro Ferrico; Port. Chloreto Ferrico Anhydro, also Crystallisado; Jap. and Russ., Ferrum Sesquichloratum; Span., Chloruro Ferrico (anhydrous and the Hydrate); U.S., Ferri Chloridum; not in Fr., Ital. or Swiss.

FERRI PERCHLORIDI LIQUOR FORTIS.

STRONG SOLUTION OF FERRIC CHLORIDE.

Medicinal Properties.—A powerful local styptic and astringent; escharotic. Mixed with equal parts of Glycerin has been used as a **paint** in diphtheria. Diluted (1 to 3), is injected into the uterus in bad cases of post-partum hæmorrhage, but the risk of embolism or metritis should not be forgotten; and into the nose for chronic hypertrophic rhinitis. The more dilute forms are used internally to arrest hæmorrhage in the gastro-intestinal or urinary tracts. *See* also 'Tinctura Ferri Perchloridi,' p. 296.

Prescribing Notes.—Preparations of Iron can be given in Infusion of Quassia or Calumba, but they tinge Infusion of Chiretta and Hops, and change to brown or black those of Cusparia, Gentian, Orange, Cascarilla, Cinchona, Cloves, Digitalis, and all astringent infusions.

Official Preparations.—Liquor Ferri Perchloridi and Tinctura Ferri Perchloridi.

Not Official.—Glycerinum Ferri Perchloridi, Liquor Ferri Chloroxydi, Liquor Ferri Dialysatus, and Tinctura Ferri Chlorati Ætherea.

Foreign Pharmacopœias.—Official in Mex., sp. gr., 1·260; Austr., sp. gr. 1·280; Jap., sp. gr. 1·280—1·282; Belg., Fr., Port. and Span., sp. gr. 1·260 (about 9 p.c. of Iron); Dan., Norw. and Swed., sp. gr. 1·298—1·302, Swiss, sp. gr. 1·280—1·290 (about 10 p.c. of Iron); Dutch, 1·441—1·488 (about 15 p.c. of Iron); Ger., Hung. and Russ., sp. gr. 1·280—1·282 (10 p.c. of Iron); Ital., sp. gr. 1·469—1·480; U.S., sp. gr. 1·387.

O.M.P.—Iron, 4; Hydrochloric Acid, 20½; Nitric Acid, 1½; Distilled Water, a sufficient quantity. Place the Iron in a flask; add a mixture of 12½ of Hydrochloric Acid and 7 of Distilled Water; expose to a moderate temperature until effervescence ceases; then boil; filter from undissolved Iron; rinse the flask and contents with a little Distilled Water; pour the rinsings over the filter; add to the filtrate 7 of Hydrochloric Acid; mix; pour the solution in a slow continuous stream into the Nitric Acid, chemical action being promoted if necessary by the application of slight heat; evaporate the product until no more Nitrous fumes escape and a precipitate begins to form; add 1 of Hydrochloric Acid, and sufficient Distilled Water to produce 17½ of the Solution.

Description.—An orange-brown solution with a strong styptic taste, miscible with Water and Alcohol in all proportions.

110 minims contain 22½ grains of Iron; 100 c.c. contain 22·5 grammes.

Tests.—Sp. gr. about 1·42. It affords the reactions characteristic of Ferric salts and Chlorides, and should not yield any characteristic reaction with the tests for Lead, Copper, Arsenium, Zinc, Calcium, Sodium, Potassium, Ammonium, Nitrates, or Ferrous salts. 5 c.c. of it diluted with 80 c.c. of Water should give, upon the addition of an excess of Solution of Ammonia, a reddish-brown precipitate, which, when well washed and incinerated, weighs 1·6 grammes.

Preparations.

LIQUOR FERRI PERCHLORIDI. Solution of Ferric Chloride.

Strong Solution of Ferric Chloride, 1; Distilled Water, a sufficient quantity. Mix the Strong Solution of Ferric Chloride with sufficient Distilled Water to produce 4 of this Solution of Ferric Chloride. =(1 in 4).

Sp. gr. 1·11.

Dose.—5 to 15 minims.

This solution and the 'Tincture of Ferric Chloride' contain identical proportions of Ferric Chloride.

Examination of commercial samples of Solution and Tincture of Ferric Chloride in U.S.A.—*A.J.P.* '94, 323.

TINCTURA FERRI PERCHLORIDI. Tincture of Ferric Chloride.
N.O.Syn.—Steel Drops. Tincture of Steel. (Modified.)

Strong Solution of Ferric Chloride, 5; Alcohol (90 p.c.), 5; Distilled Water, a sufficient quantity. Mix the Strong Solution of Ferric Chloride with the Alcohol; add sufficient Distilled Water to produce 20 of the Tincture. =(1 in 4).

Now made with Alcohol (90 p.c.) in place of Rectified Spirit.

Medicinal Properties. — Astringent, tonic, hæmostatic. The Tincture and Solution of Ferric Chloride have been more used than any other fluid preparation of Iron; given in passive hæmorrhage and as a general tonic during convalescence; invaluable as a remote astringent in chronic inflammatory discharges such as leucorrhœa and gleet; highly useful in anæmia; valuable in large doses for erysipelatous inflammations; also in chronic diarrhœa and dysentery, and to arrest hæmorrhage in typhoid.

Liquor Ferri Chloroxydi and **Liquor Ferri Dialysatus** have been much used as palatable, non-astringent and non-irritant hæmatinics, given in cases where the astringent salts would derange the stomach.

Dose.—5 to 15 minims.

Incompatibles. — Alkalis and their Carbonates, Lime Water, Calcium Carbonate, Magnesia and its Carbonate, Mucilage of Acacia.

Foreign Pharmacopœias.—Official in Dan., Norw. and Swed., Solutio Chloreti Ferrici Spirituosa; Ger., Tinct. Ferri Chlorati Ætherea; U.S., Tinctura Ferri Chloridi; Belg., Port. and Russ., from the salt, with Alcohol and Ether; Ital. (Soluzione Alcoolico-Eterea di Cloruro Ferrico), from the Solution with Alcohol and Ether; not in the others.

Tinctura Ferri Sesquichloridi P.L.—Tinctura Ferri Muriatis P.E.—There is an idea which periodically finds its way into print, that a Tincture made according to the formula of the London and Edinburgh Pharmacopœias is more efficacious than the B.P. and can be given in cases where the other is not tolerated. From a chemical point of view the only difference is that P.L. is three-fourths the strength of B.P., and when freshly made contains one-fifteenth of the Iron in the Ferrous condition. Alcohol has no reducing action on Ferric Chloride even after years of contact.

Not Official.

GLYCERINUM FERRI PERCHLORIDI (*G.H.*).—Ferric Chloride 1 part, Glycerin 4 parts.

LIQUOR FERRI CHLOROXYDI.—A solution in Water of a basic Ferric Chloride, containing ·8 per cent. of Chlorine for 5 per cent. of Ferric Oxide, approximating to the formula $Fe_2Cl_6.7Fe_2O_3$. This is the ratio of the Solution made by us many years previous to the use of 'Dialysed Iron.' It was and is stil lmade to contain 7·1 p.c. of Ferric Oxide to correspond with the Official Tincture.

Dose.—10 to 30 minims.

LIQUOR FERRI DIALYSATUS (Dialysed Iron).—This was formerly official in B.P. but is now omitted. It contains 5 p.c. of Ferric Oxide, and was dialysed until nearly tasteless. It is better to work to a definite percentage of Chlorine; it may be reduced to ·3 p.c. without interfering with the stability of the solution. It is very doubtful, however, whether there is any advantage in reducing the Chlorine ratio below that of Liquor Ferri Chloroxydi as described above.

Another method is to add a certain proportion of diluted Ammonia to a solution of Ferric Chloride, so that the precipitate which first forms just re-dissolves. The Ammonia becomes Ammonium Chloride and the Iron a very basic Oxychloride, from which the Ammonium salt is readily dialysed. Where a saving of expense is an object, as in some large institutions, it would probably be equally efficacious without dialysis.

Dose.—10 to 30 minims.

Foreign Pharmacopœias.—Official in Austr., Ferrum Hydro-oxydatum Dialysatum Liquidum, Ger., Hung., and Russ., when Liquor Ferri Oxydati Dialysati is prescribed, Liquor Ferri Oxychlorati (sp. gr. 1·050) may be dispensed; Swiss, Ferrum Oxychloratum Solution, sp. gr. 1·05; Mex., Oxido de Fierro Dialisado, sp. gr. 1·046, not in the others.

TINCTURA FERRI CHLORATI ÆTHEREA. Liquor (sp. gr. 1·280), 1; Ether, 2; Spirit, 7; all by weight.

Foreign Pharmacopœias.—Official in Ger.

FERRI PERNITRATIS LIQUOR.

SOLUTION OF FERRIC NITRATE.

Ferric Nitrate, $Fe_2 6NO_3$, eq. 480·68, in solution in Water.

Iron, 1; Nitric Acid, 4½; Distilled Water, a sufficient quantity. Dilute the Nitric Acid with 16 of the Distilled Water; introduce the Iron; set aside until the metal is dissolved, taking care to moderate the action, should it become too violent, by the addition of a little more Distilled Water; filter the liquid; add enough Distilled Water to produce 30 of the Solution.

Medicinal Properties.—Tonic, astringent, and escharotic. Like the Ferric Chloride, it is useful in chronic diarrhœa and dysentery; also in hæmatemesis and in hæmorrhage from the bowel, either by the mouth or as an injection with starch mucilage.

Dose.—5 to 15 minims.

110 minims contain 3⅓ grains of Iron; 100 c.c. contain 3·3 grammes.

Foreign Pharmacopœias.—Official in U.S., Liquor Ferri Nitratis, half the strength, sp. gr. 1·050; not in the others.

Description.—A clear solution, of a reddish-brown colour, distinctly acid and astringent to the taste.

Tests.—Sp. gr. 1·107. It affords the reactions characteristic of Ferric salts and of Nitrates. It should not yield any characteristic reaction with the Tests for Lead, Copper, Arsenium, Zinc, Calcium, Sodium, Potassium, Ammonium, Chlorides, Sulphates, or Ferrous salts. 5 c.c. treated with an excess of Solution of Ammonia should give a precipitate which, when washed, dried, and incinerated, weighs ·23 gramme.

FERRI PHOSPHAS.

IRON PHOSPHATE.

A powder containing not less than 47 p.c. of Hydrous Ferrous Phosphate, $Fe_3(PO_4)_2 8H_2O$, with Ferric Phosphate and some Iron Oxide.

Solubility.—Insoluble in Water, but soluble in Hydrochloric Acid.

Medicinal Properties.—Tonic. Possesses the general properties of the ferruginous preparations. Given with advantage in amenorrhœa, some forms of dyspepsia, rachitis and tubercular bone diseases; in nervous depression and exhaustion with tendency to phosphaturia.

Dose.—5 to 10 grains.

Prescribing Notes.—Given in **cachets**, **pills** or **powders**. A good pill can be made by adding one-third of its weight of Glucose.

Official Preparations.—Syrupus Ferri Phosphatis, Syrupus Ferri Phosphatis cum Quinina et Strychnina.

Not Official.—Liquor Ferri Phosphatis Fortis, Pilula Trium Phosphatum, Syrupus Ferri Phosphatis Compositus, Squire's Chemical Food, Syrupus Ferri Phosphatis c. Manganesio.

Foreign Pharmacopœias.—Official in Belg., Span. and U.S.; Mex., Fosfato Ferroso-Ferrico; not in the others.

O.M.P.—Ferrous Sulphate, 3; Sodium Phosphate, $2\frac{3}{4}$; Sodium Bicarbonate, $\frac{3}{4}$; Distilled Water, boiling, a sufficient quantity. Dissolve the Ferrous Sulphate in 30 of the Distilled Water, and the Sodium Phosphate in an equal quantity of Distilled Water; when each of the solutions has cooled to between 100° and 130° F. (37·8° and 54·4° C.), add the latter to the former, pouring in also a solution of the Sodium Bicarbonate in a little Distilled Water; mix thoroughly; transfer the precipitate to a calico filter; wash it with hot Distilled Water until the washings no longer afford any reaction with the tests for Sulphates; finally dry the precipitate at a temperature not exceeding 120° F. (48·9° C.).

Note on Ferrous Phosphate recommending decantation instead of washing on a calico filter.—*P.J.* '97, i. 141.

Description.—A slate-blue amorphous powder.

Tests.—The solution in Hydrochloric Acid yields a precipitate with Solutions of Potassium Ferrocyanide and Ferricyanide; and when treated with Tartaric Acid and an excess of Solution of Ammonia, and subsequently with the Solution of Magnesium Ammonio-Sulphate, it gives a white granular precipitate. Each

gramme dissolved in Hydrochloric Acid should not cease to yield a blue precipitate with Solution of Potassium Ferricyanide until at least 28·2 c.c. of the Volumetric Solution of Potassium Bichromate have been added. It should yield no characteristic reaction with the tests for Arsenium.

Preparation.

SYRUPUS FERRI PHOSPHATIS. Syrup of Ferrous Phosphate. (Altered.)

Iron, in wire, 75 grains; Concentrated Phosphoric Acid, 1¼ fl. oz.; Syrup, 14 fl. oz.; Distilled Water, a sufficient quantity. Place the Iron wire and the Concentrated Phosphoric Acid, previously diluted with an equal volume of Distilled Water, in a small flask; plug the neck with cotton wool, and heat gently until the Iron is dissolved. When cold, filter into the Syrup, and pass a sufficient quantity of Distilled Water through the filter to make the product measure 20 fl. oz.

Formerly made with Granulated Ferrous Sulphate, Sodium Phosphate, Sodium Bicarbonate, Concentrated Phosphoric Acid, Refined Sugar, and Distilled Water.

Dose.—½ to 1 fl. drm.

One fl. drm. of the Syrup represents 1 grain of anhydrous Ferrous Phosphate.

This syrup can be conveniently made by adding 1 volume of Liquor Ferri Phosphatis Fortis to 5½ vols. of Simple Syrup and 1½ vol. of Distilled Water.

Ferrous Phosphate absorbs Oxygen with great rapidity on exposure to air, and requires such a large excess of Acid to keep it in solution, that in framing a formula for Syrupus Ferri Phosphatis a compromise must be made between liability to deposit on the one hand and acidity on the other. We think it is better to use a comparatively small excess, and keep the Syrup in small bottles lying down.

(Not in the other Pharmacopœias.)

SYRUPUS FERRI PHOSPHATIS CUM QUININA ET STRYCHNINA. Syrup of Phosphate of Iron with Quinine and Strychnine. (New.)

Iron, in wire, 75 grains; Concentrated Phosphoric Acid, 1¼ fl. oz.; Strychnine, in powder, 5 grains; Quinine Sulphate, 130 grains; Syrup, 14 fl. oz.; Distilled Water, a sufficient quantity. Place the Iron wire and the Concentrated Phosphoric Acid, previously diluted with an equal volume of Distilled Water, in a small flask; plug the neck with cotton wool, and heat gently until the Iron is dissolved; in the resulting solution dissolve the Strychnine and Quinine Sulphate; filter into the Syrup; pass sufficient Distilled Water through the filter to make the product measure 20 fl. oz.

Dose.—½ to 1 fl. drm.

1 fl. drm. of this Syrup represents 1 grain of Anhydrous Ferrous Phosphate, ⅘ grain of Quinine Sulphate, and $\frac{1}{32}$ grain of Strychnine.

It resembles the compound known as Easton's Syrup.

Foreign Pharmacopœias.—Official in U.S.; not in the others.

Not Official.

LIQUOR FERRI PHOSPHATIS FORTIS.—Containing 8 grains per fluid drachm of the anhydrous Phosphate, is made by dissolving 360 grains of Iron Wire in 6 fl. oz. of Concentrated Phosphoric Acid, with sufficient Water to make 12 fl. ounces.

PILULA TRIUM PHOSPHATUM. Easton's Pill (*G.H.*).—Ferrous Phosphate, 1 grain; Quinine Sulphate, 1 grain; Strychnine, $\frac{1}{32}$ grain; Concentrated Phosphoric Acid, $1\frac{1}{2}$ minims; Liquorice Powder to 5 grains.

Dose.—5 to 10 grains.

SYRUPUS FERRI PHOSPHATIS COMPOSITUS (*B.P.C.*).—Iron Wire, free from oxide, $37\frac{1}{2}$ grains; Concentrated Phosphoric Acid (sp. gr. 1·5), 1 fl. oz.; Distilled Water, 5 fl. drm.: dissolve by a gentle heat in a flask plugged with cotton-wool, the Iron being completely covered by the liquid.

Precipitated Calcium Carbonate, 120 grains; Concentrated Phosphoric Acid 4 fl. drm.; Distilled Water, 2 fl. oz.: mix, and add Potassium Bicarbonate, 9 grains; Sodium Phosphate, 9 grains: filter and set aside.

Cochineal, 30 grains; Distilled Water, $7\frac{1}{2}$ fl. oz.: boil for fifteen minutes and filter, pouring over the filter a sufficient quantity of Distilled Water to produce 7 fl. oz. of filtrate; to this add Refined Sugar, 14 oz.: heat till dissolved and strain. When cold add the Iron and Calcium solutions and sufficient Distilled Water to produce 20 fl. oz.

Each fl. drm. = $\frac{1}{2}$ grain Ferrous Phosphate and $\frac{1}{5}$ grain Calcium Phosphate with small quantities of Potassium and Sodium Phosphates. It should be kept in bottles quite full.

Dose.—$\frac{1}{2}$ to 2 fl. drm.

SQUIRE'S CHEMICAL FOOD.—The preparation made for many years by Parrish and imported by Squire, and subsequently purchased by Squire.

It contains Ferrous Phosphate, Calcium Phosphate, Sodium Phosphate, and Potassium Phosphate.

Dose.—Half to one teaspoonful in water with meals.

A formula was published many years ago, but how far this has been a success is shown by comparing the syrups commercially sold, all of them more or less emphatically stated to be made according to the published formula.

In nine samples analysed, the Iron Phosphate ranged from ·19 to ·66, the Calcium Phosphate from ·5 to 1·6, the total Phosphoric Acid from 1·5 to 4·7; these results are expressed in grains per fl. drm.

Medicinal Properties.—A tonic in debility of whatever origin and during convalescence from acute diseases. Specially indicated in scrofula and rickets, and during pregnancy.

SYRUPUS FERRI PHOSPHATIS C. MANGANESIO.—Dissolve 100 grains Manganese Phosphate in $1\frac{1}{4}$ fl. oz. of Liquor Ferri Phosphatis Fortis and 30 minims of Phosphoric Acid, then dilute to 20 fl. oz. with Simple Syrup.

This Syrup will contain in each fl. drm. $\frac{1}{2}$ grain each of Anhydrous Ferrous Phosphate and Anhydrous Manganese Phosphate.

Dose.—1 fl. drm.

This can sometimes be taken when Syrup of Ferrous Phosphate disagrees.

FERRI SULPHAS.

FERROUS SULPHATE.

$FeSO_4.7H_2O$, eq. 276·10.

May be prepared by the interaction of diluted Sulphuric Acid and Iron.

Solubility.—1 in 1½ of Water: the solution rapidly oxidizes on exposure; insoluble in Absolute Alcohol or Alcohol (60 p.c.), hence it cannot be dissolved in Tinctures.

Medicinal Properties.—A powerful astringent and a hæmatinic tonic, but it is apt to irritate the stomach. Internally it is given in anæmia, amenorrhœa, and general debility; along with Quinine it promotes the appetite; given with cathartics, such as Magnes. Sulph. and Aloes, to increase their action, but at the same time reduce their dose; externally it is used as a **lotion** for ulcerated and erysipelatous surfaces, 3 to 5 grains in an oz. of Water; also as an **injection** for urethral and vaginal inflammations and prolapse of rectum.

Dose.—1 to 5 grains.

Prescribing Notes.—Given in solution or pill form, generally with other ingredients. The **Dried Sulphate** is best given in pills. 2½ grains, which are equal to 4 of the crystallised salt, make a nice pill with a mixture of equal parts of Liquid Glucose and Treacle. Compressed Tablets are also prepared.

Official Preparations.—Ferri Sulphas Exsiccatus and Liquor Ferri Persulphatis. *See also* 'Ferrum.'

Not Official.—Gossypium Ferratum.

Ferri Sulphas Granulata has been deleted from B.P.

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

Description.—In oblique rhombic prisms, of a pale greenish-blue colour and astringent taste.

Tests.—The salt is insoluble in Alcohol (90 p.c.), soluble in less than 2 parts of cold Water giving a clear solution (absence of Oxysulphate). It affords the reactions characteristic of Ferrous salts and of Sulphates. Each gramme dissolved in Water acidulated with Sulphuric Acid should not cease to yield a blue precipitate with Solution of Potassium Ferricyanide until 36 c.c. of the Volumetric Solution of Potassium Bichromate have been added. It should yield no characteristic reaction with the tests for Copper, Zinc, Potassium, Sodium, or Ammonium. Its solution in Water should not give any precipitate with Hydrogen Sulphide (absence of Ferric compounds, etc.).

Preparations.

FERRI SULPHAS EXSICCATUS. Exsiccated Ferrous Sulphate. Dried Sulphate of Iron.—*B.P.* '85.

Expose Ferrous Sulphate, $FeSO_4 7H_2O$, in a porcelain or iron dish to a temperature of 212° F. (100° C.), stirring occasionally until aqueous vapour ceases to be given off; reduce the residue, which should weigh about 60 p.c. of the original salt, to a fine powder.

Dose.—½ to 3 grains.

Description.—A nearly white powder, slowly but entirely soluble in Water.

Test.—Each gramme dissolved in Water acidulated with Sul-

phuric Acid should not cease to yield a blue precipitate with Solution of Potassium Ferricyanide until at least 54·6 c.c. of the Volumetric Solution of Potassium Bichromate have been added, corresponding to at least 92½ p.c. of Exsiccated Ferrous Sulphate, $FeSO_4,H_2O$, eq. 168·82.

The percentage has been lowered from 97½ in *B.P.* '85 to 92½ in *B.P.* '98.

Foreign Pharmacopœias.—Official in Belg.; Dan., dried at 104°—122° F.; Dutch; Ger. and Swiss, dried at 212° F.; Russ., dried at 77°—86° F.; U.S., dried at 300° F.; not in the others.

LIQUOR FERRI PERSULPHATIS.—Solution of Ferric Sulphate.

Ferrous Sulphate, 16; Sulphuric Acid, 1½; Nitric Acid, 1½; Distilled Water, a sufficient quantity. Add the Sulphuric Acid to 20 of the Distilled Water; dissolve the Ferrous Sulphate in the mixture with the aid of heat. Mix the Nitric Acid with 4 of the Distilled Water; add to this diluted acid, warmed, the solution of Ferrous Sulphate; concentrate by boiling, until, by the sudden disengagement of ruddy vapours, the liquid ceases to be black and acquires a red colour. If any Ferrous Salt remain in the solution, add a few drops of Nitric Acid, and boil again. When the solution is cold, make up the quantity to 22 by the addition, if necessary, of Distilled Water.

Introduced for making several preparations of Iron, which are enumerated under 'Ferrum,' p. 281.

Description.—A dense solution of a dark-red colour, inodorous and very astringent, miscible in all proportions with Alcohol and Water.

Tests.—Sp. gr. 1·441. It affords the reactions characteristic of Ferric salts and of Sulphates. It should yield no characteristic reaction with the tests for Ferrous salts. 5 c.c. diluted with 80 c.c. of Water should give, upon the addition of an excess of Solution of Ammonia, a precipitate which, when well washed and incinerated, weighs 1·04 grammes.

This solution is a good styptic; it mixes in all proportions with Water and Alcohol (90 p.c.).

Foreign Pharmacopœias.—Official in Jap., Russ. and Swiss, sp. gr. 1·428—1·430; U.S., sp. gr. 1·320; not in the others.

Not Official.

GOSSYPIUM FERRATUM. (*L. H.*)—Moisten Cotton Wool with Glycerin, then express strongly; steep the damp wool in a solution of Ferrous Sulphate, 1 part to 2 parts of water, squeeze out as much as possible of the liquid, and, without drying, pack the prepared wool into a bottle furnished with a glass stopper.

FERRUM REDACTUM.

REDUCED IRON.

A fine powder, containing at least 75 p.c. of metallic Iron, with a variable amount of Iron Oxide; prepared by reducing Ferric Hydroxide, heated to dull redness, by a stream of dry Hydrogen.

With reference to the keeping qualities of Reduced Iron it may be noted that under ordinary atmospheric conditions, a sample containing 91·5 p.c. of Iron, loosely covered with paper to keep out dust, lost only 1 p.c. in a month.

Medicinal Properties.—Chalybeate and hæmatinic. It does not, however possess the astringent properties of some of the other preparations of Iron, and therefore cannot be used as a substitute in passive hæmorrhage. It is chiefly employed in chlorosis and amenorrhœa. There is no pulverulent state of Iron so convenient as this for children, as it has no taste, a very small dose is required, and it may be given on bread and butter.

As Hydrogen is evolved by its contact with the acid gastric secretion, flatulence may be set up.

Dose.—1 to 5 grains.

Prescribing Notes.—Given in powder, pill, or in Lozenges. An excellent pill can be made by mixing Reduced Iron 24 grains, Liquorice Powder 6 grains, Glycerin of Tragacanth 6 grains, and dividing into 12 or more pills as desired.

Official Preparation.—Trochiscus Ferri Redacti.

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

Description.—A fine greyish-black powder, strongly attracted by the magnet, and producing metallic streaks when rubbed with firm pressure in a mortar.

Test.—It dissolves in Hydrochloric Acid with the evolution of Hydrogen, and without any smell of Hydrogen Sulphide, and the solution gives a light-blue precipitate with Solution of Potassium Ferrocyanide. If ·25 gramme be added to a hot solution of 1 gramme of Copper Sulphate in 15 c.c. of Water, in a flask that can immediately be well corked, and the whole be shaken occasionally during ten minutes, the liquid, after being rapidly filtered with the minimum of exposure to air, and acidulated with Sulphuric Acid, should not cease to yield a blue precipitate with Solution of Potassium Ferricyanide until at least 33·7 c.c. of the Volumetric Solution of Potassium Bichromate have been added.

B.P., '98, has raised the percentage of metallic Iron from 50 to 75 p.c., but there is no difficulty in obtaining Reduced Iron containing over 90 p.c. of metal.

On treatment with Hydrochloric Acid there is usually a residue of Carbon and Silica, and the liberated Hydrogen when passed through filter paper soaked in Lead acetate solution caused a discoloration. Nine samples out of twelve contained traces of Arsenic, five samples gave distinctly alkaline reactions. Proposed that more stringent tests be added to ensure the absence of Sulphides, of more than 1 p.c. of insoluble residue and of alkaline Carbonates; also, that there should be a limit to the amount of Arsenic present, and that various modifications be made in the method for estimation.—*P. J.* '98, ii. 161.

Preparation.

TROCHISCUS FERRI REDACTI. Reduced Iron Lozenge.

Reduced Iron, 1 grain. Mix with the Simple Basis to form a Lozenge.

Dose.—Not given in B.P.; 1 to 6 lozenges.

FERRUM TARTARATUM.

TARTARATED IRON.

Solubility.—1 in 1 of Water, very sparingly in Alcohol (90 p.c.).

Medicinal Properties.—Chalybeate tonic, and slightly diuretic, suitable in the anæmia of convalescence.

Dose.—5 to 10 grains.

Foreign Pharmacopœias.—Official in Belg., Tartras Ferrico-Potassicus; Fr., Tartrate Ferrico-Potassique; Ital., Tartrato Ferrico-Potassico; Mex., Tartrato de Potasio y Fierro; Port., Tartrato de Potassa e de Ferro; Russ., Ferro-Kalium Tartaricum; Span., Tartrato Ferrico-Potasico; Swed., Tartras Ferrico-Kalicus; Swiss, Tartarus Ferratus; U.S., Ferri et Potassii Tartras; not in the others.

O.M.P.—Solution of Ferric Sulphate, 10 fl. oz; Solution of Ammonia, 16 fl. oz. or a sufficient quantity; Acid Potassium Tartrate, in powder, 3 oz. and 146 grains; Distilled Water, a sufficient quantity. Prepare Ferric Hydroxide from 10 fl. oz. of Solution of Ferric Sulphate as directed under 'Ferri et Ammonii Citras.'

Mix the Ferric Hydroxide intimately with the Acid Potassium Tartrate in a porcelain dish; let the mixture stand for twenty-four hours; heat to a temperature not exceeding 140° F. (60° C.), add gradually 30 fl. oz. of Distilled Water; stir constantly until nothing more will dissolve; filter; evaporate at a temperature not exceeding 140° F. (60° C.), to the consistence of syrup; dry in thin layers on flat porcelain or glass plates in a drying closet at a temperature not exceeding 100° F. (37·8° C.); remove the dry flakes of Tartarated Iron.

Description.—In thin transparent scales of a deep garnet colour, somewhat sweetish and astringent in taste.

Tests.—The aqueous solution, when acidulated with Hydrochloric Acid, affords a copious blue precipitate with Solution of Potassium Ferrocyanide, but none, or only a greenish turbidity, with Solution of Potassium Ferricyanide. When the salt is boiled with Solution of Sodium Hydroxide, a reddish-brown precipitate separates, and the filtered solution, when slightly acidulated with Acetic Acid yields, as it cools, a crystalline deposit, especially if the solution is previously mixed with a little Alcohol (90 p.c.). By incinerating 10 grammes at a red heat, washing the residue with Water, and again incinerating, with free access of air, a residue of Ferric Oxide is obtained weighing not less than 3 grammes.

It always contains Ferrous salt, which precipitates with Potassium Ferricyanide; the Oxide left after incineration is strongly magnetic, so that it cannot be wholly Peroxide.

If prepared from ordinary Acid Potassium Tartrate, the residue will always contain Calcium; it is recommended to use a Tartrate prepared from Tartaric Acid by semi-neutralisation with Potassium Hydroxide.—*P.J.* (3) xvi. 514.

FICUS.

FIGS.

The dried fleshy receptacles of *Ficus Carica*.

Medicinal Properties.—Nutritious, laxative, and demulcent. Chiefly used medicinally in constipation. Cut open and heated, it is a convenient cataplasm.

Official Preparation.—Contained in Confectio Sennæ.

Foreign Pharmacopœias.—Official in Fr., Figue; Port., Figos Passados; Span., Higuera; U.S.; not in the others.

Description.—The Fig consists of the enlarged hollow succulent receptacle, bearing very numerous achenes on its inner surface. As met with in commerce it is compressed, irregular in form, soft, tough, brownish or yellowish, with a sweet taste.

FILIX MAS.

MALE FERN.

The rhizome of *Aspidium Filix-mas*, collected late in the autumn, divested of its roots, leaves, and dead portions, and carefully dried.

Medicinal Properties.—The powder of the rhizome is slightly tonic and astringent; chiefly used in the form of Liquid Extract as an anthelmintic for tapeworm.

Prescribing Notes.—The Fluid Extract can be given in milk, or made into an **emulsion** with 1 to 2 fl. drm. of very fresh Mucilage, or ½ to 1 drm. of powdered Acacia, and with Peppermint Water or Milk to form a 2 oz. draught; or in **capsules.** Best given at bedtime on an empty stomach and followed next morning by a powerful purgative.

Official Preparation.—Extractum Filicis Liquidum.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Jap., Fr. (Fougère), Ger., Hung., Norw., Ital. (Felce Maschio), Port. (Feto Macho), Russ.; Mex., Span. (Helecho Macho), Swed., Swiss, U.S. (Aspidium).

Description.—From three to six inches (seven and a-half to fifteen centimetres) or more in length, the rhizome itself is from three-quarters to one inch (two to two and a-half centimetres) in diameter. Entirely covered with the hard, persistent, curved, angular, dark-brown bases of the petioles, which bear numerous brown, membranous scales. The rhizome is brown externally, but green internally. The bases of the petioles are also green internally, and exhibit in transverse section about eight pale yellow fibro-vascular bundles in each, arranged in a diffuse circle. Odour feeble but disagreeable; taste sweetish and astringent at first, but subsequently bitter and nauseous.

Male Fern should not be kept more than a year.

Preparation.

EXTRACTUM FILICIS LIQUIDUM. LIQUID EXTRACT OF MALE FERN.

Exhaust Male Fern Rhizome, in No. 20 powder, with Ether, by percolation; evaporate the Ether from the clear percolate on a water-bath or by distillation, until an oily Extract remains.

Dose.—45 to 90 minims.

For larger doses than 90 minims, see *L.* '88, ii. 1037; *B.M.J.* '89, i. 319, and particularly as to mode of administration, *L.* '94, ii. 255.

The activity of the Extract is supposed to be due to **Filicic Acid.**—*P.J.* (3) xxii. 84; and this varies in different samples from ·71 to 9·59 p.c., reaching in one sample 13·07 p.c.—*P.J.* '97, ii. 85.

3 p.c. of Aspidin, $C_{23}H_{27}O_7$, has been extracted from the ethereal extract: it is poisonous, but nothing certain is known about its therapeutic effect.—*P.J.* '97, i. 288.

Foreign Pharmacopœias.—Official in Austr. and Russ., Ext. Filicis Maris; Belg., Dan., Dutch, Ger., Jap.; Norw., Swed., and Swiss, Ext. Filicis; Fr., Extrait de Fougère Mâle; Hung., Extract. Filicis Maris Æthereum; Ital., Estratto di Felce Maschio Etereo; Port., Extracto de Feto Macho Ethereo; Span., Aceite de Helecho; U.S., Oleoresina Aspidii. All made with Ether.

FŒNICULI FRUCTUS.

FENNEL FRUIT.

The dried ripe fruit of *Fœniculum capillaceum*, collected from cultivated plants.

Medicinal Properties.—Stimulant, aromatic, and carminative. In action similar to Anise. Antispasmodic in intestinal colic of children.

Official Preparation.—Aqua Fœniculi. Used in the preparation of Pulvis Glycyrrhizæ Compositus.

Not Official.—Oleum Fœniculi.

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

Description.—From one-fifth to about two-fifths of an inch (five to ten millimetres) long, and about one-tenth of an inch (three millimetres) in diameter; oblong, more or less curved, capped by a conspicuous stylopod and two styles, glabrous, greenish-brown or pale yellowish-brown in colour; odour aromatic; taste aromatic, sweet, and agreeable. The Fruit is readily separated into its two mericarps, each of which has five prominent primary ridges and exhibits in transverse section six large vittæ.

The ash was determined of Fruits (4 samples) 8·47, 8·93, 9·75, 7·70 p.c.; of Pulvis Fœniculi (6 samples) 24·64, 12·8, 9·90, 8·91, 13·0, 9·89 p.c., the first contained sand.

Preparation.

AQUA FŒNICULI. FENNEL WATER.

Fennel Fruit, 1; Water, 20: distil 10. =(1 in 10).

Dose.—Not given in B.P. 1 to 2 fl. oz.

Foreign Pharmacopœias.—Official in Austr., 1 in 20; Fr., Ital., Mex. and Port., 1 in 4; Ger. and Russ., 1 in 30; Hung. and Swed., 1 in 10; Span., 1 in 6; Swiss, 1 in 25; Belg., with Oil, 1 in 3000; Dan., with Oil, 1 in 2000; Dutch, Jap., and U.S., with Oil, 1 in 500; not in Norw.

Not Official.

OLEUM FŒNICULI.—A volatile Oil distilled from Fennel. Sp. gr. not less than ·960. Between 5° and 10° C. it usually solidifies to a crystalline mass, but occasion-

ally it remains liquid at a considerably lower temperature. The important constituent is Anethol.

The Oil from Japanese Fennel resembles closely that from the other varieties.—*P.J.* '96, ii. 91; *C.D.* '96, ii. 191.

Commercial varieties of Fennel and their essential oils.—*P.J.* '97, i. 225.

Dose.—5 to 15 minims.

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

Not Official.

FORMIC ALDEHYDE.

METHANAL. METHYL ALDEHYDE.

Produced by the limited oxidation of Methyl Alcohol. A gas condensible by cold to a clear mobile liquid. The commercial article 'Formol' or 'Formalin' is stated to be a 40 p.c. solution.

FORMALDEHYDUM SOLUTUM (*Ph. Ger. Supp.*).—A clear colourless fluid containing about 35 p.c. of Formaldehyde. Sp. gr. 1·079—1·081. Mixes readily with Water and Alcohol (90 p.c.), but not with Ether.

Medicinal Properties.—The strong solution (35—40 p.c.) is a powerful antiseptic, disinfectant and deodorant; it is also a powerful caustic, and should be handled with care. The vapour is irritating to the eyes and nose, probably due to traces of Formic Acid. The strong (40 p.c.) solution diluted with 10 to 50 volumes of Water is useful for fixing and hardening histological and pathological specimens. When diluted with 100 to 200 parts, it may be used as a general antiseptic in the sick room for washing the hands, &c.

Formic Aldehyde as a disinfectant.—There is no conflict of evidence as to Formaldehyde being a reliable disinfectant when used in solution. Considerable difference of opinion exists, however, as to its value when used in a gaseous state. In the form of a ½ to 1 p.c. solution, which may be used as a wash or spray, it is a cheap, rapid and powerful disinfectant. The Aldehyde vapours are non-poisonous, but very irritating to the eyes and throat; they possess marked deodorant and disinfectant properties, and are well suited to the purposes of room disinfection, for they do not affect colours. The use of the reagent in a gaseous form appears to possess the advantages over disinfection by Sulphurous Acid, that it injures nothing except Iron, it diffuses better, and it possesses greater disinfectant power.—*B.M.J.* '98, i. 1542.

Muller's Fluid containing 10 p.c. of Formol has been recommended for hardening pathological specimens, but it deposits in five days and must be changed; 60 p.c. Alcohol to which 1 p.c. Formol has been added is a good preservative fluid after hardening in above.—*B.M.J.E.* '96, i. 88.

Formalin (40 p.c.) in 2000 to 3000 of Water used freely to hypopyon ulcers, and septic abrasions of the cornea.—*B.M.J.* '96, i. 144.

2 p.c. solution in ringworm.—*B.M.J.E.* '94, ii. 103; *Y.B.T.* '95, 394.

40 p.c. solution applied to ringworm.—*B.M.J.* '96, ii. 650.

40 p.c. solution sometimes causes suppuration and is not so useful for ringworm as Carbolic Acid.—*B.M.J.* '97, i. 972.

A paper by Kanthack on the use of Formalin lamps for the disinfection of rooms.—*L.* '98, ii. 1049.

Tests.—On mixing with an ammoniacal solution of Silver Nitrate, metallic silver is separated. Heated with alkaline Copper Tartrate solution, cuprous oxide is separated.

If to 2 c.c. of the solution, an equal volume of 5 p.c. Potassium Hydroxide Solution and about ·5 gramme of Resorcinol be added and the mixture heated to boiling, the yellow color which first appears gradually becomes red. (This reaction is said to be given by no other substance.)

If 5 c.c. be evaporated to dryness on a water-bath, a white amorphous mass is left, which should leave no residue on ignition (absence of mineral impurities).

10 c.c. should require not more than ·25 c.c. of $\frac{n}{1}$ Potassium Hydroxide Solution for neutralisation, using Phenol-phthalein as indicator (absence of more than ·1 p.c. of Formic Acid). It should not contain more than traces of Chlorides, Sulphates, or heavy metals.

Dissolve 2 grammes of pure, neutral Ammonium Chloride in 25 c.c. of water, and introduce it into a flask provided with a well-fitting stopper. Add 2·25 grammes of the sample, and then run in from a burette 25 c.c. of $\frac{n}{1}$ Potassium (or Sodium) Hydroxide Solution. Stopper the flask at once, and put it aside for half an hour.* Then add a few drops of Rosolic Acid solution and determine the excess of Ammonia with $\frac{n}{1}$ Sulphuric Acid, each c.c. of $\frac{n}{1}$ Potassium Hydroxide Solution consumed indicating 2 p.c. of Formaldehyde. These tests have been taken from a very extensive paper by Carl E. Smith.—*A.J.P.* '98, 86, 447.

Amyloform, Dextroform, and **Glutol** are compounds of Formaldehyde with Starch, Dextrin, and Gelatin respectively, and have been recommended as dressings.

PARAFORMIC ALDEHYDE.—A solid polymer of Formic Aldehyde. It volatilises at 100° C. (212° F.), and is readily convertible into that substance when heated to the above temperature in the presence of water. It is used for disinfecting rooms.

UROTROPINE (Hexamethylenetetramine).—Prepared by the action of Ammonia on Formic Aldehyde.

A white crystalline powder readily soluble in Water. Recommended in the treatment of cystitis and in phosphaturia.

Dose.—7 grains dissolved in water or in aerated water.

Daily doses of 15 to 20 grains or more may be taken without harm for a long period.

Not Official.

FUCUS VESICULOSUS.

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

Foreign Pharmacopœias.—Official in Fr., Varech Vesiculeux; Mex. Encina de Mar; Port., Bodelha; Span., Fuco Vejigoso; not in the others.

Preparations.

EXTRACTUM FUCI.—Prepared by percolation in the same manner as the Fluid Extract, and evaporation of the resulting fluid to a stiff extract.

100 of dried Fucus yield about 16 of Extract.

Dose.—3 to 5 grains in **pill.**

EXTRACTUM FUCI LIQUIDUM.—Dried Fucus Vesiculosus in No. 20 Powder, 16; percolate with a mixture of Alcohol (90 p.c.) 2; Water, 1; so that the resulting fluid shall measure 32.

Dose.—A teaspoonful, given for obesity; it also diminishes tubercular glandular swellings.

Smelling fresh seaweed is said to relieve hay asthma.

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* Six hours' contact is better.—*A.J.P.* '98, 432.