

All the preparations of Conium are uncertain in action, as the active principle is very volatile. Any specimen must be carefully tested before deciding on its dosage, and if the potherful mouse-like odor of the drug is absent, the preparation is probably worthless.

*Incompatibles.*

Incompatible with *Conium* are: Vegetable Acids, Alkalies, Tannic Acid; with *Coniine* are: Albumin, Aluminum salts, Alkaloidal precipitants (see page 5), Chromic Trioxide; Copper, Iron, Manganese, and Zinc salts. Physiologically incompatible are: Nux Vomica and its alkaloids, also Picrotoxin, and other tetanizers.

PHYSIOLOGICAL ACTION AND THERAPEUTICS.

The action of Conium is that of its principal alkaloid Coniine, which causes motor paralysis without loss of sensation or consciousness. It progressively paralyzes the motor nerves, the action commencing at the peripheral end-organs and extending upward, involving the nerve-trunks and finally the centres, but the muscular irritability remains unaffected. Methyl-coniine, on the contrary, stimulates the spinal cord, and produces the convulsions often seen in conium-poisoning. The sensory nerves are slightly affected, and the general sensibility is impaired, a feeling of numbness being experienced in the extremities.

Gastric irritation is usually the first sensation produced by a full dose of Conium, nausea and vomiting being its symptoms. Then occur weakness of the legs, numbness and fatigue, drooping eyelids, diplopia, slightly dilated pupils, vertigo, impaired utterance, slow and labored breathing, and if the dose be lethal, paralysis of the voluntary muscles occurs, those of the lower limbs being first affected; speech and vision are lost, and finally death occurs from paralysis of the muscles of respiration. The heart is not affected and the mind remains clear but torpid and indifferent, until carbonic acid narcosis sets in. Muscular movement counteracts the effects of the drug to a great extent.

Conium is believed to have been the state poison of the Athenians, by the juice of which Socrates and Phocion died. It is closely allied in its physiological action to Curare.

Conium is indicated in diseases characterized by excessive motor activity. Large doses are required, as some physiological action is necessary. Children bear it well, their constant activity preventing its full action. In chorea and paralysis agitans it palliates, by depressing the motor nervous system. In acute mania and delirium tremens, to quiet motor excitement and prevent exhaustion, it is remarkably efficient, especially when given conjointly with morphine. When pain and spasm are present, it will prove a useful agent; and in tetanus, blepharospasm, asthma, whooping-cough, and other spasmodic affections it is frequently used with great benefit. The pain of cancer seems to be especially amenable to its influence when locally applied, and Coniine vapor is an admirable palliative of the tickling cough of phthisis and the irritability of the air-passages in acute bronchitis. In pneumonia and pleurisy the hypodermic use of Coniine to afford the organs rest by inducing a paretic state of the respiratory muscles has been followed by a marked decrease in the temperature and pulse-rate.

**CONVALLARIA**,—is the dried rhizome and roots of *Convallaria majalis*, Lily of the valley, a stemless perennial of the nat. ord. Liliaceæ, indigenous to Europe, northern Asia and the southeastern portion of the United States. The preparations in the market vary in action, according to the quantity of the resin present, it being emeto-cathartic. Convallaria contains two glucosides, namely—*Convallamarin*, on which the cardiac action depends, and *Convallarin*, a crystalline, purgative principle, insoluble in water; also an acrid *Resin* which probably contains the latter glucoside. Dose, gr. ij-x [av. gr. vijss.]

*Preparations.*

**Fluidextractum Convallariæ**, *Fluidextract of Convallaria*,—is the only official preparation, and probably contains Convallarin, which is not present in aqueous preparations, being insoluble in water. Dose, ℥ij-x [av. ℥ viij.]

**Extractum Convallariæ**, *Extract of Convallaria*, (Unofficial),—from the flowers and stalks with  $\frac{1}{3}$  of the leaves and root; is freely soluble in water and in alcohol. Dose, gr. ij-xxx.

**Infusum Convallariæ**, *Infusion of Convallaria*, (Unofficial),—prepared from the flowers, leaves and stems 25 parts, in water 75. Dose, ℥ss-ij.

**Convallamarinum**, *Convallamarin*,  $C_{23}H_{44}O_{12}$  (Unofficial),—an amorphous, white, bitter powder, freely soluble in water and in alcohol. Dose, gr.  $\frac{1}{4}$ -ij.

PHYSIOLOGICAL ACTION.

Convallaria has long been known as a decided cathartic and a prompt and powerful diuretic, but its cardiac action has excited attention, and it is considered a close analogue of Digitalis, while free from the so-called cumulative action which makes the latter drug so frequently a dangerous remedy. Preparations of the root are powerfully emeto-cathartic, probably due to a preponderance of the resin. Those freed from this ingredient correspond in action to Convallamarin, stimulate the appetite without impairing digestion, increase peristalsis without producing catharsis, slow the heart and raise the arterial tension, also slowing and deepening respiration. Lethal doses at first produce irregularity of the cardiac action and spasm of the respiratory muscles, high arterial tension and a very rapid pulse,—followed by lowered blood-pressure, very slow and deep breathing, and finally arrest of the heart in systole. Its mode of action is by direct stimulation of the pneumogastric, the motor and sensory nerves retain their irritability, the muscles preserve their contractility, the cerebral functions and the pupil are unaffected.

Convallarin is a drastic purgative in 3-grain doses. Convallamarin is an emetic even in small quantity, and the powdered root is sternutatory.

THERAPEUTICS.

Convallaria is a heart- tonic like Digitalis, and is indicated in the same class of cases as the latter drug, with the advantage that having no cumulative action it is not dangerous to the heart in medicinal doses, and does not disturb the stomach or the functions of the cerebro-spinal axis. In doses of gr. xv-xxv of the extract it slows the action of the heart and increases the force of its con-

tractions, raises arterial tension, augments the force and volume of the respiration, and produces prompt diuresis without altering the composition of the urine. It is often a valuable remedy in mitral stenosis or insufficiency with venous stasis, dilatation of the heart, palpitation, vehement cardiac action or disordered rhythm, and in all valvular affections accompanied by dropsy and a weak heart. It has been used with benefit in pneumonia, typhoid fever, and renal dropsy. Its action is maintained for several days after its administration has been suspended.

**COPAIBA, Copaiba**,—is an oleoresin derived from one or more South American species of *Copaiba*, nat. ord. Leguminosæ, growing chiefly in the valley of the Amazon. It is a translucent, viscid liquid, of yellow color, aromatic odor, acrid and bitter taste, sometimes fluorescent, soluble in alcohol, ether and chloroform. It is not a balsam as it contains no cinnamic acid. Its constituents are a *Volatile Oil* and a *Resin* in about equal proportions, the latter containing nearly 99 per cent. of *Copaibic Acid*. Dose,  $\text{m}x\text{--}xxx$  [av.  $\text{m}xv$ .]

*Preparations.*

**Oleum Copaibæ**, *Oil of Copaiba*,  $\text{C}_{10}\text{H}_{16}$ ,—a pale yellow liquid, of sp. gr. 0.895, bitter taste and neutral reaction, soluble in 2 volumes of alcohol. Dose,  $\text{m}v\text{--}xv$  [av.  $\text{m}viiij$ .]

**Mistura Copaibæ Composita**, *Compound Copaiba Mixture, Lajayette Mixture* (Unofficial).— $\mathbb{R}$ . Copaibæ  $\mathfrak{z}$ j, Spiritus Ætheris Nitrosi  $\mathfrak{z}$ j, Liq. Potassæ  $\mathfrak{z}$ ij. Mix with constant stirring, then add: Tinct. Lavandulæ Co.  $\mathfrak{z}$ j, Syrupi  $\mathfrak{z}$ ijss, Mucil. Dextrini (N. F.) q. s. *ad*  $\mathfrak{z}$ viiij. Mix the whole thoroughly by shaking. Of this each  $\mathfrak{z}$  contains  $\text{m}viijss$  of Copaiba (*National Formulary*). Dose,  $\mathfrak{z}$ j-iv.

*Incompatibles.*

Incompatible with *Copaiba* are: Mineral Acids, Caustic Alkalies, Calcium Hydrate, Magnesia, Water.

PHYSIOLOGICAL ACTION AND THERAPEUTICS.

Copaiba is a stimulant diuretic, diaphoretic, expectorant, and a gastro-intestinal irritant. Its taste is bitter and nauseous. In the stomach it causes heat, eructations, heaviness, frequently anorexia and diarrhea and if continued for any length of time gastro-intestinal catarrh and desquamative nephritis may result. The oil and resin diffuse into the blood and are excreted by the bronchial mucous membrane, skin and kidneys, producing increased secretion at the points of elimination. The various secretions have the odor of the drug, especially the urine. In medium doses it increases the quantity of urine and its solid constituents, but large doses will cause scanty urine, containing albumin, casts and blood, with pain in the loins and other signs of renal congestion. On the skin it often produces itching and several forms of eruption.

Copaiba has been largely used in gonorrhœa after the acute symptoms have subsided, also in chronic cystitis, acute and chronic bronchitis, and in dropsies, particularly ascites. In all these affections it is a useful remedy but its nauseous taste and irritant effects on the stomach are driving it out of fashion, especially

in private practice. One eminent surgeon declares not only that it is useless in gonorrhœa but that it does more harm than good, often prolonging the disease beyond its natural limit. In psoriasis and urticaria, and in cutaneous affections characterized by torpid peripheral circulation, this drug has been administered internally with excellent results. In long-standing cystitis in the female Copaiba has been injected into the bladder with great benefit. The resin is the most active ingredient, especially for diuretic purposes.

**CORIANDRUM, Coriander**,—is the fruit of *Coriandrum sativum*, a plant of the nat. ord. Umbelliferae. It contains a volatile and a fixed oil. Dose, gr. v-xx [av. gr. viijss.]

**Oleum Coriandri**, *Oil of Coriander*,—a volatile oil distilled from Coriander. A colorless liquid, of aromatic, bitter and pungent taste; soluble in 3 volumes of alcohol, forming a slightly turbid liquid neutral to litmus paper. Dose,  $\text{m}ij\text{--}v$  [av.  $\text{m}iiij$ .]

Coriander is stimulant, aromatic and carminative. It is used almost wholly as a flavoring to other remedies, or as a corrective against the griping effects of certain purgatives. Its flavor covers the taste of Senna and Rhubarb, and it is an ingredient of the official Confectio Sennæ.

**CORNUS, Dog-wood** (Unofficial),—is the bark of the root of *Cornus florida*, a small tree of the nat. ord. Cornaceæ, indigenous to the U. S. It contains a bitter principle named *Cornin*, which is crystallizable and soluble in water and in alcohol; also a resin and tannic acid.

Cornus is a simple bitter, having stomachic and other qualities similar to those of Calumba (which see). In addition it is possessed of considerable antiperiodic power, and has a good deal of reputation in the Southern States as a remedy in malarial fever, the physicians of that section considering it as next to quinine in efficiency. Heat destroys its active principle, consequently a decoction is a useless preparation. A fluidextract is on the market, the dose of which is  $\text{m}x\text{--}\mathfrak{z}$ j.

**COTO, Coto Bark** (Unofficial),—is the bark of some unknown tree growing in Bolivia. It contains an acrid, bitter principle, of yellow color, crystalline and soluble in hot water and in alcohol, named *Cotoin*,  $\text{C}_{22}\text{H}_{18}\text{O}_6$ ; also *Piperonylic Acid*,  $\text{C}_8\text{H}_6\text{O}_4$ , and a volatile oil, resin, etc., but no tannin. Dose, gr. j-xv.

**Paracoto Bark, False Coto**.—Its principle, *Paracotoin*,  $\text{C}_{19}\text{H}_{12}\text{O}_6$ , has a strong similarity to Cotoin therapeutically, but is less active.

A fluidextract of the official strength is prepared, also a tincture (10 per cent.), which may be administered in doses of from  $\text{m}j\text{--}xx$ . Cotoin is used in doses of gr. j-iv, and Paracotoin in somewhat larger quantities.

The physiological action of Coto has not been studied, all that is known about it being that it is decidedly irritant to the skin and mucous membranes. After its internal administration the urine takes a dark-red color with nitric acid. Ferric Chloride blackens a dilute solution of Cotoin, but has no reaction with Paracotoin.

The bark and both principles are highly recommended in diarrheas of various forms, especially those of phthisis, typhoid fever, and cholera. In Asiatic cholera Paracotoin has been used hypodermically in 3-grain doses with success. When there is any tendency to acute inflammation of the gastro-intestinal tract this agent must be used with caution. Small doses of the tincture ( $\text{m}j\text{--}v$ ) are said to be very effective in the diarrhea of children.

**CREOSOTUM, Creosote**,—is a mixture of phenols and phenol derivatives, chiefly *Guaiacol* and *Creosol*, obtained during the distillation of wood-tar, preferably that derived from the beech. It occurs as an almost colorless, or pinkish, inflammable, oily liquid, of smoky odor, caustic taste, and neutral reaction; soluble in about 150 of water, and in all proportions in absolute alcohol, ether, chloroform, carbon disulphide, acetic acid, and fixed and volatile oils. It does

not coagulate albumin or collodion though Phenol does. It was named from its remarkable preservative power over meat (*κρέας*, flesh, *σώζειν*, to preserve). Much of the commercial Creosote is an impure phenol, or a heavy oil distilled from coal-tar and containing phenol and cresylic acid. Dose  $\mathfrak{m}\mathfrak{j}$ - $\mathfrak{v}$  [av.  $\mathfrak{m}\mathfrak{i}\mathfrak{i}\mathfrak{j}$ ] well diluted, in wine or whisky. Morson's beechwood creosote is the best for internal use.

**Aqua Creosoti, Creosote Water**,—is a 1 per cent. solution, containing nearly 5 minims of Creosote in each fluid-ounce. Dose,  $\mathfrak{z}\mathfrak{j}$ - $\mathfrak{z}\mathfrak{j}$  [av.  $\mathfrak{z}\mathfrak{i}\mathfrak{j}$ .]

**Guaiacol, Guaiacol**,  $\text{C}_7\text{H}_8\text{O}_2$ ,—is one of the chief constituents of Creosote, and is prepared synthetically from catechol. It occurs as a colorless solid or liquid, of agreeable and aromatic odor, soluble in alcohol, ether, acetic acid and glycerin. Dose,  $\mathfrak{m}\mathfrak{v}$ - $\mathfrak{xv}$  [av.  $\mathfrak{m}\mathfrak{v}\mathfrak{i}\mathfrak{i}\mathfrak{j}$ ], in capsule, pill, or whisky.

**Guaiacolis Carbonas, Guaiacol Carbonate**, (Duotal),—occurs as an almost tasteless and odorless, white, crystalline powder insoluble in water. Dose, gr.  $\mathfrak{v}$ - $\mathfrak{xx}$  or more [av. gr.  $\mathfrak{xv}$ ], gradually increased to a maximum of  $\mathfrak{z}\mathfrak{j}\mathfrak{s}\mathfrak{s}$  per diem.

#### Unofficial Derivatives.

**Creosoti Carbonas, Creosote Carbonate, Creosotal**,—is a patented product, prepared directly from beech-wood creosote instead of guaiacol, and is analogous to guaiacol carbonate. It occurs as a thick, brownish, inodorous oil, insoluble in water. Dose,  $\mathfrak{m}\mathfrak{v}$ - $\mathfrak{xx}$  or more gradually increased to a maximum of 90 minims per diem.

**Benzosolum, Benzosol, Benzoyl Guaiacol**,—is prepared by heating Guaiacol with Benzoic Acid, and occurs in small, colorless, odorless, and almost tasteless crystals, practically insoluble in water. Contains 54 per cent. of Guaiacol. Dose, gr.  $\mathfrak{v}$ - $\mathfrak{xv}$ .

**Guaialin**,—is the benzoic acid ester of methylene-diguaiacol, and occurs as an odorless and almost tasteless greenish powder, which is said to contain Guaiacol 60 per cent., Benzoin 30 per cent., and Formaldehyde 7 per cent. Dose, gr.  $\mathfrak{x}$ - $\mathfrak{xv}$ , up to  $\mathfrak{z}\mathfrak{j}\mathfrak{s}\mathfrak{s}$  daily.

**Guaiiform, Geoform**,—is a condensation product of Guaiacol and Formaldehyde, soluble in alcohol and in ether, insoluble in water, and claimed to contain over 95 per cent. of guaiacol. Dose, gr.  $\mathfrak{x}$ - $\mathfrak{xv}$ .

**Thiocol, Potassium Guaiacol Sulphonate**,—occurs as a white, micro-crystalline, odorless powder, readily soluble in water, and said to contain 60 per cent. of guaiacol. Dose, gr.  $\mathfrak{v}\mathfrak{i}\mathfrak{j}$ - $\mathfrak{xxx}$ , up to  $\mathfrak{z}\mathfrak{j}\mathfrak{s}\mathfrak{s}$  or even  $\mathfrak{z}\mathfrak{i}\mathfrak{v}$  daily. It may be used hypodermically.

#### Incompatibles.

Incompatible with *Creosote* or *Guaiacol* are: Acacia, Albumin, Nitric Acid, Oxidizers, also Cupric, Ferric, Gold and Silver salts.

#### PHYSIOLOGICAL ACTION.

Creosote is styptic, escharotic, antiseptic, anesthetic, expectorant, astringent, and narcotic in overdose. Its action is practically the same as that of Phenol (see under that title), especially upon the nervous system, the heart, and the respiration; but it differs therefrom in not causing convulsions, and in increasing the coagulability of the blood, also in being much less toxic and in having a greater range of usefulness. It is rapidly absorbed and eliminated, its excretion occurring by the kidneys and the bronchial mucous membrane, which it stimulates, being quite a good expectorant. In small doses it seems to have a selective sedative influence on the terminal nerve-filaments in the gastric mucous membrane. In large doses it is a powerful poison, resembling Phenol in its symptoms, except that its nervous effects are even more marked.

It explodes when combined with silver oxide, unless previously diluted with an inert powder.

Guaiacol, locally applied, is rapidly absorbed by the skin, and appears in the urine fifteen minutes after its application. Applied by painting it over the skin of the thigh, abdomen or chest, in quantity of 20 to 50 minims, it causes a rapid reduction of body-temperature, and thereby the temperature in malarial fever, typhoid fever and pneumonia falls as much as  $7^\circ$  in the course of an hour or two, but soon rises again (Da Costa). This rapid antipyretic action is not accompanied by any marked disturbance of the nervous system or any signs of collapse, not even by a very profuse sweat, neither does there occur any active chill, though slight chilliness is sometimes experienced. Guaiacol is said to be a powerful local anesthetic, equal in this respect to cocaine and much safer, as it can be injected in ten times larger doses without producing ill effects. For this purpose it is used in sterilized olive oil (1 in 10 or 20) hypodermically, and it is claimed that thereby perfect local anesthesia is obtained for the extraction of teeth, the removal of small tumors, and similar operations. Internally administered, the action of Guaiacol is similar to that of Phenol, and in overdose it may prove equally fatal.

#### THERAPEUTICS.

Creosote, being a very complex substance of varying composition, has been almost entirely supplanted in therapeutics by Phenol for external use, and by Guaiacol for internal administration. As an astringent it has been employed in intestinal hemorrhage, gonorrhoea and gleet, and generally in the same affections as phenol. Externally it is a good application in eczema, pruritus, ulcers and scaly skin diseases, and it effectually relieves the pain of an exposed dental nerve if applied thereto. It is a good agent by inhalation in chronic bronchitis and gangrene of the lung, and it has been administered internally with decided benefit in abnormal fermentative processes in the stomach and intestines, in reflex nausea and vomiting, as from sea-sickness, and pregnancy; also as an aseptic expectorant in chronic basilar cavity, in which it seems to have greater efficacy than any other remedy, and in bronchitis, pneumonia, pulmonary gangrene, carcinoma of the stomach, and diabetes.

In pulmonary tuberculosis when well borne by the stomach, and continued over a long period of time, it has probably proved more efficient than any other remedy. Its employment in this disease is based on the statement of Guttman, that tubercle bacilli are destroyed by blood containing one part of creosote in 2000, and that even one-half that proportion arrests their development. This is denied by many observers, and later researches indicate that the good effects of this treatment are due to the formation of soluble compounds between the remedy and the toxic albuminous by-products of the tubercle bacillus, which are then eliminated from the blood. The commencing daily dose of Creosote or Guaiacol is 2 or 3 minims, largely diluted to prevent irritation, taken after meals, and increased by the addition of one minim daily until a maximum

daily dosage of 15 to 18 minims is reached, at which rate it should be continued for several months. Under this treatment cough is relieved, expectoration diminished, night-sweats are stopped, the fever is lowered, while body-weight and appetite are increased in most cases; and in many even the local conditions are decidedly improved, as shown by the physical signs.

Creosote was advocated for phthisis by Reichenbach in 1833, and its use was revived by Bouchard and Gimbert in 1877, since which time it has been tried and approved by a long list of authorities, including Jaccoud, Dujardin-Beaumetz, Dieulafoy, Germain Sée, Sommerbrodt, Von Brun, Guttmann, Douglas Powell, Burney Yeo, J. Solis-Cohen and many others, who all agree as to its utility, though differing as to its mode of action, its dose, and the methods of administration. The number of cases dealt with by some of these observers is so considerable that there is at least strong *prima facie* evidence in favor of this drug and its derivatives. Bouchard reported on 93 cases at first, and on more subsequently; Sommerbrodt's report included over 5,000 cases, treated during more than nine years; and Von Brun dealt with 1,700 cases. Professor Sommerbrodt contends that it is possible to administer the quantity necessary to inhibit the growth of the bacilli, and believes that he did so in many cases. He had the most gratifying success with this medication, and states that the more creosote the patient could bear the better was the result. Of late years the tendency has been to administer Creosote or Guaiacol by hypodermic injection. Lépine uses creosote dissolved in oil, and finds that a much larger quantity can be used hypodermically than the stomach will tolerate. Picot injects a mixture of sterilized olive oil containing 1 per cent. of Iodoform and 5 per cent. of Guaiacol, beginning with 1 Cc. of the mixture and increasing the dose to 3 Cc.

Guaiacol is preferred by many for internal administration instead of creosote, being the principal ingredient of the latter, and of more definite chemical composition, though nearly or quite as irritant to the stomach. It may be given in mixture with wine or brandy, in capsules, or hypodermically in combination with cod-liver oil. When neither of these agents agrees with the patient, useful and efficient substitutes are their carbonates, known by the respective trade-names Duotal and Creosotal, in doses of 4 to 6 grains, gradually increased to 3jss per diem. These preparations are well borne as they do not irritate the gastric mucous membrane or disturb the digestion. Creosotal is highly recommended in acute pulmonary inflammations by many clinicians, especially in pneumonia. It has been used with asserted success in typhoid fever, and Duotal achieved much notoriety in the treatment of that disease, by reason of the claims made for it by Dr. Woodbridge as an abortive remedy, which have not been sustained by the experience of others.

The antipyretic power of Guaiacol, when painted on the surface of the body, has been utilized in the treatment of several diseases accompanied by hyperpyrexia. In typhoid fever Montagnon applied 10 or 15 drops with a brush whenever the temperature exceeded 102° F. the application being followed by a profuse perspiration, the temperature fell, and in a few hours a large quantity of urine was passed. The action lasted about two hours, and the treatment was renewed about every three or four hours with excellent results, none of the patients suffering a relapse. Similar results have been obtained in the pyrexia of malarial fever and pneumonia, and this employment of the drug is claimed to promote the absorption of pleuritic effusions in a remarkable manner. Only pure guaiacol should be used, as an inferior quality produces a very grave cutaneous irritation. By other clinicians it is mixed with glycerin before

application, in the proportion of 1 part to 8 of the latter, or even in equal quantity, and it is claimed that thereby no inconvenience is experienced. This application of Guaiacol is also decidedly anesthetic in effect, and has been utilized in orchitis, epididymitis, torticollis, neuralgic headache, labor-pains, the chest-pains of tuberculous subjects, tooth-ache, sciatica, rheumatism, and other painful affections. In laryngeal tuberculosis the application of a 20 per cent. solution at first, gradually increased to full strength, has given very great satisfaction.

Benzosol contains Guaiacol in the proportion of 54 per cent. In the intestinal canal the latter is probably set free by the action of the alkaline secretions, as benzosol is excreted by the urine in the form of guaiacol and benzoic acid combinations. Compared with guaiacol, this agent has the advantage of being almost tasteless; hence it can be given in large doses without the digestive disturbance and disagreeable eructations produced by the parent substance when administered in liquids, and without the local irritant effect caused by the latter in capsules. In doses of 4 grains, gradually increased to 12 grains, thrice daily, it is said to have given as good results as creosote in the treatment of pulmonary tuberculosis.

Thiocol is more palatable than the other preparations of creosote or guaiacol, and can be administered by the mouth or hypodermically in full dosage. It is said to be non-toxic and readily assimilated, to cause no injurious effect on the blood, and to produce a striking increase in the body weight. It is used with benefit in diarrhea, pneumonia, and all forms of tuberculosis.

**CROCUS, Saffron** (Unofficial).—The stigmas of *Crocus sativus*, a plant of the nat. ord. Iridæ, cultivated in Europe, containing a volatile oil and coloring matter. So-called American Saffron is not Crocus but the flowers of *Carthamus tinctorius*. True Saffron is expensive, as it requires about 60,000 flowers to furnish one pound of the stigmas. Dose, gr. v-xx, in infusion.

**Saffron Tea**, much used in domestic practice, is an infusion of *Carthamus tinctorius*, the Safflower.

Crocus is a stimulant aromatic, having some antispasmodic and anodyne qualities. The hot infusion produces diaphoresis, probably by virtue of the hot water alone. It is said to have caused death with narcotic symptoms. On the continent of Europe it is employed as a stimulant and emmenagogue, but in this country its only use is as a coloring agent. The mis-called Saffron Tea noted above is used in domestic practice for measles and other exanthemata.

**CUBEBA, Cubeb**,—is the dried unripe but fully-grown fruit of *Piper Cubeba*, a plant of the nat. ord. Piperaceæ, cultivated in Java. It contains a *Volatile Oil*, which is official, an acrid resin composed in part of *Cubebic Acid*, also a fatty oil, gum, and *Cubebin*, which is an insoluble, neutral, odorless and tasteless body. The volatile oil may be separated into *Cubebene* a camphor, and *Cubeben* a liquid portion. The active principles are the volatile oil and cubebic acid, both of which are contained in the oleoresin. Cubeb should be kept whole and not pulverized until wanted for use. Dose of the powdered drug, gr. x-3j [av. gr. xv.]

## Preparations.

**Fluidextractum Cubebæ**, *Fluidextract of Cubeb*. Dose, ℥v-xxx [av. ℥xv.]

**Oleoresina Cubebæ** *Oleoresin of Cubeb*,—extracted by alcohol. Dose, ℥v-xx [av. ℥vijss.]

**Trochisci Cubebæ**, *Troches of Cubeb*,—each contains of the Oleoresin 2, Oil of Sassafras 1, Extract of Glycyrrhiza 25, Acacia 12, and Syrup of Tolu q. s. to form 100 troches. Dose, j-iiij.

**Oleum Cubebæ**, *Oil of Cubeb*,—is the volatile oil, a colorless or pale greenish-yellow liquid, warm, aromatic taste, odor of cubeb and neutral reaction. Is soluble in an equal volume of alcohol. Dose, ℥v-xx [av. ℥vijij.]

Cubeb belongs to the pepper family, and like black pepper is an aromatic stomachic and a stimulant diuretic in small or medium doses, but large doses derange digestion and may act as a gastro-intestinal irritant. Its constituents are eliminated by the bronchial mucous membrane, the skin and the kidneys, stimulating and disinfecting the genito-urinary passages, increasing the bronchial mucus, sweat and urine, and frequently causing an urticarial or vesicular eruption. It increases the action of the heart and the vascular system, stimulates the venereal appetite, and promotes the menstrual discharge.

Cubeb is particularly useful in affections of the bladder and urethra. It is used in the acute stage of gonorrhœa, in chronic cystitis, prostatorrhœa and chronic bronchitis with excellent results. The powder is a good application in hay-fever, chronic nasal catarrh and follicular pharyngitis, blown on to the mucous membrane by an insufflator. It may also be smoked in cigarettes with temporary relief in cases of acute nasal catarrh with "stuffed" nasal passages. In some subjects the continued use of cubeb produces nausea, hemorrhoids, hematuria, and severe headache. The troches are a useful preparation in chronic irritability of the fauces, pharynx and air-passages, and are much employed by singers and public speakers for their tonic effect on these parts and for the relief or prevention of hoarseness.

**CUNDURANGO**, *Condurango*, (Unofficial),—is the bark of *Gonobulus Condorango*, nat. ord. Asclepiadæ, a native of Columbia and Ecuador. A fluidextract is on the market, the dose of which is ℥xx-5j, or more.

Condurango is an astringent bitter, also a stomachic tonic and sedative. In South America it is employed as an alterative remedy in syphilis, and at one time it was supposed to be curative in gastric ulcer, in which its only value is as a sedative to the gastric mucous membrane, relieving the vomiting, pain, and bleeding. It is efficiently used for the relief of catarrh and hyperesthesia of the stomach. Its active principles are two glucosides, which in dogs cause ataxia and incoordination, increased motor activity, and finally convulsions, death occurring after 12 to 72 hours.

**CUPRUM**, *Copper*, Cu,—is widely distributed in nature, and exists in minute quantity in many articles of food, also in the human body, especially in the blood, the liver, and the brain. Though its salts are actively poisonous, the metal itself is inert, but is oxidized and dissolved by fruit acids and salt water, hence the danger of using copper vessels for some cooking purposes. The Sulphate is the only official salt.

## Salts and Preparations of Copper.

**Cupri Sulphas**, *Copper Sulphate*,  $\text{CuSO}_4 + 5\text{H}_2\text{O}$ ,—blue, translucent crystals, efflorescent, of nauseous, metallic taste and acid reaction, very soluble in water, soluble in 400 of alcohol. Its solution is blue by transmitted light, green by reflected light. Dose, as an emetic, gr. ij-v [av. gr. iv.] every 10 or 15 minutes,—as an astringent, gr.  $\frac{1}{8}$ - $\frac{1}{2}$  [av. gr.  $\frac{1}{5}$ .]

**Alkaline Cupric Tartrate Volumetric Solution**, *Fehling's Solution*,—the official reagent for glucose, is prepared as follows: (1) Dissolve 34.64 grammes of pure Cupric Sulphate in water, to measure exactly 500 cubic centimeters. (2) Dissolve 173 grammes of Potassium and Sodium Tartrate and 75 grammes of Potassium Hydroxide in water to measure exactly 500 cubic centimeters. Keep the two solutions in small, rubber-stoppered bottles, separate; and for use, mix exactly equal volumes of the two at the time required. One cubic centimeter of the mixed solution reduces 0.005 gramme (gr.  $\frac{1}{200}$ ) of anhydrous glucose.

**Cuprum Ammoniatum**, *Ammoniated Copper* (Unofficial),—is made by triturating 3 parts of Ammonium Carbonate with 4 of Cupric Sulphate until effervescence has ceased, then drying. A deep azure-blue powder of ammoniacal odor, a styptic, metallic taste, and alkaline reaction, soluble in water. Dose, gr.  $\frac{1}{8}$ -j.

**Cupri Arsenis**, *Copper Arsenite*,—is described under ARSENUM, page 159.

**Cuprol** (Unofficial),—is a chemical compound of Copper and Nucleinic Acid, containing 6 per cent. of copper. It is used externally in 5 to 10 per cent. aqueous solution, containing  $\frac{1}{2}$  per cent. of Chlorotone.

## Incompatibles.

Incompatible with *Copper Sulphate* are: Alkalies, Ammonium Acetate, Arsenic Trioxide, Arsenites, Calcium Chloride, Carbonates, Ferric Acetate, Glucose in alkaline solution, Iodides, Lead Acetate, Lime-water, Mercuric Chloride, Potassium Tartrate, Phosphates, Silver Nitrate, Sodium Borate, Vegetable astringent infusions and tinctures; with *Ammoniated Copper* are: Acids, Alkalies, Lime-water.

## PHYSIOLOGICAL ACTION.

The salts of Copper are gastro-intestinal irritants, producing a metallic taste, nausea with greenish-colored ejecta, purging of blood and mucus, constricted fauces, depressed heart action, hurried respiration and fever. Or, as with Arsenic, gastro-enteritis may not occur, but instead profound nervous symptoms, as headache, defective coördination, coma and convulsions. The symptoms of chronic poisoning are bronchial irritation and catarrh, gastro-intestinal catarrh, colic with diarrhea [Lead produces colic with constipation], dysentery, nausea, emaciation, anemia, salivation, and a green line (sulphide) along the margin of the gums in those who do not clean their teeth. The nervous symptoms above mentioned are also usually well marked. The liver becomes atrophied from irritation of its connective tissue and fatty degeneration of the hepatic cells. The lungs are congested, even pneumonic consolidation may be set up, the metal seeming to have an affinity for the pulmonary parenchyma. These effects are often produced by the inhalation of cuprous fumes, and by eating acid fruits cooked in a copper vessel. Brass-founding is known to cause various forms of disease, as gout, chronic nephritis, progressive paresis of the legs, tremor, muscular wasting, and locomotor ataxia. A group of symptoms known as "brass-founders' ague," has also been noticed. The fit of ague is ushered in by languor and depression, then follow prostration with pallor, cold sweats, and chills, which may even amount to rigors, with chattering of the teeth, precordial anxiety, headache, nausea and muscular pains. The onset of vomiting arrests the symptoms and usually is followed by sleep, from

which the patient awakens almost well. It is not clear whether these symptoms are due to copper or to zinc, both of which enter into the composition of brass, and some investigators contend that they are not to be credited to copper, but to its impurities, lead and arsenic.

Copper Sulphate is a simple, irritant emetic, producing prompt and continued vomiting with but little nausea or depression. In small doses it is a nerve-tonic, and is astringent to the gastro-intestinal tract. Externally applied in solution it is a useful stimulant and astringent to diseased mucous surfaces, and is mildly caustic if used in substance. The Acetate is possessed of the same general action as the sulphate. Its local action is stimulant and escharotic. The impure acetate (verdigris) is a violently irritant poison. Ammoniated Copper has no special action other than that of the sulphate.

#### THERAPEUTICS.

The Sulphate is a prompt and efficient emetic, and is so used in croup and narcotic poisoning. In phosphorus poisoning it forms a comparatively insoluble phosphide of copper besides producing emesis. Fifteen or twenty grains may be dissolved in  $\bar{\text{z}}$ iv of water, and a teaspoonful or more, according to age, given every ten minutes until vomiting is produced. In acute diarrhea and chronic dysentery it is the best metallic astringent in doses of gr.  $\frac{1}{2}$  with opium, and in gastro-intestinal catarrh it is equally efficient. Locally, it is used with benefit in throat affections, gonorrhoea, granular lids and corneal ulcers, indolent granulations and chronic inflammation of mucous membranes. In most of these affections weak solutions (gr.  $\frac{1}{2}$  to  $\frac{1}{4}$  to the  $\bar{\text{z}}$ ) are best, but in granular conjunctivitis the smooth crystal may be rubbed quickly over the surface once daily.

In various nervous diseases, as epilepsy, chorea, and hysteria, the salts of copper are sometimes beneficial, the Ammoniated Copper being considered the most efficient preparation in these cases. In Germany a tincture of the Acetate was formerly official, and has been used successfully in the treatment of pneumonia. Ammoniated copper has been highly recommended for facial neuralgia, but requires pushing to the production of some physiological action. Ointments or lotions of the Acetate are useful applications in eczema, herpes, tinea sycosis, mentagra and herpes circinatus. *Villate's Solution* has been successfully used as a local injection for the cure of caries. It is composed of Copper Sulphate, Zinc Sulphate, of each 15 parts, Liquor Plumbi Subacetatis 30, Vinegar 200. The solution is thoroughly injected into the sinuses leading to the carious bone.

Copper Sulphate is advocated for the purification of drinking water. It has been shown that certain organisms which pollute public water supplies are effectually destroyed by one part of this salt in ten million parts of water, and that one part in fifty millions of water destroys most algae in a few hours; also that in the proportion of 1 to 100,000 it is fatal to cholera and typhoid germs

in 4 or 5 hours. As  $\frac{1}{2}$  of a grain can be ingested daily without the slightest harm, this treatment of drinking water is not injurious, for it would require the daily ingestion of two gallons of water so treated to obtain this quantity of the salt (Moore). Dr. Doty finds that a mixture of copper sulphate and calcium oxide (unslaked lime) in ten parts of water gives a precipitate which is one of the most efficient deodorants and disinfectants.

Cuprol in 5 to 10 per cent. solution with  $\frac{1}{2}$  per cent. of chloretone is a practically painless astringent and stimulant of the healing process. It has been used with satisfaction in blepharitis, conjunctivitis, and other affections in which an astringent effect is desired.

**CURARE, Woorara** (Unofficial),—is a vegetable extract obtained from various members of the Strychnos family, also from *Paullinia curare* and other plants. It is used in S. America as an arrow-poison under the names Caroval and Vao. Its active principle is the very poisonous alkaloid *Curarine*,  $\text{C}_{18}\text{H}_{35}\text{N}$ .

The dose of Curare is gr.  $\frac{1}{20}$ – $\frac{1}{8}$  hypodermically,—of Curarine, gr.  $\frac{1}{200}$ – $\frac{1}{100}$  hypodermically, or gr.  $\frac{1}{100}$ – $\frac{1}{40}$  by the stomach, but as the samples vary greatly in activity they should be tried on some inferior animal before being administered to man.

*Incompatibles* are: all Caustic Alkalies, as they destroy the alkaloid. Physiologically incompatible are: Strychnine, Atropine.

#### PHYSIOLOGICAL ACTION AND THERAPEUTICS.

Curare is a paralyzer of the voluntary muscles, affecting them through the end-organs of the motor nerves. It does not at first act upon the brain or spinal cord, but if life be prolonged by artificial respiration the cord, sensory nerves and even the muscular tissue become affected. The heart, at first quickened, becomes depressed, the blood-pressure is lowered, the eyelids droop, the eyeballs protrude, vision is disordered, intestinal peristalsis and sensibility to stimuli are greatly increased, and an artificial glycosuria (curare-diabetes) is set up. The limbs are paralyzed first, death occurring by paralysis of respiration. The absorption of the drug by the stomach is very slow, as its active principle passes with difficulty through animal membranes, and its elimination, which takes place by the kidneys, being more rapid and complete than that of any other agent, no marked effect may be produced when it is administered internally. When hypodermically injected its action is very prompt. The urine of a curarized animal will poison another, and that of the second animal will paralyze a third. Compared with other motor depressants Curarine and Coniine paralyze the end-organs of the motor nerves, Gelsemine paralyzing the motor centres.

Curare is chiefly used for experimental purposes on the lower animals. It has an historical interest from its having been the means by which Bernard demonstrated the existence of contractility as an essential endowment of muscular tissue. It has been used with some success in spasmodic nervous affections, particularly in tetanus, both idiopathic and traumatic, in hydrophobia,