

of lethal effects from lethal doses in the lower animals, and has been used successfully in acute opium poisoning in man by Hirschlaff.

**Inorganic Serum**, prepared by Trunecek, is an aqueous solution of the alkaline salts normally found in the blood, and contains Sodium Chloride 4.92 grammes, Sodium Sulphate 0.44, Sodium Phosphate 0.15, Sodium Carbonate 0.21, Potassium Sulphate 0.40, Distilled Water to make 100.00 grammes. The dose, by subcutaneous injection, is 1 Cc., increased by definite increments, up to 5 Cc. every second, fourth, or seventh day. This has been used in arterio-sclerosis by Lévi of Paris and others, who report favorably upon the effects obtained. Trunecek is carrying on investigations with it in the treatment of rheumatism and other congestive conditions, with some promising results.

**Nutrient Serum.** Blood-serum injected subcutaneously in small quantities promotes the catabolism of the body, increasing the excretion of nitrogen, and causing loss of weight; but when large quantities are used it more than counterbalances the loss due to increased catabolism, is utilized as food, and prolongs life without the ingestion of other nutriment (Salter): The blood-serum of one animal injected into another of different species frequently causes transitory pyrexia, rashes, joint-pains, and other unimportant symptoms; but if heated to 150° F. the serum will not produce these effects, while its food-value remains unimpaired. A heated serum from the horse or sheep, injected in proper quantity into the human subject, will act as an efficient nutrient when it is impossible or undesirable to introduce food into the stomach or intestinal canal, as after abdominal operations and in severe cases of gastro-intestinal disease, such as gastric ulcer, typhoid fever and infantile diarrhea, or during the vomiting which occurs with post-diphtheritic paralysis. The amount for an infant is 30 to 40 Cc., for a child 60 to 80 Cc., and for an adult 100 to 120 Cc., repeated after a few days according to the severity of the case.

**SERPENTARIA, *Serpentaria* (Snake-root)**,—is the rhizome and roots of *Aristolochia Serpentina*, or of *Aristolochia reticulata*, indigenous herbaceous plants of the nat. ord. Aristolochiaceæ, growing in rich, shady woods, with purple flowers arising from joints near the roots. It contains a volatile oil, a camphor-resin and a bitter principle named *Aristolochine*, which is soluble in both alcohol and water. All its preparations should be made from the fresh root, as it deteriorates by keeping. Dose, gr. x-xxx [av. gr. xv].

*Preparations.*

**Fluidextractum Serpentinae**, *Fluidextract of Serpentina*.—Dose, ℥x-xxx [av. ℥xv].  
**Tinctura Serpentinae**, *Tincture of Serpentina*.—20 per cent. Dose, ʒss-ij [av. ʒj].  
**Tinctura Cinchonæ Composita**, *Compound Tincture of Cinchona*.—has two parts of Serpentina in 100. (See under CINCHONA.)

**PHYSIOLOGICAL ACTION AND THERAPEUTICS.**

Serpentina is a stimulating expectorant and tonic, a cardiac stimulant, a diaphoretic, diuretic, emmenagogue, aphrodisiac, and somewhat of an anti-periodic. Its taste is warm and pungent, its odor is characteristic. Small

doses promote appetite and digestion, increase the bronchial and intestinal secretions, the action of the heart, the cutaneous circulation and the surface temperature, and produce mental exhilaration. Large doses are irritant, causing nausea and vomiting, vertigo and headache, colic, borborygmi, rectal tenesmus, flatulent distention and frequent but not watery stools. The irritant action seems to produce gas rather than fluid. Pruritus ani and hemorrhoids are occasionally caused by its use.

Serpentina is chiefly employed as a vehicle for other stimulant drugs, but has many uses of its own. In bronchial affections it is extremely valuable as a stimulating expectorant. In typhoid pneumonia it is a good vehicle for ammonium carbonate, and in the exanthemata it is useful when much depression exists. It is indicated in typhoid conditions generally, and in the amenorrhea of anemia and chlorosis it is an efficient emmenagogue in many cases. It will often restore the waning sexual power in functional impotence, while in bilious vomiting it frequently checks the nausea and settles the stomach. It is used as a vehicle for cinchona in remittent fever. In diphtheria and scarlatina an infusion forms an excellent gargle. Its diaphoretic and diuretic properties, though slight, are sometimes of avail in chronic rheumatism.

**SILICON, Si.**—is next to oxygen the most abundant element in nature, its combinations forming about a fourth of the earth's crust. The oxide, *Silica*, SiO<sub>2</sub>, is familiar in the form of sea-sand, flint, quartz, etc., also as silicates of aluminum etc. in clay, granite, glass, felspar and sandstone. It is present in the stems of grasses and the teeth and bones of animals. Silicates of Aluminum, Magnesium, Potassium, and Sodium are used in medicine and surgery.

*Official Silicates.*

**Kaolinum, Kaolin**,—a native aluminum silicate. (See under ALUMINUM, page 115).  
**Talcum, Talc**,—a native hydrous magnesium silicate, a white or grayish-white powder, inodorous and tasteless, insoluble in water.  
**Talcum Purificatum, Purified Talc**,—is prepared by boiling Talc with water and hydrochloric acid, washing and drying the coarser residue.

*Unofficial Silicates.*

**Magnesii Silicas Hydratus, Hydrated Magnesium Silicate, Meerschaum**, 2MgO, 3SiO<sub>2</sub> + 2H<sub>2</sub>O,—a mineral used for the manufacture of smoking-pipes, and employed in France as a substitute for Bismuth Subnitrate in obstinate choleraic diarrhea, to protect the intestinal mucous membrane or as an absorbent. It is given in fine powder and in doses of ʒj-iv per diem.  
**Sodii Silicas, Sodium Silicate**, Na<sub>2</sub>SO<sub>3</sub> + H<sub>2</sub>O,—occurs in white lumps or as a white powder, partly soluble in water, more freely in a dilute solution of soda. Dose, gr. x-ʒj.  
**Liquor Sodii Silicatis, Solution of Sodium Silicate, Soluble Glass Solution**,—is a semi-transparent viscid liquid, of sharp saline taste and alkaline reaction. It usually contains about 20 per cent. of Silica and 10 per cent. of Soda, and is used on bandages to make immovable dressings, being lighter than plaster and stronger than starch. Its *Incompatibles* are Acacia, Acids, and Alcohol.  
**Liquor Potassii Silicatis, Solution of Potassium Silicate**,—also known as Soluble Glass Solution,—is used for immovable dressings in the same manner as the preceding. A mixture of 2 parts of this solution with one of the soda salt solution is said to set more quickly and

firmly than either solution separately. Diluted (1 to 4) the solution of Potassium Silicate has been applied locally in erysipelas, gonorrhœa, cystitis, and vaginitis, as an antiseptic with good results.

Talc is used as a dusting powder in various skin affections, and for infants; in insufflating powders, and as a remedy for diarrhœa, also in the preparation of the official waters and other pharmaceutical preparations.

Sodium Silicate may be administered internally to animals in comparatively large doses without detriment to their general condition. It has been employed with benefit in gout, hyperacidity, acid diabetes and pulmonary tuberculosis, in the latter disease inhibiting progress by inducing the formation of firm scars and coarse capsules, and by changing the process of disintegration into a fibrous condition of the pulmonary tissue (Kobert).

**SINAPIS, Mustard**,—is official under the two following titles, but the pharmacopœial preparations are directed to be made from Black Mustard only.

**Sinapis Alba, White Mustard**,—the seed of *Sinapis alba*, an annual plant of the nat. ord. Cruciferae, cultivated in gardens. It has yellow flowers in racemes, and ribbed pods with a long, ensiform beak. Dose, as emetic, ʒj-ijj [av. ʒij].

White Mustard contains *Myrosin*, a ferment, and *Sinalbin*, a crystalline substance, which reacting on each other in the presence of water produce *Sulpho-cyanate of Acrynyl*, a rubefacient principle allied to the volatile oil of black mustard. It also contains *Sinapine*, an alkaloid, *Erucic* or *Brassic Acid*, and a bland, fixed oil, all three of which are contained also in black mustard.

**Sinapis Nigra, Black Mustard**,—is the seed of *Brassica nigra*, an annual plant of the nat. ord. Cruciferae, native of Europe, but naturalized in the United States. It has small, yellow flowers on peduncles at the end of the branches, also smooth, erect pods with a short beak. Dose, as emetic, ʒj-ijj [av. ʒij].

Black Mustard contains *Myrosin*, a ferment, and *Sinigrin* (potassium myronate), which reacting on each other in the presence of water produce the *Sulpho-cyanide of Allyl*, or *Volatile Oil of Mustard*. It also contains *Sinapine*, an alkaloid, *Erucic* or *Brassic Acid*, and a bland, fixed oil; all three of which are contained also in white mustard.

**Commercial Flour of Mustard** (Unofficial),—is a mixture of white and black mustard seeds ground to a fine powder. It may be employed in lieu of either variety. Dose, as an emetic, ʒj-ijj.

#### Preparations.

**Oleum Sinapis Volatile, Volatile Oil of Mustard**, (*Sulpho-cyanide of Allyl*)  $C_4H_5NS$ ,—a colorless or pale yellow liquid, of pungent, acrid odor and taste and neutral reaction, almost insoluble in water but freely soluble in alcohol and in ether. Dose, ʒss-ʒj [av. ʒss].

**Charta Sinapis, Mustard Paper**,—Consists of Black Mustard, the fixed oil removed by percolation with Benzine, mixed with Solution of Rubber and spread on paper. Each square inch should contain about gr. vj of Mustard. For local use.

**Linimentum Sinapis Compositum, Compound Liniment of Mustard** (Unofficial),—has of the Volatile Oil ʒ, Fluidextract of Mezereum ʒ, Camphor ʒ, Castor Oil ʒ, Alcohol to ʒss.

**Thiosinamin, Allyl Sulpho-carbamide** (Unofficial),—is prepared by heating together Oil of Mustard ʒ, Alcohol ʒ, and Ammonia ʒ. It occurs as colorless crystals, which are very soluble in water, in alcohol, and in ether. A 15 to 20 per cent. alcoholic solution is used hypodermi-

cally in lupus; or a 10 per cent. solution in glycerin and water hypodermically for cicatricial stenosis of the esophagus, corneal opacities, and to promote the absorption of fibrous deposits in joints.

#### PHYSIOLOGICAL ACTION AND THERAPEUTICS.

Mustard is not irritant until its oil is developed by the action of water, and then it requires time to produce its local effects, which are rubefacient and counterirritant, also vesicant after its prolonged application. It stimulates the nervous system and produces heat, redness, severe burning pain and finally local inflammation, leaving sores which heal with difficulty and often become gangrenous. The Oil is highly irritant, and powerfully germicidal even in the dilution of 1 to 33,000 (Koch). Taken internally in full dose it may excite severe gastro-enteritis. Mustard taken internally in small doses is a condiment and carminative, in full dose it acts promptly as an emetic when mixed with warm water.

Mustard paste is used for disinfecting the surgeon's hands, after washing with sterilized corn meal as a mechanical cleanser (Park). Mixed with water it is commonly employed as a local application to redden the skin, cause counter-irritation, relieve pain, and stimulate the heart, the vascular system, and the respiratory apparatus, as in muscular rheumatism, neuralgia, colic, gastralgia, inflammation of the throat, larynx, bronchi, lungs, pleuræ and pericardium; also as a derivative in headache, cerebral congestion, and suppressed menstruation. When action of a mild character is desired it may be diluted with flaxseed or flour. Internally it may be employed as an emetic in indigestion or narcotic poisoning. Its use as a condiment is familiar, acting by stimulation of the gastric mucous membrane. In overdoses it may excite severe gastritis. White Mustard seed, unground, has been used as a laxative, as it produces no irritation. The Oil is used chiefly as an ingredient of stimulating liniments, but may be employed internally in doses of  $\frac{1}{2}$  to  $\frac{1}{4}$  drop as a gastric stimulant.

**SODIUM, Natrium, Na**.—This metal is represented in medicine by a number of official salts, which are generally colorless or white, and with very few exceptions are readily soluble in water. Some of them are found native, as the *Chloride*, in sea-water, salt lakes, salt mines; the *Nitrate*, in Peruvian deserts; and the *Borate*, in dry lakes of Persia, California, etc. The *Carbonate* occurs in the ashes of marine plants. From the Chloride is prepared the Sulphate, from this the Carbonate, and from the latter most of the other salts are prepared. All sodium salts impart a yellow color to flame, which should not appear more than transiently red when observed through a blue glass. The latter cuts off the yellow rays but allows the violet ones of potassium to be seen.

#### Sodium Salts and their Preparations.

**Sodii Hydroxidum, Sodium Hydroxide, Soda, NaOH**,—is a white, hard, opaque solid, deliquescent in moist air, efflorescent in dry air, odorless, of intensely acrid and caustic taste and strongly alkaline reaction, soluble in 1.7 of water at 59° F., and in 0.8 of boiling water,

very soluble in alcohol. Is a powerful caustic, but milder than Potassa, and should be kept in well-stoppered bottles made of hard glass.

**Liquor Sodii Hydroxidi**, *Solution of Sodium Hydroxide*, *Solution of Soda*,—contains about 5 per cent. of the hydroxide, and is prepared by dissolving 56 of Soda in 944 of Distilled Water. It is a clear, colorless liquid, odorless, of acrid and caustic taste and strongly alkaline. Dose,  $\text{m}\bar{\nu}$ - $\bar{\text{ss}}$  [av.  $\text{m}\bar{\nu}\text{xv}$ ], well diluted with water.

**Sodii Acetas**, *Sodium Acetate*,  $\text{NaC}_2\text{H}_3\text{O}_2 + 3\text{H}_2\text{O}$ ,—large, transparent prisms, efflorescent in dry air, odorless, of saline, bitter taste and a neutral or faintly alkaline reaction, soluble in 1.4 of water and in 30 of alcohol at  $59^\circ\text{F}$ ., in  $\frac{1}{2}$  of boiling water and in 2 of boiling alcohol. Dose, gr. v-xxx [av. gr. xv].

**Sodii Carbonas Monohydratus**, *Monohydrated Sodium Carbonate*,  $\text{Na}_2\text{CO}_3 + \text{H}_2\text{O}$ ,—a white, crystalline, granular powder, soluble in water and in glycerin, insoluble in alcohol and in ether. Dose, gr. j-vij [av. gr. iv].

**Sodii Bicarbonas**, *Sodium Bicarbonate*,  $\text{NaHCO}_3$ ,—an opaque, white powder, permanent in the air, odorless, of cooling, saline taste, and a slightly alkaline reaction; soluble in 12 of water, insoluble in alcohol, decomposed by hot water and converted into normal Carbonate. Of it 20 grains neutralize 16.7 grains of Citric Acid, or 17.8 grains of Tartaric Acid. It is a constituent of *Mistura Rhei et Sodæ* and of *Pulvis Effervescens Compositus*. Dose, gr. x-xxx [av. gr. xv].

**Trochisci Sodii Bicarbonatis**, *Troches of Sodium Bicarbonate*,—each troche contains of the Bicarbonate about 3 grains, with Sugar, Nutmeg, and Mucilage of Tragacanth.

**Sodii Citras**, *Sodium Citrate*,—a white, granular powder, of cooling and saline taste, very soluble in water, slightly soluble in alcohol. Dose, gr. v-xxx [av. gr. xv].

**Sodii Chloras**, *Sodium Chlorate*,  $\text{NaClO}_3$ ,—colorless, transparent tetrahedrons, permanent in dry air, odorless, of cooling, saline taste and neutral reaction; soluble in 1.1 of water and in about 100 of alcohol, also in 0.5 of boiling water and in about 40 of boiling alcohol. Should be kept in well-stoppered bottles, and should be not mixed or heated or triturated with readily oxidizable or combustible substances. Dose, gr. j-x [av. gr. iv].

**Sodii Chloridum**, *Sodium Chloride*, (*Common Salt*),  $\text{NaCl}$ ,—white, hard, cubical crystals or a crystalline powder, permanent in the air, odorless, of a purely saline taste and neutral reaction; soluble in 2.8 of water at  $59^\circ\text{F}$ ., and in 2.5 of boiling water. Almost insoluble in alcohol. Dose, gr. x- $\bar{\text{ss}}$  j [av. as emetic  $\bar{\text{ss}}$ iv].

**Sodii Ethylas**, *Sodium Ethylate*, *Caustic Alcohol*,  $\text{C}_2\text{H}_5\text{NaO}$  (Unofficial),—is a white powder, often having a brownish tinge, dissolving in water with a hissing sound. Upon contact with the smallest quantity of water or moist living tissue it splits into alcohol and caustic soda. An alcoholic solution is made by dissolving sodium in absolute alcohol, and is used as a caustic. Chloroform decomposes it at once into ether and sodium chloride. It should be kept in a cool place, as it is liable to explode.

**Sodii Nitras**, *Sodium Nitrate*, (*Chili Nitre*, *Chili Saltpetre*)  $\text{NaNO}_3$ ,—colorless, transparent crystals, slightly deliquescent, odorless, of cooling, saline and bitter taste, and neutral reaction; soluble in 1.3 of water at  $59^\circ\text{F}$ ., in 0.6 of boiling water, scarcely soluble in cold alcohol. Dose, gr. v-xxx [av. gr. xv].

**Sodii Sulphas**, *Sodium Sulphate*, (*Glauber's Salt*)  $\text{Na}_2\text{SO}_4 + 10\text{H}_2\text{O}$ ,—large, colorless, transparent, monoclinic prisms, rapidly efflorescent in air; of cooling, saline taste and neutral reaction; soluble in 2.8 of water at  $59^\circ\text{F}$ ., in 0.25 of water at  $93.2^\circ\text{F}$ ., and in 0.47 of boiling water, insoluble in alcohol. Dose, gr. v-xx; as a purgative  $\bar{\text{ss}}$ ss-j [av.  $\bar{\text{ss}}$ ss].

**Uricedin** (Unofficial),—is the trade name of a preparation which contains Sodium Citrate 67 per cent., Sodium Sulphate 27 $\frac{1}{2}$  per cent., Sodium Chloride 1.6 per cent., and smaller quantities of the citrates and phosphates of potassium and calcium. It is used in lithemia and gout. Dose, gr. x-xxx.

The **Arsenate** is described under **ARSENUM**;—the **Benzoate** under **BENZOINUM**;—the **Borate** under **ACIDUM BORICUM**;—the **Bromide** under **BROMUM**;—the **Solution of Chlorinated Soda** under **CHLORUM**;—the **Iodide** under **IODUM**;—the **Hypophosphite**, **Phosphate** and **Pyrophosphate** under **PHOSPHORUS**;—the **Nitrite** under **AMYL NITRIS**—the **Salicylate** under **SALICIN**;—the **Sulphite**, **Bisulphite** and **Thiosulphate**, under **ACIDUM SULPHUROSUM**; and the **Phenolsulphonate** under **PHENOL**.

#### Incompatibles.

Incompatibles with *Sodium Compounds* are as for Potassium compounds (see page 401), those with *Sodium Salts* are given under their respective acid constituents, as the *Carbonate* under the title **CARBONEUM**, the *Sulphate* under **ACIDUM SULPHURICUM**.

#### PHYSIOLOGICAL ACTION.

The action of the Sodium salts is similar to that of the Potassium salts, except that the former are feebler as alkalies, are not so depressant, and are not so poisonous to the cardiac muscle or the nerves. They are diffused more slowly, are neither absorbed nor excreted so readily, and have not so marked diuretic action. Locally applied in large doses to muscular and nervous tissues they are paralyzant, but not so powerfully as potassium salts. Sodium urate is not soluble like the urates of lithium and potassium, and is therefore much less readily excreted, forming the masses called chalk-stones in gouty subjects. Soda is a less active escharotic than potash, having less affinity for water. *Liquor Sodii Hydroxidi* renders the blood and secretions more alkaline, but does not alter nutrition to the extent that the potassium solution does. The Acetate is converted into the carbonate in the blood, and is a less active diuretic than the corresponding potassium salt. The Carbonate is irritant to the stomach, and is chiefly used in the preparation of the other salts. The Nitrate is mildly purgative and diuretic, and in solution is solvent to false membranes. The Ethylate is antiseptic, and a powerful but almost painless escharotic.

Sodium Bicarbonate has the same action as the corresponding potassium salt, except that it is more slowly absorbed and is less depressant. It is antacid, antipruritic, and analgesic, the latter being probably due to the increased alkalinity imparted by it to the blood. Internally in small doses it is neutralized by the hydrochloric acid of the gastric juice; in medium doses it is solvent to the gastric mucus, slightly irritant to the stomach, and sedative to the gastric nerves; in large doses it renders the stomach contents neutral or alkaline and stops the gastric digestion.

Sodium Chloride, common salt, is one of the most important and abundant of the saline constituents of the animal organism, existing normally in the blood, where it keeps the fibrin and albumin in solution. In inflammation, being thus needed, it accumulates at the seat of the morbid action, disappearing temporarily from the urine, its reappearance therein being considered one of the surest signs of the patient's improvement. In very dilute solution it enables water to dissolve both albumins and globulins, and renders water non-irritant to the animal tissues and harmless to the red blood-corpuscles. For these purposes the solution employed is one of 0.65 per cent., known in experimental physiology as the *normal salt solution*. In substance or in concentrated solution, this salt is very irritant to cut surfaces, mucous membranes, muscle and nerve tissues. Taken into the stomach in quantity it irritates that organ and induces vomiting. When absorbed in excess of the normal requirements of the body it causes the peculiar nervous irritation expressed by the sense of *thirst*; which is relieved only by the ingestion of water in sufficient quantity to enable the excess to be dissolved and excreted by the kidneys. It is rapidly absorbed, and rapidly excreted; and acts as a hemostatic, decreases the secretion of mucus, is a vermifuge against thread-worms, promotes the absorption of pleuritic exudations

and dropsies, and has considerable power as an antiperiodic and an antiseptic. In excess it neither increases nor decreases the elimination of urea or other products of tissue-waste. The excessive ingestion of potassium salts (as in the cases of herbivorous animals and vegetarian cranks) increases the excretion of sodium chloride by a double decomposition between these salts in the blood, forming potassium chloride and sodium phosphate, which being foreign to the blood are constantly excreted. In this way, by a continuous vegetable diet the normal amount of sodium chloride in the organism may be greatly reduced, and the animal will feel the want of it and will often travel hundreds of miles to visit a salt-lick.

Sodium Sulphate, administered by the mouth in dilute solution, excites active secretion in the intestines, especially in the small intestine, partly by its bitterness but also by its irritant quality and its specific power of stimulating the activity of the intestinal glands. The action is not an osmotic one, as was formerly taught. The stimulation caused by this salt extends to the liver and the pancreas, especially the former. The absorption of the secretions is impeded by the low diffusibility of the salt, the result being a large accumulation of fluid in the intestinal canal, which finds its way to the rectum and produces purgation. The more dilute the solution employed the more prompt will be the effect, and this salt will not produce catharsis if administered in concentrated solution. When injected into the blood it excites no intestinal secretion, does not act as a purgative, and produces no toxic effect. [Magnesium Sulphate is toxic when so administered.] The quantity of Sodium Sulphate to the pint of Carlsbad water (Sprudel) is 20 grains, in Friedrichshall  $46\frac{1}{2}$  grains, and in Hunyadi Janos from 122 to 173 grains; the last being the most active hepatic stimulant of the three. A mixture of the Sulphate and the Bicarbonate is sold as the natural salt obtained by evaporation of Carlsbad water.

The action of the other Sodium salts is described under the titles of the respective constituents to which their effects are mainly referable.

#### THERAPEUTICS.

The Sodium salts mentioned in the first paragraph treating of their action are not much used internally, the corresponding Potassium salts being preferred, especially when it is desired to alkalinize the urine or to promote oxidation. In the alkaline treatment of stomach affections the Sodium salts are the most efficient, especially the Bicarbonate, which is in common use as a gastric sedative and antacid. This salt in powder or saturated solution on compresses is an efficient analgesic application for burns and scalds, also to relieve the pain attending large boils and rheumatism of the joints. It is an efficient application to painful dental cavities, and to the gums in many cases of toothache. Dilute solutions are employed locally in eczema and itching skin affections. Internally it is used with benefit in frontal headache with constipation, to reduce the excretion of sugar in diabetes, and in doses of  $\text{ʒij-iv}$  to neutralize the acid toxins in diabetic

coma. The Carbonate may be used in dilute solution locally as an antipruritic, also as an alkaline bath, to remove cutaneous scabs and scaly incrustations. Added to the boiling water in which surgical instruments are sterilized, in the proportion of 1 per cent. it will prevent their rusting. The Sulphate is an efficient purgative and somewhat of an hepatic stimulant, and may be administered alone or with the bicarbonate in imitation of Carlsbad salts, for bilious disorders, gouty affections, chronic constipation, obesity and diabetes mellitus. The Chlorate has uses similar to those of potassium chlorate, and being more soluble can be used in stronger solutions, but this is of doubtful benefit for internal administration, as it possesses all the irritating power on the kidneys and destructive action on the blood possessed by the other salt. The Nitrate is employed as a mild cathartic, and in solution by atomization to destroy the false membrane in diphtheria. The Ethylate has been of service as a caustic in cancer, lupus and nevus, for the latter affection being painted over the growth with a glass rod. Caustic Soda is a better escharotic than caustic potassa, as it has less affinity for water, and hence does not destroy the tissues so deeply, nor has it the same tendency to run over adjacent parts.

Sodium Chloride is employed in baths as a mild general stimulant and a cutaneous tonic, and in concentrated hot baths for chronic rheumatism and sciatica. As an anthelmintic for threadworms it is used by enema in the strength of two tablespoonsful to the pint of water. As the *normal salt solution*, 0.65 per cent., or 50 grains to the pint of sterilized water, it is employed to wash out wounds and to irrigate the nasal and abdominal cavities; also subcutaneously or by intravenous or rectal injection to supply fluid lost in cholera and severe hemorrhages, and to dilute toxins in the blood and promote their elimination in uremia and other intoxications. A better solution would be one of 0.9 per cent., containing also a small quantity of the chlorides of calcium and potassium (Ringer). Internally it is used as an emetic and a hemostatic, as an antidote in poisoning by silver nitrate, and as a remedy in bilious diarrhea and migraine.

The therapeutics of the other sodium salts are described under the titles of the constituents to which their uses are chiefly referable.

**SOLANUM CAROLINENSE**, *Horse-nettle*, *Sand-brier* (Unofficial),—is a weed belonging to the nat. ord. Solanaceæ, a native of Florida and Carolina. In epilepsy a 20 per cent. tincture of the berries is highly recommended, in doses of  $\text{ʒss-j}$  thrice daily. It has been used with benefit in convulsions due to the albuminuria of pregnancy and in other convulsive affections.

**SPIGELIA**, (*Pink-root*)—is the dried rhizome and roots of *Spigelia marilandica*, the Carolina Pink, an herbaceous perennial of the nat. ord. Loganiaceæ, native of the Southern States; having large, showy flowers, scarlet or crimson externally, yellow within. It contains a bitter principle and a volatile oil, also tannin, wax, resin, lignin and salts. Dose,  $\text{ʒss-ij}$  [av.  $\text{ʒj}$ ] for an adult; gr. x-xx for a child of 3 years.

**Fluidextractum Spigeliae**, *Fluidextract of Spigelia*.—Dose for an adult, ʒss-ij [av. ʒj]; for a child of 3 years, ʒx-xx.

**Infusum Spigeliae Compositum**, *Compound Infusion of Spigelia, Worm Tea* (Unofficial).—has Spigelia 15, Senna 10, Fennel 10, Manna 30, Water 500. Dose, ʒjss-v.

Spigelia is anthelmintic against the round-worm (*ascaris lumbricoides*), and is in popular use as a vermifuge, administered with senna. In large doses it is an uncertain cathartic, and may produce serious symptoms, as vertigo, dimness of vision, dilated pupils, spasms and convulsions. These effects are most apt to occur when the drug fails to produce purgation, hence it is usually administered with an active cathartic.

**Spigelia Anthelmia**, *Demarara Pink-root, Worm-grass* (Unofficial).—produces vomiting, dilated pupils, dyspnea, convulsions and death. If eaten by cattle they perish in great agony. It has been used with real benefit in cardiac affections of rheumatic origin, also in rheumatic fever and in cardiac palpitation with dyspnea, due to mitral and aortic disease. A tincture (1 in 8) may be used in doses of ʒv-xx.

**STAPHISAGRIA**, (*Stavesacre*),—is the ripe seed of *Delphinium Staphisagria*, an annual or biennial plant of the nat. ord. Ranunculaceae, a native of Europe, having bluish or purple flowers in terminal racemes, and seeds in straight, oblong capsules. The seeds contain an alkaloid *Delphinine*, probably three other alkaloids, a bitter principle, a volatile oil and a fixed oil, etc. Dose, gr. ss-ij [av. gr. j].

**Fluidextractum Staphisagriae**, *Fluidextract of Staphisagria*.—Dose, ʒss-ij [av. ʒj].

**Unguentum Staphisagriae**, *Ointment of Staphisagria* (Unofficial).—contains of the powdered seeds 1 part with 2 each of olive oil and lard.

**Delphinina**, *Delphinine*,  $C_{22}H_{33}NO_6$  (Unofficial).—is the active alkaloid, and exists in the fatty oil which is extracted by ether. Dose, gr.  $\frac{1}{2}$ - $\frac{1}{4}$ .

Stavesacre is a violent emetic and cathartic, also parasiticide. The alkaloid is irritant to the skin if locally used, producing tingling, burning and inflammation. Internally, it lowers the activity of the heart and respiration, produces a most profound adynamia, and may prove fatal from paralysis of the spinal cord and asphyxia. In many respects its alkaloid resembles Aconitine and Veratrine. The ointment is often employed as a parasiticide against pediculi and the acarus scabiei. The fixed oil is probably equally effective. Delphinine has been used internally in asthma, rheumatism and neuralgia, and in the latter affection is well employed as an ointment (gr. xx to ʒj), applied over the course of painful superficial nerves. It has been suggested as an antipyretic and for dropsy. A tincture or fluidextract is a very efficient application against pediculi.

**STILLINGIA**, *Stillingia*,—is the root of *Stillingia sylvatica*, the queen's delight, an indigenous, perennial plant of the nat. ord. Euphorbiaceae. It contains a resin and a volatile oil, but its active principle has not yet been isolated. The fresh root should be used in making the preparations, as those from the dried root are almost inactive. Dose of the powdered root, gr. x-ʒj [av. gr. xxx].

#### Preparations.

**Fluidextractum Stillingiae**, *Fluidextract of Stillingia*.—Dose, ʒx-ʒj [av. ʒxxx].

**Syrupus Stillingiae Compositus**, *Compound Syrup of Stillingia* (Unofficial).—is composed of Stillingia, Corydalis, Iris, Chimaphila, Coriander, Xanthoxylum, Sambucus, Sugar, Water and Alcohol. For the formula, see U. S. Dispensatory, 17th edition. Dose, ʒj-iv thrice daily.

**Succus Alterans** (McDade).—is a proprietary preparation much used by southern practitioners in syphilis. It is said to contain Stillingia, Lappa, Phytolacca, Sarsaparilla and Xanthoxylum. Dose, ʒj-iv, thrice daily.

#### PHYSIOLOGICAL ACTION AND THERAPEUTICS.

Stillingia in large doses is emetic and cathartic, in smaller doses is expectorant, diaphoretic, diuretic, sialagogue and cholagogue, possessing the various properties which are considered alterative. Its taste is acrid and pungent, it increases the action of the heart, skin, kidneys, and bronchial mucous membrane, also the gastric, hepatic, intestinal and salivary secretions. Full doses excite epigastric pain, nausea and vomiting.

Stillingia is much employed with Sarsaparilla and similarly acting drugs as an alterative in syphilitic affections, particularly in chronic cases of the tertiary form, in which the system is greatly reduced by the abuse of mercurials and iodides. In these cases it possesses considerable power and frequently cures. It is highly esteemed in strumous affections, in ascites due to hepatic changes, in portal changes with jaundice following malaria, in intermittent fever, habitual constipation, and hemorrhoids from hepatic obstruction. In ague the fluid extract with quinine or arsenic is a useful combination, and a strong decoction has been employed to ward off an impending paroxysm. The compound syrup, a model of polypharmacy, is largely used by physicians in the western and southern states.

**STRAMONIUM**, *Stramonium*,—is the dried leaves of *Datura Stramonium*, the Jamestown weed or Thornapple, nat. ord. Solanaceae, yielding on assay not less than 0.35 per cent. of mydriatic alkaloids. The plant is an annual, of rank and vigorous growth, has a green stem with large, white flowers, and grows wild in Russia and the middle United States. It contains the alkaloids *Atropine* and *Hyoscyamine*, also some *Hyoscine* (see pages 171 and 310), and a volatile oil containing Daturic Acid. *Daturine* is the name of the mixed alkaloids. Dose, gr. ss-iiij [av. gr. j].

**Datura Tatula** (Unofficial).—is an indigenous plant of the nat. ord. Solanaceae, resembling Stramonium very closely, with which it generally agrees in its alkaloids, physiological action and therapeutics. It is distinguished by its purple stem, purple flowers and anthers, and the darker green of its leaves. It has been smoked in asthma, in a few cases giving continued relief when Stramonium had failed to render any service.

**Mandragora**,—the plant *Mandragora autumnalis*, contains *Mandragorine*, which is probably a mixture of Atropine and Hyoscyamine.

#### Preparations.

**Extractum Stramonii**, *Extract of Stramonium*.—Dose, gr.  $\frac{1}{2}$ - $\frac{1}{4}$  [av. gr.  $\frac{1}{2}$ ].

**Fluidextractum Stramonii**, *Fluidextract of Stramonium*.—Dose, ʒss-iiij [av. ʒj].

**Tinctura Stramonii**, *Tincture of Stramonium*.—10 per cent. Dose, ʒv-xv [av. ʒviiij].

**Unguentum Stramonii**, *Stramonium Ointment*.—has of the Extract 10, Diluted Alcohol 5, Benzoinated Lard 65, Hydrous Wool Fat 20.

**Daturina**, *Daturine*, (Unofficial).—is a mixture of the alkaloids. Dose, gr.  $\frac{1}{10}$ - $\frac{1}{20}$ .

#### Incompatibles.

Incompatibles are as for Belladonna (see page 171); with the addition of Mineral Acids and the salts of Iron, Lead, Mercury and Silver.

## PHYSIOLOGICAL ACTION AND THERAPEUTICS.

The action of Stramonium is similar to that of Belladonna in almost every particular, except that Stramonium is more powerful and chiefly influences the sympathetic nervous system, not affecting the motor or sensory nerves. It excites a greater degree of cardiac irregularity and a more furious delirium, and seems to have a special affinity for the generative apparatus, being decidedly aphrodisiac in full doses. It relaxes the muscular coat of the bronchial tubes more powerfully than belladonna. Poisoning by Daturine is not to be distinguished from that by Atropine.

Stramonium is chiefly used as an antispasmodic and to relieve local pain. In asthma the leaves are smoked with advantage at the commencement of a paroxysm, the smoke being drawn into the lungs. In other spasmodic affections, as hepatic colic, laryngeal cough, chorea and stammering, it is very beneficial. In dysmenorrhea and neuralgia it is used in combination with opium and hyoscyamus, and in tic douloureux and sciatica it is often efficient. In nymphomania with great mental depression it is frequently effective, and in mania of furious character, particularly the puerperal form with suicidal tendency, it is highly serviceable in 10 to 20 minim doses of the tincture every 3 or 4 hours. The ointment is much used in irritable ulcers, and as an anodyne application in painful hemorrhoids and certain cutaneous diseases.

**STRONTIUM, Sr.** This metal is represented in medicine by four salts, the Bromide, Iodide, and Salicylate, which are respectively described under BROMUM, IODUM, and SALICINUM, also the unofficial salt—

**Strontii Lactas, Strontium Lactate,** (Unofficial),—a white, granular powder, or crystalline, nodules, of slightly bitter and saline taste; soluble in 4 of water, in less than  $\frac{1}{2}$  of boiling water also in alcohol. Dose, gr. v-xxx.

*Incompatible* with Strontium Salts are: Alkalies, Carbonates, Chromates, Oxalates, Phosphates, and Sulphates.

The Strontium salts are among the recent additions to the materia medica. Their marked anti-putrescent and antiseptic properties were first noticed in 1891 by Germain Sée, on patients suffering from gastric dilatation. He found that in such cases the Bromide prevented the acetic and lactic fermentations and the formation of the gases of decomposition. The toxic action, hitherto attributed to the salts of strontium, has been ascertained to be due to barium, which was present in the commercial products used. When pure, they may be safely employed in the same doses, and in the same cases, as the corresponding preparations of potassium and sodium; while they are much less liable to cause eruptions and are more rapidly and completely eliminated by the kidneys.

The Lactate has been successfully employed in diabetes and in albuminuria. It diminishes the amount of albumin in Bright's disease, in the parenchymatous nephritis of rheumatic and scrofulous subjects, and in the albuminuria of pregnancy; for which purpose it should be given in full doses (gr. xxx) thrice daily.

It is contraindicated when there is scanty urine or symptoms of uremia. Da Costa held that while the strontium salts are admirable as diuretics in renal affections, they accomplish more in the acute than in the chronic forms of nephritis.

The actions and uses of the Bromide, Iodide and Salicylate are given under the titles BROMUM, IODUM and SALICINUM respectively.

**STROPHANTHUS**,—is the ripe seed, deprived of its long awn, of *Strophanthus Kombé*, an African climbing plant of the nat. ord. Apocynaceæ, from which the natives extract a toxic preparation known as the Kombé arrow-poison. It contains a crystalline glucoside, named *Strophanthin*, the active principle, which is an agent of great energy, the frog being killed by a solution of 1 part in 10,000,000. Dose of Strophanthus, gr. ss-ij [av. gr. ij].

## Preparations.

**Extractum Strophanthi, Extract of Strophanthus** (B. P.),—is prepared by percolation with ether and alcohol. Dose, gr.  $\frac{1}{4}$ -j.

**Tinctura Strophanthi, Tincture of Strophanthus**, (10 per cent.).—Dose  $\mathfrak{m}\mathfrak{v}$ -x, [av.  $\mathfrak{m}\mathfrak{v}\mathfrak{i}\mathfrak{j}$ ], or  $\mathfrak{m}\mathfrak{x}$ -ij frequently repeated. A stronger tincture (1 in 8) is on the market.

**Strophanthinum, Strophanthin**,  $C_{31}H_{45}O_{12}$ ,—constitutes 8 to 10 per cent. of the seeds, and is very soluble in water and in alcohol. It varies in composition and power and its solutions are prone to decomposition. Dose is generally given at gr.  $\frac{1}{300}$ - $\frac{1}{100}$  [av. gr.  $\frac{1}{200}$ ], but gr.  $\frac{1}{50}$  has often seemed inert, and gr.  $\frac{1}{300}$  of some samples has been found to be a sufficient dose.

## Analogue.

**Ouabain**,  $C_{30}H_{46}O_{12}$  (Unofficial),—is a glucoside obtained from the root and wood of *Acocanthera Ouabain*, an apocynaceous tree of the Somali coast; also from the seeds of *Strophanthus glabrus*, a climbing plant from Gaboon. The former furnishes an arrow poison used by the African natives. Ouabain occurs in white, odorless crystals, of feebly bitter taste; soluble in hot water and in spirit, slightly in cold water, insoluble in absolute alcohol, chloroform and ether. Dose, gr.  $\frac{1}{1000}$ - $\frac{1}{500}$ . In the blood gr.  $\frac{1}{50}$  is sufficient to kill a man.

## Incompatibles.

Incompatibles with *Strophanthus* are those for glucosides (see page 8).

## PHYSIOLOGICAL ACTION.

Strophanthus is primarily a muscle poison of great energy. It increases the contractile power of muscular tissue, and a poisonous dose fixes the muscles in permanent tetanic rigidity, the fibres being unable to resume their normal condition of partial flexibility. As the heart receives much more blood in a given time than any other muscle in the body, it is quickly and markedly affected by the strophanthus-charged fluid, and by regulating the dosage the cardiac muscle may be affected by a quantity which will not influence the other muscles.

Small doses of Strophanthus act exactly like Digitalis on the heart, stimulating the contractions, increasing the force of the ventricular systole, and lowering the cardiac rate. At the same time the general blood-pressure is raised and diuresis is produced, both being due to the *vis a tergo*—the direct stimulation of the circulation from behind. Large doses paralyze the heart in systole and