B.P.C. Formulary 1901, now incorporated in *B.P.C.* as follows:—

Benzoin 1·50, Pyroxylin 1·50, Tannic Acid 16, Alcohol 16, Purified Ether, *q.s.* to produce 100.—*B.P.C.*

An adaptation of Dr. Richardson's Styptic Colloid.

Official in U.S., Tannic Acid 20, Alcohol 5, Ether 25, Collodion to 100.

HÆMOSTATIC COLLODION (Dr. Pavesi's).—Collodion 100, Carbolic Acid 10, Tannic Acid 5, Benzoic Acid 5; dissolve. Is applied by means of a camel-hair pencil, or by soaking strips of linen in it.

COLLODIUM ANODYNUM (Anodyne Collodion).—Aconitine, 1 grain; Veratrine, 6 grains; Æther Methylatus, 1 fl. oz.; Flexible Collodion, 1 fl. oz.

Collodium Anodynum. *Syn.* Anodyne Colloid.—Aconitine 0·10, Veratrine 0·60, Flexible Collodion, *q.s.* to produe 100.—*B.P.C.*

CELLOIDIN.—A concentrated Collodion occurring in light, yellowish-brown, brittle strips. Is readily soluble in a mixture of Absolute Alcohol and Ether, and the solution is used for embedding histological specimens previous to cutting sections.

A solution of Pyroxylin in Acetone is known under the name **Filmogen.**

PHOTOXYLIN.—A nitrated wood pulp prepared in St. Petersburg. When made into Collodion it is stated to give a tougher film than Pyroxylin on evaporation.—*L.* '87, i. 1253; *B.M.J.* '88, i. 555.

QUASSIÆ LIGNUM.

QUASSIA WOOD.

FR., QUASSIA DE LA JAMAÏQUE; GER., QUASSIAHOLZ; ITAL., QUASSIA; SPAN., LENO DE CUASIA.

The wood of the Trunk and Branches of *Picræna excelsa.*

Imported from Jamaica.

It contains a bitter principle, **Quassin,** sparingly soluble in Water.

Medicinal Properties.—Possesses in a high degree the properties of the simple bitters, without astringency. For contra-indications, and other notes, *see* Calumba. Particularly valuable in dyspepsia due to the debility which succeeds acute disease; containing no Tannin, it is a compatible vehicle for Iron preparations. The infusion is also used as an anthelmintic enema in thread-worm.

A few chips of Quassia or a weak infusion used in the morning bath is a protection against the annoying insects found in our cornfields.—*L.* '84, ii. 306. A strong infusion destroys fleas.—*L.* '95, i. 1018.

Official Preparations.—Infusum Quassiæ, Liquor Quassiæ Concentratus, Tinctura Quassiæ.

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

Foreign Pharmacopœias.—Official in U.S., same as Brit.; Austr., Belg., Norw., Span., Swed. and Swiss use *Quassia amara*; Dutch, Fr., Ger., Ital., Jap., Mex. (Cuasia), Port. and Russ. use both. Not in Hung. or Dan. Fr. has also Quassin.

Descriptive Notes.—In the *B.P.*, only the wood of the trunk and branches of *Picræna excelsa*, Lindl. (*Picrasma excelsa*, Planch.) is official, but in the *P.G.* and *U.S.P.* that of *Quassia amara*, L., is also official. The wood is met with in commerce in the form of splintery raspings or of coarse chips or transverse slices about an inch in width and 1 to 4 in. long and a line or more in thickness, but the official description refers only to imported billets. These are usually 5 in. or more in diameter. The wood should be nearly white, but is often yellowish or pale buff; it is easily cleft, but not hard. It has a bitter taste, but scarcely any odour. The medullary rays are usually 2 to 3 cells in width, *B.P.* (2 to 5 cells, *P.G.*, 3 to 5, *U.S.P.*), and 10 to 25 cells in height. In tangential section the cells of the medullary rays are seen to contain a series of single prisms of Calcium Oxalate.

The wood of *Quassia amara* (Surinam Quassia) has a deeper yellow colour, is harder and heavier, and the medullary rays are only 1 to 2 cells broad, and 5 to 20 cells high. The *P.G.* states that the wood is free from crystals of Calcium Oxalate, Vogl that there are no crystals in the wood, but sphæraphides in the middle bark. Quassia that has been exhausted for the preparation of agricultural insecticide has been offered in commerce; in this case the chips have dark lines of fungal hyphæ present, and possess hardly any bitterness.

Tests.—Quassia contains about 3 p.c. of ash, and 4 p.c. should not be exceeded.

Preparations.

INFUSUM QUASSIÆ. Infusion of Quassia.

Quassia Wood, finely rasped, 88 grains; Distilled Water, cold, 20 fl. oz. Macerate 15 minutes, and strain. (about 1 in 100)

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

Foreign Pharmacopœias.—Official in Fr. (Quassia Amara), 1 in 200; Ital., 1 in 20; Span. (Tinct. Acuosa de Quassia Amarga), 1 in 100. Not in the others.

A **solid extract** is official in the following: Austr. and Jap., first with cold Water, subsequently boiling; Fr. (Quassia Amara), Belg., Mex., Port. and U.S. use cold Water; Swiss uses boiling Water; Mex. and U.S. have also a **fluid extract.**

LIQUOR QUASSIÆ CONCENTRATUS. Concentrated Solution of Quassia.

2 of Quassia Wood, in No. 40 powder, percolated with Alcohol (20 p.c.), to produce 20. (1 in 10)

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

Tests.—Concentrated Quassia Solution has a sp. gr. of 0·975 to 0·980; contains about 0·5 p.c. w/v of total solids and about 18 p.c. w/v of Absolute Alcohol.

TINCTURA QUASSIÆ. Tincture of Quassia.

1 of Quassia Wood, rasped, macerated with 10 of Alcohol (45 p.c.). (1 in 10)

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

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

Tests.—Tincture of Quassia has a sp. gr. of 0·945 to 0·949; contains about 0·5 p.c. w/v of total solids and about 45 p.c. w/v of Absolute Alcohol. 0·016 p.c. w/v of Quassin has been suggested as a standard.

Not Official.

EXTRACTUM QUASSIÆ.—Quassia 16 is macerated with 8 of Water for 12 hours, exhausted by percolation, partly evaporated, filtered, and further evaporated until of a consistence for forming pills.—*B.P.* 1885.

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

FLUIDEXTRACTUM QUASSIÆ.—100 of Quassia, in No. 40 powder, is exhausted with a mixture of Alcohol (95 p.c.) 30 and Water 60, the first 90 of percolate is reserved and the remainder evaporated to a soft extract, which is dissolved in the reserved portion, and enough menstruum added to make 100.—*U.S.P.*

INFUSUM QUASSIÆ CONCENTRATUM.—Quassia Wood, in No. 20 powder, 7·5; Alcohol (90 p.c.), 20; Dilute Chloroform Water (1 in 100), *q.s.* to make 100. Prepare by repercolation.

Dose.—½ to 1 fl. drm. = 1·8 to 3·6 c.c.—*Farr* and *Wright*, *P.J.*, '06, i. 165 and '07, i. 622; *C.D.* '06, i. 252; *Y.B.P.*, 1907, 249.

This appears in the *B.P.C.*, employing 5 of Quassia.

Not Official.

QUEBRACHO.

The Bark of *Aspidosperma Quebracho*, Schlecht., obtained from the Argentine Republic and Brazil (*Quebracho blanco*).

Medicinal Properties.—Was used rather extensively at one time for asthma and cardiac dyspnœa, but is now seldom prescribed.

Foreign Pharmacopœias.—Official in Austr., Mex., Span. and Swiss. Not in the others.

Tinctura Quebracho, 1 in 5 of Alcohol (60 p.c.); dose, ½ to 1 fl. drm. = 1·8 to 3·6 c.c.

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

Official in Mex., Span. and Swiss.

Fluid Extract (1 in 1) is official in Austr., and Extracto de Quebracho is official in Mex. and Span.

The following alkaloids and salts can be obtained: Aspidospermine Cryst. and Sulphate (Fraude); Aspidosamine and Hydrochloride (Hesse); Quebrachine Cryst. and Hydrochloride (Hesse); dose, ¾ to 1½ grains; Quebrachamine and Sulphate (Hesse); Hypoquebrachine and Hydrochloride (Hesse).

Quebrachine is more active and more poisonous than Aspidospermine; it has greater antithermic properties.—*L.* '86, i. 804.

Not Official.

QUERCUS CORTEX.

OAK BARK.

The dried Bark of the small Branches and young Stems of *Quercus Robur*, L., collected in spring from trees growing in Britain.

Medicinal Properties.—A local astringent. May be used topically in cases in which Tannic Acid is indicated, such as relaxed throat or tenderness of the gums, leucorrhœa, gonorrhœa, etc.

Dose.—Of the **powder**, 30 to 120 grains = 2 to 8 grammes. Of a **Decoction** (1 to 16), 1 to 2 fl. oz. = 28·4 to 56·8 c.c.

Foreign Pharmacopœias.—Official in Austr., Fr. (Chêne); Ger., Hung.; Mex. (Encina); Norw.; Port. (Corvalho); Russ., Swiss, U.S. (Quercus alba).

QUILLAIÆ CORTEX.

QUILLAIA BARK.

B.P.Syn.—PANAMA BARK. *N.O.Syn.*—SOAP BARK.

FR., ÉCORCE DE PANAMA; GER., SEIFENRINDE; ITAL., QUILLAJA; SPAN., CORTEZA DE QUILLAYA.

The inner part of the Bark of *Quillaja Saponaria*, Molina.

Imported from Chili and Peru.

Medicinal Properties.—Has been strongly recommended as an expectorant; but its use requires caution, for it is a powerful irritant.

The powder is excessively irritating to the air passages.

It has been found to possess properties allied to Senega, but it contains the two poisonous glucosides 'Quillaic Acid' and 'Sapotoxin' in much greater quantity than they exist in Senega.

Prescribing Notes.—*The Tincture is used to emulsify oils and fats; it requires from 1 to 3 of Tincture for 2 of Oil, depending on the character of the latter. Saponin is used for the same purpose.*

Not Official.—Saponin (Quillaic Acid).

Official Preparation.—Tinctura Quillaiæ. Used in the preparation of Liquor Picis Carbonis.

Foreign Pharmacopœias.—Official in Austr., Dan. (Quillaja); Fr. (Écorce de Panama); Ger. (Quillaia); Jap., Mex. (Quillaya); Swiss and U.S. (Quillaja). Not in the others. U.S. has a Fluid extract.

Tests.—Quillaia Bark contains from 11 to 12 p.c. of ash.

Preparation.

TINCTURA QUILLAIÆ. TINCTURE OF QUILLAIA.
1 of Quillaia Bark, in No. 20 powder, percolated with Alcohol (60 p.c.), to yield 20. (1 in 20)

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

Foreign Pharmacopœias.—Official in Fr. (Teinture de Panama), and Mex. 1 in 5 (Alcohol 80 p.c.); Swiss, Quillaia 1, Alcohol 5, Water 5; U.S., boil 20 of Quillaja with 80 of Water for 15 minutes, strain and wash the residue with boiling Water; evaporate to 60, and when cold add 35 of Alcohol (95 p.c.), filter, and make up with Water to 100.

Tests.—Quillaia Bark Tincture has a sp. gr. of 0·920 to 0·925; it contains about 1·25 p.c. w/v of total solids and about 58 p.c. w/v of Absolute Alcohol.

Not Official.

SAPONIN (Quillain, Quillaic Acid).—A white, amorphous powder, soluble in Water and in Alcohol (90 p.c.); insoluble in Ether and in Chloroform.

Not Official.

QUININA.

$C_{20}H_{24}N_2O_2$, $3H_2O$, eq. 375·48.

FR., HYDRATE DE QUININE; GER., CHININ; ITAL., CHININA;
SPAN., QUININA.

A white, soft, granular powder, slightly damp from adherent moisture, easily soluble in Ether or dilute mineral acids.

When separated from its solutions by shaking out with Ether or Chloroform and evaporating to dryness, it still retains a little Water, dried off with difficulty in a water-bath; for determination purposes it should be heated to 120° C. (250° F.).

It should be kept in well-stoppered glass bottles of a dark amber tint. When freshly precipitated from solutions of its salt it contains 3 molecules of Water of crystallisation as a Trihydrate.

Solubility.—Very sparingly in Water; 1 in 1 of Alcohol (90 p.c.); 1 in 3 of Chloroform; 1 in 4 of Ether.

Foreign Pharmacopœias.—Official in Dutch, Fr., Hung., Mex., Port., Span., Swed. and U.S.

Tests.—Quinine fuses when heated to 57° C. (134·6° F.) to a gummy-looking mass. It loses 2 molecules of Water of crystallisation, equivalent to 9·2 p.c. when dried over Sulphuric Acid or heated at a temperature of 100° C. (212° F.), the remaining molecule of Water of crystallisation being driven off at 125° C. (257° F.), the total loss of Water being equivalent to 14·2 p.c. Quinine which has been rendered anhydrous by heating till constant in weight at a temperature of 125° C. (257° F.), melts at 175° C. (347° F.). The aqueous solution is alkaline in reaction towards moistened red Litmus paper, and is lævogyrate. The alkaloid dissolves readily in diluted acids, its solution in diluted Sulphuric Acid exhibiting a strong fluorescence, the Hydrochloride and other haloid salts of Quinine exhibiting little fluorescence until excess of Sulphuric Acid is added. The fluorescence of solutions of the Sulphate is to a large extent destroyed by Hydrochloric Acid or by the presence of Chlorides. If just sufficient Sulphuric Acid be used to effect solution, and to this liquid be added 2 c.c. of Chlorine or Bromine Water, the subsequent addition of Ammonia Water produces an emerald-green coloration. If the alkaloid be dissolved in diluted Alcohol and sufficient dilnted Sulphuric Acid be added to convert it into a solution of Quinine Acid Sulphate and the liquid be then heated to boiling point, and a saturated Iodine Solution be added slowly and cautiously, the liquid on cooling deposits bronze-green crystals of Quinine Iodo-sulphate which are insoluble in cold Water. The acidified solution of the alkaloid is precipitated by Potassium Mercuric Iodide (Mayer's) Solution, and by Iodo-potassium Iodide (Wagner's) Solution. When separated from its solutions by shaking out with Ether or Chloroform and evaporated to dryness it still retains a little Water, which is dried off with difficulty on a water-bath. For determination purposes it should be heated to 120° C. (250° F.) before weighing. Quinine in the free state may be determined by titration with Tenth-normal Volumetric Sulphuric Acid Solution, using Cochineal, Methyl Orange or Hæmatoxylin Solution as an indicator of neutrality. The behaviour of Quinine to these indicators of neutrality is somewhat anomalous; the point of neutrality when Cochineal or Hæmatoxylin is used as an indicator is reached when sufficient Acid has been added to convert the Quinine into the ordinary Quinine Sulphate $(C_{20}H_{24}N_2O_2)_2\ H_2SO_4$. That is to say that 1 c.c. of Tenth-normal Volumetric Sulphuric Acid Solution is equivalent to 0·037848 gramme of Quinine Trihydrate or 0·032184 gramme of anhydrous Quinine. In the case of Methyl Orange the end reaction only occurs with the formation of the readily soluble Acid Sulphate $(C_{20}H_{24}N_2O_2H_2SO_4)$, 1 c.c. of Tenth-normal Volumetric Hydrochloric Acid corresponding to 0·018774 gramme of Quinine Trihydrate or 0·016092 gramme of anhydrous Quinine. The use of Hydrochloric Acid to a large extent prevents the troublesome fluorescence yielded by the Sulphuric Acid Solution. Quinine may be distinguished from Cinchonine and Cinchonidine by the intensely red coloration, slowly changing to blue and finally to green, which is produced when 1 drop of Copper Sulphate and a drop of Hydrogen Peroxide Solution is added to a solution of 0·2 of a gramme of the alkaloid in 20 c.c. of Water containing 1 c.c. of diluted Sulphuric Acid; Quinine and Quinidine both yield a reaction with this test. The absence of Cinchonine and Cinchonidine is shown by the fact that a solution of 1 gramme of the alkaloid in a slightly warm mixture of 6 c.c. of Absolute Alcohol and 3 c.c. of Ether remains clear on cooling. When treated with Sulphuric Acid it should not acquire more than a faintly yellowish colour, indicating the absence or limit of readily carbonisable organic impurities, nor should it produce a red colour on the addition of Nitric Acid, indicating the absence of Morphine. When heated with Potassium Hydroxide Solution it should not evolve an odour of Ammonia, nor should the issuing vapour have an alkaline reaction towards moistened red Litmus paper. When dried till constant in weight at 125° C. (257° F.), it should not lose more than 14·2 p.c. When ignited with free access of air it should leave no weighable residue.

Quinine should be free from the other Cinchona alkaloids, and when dissolved in Alcohol and carefully neutralised with Normal Volumetric Sulphuric Acid Solution, using Hæmatoxylin Solution as an indicator of neutrality, and evaporated to dryness, the residue should respond to the official test for absence of Cinchonidine, Cinchonine, Quinidine, Cupreine and amorphous alkaloids given under Quininæ Sulphas. The *U.S.P.* states that 2 grammes of Quinine, which have been previously dried at 50° C. (122° F.) for 2 hours in a porcelain dish, dissolved in 20 c.c. of Alcohol (94·9 p.c.) and neutralised exactly with Sulphuric Acid, using Hæmatoxylin Solution as an indicator of neutrality, when evaporated to dryness on a water-bath yields a residue which answers the *U.S.P.* test for absence of other Cinchona alkaloids given under Quininæ Sulphas. The alkaloid is not official in the German Pharmacopœia.

The official Salts of Quinine **(Hydrochlorides** and **Sulphate)** are given under separate headings.

INJECTIO QUININÆ HYPODERMICA.—Quinine Hydrate, 76 grains; Lactic Acid, 27 minims, or a sufficiency; Distilled Water, a sufficiency; rub the Quinine with 6 fl. drm. of the Water, and add the Lactic Acid so as to dissolve the Quinine, and form a solution neutral or only faintly acid to Litmus paper, and make the measure up to 1 fl. oz. with Distilled Water.

More recently the Acid Hydrobromide has been used for this purpose, *see* p. 986.

OLEATUM QUININÆ.—Quinine, 1; Oleic Acid (by weight), 3; rub the Quinine with a small quantity of the Oleic Acid in a warmed mortar to form a smooth paste, add the remainder of the Oleic Acid, previously warmed, and stir frequently until the Quinine is dissolved.—*U.S.P.*

This has been incorporated in the *B.P.C.* under the title **Oleinatum Quininæ** with the *syn.* Oleatum Quininæ.

QUININE ARSENATE ($C_{20}H_{24}N_2O_2.H_3AsO_4.2H_2O$, eq. 498·62).—Silky needles, sparingly soluble in cold Water, soluble in boiling Water. It may be prepared by the interaction of equivalent quantities of Quinine Hydrochloride and Mono-potassium Arsenate. It contains 64·5 p.c. of anhydrous Quinine, 28·3 p.c. of Arsenic Acid, and 7·2 p.c. of Water of crystallisation.

Dose.—$\frac{1}{10}$ grain = 0·0065 gramme.

Tests.—Quinine Arsenate dissolves sparingly in cold Water. The solution affords on the addition of a small quantity of Bromine Water, followed by a slight excess of Ammonia Solution an emerald-green coloration. The saturated aqueous solution affords a reddish-brown precipitate on the addition of Silver Ammonio-Nitrate Solution. 0·5 gramme of the salt when ignited with free access of air should leave no weighable residue.

QUININE ARSENATE BASIC ($(C_{20}H_{24}N_2O_2)_2H_3AsO_4.\ 8H_2O$, eq. 927·74.)—Colourless prismatic crystals, very slightly soluble in cold Water, more readily soluble in hot Water. It contains 69·4 p.c. of anhydrous Quinine, 15·2 p.c. of Arsenic Acid and 15·4 p.c. of Water of crystallisation.

Tests.—Basic Quinine Arsenate dissolves only sparingly in cold Water. The solution yields with Silver Ammonio-Nitrate Solution a reddish-brown precipitate, and when acidified with Hydrochloric Acid and warmed to about

80° C. (176° F.) it yields with Hydrogen Sulphide a yellow precipitate, soluble in Ammonium Carbonate Solution or in Sodium Hydroxide Solution. The saturated aqueous solution when treated with a small quantity of Bromine Water yields on the addition of Ammonia Solution in slight excess an emerald-green coloration. 0·5 gramme of the salt when ignited with free access of air should leave no weighable residue.

QUININÆ CARBOLAS.—The crystalline salt contains 77 p.c. of anhydrous Quinine. For extemporaneous preparations, the alkaloid may be used, and the best proportions are: Quinine, 4; Carbolic Acid, 1; melt, and cool.

Dose.—2 grains = 0·13 gramme for diarrhœa.

Quininæ Sulphocarbolas.—A yellowish-white powder, prepared by the interaction of Quinine Sulphate and Barium Paraphenolsulphonate. Dose, 1 to 5 grains = 0·06 to 0·32 gramme.

QUININÆ CITRAS.—Crystallises in delicate needles.

Various formulas are given for this salt, QCi; Q_2Ci; $Q_2Ci.7H_2O$; but the commercial salt corresponds more closely with $(C_{20}H_{24}N_2O_2)_2H_3C_6H_5O_7.3H_2O$, eq. 887·94, containing 72·5 p.c. of Quinine.

Solubility.—1 in 1200 of Water; slightly in Chloroform.

QUININÆ CITRAS EFFERVESCENS.—Contains 2 p.c. of Quinine Citrate in combination with Effervescent Sodium Citro-Tartrate, *B.P.—B.P.C.*

Official in Mex.

QUININÆ ETHYLCARBONAS (Euquinine, Euchinine).—Light, odourless, almost tasteless, silky, crystalline needles, sparingly soluble in Water; soluble in Alcohol, in Ether and in Chloroform. Produced by the action of Ethyl-chlor-carbonate on Quinine.

Antipyretic and analgesic. Recommended as a substitute for Quinine, owing to its tastelessness, and found useful in the hectic fever of tuberculosis, in whooping-cough, influenza, and malaria.—*B.M.J.E.* '96, ii. 104; '99, i. 100; '01, ii. 16; *B.M.J.* '97, ii. 1734; *L.* '97, ii. 728.

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

Official in Jap. and Swiss.

Tests.—Quinine Ethylcarbonas melts at about 95° C. (203° F.). It dissolves in a solution of Sulphuric or Nitric Acid, producing solutions having a strong green fluorescence. When treated with Sulphuric or Hydrochloric Acid and a little Chlorine Water it yields on the addition of Ammonia Solution in slight excess an emerald-green coloration; when its solution in Sulphuric Acid is mixed with Solution of Iodine it does not yield crystals of the Iodo-sulphate. When warmed with Sodium Hydroxide Solution, cooled, and sufficient Iodine Solution added to form a slight but distinct excess of the solution, again warmed it yields an odour of Iodoform. When dissolved in diluted Nitric Acid Solution it should yield no turbidity or precipitate with Hydrogen Sulphide Solution nor with Barium Chloride Solution. When heated with free access of air it should leave no weighable residue.

Under the name of **Aristochin,** a Di-Quinine Carbonic Ester, in the form of an odourless, almost tasteless powder, has been introduced. As an analgesic $\frac{1}{4}$ gramme = $3\frac{3}{4}$ grains, or more generally $\frac{1}{2}$ gramme = $7\frac{1}{2}$ grains, given 3 times, 3, 2 and 1 hour before the pain is expected to begin. In doses of $\frac{1}{2}$ gramme = $7\frac{1}{2}$ grains as an antipyretic in malaria.—*B.M.J.E.* '04, i. 55.

QUININÆ ET FERRI CHLORIDUM.—In brown scales or in a dark brown powder, very soluble in Water. Used as a hæmostatic.

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

QUININÆ FLUORIDUM.—A white, or whitish, amorphous powder.

Dose.—1 to 2 grains = 0·06 to 0·13 gramme.

QUININE FORMATES.—There are two Formates of Quinine, the neutral Quinine Formate, prepared by dissolving the requisite amount of Quinine in solution of Formic Acid and allowing to crystallise, and the basic Quinine

Formate, prepared by neutralising Quinine with the calculated amount of Formic Acid.

NEUTRAL QUININE FORMATE $C_{20}H_{24}N_2O_2(H_2CO_2)_2$, eq. 413·18.—White, shining needles, readily soluble in Water. The salt is very unstable; it contains 77·88 p.c. of alkaloid.

Tests.—Neutral Quinine Formate melts at 95° C. (203° F.). It loses Formic Acid at 50° C. (122° F.). It dissolves in Water and the aqueous solution yields when acidified with diluted Sulphuric Acid and treated with a small quantity of Chlorine or Bromine Water and an excess of Ammonia Solution an emerald-green coloration. The salt should leave no weighable residue when ignited with free access of air.

BASIC QUININE FORMATE ($C_{20}H_{24}N_2O_2$, H_2CO_2, eq. 367·51).—Forms white, silky needles, containing about 87·56 p.c. of Quinine. It is moderately soluble in Water, more so in boiling Water, readily soluble in Alcohol (90 p.c.) and in Chloroform, sparingly soluble in Ether, and insoluble in fixed Oils.

Tests.—Basic Quinine Formate melts at about 109° C. (228·2° F.). The *B.P.C.* give the m.p. as 32° C., but this is apparently an error for 132° C. The m.p. given by Lacroix (*Jour. Pharm. Chem.* [6] 22, 90) is 132° C. (269·6° F.), but this was subsequently corrected by him to 109° C. (228·2° F.). When dissolved in Water and acidified with diluted Sulphuric Acid the solution yields on the addition of a little Chlorine or Bromine Water, and subsequent addition of a slight excess of Ammonia Solution, an emerald-green coloration. Its aqueous solutions are strongly lævorotatory. The optical rotation is −144·2°. Lacroix originally gave the optical rotation as −141·1°, and this is the figure which has been adopted by the *B.P.C.*, it was subsequently altered by Lacroix to −144·2°. It should leave no weighable residue when ignited with free access of air.

QUININÆ GLYCEROPHOSPHAS.—There are two Quinine Glycerophosphates, one basic and one neutral.

The basic salt $(C_{20}H_{24}N_2O_2)_2$ $C_3H_7O_3H_2PO_4$, $5H_2O$, eq. 903·89 is the one in general use. In slender, white, crystalline needles, slightly soluble in Water, 1 in 200 of Alcohol (90 p.c.).

Useful chiefly in neuralgia and in convalescence.

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

Official in Fr. (Glycerophosphate Basique de Quinine).

Kineurine is stated to contain this salt.

Tests.—Basic Quinine Glycerophosphate loses its Water of crystallisation, equivalent to 9·8 p.c., at 100° C. (212° F.), and is converted into an anhydrous salt. It melts at about 145° C. (293° F.). The aqueous solution affords with Potassium Hydroxide Solution a white precipitate soluble in Ether. The filtrate from the precipitate evaporated to dryness and ignited with the addition of a little Potassium Carbonate and Potassium Nitrate yields a residue, which, when dissolved in Water and acidified with Nitric Acid, affords with Ammonium Molybdate Solution a yellow precipitate soluble in Ammonia and reprecipitated as a white precipitate on the addition of Magnesium Ammonio-sulphate Solution. When dissolved in Water and acidified with Sulphuric Acid it affords, on the addition of a small quantity of Chlorine or Bromine Water and the subsequent addition of Ammonia Solution in slight excess, an emerald-green coloration. When shaken with Absolute Alcohol, filtered, and the alcoholic solution evaporated to dryness it should leave no weighable residue. The aqueous solution should afford no immediate precipitate with Ammonium Molybdate Solution.

QUININÆ HYDRIODIDUM ($C_{20}H_{24}N_2O_2HI$, eq. 448·74).—The neutral salt has about the same solubility in Water as the Sulphate, and dissolves freely in Alcohol and Ether. It is generally found as a yellowish, amorphous powder.

SYRUPUS QUININÆ HYDRIODIDI.—Acid Hydriodide of Quinine, 4 scruples; Syrup, to 10 fl. oz. Triturate the Quinine in a mortar and add the Syrup gradually, stirring constantly to dissolve the salt.—*Pharm. Form.*

Syrupus Quininæ Hydriodidi. *Syn.* Syrup of Iodide of Quinine.—Quinine Hydriodide, 2; Distilled Water, 2; Syrup of Citric Acid, *q.s.* to produce 100.—*B.P.C.*

QUININÆ HYDRIODIDUM ACIDUM ($C_{20}H_{24}N_2O_2.2HI.5H_2O$, eq. 665·04).—Crystallises in large laminæ of a fine yellow colour and is soluble 1 in 20 of Water.

Both have been given in chronic rheumatism and tuberculosis.

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

QUININÆ HYDROBROMIDUM.—Colourless, silky crystals, neutral or slightly alkaline.

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

It is given (*P.J.* (3) v. 303) with H_2O, and soluble 1 in 5. *Fr. Codex* with H_2O, soluble 1 in 44·5. Our stock (May 1893) corresponded with $C_{20}H_{24}N_2O_2.HBr.H_2O$, containing 76·5 p.c. of Quinine, and soluble about 1 in 55 of Water; after drying at 125° C., its original moisture was again absorbed rapidly from the atmosphere. *U.S.* (1882) gave the formula with $2H_2O$, and solubility 1 in 16 of Water; *U.S.P.* now gives it with H_2O, and soluble 1 in 40 of Water at 25° C. (77° F.).

The **Hydrobromide** is preferred (*Pr.* lxxiii. 682) for oral administration in malaria; and where rapid action is required, hypodermic or intravenous injection may be employed.

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

Official in Belg., Fr., Mex., Port., Russ., Span., Swed., Swiss and U.S.

Tests.—Quinine Hydrobromidum loses its Water of crystallisation, equivalent to 4·25 p.c., when heated to 100° C. (212° F.), and at a higher temperature 152° C. (305·6° F.) it commences to fuse, forming a syrupy liquid. It dissolves in Water, forming a solution which is neutral or but faintly alkaline in reaction towards red Litmus paper. This solution when acidified with dilute Sulphuric Acid assumes a strong blue fluorescence, and when treated with a small quantity of Bromine Water and an excess of Ammonia Solution an emerald-green colour is produced. The aqueous solution treated with Ammonia Solution affords a white precipitate soluble in an excess of the reagent, and the precipitate is also soluble in Ether. The addition of Potassium or Sodium Hydroxide Solution to an aqueous solution of the salt affords a white precipitate, and if this precipitate be removed by shaking with Ether the aqueous liquid when treated with a few drops of Chlorine Water assumes a yellowish or reddish colour, and when shaken with Chloroform the colour passes into the chloroformic solution. A portion of the aqueous liquid after separation of the Quinine when acidified with diluted Nitric Acid affords with Silver Nitrate Solution a yellowish curdy precipitate insoluble in Nitric Acid, practically insoluble in Ammonia Solution, readily soluble in Potassium Cyanide Solution.

The more generally occurring impurities are excess of moisture, readily charred organic impurities, Sulphates, and other Cinchona alkaloids. The salt should not lose more than 4·25 p.c. of moisture when dried till constant in weight at 100° C. (212° F.). A solution of the salt in concentrated Sulphuric Acid should not be coloured more than a pale yellow; no red coloration should be produced on treating the salt with Nitric Acid. An aqueous solution of the salt should not assume more than a faint turbidity on the addition of Barium Chloride Solution.

It may be distinguished from Morphine by the Nitric Acid test described above, Morphine producing a red coloration with Nitric Acid. A confirmatory reaction for Morphine is to add 1 dgm. of Quinine Hydrobromide to 5 c.c. of a saturated Potassium Ferricyanide Solution, 25 c.c. of Water, 15 drops of Ferric Chloride T.S., and 5 c.c. of diluted Hydrochloric Acid, no blue coloration should be developed in 5 minutes. The absence of other Cinchona alkaloids may be assured by the *U.S.P.* test given under Quininæ Sulphas. 3 grammes of the Hydrobromide which has been previously dried at 50° C. (122° F.) for 2 hours should be dissolved in 30 c.c. of hot Water, 1·5 gramme of crystallised Sodium Sulphate gradually added and the liquid evaporated to dryness on a water-bath; it then being examined by the test there described.

SYRUP QUININÆ HYDROBROMIDI.—Quinine Hydrobromide, 80 grains; Dilute Hydrobromic Acid, 3 fl. drm.; Syrup of Orange (*B.P.* 1898), to make 10 fl. oz.—*A.Ph.F.*

Quinine Acid Hydrobromide, 2; Syrup of Orange, *q.s.* to produce 100.—*B.P.C.*

QUININÆ HYDROBROMIDUM ACIDUM ($C_{20}H_{24}N_2O_2.2HBr.3H_2O$, eq. 536·18).—Colourless crystals, containing 60 p.c. of Quinine.

Solubility.—1 in 6 of Water.

3 grains dissolved in 20 minims of warm Distilled Water injected into the carefully asepticised upper arm, in the treatment of chronic malarial fever. 6 injections on alternate days are usually required in a serious case.—*B.M.J.* '99, ii. 85; '02, i. 201, 439; '03, i. 848; *Y.B.P.* '02, 203.

Solutions of the **Acid Hyrobromide** and **Acid Hydrochloride** (which latter salt was made official in the British Pharmacopœia 1898) are put up in hermetically sealed glass capsules, and may be obtained in white or in dark amber-tinted glass. Each c.c. contains 3 grains of the Acid Hydrobromide or 7½ grains of the Acid Hydrochloride.

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

Official in Fr. and Mex., Bromhydrate de Quinine Neutre.

Tests.—Quinine Acid Hydrobromide loses its Water of crystallisation, equivalent to 10·0 p.c., when heated. It dissolves readily in Water, forming a clear solution which possesses an acid reaction towards blue Litmus paper. The aqueous solution yields on the addition of Ammonia Solution a white precipitate. When acidified with diluted Sulphuric Acid Solution and mixed with a small quantity of Bromine Water it yields on the addition of Ammonia Solution in slight excess an emerald-green coloration. When acidified with diluted Nitric Acid Solution it yields with Silver Nitrate Solution a yellow curdy precipitate insoluble in Nitric Acid, practically insoluble in Ammonia Solution, readily soluble in Potassium Cyanide Solution. The salt loses 10·0 p.c. when dried till constant in weight. It should yield no turbidity on the addition of diluted Sulphuric Acid. When ignited with free access of air it should leave no weighable residue. It should be free from other Cinchona alkaloids when neutralised and examined by the tests described under Quininæ Hydrobromidum, and using a correspondingly increased amount of Sodium Sulphate.

QUININÆ HYDROCHLORO-SULPHAS.—Glistening, white, silky, crystalline needles, or as a white, or yellowish-white, amorphous powder. Soluble 1 in 2 of Water; 1 in 7 of Alcohol (90 p.c.). On account of its greater solubility in Water, it has been recommended for hypodermic use.

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

Official in Mex. and Span.; Mex. has also solution for hypodermic injection, 1 in 2.

QUININÆ HYPOPHOSPHIS ($C_{20}H_{24}N_2O_2.H_3PO_2$, eq. 387·40).—Generally supplied as an amorphous powder, but it can be obtained in light, colourless, prismatic crystals.

Solubility.—1 in 250 of Water; 1 in 40 of Alcohol (90 p.c.).

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

QUININÆ IODO-HYDRIODIDUM.—A reddish-brown, amorphous powder, insoluble in Water and in Alcohol; it is obtained by adding Iodo-Potassium Iodide Solution to a solution of a Quinine salt. Has been employed in syphilitic diseases.

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

QUININÆ LACTAS ($C_{20}H_{24}N_2O_2.C_3H_6O_3$, eq. 411·21).—Colourless prismatic needles, or a white crystalline powder; soluble about 1 in 6 of Water, but there is much doubt about its solubility.

Used chiefly by hypodermic injection in 10 p.c. solution.

Official in Mex.

QUININÆ PHOSPHAS.—In light, white, acicular crystals. It is stated (*P.J.* (3) xxiii. 234) that the English-made salt has the formula $3C_{20}H_{24}N_2O_2.2H_3PO_4.6H_2O$, and the German salt $2C_{20}H_{24}N_2O_2H_3PO_4.4H_2O$; the former containing 76 p.c. and the latter 79 p.c. of Quinine.

Solubility.—1 in 420 of Water; 1 in 110 of Alcohol (90 p.c.).

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

QUININÆ SALICYLAS $(C_{20}H_{24}N_2O_2.C_7H_6O_3)_2, H_2O$, eq. 935·58.—White, crystalline, silky needles, prepared by the interaction of Quinine Sulphate with Sodium Salicylate. It is practically anhydrous, and contains 70 p.c. of Quinine.

It should be kept in well-stoppered glass bottles of a dark amber tint and exposed as little as possible to the air. The *U.S.P.* gives the formula of the salt with half a molecule of Water of crystallisation.

Solubility.—1 in 630 of Water; 1 in 24 of Alcohol (90 p.c.); 1 in 25 of Chloroform.

In 1-drm. doses of the liquor every 3 or 4 hours for a day or two, combined with a spray for the post-nasal space, is useful (*B.M.J.* '05, ii. 252, 1181) in preventing acute middle-ear suppuration from becoming chronic.

Dose.—1 to 5 grains = 0·06 to 0·32 gramme.
Given in capsules, cachets, or pills.

Official in Mex., Russ., Span. and U.S.

Tests.—Quinine Salicylate when heated commences to melt at 183° C. (361·4° F.). It dissolves slightly in Water, forming a solution which possesses an alkaline reaction towards red Litmus paper, and which yields on the addition of Ferric Chloride T.S. a violet coloration. The saturated aqueous solution when mixed with a small quantity of Chlorine or Bromine Water yields on the addition of Ammonia Solution in slight excess an emerald-green coloration. Sulphuric Acid containing one-fifth of its volume of Formaldehyde Solution yields a pink coloration. When heated till constant in weight at 100° C. (212° F.) the *U.S.P.* requires that the salt should lose not more than 2·0 p.c., indicating the absence of an excess of Water. When dissolved in Water acidified with a few drops of Nitric Acid and separated from the liberated Salicylic Acid, the filtrate should yield no marked turbidity on the addition of Silver Nitrate Solution, nor with Barium Chloride Solution, indicating the absence of more than slight traces of Chlorides and Sulphates. The alkaloid separated by mixing 2 grammes of the salt with 10 c.c. of Distilled Water adding Ammonia Solution in slight excess and extracting with 3 successive quantities each of 25 c.c., 20 c.c. and 10 c.c. of Ether, evaporating the ethereal solution to dryness on a water-bath, and dissolving the residue in Alcohol, when neutralised with Normal Volumetric Sulphuric Acid Solution, using Hæmatoxylin Solution as an indicator, shall leave when evaporated to dryness a residue which shall respond to the *U.S.P.* tests for absence of other Cinchona alkaloids given under Quininæ Sulphas. If the aqueous alkaline liquid remaining after the extraction of the Quinine be acidified with diluted Sulphuric Acid and the liberated Salicylic Acid separated, carefully measured and dried it should possess the m.p., and answer the characteristic tests given under Acidum Salicylicum. When ignited with free access of air the salt should leave no weighable residue.

QUININÆ SALICYLAS EFFERVESCENS.—Can be obtained containing 1 and 5 grains in each drm. of Quinine Salicylate.

Saloquinine (Quinine Ester of Salicylic Acid).—Colourless crystals, or a white amorphous powder; insoluble in Water, soluble in Alcohol (90 p.c.). Antipyretic, antiseptic, and analgesic. Has been recommended in typhoid fever and in neuralgia. Is also stated to possess antirheumatic properties.—*B.M.J.* '02, i. 782; *Y.B.P.* '02, 204.

This tasteless substitute for Quinine has been further recommended *Pr.* lxxiii. 682) in 15 to 20 grain doses in malaria.

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

Rheumatine (Salicylquinine Salicylate).—Colourless crystalline needles, or as a white amorphous powder; soluble about 1 in 2000 of Water; 1 in 15 of Alcohol (90 p.c.). Antirheumatic. Useful in acute articular rheumatism.—*B.M.J.* '02, i. 782; *Y.B.P.* '02, 204; *P.J.* '01, ii. 645; *C.D.* '02, i. 820.

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

QUININÆ SULPHAS ACIDUS ($C_{20}H_{24}N_2O_2.H_2SO_4.7H_2O$, eq. 544·34).—Translucent, colourless, or white, rhombic crystals. It was originally called the **Neutral Quinine Sulphate.**

It should be kept in well-stoppered glass bottles of a dark amber tint, as it has a tendency to effloresce on exposure to air.

Solubility.—1 in 10 of Water; 1 in 45 of Alcohol (90 p.c.).

Dose.—2 to 12 grains = 0·13 to 0·78 gramme.

A **solution** of 1 or 2 grains to the fl. oz. of Distilled Water applied to the eyes and nostrils for hay fever.

2 grains twice daily as a prophylactic of influenza.—*B.M.J.* '02, i. 940.

5 grains injected into the subcutaneous tissue at the angle of the scapula repeated every 3 days in malaria. Strong acids, especially Sulphuric, used to dissolve the Quinine salt may produce a local necrosis without agency of micro-organisms.—*B.M.J.* '02, i. 1113.

50 minims of a 1 in 5 solution successfully injected into each broad ligament in a case of prolapsus uteri.—*B.M.J.* '03, i. 366.

Foreign Pharmacopœias.—Official in Austr. and Hung. (Chininum bisulfuricum); Dutch (Chininum bisulphas); Fr. (Sulfate neutre de Quinine); Ital. (Bisolfato di Chinina); Jap. and U.S. (Quininæ bisulphas); Mex. (Sulfata de Quinina neutro); Span. (Sulfato Quinico neutro).

Tests.—Quinine Bisulphate when heated to a temperature of 100° C. (212° F.) loses its Water of crystallisation, the loss corresponding to 23·2 p.c. It dissolves readily in Water, forming a solution which is acid in reaction towards Litmus paper, but which is neutral in reaction towards Methyl Orange Solution. The solution exhibits a strong blue fluorescence, and when treated with a small quantity of Bromine Water it yields on the addition of Ammonia Solution in slight excess an emerald-green coloration. It also yields on the addition of Barium Chloride a white precipitate insoluble in Hydrochloric Acid. It should not lose more than 23·2 p.c. when dried at 100° C. (212° F.). The solution in Sulphuric Acid should not be of a deeper tint than a faint yellow, indicating the absence of readily charred organic impurities. The absence of Cinchona alkaloids other than Quinine may be assured by dissolving 2 grammes of the salt which has been dried at 50° C. (122° F.) in 20 c.c. of Distilled Water, and after carefully neutralising the solution with diluted Sodium Hydroxide T.S., evaporating to dryness on a water-bath, and examining the residue as directed under Quininæ Sulphas. When ignited with free access of air it should leave no weighable residue.

QUININÆ TANNAS.—A yellowish-white, amorphous powder; sparingly soluble in Water, 1 in 3 of Alcohol (90 p.c.).

It should be kept in well-stoppered glass bottles of a dark amber tint and protected as far as possible from the light. It contains from 30 to 32 p.c. of anhydrous Quinine.

Recommended because of its being tasteless.

Dose.—1 to 10 grains = 0·065 to 0·65 gramme.

Official in Austr., Dan., Dutch, Ger., Hung., Jap., Mex., Norw., Port., Russ., Span. and Swiss.

Tests.—Quinine Tannate when mixed with diluted Sulphuric Acid, a little Bromine Water and a slight excess of Ammonia Solution yields an emerald-green coloration. The *P.G.* officially requires the salt to contain 30 p.c. of Quinine as gravimetrically determined by mixing 1 gramme of the Quinine Tannate with 4 c.c. of Water, adding Sodium Hydroxide Solution (15 p.c.) until strongly alkaline in reaction and extracting the mixture with 3 successive quantities each of 7 c.c. of Ether, evaporating the mixed ethereal solutions to dryness and drying the residue until constant in weight at 100° C. (212° F.). The Quinine obtained from the Tannate when exactly neutralised with diluted Sulphuric Acid should respond to the tests for other Cinchona alkaloids given under Quininæ Sulphas. When shaken with diluted Nitric Acid and filtered, the filtrate should remain unaltered by the addition of Hydrogen Sulphide, Silver Nitrate Solution or Barium Chloride, indicating the absence of Copper and Lead, Chlorides and Sulphates. 0·2 of a gramme of the salt when ignited with free access of air should leave no weighable residue.

QUININÆ TARTRAS ($(C_2 H_{24}N_2O_2)_2.C_4H_6O_6.H_2O$, eq. 810·48).—A white, crystalline powder.

Solubility.—Very sparingly in Water (about 1 in 1000).

Quinine Sulphate, 80 grains; Tartaric Acid, 40 grains; Distilled Water, to measure 4 fl. drm., has been used in India for **hypodermic injection.**

QUININÆ VALERIANAS ($C_{20}H_{24}N_2O_2.\ C_5H_{10}O_2$, eq. 423·15).—White, lustrous, pearly crystals, having an odour of Valerianic Acid. Can be prepared by decomposing Quinine Hydrochloride with Sodium Valerianate.

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

Solubility.—1 in 120 of cold Water; 1 in 2 of Alcohol (90 p.c.); 1 in 14 of Ether.

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

Official in Fr., Ital., Mex., Port., Span. and Swed.

Tests.—Quinine Valerianate melts when heated to about 90° C. (194° F.), at 100° C. (212° F.) it loses Valerianic Acid pretty rapidly. It dissolves slightly in cold Water, the solution being neutral or faintly acid in reaction towards Litmus paper. The aqueous solution affords with Ammonia Solution a white precipitate soluble in excess of the reagent. It affords when treated with a small quantity of Bromine Water and an excess of Ammonia Solution an emerald-green coloration. When acidified with diluted Sulphuric Acid Solution it evolves a characteristic odour of Valerianic Acid, the solution exhibiting a blue fluorescence. The alkaloid extracted from the salt by treatment with Ether in alkaline solution when carefully neutralised with Sulphuric Acid, using Hæmatoxylin Solution as an indicator of neutrality should respond to the test for freedom from other Cinchona alkaloids given under Quininæ Sulphas. The salt should not yield more than a faint yellow tint when mixed with concentrated Sulphuric Acid, indicating the absence of readily charred organic impurities. An aqueous solution of the salt should not be rendered distinctly turbid by Barium Chloride Solution. When ignited with free access of air it should burn without leaving a weighable residue.

Quinine Camphorate, a white powder insoluble in Water, soluble in Alcohol (90 p.c.), **dose,** 1 to 10 grains = 0·06 to 0·65 gramme; **Quinine Bihydrochloro-carbamide,** prismatic crystals soluble in Water, **dose,** 5 to 15 grains = 0·32 to 1 gramme, chiefly used hypodermically; **Quinine Saccharinate** (Basic), crystalline needles insoluble in Water; **Quinine Sulphocarbolate,** a yellowish-white powder soluble in Alcohol, **dose,** 1 to 5 grains = 0·06 to 0·32 gramme; **Quinine Sulphocresotate,** yellow scales soluble in Water, **dose,** 1 to 5 grains = 0·06 to 0·32 gramme; and **Quinine Vanadate** are salts of Quinine which have received some attention in medical literature.

SYRUPUS QUININÆ DIKINATIS.—Introduced by Dr. Donovan of Dublin.

1 fl. drm. contains 2 grains of Quinine Dikinate.

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

WARBURG'S TINCTURE FOR MALARIAL FEVER.—The formula for this is given in the *M.T.* '75, ii. 540, with some interesting cases by Professor

Maclean, C.B.; Aloes Socotrinæ 4, Rad. Rhei 4, Sem. Angelicæ 4, Conf. Damocratis 4, Rad. Helenii 2, Croci Sativi 2, Sem. Fœniculi 2, Cretæ Præparatæ 2, Rad. Gentianæ 1, Rad. Zedoariæ 1, Pip. Cubebæ 1, Myrrh Elect. 1, Camphoræ 1, Bolet. Laricis 1. Digest with 500 of Proof Spirit on a water-bath for 12 hours, express, and add Quininæ Sulphatis 10. Continue heating on a water-bath till all the Quinine Sulphate is dissolved; filter when cold.

Warburg's Tincture is without its equal in persistent and protracted agues.—*T.G.* '94, 842.

A somewhat similar preparation was included in the *B.P.C. Formulary* 1901 under the title **Tinctura Antiperiodica** as follows:—

Tinctura Antiperiodica. *Syn.* Warburg's Tincture.—Socotrine Aloes, bruised, 240 grains; Rhubarb, bruised, 80 grains; Angelica Fruit, bruised, 80 grains; Elecampane Root, bruised, 40 grains; Saffron, 40 grains; Fennel, bruised, 40 grains; Prepared Chalk, 40 grains; Gentian, bruised, 20 grains; Zedoary Root, bruised, 20 grains; Cubebs, bruised, 20 grains; Myrrh, elect. and bruised, 20 grains; White Agaric, in powder, 20 grains; Opium, in powder, 2½ grains; Black Pepper, bruised, 4 grains; Cinnamon, bruised, 8 grains; Ginger, bruised, 8 grains; Alcohol (60 per cent.), a sufficient quantity.

Macerate for 7 days in 1 pint of the Alcohol, press and filter. Dissolve in the product:—Quinine Sulphate, 175 grains; Camphor, 20 grains. After 3 days filter, and add sufficient of the Alcohol to make 1 pint.

Dose.—1 to 4 fl. drm.

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

QUINETUM.—The mixed alkaloids from the E. I. Red Cinchona Bark. The Sulphate resembles Quinine Sulphate.

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

Dose.—Of the Sulphate 1 to 10 grains = 0·06 to 0·65 gramme.

QUINIDINÆ SULPHAS $(C_{20}H_{24}N_2O_2)_2.H_2SO_4 2H_2O$, eq. 776·78.—White, silky crystals. It should be kept in well-stoppered bottles.

Solubility.—1 in 200 of Water; 1 in 24 of Alcohol (90 p.c.); about 1 in 100 of Glycerin.

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

QUINOIDIN. *Syn.* Chinoidin.—A mixture of Alkaloids, mostly amorphous, obtained as a by-product in the manufacture of the crystallisable alkaloids from Cinchona. A brownish-black mass with alkaline reaction. On ignition should not leave more than 0·7 p.c. of ash.

Official in Span.

QUINOLINE. Chinoline. C_9H_7N, eq. 128·13.—It is formed by the distillation of Quinine or Cinchonine with aqueous Potassium Hydroxide, or synthetically from Aniline and Nitrobenzene. It is a colourless, mobile liquid, having a faint aromatic odour and a peculiar penetrating taste, sparingly soluble in Water, miscible with Alcohol, Ether and Carbon Bisulphide. It should be preserved in well-stoppered bottles of an amber tint.

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

CHINOLINE PERIODIDE.—Chinoline may be produced synthetically from Aniline and Nitrobenzene, or by the distillation of Quinine. The above Iodide is one of the series of Iodides introduced by Squire at the suggestion of Dr. Mortimer Granville, and employed in the treatment of gout. The Chinoline used in this preparation is not of synthetic production.—An Iodide made with Chinoline, prepared from Cinchonine, is known as **Cincho-quinoline Periodide** (*Squire*).

LORETIN (Meta-iod-orthoxychinolin-anasulphonic Acid).—A pale yellowish powder, odourless and non-poisonous. Introduced as a substitute for Iodoform. Used as a dusting powder, and in the form of Ointment.—*B.M.J.E.* '93, ii. 91; *M.A.* '95, 34; *L.* '94, ii. 31; '95, ii. 183; *M.P.* '94, ii. 25.

CHINOSOL (Quinosol. Potassium Oxychinoline Sulphonate).—A bright lemon-yellow powder with a faint odour, soluble in Water.

A powerful antiseptic, disinfectant and deodorant. Action more marked as a lotion than as a powder. When used as a powder should be diluted. Solutions for disinfection of instruments should not be too concentrated. Drug possesses toxic properties. If used in too concentrated a form subcutaneously it will produce local irritation and swelling. Is not rapidly absorbed by the unbroken skin. —*B.M.J.* '98, i. 91.

In doses of 1 to 5 grains internally and as a local application it has given good results in leprosy.—*P.J.* '99, ii. 135.

5 grains 3 times a day after food in the treatment of over one hundred cases of pulmonary phthisis. In almost every case improvement in the patient's general condition followed.—*L.* '99, ii. 90, 181, 238.

1 to 2 p.c. solution has power of arresting hæmorrhage.—*B.M.J.E.* '01, ii. 60.

Official in Russ.

Crurin (Quinoline Bismuth Sulphocyanide).—A yellowish-red powder, insoluble in Water and Alcohol. Recommended in ½ p.c. solution as an injection in gonorrhœa:—1 of Crurin rubbed up with Glycerin and Water, of each 5, and made up with Water to 200.—*B.M.J.E.* '02, i. 32; *C.D.* '02, i. 643; *P.J.* '00, i. 615; '00, ii. 486; '02, i. 442.

Vioform (Iodochloroxychinoline; Iodochloroxyquinoline).—An almost odourless, non-toxic powder, insoluble in Water. Antiseptic and germicide. Introduced as a substitute for Iodoform. It has been found useful in operations upon tubercular joints. Most conveniently used as an emulsion:—Vioform 50, Glycerin 200, Sterilised Water 200, Alcohol 100.—*B.M.J.E.* '03, i. 31; *P.J.* '00, ii. 470, 700; '02, i. 513; *B.M.J.E.* '07, i. 100.

Diaphthol (Quinaseptol) and **Diaphtherin** (Oxychinaseptol) have also been used as antiseptics.

QUININÆ HYDROCHLORIDUM.

QUININE HYDROCHLORIDE.

HYDROCHLORATE OF QUININE.—*B.P.* '85.

$C_{20}H_{24}N_2O_2HCl, 2H_2O$, eq. 393·79.

FR., CHLORHYDRATE BASIQUE DE QUININE; GER., CHININHYDROCHLORID; ITAL., CLORIDRATO DI CHININA; SPAN., CLORURO QUINICO.

White, odourless, silky, needle-shaped crystals, possessing a very bitter taste, and which have a tendency to lose Water in warm air. It is officially described as the Hydrochloride of an alkaloid obtained from the Bark of various species of *Cinchona* and *Remijia*. The *U.S.P.* describes it as the Hydrochloride of the alkaloid Quinine.

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

The salt contains theoretically 81·7 p.c. of anhydrous Quinine, 9·2 p.c. of Hydrochloric Acid and 9·1 p.c. of Water of crystallisation.

Solubility.—1 in 37 of Water; 1 in 1 of boiling Water; 1 in 1 of Alcohol (90 p.c.). The anhydrous salt is very soluble in Chloroform.

Medicinal Properties.—Same as Quinine Sulphate.

This salt is preferred for the prevention of ague for the following reasons: (1) it is more readily soluble and very easily absorbed; (2) it is less irritating to the gastric mucous membrane; (3) it contains relatively a greater proportion of Quinine; (4) it is the chief soluble salt of Quinine, and is almost universally used in the malarial districts of Italy.—*B.M.J.E.* '03, ii. 12.

Has been shown (*B.M.J.* '04, ii. 1543) to maintain the heart's action during an operation when administered in doses of a few grains, 24 hours before the operation.

Two cases of idiosyncrasy to Quinine are noted (*Pr.* lxxiii. 682) in which the Sulphate produced alarming symptoms, whilst the Hydrochloride was well borne.

Topical use in leucorrhœa, 2 to 3 grains as a **pessary.**—*L.* '99, i. 26, 192.

As a styptic and antiseptic agent. Recommended for parenchymatous hæmorrhages.—*L.* '01, ii. 1541.

Inoperable cancer of the uterus successfully treated by endovenous injection of 4 to 8 grains.—*B.M.J.E.* '03, i. 26.

Dose.—1 to 10 grains = 0·06 to 0·65 gramme.

Official Preparations.—Tinctura Quininæ and Vinum Quininæ.

Not Official.—Pessus Quininæ, Soluté de Quinine pour Injection Hypodermique.

Foreign Pharmacopœias.—Official in Austr., Ger., Hung., Jap., Russ. and Swiss (Chininum Hydrochloricum); Belg. (Chlorhydras Quininæ); Dan., Norw., Swed. (Chloretum Chinicum); Dutch (Hydrochloras Chinini); Fr. (Chlorhydrate Basique de Quinine); Ital. (Cloridrato di Chinina); Mex. (Clorhidrato de Quinina basico); Port. (Chlorhydrato de Quinina); Span. (Cloruro Quinico); U.S. (Quininæ Hydrochloridum).

Tests.—Quinine Hydrochloride when heated to a temperature of 100° C. (212° F.) loses 9 p.c. of Water equivalent to 2 molecules of Water of crystallisation. The *U.S.P.* states it loses its Water of crystallisation at a temperature of 120° C. (248° F.), and that at about 156° C. (312·8° F.) it commences to melt, but that it is not fully melted until a temperature of 190° C. (374° F.) is reached. It dissolves fairly readily in Water, forming a solution which is neutral to Litmus paper or at the most but faintly alkaline in reaction towards red Litmus paper. On the addition of Sulphuric Acid the aqueous solution assumes a strong bluish-green fluorescence, but the solution of the Hydrochloride itself is not fluorescent. The alkaloid extracted from a solution of the Hydrochloride should answer the tests distinctive of Quinine given under that substance. The aqueous solution when acidified with Nitric Acid yields with Silver Nitrate Solution a white curdy precipitate, which, when washed, dissolves readily and completely in Ammonia Solution. The percentage of Quinine may be determined by the direct titration of a solution of the Hydrochloride with Tenth-normal Volumetric Sodium Hydroxide Solution, using Phenolphthalein Solution as an indicator of neutrality, 1 c.c. of the Tenth-normal Volumetric Solution being equivalent to 0·039379 gramme of the crystallised Hydrochloride. The alkaloidal content may be gravimetrically determined by dissolving the salt in Water, adding sufficient Potassium or Sodium Hydroxide Solution to render the liquid distinctly alkaline, and shaking out with Ether-Chloroform Solution.

The more generally occurring impurities are excess of moisture, Sulphates, readily charred organic impurities, Cinchona alkaloids other than Quinine, and mineral impurities. The *B.P.*, the *U.S.P.* and the *P.G.* require that the salt shall not lose more than 9 p.c. of weight when dried at a temperature of 100° C. (212° F.). An aqueous solution of the salt should not be rendered more than slightly turbid on the addition of Barium Chloride Solution, indicating the limit of

Sulphate. It should produce no coloration on the addition of Sulphuric Acid, indicating the absence of readily charred organic impurities. The *B.P.* requires that the salt should yield only the slightest characteristic reactions with the tests for Sulphates, and that when the Hydrochloride is converted into the Sulphate by mixing it with an equal weight of Sodium Sulphate and dissolving the mixture in 10 times its weight of hot Water, allowing the mixture to stand at 15·5° C. (60° F.), it should answer the tests described under Quininæ Sulphas. The *U.S.P.* requires that a weighed quantity of 3 grammes of the salt, which has been previously dried for 2 hours at a temperature of 50° C. (122° F.), when dissolved in 30 c.c. of hot Distilled Water, mixed with 1·5 grammes of crystallised Sodium Sulphate, gradually and with constant stirring, and the liquid evaporated to dryness on a water-bath, the residue when dissolved in 30 c.c. of Water should respond to the *U.S.P.* test for absence of an excessive amount of Cinchona alkaloids other than Quinine. The *P.G.* dissolves a weighed quantity of 2 grammes of the Hydrochloride in a warmed mortar in 20 c.c. of Water at a temperature of 60° C. (140° F.). To the solution is added 1 gramme of powdered uneffloresced Sodium Sulphate, and the mixture thoroughly incorporated. It is allowed to stand when cold for half an hour at a temperature of 15° C., it is then pressed through a dry piece of calico of about 100 cm. square, and the expressed fluid filtered through a piece of the best filter paper. A measured quantity of 5 c.c. of this filtrate is brought to a temperature of 15° C. (59° F.), and mixed with Ammonia Solution at a temperature of 15° C. (59° F.) until the precipitate, which at first separates out, again dissolves to a clear solution, not more than 4 c.c. of Ammonia Solution shall be required. 1 gramme of the salt when ignited with free access of air should leave no weighable residue, indicating the absence of mineral impurities. Quinine may be distinguished from Morphine by the Nitric Acid colour test, the salt should dissolve in Nitric Acid without the production of a red colour. The *P.G.* states that 0·5 of a gramme of the salt mixed with 10 drops of Sulphuric Acid and 1 drop of Nitric Acid shall not yield a reddish-yellow coloration. The *U.S.P.* includes an additional test for differentiation from Morphine, it directs that 0·1 of a gramme of the salt added to 5 c.c. of a saturated Potassium Ferricyanide Solution, 25 c.c. of Water, 15 drops of Ferric Chloride T.S. and 5 drops of diluted Hydrochloric Acid Solution should not produce a blue coloration after being well shaken and allowed to stand for 5 minutes.

Residue.—When dried at 212° F. (100° C.), 1 gramme of the salt should not lose more than 0·09 gramme in weight, *B.P.*, *P.G.* and *U.S.P.* After ignition it should leave no residue, *P.G.* and *U.S.P.*

Litmus.—Its aqueous solution is neutral, *P.G.*, or faintly alkaline, *U.S.P.*

Barium Nitrate or Chloride.—An aqueous solution of the salt should not be rendered more than faintly turbid by T.S. of Barium Chloride, *U.S.P.*, by T.S. of Barium Nitrate, *P.G.*

Sulphuric Acid.—No turbidity at all should be produced in an aqueous solution (1–50) of the salt by diluted Sulphuric Acid, *P.G.* The salt should not yield any colour with Sulphuric Acid, *U.S.P.* 0·05 gramme of the salt mixed with 10 drops of Sulphuric Acid and 1 drop of Nitrate Acid, should not assume a reddish-yellow colour, *P.G.*

Preparations.

TINCTURA QUININÆ. TINCTURE OF QUININE.

Quinine Hydrochloride, 175 grains; Tincture of Orange, 20 fl. oz. (about 1 grain in 55 minims)

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

Tests.—Tincture of Quinine has a sp. gr. of 0·880 to 0·890; it contains about 3·5 p.c. w/v of total solids and about 74 p.c. w/v of Absolute Alcohol.

VINUM QUININÆ. QUININE WINE.

Quinine Hydrochloride, 20 grains; Orange Wine, 20 fl. oz.

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

Now made with Quinine Hydrochloride instead of Sulphate.

Tests.—Quinine Wine has a sp. gr. of 1·044 to 1·095; it contains about 16 p.c. w/v of total solids and from 10 to 12 p.c. w/v of Absolute Alcohol. It should yield 0·187 p.c. w/v of anhydrous Quinine. 1 fl. oz. of the wine when made alkaline with Sodium Hydroxide Solution and shaken with Ether, the aqueous alkaline layer separated, and after acidification shaken with a further quantity of Ether; the ethereal solution when mixed with a little Water, a drop or two of Ferric Chloride Solution added and the mixture well shaken should yield no violet coloration, indicating the absence of Salicylic Acid.

Not Official.

PESSUS QUININÆ.—3 to 5 grains of Quinine Hydrochloride. A valuable remedy for leucorrhœa.—*Martindale.*

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

SOLUTÉ DE QUININE (CHLORHYDRATE BASIQUE) POUR INJECTION HYPODERMIQUE.—Basic Hydrochloride of Quinine, 3 grammes; Antipyrine, 2 grammes; Distilled Water, boiled and cooled, *q.s.* to obtain 10 c.c. of solution.—*Fr.*

QUININÆ HYDROCHLORIDUM ACIDUM.

ACID QUININE HYDROCHLORIDE.

$C_{20}H_{24}N_2O_2, 2HCl, 3H_2O$, eq. 447·86.

FR., CHLORHYDRATE NEUTRE DE QUININE; GER., SAURES CHININHYDROCHLORID; ITAL., BICHLORIDRATO DI CHININA.

Small, colourless, glistening crystals, or as a white, odourless, crystalline powder, possessing a very bitter taste. It is officially described as the Acid Hydrochloride of an alkaloid obtained from the Bark of various species of *Cinchona* and *Remijia*, but would have been better described as the Acid Hydrochloride of the alkaloid Quinine.

It should be kept in well-stoppered glass bottles of a dark amber tint and exposed as little as possible to the air. The official formula for the salt shows 3 molecules of Water of crystallisation, but the majority of commercial specimens contain practically no Water of crystallisation. Howard states that the salt is anhydrous if dried at 100° C. (212° F.), but that the Pharmacopœia formula is correct for the crystalline salt formed at a lower temperature. The *Fr. Codex* (1908) gives the formula with 2½ molecules of Water of crystallisation, and states that from Absolute Ethylic Alcohol it forms acicular crystals containing 1 molecule of Alcohol of crystallisation which it loses readily. The dried salt when exposed to the air reabsorbs moisture, equivalent to 2½ molecules of Water of crystallisation.

Solubility.—2 in 1½ of Water and measures 3; 1 in 5 of Alcohol (90 p.c.); 1 in 7 of Chloroform. Insoluble in Ether.

Medicinal Properties.—Same as Quinine Sulphate and Hydrochloride. It is frequently employed by hypodermic injection. *See* notes on the Acid Hydrobromide.

Intramuscular injections in malaria.—*L.* '02, i. 1379.

5 to 10 grains twice a day for six weeks injected into the gluteal muscles in the treatment of ague.—*B.M.J.* '02, ii. 1767.

15 grains twice daily given on an empty stomach in the treatment of typhoid fever in the tropics.—*B.M.J.E.* '02, i. 80.

In doses of 2 to 3 grains hypodermically in the treatment of blackwater fever.—*B.M.J.* '02, i. 1334; *P.J.* '02, ii. 249.

1 to 2 grains injected into the subcutaneous tissue over the splenic area on 3 or 4 successive mornings in the treatment of malaria.—*B.M.J.* '03, i. 848.

Quinine Bihydrochloride is now exclusively recommended (*B.M.J.* '06, i. 1398) in amœbic abscess of the liver. Two solutions are prepared and sterilised before the operation, each containing 30 grains of this salt, but in one this amount is dissolved in 2 oz. of Water and in the other in 4 oz., the former being used if the abscess contains less than 10 oz. of pus and the latter if it is larger. In this way the dose of the salt is limited to 30 grains.

Dose.—1 to 10 grains = 0·06 to 0·65 gramme.

Foreign Pharmacopœias.—Official in Fr. (Chlorhydrate neutre de Quinine), Ital. and Mex.

Tests.—Quinine Bihydrochloride is officially required to lose not more than 12 p.c., equivalent to practically 3 molecules of Water of crystallisation at a temperature of 100° C. (212° F.). It dissolves readily in Water, forming a clear solution which possesses a strong acid reaction towards Litmus, and which yields, on the addition of Potassium or Sodium Hydroxide Solution, a white precipitate; if this precipitate be separated and carefully washed it answers the tests distinctive of Quinine given under that heading. An aqueous solution of the salt, when acidified with diluted Nitric Acid, yields, on the addition of Silver Nitrate solution, a white curdy precipitate, insoluble in Nitric Acid, and which, when separated and washed, dissolves readily and completely in Ammonia Solution. The total percentage of Hydrochloric Acid present may readily be determined by titration with Tenth-normal Volumetric Sodium Hydroxide Solution, using Phenolphthalein Solution as an indicator of neutrality. In conducting the titration, sufficient neutral Ether may be added to hold the liberated alkaloid in solution, the end reaction not being then masked by the precipitate. 1 c.c. of Tenth-normal Volumetric Alkali Solution is equivalent to 0·003619 gramme of Hydrochloric Acid and to 0·044786 gramme of crystallised Acid Quinine Hydrochloride of the official formula, or to 0·039422 gramme of the anhydrous Hydrochloride. 1 gramme of the salt, when dissolved in 20 c.c. of Water, is officially stated to require not more than 2·5 c.c. of Volumetric Sodium Hydroxide Solution for its complete neutralisation. Unfortunately the *B.P.* has omitted to mention to what indicator of neutrality; if Phenolphthalein Solution be used as an indicator, considerably more than 2·5 c.c. of Volumetric Solution will be required, as indicated above the whole of the acid radicle is determined by this indicator. With Litmus and Methyl Orange Solution the results are equally unsatisfactory. A suitable indicator for the purpose would appear to be Hæmatoxylin Solution. The presence of neutral Hydrochloride of Quinine is intended to be determined by this test, and this salt is neutral in reaction towards Hæmatoxylin Solution. If the salt be mixed with an equal weight of Sodium Sulphate, the mixture dissolved in 10 times its weight of hot Water, the liquid neutralised with Ammonia Solution, cooled and set aside at 15·5° C. (60° F.), the Quinine Sulphate formed is officially required to answer the tests for freedom from other Cinchona alkaloids, given under Quininæ Sulphas. The salt should dissolve without change of colour in concentrated Sulphuric Acid, Hydrochloric Acid gas being simultaneously evolved; indicating the absence of readily charred organic impurities. It should yield no red coloration when mixed with a few drops of concentrated Nitric Acid, which distinguishes the alkaloid from Morphine. When ignited with free access of air it should leave no weighable residue.

QUININÆ SULPHAS.

QUININE SULPHATE.

$$((C_{20}H_{24}N_2O_2)_2,\ H_2SO_4)_2,\ 15H_2O,\ \text{eq. } 1750{\cdot}24.$$

FR., SULFATE BASIQUE DE QUININE; GER., CHININSULFAT; ITAL., SOLFATO DI CHININA; SPAN., SULFATO QUINICO BASICO.

Light, white, odourless, silky, needle-shaped crystals, possessing a very persistent bitter taste. It is officially described as the Sulphate of an alkaloid obtained from the Bark of various species of *Cinchona* and *Remijia*; but would have been preferably described, as in the *U.S.P.*, as the Sulphate of the alkaloid Quinine.

The crystals effloresce on exposure to dry air, and yield a salt containing about 2 molecules of Water of crystallisation, these are in turn lost at a temperature of 100° C. (212° F.), but again reabsorbed on exposure of the dry salt to the air. Such a salt should be made official.

The *B.P.* formula shows 15 molecules of Water of crystallisation; the formula given in the *U.S.P.* shows 7 molecules of Water of crystallisation. According to Cownley there is no doubt that very little of the Quinine Sulphate used for dispensing purposes contains the amount of Water represented by the 15 molecules formula.

The formula of the salt official in the *Fr. Codex* (1908) shows $8H_2O$, the basic Quinine Sulphate being stated to crystallise with 8 molecules of Water of crystallisation during the cooling of its hot concentrated aqueous solutions; it contains 72·81 p.c. of Quinine, 11·01 p.c. of Sulphuric Acid and 16·18 p.c. of Water.

The *Fr. Codex* also states that from Absolute Ethylic Alcohol it forms acicular crystals containing 1 molecule of Alcohol of crystallisation which it loses readily, It should be kept in well-closed vessels, preferably in well-stoppered glass bottles of a dark amber tint and protected as far as possible from exposure to the light, as in addition to its efflorescent nature in dry air the salt is liable to acquire a yellow or brownish colour when exposed directly to the light.

Solubility.—About 1 in 800 of Water; 1 in 25 of boiling Water; 1 in 65 of Alcohol (90 p.c.); 1 in 40 of Glycerin.

60 grains require 60 minims of diluted Sulphuric Acid, or 100 minims of diluted Phosphoric Acid for solution in 2 fl. oz. of Distilled Water.

66 grains requires 60 minims of Diluted Nitric Acid for solution in 2 fl. oz. of Water.

Medicinal Properties.—In small doses it acts as a most valuable tonic and bitter stomachic. In large doses it has a specific action in malaria, both as a curative and as a prophylactic; in moderate doses it is an antipyretic in influenza and fevers, especially enteric (in which it also acts as an antiseptic), and it is analgesic in supra-orbital and other forms of neuralgia. Used as a spray (2 grains to 1 fl. oz.) in hay fever; contra-indicated during advanced pregnancy and in acute or subacute middle-ear disease; in large doses, or if taken frequently, produces temporary deafness. Rectal injections of a strong solution most satisfactory in amœbic dysentery.

The best remedy in influenza; also, as a trustworthy prophylactic, 2 grains every morning, the late Sir W. Broadbent, *Pr.* '07, i. 13; other references to its use as a prophylactic, *B.M.J.E.* '95, ii. 92; *L.* '95, ii. 1381.

Seems to be really an antitoxin in influenza. If quinine treatment in influenza is persevered with, there will be much less cardiac weakness and fewer serious sequelæ.—*Pr.* '07, i. 153.

It retards or arrests the alcoholic, lactic and butyric fermentations, but not the digestive action of Pepsin.

In the form of a 1 p.c. solution in just sufficient Diluted Sulphuric Acid to hold the salt in solution, has been used (*L.* '05, i. 360) as a powerful curative agent in a large variety of corneal ulcers not amenable to the ordinary routine treatment, the eyes being soaked in the solution for 5 minutes 4 or 5 times a day. As regards the use of **Quinine salts** in ophthalmic work, it is pointed out (*B.M.J.* '04, i. 452) that it has been in employment for twenty years at the Liverpool Eye and Ear Infirmary, and two formulas taken from the Pharmacopœia of this institution are: Atropine Sulphate, 4 grains; Quinine Sulphate (neutral), 4 grains; Distilled Water, 1 oz.;—and Eserine Sulphate, 1 grain; Quinine Sulphate (neutral), 4 grains; Distilled Water, 1 oz.

In whooping-cough, *M.A.* '95, 522; *T.G.* '94, 126; in cholera nostras.—*B.M.J.E.* '93, ii. 7.

As a prophylactic in African fevers.—*L.* '96, i. 219.

Combined with Ipecacuanha in dysentery.—*Pr.* liv. 478; *P.J.* (3) xxv. 1167.

10 grains with half its bulk of Tartaric Acid dissolved in 10 minims of Water in the comatose and cerebral forms of remittent fever.—*B.M.J.* '99, ii. 1474.

Quinine and the malarial parasite. As the red blood corpuscle is necessary for the life of the parasite, Quinine, by driving the parasite out of its element, places it under conditions unfavourable and destructive to its development.—*B.M.J.E.* '99, ii. 68.

½ to 1 drm. doses of Ammoniated Tincture in treatment of dengue fever in Canton.—*L.* '03, i. 184.

Quinine rash caused by taking not over ½ grain.—*T.G.* '02, 8.

Applied as a dressing 1 drm. to 8 oz. in emulsion with Cod-Liver Oil in tertiary and rheumatic ulcers of the leg.—*L.* '02, i. 443.

5 to 10 grains given, dissolved in the acid portion of an effervescing Potassium Citrate mixture, in certain forms of extensive dermatitis.—*B.M.J.* '03, i. 656; *L.* '03, i. 785.

Six cases of tetanus following the injection of strong solutions of Quinine.—*B.M.J.E.* '02, i. 63.

From the results of bacteriological tests Quinine salts seem to be more potent antiseptics than Carbolic Acid or Formaldehyde, and intermediate between these and Corrosive Sublimate.—*B.M.J.E.* '02, ii. 12.

In malaria, 2 to 5 grains every 3 or 4 hours, as soon as the diagnosis has been made, yield (*Pr.* lxxiii. 681) better results than large doses at close of or before paroxysm. $\frac{1}{8}$ to $\frac{1}{4}$ grain Morphine and $\frac{1}{150}$ grain Atropine may be given if headache is severe. Another method (*B.M.J.* '04, ii. 1450) is to give 4 doses of $7\frac{1}{2}$ grains, repeated at intervals of $\frac{1}{4}$ hour, in the evening of every third day during the first fortnight of the fever. Larger doses—15 to 20 grains—combined with from 15 to 20 minims of Laudanum have been recommended.—*B.M.J.E.* '04, ii. 1451. In blackwater fever (*B.M.J.E.* '04, ii. 83) it has been recommended by Koch's method—1 gramme (= 15 grains) on each of 2 consecutive days, at intervals of 10 days.

3 to 6 grains every 3 or 4 hours, combined with Ammonium Carbonate in an effervescing mixture form a good prescription in the treatment of puerperal infection. Best to begin with Quinine and Calomel, and in the later stages to administer Ferric Perchloride and Magnesium Sulphate.—*L.* '05, i. 1406.

In the prophylaxis of malaria a full dose of 10 or 15 grains should be taken on 2 successive days with an interval of 8 or 9 days before the next 2 doses are taken.—*L.* '05, ii. 540.

1 drm. of a solution made by dissolving 12 grains of the salt in 30 minims of Distilled Water and 30 minims of dilute Sulphuric Acid, injected (*B.M.J.* '05, ii. 724) into each ligament in the treatment of prolapsus uteri.

In the pyrexia of pulmonary tuberculosis the only drug which may be tried is Quinine, though it is apt to disturb the stomach. It should be given (*Edin. Med. Jour.* '05, 467) in a single dose of 20 to 30 grains, or 4 or 5 smaller doses at short intervals.

In the leucopenia of cachexial fever and Kala-azar, large doses of Quinine (60 grains daily) combined with red bone marrow have given much better results (*B.M.J.* '05, i. 710) than any yet reported by those who deny the value of the drug.

2 or 3 grains 3 times daily, combined with the external application of Iodine, have been known to cure an obstinate case of lupus erythematosus in a month. Adrenalin may with advantage be combined with the Quinine.—*B.M.J.* '05, i. 700.

In blackwater fever 15 to 18 grains hypodermically at once and 10 to 12 grains 3 times a day for 5 days, and twice a day for 2 following days.—*L.* '05, ii. 599.

The value of Quinine in the treatment of blackwater fever has been challenged, and the question whether the fever can be induced by its administration has been much discussed. A case reported by Dr. A. D. Ketchen in the *South African Medical Record* (*L.* '06, ii. 820) appears to prove that it can.

Dose.—1 to 10 grains = 0·06 to 0·65 gramme.

Prescribing Notes.—*Given in* **pills** *or* **cachets**, *also in* **aqueous solution** *assisted by the addition of Diluted Sulphuric or Diluted Hydrochloric Acid, 1 minim to each grain; it also dissolves readily in Tincture of Ferric Chloride.*

One of the most pleasant ways of giving Quinine is in a **mixture** *with Citric Acid, to be taken during* **effervescence** *with a solution containing Potassium Bicarbonate and Ammonium Carbonate. It is also given in solution with Hydrobromic Acid to diminish the tendency to cinchonism. Milk covers the taste well. Effervescent Quinine Citrate is also a very palatable form.*

For disguising the taste of Quinine, when administered to children, Chocolate has been suggested.

When a large dose (say 10 grains) is given, it is best suspended in Water; the bitterness is not then so intense as when in solution.

It is best made into **pills** *with 'Diluted Glucose.'*

For **hypodermic injection** *see other salts of Quinine, under each of which* *the solubilities are given. Of the neutral salts, the Lactate* (1 *in* 4) *is the most soluble ; of the acid salts, the Acid Hydrochloride* (1 *in* 1).

Quinine is precipitated from aqueous solutions of its salts by alkalis. In the Ammoniated Tincture of Quinine the alkaloid is dissolved by the Alcohol.

Incompatibles.—All alkalis and their Carbonates, Benzoates, Iodides, and Salicylates; all infusions containing Tannin throw down a Quinine Tannate, which Sulphuric Acid, instead of dissolving, helps to precipitate.

Official Preparations.—Pilula Quininæ Sulphatis and Tinctura Quininæ Ammoniata. Used in the preparation of Ferri et Quininæ Citras and Syrupus Ferri Phosphatis cum Quinina et Strychnina.

Not Official.—Ammoniated Quinine Capsules, Elixir Quininæ Ammoniatum, Mistura Quininæ, Mistura Quininæ cum Ferro, Pilulæ Metallorum, Pilulæ Quininæ Sulphatis Compositæ, Aitken's Tonic Pill, Pilula Quininæ cum Ferro.

Foreign Pharmacopœias.—Official in Austr., Ger., Hung., Jap., Russ. and Swiss (Chininum Sulfuricum); Belg. (Sulphas Quininæ); Dan., Norw. and Swed. (Sulphas Chinicus); Dutch (Sulphas Chinini); Fr. (Sulfate Basique de Quinine); Ital. (Solfato di Chinina); Mex. and Port. (Sulfato de Quinina); Span. (Sulfato Quinico basico); U.S. (Quininæ Sulphas).

Tests.—Quinine Sulphate is officially required to lose 11 molecules, equivalent to 11·2 p.c. of Water of crystallisation when exposed to dry air, and a freshly prepared salt should lose, according to the official requirements, 15·2 p.c. of Water when dried at 100° C. (212° F.). The *U.S.P.* states that when exposed to dry air or when heated to 60° C. (140° F.) it loses 5 molecules, equivalent to 10·3 p.c. of Water of crystallisation; the remaining number of molecules equivalent to 4·1 p.c. being lost at a temperature of 115° C. (239° F.); indicating a total loss of 14·4 p.c. The *P.G.* states that the salt shall lose not more than 15 p.c. when heated at a temperature of 100° C. (212° F.). *Fr. Codex* states that when exposed to the air it rapidly effloresces, losing 6 molecules of Water of crystallisation, equivalent to 12·13 p.c., leaving a salt containing 2 molecules of Water of crystallisation, equivalent to 4·60 p.c. The salt loses the whole of its Water of crystallisation only slowly at 100° C. (212° F.), but at 115° C. (239° F.) it becomes rapidly anhydrous. Neither the *B.P.* nor the *P.G.* refers to the m.p. of the dried salt. The *U.S.P.* states that when dried over Sulphuric Acid it melts at 205° C. (401° F.). The salt dissolves sparingly in Water, forming a solution which is neutral in reaction towards Litmus paper, and which possesses but a slight fluorescence. The *B.P.* states that the aqueous solution has a bluish fluorescence; the *U.S.P.* that the aqueous solution develops a vivid blue fluorescence when acidified with diluted Sulphuric Acid. The *P.G.* states that the aqueous solution exhibits no fluorescence, but on the addition of a few drops of diluted Sulphuric Acid a blue fluorescence is developed. A solution of the salt affords with Ammonia Solution a white precipitate soluble in excess of the reagent or in Ether. The separated alkaloid answers the tests distinctive of Quinine given under Quinina. When acidified with Hydrochloric Acid the aqueous solution affords with Barium Chloride Solution a white precipitate insoluble in Hydrochloric Acid.

The more generally occurring impurities are deficiency of Water of crystallisation, readily charred organic impurities, Ammonium

Sulphate and inorganic salts, Morphine, mineral impurities, Cinchonidine, Cinchonine and amorphous Cinchona alkaloids. The *B.P.*, as above stated, requires that a freshly prepared salt, when dried at 100° C. (212° F.), should lose 15·2 p.c. of Water. The *U.S.P.* requires that the residue remaining on drying 1 gramme of the salt at a temperature of 115° C. (239° F.) until it ceases to lose weight, should weigh not less than 0·838 gramme, indicating a loss of 16·18 p.c., equivalent to 8 molecules of Water of crystallisation, although the formula given only shows $7H_2O$. The *P.G.* requires that when dried at 100° C. (212° F.) it shall lose not more than 15 p.c. by weight. The salt should not acquire a faintly yellowish tint when mixed with Sulphuric Acid, indicating the absence of readily charred organic impurities. The *P.G.* and the *U.S.P.* include a test for the absence of Ammonium Sulphate and inorganic salts described in small type below under the heading of Chloroform and Alcohol. No similar test is mentioned in the *B.P.* Quinine may be distinguished from Morphine by the Nitric Acid test also described in small type. The *P.G.* includes a test for Chlorides with Silver Nitrate. 1 gramme of the salt, when ignited with free access of air, should leave no weighable residue. The natural and most probable impurity is Cinchonidine Sulphate, which is generally present to some extent in the commercial Sulphate. The *B.P.* requires that when tested according to the official method the salt should not yield an appreciable reaction distinctive of Cinchonine, Cupreine, Quinidine or amorphous alkaloid, and that not more than a total of 3 p.c. of impure Cinchonidine crystals should be yielded when the sample is assayed according to the official test, which means about double this amount in the sample. The *B.P.* includes tests for the alkaloids Quinidine and Cupreine, but they are very unlikely impurities. The test for Cinchonidine and Cinchonine depends upon two principal features, the comparative solubilities of the Sulphates in Water and the relative insolubility of Cinchonidine and Cinchonine in Ether. Quinine Sulphate is soluble 1 in about 800 of Water, Cinchonidine Sulphate 1 in 100 of Water and Cinchonine Sulphate 1 in 70 of Water, and advantage is taken of the comparative insolubility of Quinine Sulphate in cold Water to remove a greater portion of the Quinine by crystallisation. Freshly precipitated Quinine is readily soluble in Ether, whereas both Cinchonidine and Cinchonine require comparatively large quantities of Ether to effect solution. Opinions differ as to whether it is preferable to effect solution of the Cinchonidine and Cinchonine Sulphates by digesting a weighed quantity of the sample with a limited amount of Water at 60° C. (140° F.), or to use sufficient Water at a temperature of 100° C. (212° F.) to dissolve all three Sulphates and to decompose any double Sulphate of the two alkaloids, subsequently cooling to 50° C. (122° F.). It seems to be generally conceded that simple digestion of the salt with Water at 15·5° C. (60° F.) does not effect solution of the more soluble salt, owing possibly to the existence of a double Sulphate. When, however, solution of the mixed Sulphates is made in just about sufficient boiling Water to effect solution, the less soluble salt crystallises out almost entirely, leaving the more soluble salt in solution. In the *Fr. Codex* method, which is described below, solution is effected at a boiling temperature and the *B.P.* dissolves a weighed quantity of 4 grammes of the salt in 120 c.c. of boiling Water, and after cooling the solution gradually to 50° C. (122° F.) with intervals of frequent stirring, filters off the recrystallised Sulphate and evaporates the filtrate to a volume of somewhat less than 10 c.c., which is transferred to a small stoppered flask and shaken when cold with 10 c.c. of Ether and 5 c.c. of Ammonia Solution. Any crystals which separate out after the mixture has been allowed to remain at rest in a cool place for not less than 24 hours are collected on a tared filter and dried at a temperature of 100° C. (212° F.); after previously washing with a little Ether. When cool they are weighed and the weight should not amount to more than 0·12 of a gramme, indicating not more than 3 p.c. of impure Cinchonidine. The *U.S.P.* and the *P.G.* do not employ the Ether-solubility test, but use that with Ammonia Solution described below. The *B.P.* test has been severely and very adversely criticised. It has been shown by Cownley (*P.J.* '98, i. 412) that Cinchonine and Cupreine are never present in Quinine Sulphate of any known commercial manufacture; moreover, Cupreine occurs in Cuprea Bark (Remijia pedunculata), now seldom if ever employed by Quinine manufacturers, and in any case it could only exist in Quinine Sulphate to the extent of a few hundredths p.c. A yield of 3 p.c. of crystals of Cinchonidine (by the *B.P.* test) really means an admixture of 5·99 p.c. crystallised Cinchonidine Sulphate in Quinine Sulphate answering the *B.P.* requirements, while the 1885 *B.P.* stipulated that a Quinine Sulphate should not contain much more than 5 p.c. of Sulphates of other Cinchona alkaloids. It would therefore have been better for the Pharmacopœia, failing the insertion of a satisfactory test, to describe that limit of impurity leaving its determination, when necessary, in the hands of those competent to undertake it. Paul, who has experimented extensively on the *B.P.* tests for Cinchonidine, suggests (*C.D.* '04, ii. 429) the following method of procedure:—A weighed quantity of 1 gramme of the Quinine Sulphate to be examined is dissolved in 100 c.c. of boiling Distilled Water, the solution after cooling is filtered from the crystallised salt, the filtrate concentrated to 30 c.c. Any further crystals which may have formed are separated by passing the cooled solution through a loose plug of Cotton-Wool fitted in the neck of a funnel, and the volume of the solution is made up to 30 c.c. if necessary, by washing the crystals with a few drops of Water. A measured quantity of 5 c.c. of this solution, after adding 5 drops of Ammonia Solution, is shaken with 1 c.c. of Ether in a corked tube, the tube being allowed to remain in a cool place for 1 hour. If at the end of that time no crystals are formed in the solution the quantity of Cinchonidine in the 5 c.c. of the solution must be less than 0·004 gramme, and the corresponding quantity of Sulphate in 1 gramme of the salt under examination would not be more than 0·0324 (= 0·004 × 1·35 grammes), or 3·24 p.c. In the more than probable case of crystals being formed in appreciable quantity within a shorter time than 1 hour the amount of the salt under examination will be more than 3·24 p.c. To ascertain how much more it may be, shake out a volume of less than 5 c.c. with 1 c.c. of Ether, repeat that operation until a difference amounting to 0·5 c.c. of solution, between two experiments, also corresponds to entire absence of crystals in the one instance and the very slight formation of crystals in the other after 12 hours; then take the mean of those two quantities of solution as containing 0·004 gramme of Cinchonidine and calculate the percentage of Sulphate on that basis. Thus for example, if 4 c.c. of solution gave no crystals and 4·5 c.c. only a very little after 12 hours, 4·25 c.c. is to be taken as the quantity containing 0·004 gramme of Cinchonidine in the calculation, as follows: 4·25 c.c.: 0·004 = 30 c.c.: 0·0282 × 1·35 = 0·038 gramme in 1 gramme, or 3·8 p.c. of Cinchonidine Sulphate in the sample operated upon. Paul states that the operations requisite in applying the Ether test are extremely simple, and while they admit of being carried out with ease, the results obtainable are not deficient in accuracy. The *U.S.P.* and *P.G.* tests depend upon the amount of Ammonia Solution required to redissolve the precipitate at first formed in a strictly neutral aqueous solution of the salt, from which the greater portion of the Quinine Sulphate has been removed by recrystallisation, so as to produce a clear liquid. The *U.S.P.* test is described in small type below under the heading of Ammonia Solution. The *P.G.* test which differs slightly from the *U.S.P.* is virtually as follows: A weighed quantity of 2 grammes of the Quinine Sulphate which has been previously completely dried at a temperature of 40° to 50° C. (104° to 122° F.) is digested with 20 c.c. of Water for half an hour in a water-bath at a temperature of 60° to 65° C. (140° to 149° F.) with intervals of frequent shaking, it is then placed in Water at 15° C. (59° F.), and allowed to stand for 2 hours with intervals of vigorous shaking. The crystals are separated by filtration through a piece of dry calico of a capacity of about 100 cm. square, the expressed liquid is filtered through a filter prepared from the best filter paper of about 7 cm. diameter. A measured quantity of 5 c.c. of the filtrate having a temperature of 15° C. (59° F.) is transferred to a dry test-tube, and sufficient Ammonia Solution having a temperature of 15° C. (59° F.) added to completely dissolve the precipitate at first produced, and to produce a clear solution, not more than 4 c.c. of Ammonia Solution should be necessary. The *Fr. Codex* (1908) also employs the Ammonia test for detecting the presence of other Cinchona alkaloids, and for their detection the following method is given: 1 gramme of the official basic Quinine Sulphate is dissolved at a boiling temperature in 30 grammes of Distilled Water, is allowed to cool to 15° C. (59° F.) and maintained at that temperature during half an hour, the vessel being immersed in a water-bath maintained at a temperature of 15° C. (59° F), and frequently shaken. The liquid is filtered at this temperature, and the 2 following tests are performed on the liquid. (1) A measured quantity of 5 c.c. of the limpid liquid is transferred, by means of a graduated pipette, to an assay tube, and exactly 5 c.c. of a 10 p.c. w/w Ammonia Solution added, care being taken to disturb the flask as little as possible during the mixing of the liquid. The tube is stoppered and gently inverted several times, the Quinine at first precipitated is redissolved, and a limpid mixture should be obtained, which should remain in this condition during 24 hours. A permanent turbidity or slow deposition of crystals in the previously clear liquid indicates the presence of alkaloids other than Quinine. (2) A measured quantity of 5 c.c. of the original limpid liquid is transferred to a small accurately tared porcelain evaporating basin, evaporated on a water-bath at a temperature of 100° C. (212° F.) until the evaporating basin and its contents no longer show a variation in weight, the residue left on evaporation of the 5 c.c. of liquid should not weigh more than 0·008 of a gramme. The presence of other soluble salts increases the weight of this residue.

The Ammonia test for Quinine Sulphate has been criticised (*C.D.* '05, i. 488), and the results of some experiments dealing with the solubility of Quinine in Ammonia are there recorded. With a view of removing several factors tending to invalidate the Ammonia test, the use of a solution of a fixed Hydroxide instead of Ammonia was suggested; Potassium and Sodium Hydroxide were tried, but the Calcium Hydroxide Solution (*B.P.*) was finally chosen, as it was readily made of constant strength, was less liable to impurity, and any decomposition is evident to the eye. In addition to the evidence of solution of the precipitated alkaloid confirmed by the eye, a determination of the Sulphuric Acid radicle is suggested, Phenolphthalein Solution being employed as an indicator of neutrality. It was found that 20 c.c. of a saturated aqueous solution of purified Quinine Sulphate, to which 3 drops of Phenolphthalein Solution were added, required 2 c.c. of Calcium Hydroxide Solution (*B.P.*), whilst 20 c.c. of Cinchonidine Sulphate Solution required 13·7 c.c. of a similar solution; thus a double method of testing the purity of the Sulphate, *e.g.*, the solubility of the alkaloids and the quantity of Sulphuric Acid radicle in the aqueous solution is available. The value of the methods was tried with 5 grammes of commercial Quinine Sulphate, each treated with 100 c.c. of Water at 60° C. (140° F.) for 1 hour, frequently shaking, then cooling to 15° C. (59° F.), keeping at this temperature for 2 hours, frequently stirring, and then filtering. 20 c.c. of the Quinine Sulphate Solution required 41 c.c. of Calcium Hydroxide Solution (*B.P.*) to form a clear solution, and 2·8 c.c. of a similar solution, when titrated using Phenolphthalein Solution as an indicator. A mixture containing 1 p.c. of Cinchonidine required 45 c.c. of Calcium Hydroxide Solution (*B.P.*) to form a clear solution, and 3·3 c.c. when titrated, using Phenolphthalein Solution as an indicator. A mixture containing 3 p.c. of Cinchonidine required 55 c.c. of the Calcium Hydroxide Solution to form a clear solution, and 3·8 c.c. for titration; whilst a mixture containing 5 p.c. of Cinchonidine required 71 c.c. of the Calcium Hydroxide Solution to form a clear solution, and 4·7 c.c. for titration. In view of the remarks respecting Quinidine and Cupreine which appear above, the advantage of retaining tests for the presence of these alkaloids is doubtful, but if their presence is suspected the following brief outlines of the methods adopted for their detection may be useful. The *B.P.* test for Quinidine depends upon the precipitation of Quinidine Hydriodide by the addition of Potassium Iodide Solution, precaution being taken to prevent precipitation of amorphous Iodides by the addition of a little Alcohol (90 p.c.). The major portion of the Quinine Sulphate is removed from a weighed quantity of 1 gramme of the salt by dissolving it in 30 c.c. of boiling Water, cooling and filtering. A little Alcohol (90 p.c.) is added to the cold filtrate and sufficient Potassium Iodide Solution to precipitate the Quinidine Hydriodide, which is collected on a tared filter, washed with a little Water, dried till constant in weight, and when cool, weighed; its weight represents about an equal quantity of crystallised Quinidine Sulphate. It is officially required to yield none, or only the slightest traces. Cupreine forms a Sulphate which is sparingly soluble in Water, and this Sulphate will appear with the recrystallised Quinine Sulphate obtained in the first stages of the Cinchonidine test. The *B.P.* removes it from this crystalline precipitate by adding 6 c.c. of Ammonia Solution, and shaking with 25 c.c. of Ether, and this ethereal solution is mixed with the ethereal liquid obtained in the washing of the impure Cinchonidine crystals, and from the mixed ethereal liquids the Cupreine is separated by shaking with 6 c.c. of Sodium Hydroxide Solution (10 p.c.), Cupreine forming with an excess of Sodium Hydroxide Solution a definite crystallisable compound which cannot be extracted by Ether. The alkaline layer after separation is shaken with Ether to remove all traces of other alkaloids, and after being exactly neutralised with diluted Sulphuric Acid the Cupreine Sulphate is allowed to crystallise. This involves the presence of a fair quantity of Cupreine, and it would have been preferable to add Ammonium Chloride to the alkaline solution, to extract with Ether, or to neutralise the alkaline liquid with diluted Sulphuric Acid, to add Ammonia Solution and to extract with Ether. In the event of Cupreine being present it will separate out in crystals from the ethereal solution. The *B.P.* requires the sample to be either free from this alkaloid, or at the most to contain the slightest traces. In testing for Cinchonine and amorphous alkaloids the *B.P.* dissolves 1 gramme of the Sulphate in 30 c.c. of boiling Water, precipitating the Quinine and other crystalline alkaloids by the addition of 1 gramme of Sodium Potassium Tartrate; the cold filtered aqueous liquid when evaporated to a small bulk is officially required to yield little or no precipitate with Ammonia Solution. The remarks on the British Pharmacopœia tests for these latter alkaloids appear above.

Residue.—After ignition the salt should not leave any residue, *B.P.*, *P.G.* and *U.S.P.*

Chloroform and Alcohol.—1 gramme of the salt, when gently heated to 50° C. (122° F.) with 7 c.c. of a mixture of 2 volumes of Chloroform and 1 volume of Absolute Alcohol, should completely dissolve and the solution should remain clear on cooling, *U.S.P.* and *P.G.*; the latter stating a temperature of from 40° to 50° C. (104° to 122° F.).

Sulphuric Acid.—Sulphuric Acid should impart to the salt not more than a faintly yellowish tint, *U.S.P.*; the salt should scarcely be coloured when moistened with Sulphuric Acid, *P.G.*

Nitric Acid.—Nitric Acid should not produce a red colour, *U.S.P.*; the salt should scarcely be coloured when moistened with Nitric Acid, *P.G.*

Silver Nitrate.—An aqueous solution of the salt, after acidifying with Nitric Acid, should not be affected by T.S. of Silver Nitrate, *P.G.*

Ammonia Solution.—The Quinine Sulphate is dried in a porcelain dish on a water-bath for 2 hours at 50° C. (122° F.).

Transfer a weighed quantity of 1·8 grammes of the dried residue (which should be neutral or slightly alkaline to Litmus paper) to a dry test-tube and agitate it with 20 c.c. of Distilled Water for half an hour at 65° C. (149° F.) and then allow it to cool to 15° C. (59° F.), and keep the temperature at 15° C. (59° F.) for 2 hours, shaking the test-tube occasionally. Filter the liquid, transfer 5 c.c. of the filtrate to a test-tube, and carefully add 7 c.c. of Ammonia Water (which must be of official strength and have the temperature of exactly 15° C. (59° F.) and must be all added at once). A clear liquid should result. If the temperature during the maceration has been 16° C. (60·8° F.) 7·5 c.c. of Ammonia Water may be added. If 17° C. (62·8° F.) 8 c.c. may be added (limit of allowable foreign Cinchona alkaloids), *U.S.P.*

Preparations.

PILULA QUININÆ SULPHATIS. Pill of Quinine Sulphate.

Triturate 30 grains of Quinine Sulphate with 1 grain of Tartaric Acid, and add them to the previously-mixed Glycerin, 4 grains, and Tragacanth, 1 grain.

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

TINCTURA QUININÆ AMMONIATA. Ammoniated Tincture of Quinine.

Quinine Sulphate, 175 grains; Solution of Ammonia, 2 fl. oz.; Alcohol (60 p.c.), 18 fl. oz. (about 1 grain in 55 minims)

When first made the Tincture usually deposits a little, so it is better to allow a day or two to elapse before filtering.

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

When mixed with Water the Quinine is precipitated in a fine state of division, but the particles soon aggregate and adhere to the sides of the glass; therefore this preparation should not be prescribed in mixtures unless Mucilage of Acacia be used to suspend the Quinine.

When prepared with Ammonium Carbonate instead of Liquor the Tincture does not precipitate so badly, and it may be diluted with Water saturated with Carbonic Acid without any precipitation at all.

Tests.—Ammoniated Tincture of Quinine possesses a sp. gr. of 0·9225 to 0·9230; it contains about 1·8 p.c. w/v of total solids and about 54 p.c. w/v of Absolute Alcohol. 10 c.c. of the Tincture requires for neutralisation about 5·5 c.c. of Normal Volumetric Sulphuric Acid Solution, using Cochineal Solution as an indicator of neutrality.

Not Official.

AMMONIATED QUININE CAPSULES.—Quinine Sulphate, 60 grains; Ammonium Carbonate (powdered finely), 100 grains; Soft Paraffin and Liquid Paraffin, *q.s.* to make a thin paste and fill 100 capsules. Each capsule represents about 30 minims of Ammoniated Tincture of Quinine.

ELIXIR QUININÆ AMMONIATUM.—Quinine Sulphate, 1; Ammonium Carbonate, 3; Alcohol, 25; Solution of Carmine, 0·25; Elixir of Orange, 50; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

MISTURA QUININÆ.—Quinine Sulphate, 1 grain; Diluted Sulphuric Acid, *q.s.*; Distilled Water, to 1 fl. oz.—*London Ophthalmic.*

Quinine Sulphate, 1 grain; diluted Sulphuric Acid, 1 minim; Tincture of Orange, 10 minims; Water, to 1 fl. oz.—*St. Thomas's.*

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

MISTURA QUININÆ CUM FERRO.—Quinine Sulphate, 1 grain; Solution of Ferric Chloride, 10 minims; Water, to 1 fl. oz.—*St. Thomas's.*

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

PILULÆ METALLORUM.—Quinine Sulphate, 1 grain; Reduced Iron, 1 grain; Strychnine (alkaloid), $\frac{1}{20}$ grain; Arsenic Trioxide, $\frac{1}{20}$ grain; in one pill.—*U.S.N.F.*

Note.—A similar combination is known under the name of Aitken's Tonic Pills:—

Quinine Sulphate, 1 grain; Reduced Iron, $\frac{2}{3}$ grain; Strychnine (alkaloid), $\frac{1}{50}$ grain; Arsenic Trioxide, $\frac{1}{50}$ grain; in one pill.—*U.S.N.F.*

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

Pilulæ Quininæ Sulphatis Compositæ. *Syn.* Aitkin's Tonic Pills.—Quinine Sulphate, $\frac{1}{2}$ grain; Reduced Iron, $\frac{1}{3}$ grain; Arsenious Anhydride, $\frac{1}{100}$ grain; Strychnine, $\frac{1}{100}$ grain; Extract of Gentian, *q.s.*, in 1 pill.—*B.P.C.*

Aitken's Tonic Pill.—Quinine Sulphate, 1 grain; Reduced Iron, $\frac{2}{3}$ grain; Arsenious Anhydride, $\frac{1}{50}$ grain; Strychnine, $\frac{1}{50}$ grain; Extract of Gentian, *q.s.*—*Pharm. Form.*

PILULA QUININÆ CUM FERRO.—Quinine Sulphate, 1 grain; Ferrous Sulphate, 1 grain; Extract of Gentian, 3 grains; in each pill.—*Brompton.*

Quinine Sulphate, 1 grain; Exsiccated Ferrous Sulphate, 1 grain; in each pill.—*St. Thomas's.*

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

RESINA.

RESIN.

Fr., Colophane; Ger., Kolophonium; Ital., Colofonia; Span., Colofonia.

A translucent, pale amber-coloured, brittle solid, having a terebinthinate odour. Readily reduced to powder. It is officially described as the residue from the crude Oleo-Resin of various species of *Pinus*, after the Oil of Turpentine has been removed by distillation.

Solubility.—In almost all proportions of Alcohol (90 p.c.) Ether, and Oil of Turpentine; also in hot Olive Oil.

Medicinal Properties.—Antiseptic, and slightly stimulant. It is an **ingredient** of plasters used for strapping wounds. The **ointment** forms a stimulating dressing for indolent ulcers and sores. Never used internally.

Official Preparations.—Emplastrum Resinæ and Unguentum Resinæ. Used in the preparation of Emplastrum Calefaciens, Emplastrum Cantharidis, Emplastrum Menthol, Emplastrum Picis, Emplastrum Plumbi Iodidi, Emplastrum Saponis.

Not Official.—Resina Carbolica, Resina Carbolisata.

Resin Plaster is contained in Emplastrum Belladonnæ, Emplastrum Opii, also in Emplastrum Calefaciens.