

**ELATERINUM**, *Elaterin*,  $C_{20}H_{28}O_6$ ,—is a neutral principle extracted from *Elaterium*, a substance deposited by the juice of the fruit of *Ecballium Elaterium*, the squirting cucumber, a European plant of the nat. ord. Cucurbitaceæ. Elaterin occurs in small, colorless scales or prisms, of bitter taste and neutral reaction, insoluble in water, soluble in 337 of alcohol and in solutions of the alkalies. Dose, gr.  $\frac{1}{20}$ – $\frac{1}{12}$  [av. gr.  $\frac{1}{10}$ .]

**Trituratio Elaterini**, *Trituration of Elaterin*,—Elaterin 10, Sugar of Milk 90, thoroughly mixed by trituration. Dose, gr.  $\frac{1}{4}$ – $\frac{1}{2}$  [av. gr. ss.]

Elaterin is the most powerful of the hydragogue cathartics, causing profuse, watery stools, and when given in large doses great prostration and gastrointestinal irritation, nausea and vomiting. In the lower animals it does not produce purgation, but profoundly impresses the nervous system, causing irregular breathing, convulsions and death. Its chief use is to produce free watery discharges in ascites, anasarca, uremia and cerebral disorders, but while the most efficient agent we possess for this purpose it must be used with great caution in the aged and feeble, as its action is very depressant.

Aside from its action on the excretory functions of the bowels and kidneys, *Elaterium* excites absorption of fluid from the tissue spaces, and has removed edema when administered in non-purgative doses. It is no longer official by reason of its variable quality.

**ERGOTA**, *Ergot*, (*Ergot of Rye*),—is the sclerotium (compact mycelium or spawn, intermediate fibrous stage) of *Claviceps purpurea* (class Fungi), replacing the grain of Rye, *Secale cereale* (nat. ord. Gramineæ). It occurs in fusiform, curved, grain-like bodies, of purplish-black color, peculiar, heavy odor, and oily, disagreeable taste. It should be only moderately dried, preserved in a close vessel, and have a few drops of chloroform dropped upon it from time to time, to prevent the development of insects. When more than one year old it is unfit for use. Dose, gr. x– $\frac{3}{j}$  [av. gr. xxx.]

#### Composition of Ergot.

The composition of Ergot and the nomenclature of its supposed constituents are subjects upon which there exists a great diversity of opinions, and about which there is nothing settled. According to Kobert, it contains three active principles, viz.—*Ergotinic Acid*, a nitrogenous glucoside, which has no ecbolic action but affects the nervous system, the heart and the respiration; *Sphacelinic Acid*, a non-nitrogenous resin, which stimulates the vaso-motor centre and causes uterine contraction; and *Cornutine*, an alkaloid, found in very small quantity, and believed to be the ingredient which causes the convulsions. Ergot also contains *Trimethylamine*, Tannic Acid, and a fixed oil.

Jacobj found in Sphacelinic Acid a toxic resin named *Sphacelotoxin*, which differs from all other poisons in producing gangrene of various organs, especially in fowls and pigs. It

induced abortion in pregnant animals and caused ataxia and other nervous symptoms in fowls.

Tanret's *Ergotinine* has been proved to have no action on the uterus. The *Ergotin* of Bonjean, Wiggers and Tanret is not a fixed compound, but a mixture. The *Ecboline* of Wiggers is also a mixture. The *Sclerotinic Acid* of Dragendorf is said by many authorities to act on the uterus, but this is positively denied by many others. It is probably a very uncertain preparation, and is said to be really a mixture of sphacelinic acid and cornutine.

#### Preparations.

**Extractum Ergotæ**, *Extract of Ergot*,—Dose, gr. ij–x [av. gr. iv.]

**Fluidextractum Ergotæ**, *Fluidextract of Ergot*,—Dose,  $\mathfrak{xx}$ – $\mathfrak{3j}$  [av.  $\mathfrak{xxxx}$ .]

**Vinum Ergotæ**, *Wine of Ergot*,—has of the fluidextract 20 per cent. Dose,  $\mathfrak{3j}$ –iv [av.  $\mathfrak{3ij}$ .]

**Ergotin** (Unofficial),—is the name of several watery extracts found on the market, and varying much in action from each other and from the parent drug. That made by Squibb has about the same strength as the official extract, and represents the general powers of Ergot. It may be used hypodermically in doses of gr.  $\frac{1}{4}$ –gr. v. The Ergotin of Bonjean is an aqueous extract, very variable in quality and frequently inert.

**Injectio Ergotæ Hypodermica**, *Hypodermic Injection of Ergot* (B.P.),—is a 33 per cent. solution of the extract, in distilled water, with about 1 per cent. of Phenol. It should be recently prepared. Dose, hypodermically,  $\mathfrak{iiij}$ –x.

**Ergone** (Unofficial),—is the trade name of a fluid extract from which the inert, irritant, and depressant principles are said to have been removed as much as possible. It contains Chloretone as a preservative. Dose,  $\mathfrak{xx}$ – $\mathfrak{3j}$ .

**Ergoapiol** (Unofficial),—is the trade name of a mixture of Ergot and Apiol, used in dysmenorrhea and other disorders of the menstrual function attended by pain. Dose, 1 capsule four times daily.

#### Incompatibles.

Incompatible with *Ergot* preparations are: Tannic Acid and other alkaloidal precipitants (see page 5), also Caustic Alkalies, Metallic Salts. Physiologically incompatible with its action on the circulation are: Aconite, Amyl Nitrite, Lobelia, Tobacco, Veratrum.

#### Unofficial Analogue.

**Ustilago Maydis**, *Corn Smut*,—is a fungus growing on maize. It contains a volatile alkaloid, *Secaline*, which is supposed to be identical with trimethylamine, and an acid principle resembling one of the constituents of ergot. Dose of the fluidextract,  $\mathfrak{3ss}$ – $\mathfrak{ij}$ .

#### PHYSIOLOGICAL ACTION.

Ergot is a powerful vaso-constrictor, a cardiac sedative, a motor excitant, and a stimulant of involuntary muscular tissue. It is hemostatic, ecbolic, anhidrotic, and convulsant. After a full dose there is at first a brief fall of the blood-pressure, due to the depressant action of the drug on the heart; but the vessels soon contract throughout the body, the blood-pressure is greatly raised, and the blood-supply being decreased an arterial ischemia results. This effect is generally believed to be due to stimulation of both the vaso-motor centre in the medulla, and the unstriated muscular fibres in the walls of the vessels, but some authorities hold that it is caused by the centric action alone. A very large dose depresses both the heart and the vaso-motor centre, the primary fall of blood-pressure continues, and progressive paralysis of the cardiac and vaso-motor apparatus results.

Ergot causes powerful contractions of the parturient uterus by stimulating the spinal centres presiding over that organ. This action is not so constant



on the impregnated but not parturient womb, and though it often produces abortion it frequently fails to initiate uterine contraction in pregnant women. It arrests post-partum hemorrhage by laterally closing the blood outlets in spite of the increased pressure in the vessels. It increases intestinal peristalsis, blanches the intestinal vessels, and lessens the secretion of the urine, saliva, sweat, and milk.

The phenomena produced by Ergot are divided into two classes, according as the drug is taken in large quantity for a short time, or in small doses for a considerable period. In a large dose it acts as a gastro-intestinal irritant, causing nausea and vomiting, gastralgia, colic, thirst, and purging. It slows the heart, raises the arterial tension greatly, dilates the pupils and produces pallor, vertigo and frontal headache. It stimulates the contraction of unstriated muscular fibre, especially affecting the sphincters and causing contraction of the sphincter of the bladder, making micturition difficult if not impossible. It produces cerebral and spinal anemia, a great fall of the body-temperature, coldness of the surface, tetanic spasms, and violent convulsions. A very large dose is necessary to cause these results, and as much as  $\frac{3}{4}$  of the fluid extract has been given daily for a week or more, without producing any marked effect.

*Chronic Ergotism* occurs in two forms, the convulsive and the gangrenous,—either usually excluding the other. The convulsions are tetanoid spasms of the flexor muscles, the uterus, the intestinal fibres, and the muscles of respiration, ending in coma and death by asphyxia. The gangrenous form begins with coldness and numbness of the limbs, formication of the skin all over the body, loss of sensibility and abolishment of the special senses, bullæ of blood and ichor, followed by dry or moist gangrene of the lower extremities, buttocks and other parts, epileptiform convulsions, coma and death. Autopsies show changes in the posterior columns of the cord, resulting probably from spinal anemia.

Experiments with the various derivatives of Ergot show that no one of its constituents possesses the power of the drug itself. Its actions on the circulation and the uterus are ascribed to Sphacelotoxin, its convulsant action to Cornutine, and its effect on the heart and the stomach to Ergotinic Acid.

The properties of Ustilago, so far as examined, resemble those of ergot and nux vomica combined. It is a spinal excitant and exalts sensibility and reflex action, producing tonic convulsions on irritation of the skin. It slows the heart by stimulation of the pneumogastric, dilates the pupils, causes muscular paresis and death by tetanus of the respiratory muscles or by exhaustion. Experiments on its reputed oxytocic action have not substantiated the claims made for it in this respect, though it is said to have produced abortion in cows which had eaten the diseased grain.

#### THERAPEUTICS.

The most familiar use of Ergot is to promote uterine contraction in protracted labor due to inertia of the womb, but as it produces continuous (tetanic)

contractions instead of the intermittent natural ones, it is dangerous when there is much resistance in front of the child, the probable results being rupture of the uterus or severe laceration of the perineum, and stoppage of the placental respiration of the fetus. Towards the end of the second stage, when the head is beginning to emerge at the vulva, is the proper time for its administration, if used at all, in order to promote firm uterine contraction, thereby preventing post-partum hemorrhage, promoting the expulsion of the placenta, and guarding against puerperal infection by closing the uterine lymph-spaces and thus opposing a barrier to the entrance of infectious material. It is used in many uterine affections, as chronic metritis, subinvolution, congestive dysmenorrhea, hemorrhages, fibroids, and polypi, to produce firm contraction and promote the absorption of inflammatory products. It is efficient in many cases of amenorrhea in plethoric subjects, and in the atonic type of spermatorrhea.

Ergot is extensively employed in all forms of hemorrhage in which no direct styptic application can be made, and even when such is possible it is a useful hemostatic adjuvant. It is particularly efficient in uterine hemorrhages, purpura hemorrhagica, and in venous, capillary, and atonic arterial bleeding; but may be injurious in active arterial hemorrhage. Hemorrhoids are well treated by its local application, but in this affection it should not be used internally as it promotes venous congestion. In aneurism it aids coagulation by slowing the blood-current, and in cardiac hypertrophy without valvular lesion it acts well by slowing the heart. In diabetes insipidus full doses of Ergot are often curative, and it has been used with benefit in diabetes mellitus. In epilepsy it increases the efficiency of the bromides, and often gives good results. It is very efficient in enlargement of the spleen, and is said to have even cured leukemia. In conjunctivitis, gonorrhœa, and inflammations of mucous membranes generally, it is of striking benefit, if used both locally and internally. It is an excellent remedy in acute and chronic dysentery, chronic diarrhea, mania due to cerebral hyperemia, headache and migraine of congestive form, myelitis, spinal congestion, cerebro-spinal meningitis, lax sphincters of the rectum and bladder, and incontinence of urine from paralysis of the sphincter vesicæ.

Hypodermically, the aqueous extract dissolved in water and free from alcohol or any other irritating substance, is in many cases much more prompt in action than when given internally, especially if injected near the seat of the affection. This is particularly true in post-partum and other hemorrhages, prolapse of the rectum, chronic metritis and subinvolution of the womb, uterine fibroids, varicocele and varicose veins. When so administered it will frequently contract the sphincter of the bladder so as to produce retention of urine and necessitate the use of the catheter.

Ustilago has been used in uterine inertia during labor, in doses of  $\frac{3}{4}$ -ij of the fluidextract, and is said to increase the severity, frequency, and duration of the expulsive efforts, while not causing so prolonged a contraction as ergot does.



**ERIGERON, Fleabane** (Unofficial),—is the flowering plant *Erigeron canadense*, a plant of the nat. ord. Compositæ, growing in N. America. It contains a Volatile Oil, which is official, also tannic acid and a bitter extractive.

**Oleum Erigerontis, Oil of Fleabane**,—a pale yellow liquid, becoming darker by age and exposure to air, of peculiar and persistent odor, pungent taste and neutral reaction, readily soluble in alcohol. Dose, ℥x-ʒss [av. ℥xv.]

Oil of Erigeron has the same action as Oil of Turpentine but is less irritant and less efficient. It has considerable reputation as a hemostatic, especially in menorrhagia and intestinal hemorrhage of passive form, as in typhoid fever. It is used with benefit in diarrhea and dysentery, and in hemoptysis without fever or other evidence of irritation it is a valuable remedy.

**ERIODICTYON**, the dried leaves of *Eriodictyon californicum*, the Yerba Santa, a California shrub of the nat. ord. Hydrophyllaceæ. They contain an acrid resin and an aromatic Volatile Oil. Dose, gr. v-xxx [av. gr. xv.]

**Fluidextractum Eriodictyi, Fluidextract of Eriodictyon**,—Dose, ℥v-xxx [av. ℥xv.]  
Eriodictyon is expectorant, and covers the taste of Quinine in a remarkable manner, for which purpose it is combined in mixture with Glycyrrhizin, under the title *Velatine*, a proprietary preparation. It is used with fair success in bronchial and laryngeal affections, also in asthma. Combined in syrup with Grindelia it is very efficient for coughs.

**EUCALYPTUS, Eucalyptus**,—the dried leaves, collected from the older parts of the tree, of *Eucalyptus Globulus* or blue gum-tree, nat. ord. Myrtaceæ, a native of Australia, now grown in California and Italy. They contain tannic acid, a resin, a fatty acid and a Volatile Oil. The latter consists of three different oils which distil over at various temperatures, the first product being the official substance *Eucalyptol*, which by the action of phosphoric acid is converted into *Eucalyptene*, a substance allied to Cymene, and *Eucalyptolen*. Dose, gr. x-ʒj [av. gr. xxx.]

#### Preparations.

**Fluidextractum Eucalypti, Fluidextract of Eucalyptus**,—is three-fourths alcohol. Dose, ℥x-ʒj [av. ℥xxx.]

**Oleum Eucalypti, Oil of Eucalyptus**,—the volatile oil, is distilled from the fresh leaves of Eucalyptus. Is soluble, in all proportions, in alcohol, carbon disulphide, or glacial acetic acid. Dose, ℥v-xx [av. ℥vij.] in emulsion or capsules.

**Eucalyptol**,  $C_{10}H_{18}O$ ,—is an organic oxide (cineol) obtained from the volatile oil; a colorless liquid, of aromatic, camphoraceous odor, and pungent, cooling taste; soluble in all proportions in alcohol, carbon disulphide and glacial acetic acid. Dose, ℥ij-x, [av. ℥v.]  
*Incompatible* with Eucalyptol is Potassium Permanganate.

**Sanosin** (Unofficial),—is a mixture of Sulphur, Charcoal, and pulverized Eucalyptus leaves, impregnated with the Oil of Eucalyptus. The fumes of this preparation when burning are used in Germany as an inhalation in pulmonary tuberculosis, with reported germicidal effect upon the bacilli.

#### PHYSIOLOGICAL ACTION.

The taste of Eucalyptus is warm, aromatic, bitter and camphoraceous. It increases the flow of saliva, the gastric juice and the intestinal secretions, and in small doses promotes appetite and digestion, increases the heart's action and lowers arterial tension. In large doses it produces eructations, indigestion, diarrhea, nausea and vomiting, lowered temperature, great muscular weakness, and if continued will irritate and congest the kidneys, and induce a feverish

state with symptoms of cerebral congestion and great constitutional disturbance. In toxic doses it is a narcotic poison, and a fatal dose causes paralysis of respiration by direct action on the respiratory centre in the medulla.

Eucalyptus is powerfully antiseptic and destructive to low forms of life, a stimulating expectorant and an efficient diaphoretic. By some authorities it is believed to reduce the size of an enlarged spleen and to possess anti-malarial properties by absorbing noxious germs as well as by draining the soil of its water, and by its aseptic emanations purifying the atmosphere in its vicinity. It is largely cultivated in malarial districts for these properties, and is reported to have rendered habitable a portion of the deadly Roman Campagna.

Eucalyptus is eliminated by the skin, the bronchial mucous membrane and the kidneys. It imparts its odor to the breath and the urine, and is more or less irritant at the points of its elimination.

#### THERAPEUTICS.

Eucalyptus is an efficient stomachic in atonic dyspepsia and chronic gastric catarrh, and is used in intestinal catarrh, and in conditions of the intestinal canal which favor the development of worms. In chronic catarrhal conditions of the genito-urinary organs, the broncho-pulmonary mucous membrane and especially the bladder, it is very useful, acting as a stimulant and disinfectant to the mucous membranes. It is equally beneficial in chronic bronchitis and bronchorrhœa, in cachectic states generally and in convalescence from acute diseases. In epidemic influenza (grippe) the oil has been used internally with good results, and sprinkled on blotting-paper placed in offices and stores has seemed to act as a prophylactic on persons employed therein. In hysteria, chorea and asthma it is beneficial, in the latter affection being advantageously smoked in cigarettes with stramonium or belladonna leaves. In malaria as a reconstructant it is better than quinine, and it has considerable utility in obstinate intermittents where it is desirable to stop the use of cinchona preparations. As an antiseptic it is highly valuable in dilute solution for application to ulcers and as a substitute for phenol on gauze in the antiseptic treatment of wounds. It is used in dilute solution locally, as a stimulating disinfectant in stomatitis, and in the subacute stages of pharyngitis and tonsillitis. An aqueous preparation is highly recommended as a vehicle for alkaloids in solution for hypodermic use, to prevent the development of the penicillium which rapidly destroys the alkaloid.

**EUONYMUS, Euonymus**,—is the dried bark of the root of *Euonymus atropurpureus*, Wahoo, nat. ord. Celastraceæ, native in the United States. It contains a bitter principle *Euonymin*, also *Asparagin*, *Euonic Acid*, resins and a fixed oil. Dose, gr. v-xv [av. gr. vijss.]

**Extractum Euonymi, Extract of Euonymus**,—Dose, gr. j-v [av. gr. ij.]

**Fluidextractum Euonymi, Fluidextract of Euonymus**,—Dose, ℥v-xv [av. ℥vij.]

**Euonymin** (Unofficial),—the eclectic preparation, consists of the fixed oil and resin, and is given in doses of gr. ss-v.



*Euonymus* is classed with Rhubarb, Jalap, Aloes, etc., as a tonic-astringent and resin-bearing purgative. It is said to be also diuretic and expectorant and a very efficient cholagogue. Its cathartic action is similar to that of Rhubarb, but milder. It has been employed with benefit in some cases of dropsy, also in habitual constipation, torpid liver, and pulmonary affections. In overdoses it will set up considerable gastro-intestinal irritation.

**EUPATORIUM, Eupatorium**, (*Thorough-wort, Boneset*)—the dried leaves and flowering tops of *Eupatorium perfoliatum*, an American plant of the nat. ord. Compositæ. It contains a neutral, bitter principle, named *Eupatorin*, tannic acid, a volatile oil, etc. Dose, gr. x-3j [av. gr. xxx.]

**Fluidextractum Eupatorii**, *Fluidextract of Eupatorium*,—Dose, ℥x-3j [av. ℥xxx.]

Eupatorium is a bitter tonic and efficient diaphoretic, also in full doses emetic and aperient. It has been supposed to have antiperiodic and teniafuge powers. A warm infusion (Boneset tea) is a popular diaphoretic in remittent and typhoid fevers, also at the onset of an attack of acute catarrh or general cold. As a bitter tonic it may be used with advantage in dyspepsia and general debility. Its common name is derived from its supposed power to relieve the bone pains of dengue, the "break-bone fever."

Another variety of Eupatorium, *E. purpureum*, Gravel-root, is reputed to have decided power over the uric acid diathesis.

**EUPHRASIA, Eye-bright** (Unofficial),—is a plant of the nat. ord. Strophulariaceæ, growing in Europe and the U. S., containing *Euphrastic Acid*, tannin, etc. It was formerly of great repute in various eye-affections, and may be of utility as a mild astringent in catarrhal conjunctivitis. Its chief value, however, is to abort an attack of acute nasal catarrh with lachrymation, for which purpose a few drops of the tincture every two hours is said to be remarkably efficient. In hay-fever it is of decided utility in mitigating the catarrhal symptoms, and in the acute coryza of measles it will be found an excellent remedy. A tincture of the fresh plant (1 in 10) should be used, and given in doses of ℥j-v.

**FEL BOVIS, Ox-gall**, (*Fel Tauri*), the fresh bile of *Bos Taurus*, the ox,—is a dark-green, viscid liquid, of peculiar odor, bitter taste, and neutral or faintly alkaline reaction. It contains Sodium Glycocholate, Sodium Taurocholate, Cholesterin and coloring matter.

**Fel Bovis Purificatum**, *Purified Ox-gall*,—3 of Ox-gall and 1 of Alcohol evaporated to pilular consistence after standing 24 hours. Dose, gr. v-xv [av. gr. vijss.]

Bile is tonic, antiseptic and purgative. It assists in the emulsification of fats, and stimulates the absorbent powers of the mucous membrane. In the stomach it neutralizes the gastric juice, precipitates the pepsin, and is apt to cause nausea and vomiting. It is found to act well in stimulating the resolution of hypertrophies when locally applied to the part, as the mammae and tonsils, also for pannus. It is used as a laxative in constipation when the secretion of bile is deficient, but has no advantages over other purgatives.

Sodium Glycocholate is an excellent cholagogue, and stimulates the digestion of fats in marked degree. Its dose is gr. ij-v, thrice daily.

**FERRUM, Iron, Fe.**—is metallic Iron in the form of fine, bright, and non-elastic wire.

**Ferrum Reductum, Reduced Iron**,—is metallic Iron in fine powder, obtained by reducing the Sesquioxide by hydrogen at a dull red heat. It is a fine, gray-black, lustreless powder, odorless, tasteless, and insoluble in water or alcohol, but soluble in dilute sulphuric acid with evolution of nearly odorless hydrogen gas. Dose, gr. ss-ij [av. gr. j], after meals.

*Salts of Iron and their Preparations.*

**Ferri Carbonas Saccharatus**, *Saccharated Ferrous Carbonate*,—has at least 15 per cent. of ferrous carbonate. A greenish-gray powder, of sweetish taste at first, changing to

ferruginous. Partially soluble in water, but soluble in dilute hydrochloric acid with evolution of CO<sub>2</sub>. Action,—slightly stimulant to the digestive tract. Dose, gr. ij-x [av. gr. iv.]

**Massa Ferri Carbonatis**, *Mass of Ferrous Carbonate*, (*Vallet's Mass*)—Ferrous Sulphate 100, Sodium Carbonate 46, Honey 38, Sugar 25, Syrup and Distilled Water, each, to make 100 parts. Has 42 per cent. of Ferrous Carbonate. An astringent, non-irritant, ferruginous tonic. Dose, gr. j-v, [av. gr. iv] after food.

**Pilulæ Ferri Carbonatis**, *Pills of Ferrous Carbonate*, (*Ferruginous Pills, Chalybeate Pills, Bland's Pills*)—made by mixing Ferrous Sulphate, about 2½ grains for each pill, with Potassium Carbonate, Sugar, Tragacanth, Althæa, Glycerin and Water. Dose, j-ij [av. ij.]

**Mistura Ferri Composita**, *Compound Iron Mixture*, (*Griffith's Mixture*),—has of Ferrous Sulphate 6, Myrrh 18, Sugar 18, Potassium Carbonate 8, Spirit of Lavender 60, Rose-water to 1000. Is really a solution of the Carbonate formed by reaction between the two principal constituents. An excellent chalybeate. Dose, ʒij-vj [av. gr. iv.]

**Ferri Chloridum**, *Ferric Chloride*, (*Perchloride of Iron*) FeCl<sub>3</sub> + 12H<sub>2</sub>O,—orange-yellow, deliquescent pieces, of styptic taste and acid reaction, freely soluble in water, alcohol or ether. Action,—strongly astringent, hemostatic. Dose, gr. ss-jss [av. gr. j.]

**Liquor Ferri Chloridi**, *Solution of Ferric Chloride*,—an aqueous solution of the preceding, containing 29 per cent. of the anhydrous salt, with some free HCl. Action is strongly astringent and styptic. Dose, ℥j-ij [av. ℥jss.], well diluted. *Creuse's Tasteless Solution*, is an agreeable preparation; it has Liquoris Ferri Chloridi ʒj, Acidi Citrici gr. 544, Sodii Carb. gr. 1000 or q. s., Aqua Destil. ʒj, Alcoholis, q. s. Dissolve the citric acid in the water, heat to the boiling point, gradually adding the sodium carbonate until the acid is neutralized; mix with the iron solution and add alcohol up to a total of ʒiv. Dose, ℥xx-xxx, diluted.

**Tinctura Ferri Chloridi**, *Tincture of Ferric Chloride*,—a hydro-alcoholic solution of Ferric Chloride, containing about 13.3 per cent. of the anhydrous salt, corresponding to about 4.6 per cent. of metallic iron. Has of the preceding solution 35 in Alcohol to make 100. A bright, brownish liquid, of ethereal odor, styptic taste and acid reaction. Is used in *Mistura Ferri et Ammonii Acetatis*. One of the best preparations of Iron. Action,—ferruginous tonic. Dose, ℥v-xv [av. ℥vij.] in water, syrup or glycerin.

**Ferri Citras**, *Ferric Citrate*,—garnet-red, transparent scales, slowly soluble in water, not in alcohol. Action,—mildly stimulant. Dose, gr. ij-vj [av. gr. iv.]

**Ferri Hypophosphis**, *Ferric Hypophosphite*,—a white or grayish-white powder, odorless, tasteless, slightly soluble in water, freely so in HCl or in a solution of sodium citrate. Action, ferruginous tonic. Dose, gr. j-v [av. gr. ij.]

**Pilulæ Ferri Iodidi**, *Pills of Ferrous Iodide*,—made with Reduced Iron, Iodine, Licorice, Sugar, Acacia and Water, covered with a coating of Balsam of Tolu in Ether. "Blancard's Pills" differ from these only in being covered with a coating of reduced iron to protect the interior from oxidation, but it also protects them from the solvent action of the gastric juice. Dose, 1 or 2 pills [av. ij], thrice daily.

**Syrupus Ferri Iodidi**, *Syrup of Ferrous Iodide*,—is a syrupy liquid containing 5 per cent. of ferrous iodide. Action,—ferruginous tonic. Dose, ℥v-xxx [av. ℥xxv.]

**Ferri Hydroxidum**, *Ferric Hydroxide (Hydrated Ferric Oxide)* Fe(OH)<sub>3</sub>—is a brown-red magma, wholly soluble in HCl without effervescence. Should be freshly prepared by mixing together Solution of Ferric Sulphate 100, Ammonia Water 138, and Water to 300 grammes. It is the chemical antidote for Arsenic. Dose, ʒj in water, frequently repeated.

**Ferri Hydroxidum cum Magnesii Oxido**, *Ferric Hydroxide with Magnesium Oxide (Ferric Hydrate with Magnesia)*,—is a more convenient and more efficient antidote for Arsenic than the preceding, as the excess of the alkaline precipitant is non-irritant, and is itself an Arsenic antidote. The two following solutions should be kept ready: (1) Solution of Ferric Sulphate 40 Cc. in Water 125 Cc. (2) Magnesium Oxide, 10 grammes rubbed up with Water 750 Cc. in a bottle of 1000 Cc. capacity. When wanted, shake the latter to a homogeneous magma, add it to the former gradually, and shake them together to a uniform, smooth mixture. Should be given in large doses (ʒiv) and frequently repeated.

**Ferri Phosphas Solubilis**, *Soluble Ferric Phosphate*,—bright-green, transparent scales, of acidulous, saline taste, soluble in water, not in alcohol. Used as an adjuvant to laxative pills to prevent the after reactionary constipation. Dose, gr. j-vj [av. gr. iv.]

**Ferri Pyrophosphas Solubilis**, *Soluble Ferric Pyrophosphate*,—green, transparent scales, of acidulous taste, soluble in water but not in alcohol. Is almost tasteless and unirritating, and non-constipative. Dose, gr. ij-v [av. gr. iv.]

**Ferri Sulphas**, *Ferrous Sulphate*, FeSO<sub>4</sub> + 7H<sub>2</sub>O,—large, pale, bluish-green prisms,



efflorescent, of saline, styptic taste, and acid reaction, soluble in water, insoluble in alcohol. Is chiefly used to make the Dried Sulphate and other preparations. Dose, gr. j-v [av. gr. iij.]

**Ferri Sulphas Exsiccatus**, *Exsiccated Ferrous Sulphate*,—a grayish-white powder, nearly soluble in water consisting of the preceding salt, heated gradually until it ceases to lose weight. The most astringent and irritating ferrous salt, but an excellent one in small doses. Dose, gr. ss-ij [av. gr. ij] in pills.

**Ferri Sulphas Granulatus**, *Granulated Ferrous Sulphate*,—is the same salt as the Sulphate, precipitated by alcohol from solution in dilute sulphuric acid. Dose, gr. ss-v [av. gr. iij.]

**Liquor Ferri Subsulphatis**, *Solution of Ferric Subsulphate, (Monse's Solution)*—is an aqueous solution of chiefly Basic Ferric Sulphate; a dark, reddish-brown, almost syrupy liquid, of very astringent but not caustic taste, and acid reaction, mixing with water and alcohol in all proportions without decomposition. Is but slightly irritating and powerfully astringent, chiefly used locally as an astringent and hemostatic, but may be given internally in doses of ℥j-v [av. ℥ij] well diluted.

**Liquor Ferri Tersulphatis**, *Solution of Ferric Sulphate*,—is an aqueous solution of Normal Ferric Sulphate,  $Fe_2(SO_4)_3$ , containing 36 per cent. of the salt. Has the properties described for the preceding. Used to make other preparations of Iron.

#### Compound Iron Salts and their Preparations.

**Liquor Ferri et Ammonii Acetatis**, *Solution of Iron and Ammonium Acetate, (Basham's Mixture)*—prepared with Tincture of Ferric Chloride 4, Diluted Acetic Acid 6, Solution of Ammonium Acetate 50, Aromatic Elixir 12, Glycerin 12, Water to 100. An excellent and very pleasant preparation, having some diuretic and diaphoretic powers. Dose, ℥ij-v [av. ℥iv], well diluted.

**Ferri et Ammonii Citras**, *Iron and Ammonium Citrate*,—transparent, garnet-red scales, deliquescent, readily soluble in water, insoluble in alcohol. Dose, gr. ij-v [av. gr. iv.]

**Vinum Ferri**, *Wine of Iron*,—has of Iron and Ammonium Citrate 4 per cent. Dose, ℥j-iv [av. ℥ij.]

**Ferri et Ammonii Sulphas**, *Ferric Ammonium Sulphate (Ammonio-ferric Alum)*,—pale, violet crystals, efflorescent, of styptic taste and slightly acid reaction, soluble in 3 of water, insoluble in alcohol. Is the least astringent of the sulphates of iron, but more so than any of the salts formed by vegetable acids. Dose, gr. iij-xv [av. gr. vijss.]

**Ferri et Ammonii Tartras**, *Iron and Ammonium Tartrate, Ammonio-ferric Tartrate*,—transparent, reddish-brown scales, slightly deliquescent, of sweetish and slightly ferruginous taste, very soluble in water, insoluble in alcohol. Contains an equivalent of about 25 per cent. of Ferric Oxide, and has but slight irritant qualities. Dose, gr. ij-v [av. gr. iv.]

**Ferri et Potassii Tartras**, *Potassio-ferric Tartrate*,—transparent, garnet-red scales, slightly deliquescent, of sweetish and slightly ferruginous taste, very soluble in water, insoluble in alcohol. Is the least disagreeable in taste of all the iron preparations, and but slightly astringent and not constipating. Dose, gr. ij-v [av. gr. iv.]

**Ferri et Quininæ Citras**, *Iron and Quinine Citrate*,—thin, transparent, yellowish-brown scales, slowly deliquescent, of bitter taste, slowly soluble in water, slightly soluble in alcohol. Contains 11½ per cent. of dry quinine. Action, astringent and stimulant to the digestive tract. Dose, gr. iij-v [av. gr. iv.]

**Ferri et Quininæ Citras Solubilis**, *Soluble Iron and Quinine Citrate*,—thin, transparent scales, of greenish, golden-yellow color, rapidly soluble in cold water, partly soluble in alcohol. Dose, gr. iij-v [av. gr. iv.]

**Vinum Ferri Amarum**, *Bitter Wine of Iron*,—has of the preceding 5 parts, Tinct. Aurantii Dulcis 6, Syrup 30, White Wine to 100. Dose, ℥j-iv [av. ℥ij.]

**Ferri et Strychninæ Citras**, *Iron and Strychnine Citrate*,—transparent, garnet-red scales, deliquescent, readily soluble in water, slightly so in alcohol. Contains 1 per cent. of Strychnine. Action,—astringent and stimulating. Dose, gr. j-ij [av. gr. ij.]

The Glycerite, Elixir, and Syrup of the Phosphates of Iron, Quinine and Strychnine are described under PHOSPHORUS.

**Syrupus Hypophosphitum Compositus**, *Compound Syrup of Hypophosphites*,—has of Ferric Hypophosphite 2½ per cent., and is described under PHOSPHORUS.

**Pilulæ Aloes et Ferri**, *Pills of Aloes and Iron*,—are described under ALOES.

#### Unofficial Preparations of Iron.

**Ferratin**, *Acid Albuminate of Iron*,—is a patented preparation, claimed to be the characteristic iron compound of the liver, but this is denied by competent authority. It is artificially prepared from albumin, is insoluble in water and dilute acids, but is soluble in water having a slight alkaline reaction. It causes no digestive disturbance, and has given good results in anemia, chlorosis, and allied affections. Dose, gr. jss-vij.

**Ferri Albuminas**, *Iron Albuminate*,—a cinnamon-brown powder, soluble in water acidulated slightly with HCl. Dose, gr. x-xxx, in simple aqueous solution, or in pill.

**Ferrinol**,—is a combination of iron and nucleic acid. It occurs in the form of a brown powder, and contains about 6 per cent. of iron. It is not acted on by the gastric juice and does not irritate the stomach, but is absorbed entirely from the small intestine. Dose, gr. iij-v, thrice daily.

**Hemogalol**,—is Hemoglobin deoxidized by pyrogallol. It occurs as a reddish-brown powder, insoluble in water and in alcohol. It is claimed to be the nearest to blood iron of any of the organic iron preparations, and to be readily assimilated without disagreeable effects of any kind. Dose, gr. iv-vij, thrice daily, ½ hour before meals.

**Ferri Bromidum**, *Ferrous Bromide*,  $FeBr_2 + 3H_2O$ ,—a yellow salt, of styptic taste, unstable, deliquescent and very soluble. A syrup was official in the Br. Ph. which had about 4½ grains of the bromide in each fluid-drachm. Dose of the syrup, ℥ss-j.

**Ferrum Dialysatum**, *Dialyzed Iron*,—is a 10 per cent. solution of Ferric Oxochloride in water. A reddish-brown liquid, free from astringent, styptic taste, but a very feeble chalybeate. Is used as a chalybeate, and as an antidote to Arsenic, but is not considered an eligible preparation. Dose, ℥xx-xxx.

**Ferri Malas**, *Ferrous Malate*,—is a combination of the juice of sour apples and powdered iron, much esteemed in Germany, where it is official and is given in tincture, *Tinctura Ferri Pomatum* (Ph. Ger.), the dose of which is ℥xxv-xxx.

**Peptomangan**, *Liquor Mangano-ferric Peptonatus*,—is described under MANGANUM.

**Mistura Ferri Laxans**, *Laxative Iron Mixture*,—Ferri Sulph. gr. ij, Magnesii Sulph. ℥j, Ac. Sulph. Dil. ℥ij, Spt. Chlorof. ℥xx, Aq. Ment. Pip. ad ℥j. Dose, ℥j.

**Mistura Ferro-salina**, *Ferro-saline Mixture*,—Magnesii Sulph. ℥j, Potassii Bitart. ℥j, Ferri Sulph. Exsic. gr. x, Aquæ quart j. Dose, a wineglassful.

**Syrupus Ferri et Mangani Iodidi**, *Syrup of Iron and Manganese Iodide*,—is a pale, straw-colored liquid, containing a little sulphate of potassium, and in each fluid ℥ has 50 grains of the mixed iodides in the proportion of Iron Iodide 3 parts to 1 of Manganese Iodide. Dose, ℥xx-xxx.

**Syrupus Ferri et Mangani Phosphatis**, *Syrup of Iron and Manganese Phosphate*,—as used by Dr. Simpson, of Edinburgh, contains in each ℥ of syrup 2 grains of Iron Phosphate and 1 grain of Manganese Phosphate. Dose, ℥j.

#### Incompatibles.

Incompatible with *Metallic Iron* are: Hydrogen Dioxide, Oxidizers, Potassium Chlorate, Potassium Permanganate; Salts of Antimony, Copper, Bismuth, Lead, Mercury, and Silver. With *Ferrous Salts* are: Alkalies, Carbonates, Chromates, Chlorates in acid solution, Ferricyanides, Gold salts, Hydrogen Dioxide, Mercuric salts, Phosphates, Permanganates, Sulphides, Tannic Acid, Silver Salts. With *Ferric Salts* are: Acacia, Albumin, Alkalies, Apomorphine, Aloin, Benzoates, Carbonates, Creosote, Balsam of Peru, Benzoin in alcoholic solution, Diuretin, Gallic Acid, Gelatin, Guaiac, Guaiacol, Hydriodic Acid, Hypophosphites, Hypo-sulphites, Iodides, Morphine; Oils of Bay, Cloves, Cinnamon, Pimento, Thyme, and Wintergreen; Pyrogallol, Resorcin, Salol, Salicylates, Sulphides, Sulphites, Tannic Acid, Vegetable infusions and decoctions.

Incompatible with the *Tincture of Ferric Chloride* are: Acacia, Albumin, Alkalies, Carbonates, Gelatin, Lime-water, Magnesium Carbonate, Piperazin, Vegetable decoctions, infusions, and tinctures. With *Ferrous Sulphate* are: Alkalies, Carbonates; Chlorides of Ammonium, Barium, and Calcium; Gold and Silver salts, Lead Acetate, Lime-water, Piperazin, Potassium Iodide, Potassium Nitrate, Rochelle salt, Sodium Borate, Tannic Acid, Vegetable astringent infusions.



*Notes on the Preparations.*

The blandest iron preparations are those which are insoluble or but sparingly soluble in water; as metallic iron, ferrous carbonate, ferric hydroxide and ferric hypophosphite. Of the aqueously soluble compounds, those which are salts of the vegetable acids, and the mixed salts ferric phosphate and ferric pyrophosphate, are more or less bland, especially the citrate, the tartrate and the phosphate, which are purely bland. The iron salts of the strong mineral acids are irritant and astringent or styptic in varying degree; the iodide and bromide are irritant but not very astringent, ferrous sulphate and the ammonio-ferric sulphate are powerfully astringent but not styptic; and ferric chloride, ferric nitrate and ferric sulphate are powerfully astringent and styptic. In overdoses the astringent salts are irritant poisons and may produce fatal results if in sufficient volume and concentration of solution. The per-salts (ferric) are the most actively irritant. The ferrous salts are the most readily absorbed and tolerated, are less irritant and astringent than the ferric salts, and are the most suitable ones for prolonged administration.

The Oxides and Carbonates possess the hematinic action of iron with but slight astringency, and are therefore employed to restore the quality of the blood in cases of anemia, chlorosis and amenorrhea with tendency to dyspepsia and constipation. Ferrum Reductum is one of the best preparations for internal use, but it causes sulphuretted or phosphoretted eructations which are disagreeable. The Subcarbonate is little more than the red oxide, but in the *massa ferri carbonatis* oxidation is prevented by the sugar. The Hydroxide is used only as an antidote in arsenical poisoning.

The Vegetable Acid Salts are the least irritant to the stomach, but are also the least efficient as chalybeates. They may be administered in white wines, or with alkalis and vegetable acids in effervescent mixtures. The Mineral Acid Salts are characterized by their astringent and corrugating action on the tissues, and are used locally as hemostatics, the solution of the subsulphate being preferred for topical use as it is powerfully styptic but not corrosive. The pyrophosphate is easily assimilated, readily soluble and devoid of irritant qualities. The tincture of the chloride is one of the most efficient preparations for internal use, and is most agreeable in the form of Creuse's tasteless solution. Other Compounds contain iron in combination with other active agents, as the preparations of the iodide and bromide, those with quinine and strychnine. These preparations are generally used for a twofold purpose, namely to relieve anemia and to act upon the specific ailment upon which the anemia depends. The Albuminate contains 5 per cent. of ferric oxide and is considered by many practitioners to be the most readily assimilated of all the iron preparations. Ferratin and other organic iron preparations are claimed to be devoid of irritant qualities, and to be fully efficient chalybeates.

## PHYSIOLOGICAL ACTION.

Metallic Iron is not inert, for in the stomach it acquires molecular activity through its oxidation. It is a normal constituent of the blood (1 part to 230 of red corpuscles), and is also found in the bile, lymph, chyle, gastric juice, in the pigment of the eye, in the milk and in the urine. Occurring in the blood, the tissues generally and many of the healthy secretions, also in most of the foods upon which the body is nourished, it may be considered a food rather than a medicine, though it has many medicinal uses. Administered internally in small doses it acts as a stomachic and general tonic, promotes appetite and digestion and improves the quality of the blood, increasing the number of the red corpuscles.

In large doses or in small ones long continued it is directly unfavorable to digestion, nausea and vomiting being caused by the soluble preparations. Its per-salts are actively irritant, and some, as the iodide, chloride, nitrate and sulphate, are active poisons, highly astringent to the tissues and very injurious to the teeth. Locally the iron salts of the mineral acids are more or less constringent and irritant to the mucous membranes and the tissues, acting as astringents and hemostatics by virtue of their power to coagulate albumin. The tincture of the chloride is considered diuretic.

Absorbable iron preparations administered to a healthy person, or for a long time in disease, exert but little influence, and give rise to few and slight clinical symptoms. A sense of tension and fulness of the head, dull pains, discomfort, also a hard and quickened pulse, constitute usually the only obvious derangement. When given, however, to a person suffering from anemia or chlorosis the morbid symptoms expressive of deficient hemoglobin subside and the patient soon improves in health and strength. The action of iron is to cause an increase of the hemoglobin of the red blood corpuscles either by its direct conversion into an ingredient of hemoglobin, or by stimulating the functional activity of the hematopoietic organs, or perhaps by both means combined. This power of enriching the red blood corpuscles with hemoglobin is essentially the whole constitutional action of iron. About 40 to 50 grains are estimated to be present in the tissues of a healthy adult, but only about  $\frac{1}{2}$  to  $\frac{1}{3}$  of a grain is daily supplied by the ordinary dietary. This amount of intake is sufficient to preserve the iron equilibrium, about the same quantity being excreted daily, chiefly in the feces and to a slight extent in the urine.

In the stomach all iron preparations are changed to the chloride by the HCl of the gastric juice, and in the duodenum to an alkaline albuminate. The greater portion is carried on through the intestinal canal, where it is converted into a sulphide, which blackens the feces; a part, however, is absorbed by the intestinal epithelium in solid form and perhaps in solution. After reaching the blood by way of the lymph channels, this small quantity of absorbed iron is deposited in the spleen, where it may undergo some changes, is again taken up by the blood and deposited in the liver and perhaps in the bone marrow.