200 c.c. capacity, the Chloroform-Ether solution is washed with 3 successive quantities each of 10 c.c. of Water and the washings filtered through the same filter, which is finally washed with Water, and the mixed filtrate and washings are diluted with Water to about 100 c.c. After the addition of sufficient Ether to form a layer of about 1 cm., the excess of volumetric acid is titrated with Hundredth-normal Volumetric Potassium Hydroxide Solution, using 5 drops of Iodeosin Solution as an indicator of neutrality, the mixture being well shaken after each addition. It is required that not more than 17 c.c. of the Hundredth-normal Solution shall be necessary. The number of c.c. of Hundredth-normal Volumetric Potassium Hydroxide Solution required is subtracted from 40, the difference multiplied by 0·00364 (the mean molecular equivalents of Strychnine and Brucine), the product multiplied by 100 and divided by $33\frac{1}{3}$ yields the percentage w/w of total alkaloids present in the Tincture.

STRYCHNINE.—*See* STRYCHNINA.

Not Official.

BRUCINE ($C_{23}H_{26}N_2O_4.4H_2O$, eq. 462·85).—Colourless, transparent, monoclinic crystals, containing about 15 p.c. of Water. Its salts are bitter, and most of them crystallisable.

It should be kept in well-stoppered glass bottles of a dark amber tint and protected as far as possible from contact with air, as the crystals quickly effloresce when exposed to dry air.

Solubility.—But slightly soluble in Water; 1 in 20 of Alcohol (90 p.c.), 1 in 2 of Chloroform, with separation of the combined Water.

Brucine resembles Strychnine in its physiological action, but is weaker.

Dose.—$\frac{1}{10}$ to $\frac{1}{2}$ grain = 0·006 to 0·032 gramme.

It possesses analgesic properties, in 5 p.c. solutions of the **Sulphate** or **Nitrate** applied locally.—*T.G.* '85, 376; '86, 18.

Tests.—Brucine rapidly loses its Water of crystallisation when exposed to dry air or over Sulphuric Acid at 100° C. (212° F.) it becomes anhydrous, the anhydrous product melting at 178° C. (352·4° F.) the aqueous solution is lævogyrate; the alkaloid dissolves in concentrated Sulphuric Acid without colour. Concentrated Nitric Acid, or Sulphuric Acid containing Nitric Acid, produces a blood-red coloration, passing to orange and finally to yellow. The salts produced when Brucine is neutralised with acid are neutral in reaction towards the customary indicators of neutrality, and the alkaloid may therefore be titrated direct with Normal or Tenth-normal Hydrochloric or Sulphuric Acid Solution, using Iodeosin Solution as an indicator of neutrality. 1 c.c. of Normal Sulphuric or Hydrochloric Acid Solution is equivalent to 0·39133 gramme of anhydrous Brucine or 0·46285 gramme of hydrated Brucine. Brucine should be free from Strychnine, its presence may be detected by oxidising the Brucine with Nitric Acid, shaking out the Strychnine by an immiscible solvent and applying the Sulphuric Acid and Potassium Bichromate test when no violet or purple-violet coloration should be produced.

OLEA.

In the British Pharmacopœia the term **Oleum** is applied to an Oil (whether expressed or distilled), as it is also in Austr., Dutch, Ger., Hung., Jap., Russ. and U.S. The other names for fixed and volatile Oils respectively are: Belg., **Oleum** and **Essentia**; Dan.,

Norw. and Swed., **Oleum** and **Ætheroleum**; Fr., **Huile** and **Essence**; Ital. **Olio** and **Essenza**; Mex., **Aceite** and **Aceite Volatil**; Port., **Oleo** and **Essencia**; Span., **Aceite** and **Esencia.**

Elæosaccharum.—A title used in the Foreign Pharmacopœias to denote a trituration of an Essential Oil with Sugar. Austr., Dutch, Russ. and Swiss use 1 drop of the Oil to 2 grammes of Sugar; Belg., Dan. and Norw., Oil 1, Sugar 49; Ger., Jap. and Swed., Oil 1 gramme, Sugar 50 grammes; they are all practically the same strength. Ital. (Oleosaccari), Oil 1 gramme, and Sugar 20 grammes; Span., Oil 1, Sugar 25.

Not Official.

OLEATES.

Some of these preparations have come into general use. They were originally made by dissolving the oxide of the metal, or an alkaloid, in an excess of Oleic Acid; but later Dr. Shoemaker proposed the method of precipitation by double decomposition between a salt of the base and Solution of Castile Soap (Sodium Oleate with a little Palmitate); Solution of Potassium Oleate may be used with advantage in place of the Solution of Castile Soap, when the pure Oleate is required. The Oleate can also be purified from Palmitate by solution in Petroleum Spirit.

The various Oleates will be found under the headings of their respective bases.

OLIVÆ OLEUM.

OLIVE OIL.

Fr., Huile d'Olive; Ger., Olivenöl; Ital., Olio di Olive; Span., Aceite de Olivas.

A clear, pale yellow, or greenish-yellow, oily fluid, possessing a faint characteristic odour and bland oily taste.

It is expressed from the ripe Fruit of *Olea Europæa.*

Chiefly obtained from the south of Europe.

Adulteration of Olive Oil is very general, large quantities of Cottonseed and other Oils being used for admixture.

On exposure to the air it is apt to become rancid, acquiring a disagreeable smell.

Solubility.—1 in 2 of Ether; partially in Alcohol (90 p.c.).

Medicinal Properties.—Nutritious and mildly laxative, demulcent in the form of emulsion; externally as a lubricant in massage, also as an emollient and protective for burns and certain cutaneous diseases. 4 to 8 fl. oz. daily, and also larger quantities, have been given in cases of gall stones. Used as a laxative enema, especially for intestinal obstruction (5 oz. warm Oil, with or without 8 oz. warm Starch Mucilage). Given by the mouth in corrosive poisoning. It is most extensively employed in pharmacy, in the preparation of certain liniments, ointments and plasters.

Its use in typhoid is regarded (*B.M.J.* '05, i. 414) as a perfect boon. A breakfast-cupful is administered as an injection by the bowel for the first four or five days at intervals of 12 to 24 hours, and subsequently every second day. ½ to 1 fl. oz. every four hours may also be given by the mouth without producing nausea.

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

Prescribing Notes.—*It may be given as* **capsules,** *or in emulsion: 1 oz. of Olive Oil with 180 grains of powdered Gum Acacia and Water to 2 oz. Olive Oil mixes well with Malt Extract. Heated to 120° to 140° C. in a small flask (plugged with Cotton-Wool) for half an hour, it forms* **Oleum Aseptieum** *or* **Sterilised Olive Oil.** *Almond Oil and Liquid Paraffin can be sterilised in a similar manner.*

Official Preparations.—Used in the preparation of Emplastrum Ammoniaci cum Hydrargyro, Emplastrum Hydrargyri, Emplastrum Picis, Emplastrum Plumbi, Linimentum Ammoniæ, Linimentum Calcis, Linimentum Camphoræ, Sapo Durus, Sapo Mollis, Unguentum Capsici, Unguentum Hydrargyri Compositum, Unguentum Hydrargyri Nitratis, and Unguentum Resinæ.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex. (Aceite de Olivo), Norw., Port. (Azeite), Russ., Span. (Aceite), Swed., Swiss and U.S. Ger. and Russ. have also Oleum Olivarum Commune. Fr. has also Huile d'Olive purifiée et sterilisée.

Tests.—Olive Oil has a sp. gr. of 0·915 to 0·918. Five samples examined in the author's laboratory had sp. gr. of 0·916 to 0·917, averaging 0·916. The *B.P.* gravities are 0·914 to 0·919, the *U.S.P.* 0·910 to 0·915 at 25° C. (77° F.), and the *P.G.* 0·915 to 0·918. It is officially stated to be liable to assume a pasty consistency at 10° C. (50° F.) and at 0° C. (32° F.) to form a nearly solid granular mass. The *U.S.P.* states that when cooled from 8° to 10° C. (46·4° to 50° F.) it becomes somewhat cloudy from separation of crystalline particles, and at 0° C. (32° F.) it forms a whitish granular mass. The *P.G.* statement is essentially the same as that of the British Pharmacopœia. The congealing point depends greatly upon the length of time to which the Oil is exposed to cold, for instance, the Oil cooled by Ether to −12·8° C. (9° F.) remained unchanged, but when kept at 0° C. (32° F.) for 4 hours it partially solidified. Some samples of Oil pressed in the author's laboratory from Olives grown in the south of France showed no sign of congelation during 6 hours at 0° C. (32° F.) or 3 hours at −9·4° C. (15° F.). On the other hand, in the following year an Oil from the same district (guaranteed pure) set at once when cooled to −10·6° C. (13° F.) and within 2 hours at 0° C. (32° F.). It has since been discovered that the non-freezing Oil is only produced when the fruits have been allowed to over-ripen. The Saponification value and the Iodine absorption afford a useful means of judging the purity of an Olive Oil, but neither are referred to in the *B.P.* The Saponification value should be about 190, the Iodine absorption not less than 80. The *U.S.P.* gives the Saponification value of 191 to 195 and an Iodine absorption of not less than 80 nor more than 88. The *P.G.* makes no reference to the Saponification value, but gives an Iodine absorption of not less than 80 and not more than 84. Five samples of genuine Oil examined in the author's laboratory gave from 189·7 to 198·3 for the Saponification value, with an average of 194·1 and 81·28 to 83·82, with an average of 82·80 for the Iodine absorption. Five other samples of genuine Oil examined for their Iodine value alone showed from 81·28 to 82·82, with an average of 82. Adulteration of Olive Oil is very general, large quantities of Cottonseed and other Seed Oils, Sesame Oil and other Oils being used for the admixture. The *B.P.* includes a test for Cottonseed Oil which is performed by shaking a measured quantity

of 10 c.c. of the Oil with 2 c.c of a mixture containing 1 p.c. solution of Silver Nitrate in Absolute Alcohol, to which is added 20 p.c. w/v of Ether and a drop of Nitric Acid. It is officially required that no blackening should occur when the mixture is heated on a water-bath for 10 minutes. The *U.S.P.* employs an alcoholic solution of Silver Nitrate acidulated with Nitric Acid as described below, but it contains no Ether. The *U.S.P.* contains a useful test for the detection of Cottonseed, and is essentially that given in the 17th Edition of the *Companion* and which was suggested to the author by Mr. E. J. Bevan and described under Adeps. It consists in heating a few c.c. of the Oil with 1 c.c. of a 1 p.c. solution of Sulphur in Carbon Bisulphide in a salt-bath for about half an hour, no reddish colour should be developed. The *B.P.* test is essentially Bechi's Silver Nitrate test, it is more generally carried out on the fatty acids of the Oil, and not on the glycerides. The *U.S.P.* and *P.G.* include an Elaïdin test with Nitric Acid, which is described in the small type below; this forms a useful means of detecting sophisticated Oil.

The Sugar test is adopted by the *U.S.P.* for the detection of Sesame Oil, a 1 p.c. solution of Sugar in Hydrochloric Acid (sp. gr. 1·18) being employed: the test is described below. It frequently contains an excessive amount of free fatty acid, but no test for it is included in *B.P.*, *U.S.P.* or *P.G.* The free acid may be determined by warming 5 or 10 grammes of the Oil with 25 c.c. of Alcohol (90 p.c.), cooling and titrating the alcoholic solution with Tenth-normal Volumetric Potassium or Sodium Hydroxide Solution, using Phenolphthalein Solution as an indicator of neutrality. 1 c.c. of Tenth-normal Volumetric Alkali Solution represents 0·028014 gramme of Oleic Acid. The above-mentioned five samples showed from a mere trace to 1·4 p.c. of free acid, with an average of 0·875 p.c. Mineral Oil, if present, may be determined by the amount of unsaponifiable residue; the Oil is saponified with Alcoholic Potassium Hydroxide Solution, evaporated to dryness to remove the Alcohol, the residue is dissolved in Water and the unsaponifiable Oil shaken out with Ether, the ethereal solution evaporated, the residue dried at 100° to 105° C. (212° to 221° F.) till constant, the residue cooled and weighed. Cottonseed, Rape, or Linseed Oils may be detected by the increased Iodine absorption, as also may Fish Oils. The m.p. of the fatty acids obtained from the Oil also affords a useful indication of the nature of the adulteration. Arachis Oil, which gives an Elaïdin test very similar to Olive Oil, may be detected by the isolation of Arachidic Acid.

A test for the absence of Sesame Oil has been suggested with Pyrogallol Solution; 10 c.c. of the Oil are shaken with 10 c.c. of a freshly prepared solution of Pyrogallol (2 grammes) in Hydrochloric Acid (30 grammes) and the separated acid liquid heated in a water-bath for 10 minutes, no distinct violet coloration should be produced.

Nitric Acid.—On vigorously shaking 2 c.c. of the Oil and 2 c.c. of Nitric Acid (sp. gr. 1·37), the Oil should retain a light yellow colour, not becoming orange or reddish-brown, and after 6 hours should change into a yellowish-white solid mass and an almost colourless liquid, *U.S.P.*; 1 c.c. of fuming Nitric

Acid, 1 c.c. of Water and 2 c.c. of Oil at 10° C. (50° F.); a greenish-white, but not red or brown mixture is obtained, which separates into a firm white mass and a faintly coloured liquid after from 2 to 6 hours, *P.G.*

Silver Nitrate.—If 5 c.c. of the Oil be shaken with 5 c.c. of a solution of 0·1 gramme of Silver Nitrate in 10 c.c. of Alcohol, with the addition of 2 drops of Nitric Acid, and the mixture heated for about 5 minutes on a water-bath, the Oil should retain its original pale colour, not becoming reddish or brown, nor should any dark colour be produced at the line of contact of the two liquids, *U.S.P.*

Amyl Alcohol.—If 2 c.c. of the Oil be mixed in a test-tube with 2 c.c. of equal volumes of Amyl Alcohol and Carbon Bisulphide containing 1 p.c. of Sulphur in solution, and the test-tube be immersed to one-third or one-half its depth in boiling salt Water, no reddish colour should develop in from 10 to 15 minutes, *U.S.P.*

Hydrochloric Acid with Sugar.—If a mixture of 2 c.c. of Oil and 1 c.c. of Hydrochloric Acid (sp. gr. 1·18) containing 1 p.c. of Sugar be shaken for half a minute and allowed to stand for 5 minutes, then 3 c.c. of Water added and the whole again shaken, the acid layer should not show a pink colour, *U.S.P.*

OLEUM ARACHIS. *Syn.* Earth-Nut, Ground-Nut or Pea-Nut Oil.—The oil expressed from the seeds of *Arachis Hypogæa*; **Oleum Sesami**, the oil expressed from the seeds *Sesamum indicum*; both are official in the *Ind.* and *Col. Add.*, the former for India and the African, Eastern and Australian Colonies, the latter for India and African, Eastern and North American Colonies, in which places they are officially permitted to be used in place of Olive Oil in making liniments, ointments, plasters and soaps.

OPIUM.

OPIUM.

Fr., Opium de Smyrne; Ger., Opium; Ital., Oppio; Span., Opio.

The milky exudation of *Papaver somniferum*, L., obtained by incision from the unripe Capsules, and inspissated by spontaneous evaporation.

Opium in powder should contain between 9½ and 10½ p.c. of anhydrous Morphine.

The Extract and Tincture of Opium being standardised preparations, any suitable variety of Opium may be used in their manufacture, provided that when dry it shall yield when assayed by the official process not less than 7·5 p.c. of anhydrous Morphine. When used in the preparation of the remaining official galenical preparations, Opium is officially required to be of such a strength that the powder obtained from the Opium when dried till constant in weight at 100° C. (212° F.) shall yield not less than 9·5 and not more than 10·5 p.c. of anhydrous Morphine. The *B.P.* also permits the dilution of an Opium of greater alkaloidal strength than official requirements to be diluted with one of a less official strength or with Milk Sugar. The *U.S.P.* requires that Opium shall yield when in its normal moist condition not less than 9 p.c. of crystalline Morphine; the *P.G.* requires that 100 parts of powdered Opium shall contain 10 to 12 parts of anhydrous Morphine, and on drying at 100° C. (212° F.) shall lose not more than 8 p.c. of its weight.

The Opium official in the *Fr. Codex* (1908), when dried at 60° C. (140° F.), is required to contain at least 10 p.c. of Morphine.

Opium Granulatum (Opium dried and in coarse powder), and Opium Deodoratum should yield not less than 12 p.c. nor more than 12·5 p.c. of crystallised Morphine.

Medicinal Properties.—As a hypnotic and sedative it is used in insomnia, excitement and delirium of whatever origin, including that of typhoid; as an analgesic to relieve all forms of neuralgic and abdominal pain, the pain of pleurisy, and of gastric ulcer and of cancer, the pain during the passage of biliary and renal calculi, and the after-pains of labour; as a hæmostatic in intestinal and pulmonary hæmorrhage; in diabetes; in full doses for acute peritonitis; in small doses along with other astringents in diarrhœa.

In aortic regurgitation it increases the peripheral blood supply, especially to the brain, it reduces the tendency to syncope, it relieves the angina, and the cardiac dyspnœa, but if the kidneys are affected it should not be given.

As an **expectorant** it is used, guarded by Ammonia, only where the secretion of mucus is abundant, and not thick and viscid or scanty.

As a diaphoretic, in form of Dover's Powder, it is valuable in influenza and coryza.

As an antispasmodic, in puerperal convulsions, epilepsy, colic, severe forms of chorea and spasmodic asthma; in spasmodic urethral stricture.

Locally in the form of **liniment**, **plaster**, or fomentation, it is used in neuralgias, rheumatism, lumbago and sciatica.

To avoid impairment of digestion, and to obtain rapid action, it is given subcutaneously (as hypodermic injection of Morphine) in neuralgia and sciatica, near the seat of pain, also in angina pectoris, cardiac paroxysmal pain, and for the dyspnœa caused by intra-thoracic tumours.

In form of Morphine, or Lead and Opium, **suppository** it relieves rectal and genito-urinary and other pelvic pains, and is useful after operations on these regions. Opium is preferable to Morphine in peritonitis, enteritis, and other abdominal inflammations, on account of its direct and more prolonged anodyne and astringent effect, and because of its more continued action it is preferable in delirium and other 'head symptoms.'

Its continued use impairs the appetite, digestion and intellect; that it is a cardiac depressant should always be borne in mind. Great caution should be exercised in giving Opium to infants and young children, as they are very susceptible to its action, and it is contra-indicated in the pain of chronic dyspepsia, in cases of coma with contracted pupil, in kidney diseases, in nursing females and plethoric persons, in cerebral hyperæmia, in alcoholic intoxication, and for the control of nausea and vomiting in uræmia; in the advanced stages of bronchitis and pneumonia, or whenever the respiration is seriously embarrassed, it is a most dangerous remedy.

Valuable papers on Morphine in cardiac diseases.—*L.* '98, ii. 1393; and by Burney Yeo, Stockman, etc., on Opium in acute and chronic disease.—*Pr.* '07, i. 625.

Of sugar-reducing drugs, the most to be relied upon. Most useful in severe cases, in which a rigid diet fails.—*Pr.* '07, ii. 148.

A modification of the Bromide treatment of epilepsy is found in the Opium-bromide therapy. One of the preparations of Opium, preferably the Extract, is given (*L.* '05, i. 710) for a period of six weeks in increasing doses up to 15 grains per diem, when it is suddenly stopped and large doses of Bromide salt, from 90 to 120 grains, are substituted, this large dose being gradually diminished until about 30 grains are taken daily.

A useful way of giving Opium consists (*B.M.J.* '05, ii. 1004) in mixing ½ drm. to 1 drm. of Tincture or Liquid Extract with enough Water to bring it up to 2 fl. drm. and inject it into the empty rectum by a Glycerin springe. In half to three-quarters of an hour the Opium is usually absorbed and relieves pain almost more efficiently and for a longer time than a subcutaneous injection does.

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

Ph. Ger. maximum single dose, 0·15 gramme; maximum daily dose, 0·5 gramme.

Prescribing Notes.—*Powdered Opium can be made into* **pills** *with Alcohol* (60 *p.c.*).

It is convenient to remember that $\frac{1}{10}$ *grain Morphine is contained in* 1 *grain of Powdered Opium, in* ½ *grain of Extract, in* 15 *minims of Liquid Extract or of Tincture, in* 96 *minims of Ammoniated Tincture of Opium, in* 240 *minims of Compound Tincture of Camphor.*

Opium is frequently ordered in lotions, 20 *to* 60 *minims of Liquid Extract or Tincture to the fl. oz. It is also prescribed with Lead Acetate and Lead Subacetate, but the result is a turbid liquid deficient in strength of Lead owing to the precipitation of Lead Meconate; Solution of Morphine Acetate being nearly the same strength as the Tincture, and mixing readily with Lead Lotions without precipitation, can advantageously be employed in its place.*

Incompatibles.—The Alkaline Carbonates, Lime Water, salts of Lead, Iron, Copper, Mercury, and Zinc, Liquor Arsenicalis, and vegetable astringents.

Official Preparations.—Extractum Opii and Tinctura Opii; used in the preparation of Codeine and of Morphine; of the **Powdered Opium,** Emplastrum Opii, Pilula Plumbi cum Opio, Pulvis Cretæ Aromaticus cum Opio, Pulvis Opii Compositus, and Unguentum Gallæ cum Opio. Contained in Pilula Saponis Composita, Pulvis Kino Compositus, Pulvis Ipecacuanhæ Compositus, and Suppositoria Plumbi Composita. Of the **Compound Powder,** Pilula Ipecacuanhæ cum Scilla; of the **Extract,** Extractum Opii Liquidum. Of the **Tincture,** Linimentum Opii and Tinctura Opii Ammoniata; contained in Tinctura Camphoræ Composita.

Not Official.—Acetum, Aqua, Confectio, Enema, Trochiscus, Unguentum, and Vinum, Opii, Solution of Bimeconate of Morphia (Squire), *Syn.* Liquor Meconicus, Meconii Periodidum, Liquor Opii Sedativus, Linctus Opiatus, Linimentum Opii Ammoniatum, Sydenham's Laudanum, Tinctura Opii Crocata, Tinctura Opii Deodorati, Narceina, Narcotina, Papaverina, Cotarnine Hydrochloride, Stypticin, and Styptol.

Antidotes.—In poisoning by Opium the antidotes are, an emetic of 10 grains of Copper Sulphate, the stomach-tube, external stimulants, cold affusion, Ammonia to the nostrils, compelled exertion, and artificial respiration. Belladonna or hypodermic injection of Atropine should be used; Strychnine; Amyl Nitrite; Gelsemium; Potassium Permanganate. *See* also Morphinæ Hydrochloridum.

Foreign Pharmacopœias.—Official in Austr., not less than 12 p.c.; Belg., Dan., Dutch, Hung., Ital., Norw., Port. and Span., not less than 10 p.c.; Mex., 10 p.c.; Ger., Russ., Swed. and Swiss, 10 to 12 p.c.; Fr. and Jap., 10 to 11 p.c.; U.S., not less than 12 p.c.; all calculated on dried Opium.

Descriptive Notes.—The Opium chiefly imported into this country comes from Asia Minor, Greece, and Persia. The Opium from Turkey used in pharmacy is largely that from the districts Karahissar,

Boghaditz, and Ghiveh, which latter is often called Constantinople Opium. It occurs in more or less rounded pieces, averaging from ½ to 2 lb. in weight, usually covered with Poppy leaves, with Rumex capsules more or less adherent to the cakes. The Boghaditz is richest in Morphine, but gummy and difficult to assay. The Yerli Opium comes from the country surrounding Smyrna, it is soft and unsightly, and chiefly used in the manufacture of Morphine. Natural Karahissar Opium usually yields 11½ to 12 p.c. of Morphine, it is also used for the manufacture of Morphine; the inferior qualities are known as Adet. Grecian or Salonica Opium, like the two following, is sold as 'shipping' Opium. The best is selected for Cuba, and soft grades are shipped to the United States. It contains from 10 to 14 p.c. of Morphine, and is sold at a high price for smoking. Tokat and Malatia Opiums are produced in Armenia and go chiefly to Cuba, the West Indies, and Central and South America. They average from 7 to 14 p.c. of Morphine. These shipping Opiums are generally in softer and flatter cakes and have, on arrival a greener leaf on their surface. When purchased fresh on the Turkey market an allowance is made for the moisture in Opium and a charge of 2*d.* per lb. is made for drying it. It loses approximately 23 p.c. in the drying warehouses before it is fit for shipment. The Boghaditz, Karahissar and Yerli Opiums vary much in size, shape, and weight, and the Poppy leaves covering them are irregularly placed; in the Ghiveh Opium, on the contrary, two leaves are placed in opposite directions on either side of the bun-shaped cakes. All Turkey Opiums have a granular fracture, and consist of agglomerated tears. Persian Opiums, on the contrary, have a uniform non-granular consistence. The Opiums used in pharmacy, although averaging from 11 to 12 p.c. of Morphine, have of late years, since a uniform standard has become official (10 p.c., *B.P.*), been purposely lowered in Morphine contents. Persian Opium is chiefly re-exported, although it is also used for the manufacture of Morphine, as it averages about 12 p.c. of that alkaloid, whereas that exported direct from Turkey to China averages 9 to 10 p.c., consisting of 80 p.c. of pure juice and 20 p.c. of foreign substances. Persian Opium is prepared in various forms, cones, loaves, rectangular blocks, sticks, etc., and these are packed in coloured paper, vine, or fig leaves, sometimes in 'poppy trash,' but the pieces of each brand are usually of uniform size and weight. The Opium in sticks is used for eating, and contains rarely more than 3 p.c. of Morphine, sometimes only traces. In estimating the value of a chest of Opium, a small portion is taken out of a third of the pieces in the chest, this is beaten into a uniform mass and a small portion of the mass is analysed. The cakes of Opium naturally vary in Morphine contents according to the amount of adulteration with foreign matters and the condition of collection.

Opium is sometimes adulterated with paste made of evaporated grape juice and paste made of dried apricots and inferior gum tragacanth, but such pieces are deficient in elasticity (or 'touch' as the Chinese call it) and break with a short fracture. Particles of Lead added to increase weight have also been found in Opium.

Tests.—The *B.P.* process for the determination of Morphine is a combined gravimetric and volumetric one; the *U.S.P.* is a gravimetric process, the Morphine crystals obtained being purified by re-solution in Lime Water and the amount of insoluble matter deducted from the weight of impure Morphine first obtained. The Morphine crystals so obtained contain the Water of crystallisation and are not anhydrous; the *P.G.* is a volumetric process. The process adopted by the *Fr. Codex* for the determination of the Morphine is the Lime and Ammonium Chloride method, somewhat similar to the *B.P.* The crystals are dried at a temperature of 100° C. (212° F.), and when completely dried (which is stated to require about 2 hours), they are cooled and washed with three successive quantities each of 8 c.c. of Benzene and again dried at 100° C. (212° F.); the yield should not be less than 10 nor more than 11 p.c. The process at present official in the *B.P.* is a modification of that of the *B.P.* 1885; it was originally devised by Portes and Langlois, and with slight alterations was adopted by the Société de Pharmacie of Paris, and was the official process of the *U.S.P.* 1880. It was improved by Conroy (*P.J.* [3] xv. 473) and adopted as the official process in the *B.P.* 1885. It is a Lime process, and differs only in the following essential points from that of the *U.S.P.* 1880: (1) Double the quantities of Opium, Calcium Hydroxide and Ammonium Chloride are employed by the *B.P.*, and therefore double the quantities are used throughout; (2) the anhydrous and not the crystalline Morphine is weighed; (3) a volumetric determination has been added by the *B.P.* for the purpose of determining the quantity of pure alkaloid present. The process is almost a verbatim copy of the *U.S.P.* 1880, which reads as follows: A weighed quantity of 7 grammes of Opium, in any condition to be valued (the *B.P.* directs dried at 100° C. (212° F.) in No. 50 powder), is triturated with 3 grammes of freshly-slaked Lime and 20 c.c. of Distilled Water in a mortar until a uniform mixture results. A measured quantity of 50 c.c. of Distilled Water is then added and the mixture stirred occasionally during half an hour, it is filtered through a plaited filter into a wide-mouth stoppered bottle having a capacity of about 120 c.c., and marked at exactly 50 c.c. The *B.P.* makes an allowance for the soluble matters contained in the Opium, and requires the bottle to be marked at 104 c.c., and the corresponding mark on the bottle would therefore be 52 c.c. A measured quantity of 50 c.c. of the filtrate (*B.P.* quantities correspond to 52 c.c.), is collected, representing 5 grammes of Opium, 5 c.c. of Alcohol (94 p.c.) and 25 c.c. of Ether added and the mixture shaken; a weighed quantity of 3 grammes of Ammonium Chloride is added and the mixture well and frequently shaken during half an hour, and then set aside for 12 hours to allow the crystallisation of the Morphine. Counterbalance 2 small filters, place one within the other in a small funnel, and decant the ethereal layer as completely as practicable upon the filter. The *B.P.* inserts instructions as to how the filter papers are to be placed in the funnel, the triple fold of one paper being superimposed upon the single fold of the other. A measured quantity of 10 c.c. of Ether

is added to the contents of the bottle, which is rotated, and the ethereal layer is again decanted upon the filter, the latter being washed with 5 c.c. of Ether added slowly and in portions, the filter is now allowed to dry in the air and the liquid in the bottle poured upon it in portions in such a way as to transfer the greater part of the crystals to the filter. The bottle is washed and the remaining crystals are transferred with several small portions of Distilled Water, using not much more than 10 c.c. in all and distributing the portions evenly upon the filter. The *B.P.* employs Morphinated Water for washing out the bottles and for washing the crystals on the filter. The Morphinated Water consists of a saturated solution of Morphine in Chloroform Water, and is prepared by digesting an excess of pure Morphine with Chloroform Water for 7 days at a temperature of 15·5° C. (60° F.). The filter is allowed to drain and dry, first by pressing it between sheets of bibulous paper, afterwards at a temperature between 55° and 60° C. (131° to 140° F.), this yields the Morphine as a crystalline product containing 1 molecule of Water of crystallisation, the *B.P.* removes this molecule of Water of crystallisation by further drying for 2 hours at a temperature of 110° C. (230° F.), and weighs the Morphine in the anhydrous condition, making an allowance of 0·104 of a gramme for each 104 c.c. for the solubility of Morphine in the menstruum used. Inasmuch as the *B.P.* process is carried out on twice the quantity recommended by the *U.S.P.* 1880 the weight of anhydrous Morphine obtained plus the solubility allowance of 0·104 of a gramme multiplied by 10 yields the percentage of impure Morphine present in the sample. The *B.P.* then directs the determination of the amount of pure alkaloid present by the following volumetric method: A weighed quantity of 0·5 gramme of the crystals is titrated with Tenth-normal Volumetric Sulphuric Acid Solution, the titration being officially directed to be continued until the liquid, after boiling, slightly reddens blue Litmus paper. 1 c.c. of Tenth-normal Volumetric Sulphuric Acid Solution represents 0·0283 gramme of pure anhydrous Morphine. If the number of c.c. of Tenth-normal Volumetric Sulphuric Acid Solution used be multiplied by 0·0283 the product will be the weight of pure anhydrous Morphine present in the 0·5 gramme of the crystals operated on. From this weight the amount of pure anhydrous Morphine present in the total weight of crystals obtained in the gravimetric process may be calculated, and the resultant weight of pure anhydrous Morphine, plus 0·104 of a gramme (solubility allowance), indicates the amount of pure anhydrous Morphine present in 10 grammes of the Opium, which should amount to not less than 0·95 of a gramme, and not more than 1·05 grammes, corresponding to not less than 9·5 nor more than 10·5 p.c. of pure anhydrous Morphine in the dry, powdered Opium. The volumetric portion of the Pharmacopœia process is not very happy. It is better to dissolve a given weight of the crystals in an excess of Tenth-normal Volumetric Sulphuric Acid Solution and to titrate the excess of Tenth-normal Volumetric Acid Solution with Tenth-normal Volumetric Potassium or Sodium Hydroxide Solution, and to use

Methyl Orange Solution in the place of blue Litmus paper as an indicator of neutrality. The part of the test relating to the titration is not very clearly worded, one does not add 'to the weight of anhydrous Morphine indicated by the titration, but to the total weight of the crystals in the filter, afforded by the titration figure.'

The following method of assay is recommended by Dott:—A weighed quantity of 10 grammes of powdered Opium is digested with 25 c.c. of Water, 1·8 grammes of Barium Chloride dissolved in about 12 c.c. of Water is added, the solution made up to 50 c.c., well mixed and after a short time filtered. A measured quantity of 25 c.c. (= 5 grammes of Opium) is mixed with diluted Sulphuric Acid, just enough to precipitate the Barium, about 1 c.c. is required, and the solution should be warmed to cause the precipitate to subside, and the solution to filter clear. To the filtered solution about 0·5 c.c. of dilute Ammonia Solution is added, sufficient to neutralise the free acid, and the solution concentrated to 6 or 7 c.c. and allowed to cool. 1 c.c. of Alcohol (90 p.c.) and 1 c.c. of Ether is added and Ammonia Solution in slight excess; the Ammonia Solution being added gradually until there is no further precipitation and a perceptible odour of Ammonia remains after well stirring, breaking down any lumps with a stirring-rod. After 3 hours the precipitate is collected on counterpoised filters and washed. It should be noticed that the solution has a faint odour of Ammonia, if not, 1 or 2 drops of Ammonia Solution should be added. The dried precipitate is washed with Benzene or Chloroform, dried and weighed. It is then titrated with Tenth-normal Volumetric Sulphuric Acid Solution until the Morphine is neutralised as indicated by the solution reddening blue Litmus paper. 1 c.c. of Tenth-normal Sulphuric Acid Solution equals 0·0303 gramme of hydrated Morphine, equivalent to 0·0283 gramme of anhydrous Morphine.

The *U.S.P.* process is practically on the following lines:—A weighed quantity of 10 grammes of Opium in any condition to be valued is introduced into an Erlenmeyer flask together with 100 c.c. of Water and the mixture shaken for 10 minutes during 3 hours, the contents are poured on to a wetted filter and when the liquid is drained off, the residue is carefully washed with Water until 150 c.c. of the filtrate have been obtained, the Water being dropped upon the edges of the filter and its contents. The residual Opium is re-transferred to the flask, 50 c.c. of Water added, the agitation repeated during 15 minutes and again filtered. The residue is washed as before until a second 150 c.c. have been collected. The filtrates are evaporated down in rotation in a tared dish, the containing vessels being rinsed out with a third filtrate and the evaporation continued until the residue is reduced to a weight of 14 grammes. After dissolving in the fluid any extract which may have dried on the sides of the basin, it is transferred to a tared Erlenmeyer flask of the capacity of about 100 c.c., the dish rinsed with a few drops of Water and the washings transferred to the flask until the mixed solution and washings weigh 20 grammes. 10 grammes of Alcohol (94·9 p.c.) are added, the flask well shaken and 25 c.c. of Ether added, the flask

again shaken; 3·5 c.c. of Ammonia Solution are now added from a graduated pipette or burette, the flask stoppered and shaken thoroughly during 10 minutes and set aside in a moderately cool place for at least sixteen hours. The ethereal solution is decanted as completely as possible on to two small counterpoised filters contained in a glass funnel in such a way that the triple fold of the inner filter is laid against the single fold of the outer filter, both being previously moistened with Ether. The contents of the flask are washed with 10 c.c. of Ether, which is also decanted on to the filter, the operation being completed with a further quantity of 10 c.c. of Ether; the filter paper is then dried, and the aqueous contents of the flask are then transferred to the filter, the crystals of Morphine, and the aqueous contents of the bottle are transferred to the filter, the remaining crystals being removed from the flask with Water, using not more than 15 c.c. in all. The filter is allowed to drain, washed with Alcohol (94·9 p.c.) previously saturated with powdered Morphine, and finally with Ether, using about 10 c.c. or more if necessary. The filter is allowed to dry at a temperature not exceeding 60° C. (140° F.) until its weight remains constant, transferred to a tared watch-glass and weighed. The crystals are placed in an Erlenmeyer flask together with 10 c.c. of Lime Water for each 0·1 of a gramme of Morphine and the mixture shaken at intervals during 30 minutes. The liquid is passed through two filter papers folded so that the triple fold of the inner filter paper is superimposed against the outer filter paper, the flask rinsed with Lime Water and the washings passed through the filter until the filtrate, after acidification, no longer yields a precipitate with Mercuric Potassium Iodide (Mayer's) Solution; the filters are pressed between folds of bibulous paper until nearly dry, and dried to a constant weight. The weight of the insoluble matter on the filter deducted from the weight of Morphine crystals previously found, and the difference multiplied by 10, represents the percentage of crystallised Morphine contained in the Opium.

The *P.G.* method of determination is as follows:—A weighed quantity of 6 grammes of Opium in a state of middling fine powder is triturated with 6 grammes of Water and the mixture transferred to a dry tared flask and the contents brought to a weight of 54 grammes by the addition of a further quantity of Water. After the mixture has been allowed to stand for 1 hour with intervals of vigorous shaking, the mass is pressed through a piece of dry calico, 42 grammes of the pressed fluid filtered through a dry filter paper into a dry flask, 2 grammes of a 1 in 2 w/w Sodium Salicylate Solution added and the whole vigorously shaken. A weighed quantity of 36 grammes of the clear fluid is then filtered through a dry filter into a flask, the filtrate is rotated with 10 grammes of Ether and mixed with 5 grammes of a mixture of 17 grammes of Ammonia Solution and 83 grammes of Water; the flask is then closely stoppered, the contents shaken vigorously for 10 minutes and allowed to remain at least for 24 hours. The ethereal liquid is then completely transferred to a plaited filter, the aqueous liquid remaining in the flask is washed with 10 grammes of Ether, the mixture allowed to remain a few seconds and then trans-

ferred again to the filter. After the separation of the ethereal liquid the aqueous solution is transferred through the same filter together with the crystalline residue. The filter as well as the flask is washed 3 times with successive quantities of 5 grammes of Water saturated with Ether; after the flask has been thoroughly washed out and the filter has been completely drained, the Morphine crystals, after drying, are dissolved in 25 c.c. of Tenth-normal Volumetric Hydrochloric Acid, the solution is transferred to a flask of 100 c.c. capacity, the filter and flask washed with Water and the solution diluted to 100 c.c. A measured quantity of 50 c.c. of this solution is transferred to a stoppered flask of about 200 c.c. capacity, 50 c.c. of Water added, and sufficient Ether added to form a layer of about 1 cm., and the excess of Tenth-normal Volumetric Hydrochloric Acid Solution is titrated with Tenth-normal Volumetric Potassium Hydroxide Solution, using 5 drops of Iodeosin Solution as an indicator of neutrality, shaking the solution after each addition. Not more than 5·4 c.c. and not less than 4·1 c.c. of the Tenth-normal Volumetric Potassium Hydroxide Solution should be required. The number of c.c. of Tenth-normal Volumetric Potassium Hydroxide Solution required multiplied by 2, the product subtracted from 25, the difference multiplied by 0·0285 yields the weight of anhydrous Morphine present in 4 grammes of the Opium, and if this figure be again multiplied by 25 will yield the percentage by weight of anhydrous Morphine present in the sample.

Preparations.

EMPLASTRUM OPII. Opium Plaster.

Opium in very fine powder, 1; Resin Plaster, 9. (1 in 10)

Anodyne to relieve local pain.

Foreign Pharmacopœias.—Official in Mex., 1 Opium in 20; Fr., 1 Extract in 4; Port., 1 Extract in 10; U.S., 6 Extract in 100. Not in the others.

EXTRACTUM OPII. Extract of Opium.

An Aqueous Extract containing 20 p.c. of Morphine.

Dose.—$\frac{1}{4}$ to 1 grain = 0·016 to 0·065 gramme.

Ph. Ger. maximum single dose, 0·15 gramme; maximum daily dose, 0·5 gramme.

The *B.P.* and *U.S.P.* both require the Extract to contain 20 p.c. of Morphine, the *P.G.* Extract is required to yield from 15 to 20 p.c. of Morphine.

The Extract of Opium official in the *Fr. Codex* (1908) is required to contain exactly 20 p.c. of Morphine, which is in accordance with the recommendation of the *Brussels Conference*.

The *Brussels Conference* agreed to a content of 20 p.c. of Morphine in the extract.

It is officially permitted to mix stronger and weaker Extracts in order to obtain extract of Opium of proper strength and consistence. An Extract of Opium stronger than the official requirements may be diluted with a sufficiency of Distilled Water or with Milk Sugar. In the first issue of the *B.P.* '85 the Extract was directed to be made from Opium in powder and restricted in the official variety, but the criticism evoked was so strong that in the later reprints it was permitted to use any variety of Opium as long as the product conformed to the official standard of Morphine.

Foreign Pharmacopœias.—Official in Austr., Belg., Dutch, Fr., Ger.,

Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S. Not in Dan.

The International Standard is 20 p.c. of Morphine. Austr., Belg., Dutch, Fr., Mex., Span., Swiss and U.S. all 20 p.c. of Morphine. Ger., 15 to 20 p.c. Jap., 16 to 17·5 p.c. Ital., 15 p.c. Swed., 17 to 20 p.c. The remainder do not give percentage.

Tests.—Extract of Opium is assayed according to the process described under Opium; a weighed quantity of 7 grammes of the Extract being used in place of the 14 grammes of powdered Opium there employed. The *U.S.P.* employs the following process for the assay of the Extract:—A weighed quantity of 4 grammes is dissolved in 30 c.c. of Water, the solution filtered, the filter and residue washed with Water until all soluble matter is extracted, the washings being separately collected. They are evaporated in a tared dish to a weight of 10 grammes. When completely dissolved the Extract is poured into a tared Erlenmeyer flask of about 100 c.c. capacity, the dish rinsed with a few drops of Water until the total weight of the solution amounts to 15 grammes, a weighed quantity of 7 grammes of Alcohol (94·9 p.c.) is added, the flask well shaken and 20 c.c. of Ether added, the shaking being repeated. 2·2 c.c. of Ammonia Water is added from a pipette, the flask stoppered and thoroughly shaken for 10 minutes and set aside for 6 hours or over night. The Ether solution is then filtered through two counterpoised filter papers, the filter papers being placed in the funnel in such a manner that the triple fold of the inner filter is superposed on the single fold of the outer filter, and the papers are previously moistened with Ether. The contents of the flask are washed with 15 c.c. of Ether, which Ether solution is again decanted on the filter, the washing is repeated with a further portion of 15 c.c. of Ether, the aqueous liquids in the flask are transferred to the filter together with the crystals of Morphine, the crystals remaining in the flask being transferred by washing with several portions of Water, using a total quantity of not more than 10 c.c. The filter is allowed to drain, the crystals being washed free from the mother liquor first with Water and afterwards with (94·9 p.c.) Alcohol (saturated with Morphine), and finally with Ether, using about 10 c.c. or more if necessary. The filter is allowed to dry at a temperature not exceeding 60° C. (140° F.) until constant in weight, the crystals of Morphine carefully transferred to a watch-glass and weighed; they are then transferred to an Erlenmeyer flask, and Lime Water in the proportion of 10 c.c. for each 0·1 of a gramme of Morphine added, the flask being shaken at intervals for 25 minutes, the filter placed in a funnel in such a way that the triple fold of the inner filter is laid against the single fold of the outer filter; the flask is rinsed with Lime Water passing the washings through the filter until the filtrate after being acidified will no longer yield a precipitate with Mercuric Potassium Iodide (Mayer's) Solution. The filters are pressed between folds of bibulous paper, dried to a constant weight and weighed. The weight of insoluble matter on the filter is subtracted from the weight of the impure Morphine crystals found above, the difference multiplied by 5 yields the percentage of pure crystalline Morphine present in the Extract of Opium.

The German Pharmacopœia employs the following method for the determination of Morphine in the Extract:—A weighed quantity of 3 grammes is dissolved in 40 grammes of Water, 2 grammes of a 1 in 2 w/w solution of Sodium Salicylate added to the solution and 30 grammes of the clear liquid filtered through a dry filter into a dry flask. The filtrate is mixed with 10 grammes of Ether and 5 grammes of a mixture of 17 grammes of Ammonia Solution and 83 grammes of Water, the flask is stoppered, the contents shaken vigorously for 10 minutes and allowed to remain at rest for 24 hours. The ethereal liquid is then filtered through a counterpoised filter, the aqueous fluid remaining in the flask is washed with 10 grammes of Ether and the ethereal liquid passed through the same filter. The aqueous solution is then passed through the filter without removing the residue which is crystallised on the sides of the flask, the flask is washed with 3 successive quantities of Water saturated with Ether. After it has been well washed and the filter is completely drained, the Morphine crystals, after drying, are dissolved in 25 cc. of Tenth-normal Volumetric Hydrochloric Acid, the solution transferred to a flask of 100 c.c. capacity, the filter and the flask washed thoroughly with Water, and the filtrate and washings finally diluted to 100 c.c. A measured quantity of 50 c.c. of this solution is mixed in a stoppered flask of about 200 c.c. capacity with 50 c.c. of Water and sufficient Ether to form a layer of about 1 cm. The excess of acid is titrated with Tenth-normal Volumetric Potassium Hydroxide Solution, using 5 drops of Iodeosin Solution as an indicator of neutrality. Not more than 6·5 c.c. and not less than 5·5 c.c. of the tenth-normal volumetric alkali solution should be necessary to neutralise the excess of acid. The number of c.c. of Tenth-normal Volumetric Potassium Hydroxide Solution required is multiplied by 2, the product subtracted from 25, the difference is multiplied by 0·0285, and this product multiplied by 100 and divided by 2·25 yields the percentage by weight of anhydrous Morphine in the extract.

EXTRACTUM OPII LIQUIDUM. Liquid Extract of Opium. Extract of Opium, $\frac{3}{4}$; Distilled Water, 16; Alcohol (90 p.c.), 4.

Contains 1 grain of Extract = $\frac{1}{5}$ grain Morphine, in 29 minims.

Dose.—5 to 30 minims = 0·3 to 1·8 c.c.

Not in the foreign Pharmacopœias.

The *B.P.* Liquid Extract of Opium is required to contain 0·75 p.c. w/v of anhydrous Morphine; a Fluid Extract is not official in either the *U.S.P.* or *P.G.*

Tests.—Liquid Extract of Opium has a sp. gr. of 0·985 to 0·990; it contains about 3 p.c. w/v of total solids; and about 18 p.c. w/v of Absolute Alcohol. It is officially required to contain not less than 0·7 p.c. w/v nor more than 0·8 p.c. w/v of anhydrous Morphine as determined by a similar process to that adopted for the determination of the alkaloid in the Tincture (*see* Tinctura Opii).

LINIMENTUM OPII. Liniment of Opium.
Tincture of Opium, 1; Liniment of Soap, 1. (1 in 2)

The addition of the Opium to the Soap Liniment renders it more useful in many cases of rheumatism and local pains.

Official in Span., Tintura Alcoholica de Opio Jabonosa.

PILULA SAPONIS COMPOSITA. Compound Pill of Soap.
Opium, in powder, 1; Hard Soap, in powder, 3; Syrup of Glucose (by weight), 1. (1 of Powdered Opium in 5)

Dose.—2 to 4 grains = 0·13 to 0.26 gramme.

Foreign Pharmacopœias.—Official in Fr., 1 Extract in 10; Dan. (Pilulas Cynoglossi), about 1 in 7; Norw., 1 Opium in 7½; Span., 1 Extract in 10; Port. (Pilulas de Opio Comp.), 1 Extract in 10; U.S. (Pilula Opii), Powdered Opium 6½, Soap 2; Mex. has Píldoras pacíficas, each containing ·02 gramme of Opium with other ingredients. Not in the others.

PULVIS OPII COMPOSITUS. Compound Powder of Opium.
Opium, 3; Black Pepper, 4; Ginger, 10; Caraway Fruit, 12; Tragacanth, 1. (1 of Powdered Opium in 10)

1 of this powder with 3 of Syrup forms **Confectio Opii**, *B.P.* '85.

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

TINCTURA OPII. Tincture of Opium. *B.P.Syn.*—Laudanum. *N.O.Syn.*—Tinctura Thebaica.

Opium treated with equal volumes of Distilled Water and Alcohol (90 p.c.), and standardised to contain 0·75 gramme of anhydrous Morphine in 100 c.c.

Contains ½ grain Morphine in 29 minims.

Dose.—5 to 15 minims = 0·3 to 0·9 c.c., for repeated administration; for a single administration, 20 to 30 minims = 1·2 to 1·8 c.c.

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

The *B.P.* Tincture of Opium is required to yield 0·75 p.c. w/v of anhydrous Morphine. The *U.S.P.* Tincture is required to contain not less than 1·2 p.c. w/v nor more than 1·25 p.c. w/v of crystallisable Morphine. The Tincture of the German Pharmacopœia is required to yield 1 to 1·2 p.c. w/v of anhydrous Morphine.

The *Brussels Conference* fixed the strength of the Tincture at 10 p.c. of Opium, and Alcohol (70 p.c.) as a menstruum for the preparation of the Tincture, that it shall be prepared by percolation, and that the strength in Morphine should be 1 p.c. w/w. The Tincture of Opium official in the *Fr. Codex* conforms to these requirements; but it is made from the standardised Extract.

This preparation is stated officially to contain the soluble matter of 32·8 grains of Opium (containing 10 p.c. of anhydrous Morphine) in 1 fl. oz. or about 1 grain of such Opium in 15 minims.

Provided that the Opium does not contain less than 7·5 p.c. of Morphine calculated as anhydrous, any variety is officially allowed for

the preparation of the Tincture, it being also stipulated that the resultant tincture should correspond to the quantitative test given above.

B.P. '85 ordered a definite quantity of Opium containing about 10 p.c. of Morphine; only about three-quarters of the Morphine was extracted from the Tincture, but the figure for Morphine was fixed on a different assumption. This difficulty is now removed by fixing a standard for the Morphine content of the Tincture irrespective of the quantity of Opium employed.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Ger., Hung., Ital., Jap., Norw., Russ., Swed., Swiss and U.S., 1 (powder) in 10; Mex., 1 in 8; Fr., Port. and Span., 1 Extract in 20. All by weight, except U.S. U.S. has also Tinctura Opii Decolorati.

The *Brussels Conference* agreed to a strength of 10 p.c. of Opium, 1 p.c. of Morphine; using Alcohol (70 p.c.).

The *Fr. Codex* contains 5 p.c. w/w of Extract of Opium, corresponding to about 10 p.c. of Opium dried at 60° C. (140° F.); it is prepared with 70 p.c. Alcohol in accordance with the recommendation of the *Brussels Conference*.

Tests.—Tincture of Opium has a sp. gr. of 0·950 to 0·960; it contains about 3·5 p.c. w/v of total solids and about 43 to 44 p.c. w/v of Absolute Alcohol. It is officially required to yield not less than 0·7 p.c. w/v nor more than 0·8 p.c. w/v of anhydrous Morphine as determined by evaporating a measured quantity of 80 c.c. of the Tincture to about $\frac{3}{8}$th its volume, adding 3 grammes of freshly slaked Lime, and thoroughly mixing and diluting the mixture with Water to 85 c.c. It is then set aside, with intervals of occasional shaking, for 30 minutes. A measured quantity of 50 c.c. (= 50 c.c. Tincture) is filtered into a wide-mouthed, stoppered bottle, 5 c.c. of Alcohol (90 p.c.) and 30 c.c. of Ether added, and the mixture shaken; 2 grammes of Ammonium Chloride is then added, and the mixture frequently and vigorously shaken during 30 minutes, and finally set aside for 12 hours to allow the Morphine to crystallise. The ethereal liquid is then suitably transferred to two small counterpoised filter papers contained in a funnel in such a way that the triple fold of the one filter shall be laid upon the single fold of the other filter paper. The transference is preferably not made in a pipette as recommended in the *B.P.*, which is clumsy and apt to result in loss of alkaloid. The aqueous liquid in the bottle is washed by shaking with 15 c.c. of Ether, which ethereal solution is passed through the same filter paper, and the filter is finally washed with 10 c.c. of Ether. After the filter has been allowed to dry, the aqueous liquid is filtered through the same filter paper, the crystals being transferred to the filter, first by means of small successive quantities of the filtrate, and the last traces of crystals are transferred from the bottle by washing with Morphinated Water; the crystals on the filter are washed with Morphinated Water until the washings are colourless; dried first by pressure between folds of bibulous paper, subsequently at a temperature not exceeding 60° C. (140° F.), and finally are rendered anhydrous by drying at 110° C. for 2 hours, cooled and weighed. The solubility allowance recommended by the

B.P. is of 0·05 of a gramme or 0·1 of a gramme for every 100 c.c. of the original filtrate, and this figure must be added to the weight of crystals obtained in the gravimetric determination, the product multiplied by 2, indicates the percentage w/v of anhydrous Morphine present in the Tincture. A weighed quantity of 0·3 gramme of the crystals is titrated with Tenth-normal Volumetric Sulphuric Acid Solution in the same manner as directed for the crystals obtained in the Opium determination. The number of c.c. Tenth-normal Volumetric Sulphuric Acid Solution required, multiplied by 0·0283, represents the amount of pure anhydrous Morphine present in 0·3 of a gramme of the crystals worked upon; from this the weight of pure anhydrous Morphine present in the total amount of crystals obtained in the determination may be calculated; to the weight of pure anhydrous Morphine thus obtained, is added 0·05 of a gramme or 0·1 of a gramme for every 100 c.c. of the original filtrate and the product multiplied by 2 yields the percentage w/v of pure anhydrous Morphine present in the Tincture.

The *U.S.P.* method of assay is to evaporate 100 c.c. of the Tincture to about one-fifth of its volume, add 40 c.c. of Water and mix thoroughly; set aside the mixture for 1 hour, stirring occasionally during the interval to disintegrate the resinous flakes adhering to the dish. It is then filtered, the residue washed with Water until all the soluble matter is extracted, and the filtrate and washings evaporated in a tared dish to a weight of 14 grammes, which is then assayed according to the process described under Opium. In calculating the results the final multiplication by 10 is omitted, as the 14 grammes worked upon represents 100 c.c. of the Tincture.

The *P.G.* evaporates 50 grammes in a weighed porcelain dish to 15 grammes, dilutes with Water to a weight of 38 grammes, adds 2 grammes of a 1 in 2 w/w solution of Sodium Salicylate, and after vigorous shaking filters 32 grammes of the clear fluid through a dry filter paper into a dry flask. The filtrate is shaken with 10 grammes of Ether, 5 grammes of a mixture of 17 grammes of Ammonia Solution and 83 grammes of Water added; the flask is stoppered and the contents vigorously shaken for 10 minutes and allowed to remain at rest for 24 hours. The ethereal layer is then completely separated, passed through a counterpoised filter, the aqueous solution remaining in the flask washed with 10 grammes of Ether, and this ethereal liquid again passed through the filter. After the complete separation of the ethereal fluid, the aqueous solution is passed through the same filter without disturbing the crystalline residue which is attached to the sides of the flask. The filter and flask are washed with 3 successive quantities each of 5 grammes of Water saturated with Ether, and after the flask has been well washed the filter is completely drained. The Morphine crystals, after drying, are dissolved in 25 c.c. of Tenth-normal Volumetric Hydrochloric Acid, the solution transferred to a flask of 100 c.c. capacity. The filter and flask washed with Water and the solution diluted to 100 c.c., a measured quantity of 50 c.c. of this solution is transferred to a stoppered flask of about 200 c.c. capacity, 50 c.c. of Water

added and sufficient Ether to form a layer of about 1 cm. The excess of Tenth-normal Volumetric Sulphuric Acid Solution is titrated with Tenth-normal Volumetric Potassium Hydroxide Solution, using 5 drops of Iodeosin Solution as an indicator of neutrality. After each addition the mixture is vigorously shaken, not more than 5·5 c.c. and not less than 4·2 c.c. of Tenth-normal Volumetric Alkali Solution shall be required. The number of c.c. of Tenth-normal Volumetric Alkali Solution required should be multiplied by 2, the product subtracted from 25, the difference multiplied by 0·0285, and the product again multiplied by 100 and divided by 40 yields the percentage w/v of anhydrous Morphine present in the Tincture.

TINCTURA OPII AMMONIATA. AMMONIATED TINCTURE OF OPIUM. Scotch Paregoric.

Tincture of Opium, 3 fl. oz.; Benzoic Acid, 180 grains; Oil of Anise, 1 fl. drm.; Solution of Ammonia, 4 fl. oz.; Alcohol (90 p.c.), *q.s.* to yield 20 fl. oz.

Tincture of Opium is now used instead of Powdered Opium, Saffron is omitted, and Liquor Ammoniæ Fortis replaced by Liquor Ammoniæ.

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

Contains $\frac{1}{30}$ grain Morphine in 32 minims.

TINCTURA OPII BENZOICA.—*See* TINCTURA CAMPHORÆ COMPOSITA.

Other preparations containing Opium:—

	Proportion of Opium.
Pilula Ipecacuanhæ cum Scilla	about 1 in 20
Pilula Plumbi cum Opio	1 in 8
Pulvis Cretæ Aromaticus cum Opio	1 in 40
Pulvis Ipecacuanhæ Compositus	1 in 10
Pulvis Kino Compositus	1 in 20
Suppositoria Plumbi Composita	1 grain in each
Tinctura Camphoræ Composita	¼ grain in 1 fl. drm.
Unguentum Gallæ cum Opio	1 in 13⅓

	Proportion of Morphine salt.
Injectio Morphinæ Hypodermica	1 in 20
Liquor Morphinæ Acetatis	1 in 100
Liquor Morphinæ Hydrochloridi	1 in 100
Liquor Morphinæ Tartratis	1 in 100
Suppositoria Morphinæ	¼ grain in each
Tinctura Chloroformi et Morphinæ Composita	1 in 100
Trochiscus Morphinæ	$\frac{1}{36}$ grain in each
Trochiscus Morphinæ et Ipecacuanhæ	$\frac{1}{36}$ grain in each

Not Official.

AQUA OPII.—Opium, in powder, 1; Water, 12; distil 6.
Occasionally employed in eye lotions. Aqua Opii, 1; Aqua Sambuci, 7.

ACETUM OPII.—Powdered Opium, 10; Myristica, in No. 30 powder, 3; Sugar, 20; Diluted Acetic Acid, *q.s.* to make 100.—*U.S.P.*

Average Dose.—8 minims = 0·5 c.c.
Acetum Opii, *B.P.C.*, nearly corresponds to the above, the difference being in the Diluted Acetic Acid, which is stronger in the *U.S.P.* than in the *B.P.*

CONFECTIO OPII.—Compound Powder of Opium, 1; Syrup (by weight), 3. —*B.P.* 1885.

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

ENEMA OPII.—Tincture of Opium, 10 to 40 minims; Mucilage of Starch, 2 to 4 fl. oz.—*St. Thomas's.*

Tincture of Opium, 3; Mucilage of Starch, *q.s.* to make 100.—*B.P.C.*

The quantity sufficient for one application is 2 fl. oz., which should be administered warm.—*B.P.C.*

LINCTUS OPIATUS.—Tincture of Opium, 2 minims; Oxymel of Squill, 15 minims; Mucilage of Tragacanth, 15 minims; Glycerin, 15 minims; Emulsion of Chloroform, 3 minims; Syrup, to 1 fl. drm.—*St. Thomas's.*

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

LINIMENTUM OPII AMMONIATUM.—Liniment of Soap, 6; Compound Camphor Liniment, 6; Tincture of Opium, 6; Liniment of Belladonna, 1: Stronger Solution of Ammonia, 1; mix, and after standing a week, filter quickly. —*B.P.C. Formulary* 1901, now incorporated in the *B.P.C.*

LIQUOR MORPHINÆ BIMECONATIS (*Squire*). *Syn.* **Liquor Meconicus.**—A purified Solution of Opium (introduced by Peter Squire in 1839), containing the whole of the alkaloids in their natural state of combination. It is now standardised to contain 1 p.c. of Morphine. The volatile and extractive matters, to which the unpleasant secondary effects of Opium have been attributed, are removed in the process of its manufacture.

The Solution of the same name inserted in the *B.P.* of 1885, though obviously intended to take its place, differed so widely from the original in its properties and method of preparation, that it was no substitute for it, and was deleted in 1898.

Dose.—5 to 30 minims = 0·3 to 1·8 c.c.

LIQUOR OPII SEDATIVUS (*Battley*) has enjoyed a reputation for a long time as an anodyne and sedative superior to Tincture of Opium, but it is somewhat stronger.

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

Liquor Opii Sedativus.—Opium (10 p.c.), 2 oz.; Calcium Hydrate, 2 drm.; Alcohol (90 p.c.), 4 oz.; Sherry, 3 oz.; Water, *q.s.* Boil the Opium (broken into small pieces) and Lime in 15 oz. of Water for half an hour, and allow to cool. Make up to 13 oz. with Water; add the Alcohol and Sherry. Filter, press the marc, add the expressed liquid filtered, and to this add **Proof Spirit** to make 20 fl. oz. Set aside for 6 months to mature; filter. By allowing it to stand for the time mentioned the flavour and aroma are greatly improved.—*A.Ph.F.*

Opium, in small pieces, 10; Calcium Hydroxide, 1·50; Alcohol, 20; Sherry, 15; Distilled Water, *q.s.*; Alcohol (60 p.c.), *q.s.* to produce 100.—*B.P.C.*

MECONII PERIODIDUM.—A preparation representing the alkaloids of the above preparation in combination with excess of Iodine, on the lines of the other Di-iodo-hydriodides.

Dose.—$\frac{1}{5}$ to $\frac{1}{2}$ grain = 0·008 to 0·032 gramme.

TINCTURA OPII CROCATA (Sydenham's Laudanum).—Contains Saffron, and occurs in the majority of the foreign Pharmacopœias. The *Brussels Conference* agreed to a strength of 1 p.c. w/w of Morphine.

All the preparations are by weight, except *B.P.C.*

Austr.—Opium 10, Saffron 2, Alcohol (68 p.c.) 40, Cinnamon Water 60.

Dutch.—Opium 60, Saffron, 20, Cinnamon 5, Cloves 5, Alcohol 250, Water 250. Macerate for 8 days, express, filter, and, if necessary, dilute to contain 1 p.c. of Morphine.

Hung.—Opium 15, Saffron 15, Cinnamon Water 150.

Ger.—Opium 15, Saffron 5, Cloves 1, Cassia 1, Alcohol (68 p.c.) 70, Water 70.

Russ.—Opium 15, Saffron 5, Cloves 1, Cassia 1, Alcohol (70 p.c.) 75, Water 75.

Swiss.—Opium 10, Saffron 3, Cloves 1, Cassia 1, Alcohol (68 p.c.) 94.

Opium 5, Cinnamon Bark 1, Cloves 1, Saffron 5, Detannated Sherry, *q.s.* to produce 100.—*B.P.C.*

Laudanum Sydenhami.
Belg.—Extract of Opium 50, Tincture of Saffron 150, Oil of Cinnamon 1, Eugenol 1, Alcohol (70 p.c.) 798.

Laudano de Sydenham.
Mex.—Opium 10, Saffron 5, Oil of Cinnamon 16 drops, Oil of Cloves 16 drops, Crystallisable Acetic Acid 0·8, Alcohol (30 p.c.) 80.

Laudanum de Sydenham.
Fr.—Opium 100, Saffron 50, Oil of Cloves 1, Oil of Cinnamon 1, Alcohol 30 p.c. 1000.
It is required to 1 p.c. of Morphine in conformity with the recommendation of the *Brussels Conference*.

Vinum Opii.
U.S.—Opium 10, Cassia 1, Cloves 1, Alcohol 15, White Wine to measure 100.

Vinum Opii Aromaticum.
Jap.—Saffron 1, Cloves 1, Cinnamon 1, Dilute Spirit 7, Sherry 85, Opium 1.

Vinum Opii Crocatum.
Norw.—Opium 15, Saffron 5, Cloves 1, Cinnamon 1, Malaga Wine 150.
Swed.—Opium 15, Saffron 5, Cloves 1, Cinnamon 1, Marsala Wine 150.

Vinho de Opio Composto.
Port.—Extract of Opium 5, Saffron 3, Cloves 1, Cinnamon 1, Madeira Wine 100.

Vino de Opio Compuesto.
Span.—Opium 10, Saffron 5, Cloves 1, Cinnamon 1, White Wine to 100.

Laudano Vino Oppiato Composto.
Ital.—Opium 16, Saffron 8, Cinnamon 1, Cloves 1, Alcohol (60 p.c.) 70, Water 70.

Tinctura Thebaicum Crocatum.
Dan.—Opium 100, Saffron 25, Cloves 6, Cinnamon 6, Alcohol (68 p.c.) to 1000.

TINCTURA OPII DEODORATI.—Granulated Opium (containing 12 to 12·5 of Crystallisable Morphine), 10; Purified Petroleum Benzin, 7·5; Alcohol (95 p.c.), 20; Water, *q.s.* to produce 100. Heat 50 of Water to boiling and pour it on the Granulated Opium contained in a suitable vessel, stirring the mixture frequently during 24 hours. Transfer to a percolator, return the first portion of the percolate until it runs through clear, and when the liquid ceases to drop continue the percolation with Water until the Opium is exhausted. Concentrate the percolate on a water-bath to 15, and when cool shake it vigorously for 10 minutes with 6·5 of the Purified Petroleum Benzin, separate the Benzin, repeat the shaking out for a few minutes with the remainder of the Benzin and, having carefully and completely separated this second portion of Benzin, evaporate the remaining liquid in a warm place spontaneously until the odour of Benzin has disappeared, removing the last traces by the heat of a water-bath. Mix the deodorised liquid so obtained with 60 of Water, filter the mixture through a paper filter and, having mixed the Alcohol with the filtrate, wash the filter with sufficient Water to make 100.—*U.S.P.*

Average Dose.—8 minims = 0·5 c.c.
It should contain 1·2 to 1·25 p.c. w/v of crystallised Morphine.
This has been incorporated in the *B.P.C.* in a modified form, using Opium, *B.P.*, 7·5, adjusting the strength of the Tincture to 0·75 p.c. of anhydrous Morphine.

TROCHISCUS OPII.—$\frac{1}{10}$ grain of Extract of Opium in each.

Dose.—1 to 6 lozenges.
U.S., Powdered Opium $\frac{1}{13}$ grain in each.

UNGUENTUM OPII.—Extract of Opium, 1; Spermaceti Ointment, 9. Rub the Extract with a small quantity of Water to a syrupy consistence, and mix with the Ointment. (1 in 10)

VINUM OPII (sine Aromat.).—Opium, in powder, 1; Sherry, 10. Macerate 7 days, and filter. (1 of powder in 10)

Used as a **collyrium**, 1 to 16 of Water.

Dose.—10 to 40 minims = 0·6 to 2·4 c.c.

VINUM OPII.—Extract of Opium, 1 oz.; Cinnamon Bark, 75 grains; Cloves, 75 grains; Sherry, 20 fl. oz. Dose.—10 to 40 minims = 0·6 to 2·36 c.c. Each fl. drm. contains about half a grain of Morphine.—*B.P.* 1885.

This has been incorporated in the *B.P.C.*, using detannated Sherry.

NARCEINA. Narceine $C_{23}H_{27}NO_8$, $3H_2O$, eq. 495·55).—In white, silky, acicular crystals; neutral, with a slightly bitter taste. Soluble in 375 parts of cold and in 220 of hot Water, also soluble in Alcohol; insoluble in Ether, and practically insoluble in Chloroform.

It should be kept in well-stoppered glass bottles of a dark amber tint and protected as far as possible from contact with air, as it is liable to absorb both Carbon Dioxide and moisture.

Dose.—$\frac{1}{2}$ to 1 grain = 0·032 to 0·065 gramme.

Tests.—Narceine should not melt under 165° C. (329° F.). Commercially, pure Narceine should not fuse under 170° C. (328° F.). It contains three molecules of Water of crystallisation, equivalent to 10·8 p.c., which are lost at a temperature of 100° C. (212° F.), and when heated to a still higher temperature it evolves an odour resembling Trimethylamine. The aqueous solution should be neutral in reaction towards Litmus paper, the alkaloid dissolves completely in diluted Sulphuric Acid, and if this acid solution be concentrated on a water-bath a beautiful violet coloration is produced, which changes to cherry-red. On further heating, upon the introduction of a trace of Nitric Acid, a bluish-violet streak is produced. It is precipitated by the usual alkaloidal reagents, *e.g.*, Mercuric Potassium Iodide (Mayer's) Solution, Iodo-Potassium Iodide (Wagner's) Solution and Picric Acid Solution. Diluted Iodine Solution produces a blue coloration. Narceine may be distinguished from Morphine by not immediately yielding a blue coloration with Potassium Ferrocyanide containing a trace of Ferric Chloride T.S. It should leave no weighable residue when ignited with free access of air.

Foreign Pharmacopœias.—Official in Mex. Not in the others.

Under the title **Antispasmin,** a combination of Narceine-Sodium and Sodium Salicylate has been introduced as a hypnotic and sedative.

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

Narcyl.—In chemical constitution it is an Ethyl-narceine Hydrochloride, and forms fine silky needles sparingly soluble in Water. It is stated to be useful in allaying the severe cough in cases of pulmonary tuberculosis.

Dose.—1 to $1\frac{1}{2}$ grain = 0·065 to 0·1 gramme, in 24 hours.

NARCOTINA. Narcotine $C_{22}H_{23}NO_7$, eq. 410·12.—Trimetric prismatic crystals, or in large, colourless, glistening needles. Insoluble in Water; soluble in Ether, in boiling Alcohol, and in diluted Acids; insoluble in Potassium Hydroxide Solution. It has no narcotic properties, and has therefore been called **Anarcotina**; it has been given as a substitute for Quinine, as an antiperiodic in ague.

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

Tests.—Narcotine melts at about 170° C. (338° F.), and when heated to a somewhat higher temperature evolves an odour somewhat resembling Trimethylamine. It dissolves completely in diluted Sulphuric Acid, and on evaporating this solution an orange-red coloration is first produced, changing to a bluish-violet and finally to a reddish-violet. Concentrated Sulphuric Acid dissolves Narcotine with the production of a greenish-yellow colour, rapidly changing to a yellow and finally to a reddish-yellow colour. On the addition of a trace of Nitric Acid to its solution in concentrated Sulphuric Acid a beautiful red coloration is produced; it is precipitated by the usual alkaloidal reagents, *e.g.*, Mercuric Potassium Iodide (Mayer's) Solution, Iodo-Potassium Iodide (Wagner's) Solution,

Picric Acid, etc. When heated with Nitric Acid it is oxidised with the formation of Cotarnine.

Narcotine may be distinguished from the majority of other alkaloids by shaking with Acetic Acid Solution (2 p.c.) and filtering, the filtrate, when evaporated to dryness, should leave no weighable residue. It may be distinguished from Morphine by shaking with Sodium Hydroxide Solution (5 p.c.), the filtrate should yield no crystalline precipitate in 24 hours when treated with an excess of Ammonium Chloride Solution. It should leave no weighable residue when ignited with free access of air.

COTARNINÆ HYDROCHLORIDUM. Cotarnine Hydrochloride, Stypticin, $C_{12}H_{13}NO_3H_2O$ HCl, eq. 271·57.—A pale yellow, crystalline powder, soluble in Water and in Alcohol. Cotarnine is produced by the oxidation of Narcotine, usually by means of Nitric Acid. Cotarnine Hydrochloride is the Hydrochloride of this oxidation product.

Dose.—$\frac{1}{3}$ to $\frac{1}{2}$ grain = 0·021 to 0·032 gramme, given in capsule, or by hypodermic injection.

It may also be prescribed as a 1 in 10 **Tincture,** made with Tincture of Cinnamon. Dose.—10 drops in Water 4 times a day.—*B.M.J.E.* '01, ii. 68.

Valuable in menorrhagia. Contra-indicated in threatened abortion.—*P.J.* '95, ii. 471; *B.M.J.* '96, ii. 17; *B.M.J.E.* '96, i. 7; '98, i. 71, 103.

In uterine hæmorrhage and in hæmorrhage during pregnancy, menopausal bleedings and post-puerperal hæmorrhage. Failed almost entirely in all the cases of chronic metritis and endometritis.—*Pr.* lxiii. 441; *B.M.J.E.* '99, ii. 86.

Principally useful in cases in which there is an unhealthy condition of uterine mucous membrane, but of little value in cases in which fibroid, cancer or other new growths are present; of very little value in connection with pregnancy; 2½ grains is the minimum dose, repeated 3 or 4 times in the 24 hours, and continued over long periods of time.—*F.T.* '07, 15. One of the most valuable uterine hæmostatics and sedatives.—*F.T.* '07, 80.

Tablets, each containing 0·05 gramme = ¾ grain, are made.

Tests.—Cotarnine Hydrochloride dissolves readily in Water, forming a yellowish solution, and should be neutral towards Litmus. A 6 p.c. aqueous solution of the salt, when treated with Iodo-Potassium Iodide Solution, yields a brownish precipitate, which re-crystallises from Alcohol and melts at about 142°.C. (287·6° F.). If 3 drops of Sodium Hydroxide Solution (15 p.c.) be added to solution of 0·1 of a gramme of the Hydrochloride in 3 c.c. of Water, the addition of each drop produces a milky turbidity which again disappears on shaking, the free base crystallising from the clear solution. The precipitate should be white, and the supernatant liquid clear and of a pale yellow colour. The crystalline base, when separated, should possess a m.p. of about 130° C. (266° F.), but the m.p. is stated to depend largely upon the rapidity with which it is heated; should the above supernatant liquid be turbid or strongly coloured, it indicates the presence of foreign impurities. The salt should leave no weighable residue when ignited with free access of air.

COTARNINÆ PHTHALAS (Styptol).—A micro-crystalline powder, soluble in Water. Useful in arresting uterine hæmorrhage. May be given in doses of ¾ grain = 0·05 gramme, in powder or cachet.—*B.M.J.E.* '03, ii. 36.

Three grains dissolved in 35 minims of Water can be used subcutaneously to rapidly arrest hæmorrhages.—*B.M.J.* '05, i. 311. Stated to possess the advantage over Stypticin of being less irritating. Employed as a 2 to 5 p.c. solution in superficial inflammations. For extensive eczema a 1 to 2 p.c. solution was found best, while a 5 p.c. solution was used for small furuncles. Internally it may be given in the form of powder in doses of 0·1 gramme (1½ grains) or in the form of a tablet 0·05 gramme (¾ grain) 4 to 6 a day on an average.—*M.P.* '05, ii. 299.

Tests.—When tested with solutions of Sodium Hydroxide Solution (15 p.c.) as described above under Cotarnine Hydrochloride it should yield a base possessing the m.p. of Cotarnine. It should leave no weighable residue when ignited with free access of air.

PAPAVERINA. Papaverine. $C_{20}H_{21}NO_4$, eq. 336·66.—White, crystalline

needles, or colourless, trimetric prisms. Insoluble in Water; sparingly soluble in Alcohol and Ether. Strongly narcotic.

Dose.—$\frac{1}{12}$ to $\frac{1}{8}$ grain = 0·0054 to 0·0216 gramme.

Tests.—Papaverine melts at about 147° C. (296·6° F.). It yields when warmed with Sulphuric Acid a bluish-violet coloration; in Nitric Acid it dissolves with a dark red colour. When treated with Chlorine Water it dissolves with a production of a greenish coloration, which on the addition of Ammonia Water changes after some time to a blackish-brown coloration. It should yield no weighable residue when ignited with free access of air.

Not Official.

OREXIN.

CEDRARINE. PHENYL-DIHYDRO-QUINAZOLINE.

$C_{14}H_{12}N_2$, eq. 206·62.

A whitish amorphous powder, having a pungent taste, and having an irritating effect on the nostrils, inducing violent sneezing. Insoluble in Water.

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

OREXIN HYDROCHLORIDE ($C_{14}H_{12}N_2HCl$, $2H_2O$, eq. 278·57).—In white needles, or as a white powder, soluble in Water and in Alcohol (90 p.c.); insoluble in Ether. Stated to possess a stimulating effect on the appetite, and to be found useful in nervous dyspepsia. This salt is now entirely superseded by the Tannate.

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

OREXIN TANNATE.—A pale yellow, amorphous, odourless and tasteless powder, insoluble in Water; 1 in 50 of Alcohol (90 p.c.). Introduced as a gastric tonic. Useful in the anorexia of phthisis. It has been recommended as a prophylactic against sea-sickness, and also to control the obstinate vomiting following Chloroform narcosis. It is contra-indicated in hyperacidity of the stomach.—*L.* '00, i. 1020; *B.M.J.E.* '02, ii. 96; *M.A.* '00, 493; *P.J.* '03, i. 162.

Dose.—5 to 10 grains = 0·32 to 0·65 gramme, in a cachet, 1 or 2 hours before a meal. It should not be prescribed with solutions containing Iron salts.

Foreign Pharmacopœias.—Official in Jap.

Tests.—Orexin Tannate when heated with Zinc dust or powdered Zinc it evolves a strong odour resembling Iso-nitrile, and on treating this mixture with very dilute Hydrochloric Acid the filtrate yields a blue coloration on the addition of Chlorinated Lime Solution. It should leave no weighable residue when ignited with free access of air.

Not Official.

OVI ALBUMEN.

The liquid white of the Egg, *Gallus Bankiva* var. *domesticus*, Temm., was official in the *B.P.* '85, and now appears in the Appendix of the *B.P.* '98. It is a glairy, viscid, colourless, or pale yellowish liquid. It may be obtained in the solid state by cautious evaporation at a temperature below 50° C. (122° F.). It is employed as an antidote in poisoning by Copper, Mercury, or Silver salts, and for certain purposes of clarification.

Commercial dried Albumen is in thin, transparent flakes, which should be free from unpleasant taste or odour of putrefaction.

It is coagulated by heat, and is then rendered white, opaque and insoluble; in this condition it is employed officially as a test for Pepsin.

By the action of the gastric juice or of Pepsin in weak Hydrochloric Acid solution, or by Trypsin, Albumen is first converted into acid-Albumen or Syntonin, and finally into Peptone.

A solution of Albumen is used as a means of proving the absence of Meta-phosphoric Acid from Acetum Phosphoricum Concentratum.

Foreign Pharmacopœias.—The dried white is official in Dan., Dutch, Ger., Ital., Swed.; the liquid white in the Fr., Mex. and Port.

EIGONS.—Alpha and Beta-Eigons are stated to be stable combinations of Iodine with Albumen and Peptone respectively, and the corresponding Brom-Eigons are similar preparations containing Bromine.

α-EIGON is a light, yellowish-grey powder, possessing a faint odour. Insoluble in Water; soluble in solution of Sodium Hydroxide forming Sodium α-Eigon. It contains about 20 p.c. Iodine. Employed internally and used as a dusting powder. Introduced as a substitute for Iodoform and the Iodides; also used in veterinary practice.—*P.J.* '01, i. 702.

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

β-EIGON.—A light, yellowish-brown powder, possessing a faint Peptone odour. Soluble in Water, on which account, and as it is stated to be readily assimilable, it has been given in derangements of the stomach.

The Bromine compounds have been employed as sedatives in doses of 10 to 15 grains = 0·65 to 1 gramme, 3 or 4 times daily.—*B.M.J.E.* '02, i. 47.

IODALBACID.—A yellowish, tasteless, odourless powder, soluble in Water. It is a combination of Iodine and Albumen, and is stated to be useful as a ubstitute for the alkaline Iodides.

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

OVI VITELLUS.—The yolk of the Egg of *Gallus Bankiva* var. *domesticus* was official in *B.P.* '85, and now appears in the Appendix of the *B.P.* '98. It is officially used in the preparation of Mistura Spiritus Vini Gallici, and is unofficially employed as an emulsifying agent.

GLYCERITUM VITELLI.—Fresh yolk of Egg 9, Glycerin 11; rub the yolk of Egg in a mortar with the Glycerin gradually added, and mix thoroughly. —*U.S.P.* 1890.

LECITHIN (Choline Distearyl-glycerophosphate).—A translucent, yellow or yellowish-white, hygroscopic, waxy solid, which should be completely soluble in Chloroform. It is a phosphorised organic constituent contained in considerable proportion in the yolk of Egg, from which it is chiefly prepared. It has been employed in neurasthenia, in brain and nervous diseases, and in tuberculosis. It may be injected hypodermically in doses of ¾ to 2 grains = 0·05 to 0·13 gramme, dissolved in sterilised oil.—*L.* '02, i. 392, 676, 687, 1119; *C.D.* '01, ii. 725; '02, ii. 155.

Dose.—1 to 5 grains given in the form of pill, granules, or as a confection.

Lecitogen.—A combination of Lecithin and Cocoa. It occurs as a powder pleasant to the taste, is taken in doses of 3 or 4 teaspoonfuls daily in Milk or Water, and is useful in secondary anæmias.—*B.M.J.E.* '05, ii. 100.

Not Official.

OXYGEN.

A colourless, odourless, tasteless gas, it has been condensed to a liquid at a very low temperature and under great pressure; but as supplied for medical purposes it is in the form of compressed gas. It may be prepared in small quantities by heating Potassium Chlorate mixed with half its weight of pure dry black Manganese Oxide, and subsequent purification of the gas; but on the commercial scale it is generally prepared from pure dry air by absorption with caustic Baryta.

When employed medicinally, it is generally inhaled from bags connected with cast-iron cylinders, containing 10, 20 and 40 cubic feet of compressed gas, furnished with gun-metal taps.

Ital. requires that it shall be free from Carbonic Acid gas, from Chlorine compounds, and from Ozone.

Medicinal Properties.—Useful in pneumonia, bronchitis, bronchial catarrh, asthma. It has also been employed in poisoning by coal-gas, and Carbon Monoxide. In the form of Hydrogen Peroxide it has been used in Cyanide poisoning.

A case of acute double pneumonia successfully treated with Oxygen.—*L.* '01, ii. 840.

Case of fetid bronchorrhœa treated by inhalation for several hours daily.—*B.M.J.* '02, i. 509.

Treatment at the Oxygen Hospital of 88 cases of various skin diseases, including also 9 cases of consumption; of these 50 were discharged cured, and 13 were greatly relieved; in all the cases of consumption the disease was arrested.—*L.* '03, ii. 274.

Tried with success (*L.* '05, ii. 636) in epileptic fits.

In pneumonia is seldom required, and its value is stated (*B.M.J.* '05, i. 812; *L.* '07, i. 808) to be much over-estimated and disappointing.

Its administration is stated (*B.M.J.E.* '05, ii. 48) to have given favourable results in cases of chlorosis, more particularly those manifesting severe gastric disturbance and intolerant of Iron.

Foreign Pharmacopœias.—Official in Fr. (*Oxygène*); Ital. (*Ossigeno*); Mex. and Span. (*Oxygeno*).

OZONE.—Is an allotropic modification of Oxygen, produced by passing a silent discharge of electricity through Oxygen Gas. This gas possesses a peculiar odour, somewhat suggestive of dilute Chlorine. It is a powerful oxidising agent. When present in the air in large quantities it frequently produces irritation of the mucous membrane.

SODIUM PEROXIDE.—A white amorphous powder, which dissolves in Water with a hissing noise, with evolution of heat and formation of Hydrogen Peroxide. It is a powerful oxidising agent.

Under the names of **Biogen** and **Hopogan,** Manganese Peroxide and Magnesium Peroxide have been prepared and introduced into commerce; they evolve Oxygen on contact with a dilute Acid.

BENZOYL PEROXIDE.—Well-formed white prisms, m.p. 103·5° C. (218·3° F.). Insoluble in Water; soluble in Oil to the extent of 2 to 3 p.c. Prepared by the action of Sodium Peroxide on Benzoyl Chloride. It is a powerful disinfectant (*P.J.* '05, ii. 330), useful in the treatment of burns, wounds and many skin diseases. It may be prescribed in oily solution or as the following ointment: Benzoyl Peroxide, 1; Vaseline, 5; Lanolin, 5.

OXYMEL. *See* MEL.

OXYMEL SCILLÆ. *See* SCILLA.

Not Official.

PANCREAS ENZYMES.

Pancreatic Juice, the fluid secreted by the fresh and healthy pancreas of the pig, Sus scrofa, or of the ox, Bos taurus, is known to possess four distinct properties: (*a*) the conversion of proteids, (*b*) the conversion of Starch and Glycogen, (*c*) the emulsification of fats, and (*d*) the curdling of Milk. Each of these properties is attributable to a peculiar ferment or enzyme, which as originally present in the pancreas is in an insoluble and inactive condition, known as a Zymogen, the ultimate solution depending upon the conversion of this insoluble and inactive Zymogen into a soluble and active enzyme by the aid