

volatilized by heat, or the inunction method with the Oleate or the Ointment, or the hypodermic method, may be used when the stomach will not bear any mercurial. In tertiary syphilis the condition of the patient must be the chief guide to the use of mercury, which becomes necessary however when the local lesions threaten a fatal result or the production of organic changes in a vital organ.

Tonsillitis, parotitis and other acute glandular inflammations of the throat and neck may often be rapidly cured by calomel gr. $\frac{1}{20}$ or gray powder gr. $\frac{1}{5}$ every two hours. In irritable stomach with obstinate vomiting the same small doses of calomel every half hour are very efficient. The dysentery of adults with slimy and bloody stools is best treated by small doses (gr. $\frac{1}{100}$) of the bichloride, and in the diarrhea and dysentery (ileo-colitis) of infants gray powder gr. $\frac{1}{5}$ or calomel gr. $\frac{1}{20}$ will be found effective. In gastric ulcer and in the first stage of hepatic cirrhosis, the bichloride in doses of gr. $\frac{1}{60}$ to $\frac{1}{30}$ thrice daily is a good remedy. Typhoid fever is treated in Germany by calomel, gr. x daily for three days, as an antipyretic. Diphtheria is by many practitioners considered to be best antagonized by calomel in large doses, and in this affection the cyanide has had many advocates in doses of gr. $\frac{1}{100}$ — $\frac{1}{50}$ every hour, a weak solution being used at the same time as a gargle. Asiatic cholera is frequently treated by small, repeated doses of calomel with opium from the start. Inflammations of sthenic character in the stage of exudation, especially when affecting serous membranes, are considered by many authorities to be best met by the free use of mercurials, but this treatment is fast going out of favor, excepting in cases of iritis, which affection is very often of syphilitic causation, and in pneumonia, which is frequently treated, according to the best American authorities, with sedative doses (gr. xv-xx) of calomel.

In the general condition known as "biliousness," manifested by whitish or clay-colored stools, constipation, nausea, anorexia, coated tongue, and slight jaundice, mercurial purgatives have long been a routine remedy, but mild saline purgatives are by many authorities considered equally efficient. As an antiseptic to the gastro-enteric tract in many forms of stomach and intestinal disorders (dyspepsia septica) the administration of minute doses of the yellow oxide will be found remarkably efficient. It is best used in trituration with sugar of milk, 1 to 1,000, and in doses of gr. $\frac{1}{60}$ — $\frac{1}{30}$. By the use of these small doses failing digestion and nutrition may often be improved.

In laryngeal diphtheria (membranous croup) the subsulphate as an emetic is by many considered to have some specially beneficial influence.

Locally, an ointment of calomel ʒj to ʒj of lard is an excellent antipruritic, and ointments of the chlorides and iodides are much used in skin diseases, particularly psoriasis, herpes, acne and pityriasis. In parasitic affections a lotion of the bichloride, gr. ij to ʒj of distilled water, or a 5 per cent. oleate with $\frac{1}{4}$ th part of ether, is very efficient. The oleate is a serviceable application to syphilitic indurations, but is not deemed advisable when ulceration exists. In conjunc-

tivitis calomel may be used as a sedative application, or still better an ointment of the yellow oxide, gr. ij-x to ʒj of vaselin, triturated to the utmost fineness before mixing. Goitre and enlarged spleen are often speedily reduced by rubbing into the skin covering them the ointment of the red iodide somewhat diluted and applied before a hot fire or in the direct sunlight. The acid nitrate solution is one of the best caustics for destroying chancroid and syphilitic warts and vegetations. The black and yellow washes are used as applications to syphilitic erosions and ulcerated indurations.

As an antiseptic injection or application to dressings a solution of the bichloride, gr. vijss in a quart of water, with gr. xl of citric or tartaric acid to prevent albuminate formation, is probably the most efficient, as it is the most generally used. This proportion makes a solution of 1 in 2,000, but weaker solutions, 1 in 5,000, are sufficiently antiseptic for many purposes. They should not be employed for the disinfection of surgical instruments, which are injured by this salt.

Sublamin is not irritant to the skin even in strong solution, and not forming an albuminate when applied to the tissues it has a more penetrating effect than the bichloride, and is said to be quite as efficient as that salt in germicidal power, while free from its disadvantages. This preparation is used in solutions of 1 in 500 or 1 in 1,000 for the sterilization of nickel-plated instruments, the operator's hands, and the site of operation.

Mercuriol does not coagulate albumin, and is used as an alterative, astringent, and antiseptic application in many morbid conditions. As a gonococccide its use in $\frac{1}{2}$ to 2 per cent. solutions is considered by many specialists to be a decided advance on the treatment of gonorrhoea by astringent injections and balsamic remedies. In chronic cystitis a 1 per cent. solution as a wash for the bladder has given great satisfaction, and it is said to be the least irritant of effective antiseptics for the local treatment of the nose and ear. A 2 to 5 per cent. ointment is used with benefit as a dressing for ulcers, and the powder itself may be dusted on wounds. Internally in doses of gr. j-ʒss twice daily it has given satisfaction in syphilis.

The Hypodermic Injection of mercurials has many advantages in syphilis, being rapid and powerful in action, free from gastro-intestinal irritation, and cleanly, though somewhat painful. Many preparations have been thus used, but none has any distinct advantage over the *Bichloride*, which is less dangerous than many others, especially those containing calomel. Hebra's formula is a 1 per cent. solution in a 6 per cent. solution of sodium chloride, giving of the salt gr. $\frac{1}{4}$ to $\frac{1}{2}$ once daily, gr. $\frac{1}{16}$ to $\frac{1}{8}$ daily or every other day (Wood), injected deeply into the gluteal muscles or those of the back, the part being massaged to prevent local irritation. The *Sal Alembroth Solution* is prepared by dissolving the bichloride gr. xvj, ammonium chloride gr. viij, in distilled water ʒj; the dose of which is ʒxx, containing gr. $\frac{1}{2}$ of mercuric ammonium chloride. *Gray Oil* is prepared by emulsifying ʒij of lanolin with chloroform, adding ʒiv of metallic mercury, triturating, and adding $\frac{1}{4}$ th part of olive oil; the dose being ʒj-ij every 2 or 3 days: or mercury ʒj, lanolin ʒij, oil carbolized 2 per cent. ʒj, made into a cream, of which ʒxx may be injected once a week. Other Preparations adapted to this method are: The *Benzoate*, in 1 per cent. aqueous solution, with $\frac{1}{2}$ per cent. of sodium chloride (Gaucher); the *Salicylate*, gr. $\frac{1}{2}$ —1 in 20 minims of sterilized liquid petrolatum; the *Subchloride (calomel)* with sodium chloride, 5 parts of each in 50 of water. The latter causes much pain, frequently produces abscess, and is liable to induce severe pyalism.

HYDRASTIS, Hydrastis,—is the dried rhizome and roots of *Hydrastis canadensis*, Golden Seal, a small plant of the nat. ord. Ranunculaceæ, growing in most parts of the United States. It contains three alkaloids, *Hydrastine* $C_{21}H_{21}HO_6$, white and crystalline, soluble in alcohol and in ether, insoluble in water; *Berberine* $C_{20}N_{17}NO_4$, yellow and crystalline, soluble in hot water and in alcohol, insoluble in ether; and *Canadine*, $C_{21}H_{21}NO_4$, white needles, present in very small quantity. From Hydrastine oxidation liberates *Opianic Acid* and the artificial alkaloid *Hydrastinine* $C_{11}H_{11}NO_2$, the hydrochloride of which is official. Dose of Hydrastis, gr. x-xlv [av. gr. xxx.]

Preparations.

Fluidextractum Hydrastis, *Fluidextract of Hydrastis*. Dose, ℥ x-xlv [av. ℥ xxx.]

Tinctura Hydrastis, *Tincture of Hydrastis*,—20 per cent. strength. Dose, ʒss-ʒj [av. ʒj.]

Glyceritum Hydrastis, *Glycerite of Hydrastis*,—has of Hydrastis 2, in Glycerin 1, prepared by percolation with water and alcohol. Dose, ℥x-xlv [av. ℥xxx.]

Hydrastina, *Hydrastine*,—the alkaloid (see above). Dose, gr. ʒ-½ [av. gr. ½.]

Hydrastinæ Hydrochloridum, *Hydrastinine Hydrochloride*,—the hydrochloride of an artificial alkaloid derived from Hydrastine. Dose, gr. ʒ-j [av. gr. ss] in capsule 3 or 4 times a day, or hypodermically in 10 per cent. solution.

Hydrastin (Unofficial),—is an impure extract precipitated by hydrochloric acid from an alcoholic solution of hydrastis, and contains Berberine, Hydrastine, and resin. Dose, gr. ij-v.

Incompatibles.

Incompatible with preparations of *Hydrastis* are Alkalies, Hydrochloric Acid, Tannic Acid, and other alkaloidal precipitants, (see page 5).

PHYSIOLOGICAL ACTION.

Hydrastis is a simple bitter and a stomachic tonic. It promotes appetite and digestion and increases the secretions of the gastro-intestinal tract and the flow of bile, but if long used it will derange digestion and produce constipation. It is considered alterative to the mucous membranes, deobstruent to the glandular system, cholagogue, diuretic, antiseptic, and antiperiodic, in the latter respect ranking next to cinchona. Hydrastine stimulates the medullary centres and the intestinal, cardiac, and uterine muscles, raises arterial tension, slows and strengthens the heart beat, quickens respiration, promotes intestinal peristalsis and uterine contraction. In toxic dose it stimulates the spinal cord, causing tetanic convulsions, depresses the motor nerves and the muscles, and finally paralyzes the medullary and spinal centres and the heart, death occurring by respiratory paralysis. It is a poison to the muscular system, both striated and non-striated, throughout the body. Hydrastinine is a powerful depressant to the entire motor tract, from the cerebral cortex to the muscular tissue. It has a stimulant effect upon the circulation, causes the heart to act more slowly and more powerfully, and contracts the blood vessels, producing a marked and prolonged rise of arterial tension throughout the body. It is believed to have a powerful antispasmodic action, and to decrease the general excitability of the cerebral cortex. Berberine causes toxic symptoms in small animals, but seems

to act only as a bitter tonic on man. Canadine in small dose produces drowsiness and languor, in large dose it depresses the central nervous system after a short period of excitement, and causes weakness and arrhythmia of the heart, and its injection is followed by violent intestinal peristalsis and diarrhea.

THERAPEUTICS.

Hydrastis is used as a stomachic tonic, an alterative application to mucous surfaces, and an antiperiodic. It is an excellent remedy locally and internally in all forms of catarrh, especially that of the stomach, duodenum, gall-ducts, bladder, uterus and vagina. Internally it is efficient in many glandular swellings, in chronic constipation due to a sluggish state of the liver or deficiency of the other intestinal secretions, in chronic dyspepsia, and as a substitute for alcohol in dipsomaniacs when a catarrhal state of the stomach has been induced. In gonorrhœa, gleet, and chronic nasal catarrh, it is employed locally with much benefit, also in syphilitic affections of the mouth, throat and nares. As an alterative and antiseptic application it is recommended for unhealthy ulcers and sores, cancerous ulcerations, mercurial and aphthous stomatitis, rectal fissure, fistula and prolapse, internal and external hemorrhoids, cracks, fissures and abrasions of the nipples, erosion and ulceration of the cervix uteri, and in conjunctivitis with muco-purulent discharge. In the second stage of gonorrhœa, after the acute inflammation has subsided, injections of the commercial extract (hydrastin), or the fluidextract suspended in mucilage, are often very efficient in restoring the urethral mucous membrane to a healthy condition. Hydrastine and Hydrastin rank high in the treatment of intermittent fever and chronic malaria, though much inferior to quinine.

Hydrastinine has long been known as a uterine vaso-constrictor, and as such has been successfully employed in metrorrhagia. It is considered preferable to hydrastine on account of its stimulant action on the cardiac muscle, and the persistent constriction which it produces in the walls of the vessels. The hydrochloride is employed in a dose of one grain hypodermically, using a ten per cent. solution; the injections being best made, for menstrual irregularities, during a few days previous to the expected term. It has been used with great benefit in dysmenorrhœa, metritis, endometritis, myomata and pyo-salpingitis. It has been employed successfully in the treatment of hydrophobia, strychnine-poisoning and epilepsy, in the latter disease having been given in doses of ¼ to ½ grain, up to 2 grains daily, with marked benefit in many cases. It is an excellent subsidiary cardiac tonic, when a slow but permanent action on the circulation is required: and its mild and enduring effect as an arterial constrictor is useful in acute and chronic aortitis and arterio-sclerosis.

HYDROCOTYLE, Pennywort (Unofficial),—is the leaf of *Hydrocotyle asiatica*, a small plant of the nat. ord. Umbelliferae, a native of southern Africa and India. It contains a peculiar, oleaginous substance, *Vellarine*, which has a bitter, persistent taste, and is thought to be the active principle. It has long been used in its native countries as an alterative to purify

the blood, and has been found of service in eczema, lupus, psoriasis, syphilitic and scrofulous sores, and in leprosy. An ounce of the dried plant or leaves is given daily in infusion. It causes great itching over the whole body, ovarian pain in females, and urinary irritation. In one case in which the drug was being given for lupus of the hand a severe orchitis was set up without any other apparent cause. It certainly exerts a markedly special influence on the genito-urinary tract.

HYOSCYAMUS, Hyoscyamus,—is the dried leaves and flowering tops, collected from plants of the second year's growth, of *Hyoscyamus niger*, Henbane, nat. ord. Solanaceæ, growing in Europe and the northern United States. It should contain not less than 0.08 per cent. of mydriatic alkaloids, including *Hyoscyamine* $C_{17}H_{23}NO_3$, isomeric with Atropine, *Hyoscine* $C_{17}H_{21}NO_4$, closely allied to Atropine, and *Atropine* $C_{17}H_{23}NO_3$ (see under BELLADONNA), the latter in very small quantity. Dose of Hyoscyamus, gr. j–vj [av. gr. iv.]

Scopola,—is the dried rhizome of *Scopola Carniolica*, nat. ord. Solanaceæ, yielding not less than 0.5 per cent. of its alkaloids. It contains the alkaloid *Scopolamine*, $C_{17}H_{21}NO_4$, which is chemically identical with Hyoscine. The plant is a common one in the mountains of Bavaria and Hungary. Dose, gr. ss–j [av. gr. $\frac{3}{4}$.]

Preparations of Hyoscyamus.

Extractum Hyoscyami, *Extract of Hyoscyamus*,—obtained by evaporating the fluid-extract. Dose, gr. ss–jss [av. gr. j.]

Fluidextractum Hyoscyami, *Fluidextract of Hyoscyamus*,—Dose, ℥j–v [av. ℥ij.]

Tinctura Hyoscyami, *Tincture of Hyoscyamus*,—10 per cent. strength. Dose, ℥v–xxx [av. ℥xv.]

Preparations of Hyoscyamus are very uncertain in strength and physiological activity.

Hyoscinae Hydrobromidum, *Hyoscine Hydrobromide*,—colorless crystals, soluble in 2 of water and in 16 of alcohol. Nearly all of this salt furnished by manufacturing chemists consists of Scopolamine Hydrobromide (Schmidt). Dose, gr. $\frac{1}{200}$ – $\frac{1}{100}$ [av. gr. $\frac{1}{125}$.] for the sane; larger doses, up to gr. $\frac{1}{30}$, are used for the insane.

Hyoscyaminæ Hydrobromidum, *Hyoscyamine Hydrobromide*,—white, prismatic crystals, or a yellowish, amorphous mass, of tobacco-like odor, and acrid, bitter, nauseous taste; very soluble in water, soluble in 2 of alcohol. Dose, gr. $\frac{1}{200}$ – $\frac{1}{100}$ [av. gr. $\frac{1}{125}$.]

Hyoscyaminæ Sulphas, *Hyoscyamine Sulphate*,—white crystals, or a white powder, odorless, of bitter, acrid taste; very soluble in water, soluble in 7 of alcohol. Dose, gr. $\frac{1}{200}$ – $\frac{1}{100}$ [av. gr. $\frac{1}{125}$.]; but higher doses are used for the insane.

Preparations of Scopola.

Extractum Scopolæ, *Extract of Scopola*,—prepared by evaporating the fluidextract. Dose, gr. $\frac{1}{2}$ – $\frac{1}{3}$ [av. gr. $\frac{1}{3}$.]

Fluidextractum Scopolæ, *Fluidextract of Scopola*,—prepared by maceration and percolation with Alcohol 8, Water 2. Dose, ℥ss–ij [av. ℥j.]

Scopolaminæ Hydrobromidum, *Scopolamine Hydrobromide*,—chemically identical with Hyoscine Hydrobromide. Dose, gr. $\frac{1}{200}$ – $\frac{1}{100}$ [av. gr. $\frac{1}{125}$.]

Incompatibles.

Incompatible with *Hyoscyamus* are: Acids, Caustic Alkalies, Alkaloidal precipitants (see page 5), Ferrous Sulphate, Lead Acetate, Silver Nitrate, Vegetable astringents. Liquor Potassii Hydroxidi, though incompatible, is frequently prescribed with the tincture of hyoscyamus, the combination seeming to have therapeutical value. Physiological incompatibles are the same as for Belladonna (see page 172).

PHYSIOLOGICAL ACTION.

Hyoscyamus has similar action to that of Belladonna, Duboisia and Stramonium, except that it is the least powerful and irritant of the group, but the most calmative and hypnotic. The delirium produced by it is never furious and is without hyperemia, but is frequently accompanied by insomnia. It is more stimulant to the vaso-motor system and to the cardiac accelerator apparatus than Stramonium, but is less active on the pneumogastric. It has decided laxative and carminative effects on the intestines and a very marked sedative influence on the urinary passages.

Hyoscyamine is considered identical with Atropine in its effects on the motor apparatus and the circulation, including the heart and the vaso-motor system, but having a less stimulant action on the central nervous system, producing symptoms of cerebral depression instead of garrulous delirium. It is less powerful than atropine as a mydriatic, and in a few cases it has seemed to diminish the respiratory rate. It is believed to be a hypnotic, though some deny that it possesses any soporific influence.

Hyoscine is a cerebral and spinal sedative, and a powerful hypnotic, directly depressing the higher functions of the brain, and affecting the heart but feebly. It is probably the action of this agent which prevents Hyoscyamus from causing the excitation and delirium of belladonna. After the hypodermic administration of a full dose (gr. $\frac{1}{30}$), there is, in most subjects, a period of semi-maniacal delirium, with flushed face and dry mouth, lasting from one to two hours, and followed by the sedative action of the drug, during which the pulse-rate and frequency of respiration, at first quickened, are distinctly lowered. It especially affects the motor tract of the spinal cord and the cerebral cortex, slightly depresses the heart, but paralyzes respiration. It is free from irritant qualities and may be used hypodermically. Its habitual use brings on muscular paralysis and delirium of violent character. It is frequently used as a hypnotic by alcoholics and nervous subjects, and will probably be responsible for many deaths. As a mydriatic its reputation is doubtful, some observers claiming greater power for it in this respect than that of Atropine, while others say that mydriasis may follow its use but is not always produced by even large doses. Severe toxic symptoms have followed the application of 4 drops of a 1 per cent. solution (equal to gr. $\frac{1}{25}$) to the ocular conjunctivæ. In large doses Hyoscine is a dangerous depressant of the respiration, but it may be used without unpleasant effects in medicinal doses. Whenever full doses are employed the respiration should be watched for several hours.

Dr. Balagopal, of India, has reported a case in which a man suffering from intermittent attacks of maniacal delirium was accidentally given gr. $\frac{1}{4}$ of the hydrobromide of hyoscine hypodermically. Severe toxic symptoms supervened, which were however antagonized by Sulphuric Ether administered subcutaneously. The patient recovered, and thereafter remained free from mental disorder.

THERAPEUTICS.

Hyoscyamus is a valuable though feeble narcotic, and is chiefly used as a hypnotic and an anodyne when opium is contraindicated, and for children. It is by far the best agent to use in acute mania with great motor excitement, obstinate insomnia and varied hallucinations. Chronic mania has been more benefited by it than by any other drug, and it is very efficient in insanity characterized by frequent delusions. In delirium tremens and the delirium of fevers it is an excellent hypnotic, and the monomania of hypochondriacs is alleviated and often cured by it. Whooping-cough, nervous coughs, and especially a dry, tickling night-cough, are greatly alleviated by full doses of Hyoscyamus. It is efficient in colic of various forms, to palliate the trembling of paralysis agitans and mercurial tremor, and to relieve the pains and disordered coördination of locomotor ataxia. In constipation it is a good remedy, the extract being much employed in combination with other purgatives to render them more efficient and less drastic, but the quantity generally used is too small to be of any particular benefit. The tincture is an efficient remedy in irritability of the bladder from any cause.

Hyoscyamine may be used for the same purposes as Atropine, but being liable to considerable variation in purity and activity, it is not a popular agent with the profession.

Hyoscine has been frequently used in neuralgia, whooping-cough, acute mania, insomnia from cerebral excitement, delirium tremens, asthma and enteralgia, also in ophthalmic practice as a mydriatic. It is an excellent hypnotic and sedative, and has been used with satisfaction to control the motor restlessness of fevers. It efficiently but temporarily controls the tremor of paralysis agitans, and is highly useful at times in the treatment of the morphine-habit, especially for the extreme restlessness and insomnia resulting from the final withdrawal of that drug. In such cases, however, it must be used only in emergencies and should not be given habitually, as it excites a high degree of delirium in most subjects at first, followed after about 2 hours by its secondary sedative influence. Excessively or carelessly employed, it is liable to seriously derange the mental faculties in the same manner as atropine, and is probably responsible for many of the impaired intellects which emerge from the so-called "bichloride of gold cures." Dr. Lionel Weatherly has found it particularly useful in that form of mental disturbance which renders the patient violent and abusive, restless and domineering—a nuisance to every one who has anything to do with him. Under the administration of repeated small doses of hyoscine such a patient becomes a changed man. Violence and abusiveness give place to an amiable politeness, and instead of indulging himself in the free exercise of an extensive, if somewhat shady vocabulary, the patient subsides into silence.

Scopolamine-Morphine Anesthesia, produced by the hypodermic injection of Scopolamine (Hyoscine) Hydrobromide, gr. $\frac{1}{60}$, and Morphine Sulphate, gr. jss, administered separately $1\frac{1}{2}$

hour before operation, induces deep narcosis and general anesthesia, in which surgical operations may be performed. Though used in many cases by Blos and others, this method is not generally approved, as it is sometimes ineffective, requires a previous test to determine the susceptibility of the patient, and is dangerous to the respiration for some time after the narcosis has disappeared.

IGNATIA, St. Ignatius' Bean (Unofficial),—is the seed of *Strychnos Ignatia*, a small tree of the nat. ord. Loganiaceæ, native in the Philippine Islands, also called *Ignatia Amara*. It contains the alkaloids *Strychnine* and *Brucine*, about 1 per cent. of each, for a description of which see under the title **NUX VOMICA**.

Tinctura Ignatiæ, Tincture of Ignatia (Unofficial),—strength 10 per cent. Dose, ℥ij-x. Incompatibles are the same as for Nux Vomica.

PHYSIOLOGICAL ACTION AND THERAPEUTICS.

Ignatia closely resembles Nux Vomica in action, a poisonous dose producing the same exaltation of the spinal functions, with muscular twitching, tetanic spasms, and death by asphyxia through tetanic fixation of the respiratory muscles, but as it contains a greater quantity of Strychnine than the latter it is more powerful in the same dose. It exalts the susceptibility of the sensory nerves and the nerves of special sense for a time, but an opposite condition soon succeeds, manifested by numbness and torpor with great mental depression. It causes a feeling of constriction about the throat and a sensation of anguish at the pit of the stomach. Its antagonists and incompatibles are the same as those for nux vomica.

Ignatia is recommended in hysteria to control the general hyperesthesia, also for insomnia, clonus hystericus, mental excitement or depression, aphonia, perverted appetite, and convulsive crying or laughing. It will often remove the intercostal neuralgia of hysterical subjects, and the sensation as of a ball rising to the throat (globus hystericus). Cerebro-spinal irritability is diminished by small doses though excited by large ones, Ignatia being probably the most efficient controller of functional phenomena of the cerebro-spinal axis. In the convulsions of children from intestinal irritation without cerebral congestion, and in insomnia from nervous erethism, small doses of Ignatia are used with the happiest results. It is by many practitioners preferred to nux vomica as a stomachic tonic, and is useful in the treatment of dyspepsia, hypochondriasis and various nervous affections.

ILICIIUM, Star Anise,—is the fruit of *Illicium verum*, an Asiatic shrub of the nat. ord. Magnoliaceæ. It contains a *Volatile Oil* which is chemically and practically identical with the Oil of Anise. Another species, *Illicium anisatum* (*Illicium religiosum*), is very poisonous, causing vomiting, epileptiform convulsions, dilated pupils and cyanosed countenance. Its carpels are more woody, shrivelled and wrinkled, and end in a curved beak. Illicium is recognized officially as a source of the Oil of Anise, and has actions and uses similar to those of Anisum.

IODUM, Iodine, I,—is a non-metallic element, existing in sea-weed, sea-water, some fresh waters and fresh-water plants, also in sponge, oysters, eggs, cod-liver oil, rock salt and several ores. It occurs in bluish-black rhombic plates, of metallic lustre, peculiar odor, acrid taste and neutral reaction; sparingly soluble in water, readily so in ether, and in 10 of alcohol, also in an aqueous solution of potassium iodide or sodium chloride. It volatilizes slowly at ordinary temperatures, and produces a dark-blue color with gelatinized starch in a cold solution. Internally it is generally administered in the form of an iodide or as the compound solution of iodine. Dose, gr. $\frac{1}{20}$ – $\frac{1}{4}$ [av. gr. $\frac{1}{10}$].

Preparations of Iodine.

Tinctura Iodi, Tincture of Iodine,—strength 7 per cent. Dose, ℥j–iij [av. ℥jss]; but it is generally used as a local application, or for injection into cavities.

Liquor Iodi Compositus, Compound Solution of Iodine, (Lugol's Solution)—has of Iodine 5, Potassium Iodide 10, in Distilled Water to 100. Dose, ℥j–x, [av. ℥iij], well diluted.

Unguentum Iodi, Ointment of Iodine,—has of Iodine 4, Potassium Iodide 4, Glycerin 12, Benzoinated Lard 80.

Churchill's Tincture of Iodine (Unofficial),—contains Iodine gr. lxxv, Potassium Iodide ʒjss, Alcohol ʒj, and is used locally, chiefly in gynecology.

Iodides and their Preparations.

Ammonii Iodidum, Ammonium Iodide, NH₄I,—a deliquescent, granular, white salt soluble in 1 of water and in 9 of alcohol at 59° F. Dose, gr. ij–x [av. gr. iv.]

Potassii Iodidum, Potassium Iodide, KI,—a colorless, deliquescent, crystalline salt, of saline and bitter taste; soluble in 0.8 of water and in 18 of alcohol. ʒj of this salt dissolved in ʒj of water makes nearly ʒjss of fluid, so that ℥viijss of the solution would be required to obtain gr. v, a fact to be remembered in prescribing. Dose, gr. v–xx [av. gr. vijss.]

Unguentum Potassii Iodidi, Ointment of Potassium Iodide,—has of the Iodide 10, Potassium Carbonate 0.6, Hot Water 10, Benzoinated Lard 80.

Rubidii Iodidum, Rubidium Iodide, RbI, (Unofficial),—occurs in white, non-efflorescent crystals, odorless, of milder taste and greater solubility in water than Potassium Iodide. Dose, gr. v–xx.

Sodii Iodidum, Sodium Iodide, NaI,—minute, deliquescent crystals; soluble in 0.6 of water and in 1.8 of alcohol. Dose, gr. v–xx [av. gr. vijss.]

Strontii Iodidum, Strontium Iodide, SrI₂(H₂O)₆,—colorless, hexagonal plates, of bitter, saline taste; very soluble in water and in alcohol. Dose, gr. v–xx [av. gr. vijss.]

Iodoformum, Iodoform, Triiodomethane (Formyl Iodide), CHI₃,—usually obtained by the action of iodine upon alcohol in the presence of an alkali, occurs in small, lemon-yellow crystals, of saffron-like and penetrating odor; very slightly soluble in water, soluble in about 52 of alcohol, 12 of boiling alcohol, and in 5.2 of ether; very soluble in chloroform, benzoin and fixed and volatile oils. Its solutions have neutral reaction. Dose, gr. j–vj [av. gr. iv.]

To remove its odor without forming a compound the best agents are Thymol (gtt. ij ad ʒj of Iodoform), Oil of Mirbane (gtt. vj ad gr. xv), Oil of Bitter Almonds, or Oil of Rose (gtt. j ad ʒj). Oil of Turpentine is particularly serviceable in removing the odor from the hands, or from spatulas, mortars, etc.

Unguentum Iodoformi, Iodoform Ointment,—Iodoform, finely pulverized, 10, Lard 90, thoroughly mixed by trituration.

Iodolum, Iodol, Tetraiodopyrrol, C₄I₄NH,—is a derivative of the base pyrrol (a coal-tar ingredient), obtained by the action of iodine on the base in the presence of alcohol; a grayish-brown, crystalline powder, without odor or taste, soluble in 9 of alcohol, almost insoluble in water. It dissolves readily in the gastric juice. Dose, gr. j–x [av. gr. iv.]

Thymolis Iodidum, Thymol Iodide, Di-thymol-diiodide, commonly known under the trade name *Aristol*,—contains 45 per cent. of Iodine, and occurs as a reddish-yellow, bulky powder, insoluble in water and in glycerin, slightly soluble in alcohol, readily soluble in ether, chloroform, collodion, and in fixed and volatile oils. It should not be mixed with alkalies,

metallic oxides, starch or water; and no heat should be used in dispensing it, as it readily parts with its iodine. It is used locally as a substitute for Iodoform.

Other Iodides and preparations thereof are—Arseni Iodidum, Liquor Arseni et Hydrargyri Iodidum, Hydrargyri Iodidum Rubrum, Hydrargyri Iodidum Flavum, Syrupus Ferri Iodidi, Pilulæ Ferri Iodidi, Plumbi Iodidum, Sulphuris Iodidum and Zinci Iodidum. As these preparations are allied in action and uses less closely to Iodine than to the other elements in their composition, they are described under other titles. (See *Arsenum, Hydrargyrum*, etc.) Ethyl Iodide or Hydriodic Ether is described under *Æther*.

Hydriodic Acid Preparations.

Acidum Hydriodicum Dilutum, Diluted Hydriodic Acid,—contains not less than 10 per cent. by weight of Hydriodic Acid HI. Dose, ℥v–xv [av. ℥viij.]

Syrupus Acidi Hydriodici, Syrup of Hydriodic Acid,—contains about 1 per cent. of the absolute acid. Dose, ʒss–ij [av. ʒj], well diluted.

Unofficial Iodine Compounds.

Iodized Phenol, Carbolated Iodine,—is a mixture of Iodine and crystallized Phenol in varying proportions, generally 1 of the former to 4 of the latter: for local use, especially in gynecology.

Iodipin,—is a compound of Iodine with the fatty acids of Sesame Oil, and occurs as a yellow or brown, oily fluid, which is marketed in two strengths, containing respectively 10 and 25 per cent. of Iodine, the latter being intended for hypodermic use. Dose, of the 10 per cent. preparation ʒj–iv thrice daily, in emulsion or capsules; of the 25 per cent. preparation ʒij–ʒjss daily.

Iodomuth,—is a proprietary compound of Bismuth and Iodine, said to contain 25 per cent. of the latter. It occurs as a reddish-brown, impalpable powder, odorless and tasteless; and is used locally as an alterative and stimulant antiseptic for ulcers, sores and wounds, also internally for gastroenteritis, dysentery and cholera infantum. Dose, gr. j–viij.

Europphen, Isobutyl-orthocresol Iodide,—is produced by the action of Iodine upon Isobutyl-orthocresol in a solution of Potassium Iodide, and contains about 27 per cent. of Iodine, which it gives up to metallic oxides and mercury salts, and when brought into contact with aqueous liquids. It occurs as a very fine, amorphous, yellow powder, of faint, aromatic odor like that of saffron; insoluble in water and in glycerin, soluble in alcohol, ether, chloroform and fatty oils; readily decomposed by heat and by starch, slowly by light. It is five times lighter and more bulky than Iodoform, and is used as a substitute therefor in all local applications where a dry antiseptic is required. It is incompatible with starch, metallic oxides, mercurials, and other substances which readily unite with iodine. A 3 to 10 per cent. solution in olive oil is employed hypodermically.

Nosophen, Iodophen,—is a patented preparation, chemically entitled *Tetra-iodo-phenol-phthalein*, and obtained by the action of Iodine on a solution of phenol-phthalein. It contains 60 per cent. of Iodine and occurs as a yellow, insoluble powder, of feebly acid character, with alkalies forming soluble salts, the sodium salt being of blue color and named *Antinosin*. Nosophen is highly germicidal and is used as an antiseptic dusting powder for wounds and ulcers, also internally for catarrhal inflammations of the gastro-intestinal tract. Dose, gr. v–viij.

Bismuthi Subiodidum, Bismuth Subiodide, BiOI,—is described on page 177. It is odorless, non-irritant, and highly antiseptic, and a powerful stimulant of granulation in wounds.

Airol and Eudoxin are Iodine compounds, but are described under *BISMUTHUM*, on page 177.

Potassium Sozo-iodolate,—contains 53 per cent. of Iodine, 20 of Phenol, and 7 of Sulphur. It is odorless, antiseptic, germicidal, non-toxic and non-irritant; and is used locally in eczema, scabies, and other skin affections.

Incompatibles.

Incompatible with *Iodine* are: Alkalies, Alkaline earths, Alkaloids, Chloral Hydrate, Ferrous salts, Hypophosphites, Hyposulphites, Mercurous salts, Metals, Oils, Turpentine, Starch, Tannic Acid. With *Iodides* are: Alkaloids, Arsenic salts in acid solution, Bromine, Chlorine, Hydrogen Peroxide in acid solution, Metallic salts (ic and ous), Nitrites in acid solution. With *Iodoform* are: Alkalies with heat, Balsam of Peru, Calomel, Mercuric Oxide, Oils in the light, Silver Nitrate, Tannic Acid.

Potassium Iodide decomposes nearly all the metallic salts and is incompatible with many other substances. Added to Potassium Chlorate in solution it forms a poisonous compound. It is best prescribed alone or in some simple vehicle, a favorite one being the Compound Syrup of Sarsaparilla. It may be prescribed with Tincture of Cinchona, an ounce of which dissolves 30 grains, or in combination with Liquor Potassii Arsenitis, which prevents the iodic eruption to some extent. In the "mixed treatment" of syphilis it is combined with the Biniodide of Mercury. It is better borne when combined with Nux Vomica or Potassium Acetate, or given alternately with Iodide of Iron (Squire). Its efficacy is increased by uniting it with Ammonium Carbonate, 2 parts to 1 or $1\frac{1}{2}$ of the Iodide (Gull).

PHYSIOLOGICAL ACTION.

Iodine is irritant to the mucous membranes and to the skin. Applied to the latter it stains a deep yellowish-brown color and combines with the albumin of the tissue, causing considerable pain and subsequent exfoliation of the epidermis. Vesication may be quickly produced if the quantity used be large. Inhaled its vapor irritates the respiratory mucous membrane, producing sneezing, cough, dyspnea, also pain in the chest and in the frontal sinuses. In the gastro-intestinal canal it is equally irritant, but is gradually converted into the iodide or iodate of sodium, in which form or as an albuminate it is absorbed into the blood. Iodine decomposes organic molecules, and in the presence of phosphoretted or sulphuretted gases it acts like chlorine but more feebly, uniting with their hydrogen and thus breaking up those noxious compounds it is disinfectant and deodorant.

Iodides are rapidly absorbed and less rapidly excreted, the potassium iodide appearing in the urine and saliva in about 15 minutes after its ingestion. About 80 per cent. of it escapes within 24 hours, and the remainder is slowly eliminated during a period of about 5 days. At the points of elimination iodine and ozone are set free, hence they are remotely irritant to the mucous membranes, causing violent coryza, with soreness of the throat, acute conjunctivitis, profuse mucous discharges, headache and irritation of the kidneys and the skin. Intravenous injections of these salts produce at first a rapid elevation of arterial pressure with acceleration of the cardiac rate; followed by slowing of the heart, and later on lowered blood-pressure with increased heart-rate. If used for any length of time they induce great waste and rapid elimination of waste products, causing anemia, emaciation and mental depression; but these effects are credited chiefly to the metallic constituent, being most severe from the potassium salt. They combine with certain poisons in the system, particularly lead, mercury and the products of the syphilitic disease, hastening their elimination. *Iodism* is the term applied to the general condition produced by these agents, and comprises the symptoms above noted together with frontal headache, ptyalism, a saline taste in the mouth, dysphagia, temporary impotence, and an acneiform eruption on the face and limbs. Sometimes the eruption is furuncular or even purpuric. It is less apt to result from the use of the Strontium Iodide than from that of the others. The copious dilution of these preparations with water promotes their excretion, and to a great extent prevents the development of unpleasant results. The ptyalism occasionally produced by iodides is not

a direct result of their action, and occurs only in persons who have previously taken mercurials. In such cases the mercury, which had been deposited in the tissues as an albuminate, is set free by the iodide and coming again into the circulation it produces its constitutional effects. (Murrell.)

Potassium Iodide occasionally gives rise to some peculiar symptoms in certain susceptible persons. Among these are diuresis, cerebral excitement as from alcohol, hemorrhages from the urethra and the vagina, glossitis (Gross), also laryngitis and sudden edema of the glottis. The latter may be of so intense a character as to require the instant performance of tracheotomy in order to avert death. On the circulation it produces marked and important effects in most cases. It causes acceleration of the pulse and vascular dilatation, leading to abundant secretion from several glands. It reduces the temperature a degree or more, and slows the rate of the respiration.

Iodoform contains from 94 to 97 per cent. of Iodine and naturally resembles the latter in action. Locally its action is anesthetic and powerfully antiseptic. It is one of the best agents to prevent decomposition and to destroy the germs of putrefaction and of disease, but must be carefully employed, as when used in quantity on an extensive raw surface it has often produced fatal results with symptoms of narcotic poisoning. The first sign of its dangerous absorption is increase of temperature, which may reach 104° F. or more, then headache, quick and feeble pulse, marked anxiety and restlessness. Collapse and death may suddenly supervene. The quantities which have produced fatal results from local absorption vary from 525 to 4,500 grains. In small doses internally it is considered to be a tonic and alterative, wasting does not occur, but the body-weight increases and the general condition improves. In these respects its action markedly differs from that of Iodine or the Iodides. In medicinal doses internally administered for any length of time it may cause profuse salivation.

Ethyl Iodide (see pages 87 and 90) is used by inhalation to bring the system rapidly under the influence of Iodine. It is a good antispasmodic and general stimulant and a very slow anesthetic.

THERAPEUTICS OF IODINE.

The tincture and the compound solution are much employed locally as counterirritants and by injection into cavities as alterative applications, instances of which are their use in glandular tumors, hypertrophied tonsils, cervical and ovarian cysts, empyema, and hydrocele. In various skin diseases, as chloasma, lentigo, lupus, the tincture or a glycerite is well applied, and in many splenic and hepatic disorders of chronic type the ointment or tincture is a favorite counterirritant application. In sores, ulcers, and fissures, a mixture of Iodoform and Tannin is strongly recommended, and the tincture is much used locally to promote absorption of the products of acute inflammations. In acute catarrh and hay-fever inhalations of Iodine-vapor or that from Iodized