without producing cathartic results. The preparations most in use for children are the Aromatic Syrup and the Mistura Rhei et Sodæ.

**RHUS AROMATICA, Sweet Sumach** (Unofficial),—is an indigenous shrub of the nat. ord. Terebinthaceæ, growing about 5 feet high, and having yellow flowers in spikes. The root-bark contains a volatile oil, several resins, fat, tannin, etc. A fluidextract is prepared from the bark of the root acccording to the general pharmacopœial rule, and may be given in doses of ♏x–xxx, every 2 or 3 hours.

Rhus Aromatica has astringent properties, and seems to possess a selective action upon the urinary tract. Its action is not yet clearly made out. Therapeutically it has been used with advantage in cystitis, night-sweats, hematuria, menorrhagia, diabetes insipidus, diarrhea and dysentery. As a remedy for incontinence of urine in children it has attracted considerable attention, having been extremely efficient in doses of ♏xv of a good fluidextract four times daily, administered in glycerin and water, or any other suitable excipient. It is reported to be equally effective in hysterical enuresis of adults, but larger doses (♏xx–xxx several times a day) are required. Diabetes insipidus is remarkably benefited by its continued use, and even in diabetes mellitus its employment has occasionally seemed to have been curative.

**RHUS GLABRA** (*Smooth Sumach*),—is the dried fruit of *Rhus glabra*, an indigenous shrub of the nat. ord. *Anacardiaceæ*, growing in rocky and barren soil to a height of 8 to 12 feet. The leaves and bark have an astringent and bitter taste, and are also used medicinally. It contains tannin, coloring matter, also potassium and calcium malates.

**Fluidextractum Rhoïs Glabræ,** *Fluidextract of Rhus Glabra.*—Dose, ♏v–xxx [av. ♏xv.]

Sumach-berries form a useful acidulous and astringent drink or gargle in catarrhal pharyngitis, stomatitis, and aphthæ. An infusion (℥j to the pint) or the official fluidextract may be used as a wash and dressing for ulcers and wounds. Internally they are useful remedies for mild catarrhal affections of the stomach and bowels.

**RHUS TOXICODENDRON, Poison Ivy** (Unofficial),—is the fresh leaves of *Rhus radicans*, a plant of the nat. ord. *Anacardiaceæ*, indigenous to Canada and the greater part of the eastern United States. This climbing plant is not by itself a distinct species, but a variety of the erect shrub, *Rhus Toxicodendron*, the poison oak, formerly official as a source of the drug; both of which when wounded exuding a poisonous, acrid, milky juice, which turns dark on exposure. The poisonous principle of the plant is *Toxicodendric Acid*, which is volatile, and also exists in *Rhus venenata* the swamp sumach, *Rhus pumila*, and *Rhus diversiloba*, the first of which is probably the most poisonous of the four. The dose of the leaves is generally placed at gr. j–iv, but if old and dry they will generally prove to be inert.

**Tinctura Rhoïs Toxicodendri,** *Tincture of Rhus Toxicodendron* (Unofficial),—may be prepared according to the formula of the Pharmacopœia for Tincturæ Herbarum Recentium (tinctures of fresh herbs), one part of the fresh leaves to two of Alcohol. Dose, ♏$\frac{1}{20}$–♏ij.

**Extractum Rhoïs Toxicodendri,** *Extract of Rhus Toxicodendron* (Unofficial),—has been used in France in large doses. It is probably inert.

### Physiological Action.

The effects of Rhus Toxicodendron upon the skin are familiar to all who have suffered from contact with poison-oak or ivy. Some persons are so susceptible to this poison that the exhalations from the plant will produce on them its characteristic action. Others are apparently insusceptible to its influence, and can with impunity rub the juice into their skin, or even chew its leaves. The action of the plant when locally applied is that of a cutaneous irritant, causing redness and swelling of the affected parts, with a vesicular eruption and intolerable itching, which may spread rapidly over the surface of the body and extend to the mucous membranes, producing conjunctivitis, redness and tumefaction of the mouth and throat, thirst, cough, nausea and vomiting, vertigo and stupefaction. Colicky pains are experienced in the abdomen, are worse at night and are aggravated by food and drink. Diarrhea may occur, with tenesmus and bloody stools, also diuresis, bloody urine, or even complete retention. Fever with delirium is frequently present, and may be typhoid in character, or intermittent with profuse perspiration. Pains of rheumatoid type are experienced throughout the body, but particularly in the joints and lumbar region, apparently intensified by rest and heat. The fibrous structures are evidently the seat of its selective action, and a sensation of numbness in the lower extremities is frequently experienced. Similar phenomena attend its internal administration, but fatal results have not followed in any case of poisoning recorded. The effects of the poison usually last from ten to fifteen days, and are then followed by desquamation of the epidermis.



### Therapeutics.

Rhus Toxicodendron was used medicinally by Dufresnoy in France and by Alderson in England about the close of the eighteenth century. The attention of the former was attracted to it by the accidental poisoning of a student who was afflicted with chronic eczema, which disappeared on the subsidence of the Rhus symptoms. It is a favorite remedy with the so-called homeopathists, who ascribe to it extraordinary virtues in acute cutaneous affections of vesicular type, subacute and chronic rheumatism, vesicular erysipelas and typhoid fever. Among regular authorities it has met with very little favor as a remedial agent, though Phillips recommends it strongly in rheumatic affections of the fibrous tissues, erythema and erysipelas, eczema, herpes zoster and pemphigus. Piffard corroborates these opinions of its therapeutical value, and states that when rheumatic pain is worse at night prompt relief may be expected from Rhus. It was used by Dufresnoy in paralyses with some success, and Eberle reports a case of paralysis in which it proved curative. It is admitted by many observers to be a useful remedy in paralytic affections of the lower extremities depending on a rheumatic diathesis, or resulting from exposure to cold and wet. As an external application it is efficacious in sprains and other affections of ligaments and tendons, extensive but superficial burns, stings of insects and chilblains. For these affections a lotion of about ʒss of the tincture to a pint of water is usually employed.

**RICINI OLEUM, Castor Oil,**—is a fixed oil expressed from the seeds of *Ricinus communis*, a tree of the nat. ord. Euphorbiaceæ, indigenous to India,

but extensively cultivated in the United States. The oil is an almost colorless, transparent, viscid liquid, of faint odor, bland or slightly acrid taste, neutral reaction, soluble in an equal weight of alcohol. It consists mainly of *Ricinolein*, the glyceride of ricinoleic acid, also palmitin, stearin and myristin in small quantities, and an acrid principle. The seeds contain a highly toxic ferment or phytalbumose named *Ricin*, and an alkaloid, *Ricinine*, which seems to be inert. Dose, ʒij–℥j [av. ʒiv.]

*Administration.*

The nauseous smell is best concealed by the Essential Oil of Bitter Almonds. Emulsions are not a success. Capsules containing the requisite dose are easily obtained. In the absence of these the best way to administer a dose of oil is to smear the sides of a clean wineglass with very thick cream, then pour in the oil, covering it with a little more cream. A teaspoonful of cream being then taken into the patient's mouth, he is directed to bolt the dose at one gulp. Some prefer it floated on orange-juice, strong coffee, gruel or wine. One of the best vehicles for it is foaming beer. Glycerin increases its purgative power, when given conjointly. If the mouth be chilled by broken ice immediately before taking the oil, the taste of the latter will be imperceptible.

PHYSIOLOGICAL ACTION AND THERAPEUTICS.

Used externally pure Castor Oil is perfectly bland. Internally administered it is non-irritant until it reaches the duodenum, where it is decomposed by the pancreatic juice setting free the Ricinoleic Acid, which produces purgation by a mildly irritant action on the bowel, stimulating the intestinal glands and muscular coat, but not the liver. It is a simple purgative, acting in four to six hours, producing one or more liquid stools without pain or tenesmus, and followed by a sedative effect on the intestines. The leaves are believed to possess galactagogue properties when locally applied as a poultice to the breasts. Ricinoleic Acid enters the blood and the tissues, and is excreted with the various secretions of the body, imparting its purgative qualities to the milk of the nursing mother. Ricin, given either hypodermically or by the mouth, produces violent gastro-enteritis, nephritis and cystitis, also inflammation of the mucous lining of the biliary duct. To it are ascribed the jaundice and anuria observed in some cases of poisoning by castor-oil seeds.

Castor Oil is one of the best of the simple purgatives, and is used when a free evacuation of the bowels is alone indicated, or when only a laxative action is desired, as in the constipation of typhoid fever, in pregnancy and post-partum conditions, diarrhea from the presence of irritating matter in the bowels, and after operations on the abdominal or pelvic organs. It is often used as a purgative for children, also for the aged and infirm. Infants bear a larger relative dose than adults, probably from their ability to digest a greater quantity of what is taken. It is employed with great benefit as a laxative in irritation or inflammation of the bowels, in hemorrhoids, inflammatory or spasmodic affections of the genito-urinary organs, nephritis or cystitis, gonorrhea, calculi, and stricture of the urethra and rectum. In cases of dysentery 10 to 20 drops of laudanum may be added to each dose to counteract the pain, tenesmus and exhaustion resulting from the frequency of the passages. If much depression



exists, as shown by lowered arterial tension and a dry, glazed tongue, 5 drops of oil of turpentine should also be added.

Castor Oil is much used in the puerperal state and greatly abused. There is considerable evidence in support of the charge that it induces hemorrhoids by congesting the rectal vessels. Its purgative action is milder in proportion to the purity of the sample employed. Externally, the pure oil is employed as a local sedative and protective, as in neutralizing the effects of lime upon the conjunctiva. The leaves of the castor-oil plant are used to promote the secretion of milk. They may be applied to the breast in poultice, and a decoction or fluidextract given internally at the same time.

**ROSA, Rose,**—is represented in official pharmacy by the petals of one species and the volatile oil from another.

**Rosa Damascena,** *Damask Rose,*—is the source of the official Oil of Rose, which is distilled from the fresh flowers. This variety of the nat. order Rosaceæ is largely cultivated in Roumelia, on the southern slope of the Balkan mountains, from which section comes nearly all of the oil supplied to commerce.

**Rosa Gallica,** *Red Rose,*—is the petals of *Rosa gallica*, collected before expanding. They contain an aromatic oil, tannic and gallic acids, *Quercitrin*, coloring matter, salts, etc.

*Preparations.*

**Oleum Rosæ,** *Oil of Rose, Attar of Rose,*—is a volatile oil distilled from the fresh flowers of *Rosa damascena*. It is a pale-yellowish, transparent liquid, having a strong odor of rose, a sweetish taste and a slightly acid reaction, but slightly soluble in alcohol. It consists of an aromatic oxygenated elæopten and an odorless solid stearopten (rose-camphor). Being very expensive it is much adulterated with other volatile oils. It is used chiefly for perfuming cosmetic preparations, ointments and lotions, and as the basis of the following three preparations.

**Aqua Rosæ Fortior,** *Stronger Rose Water,* (*Triple Rose Water*),—is water saturated with the volatile oil of Rose petals. An agreeable excipient and flavoring agent. Dose, ℥ss–iv [av. ℥ij.]

**Aqua Rosæ,** *Rose Water,*—consists of equal volumes of the preceding and distilled water, mixed together immediately before use. It is an ingredient of Mistura Ferri Composita. Dose, ʒj–℥j [av. ʒiv.]

**Unguentum Aquæ Rosæ,** *Ointment of Rose Water,* (*Cold Cream*),—has of Stronger Rose Water 19, Expressed Oil of Almond 56, Spermaceti 12½, White Wax 12, and Sodium Borate ½.

**Fluidextractum Rosæ,** *Fluidextract of Rose,*—prepared from Red Rose with glycerin and diluted alcohol. Dose, ♏v–ʒj [av. ♏xxx.]

**Confectio Rosæ,** *Confection of Rose,*—has of Red Rose 8, Sugar 64, Honey 12, Stronger Rose Water 16, beaten together into a mass. Dose, gr. x–ʒj.

**Mel Rosæ,** *Honey of Rose,*—has of the Fluidextract 12, and Clarified Honey to 100. Dose, ʒj–ij [av. ʒj.]

**Syrupus Rosæ,** *Syrup of Rose,*—has of the Fluidextract 12½ per cent. Dose, ʒj–ij for flavoring.

Red Rose is an ingredient of Pil. Aloes et Mastiches. The Confection is an ingredient of Pil. Aloes et Ferri.

Rose Water has no strictly medicinal properties, but is an agreeable excipient for lotions, collyria and urethral injections. The ointment, commonly termed *cold cream*, is a pleasant emollient and protective agent, generally used

for chapped hands and other superficial skin affections. Red Rose is classed among the astringents, as it contains an appreciable amount of tannic and gallic acids. A compound infusion, containing sugar and dilute sulphuric acid, was formerly official, and is used as an agreeable gargle for the throat and mouth in inflamed and ulcerated conditions. The chief uses of the rose preparations are as vehicles for other agents, or to impart flavor and odor to extemporaneous prescriptions.

**ROSMARINUS, Rosemary,**—the source of the official oil of Rosemary, is the fresh flowering tops of *Rosmarinus officinalis*, a shrub of the nat. ord. Labiatæ, cultivated for the sake of its large, pale-blue flowers. They are pungently aromatic and somewhat camphoraceous, and contain the volatile oil, a little tannin, some resin and a bitter principle.

**Oleum Rosmarini,** *Oil of Rosemary,*—is the volatile oil distilled from Rosemary, a colorless or yellowish liquid, having the characteristic odor of the plant and a camphoraceous taste; readily soluble in alcohol. It should yield, on assay, not less than 5 per cent. of ester, calculated as bornyl acetate, and not less than 15 per cent. of total *Borneol.* Dose, ♏j–v [av. ♏iij.]

Rosemary was formerly considered emmenagogue, galactagogue and diuretic, but is now never employed in substance. Its oil is somewhat stimulant and carminative, and in excessive quantity has caused death. It is chiefly used as an external stimulant in liniments and lotions, especially to the scalp in alopecia, where it is supposed to increase the blood-supply to the hair bulbs and is usually combined with cantharides. Inhaled it reduces the body-temperature and gives the urine a violaceous odor.

**RUBUS, Rubus,**—is the dried bark of the rhizome of *Rubus villosus*, the common Blackberry, *Rubus nigrobaccus*, or *Rubus cuneifolius*, nat. ord. Rosaceæ. It contains more than 10 per cent. of Tannic Acid. Dose, gr. x–xxx [av. gr. xv.]

**Fluidextractum Rubi,** *Fluidextract of Rubus.* Dose, ♏ x–xxx [av. ♏ xv.]

**Syrupus Rubi,** *Syrup of Rubus,*—has of the Fluidextract 25, Syrup 75. Dose, ℥ss–ij [av. ℥j.]

**Syrupus Rubi Aromaticus,** *Aromatic Syrup of Rubus* (Unofficial),—contains Rubus, Cinnamon, Cloves and Mace. Each fl℥ has 30 grains of the drug. Dose, ℥j–iv.

Blackberry-bark derives its virtues from its tannin. It is strongly astringent, and may be used in decoction, wine or the above-named preparations. It is highly esteemed in summer and infantile diarrheas.

**RUBUS IDÆUS, Raspberry,** (Unofficial),—is the fruit of *Rubus idæus*, the Raspberry bush, nat. ord. Rosaceæ. It contains sugar, malic and citric acids, proteids, pectin, etc., also a *Volatile Oil* consisting of compound ethers, to which the odor is due. Its sole use in medicine is to prepare a pleasantly flavored syrup. The closely allied, light-red fruit of *Rubus strigosus*, the wild Red Raspberry, and the purplish-black fruit of *Rubus occidentalis*, the Thimble-berry, may be employed in place of the raspberry.

**Syrupus Rubi Idæi,** *Raspberry Syrup,* (Unofficial),—has of Raspberries and Sugar any convenient quantity, boiled (but not in tinned vessels) and strained. Dose, ad libitum. It has a bright-red color, a fruity, agreeable odor, a pleasant, acidulous taste and an acid reaction. It has no special medicinal virtues, but forms an agreeable flavoring for mixtures, and mixed with water a pleasant drink in febrile conditions.

The leaves of the wild Red Raspberry (*Rubus strigosus*) are considerably astringent, and in infusion, ℥j to the pint, are a popular domestic remedy for diarrheas.

**RUMEX, Yellow Dock** (Unofficial),—is the root of *Rumex crispus,* and of some other species of Rumex, plants of the nat. ord. Polygonaceæ, growing as common weeds along roadsides. Several species of Rumex have sour leaves, and are popularly called *Sorrel* to distinguish them from the others which are called *Dock.* The official root contains tannin, mucilage, starch, calcium oxalate, and two principles named *Rumicin* and *Lapathin,* which are shown to be



identical with *Chrysophanic Acid.* Its constituents are nearly identical with those of Rhubarb. Dose, gr. xv–ʒj.

**Fluidextractum Rumicis,** *Fluidextract of Rumex* (Unofficial),—Dose, ♏xv–ʒj.

**Decoctum Rumicis,** *Decoction of Rumex* (Unofficial),—℥ij of the fresh root, or ℥j of the dry root, to Oj of water. Dose, ℥j–ij.

Rumex is astringent, tonic and laxative, and has also been considered alterative and antiscorbutic. It is employed in chronic cutaneous disorders, glandular swellings, and other symptoms of the strumous diathesis. It seems to possess a selective action on the mucous membrane of the larynx, and in many cases of laryngeal irritation with catarrhal symptoms, dry, violent cough, and a sense of soreness behind the sternum, it will give relief. The Rumex Acetosa has a popular reputation as a local application for cancer.

**RUTA, Rue** (Unofficial),—the leaves of *Ruta graveolens*, an herbaceous perennial of the nat. ord. Rutaceæ, growing wild throughout Southern Europe, and frequently cultivated in gardens for its yellowish flowers. The fresh leaves only should be used, and as drying impairs their qualities the oil is generally employed in medicine.

**Oleum Rutæ,** *Oil of Rue* (Unofficial),—the volatile oil distilled from *Ruta graveolens;* a colorless, or greenish-yellow liquid, of disagreeable but aromatic odor, pungent acrid taste and neutral reaction, soluble in an equal weight of alcohol. Dose, ♏j–ij.

### Physiological Action and Therapeutics.

Rue is an active irritant, the oil applied locally producing heat, inflammation and vesication. Administered in full medicinal dose it causes a sensation of heat in the stomach and skin, increases the action of the heart, and stimulates the bronchial, cutaneous and renal secretions. The odor of the oil is distinctly perceptible in the breath, sweat and urine. After a toxic dose of the oil violent gastro-enteritis results, with extreme prostration, convulsions, strangury and suppression of the urine, and the symptoms of a narcotic poison ensue if the dose is large enough. Abortion may be produced by large doses, but with great danger to life. Rue is an efficient emmenagogue, and in men aphrodisiac; it is also considered antispasmodic and carminative.

The Oil of Rue is employed internally in amenorrhea, menorrhagia, and metrorrhagia, hysteria, convulsions and flatulence. As an emmenagogue it is efficient when the condition is one of functional inactivity of the uterus and ovaries. In small doses it has been well used in metrorrhagia from debility and after abortion. A decoction of the fresh leaves is often employed by injection against thread-worms, and internally to remove lumbricoid worms. Externally the same preparation has been applied to the chest in chronic bronchitis, also in various scaly eruptions and glandular enlargements. Used as an abortifacient it has frequently caused death, preceded by symptoms of irritant and narcotic poisoning. Even in poisonous doses its abortifacient action is very uncertain, so that only the most ignorant criminals employ it with such purpose. It was formerly official but has been dismissed from the pharmacopœia.

**SABAL, Sabal,**—is the partially dried ripe fruit of *Serenoa serrulata*, the Saw Palmetto, nat. ord. Palmæ. Dose, gr. x–ʒj [av. gr. xv]. There are no official preparations, but a fluidextract is given in doses of ʒj three or four times a day.

**Elixir Saw Palmetto and Santal Compound** (Unofficial),—each fluidounce represents Saw Palmetto berries ʒij, Corn-silk ʒij, Sandal-wood gr. xxx. Dose, ʒj–iv, three to six times a day.

**Sanmetto** (Unofficial),—is a similar preparation to the preceding.

Sabal is sedative, nutritive and tonic. It seems to have some specific action on the tonsils and the prostate gland, and has been used with much benefit in the enuresis of old men, enlargement of the tonsils, spasmodic croup, chronic sore throat, and gonorrhea. The compound elixir is highly praised in the late stage of gonorrhea, in prostatic enlargement, incontinence of urine, vesical catarrh, irritable bladder, and urethritis. Sabal is one of the latest additions to the pharmacopœia.

**SABINA, Savin,**—the tops of *Juniperus Sabina*, a small evergreen shrub of the nat. ord. Coniferæ, growing in Northern Europe, Asia and America. It closely resembles Red Cedar (*Juniperus virginiana*), but is distinguished from the latter by its smaller size and by its larger fruit. It contains a volatile Oil which is official, also tannin, resin, extractive matters, chlorophyll, etc. Dose, gr. v–x [av. gr. vijss.]

*Preparations.*

**Fluidextractum Sabinæ,** *Fluidextract of Savin.*—Dose, ♏ij–x [av. ♏v.]

**Ceratum Sabinæ,** *Savin Cerate* (Unofficial),—may be prepared by incorporating the Fluidextract 25, in Resin Cerate 90, melted and cooled.

**Oleum Sabinæ,** *Oil of Savin*, $C_{10}H_{16}$—a volatile oil distilled from the fresh tops of Savin; existing in the fresh tops in the proportion of 2½ per cent., and in the berries 10 per cent. It is a colorless or yellowish liquid, isomeric with oil of turpentine, having a peculiar, terebinthinate odor, a pungent camphoraceous taste and neutral reaction; soluble in an equal volume of alcohol. Dose, ♏j–ij [av. ♏j.]

### Physiological Action and Therapeutics.

Externally the action of Savin resembles that of Turpentine, except that it is more irritant, the oil producing vesication if applied sufficiently long. Internally a full medicinal dose causes heat sensations, nauseous eructations, flatulence, increased cardiac action, stimulation of the cutaneous, bronchial and renal secretions, irritation of the kidneys, hyperemia of the ovaries and uterus, and increased menstrual activity. In large doses it produces hematuria, dysuria, and intense gastro-enteritis, with violent vomiting and purging. Toxic doses produce the symptoms of an irritant and narcotic poison. It may originate uterine contractions in the pregnant female, but its abortifacient effect can only be produced by a quantity sufficient to endanger life. The oil diffuses into the blood and is excreted by the various excretory channels.

As an emmenagogue Savin is highly esteemed by many authorities. Phillips considers it "one of the most certain and powerful" agents of this class, "with the additional advantage that it can be given with perfect freedom from risk of doing harm." So irritant an agent, however, requires the exercise of great caution in its use. It has been found extremely efficient in dysmenorrhea when not due to mechanical causes; also in menorrhagia and hemorrhage after abortion. In chronic gout and the joint affections of chronic rheumatism, it was formerly much employed. Externally the Cerate is used to prolong the discharge from blisters, setons or issues, and to stimulate the healing of indolent ulcers. For these purposes it is considered safer than cantharides, as its prolonged employment does not bring on strangury or vesical irritation. As a caustic it is efficient for the destruction of warts and other excrescences, and the moistened powder is used as a paste on venereal condylomata, in combination with burnt alum or cupric subacetate. The Oil is the most efficient preparation for internal administration.



**SACCHARUM, Sugar,** $C_{12}H_{22}O_{11}$,—is the refined sugar obtained from *Saccharum officinarum*, the sugar-cane, a perennial plant of the nat. order Gramineæ, indigenous to India and adjoining countries but cultivated in tropical regions throughout the world. It is also obtained from various species or varieties of *Sorghum*, nat. order Gramineæ, and from one or more varieties of *Beta vulgaris*, the sugar-beet, nat. ord. Chenopodiaceæ. It is present in several other grasses, as *Zea Mays*, (maize), also in the juice of various trees (maple, birch, palm, etc.), and in many roots.

Sugar occurs in white, dry, hard, crystalline granules, permanent in the air, odorless, of purely sweet taste and neutral reaction, soluble in 0.5 of water and in 175 of alcohol, in 0.2 of boiling water and in 28 of boiling alcohol, insoluble in ether. The saturated aqueous solution is miscible with water in all proportions.

*Other Sugars.*

**Saccharum Lactis,** *Sugar of Milk*, (*Lactose*), $C_{12}H_{22}O_{11} + H_2O$,—is one of the constituents of the milk of mammals, and is officially described as a peculiar crystalline sugar obtained from the whey of cow's milk by evaporation and purified by re-crystallization. Occurs in white, hard, crystalline masses, yielding a gritty, white powder, odorless, permanent in the air, of faintly sweet taste and neutral reaction, soluble in about 6 of water and in 1 of boiling water, insoluble in alcohol, ether or chloroform.

**Glucose,** *Dextrose, Grape-sugar. Starch-sugar*, $C_6H_{12}O_6$ (Unofficial), also known as liver-sugar, diabetic sugar,—forms yellowish nodules or crystals, very soluble in water and in alcohol, has a sweet taste less marked than that of cane-sugar, may be obtained artificially from cane-sugar or from starch, by boiling with a dilute mineral acid, or by the action of diastase, a vegetable ferment formed during the germination of grain. Boiling solutions of the alkalies convert it into a brown substance (melassic acid).

**Levulose,** *Fruit-sugar*, $C_6H_{12}O_6$ (Unofficial),—frequently found with grape-sugar in fruits, also in honey. See also *Diabetin*, on next page.

**Inosit,** *Phaseo-mannit*, $C_6H_{12}O_6 + 2H_2O$ (Unofficial),—exists in the juise of some meats, in asparagus, etc. Is very sweet, but does not undergo alcoholic fermentation.

*Allied Substances.*

**Theriaca,** *Treacle, Sugar-house Molasses* (Unofficial),—is the uncrystallizable residue of the process for refining sugar, a thick, brown, fermentable syrup, very sweet and of sp. gr. about 1.40.

**Amylum,** *Starch*, $C_6H_{10}O_5$,—when boiled with dilute mineral acids or when subjected to

the action of diastase, ptyalin, or pancreatin, is converted into glucose. (See the article AMYLUM, page 123).

**Benzosulphinidum,** *Benzosulphinide, Saccharin,* (*Glusidum,* B. P.), the anhydride of ortho-sulphamide-benzoic acid,—occurs as a white, crystalline powder, having an intensely sweet taste, even in dilute solutions; soluble in 250 of water, and in 25 of alcohol at 77° F., in 24 of boiling water, readily soluble in ammonia water, in alkali hydroxide solutions, and in a solution of sodium bicarbonate with evolution of $CO_2$. Dose, gr. ss–v [av. gr. iij.]

*Preparations.*

**Syrupus,** *Syrup,*—has of Sugar 85, Distilled Water to 100.

Sugar is an ingredient of Pil. Ferri Carbonatis, Pil. Ferri Iodidi, Ferri Carbonas Saccharatus, Mistura Ferri Composita, Pulvis Cretæ Compositus, Pulvis Glycyrrhizæ Compositus, also the Troches, Syrups, Compound Syrups, etc.

## PHYSIOLOGICAL ACTION AND THERAPEUTICS.

Sugar is employed in pharmacy and therapeutics chiefly as a vehicle, a corrigent, a preservative and an antiseptic. Syrups protect the active ingredients against putrefaction, but not always against fermentation. They also protect certain ferruginous preparations against oxidation. As an ingredient in troches, powders and extemporaneous mixtures sugar is used to cover the taste or to make insoluble substances more easily miscible with water. It increases the solubility of lime in water. As a food it possesses well-known properties, being a nutrient to adipose tissue and a respiratory fuel, and is decidedly diuretic in its action upon healthy kidneys. Sugar and sugar-forming food constitute more than one-half of the nourishment needed by a healthy person, and when withheld or diverted as in diabetes, the patient is actually starved and undergoes progressive and rapid emaciation. Levulose is found to be more easily consumed in the system than cane-sugar, and in the treatment of diabetic patients may be used with benefit for some time. Heretofore its cost has been very great, but it is now being manufactured in large quantities and sold at a reasonable price, under the trade-name *Diabetin.*

Sugar of Milk is the least soluble of all sugars in water, but is soluble in alcohol. It enters into alcoholic fermentation with difficulty. In the presence of decomposing albuminous matter and under certain other influences, it undergoes the *lactic fermentation,* which results in the formation of lactic acid, carbon dioxide and alcohol. It readily reacts with the reduction tests.

Sugar of Milk is a powerful diuretic, especially in cardiac dropsy, in which Sée considers it "the best and most certain diuretic we possess, the excretion of urine caused by it being greater than that due to any other drug." He found that it acts similarly to Caffeine though more powerfully, while possessing none of the disadvantages of the latter. Its diuretic action is but slight in cases where extensive renal disease exists, and it has no power over dyspnea.

Sugar of Milk is used in the triturations, also in Dover's powder, as a diluent. Being much harder than sugar it is considered a valuable excipient for powders requiring the minute subdivision of their medicinal constituent. It is less sweet than sugar, and being less apt to ferment in the stomach and bowels is better than the latter for use with infants' food.



Benzosulphinide (Saccharin), when pure is about 500 times sweeter than sugar, and imparts a distinctly sweet taste to 70,000 times its weight of water; but the commercial article is standardized to about 300 times the sweetening power of sugar. It is not a food, but has no injurious action on man, and is eliminated in the urine and the saliva without change. It is used as a substitute for sugar in the food of diabetics and subjects of hepatic disease and corpulence; also to cover the taste of nauseous drugs and as an internal antiseptic in cases of cystitis with decomposing urine. A grain of Saccharin sweetens 6 to 8 fluidounces of liquid. It may be used to a maximum quantity of 30 grains per diem. It is rendered soluble by mixing with it two-thirds its quantity of sodium bicarbonate. It is an efficient antiseptic.

**Dulcin,** *Sucrol, Para-phenetol-carbamide* (Unofficial),—is a urea derivative of phenetidin and occurs in colorless crystals which are soluble in 800 of water, 55 of boiling water, 25 of alcohol, also in ether. Its sweetening power is about 200 times that of sugar. In reasonable doses it is harmless, does not cause any decomposition of the blood, or give rise to the great disgust engendered by Saccharin on prolonged use. Its great insolubility is its chief disadvantage. Dose, gr. ss–ij, up to a daily maximum of 30 grains.

**Saxin,**—is a similar product of English manufacture, said to be 600 times sweeter than sugar.

**SALICINUM, Salicin,** $C_{13}H_{18}O_7$,—is a glucoside obtained from several species of *Salix,* the Willow, and *Populus,* the Poplar, trees of the nat. ord. Salicaceæ. It is found also in *Gaultheria procumbens,* the wintergreen, nat. ord. Ericaceæ; and in *Betula lenta,* the sweet birch, nat. ord. Betulaceæ; the volatile oils of which, distilled from the leaves of the former and from the bark of the latter, consist almost entirely of methyl salicylate (see next page).

Salicin occurs in colorless or white and silky, shining crystalline needles, or a crystalline powder, odorless, of very bitter taste, permanent in the air, of neutral reaction; soluble in 28 of water and in 30 of alcohol, in 0.7 of boiling water and in 2 of boiling alcohol; almost insoluble in ether or chloroform. Dose, gr. x–xxx [av. gr. xv.]

**Salix Nigra,** the *Pussy Willow* (Unofficial),—grows along streams in the Southern States. A fluidextract is on the market, and may be used in doses of ʒss thrice daily, as a sexual sedative.

**Acidum Salicylicum,** *Salicylic Acid,* $HC_7H_5O_3$,—is a monobasic organic acid, existing naturally in combination in various plants. but generally prepared synthetically from phenol. It occurs in light, fine, white, prismatic needles, or a crystalline powder, odorless, of sweetish, afterwards acrid taste and acid reaction, permanent in the air; soluble in about 450 of cold water, but readily soluble in water containing 8 per cent. of Borax or 10 per cent. of Sodium Phosphate. It is soluble in 2½ of alcohol, in 14 of boiling water, in 2 of ether, in 80 of chloroform, and is very soluble in boiling alcohol. Dose, gr. v–xv [av. gr. vijss.]

Salicylic Acid is a derivative of Salicin, probably by double oxidation; but may also be considered as a substitution-derivative of Benzene, formed by replacing 2 atoms of its hydrogen, the one by hydroxyl, and the other by carboxyl. It is obtained therefore either synthetically by combining the elements of Phenol with these of Carbonic Acid, and subsequent purification, —or from natural Salicylates as the Oil of Wintergreen and Sweet-Birch,—or from Salicin, by heating with caustic potash and treating with hydrochloric acid. The acid prepared from