leave the cardiac muscle in a state of contraction resembling cadaveric rigidity. It does not act through the nervous system, but paralyzes the muscular tissue, striated and non-striated, by direct contact; and when contractility has been once destroyed thereby no stimulus will re-excite it. It does not affect the vascular system directly. The influence of one injection of gr. $\frac{1}{50}$ of Strophanthin on the circulation is said to have lasted eight days. Strophanthus differs from Digitalis in being less irritant to the stomach, more rapid in its cardiac action, more quickly eliminated and therefore not cumulative, more powerfully diuretic, and having no direct contractile influence on the vessels. It has little or no action upon the general nervous system, but its active principle *Strophanthin* is a powerful local anesthetic and a myotic when applied to the conjunctiva.

Therapeutics.

Strophanthus is undoubtedly a valuable cardiac stimulant, from the rapidity and permanence of its action, as well as its non-interference with the calibre of the peripheral vessels. It promptly relieves cardiac dyspnea, often modifies the pulse-rate in less than an hour, while the influence of a single dose upon the circulation persists for a long time. It may well replace digitalis in the treatment of chronic Bright's disease and valvular lesions of the heart, when it is important that the work of the heart should not be increased by any additional resistance in the arterial system. It has been reported as exceedingly useful in the treatment of Bright's disease for the dyspnea, orthopnea, dropsy and uremia; also in mitral insufficiency with great anasarca and dyspnea, in palpitation, exaggerated cardiac action, in weak heart, and for exophthalmos with tumultuous action of the heart; also in pulmonary edema due to valvular lesions or to pneumonia. It is useful in endocarditis, also in atheroma of the arteries, in reflex palpitation of neurasthenia, hysteria and chlorosis, and for rigors due to catheterization or operations on the urethra. Notwithstanding its undoubted value, it has not become popular with the medical profession, by reason of the uncertainty of the pharmaceutical preparations on the market.

Ouabaïn is an extremely active poison, paralyzing the cardiac muscle by direct action. It is a powerful emetic, especially when given hypodermically; also a potent local anesthetic, being considered by many observers as superior to Cocaine in this respect. In therapeutic doses it does not seem to affect the body-temperature, but increases urination, either by stimulating the blood-pressure or by paralyzing the sphincter vesicæ. It also promotes defecation, probably by stimulating peristalsis. Very small doses give some evidence of action similar to that of Digitalis. It has been used with striking benefit in all stages of pertussis; and to some extent as a local anesthetic for the eye.

STYRAX, Storax,—is a balsam prepared from the wood and inner bark of *Liquidambar orientalis*, the Oriental Sweet-gum, a tree of the nat. ord. Hamamelidaceæ, growing in Asia Minor. It is semi-liquid, sticky, opaque and gray-colored, of agreeable odor and balsamic taste, completely soluble (except accidental impurities) in an equal weight of warm alcohol.

It consists of a volatile oil named *Styrol*, C_8H_8; a crystalline solid *Styracin*, which is a cinnamate of cinnamic ether; two peculiar resins, one hard, the other soft; and *Cinnamic Acid*, $C_9H_9O_2$, a colorless, odorless, crystalline body, closely allied to Benzoic Acid, excreted in the urine partly as Hippuric Acid, and occurring also in the Balsams of Peru and Tolu. Dose of Storax, gr. v–xx [av. gr. xv].

Tinctura Benzoini Composita, *Compound Tincture of Benzoin*, (*Friar's Balsam*),—contains 8 per cent. of Storax. Dose, ♏x–℥j [av. ♏xxx].

Storax is a stimulant expectorant, an antiseptic and a disinfectant, acting both locally and remotely, like benzoin and the balsams. It is used with benefit in chronic bronchitis and other affections of the respiratory organs, also in chronic catarrhs of the genito-urinary passages, in gonorrhea and in amenorrhea. Externally it is employed in ointment as a detergent for foul ulcers, and as a parasiticide for scabies and phthiriasis.

SUCCINUM, Amber (Unofficial)—the source of Oil of Amber, is a fossil resin, occurring, in alluvial deposits, chiefly in Prussia, Bohemia, and Courland. It is usually associated with lignite, sometimes encloses insects and parts of vegetables, and consists of a volatile oil, a yellow resin, another resin, succinic acid, and a bituminous principle. Its source is thought to be an extinct coniferous tree, the *Pinites succinifer*, of which amber represents the exudation. The *Kauri Gum* from New Zealand is a similar substance.

Oleum Succini, *Oil of Amber* (Unofficial),—is a volatile oil obtained by the destructive distillation of Amber, and purified by subsequent rectification; a pale yellow, thin liquid, of sp. gr. about 0.920, of empyreumatic and balsamic odor, warm, acrid taste, and neutral or faintly acid reaction, readily soluble in alcohol. Dose, gtt. v–x.

Oil of Amber is stimulant, antispasmodic and diuretic, when used internally. Externally it is irritant and rubefacient. It has been employed with benefit in epilepsy, hysteria, convulsions, amenorrhea and whooping-cough. As a liniment it is often used in chronic rheumatism, and has been applied along the spine in infantile convulsions, mixed with an equal part of laudanum and diluted with olive oil or brandy.

SULPHONMETHANUM, Sulphonmethane, (*Sulphonal*), $C_7H_{16}S_2O_4$,—is diethylsulphone-dimethylmethane, the product of the oxidation of the mercaptol obtained by the condensation of acetone with ethylmercaptan. It occurs in colorless, prismatic crystals, soluble in 15 of boiling water, in about 450 of cold water, and in about 50 of cold alcohol; very soluble in boiling alcohol. Sulphonal is a very stable body, being unaffected by concentrated acids, alkalies or oxidizing agents, cold or warm. Dose, gr. x–xxx [av. gr. xv], in hot aqueous solution.

Official Analogues.

Sulphonethylmethanum, *Sulphonethylmethane*, (*Trional*), $C_8H_{18}S_2O_4$,—is diethylsulphone-methylethylmethane, a product of the oxidation of the mercaptol obtained by the condensation of methylethylketone with ethyl mercaptan. It occurs in lustrous, bitter crystals, soluble in 320 of cold water, readily soluble in hot water, in alcohol and in ether. It is an efficient hypnotic, prompter in action and less liable to produce ill effects than Sulphonal, but must be given in doses fully as large, gr. x–xxx [av gr. xv].

Æthylis Carbamas, *Ethyl Carbamate*, (*Urethane*), $C_3H_7NO_2$,—is an ester of carbamic acid, obtained by the reaction of ethyl alcohol upon carbamide (urea) or one of its salts. It occurs in colorless crystals, readily soluble in water, alcohol, ether, or glycerin. Dose, gr. x–xxx [av. gr. xv]; but is best given in doses of 5 grains frequently repeated, up to 20 grains or more, as a full dose may cause vomiting. It is incompatible with many substances, and is best administered by itself.

Unofficial Analogues.

Tetronal, *Diethylsulphon-diethyl-methane*,—contains 4 ethyl groups to 3 in Trional and but 2 in Sulphonal. Dr. Lauder Brunton holds of the physiological action of the disulphones, to which group these three substances belong, that only those containing ethyl groups are active, and that the hypnotic activity is increased with the number of such groups. This,

if substantiated in practice, would make Tetronal the most powerful hypnotic of the three, but it is scarcely heard of in practice. It is patented in this country, though produced by a foreign manufacturer. Dose, gr. x–xxx.

Veronal, *Diethyl-malonyl-urea,* $C_8H_{12}N_2O_3$,—is a white, crystalline powder, of faintly bitter taste, soluble in 145 of water, and in 12 of boiling water. Dose, gr. v–xv, an average dose being gr. vijss, in some hot liquid, or in cachet, or as a powder.

Physiological Action and Therapeutics.

Sulphonal was introduced several years ago as a harmless hypnotic which would produce sound and quiet sleep without unpleasant after-effects, without intoxicant or narcotic action, and having no unfavorable effects on the heart or circulation even in full doses. It rapidly came into general use as a hypnotic in mental diseases, in nervous insomnia and in sleeplessness from various causes. Many competent observers have recorded instances of toxic action following its use, and opinions are now greatly divided as to its therapeutical value. If it were not for the very evident advantage of the drug when used with care and under medical supervision, it would stand a very fair chance of being either excluded from practice or restricted by law (Squibb). Its prolonged use has caused noises in the ears, headache, vertigo, weakness and incapacity for mental or physical exertion. The subject may pass into a condition of drowsiness or stupor, or may suffer from difficulty of speech; and ptosis, edema of the eyelids and cyanosis may be experienced. In one case a single dose of 20 grains caused edema of the lower limbs after a very restless night. In another a dose of 20 grains taken nightly for 15 months was accompanied by complete cessation of menstruation. It has produced persistent skin eruptions in some cases and severe functional disturbances in others. The chief characteristics of chronic poisoning by this drug are as follows:—disturbances of digestion, shown by vomiting and diarrhea or constipation; disturbances of the nervous system, as ataxy and feebleness of the limbs, ptosis and ascending paralysis; also ischuria and oliguria, sometimes albuminuria or hematoporphyrinuria. In order to secure elimination and to guard against cumulative action and consequent toxicity, its administration should be interrupted from time to time, and the patient taking it should be frequently purged.

As a hypnotic Sulphonal acts admirably in many instances, if administered in hot fluids and about two hours before its action is required; but its efficacy decreases with use, and it is of no value whatever against insomnia due to pain. The average hypnotic dose is about 20 grains for a woman and 30 grains for a man. The dose is to be administered only once daily, and should be discontinued at the first sign of toxic action. In no case should its administration be continued over any great length of time. In cases of insomnia due to neuralgia and nervous excitement, the dose of sulphonal may be advantageously combined with a small dose of morphine, in proportion to suit individual cases, the mixture forming a safe and efficient hypnotic. An excellent hypnotic combination is made by mixing together 10 or 15 grains each of sulphonal and trional, to be taken in some hot liquid at bed-time. The trional producing

early sleep and the sulphonal effects being manifested later, the patient will usually obtain a more prolonged result from the small dose of each agent administered together than from a larger dose of either alone.

Trional is an efficient hypnotic, acting more rapidly than sulphonal, and usually without cumulative action or unpleasant after-effects. Several cases of poisoning, including three deaths, have been reported as caused by it, and in one case its prolonged administration gave rise to multiple neuritis and hematoporphyrinuria (Hart). It has been used with satisfaction as a hypnotic and sedative for the insane and in the treatment of narcomania. It acts well in chorea, and as an alternating substitute for the bromides in epilepsy. It is said to be particularly efficient in cases of slight psychical excitement accompanied by obstinate insomnia, also in many forms of delirium. When pain is present it may be administered in conjunction with phenacetin or acetanilide. When used for any long period the daily action of the bowels should be obtained, an alkaline water should be freely administered, and the drug be intermitted every week for one or two days.

Ethyl Carbamate (Urethane) is a mild hypnotic for adults, but a safe and efficient one for children. It stimulates the respiration, and in medicinal doses does not affect the circulation; but in very large quantity it slows the heart, depresses the body temperature, and induces muscular relaxation and some degree of general anesthesia.

Tetronal is theoretically more hypnotic than trional, but has not proved so efficient in practice and often causes vomiting. It is rarely used in this country.

Veronal is a very efficient hypnotic in dose of 8 to 10 grains, given in some hot liquid when a rapid action is required. It induces a practically normal sleep, does not affect the heart, circulation or kidneys, and is free from after-effects. It is particularly efficient when mixed with Sulphonethylmethane (Trional) in the proportion of two parts of the former to one of the latter, (gr. viij with gr. iv, or gr. x with gr. v). It sometimes causes some motor incoordination, especially of the lower extremities, also an erythematous eruption and neuralgia, and is said to diminish the solid and urinary excretions.

SULPHUR, and SULPHIDES.—The non-metallic element Sulphur, S, is a brittle solid of a pale yellow color, permanent in the air, of crystalline texture and susceptible of several allotropic states, which are for the most part induced by heat. It is obtained native in several volcanic districts, or from the native Sulphides of Iron and Copper (iron and copper pyrites) by roasting, as it sublimes at about 238° F. It is official in three forms, viz.—

Sulphur Sublimatum, *Sublimed Sulphur,* S,—is prepared from crude Sulphur by sublimation and condensation. It is a fine citron-yellow powder, of faintly acid taste and acid reaction, insoluble in water or alcohol. Ignited it burns with a blue flame, forming sulphurous acid gas, and leaving no residue or only a trace. Dose, gr. x–℈ij [av. ℈j].

Sulphur Lotum, *Washed Sulphur,* S,—prepared by digesting sublimed sulphur with dilute water of ammonia, thoroughly washing with water and passing through a sieve. In this process the ammonia dissolves out any sulphide

of arsenic which may be present and neutralizes any sulphurous or sulphuric acid. For its solubility and dose see SULPHUR PRÆCIPITATUM below.

Sulphur Præcipitatum, *Precipitated Sulphur*, (*Lac Sulphuris*, *Milk of Sulphur*), S,—is prepared by boiling sublimed Sulphur with slaked lime and water, forming the sulphide and hyposulphite of calcium, which are then decomposed by HCl, and Sulphur is precipitated as a very fine powder which is next washed until the washings are tasteless, and dried with a gentle heat. The result is a very fine, yellowish-white, amorphous powder, odorless and almost tasteless, insoluble in water or alcohol, but completely soluble in carbon disulphide or in a boiling solution of soda. By heat it is completely volatilized. Dose, gr. x–ʒij [av. ʒj].

Preparations of Sulphur.

Unguentum Sulphuris, *Sulphur Ointment*,—has of Washed Sulphur 15, Benzoinated Lard 85, rubbed together until thoroughly mixed.

Pulvis Glycyrrhizæ Compositus, *Compound Licorice Powder* (see under GLYCYRRHIZA),—contains 8 per cent. of Washed Sulphur. Dose, ʒss–jss [av. ʒj].

Sulphurous Acid and the **Sulphites** are described under ACIDUM SULPHUROSUM; the **Sulphates** under the titles of their respective bases. For **Sulphuric Acid** see ACIDUM SULPHURICUM.

Sulphides.

Calx Sulphurata, *Sulphurated Lime*, (*Crude Calcium Sulphide*),—is a mixture of CaS, $CaSO_4$, and Carbon, in varying proportions, containing at least 60 per cent. of the first. A pale, gray powder, of offensive taste and smell, and alkaline reaction, insoluble in alcohol, very slightly soluble in water. Dose, gr. $\frac{1}{10}$–ij [av. gr. j].

Calcii Sulphidum, *Calcium Sulphide*, CaS (Unofficial),—a constituent of the preceding, is named *Hepar Sulphuris*, *Liver of Sulphur*, by the homeopathists, who prepare it by mixing equal parts of powdered oyster-shell and sublimed sulphur, and heating at a white heat in a crucible hermetically sealed. Dose, gr. $\frac{1}{10}$–$\frac{1}{2}$.

Sulphuris Iodidum, *Sulphur Iodide*, (*Iodine Disulphide*),—is prepared by fusing together Washed Sulphur 1 part and Iodine 4. It is a grayish-black crystalline solid, having the odor of iodine, an acrid taste and a faintly acid reaction, insoluble in water, but very soluble in disulphide of carbon and in about 60 of glycerin. Alcohol and ether dissolve out the iodine, leaving the sulphur. Used only as ointment, gr. xxx to the ʒ.

Hydrogenii Sulphidum, *Hydrogen Sulphide*, *Sulphuretted Hydrogen*, H_2S,—is used only for test purposes; a saturated, aqueous solution being one of the official reagents. It is a colorless gas, having the odor of rotten eggs, prepared by the action of dilute sulphuric acid on iron sulphide. It precipitates most of the metals from acid solutions as sulphides; that with Arsenic being yellow; with Antimony, orange; with Cadmium, yellow; with Copper, Lead, Mercury and Silver, black; with Bismuth, brown; with Gold and Platinum, brownish-black.

Carbon Disulphide is described under CARBONEUM.

Unofficial Allied Compounds.

Ichthyolum, *Ichthyol*, *Ammonium Sulpho-ichthyolate*, $C_{28}H_{36}S_3O_6(NH_4)_2$,—is prepared from the product of the distillation of bituminous rocks from the Tyrol which contain fossil fishes. It occurs as a viscous, reddish-brown mass, of tarry odor and appearance and feebly alkaline reaction; soluble in water and in a mixture of alcohol and ether; mixes in all proportions with glycerin, fats and oils. It contains a large proportion of Sulphur, about 10 per cent. Dose, gr. j–x, up to ʒjss daily, in pills or capsules, or dissolved in peppermint water. Sulpho-ichthyolates of Lithium, Sodium, and Zinc are on the market.

Ichthalbin, *Ichthyol Albuminate*,—occurs as a greenish-brown powder, odorless and almost tasteless, insoluble in water but soluble in alkaline solutions. It contains 75 per cent. of Ichthyol, and is used in syphilis, also in scrofula with a lowered condition of nutrition. Dose, gr. xv–xxx, thrice daily.

Ichthargan,—is the trade name of a compound of Ichthyol and Silver, described under the title ARGENTUM.

Ichthoform,—is a chemical compound of Ichthyol and Formaldehyde, and occurs as a dark-brown, practically odorless powder, insoluble in the usual solvents. Dose, gr. x–xxx thrice daily.

Sulphaminol, *Thioxy-diphenyl-amine*,—obtained by the action of sulphur on salts of metaoxy-diphenyl-amine, is an inodorous, yellowish powder, insoluble in water, but soluble in alkaline solutions, alcohol, and glacial acetic acid. It readily breaks up, yielding sulphur and phenol. Dose, gr. ij–v.

Thigenol,—is the trade name of a solution of sodium sulphite in a synthetic sulphuretted oil containing 10 per cent. of sulphur in organic combination. It occurs as a dark-brown, syrupy fluid, soluble in distilled water, alcohol, or glycerin. It is odorless and almost tasteless, and is used locally in eczema, seborrhea, acne rosacea, and other skin diseases. Dose, gr. iij–x.

Thiolum, *Thiol*,—is prepared by the sulphuration of certain non-saturated hydrocarbons, and is a product very similar to Ichthyol. It occurs in both dry and liquid form, the former, *Thiolum siccum*, as dark-brown lamellæ or powder, of bituminous odor and bitter, astringent taste; soluble in water and in chloroform, sparingly in alcohol, insoluble in ether and in benzin. The liquid form, *Thiolum liquidum*, is a dark-colored, syrupy fluid, miscible in all proportions with water. Dose, internally, gr. v–xxx.

Tumenolum, *Tumenol*,—is obtained by treating the unsaturated hydrocarbons of mineral oils with concentrated sulphuric acid. It occurs in several forms, solid and fluid, that known as *Commercial Tumenol* being considered the most generally useful. It is a dark-brown fluid, which can be employed in ointment and in tincture, externally.

Incompatibles.

Incompatible with *Sulphur* are Potassium Chlorate, Potassium Permanganate, Calcium Chloride, and all oxidizers. With the *Sulphides* in solution are Mineral Acids, Metallic Salts. With *Ichthyol* are Acids, Alkaloids, Alkaline Carbonates and Hydrates, Iodine, Resorcinol.

PHYSIOLOGICAL ACTION.

Sulphur used externally is a mild vascular stimulant, causing slight dilatation of the vessels, and in some persons producing eczema. Applied to raw surfaces it is converted into sulphurous and sulphuric acids, and is powerfully irritant. It is parasiticide, especially to the itch-mite. Taken into the stomach it has no effect on that viscus, and most of it passes out in the feces unaltered; but a portion is converted in the intestinal canal by the alkaline bile into hydrogen sulphide and other sulphides, which are mildly laxative and diaphoretic. The former is excreted by the lungs, giving to the breath the smell of rotten eggs, also by the skin, discoloring silver articles carried about the person by forming a sulphide of silver. The Sulphides are partly absorbed into the blood and are excreted in the urine, chiefly as sulphates, and in the feces, which they blacken and render soft. Given in full doses they are irritant to the stomach and intestines, extremely nauseous to the taste and smell, increase the secretions of the intestinal glands, promote peristaltic action, and if used for any length of time they impair the blood, causing anemia, emaciation, tremor and great debility.

Hydrogen Sulphide is very destructive to plant life. In animals it destroys the tissue functions, decomposing the blood and paralyzing the nervous and muscular systems. The symptoms of poisoning are those of asphyxia; muscular tremors occur and are followed by convulsions and death. This gas is often found in cesspools in large quantities, but in one case poisoning occurred

from its excessive formation in the intestines and subsequent absorption into the blood.

Calx Sulphurata and Potassa Sulphurata are parasiticides and act like the sulphides as local irritants and in large doses as irritant poisons, producing narcotic symptoms and convulsions. In small doses they act like sulphur, and are supposed by many observers to have a special influence on suppuration, limiting or preventing it if given in small doses frequently repeated.

The Iodide is believed to possess some of the properties of both its elements. It is doubtful whether it is a distinct chemical compound or merely a physical mixture. As a parasiticide it is very efficient, and has been found remarkably alterative in many local affections of chronic character, but may prove very irritant to the skin if improperly prepared.

The actions of Sulphuric Acid, of Sulphurous Acid and of the Sulphites are respectively described under the titles ACIDUM SULPHURICUM and ACIDUM SULPHUROSUM; those of the Sulphates under the titles of their respective bases.

THERAPEUTICS.

Sulphur is chiefly used as a laxative when pultaceous rather than liquid stools are required, as in hemorrhoids and anal fissure, also in constipation. Scabies has long been treated by its local and internal use, but sulphur alone does not kill the itch insect. The older sulphur ointments were made with sublimed sulphur, and probably contained a considerable amount of sulphurous acid, on which their parasiticide property depended. The later ointments, made with purified sulphur, all contain an alkaline ingredient and develop sulphides, which are powerful insect poisons. Sulphur fumigations are practically applications of volatile sulphurous acid, while most of the sulphur baths and sulphurous mineral waters are solutions of sulphuretted hydrogen or of the alkaline sulphides. They are of value in lead poisoning to favor the elimination of that metal, in chronic constipation, chronic rheumatism and sciatica and many skin diseases, especially chronic psoriasis, eczema, pityriasis and prurigo. The Ointment and the alkaline ointment are both used in scabies.

The Iodide has been used internally in scrofula, glanders and cutaneous disorders, but it is chiefly employed as an ointment in lupus and parasitic skin diseases, especially herpes circinatus. Calx Sulphurata is an efficient depilatory, and is used as a paste to remove hair from fields of operation where the razor cannot be employed. It is painless, non-irritant, leaves no trace behind, and does not prevent the subsequent growth of the hair. Internally, in doses of gr. $\frac{1}{10}$ frequently repeated, it has been considered an efficient remedy to prevent or limit suppuration, and is used in crops of boils, scrofulous sores, carbuncles, and tuberculous glands.

Ichthyol was introduced twenty years ago, by Dr. Unna, the celebrated dermatologist, as an efficient remedy in certain chronic skin diseases, particularly eczema and psoriasis. It causes slight irritation and a burning sensation if applied undiluted to the skin, but in a 50 per cent. ointment it is not irritant,

even if covered with oiled silk. As a local application its value is due to its large proportion of sulphur, which is in a similar condition to that in organic sulphides and mercaptans, and in any pharmaceutical combination would excite a dermatitis. Its application in medicine depends chiefly upon its reducing property, its antiseptic power and its contractile action upon the vascular system. Most of the affections for which it has been recommended are caused by anomalous circulation, especially capillary dilatation. Used internally, it retards the disintegration of albumins and favors their formation and accumulation, checking waste and promoting assimilation without irritating the gastro-intestinal mucous membrane or interfering with digestion. It has little apparent toxic action on the general system, though instances of poisoning are reported as caused by its free use in eczema infantile, and in the curetted uterus. It is an intestinal antiseptic, is analgesic and antiphlogistic, and has remarkable power over exudations, promoting their absorption and alleviating the pain due to them, when given internally and applied externally at the same time. For these purposes it has been highly praised in gynecology and even in pleurisy. For chronic rheumatism a 50 per cent. ointment is used locally and the remedy is also given internally. It has done excellent service in erysipelas and in ulcers of the leg, locally applied in ointment form with Lanolin or pure; and internally in various affections of the digestive and intestinal tract, also in phthisis, syphilis and leprosy. In gynecology it is combined with glycerin (1 in 10); it is used with turpentine as a liniment for rheumatism, or with an equal weight of a mixture of lanolin and olive oil and 30 per cent. of chloroform; and against erysipelas as a 10 to 20 per cent. collodion, with or without castor oil. Applied as a thick ointment it is very serviceable in many skin diseases, especially furunculosis, impetigo contagiosa, folliculitis of the scalp, impetiginous eczema, acne, herpes genitalis and sycosis barbæ. In variola, a 20 per cent. ointment is successfully used, giving prompt relief to the local symptoms, shortening the course of the disease, and preventing pitting; and in other eruptive fevers it alleviates itching and controls the dermatitis. It is an efficient application in chronic joint affections, acute sprains, acute articular rheumatism, fissures of the nipples and anus, and in almost every form of subacute and chronic gout, in lymphatic enlargements, and in all diseases depending on hyperemia and capillary dilatation. For internal administration it should be prescribed in neutral aqueous solutions or in capsules, as it is decomposed in acid or alkaline solutions.

Ichthoform is a harmless intestinal antiseptic and has been used internally with much satisfaction in acute gastro-enteritis, chronic gastric catarrh, dysentery, the diarrhea of tuberculosis and typhoid fever, chronic intestinal catarrh, and intestinal fermentation. Locally it is applied with benefit in endometritis, ozena, wounds, ulcers, and other lesions for which iodoform is considered applicable.

Thigenol has been employed with excellent results in various types of eczema, in seborrhea, and in acne rosacea. Sulphaminol by insufflation has given satis-

faction in tuberculous laryngitis and diseases of the antrum and frontal sinuses, also in doses of gr. iv internally in cystitis.

Thiol causes neither pain, burning, nor other symptoms of irritation, nor any bleeding from eroded surfaces. The dry form is used as a dusting powder in erysipelas, eczema, erythema, intertrigo, impetigo, pemphigus, periphlebitis, subcutaneous hemorrhages, and syphilitic ulcers. It is an efficient application in pelvic exudations and endometritis.

Tumenol is said to owe its therapeutic value to its reducing power rather than to the sulphur in its composition. It is of no service in erysipelas, and is not a parasiticide; but has rendered good service in moist eczema, erosions, excoriations and superficial ulceration. The tincture is an efficient application in all forms of pruritus.

SUMBUL,—is the dried rhizome and root of an undetermined plant, probably of the nat. ord. Umbelliferæ, growing in northern Asia. It contains *Angelic* and *Valeric Acids*, also a volatile oil, balsamic resins, and a bitter principle. Dose, gr. x–℥j [av. gr. xxx].

Fluidextractum Sumbul, *Fluidextract of Sumbul,*—Dose, ♏x–℥j [av. ♏xxx].

Extractum Sumbul, *Extract of Sumbul,*—Dose, gr. j–x [av. gr. iv].

Sumbul is an efficient nerve tonic, having qualities closely resembling musk and valerian. It is used by the Russian physicians in very many morbid conditions and seems to be a favorite remedy in that country for almost any disease. It is probably of some value in hysteria and other nervous derangements of delicate females, and may be used as a substitute for musk in typhoid conditions and fevers, asthma, delirium tremens and perhaps in epilepsy.

TABACUM, Tobacco (Unofficial)—is the commercial dried leaf of *Nicotiana Tabacum*, an annual plant of the nat. ord. Solanaceæ, native of tropical America, but cultivated in several parts of the world, especially in Cuba and Virginia. The leaves contain a very poisonous, oily fluid alkaloid named *Nicotine*, $C_{10}H_{14}N_2$, which consists of *Pyridine*, C_5H_5N, and a hydrated pyrrhol ring, occurs in the plant as a malate, and varies in quantity from 1 to 10 per cent. in different specimens. Tobacco contains also a volatilizable, camphoraceous principle named *Nicotianin*, the existence of which is denied by some analysts, besides potassium and calcium salts (nitrates and phosphates), silica, gum, resin, and other substances.

The proportion of Nicotine in tobacco is stated at 6 in 10,000 parts (0.06 per cent.) by Posselt and Reimann, but other analysts have found 2 per cent. in Havana tobacco and more than 8 per cent. in French tobacco. Turkish tobacco is said to contain little or none. The effect of curing undoubtedly produces chemical changes but chemists differ as to whether the proportion of nicotine is greater or less after that process.

According to Zeise (1843) and Vohl and Eulenberg (1872), tobacco-smoke contains no nicotine, but does contain a series of empyreumatic products, the result probably of its decomposition, viz.—pyridine, collidine, picoline, parvoline, etc. Of these, *Pyridine* C_5H_5N, predominates when tobacco is smoked in a pipe, but *Collidine* $C_8H_{11}N$, which is far less active, predominates when there is free access of air as in smoking cigars. Tobacco-smoke also contains *Carbon Dioxide*, CO_2, of which Krause determines the average proportion to be 9.3 per cent., and to which he credits much of the injurious effects of smoking in young subjects. It also contains creosote, hydrogen cyanide and sulphide gases, also several acids, including acetic and valerianic.

Unofficial Preparations and Derivatives.

Enema Tabaci, *Enema of Tobacco* (B. P. 1867),—gr. xx of the leaf infused in ℥viij of boiling water for an hour, strained, and the whole administered as one enema.

Oleum Tabaci, *Oil of Tobacco,*—is an empyreumatic product and a most virulent poison, obtained by distillation at a temperature above that of boiling water.

Vinum Tabaci, *Wine of Tobacco,*— ℥j to the pint. Dose, ♏v–℥j.

Nicotina, *Nicotine*, $C_{10}H_{14}N_2$,—the alkaloid and active principle; a colorless, oily fluid, having the odor of tobacco and an acrid taste; readily soluble in water, and forming soluble salts with acids. Dose, ♏$\frac{1}{20}$–$\frac{1}{10}$, up to ♏ij in two hours, in tetanus and in strychnine poisoning.

Nicotinæ Bitartras, *Nicotine Bitartrate,*—occurs in fine, white crystals, having a tendency to aggregate, readily soluble in water. This salt is stable and keeps well, even in solution. It is recommended as the most suitable form of administering nicotine in tetanus and strychnine poisoning. Dose, gr. $\frac{1}{20}$–$\frac{1}{10}$, up to a maximum of gr. ij in 2 hours.

Pyridina, *Pyridine*, C_5H_5N,—is a colorless, liquid, alkaloidal base, formed during the dry distillation of nitrogenated organic substances. It has a powerful odor, evaporates in the air, and mixes with water in all proportions. Dose, internally ♏v–xv; by inhalation ℥j allowed to evaporate in an open dish in a small room, in which the patient is exposed for 20 or 30 minutes thrice daily for the relief of asthma (Sée).

Incompatibles.

Incompatibles are as for Alkaloids (see page 6). Physiologically incompatible are Strychnine, Atropine, Digitalis, Ergot, Alcohol, Ammonia.

Physiological Action.

Tobacco is a very depressant nauseant, an emetic by irritant as well as by systemic action, and an antispasmodic; also sternutatory, diuretic, diaphoretic, cathartic, sedative and narcotic. It first stimulates and afterwards paralyzes the motor nerves and the secreting nerves of the glands, also the spinal cord and the vagus; at first stimulating both the vagus-roots and its ends in the heart, slowing the pulse-rate, but afterwards paralyzing the latter and causing high pulse-rate. It increases the salivary and intestinal secretions, and produces diuresis, tremor, clonic spasms, and a tetanic stage followed by paresis. It contracts the pupils, slows and depresses the heart, lowers arterial tension at first and afterwards raises it, reduces the body-temperature and causes profuse sweating, cold and clammy skin, collapse and death usually by paralysis of respiration, sometimes by paralysis of the heart. It does not impair the muscular irritability, nor does it act upon the cerebrum directly. Its empyreumatic products act similarly but less powerfully. Fatal results have followed the inhalation of its vapor into the lungs.

The continued use of Tobacco, by smoking or chewing it to excess, produces granular inflammation of the fauces and pharynx, atrophy of the retina, dyspepsia, lowered sexual power, sudden faints, nervous depression, cardiac irritability and occasionally angina pectoris. Used by the young it hinders the development of the higher nerve centres and impairs the nutrition of the body by interfering with the processes of digestion and assimilation. It has been credited with causing cancer of the lips and tongue, blunting of the moral sense, mental aberration and even insanity. The so-called "tobacco heart" includes many forms of nervous, painful or oppressed cardiac action, depending on the

age of the subject, the quantity consumed and other circumstances. In mild cases an occasional palpitation or flutter is complained of; in more severe ones there are considerable cardiac irregularity and rapidity, and more or less distress experienced; in some there are actual cardiac pain, decided irregularity and occasional intermittence of action, and the symptoms may simulate those of a case of angina pectoris. There are no physical signs as a rule, so that the diagnosis is made by exclusion. The pathology is unknown, but probably involves some lesion of the vagus. In the young, excessive indulgence in tobacco may lead to cardiac hypertrophy, dilatation and even valvular lesions (Osler). A synergistic action has been observed by the author between opium and tobacco in many cases, in which persons accustomed to tobacco began to use opium or morphine, when the slightest use of tobacco made them very sick, as though they were novices in this respect.

Nicotine, in even minute doses causes symptoms of intense gastric irritation with an extreme degree of collapse. It abolishes the function of the motor nerves and paralyzes respiration. Its general action is that of tobacco, but it is one of the most powerful and rapidly-acting poisons known, death having occurred within three minutes after its ingestion, the patient dropping instantly to the floor insensible, with no symptoms except a wild stare and a deep sigh. The $\frac{1}{15}$ of a grain has caused death in a human being, and $\frac{1}{32}$ is fatal to cats and dogs.

Therapeutics.

Tobacco is now but little used in medicine, the dangers attending its employment either internally or externally having caused it to be superseded by less violently acting agents. The principal objects for which it is employed are to relax spasm of the intestines and to relieve local pain therein. Intestinal affections, like impaction of the cecum, intussusception and strangulated hernia, may be overcome by a tobacco-enema to relax spasm, but it is a dangerous expedient. In dropsy, especially the renal form, it makes a very efficient diuretic. In tetanus there is no more effective remedy than minim doses of the alkaloid every two hours by the stomach, or ♏ij by the rectum, or better still the wine in 10 minim doses repeated for effect. Strychnine-poisoning may be treated by minute doses of Nicotine, gr. $\frac{1}{24}$ hypodermically, as a physiological antagonist. It may be employed with advantage in habitual constipation, for the dyspnœa of spasmodic asthma and emphysema, also in nymphomania and chordee. In all forms of asthma the inhalation of the fumes of Pyridine is beneficial, as it has a powerfully sedative action on the respiratory centre. The use of Tobacco in moderation, when under excessive exertion, aids in supporting the system and lessening the sense of fatigue. Smokers rarely suffer from constipation, but generally experience an immediate laxative result from their morning cigar.

TAMARINDUS, Tamarind,—is the preserved pulp of the fruit of *Tamarindus indica*, a large tree of the nat. ord. Leguminosæ, native in the East and West Indies. It contains citric, tartaric and malic acids, sugar, gum, potassium bitartrate. Dose, ʒj–ʒj [av. ʒiv].

Confectio Sennæ, *Confection of Senna,*—contains Tamarind to the amount of 10 per cent. Dose, ʒj–ij [av. ʒj]. (See under Senna.)

Tamarind is a laxative and refrigerant fruit. In infusion it may be used by convalescents as a pleasant acidulous drink, or the pulp may be boiled with milk as a whey for the same purpose. As a laxative it is usually prescribed in connection with other agents having the same action.

TANACETUM, Tansy (Unofficial),—the leaves and tops of *Tanacetum vulgare*, a perennial, herbaceous plant of the nat. ord. Compositæ, indigenous in Europe but cultivated in gardens and growing wild in old fields. It contains a volatile oil, a bitter principle *Tanacetin*, a tannic acid, etc. A fluidextract may be prepared according to the general rule and administered in doses of ♏x–ʒj. The dose of the volatile oil (Oleum Tanaceti) is 1 to 3 drops. An infusion (Tansy Tea) may be made in the proportion of ℥j to the pint, and used in doses of ℥j–ij.

Tansy is emmenagogue, diuretic and anthelmintic, an aromatic bitter and an irritant narcotic poison. Fatal results have followed upon overdoses of the oil (ʒss–j) or strong decoctions, preceded by clonic spasms, disturbed respiration and cessation of the heart's action. It is a useful remedy in amenorrhea, but is in popular repute as an abortifacient, a virtue which it does not possess except in quantity dangerous to life.

TARAXACUM, (*Dandelion*),—is the dried root of *Taraxacum officinale*, a pant of the nat. ord. Compositæ. All parts of the plant contain a bitter, milky juice, exuding from any break or wound. Its constituents are a bitter amorphous principle named *Taraxacin*, a crystalline principle *Taraxacerin*, with potassium and calcium salts, Inulin, and resinoid bodies, etc. The French name for the plant is Pissenlit. Dose, ʒj–ʒj [av. ʒij].

Extractum Taraxaci, *Extract of Taraxacum.*—Dose, gr. v–xxx [av. gr. xv].

Fluidextractum Taraxaci, *Fluidextract of Taraxacum.*—Dose, ʒj–ʒj [av. ʒij].

Taraxacum is a bitter tonic, a diuretic and an aperient. It has been supposed to act especially on the liver and is chiefly used in dyspepsia with hepatic torpor. As found in the shops it is usually inert. The extract is used as an excipient for pills.

TEREBINTHINA, Turpentine.—A Turpentine means a vegetable exudation, liquid or concrete, consisting of resin combined with a peculiar essential oil named *Oil of Turpentine*, $C_{10}H_{16}$, and generally procured from various species of the nat. ord. Pinaceæ. Of the many turpentines two only are official, viz.—

Terebinthina, *Turpentine,*—a concrete oleoresin from *Pinus palustris* the Yellow Pine, and other species of *Pinus*, nat. ord. Pinaceæ. It occurs in tough, yellowish masses, brittle when cold, crummy-crystalline interiorly, of terebinthinate odor and taste. Dose, gr. v–xxx as a stimulant, antispasmodic or diuretic; ʒij–iv as an anthelmintic.

Terebinthina Canadensis, *Canada Turpentine,* (*Balsam of Fir*),—a liquid oleoresin obtained from *Abies balsamea*, the Silver Fir or Balm of Gilead, nat. ord. Coniferæ. A yellowish. transparent, viscid liquid, of agreeable, terebinthinate odor and a bitterish and slightly acrid taste, slowly drying on exposure, forming a transparent mass; completely soluble in ether, chloroform or benzol. Dose, gr. x–xxx.

Pitch and its preparations are described under the title Pix.

Unofficial Turpentines.

Chian Turpentine,—from the *Pistacea Terebinthus*, a small larch tree growing in the islands of Chio and Cyprus; a thick, tenacious, greenish-yellow