

low temperature. When maintained at a temperature below 50° F. it is a colorless liquid having an alliacious taste and smell. Its specific gravity at 32° F. is .9214. It mixes with water, about one part in fifty, and with alcohol and ether in all proportions. Its boiling point is 50° F., and above this temperature it exists as a gas. As a gas it is exceedingly inflammable, burning with a greenish flame and evolving hydrochloric acid.

Following the introduction of ether and chloroform, it was one of the many compounds suggested as suitable for general anesthesia. Being very volatile it was easily administered and its anesthetic action was more rapidly procured. The anesthesia which it produced, however, proved to be very transient, and further experience as well as experimental work has shown that its action is accompanied by marked vascular and cardiac depression. Although strongly advocated by many, its employment never became general and it has now fallen into disuse.

It is now better known as a local anesthetic. Advantage has been taken of its rapid evaporation to utilize the intense cold produced, in dental and minor surgical practice, and for the relief of the pain of superficial neuralgia. It has been used with satisfaction for the extraction of teeth, for opening abscesses, for removing ingrowing toenails, and for similar painful operations, and has been found to give instantaneous relief in facial neuralgia, intercostal neuralgia, and sciatica.

The method of utilizing this property was made simple and easy by M. Mounet, of Lyons, who suggested the storing of the compressed fluid in small capsules and tubes, by which means it may be preserved without alteration for a great length of time. When the drug was required for use the point of the capillary tube was broken off, and the opening directed downward on the part to be anesthetized. These tubes have now been perfected by the addition of a screw cap which allows of any proportion of the contents being utilized, the remainder being preserved for future use. The heat of the hand is sufficient to raise the temperature of the fluid above its boiling point, and a stream of the rapidly volatilizing fluid issues as a spray, and may be applied to any part. The tube should be held at a distance of eight or ten inches from the part, and the surrounding tissues protected to prevent excessive and needless destruction of tissue. The surface of the skin acted upon rapidly becomes blanched and devoid of sensation, and regains its normal state upon the removal of the spray. If the application is persisted in, the vitality of the part is destroyed and necrosis is the result. During the employment of the spray care must be taken that no flame shall be in proximity, on account of the inflammability of the gas.

Beaumont Small.

**ETHYL FORMATE.**—*Formic Ether*:  $H.COOC_2H_5$ . This is the ethyl ester of formic acid, and is an ethereal liquid smelling like peach kernels. It is soluble in ten parts of water, and boils at 54° C. It is said to be of value as an antiseptic to the upper air passages.

W. A. Bastedo.

**ETHYL IODIDE.**—*Hydriodic Ether*:  $C_2H_5I$ . This body is a colorless ethereal fluid, non-inflammable, practically insoluble in water, but freely soluble in alcohol. It has a sharp taste and a smell simply penetrating if pure, but if impure often offensive. Ethyl iodide affects the human system after the manner of the volatile ethers generally, but is used in medicine—so far as it is used at all—either for the sake of *iodizing*, for which purpose some consider it efficacious, or for relieving oppression of breathing in pulmonary complaints. It is administered by inhalation, in dosage of fifteen drops.

Edvard Curtis.

**ETHYL PHENACETIN** ( $C_9H_9.OC_2H_5.NC_6H_5.CH_2CO$ ) is prepared by the action of ethyl iodide on phenacetin sodium. It is a yellow-colored oil, almost insoluble in water, readily soluble in alcohol and ether, and boiling at 350° C. As was expected, the introduction into phen-

acetin of an additional ethyl group has increased its hypnotic tendency, but the drug is not of sufficient value to be classed with such hypnotics as trional, chloralamide, etc.

W. A. Bastedo.

**ETHYLENE BROMIDE.**— $C_2H_4Br_2$ . This organic compound was introduced into therapeutics as a convenient means of supplying bromine in cases in which its use is indicated for a prolonged period. The advantage claimed for it is, that it is not combined with potassium, sodium, or any basilius radicle, and its use does not disturb the digestion, the skin, or the mucous membranes, or produce any of the unpleasant effects that the older salts are liable to cause.

It is a colorless or faintly brown liquid, containing 90.9 per cent. of bromine. The odor is agreeable and taste sweetish. Its specific gravity is 2.163 at 69.8° F. Below 48° F. it becomes a solid, forming crystals. It is insoluble in water, soluble 1 in 4 of rectified spirit, and miscible in all proportions with absolute alcohol and oils.

The employment of ethylene bromide in epilepsy was recommended by Dr. J. Donath.<sup>1</sup> He used it in a great number of cases, and reports the details of ten cases in which he was able to watch its effects carefully. As a substitute for the bromides he found it very satisfactory, and the results, in his estimation, were much better. The cases were all of long standing and had been subjected to many forms of treatment. Under the use of the remedy the attacks became milder, shorter, and fewer in number, and in many instances assumed the character of *petit mal*. In three of the cases the convulsions were replaced by simple muscular twitchings without loss of consciousness.

The dose administered was gtt. vi. to xij. three times a day. It may be given in capsules with oil or in solution. The following preparations are recommended: (1) Ethylene bromide, gr. lxxv.; oil of almonds emulsion, ℥ij.; oil of peppermint, gtt. ij.; dose, gtt. xxx. three times a day, in a third of a glass of milk. (2) Ethylene bromide, gr. xxiv.; rectified spirits, gr. lxxv.; oil of peppermint, gtt. ii.; dose, gtt. v. to x. three times a day. In preparing these mixtures the high specific gravity must not be forgotten, it being nearly two and a half times as heavy as water. Before using the drug Donath tested its action on himself, and found that in ordinary doses it did not produce any disturbing effects; but in large doses it was sometimes followed by nausea.

This drug must not be mistaken for ethyl bromide, which it resembles both in name and in appearance. A case is reported<sup>2</sup> in which such a mistake was made with fatal consequences. A written order for the anesthetic, ethyl bromide, was sent to a druggist, who supplied ethylene bromide. Ten drachms were inhaled without producing any insensibility or anesthesia. The administration was followed by suppression of urine and uncontrollable vomiting, which continued until the patient died, upon the following day. At the post-mortem examination there was found an hyperemia of the meninges of the brain, also of the lungs, spleen, and kidneys. The liver was much enlarged, of a dirty-yellow color, and the cells were affected by a granular degeneration.

Beaumont Small.

<sup>1</sup> British Medical Journal, July 11th, 1891.

<sup>2</sup> The London Lancet, January 10th, 1891.

**ETHYLENE-DIAMINE** [ $C_2H_4(NH_2)_2$ ] is a clear, colorless liquid of specific gravity 0.970. It is readily soluble in water, has an ammoniacal odor, and strongly alkaline reaction, and dissolves albumin easily. It has been recommended for the solution of the false membrane of diphtheria, being especially useful, as its efficiency is not destroyed by antiseptics.

*Ethylene-diamine-trikresol* or *trikresolamine* is a solution of two per cent. each of ethylene-diamine and trikresol. It is a clear colorless liquid of alkaline reaction, becoming slightly yellow and cloudy on exposure to air. On account of this cloudiness, the manufacturers now make

*kresamin*, a twenty-five-per-cent. solution of these two chemicals from which a one- or two-per-cent. solution may be prepared when wanted (see *Kresamin*).

Ethylene-diamine silver phosphate is argentamine (see *Silver*).

W. A. Bastedo.

**ETHYLENE DICHLORIDE.**—*Ethene Dichloride*, *Dutch Liquid*:  $C_2H_2Cl_2$ . This body is a thin, colorless, oily fluid, smelling and tasting much like chloroform; volatile and inflammable; dissolving sparingly in water and freely in alcohol and ether. Its only medical interest lies in its attempted substitution for chloroform, as an anesthetic which should retain the advantages of chloroform while free from its dangers. It seems to operate much like chloroform, and, according to Reichert, has little tendency to paralyze the heart. It is, however, very irritating to the throat. Administration, in mode and dose, is the same as with chloroform.

Edvard Curtis.

**ETHYLENE-PHENYLHYDRAZIN-SUCCINIC ACID** ( $C_{20}H_{22}N_4O_4$ ) is prepared by boiling ethylene-phenylhydrazin with succinic anhydride in alcohol. It forms crystalline needles soluble in water, and is used as an antipyretic.

W. A. Bastedo.

**ETHYLIDENE CHLORIDE** ( $CH_2CHCl_2$ ).—Chlor-ethylidene; chloriden; ethidene bichloride; Aran's ether; Wigger's ether. This is a colorless ethereal liquid prepared by the action of chlorine on ethyl chloride. It has an agreeable fruity odor, a boiling point of 57° C. (134.6° F.), and specific gravity 1.180. It has been used as a safe and ephemeral general anesthetic for short operations.

W. A. Bastedo.

**ETIOLOGY.** See *Infectious Diseases*.

**EUCALYPTUS.**—Blue Gum-tree. "The leaves of *Eucalyptus globulus* Labillardiere (fam. *Myrtaceae*) collected from the older parts of the tree" (U. S. P.). At the close of this article will be found some general infor-

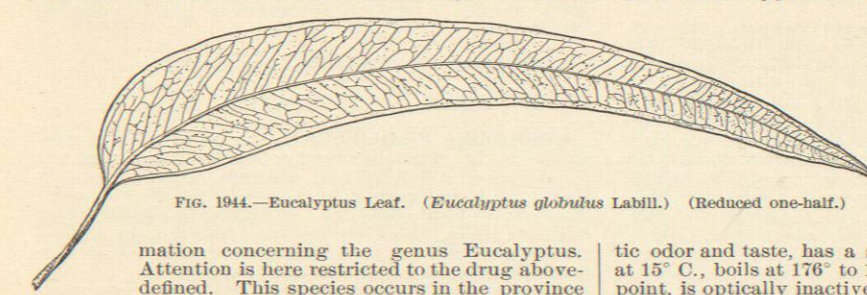


FIG. 1944.—Eucalyptus Leaf. (*Eucalyptus globulus* Labill.) (Reduced one-half.)

mation concerning the genus *Eucalyptus*. Attention is here restricted to the drug above-defined. This species occurs in the province of Victoria, Australia, and in Tasmania. It grows to a great size, but is not nearly so large as some of the other species. The exhalations from the tree, where forests of it occur, and especially from the fallen leaves, charge the atmosphere, thereby disinfecting it. This has suggested the idea of planting it in malarial regions, as about Rome, for a similar purpose, but it is doubtful if the experiment has anywhere been performed in a sufficiently thorough manner or upon a sufficiently extensive scale. It was an incorrect notion of this property of the tree which suggested its first use in medicine, that of a specific for malaria. In this direction it proved disappointing, but the other important medicinal uses were found for it. The tree, when young, and the younger portions of it for some time after, bear leaves which to a great extent are wanting in the active constituent. These leaves are broadly ovate, heart-shaped at the base, little or not at all tapering at the apex, and comparatively thin. The official leaves (Fig. 1944) are 15 to 30 cm. (6 to 12 in.) long by 2 to 4 cm. (¾ to 1½ in.) broad, lanceolate and tapering from near the blunt base to an acute tip, strongly scythe-shaped, and

very inequilateral, entire-margined, very thick, leathery, smooth, strongly glaucous, and with a short, stout, flattened and twisted petiole. Against the light they are strongly pellucid-punctate. They are highly aromatic. It is not known how leaves grown in the several countries where the tree has been introduced compare with those of native origin, but some of them are known to be very inferior, and it is certainly a conservative and wise policy to accept only those of native growth.

**COMPOSITION.**—Besides their active constituent, about six per cent. of volatile oil, they contain wax, resin, and tannin. The medicinal properties and uses of the drug can be best considered farther on, in connection with those of the oil and of eucalyptol.

*Oil of Eucalyptus* (*Oleum Eucalypti*, U. S. P.) is defined as "a volatile oil distilled from the fresh leaves of *E. globulus* Labillardiere, *E. oleosa* F. von Müller, and some other species." It has a specific gravity of about 0.915 to 0.925 at 15° C., a characteristic odor and taste, and it dissolves freely in alcohol. Since the active constituent of the oil is *eucalyptol* (properly called *cincol*), the determination of the percentage of that constituent constitutes the proper method of valuation. For the same reason, it seems more rational for the Pharmacopœia to drop the oil from its next edition and to specify only the *eucalyptol*. With *eucalyptol*, there is *pinene* (from *E. globulus*) or *cuminol* (from *E. oleosa*), or the two oils may be mixed. Traces of several aldehydes may also be present. The optical rotation will also differ greatly in accordance with the source. The definition is faulty in that it does not specify the "other species," the oils of some of which are very distinct, even to being quite wanting in *eucalyptol*. The action of the oil, except for its being weaker and less regular, is that of *eucalyptol*. *Phellandrene* is its most common impurity, derived from other species of *Eucalyptus*.

*Eucalyptol* or *Cincol* ( $C_{10}H_{18}O$ ) is defined by the Pharmacopœia as "a neutral body obtained from the volatile oil of *Eucalyptus globulus* Labillardiere and of some other species of *eucalyptus*." The allowance of "other species"

is here not objectionable as in the case of the oil, for the *eucalyptol* will be the same no matter what its source. It is also the active constituent of oil of cajuput and of some other Myrtaceous oils, and occurs in *santonica*, *rosemary*, *peppermint*, and many other oils of this and of other families. It is liquid, colorless, with a characteris-

tic odor and taste, has a specific gravity of about 0.930 at 15° C., boils at 176° to 177° C., crystallizes at freezing point, is optically inactive, and dissolves freely in alcohol. The commonest adulterant is the oil, which at once renders it optically active.

**ACTION AND USES.**—The action and uses of *eucalyptol* and of the oil must be considered first, as that of the leaves is not quite identical. Their special property among volatile oils (see *Active Constituents of Plants*) is their antiseptic and expectorant properties. As an antiseptic, *eucalyptol* ranks second only to oil of cinnamon, and this property increases somewhat as the oil ages. It is not markedly irritating to the skin unless the surface is abraded or the vapor is confined, but it is markedly irritating to mucous membranes, especially to that of the stomach. As an expectorant, whether taken internally or by inhalation, it is both stimulating and antiseptic. Its antiperiodic action is very similar in kind, but also very inferior, to that of quinine. As a poison it acts as a gastro-intestinal irritant, and as a paralyzant of the vital functions, especially of the heart.

The uses of this drug are all to be regarded as local; even when given internally, it is transported in the circulation to the seat of its action. Externally, it is an excellent application to ulcers which require either disin-

fection or stimulation. For this purpose, a two- to five-per-cent. solution of the oil in alcohol may be employed, or a ten-per-cent. tincture of the leaves is sometimes even better, owing to the resin and tannin contained. The greatest value of eucalyptus is in the treatment of catarrhal conditions. Here the beneficial results are directly proportional to the need for stimulation and disinfection, and the reverse is true when there is already irritation or inflammation. Thus it is used topically, as well as internally, in gonorrhœa and vesical catarrh, in low forms of dyspepsia, and in respiratory catarrh. Although slightly diaphoretic, it is scarcely useful in that way. Its anti-periodic powers are feeble, but it is often of use when the case is mild, and the surroundings are not continuously infectious.

In considering the properties of the leaves, we have to regard only the percentage of oil which they contain, and the fact that the amounts of resin and tannin, and the bitter taste, are sufficient to add their effects to those of the eucalyptol.

The dose of the leaves and of their fluid extract, the only official preparation, is 2 to 8 gm., or c.c. (3 ss.-ij.), respectively. The oil and the eucalyptol are given in doses of from 0.3 to 2 c.c. (℥v. to xxx.).

The genus *Eucalyptus* contains between one hundred and twenty-five and one hundred and fifty species, almost all of Australia and Tasmania. They are for the most part large trees, rivalling in altitude the highest known, and form dense and vast forests. Their economic importance is of the highest. Their ability to withstand adverse climatic conditions permits of forestry operations where they would be otherwise impossible. Their timber is proof against the attacks of many destructive animals, and resists decay. Their astringent gums, described below, are of great importance. Many of the oils, though excluded from the uses above specified, as they contain no eucalyptol, are of importance in the arts. The trees are, moreover, highly ornamental.

(See *Honey, Eucalyptus*, and *Manna, Australian*).

Henry H. Rusby.

**EUCALYPTUS GUM.**—**EUCALYPTI GUMMI.** A ruby-colored exudation, or so-called red gum, from the bark of *Eucalyptus rostratus* Schlecht, and some other species of eucalyptus. Sixteen species of eucalyptus have been named as yielding these gums, which are now very generally used in the place of our official malabar kino, this having become excessively scarce and high-priced. It is even true that the former is very commonly given when the latter is called for. The two are very similar indeed, this one occurring in grains or small masses, the fragments transparent and of a ruby-red or garnet-red color, somewhat tough and of a very astringent taste. When chewed, it adheres to the teeth and tinges the saliva red. Cold water dissolves from eighty to ninety per cent., forming a neutral solution, and it is almost entirely soluble in ninety-per-cent. alcohol. The properties and uses of this substance are identical with those of kino, and the dose is gr. ij.-v.

**EUDERMOL**, or nicotine salicylate, occurs in colorless hexagonal crystals or anhydrous needles, melting at 117.5° C., and soluble in water, alcohol, and oils. It contains fifty-four per cent. of nicotine, is non-irritant, odorless, and does not soil the clothing, and in 0.1 to 0.25 per cent. ointment is recommended in scabies, syphilis, and other parasitic skin diseases. Applied to a raw surface, it may produce symptoms of nicotine poisoning.

W. A. Bastedo.

**EUGALLOL**, or pyrogallol monoacetate [C<sub>6</sub>H<sub>2</sub>.CH<sub>2</sub>.CO.(OH)<sub>2</sub>], is a thick, brownish, transparent, syrupy material, readily soluble in water and in its own weight of acetone. It is marketed in thirty-three-per-cent. acetone solution, and when this is painted on the skin and allowed to evaporate it leaves a firm, elastic varnish. It is used in skin diseases, and Kromayer claims that when applied every day it induces an inflammation under

whose influence the most stubborn psoriatic patch will disappear. He adds to its usefulness by dusting it with zinc oxide before it is dry.

W. A. Bastedo.

**EUGENOFORM** is the sodium salt of eugenol-carbinol, the product of the action of formaldehyde on eugenol. It forms broad, colorless crystals, readily soluble in water, with difficulty in alcohol, and insoluble in ether. Its melting point is 160° C. The claim is made that it liberates formaldehyde in the system, and on this account Vogel recommends it as antiseptic to the gastro-intestinal tract in cholera, typhoid, etc. Its dose is 0.5-1 gm. (gr. vij.-xv.).

W. A. Bastedo.

**EUGENOL**; **EUGENIC ACID.** See *Cloves*.

**EUGENOL-ACETAMID** (C<sub>6</sub>H<sub>5</sub>.C<sub>2</sub>H<sub>5</sub>.OCH<sub>2</sub>.OCH<sub>2</sub>.CONH<sub>2</sub>) is prepared by the action of eugenol sodium on monochloroacetic acid, with subsequent heating in the presence of ammonia. It forms fine needles or plates, and, according to Merck, is a local anesthetic and antiseptic. It can be used for toothache or neuralgic pains.

W. A. Bastedo.

**EUGENOL IODIDE**, or iodo-eugenol (C<sub>6</sub>H<sub>5</sub>I.C<sub>2</sub>H<sub>5</sub>.OCH<sub>2</sub>.OH), is obtained by the action of iodine on eugenol sodium. It is a yellowish, odorless, insoluble powder, which melts at 150° C. (302° F.), and is used as an antiseptic or as an iodoform substitute.

W. A. Bastedo.

**EUNATROL** is a proprietary pill of sodium oleate coated with chocolate. Extravagant claims are made as to its value in gall stones and other biliary derangements. Dose, 1 gm. (gr. xv.) three times a day.

W. A. Bastedo.

**EUNOL** exists in "alpha" and "beta" modifications, made by combining eucalyptol with alpha- and beta-naphthol, respectively. These compounds are bitter, insoluble in water, and soluble in alcohol, ether, chloroform, and oils. They are antiseptic, and may be used in surgery and dermatology.

W. A. Bastedo.

**EUONYMUS**; **EUONYMIN.** See *Wahoo*.

**EUPATORIUM.** See *Thoroughwort*.

**EUPHORBIA PILULIFERA L.**—A plant of the order *Euphorbiaceae*, which has been recommended as a remedy for spasmodic affections and neuroses of the respiratory tract. It is indigenous to Australia, Brazil, and other Southern tropical countries. It derives its specific name from the seeds, which are held in capsules in the axils of the leaf, and when ripe are brown and hard. It is commonly known as the pill-bearing spurge. It is a very common annual herbaceous plant, and has a local reputation as a curative agent in all pulmonary troubles. Dr. Mattheson, of Queensland, was the first to call attention to its value in asthma, paroxysmal dyspnoea, whooping-cough, and other spasmodic affections. Later, it was studied by Dr. Marsset, under the direction of Dujardin-Beaumez, and the result of his researches was published in the *Therapeutic Gazette*, February, 1885. Its action is directed to the respiratory and cardiac centres, and causes a retardation of the respiration and pulse, and when death has been produced it arises from a paralysis of these organs. It does not influence any of the other organs of the body, but when administered in excess it produces an irritant action on the gastric mucous membrane.

Its active principle is an acrid resin, which is soluble in water and dilute alcohol. Experiments on animals show that one part of the resin to one hundred of the animal, by weight, will produce a fatal result.

It has proved of service in all spasmodic affections of the bronchial tubes and lungs, in the dyspnoea of emphysema of the lungs, and in that due to cardiac affections. Dujardin-Beaumez recommends it to be used in all cases in which iodide of potassium is used to relieve dyspnoea.

It has also been used to relieve the spasms and distress of angina pectoris, and in hay asthma as well as in coryza. In the latter diseases it rapidly checked the sneezing and other troublesome symptoms.

The dried plant is used, and its virtues are said to be best extracted by water. A decoction may be made by steeping half an ounce of the plant in two quarts of water, the dose to be three or four wineglassfuls during the day. The fluid extract is the best preparation to use, the dose being from fl. ʒ ss. to i.

Beaumont Small.

**EUPHORBIAEÆ.**—(*The Spurge Family.*) One of the most important medicinal families of plants, if we consider its domestic as well as its professional uses. It contains more than two hundred genera and three thousand species, distributed over almost the entire earth, most abundant in the tropics, gradually decreasing with the temperature, and wanting in very cold regions. Their most notable property is their great power of adaptation to environment, so that some of them thrive equally well in the most arid deserts, and amidst luxuriant floras. Their economic value is great in other than medicinal directions. Two of our best rubbers are yielded respectively by the manihot and the heveas. Other manihots yield the highly important food cassava and its starch, tapioca. Some of the fruits are edible, and some of the timbers have special uses. Numerous species yield useful fixed oils, and several dye-stuffs are obtained. Medicinally, the properties depend almost entirely upon local stimulation or irritation, even the "alterative" effects probably depending ultimately upon some such depurative action. This irritating action increases in many species to the point of rendering them violent poisons, either externally or internally, or both. These irritating principles exist commonly in the milky juices with which the tissues abound, these being frequently highly caustic to the skin or other tissues. Even such violently acting juices have often been utilized as escharotics or epispastics. Among such juices we may mention those of *Hura*, *Euphorbia heterodoxa* Muell (Alvelos), and other species of this genus, *Hippomane*, *Toxicodendron*, *Ophthalmablapton*, and *Excoecaria*. The latter acts violently even by access of its smoke, and smoking the body with it is, among the Fiji, a heroic treatment for leprosy. Juices, mostly milder in their action, are used internally as irritant purges, but many of them in overdoses may prove emetico-cathartic poisons. Rarely do these purgatives consist of the extracted juice, as in *euphorbium*, but usually of the tissues containing the latex, fresh or dried, or medicinal preparations of them. Among such may be mentioned the root of *Jatropha macrorrhiza* Benth., of *Stillingia*, of *Euphorbia Ipecacuanha* L., *E. Lathyris* L., *E. marginata* Pursh., *E. corollata* L., *E. Cypris* L., and other species of this genus, the sparges, the herbage of *Mercurialis*, *Tragia* sps., and *Joannesia*, and various parts of many species of *Oxotum* and *Phyllanthus*. Many of the latter are also used as fish poisons. In other cases, the purgative constituent is, or resides in, a fixed oil, usually of the seeds, as in croton, castor, and curcas oils. Powerful albuminous poisons usually also reside in these seeds. Occasionally, as in *buxus*, alkaloids occur, while a number of special or exceptional drugs, like *kamala* and *cas-carilla*, will be found discussed in their proper alphabetical order. A complete enumeration of the medicinal species of the family would fill several of these pages.

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**EUPHORBIAEÆ.**—(*The Spurge Family.*) One of the most important medicinal families of plants, if we consider its domestic as well as its professional uses. It contains more than two hundred genera and three thousand species, distributed over almost the entire earth, most abundant in the tropics, gradually decreasing with the temperature, and wanting in very cold regions. Their most notable property is their great power of adaptation to environment, so that some of them thrive equally well in the most arid deserts, and amidst luxuriant floras. Their economic value is great in other than medicinal directions. Two of our best rubbers are yielded respectively by the manihot and the heveas. Other manihots yield the highly important food cassava and its starch, tapioca. Some of the fruits are edible, and some of the timbers have special uses. Numerous species yield useful fixed oils, and several dye-stuffs are obtained. Medicinally, the properties depend almost entirely upon local stimulation or irritation, even the "alterative" effects probably depending ultimately upon some such depurative action. This irritating action increases in many species to the point of rendering them violent poisons, either externally or internally, or both. These irritating principles exist commonly in the milky juices with which the tissues abound, these being frequently highly caustic to the skin or other tissues. Even such violently acting juices have often been utilized as escharotics or epispastics. Among such juices we may mention those of *Hura*, *Euphorbia heterodoxa* Muell (Alvelos), and other species of this genus, *Hippomane*, *Toxicodendron*, *Ophthalmablapton*, and *Excoecaria*. The latter acts violently even by access of its smoke, and smoking the body with it is, among the Fiji, a heroic treatment for leprosy. Juices, mostly milder in their action, are used internally as irritant purges, but many of them in overdoses may prove emetico-cathartic poisons. Rarely do these purgatives consist of the extracted juice, as in *euphorbium*, but usually of the tissues containing the latex, fresh or dried, or medicinal preparations of them. Among such may be mentioned the root of *Jatropha macrorrhiza* Benth., of *Stillingia*, of *Euphorbia Ipecacuanha* L., *E. Lathyris* L., *E. marginata* Pursh., *E. corollata* L., *E. Cypris* L., and other species of this genus, the sparges, the herbage of *Mercurialis*, *Tragia* sps., and *Joannesia*, and various parts of many species of *Oxotum* and *Phyllanthus*. Many of the latter are also used as fish poisons. In other cases, the purgative constituent is, or resides in, a fixed oil, usually of the seeds, as in croton, castor, and curcas oils. Powerful albuminous poisons usually also reside in these seeds. Occasionally, as in *buxus*, alkaloids occur, while a number of special or exceptional drugs, like *kamala* and *cas-carilla*, will be found discussed in their proper alphabetical order. A complete enumeration of the medicinal species of the family would fill several of these pages.

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The resin is exported from Mogador. It has been known in European commerce from a very remote period, is mentioned by numerous older medical writers, and had its place in most pharmacopœias, but its use is now nearly obsolete. It is collected by incising the stems early in the season, and collecting the hardened tears some weeks later. These are usually irregular, from the size of a hickory nut down, yellow, translucent, with a dull, waxy surface, and a brittle fracture. They often enclose or fasten spines or other portions of the plant. Frequently they are perforated. The odor is slight, unless heated, but the dust raised by gathering, sorting, or powdering it is exceedingly irritating to face and nose, so that those handling it should wear veils, or take means to avoid the dust. Flückiger's analysis of euphorbium gives it the following composition: *amorphous resin*, 88; *euphorbon*, 22; *mucilage*, 18; *malates*, 12; *inorganic ingredients*, 10. Of these, the irritating and active principle is the amorphous resin. It is soluble in alcohol.

**ACTION AND USE.**—Euphorbium is a violent irritant, like cashew nuts, chrysarobin, croton oil, etc.; it is also, like the latter, an irritant drastic. Formerly it was used internally for this quality, but is now never so given. For external use as an irritant, or, more generally, diluted with other things, as a rubefacient (ointments, plasters, etc.), it is occasionally called for, and in the more obstinate chronic skin affections has some value; but the necessity which cannot better be met with other medicines must be rare.

W. P. Bolles.

**EUPHORIN.**—Phenyl-urethane. Carbonate of ethyl and phenyl. This is a compound derived from aniline and is somewhat allied to acetanilid. It occurs as a white crystalline powder, with a faint aromatic odor and slight taste, almost insoluble in water, but freely soluble in weak alcohol and wines. It was introduced by Dr. Sansoni\* to replace antipyrin, antifebrin, and other drugs of the same class. The dose is from gr. viiss. to xv.

It is also employed as an antiseptic powder in the treatment of ulcers and wounds.

Beaumont Small.

**EUPHTHALMIN HYDROCHLORATE** (C<sub>17</sub>H<sub>22</sub>NO<sub>3</sub>.HCl).—The mandelic acid derivative of labile n-methylvinyl-diacetone-alkamine, was introduced to ophthalmology by Treutler in 1897. It is closely related to beta-eucaine, the hydrochlorate of benzoyl-vinyl-diacetone-alkamine, bearing to this the same relation as does homatropine to tropacocaine. It is a white, crystalline powder, readily soluble in water and in two parts of boiling alcohol, but separating into crystalline aggregates on addition of ether. It is anhydrous, melts at 183° C., and is not decomposed by boiling.

The salicylate (C<sub>17</sub>H<sub>22</sub>NO<sub>3</sub>.C<sub>6</sub>H<sub>4</sub>.OH.CO<sub>2</sub>H) is made by dissolving equal parts of euphthalmin (base) and acid salicylic in absolute ether, and recrystallizing from ether and alcohol. It melts at 115° C., and is readily soluble in water.

Experiments on animals by Vinci show a primary irritation of the nervous system in the form of restlessness, excitement, and increased reflexes, then tonic and clonic spasms, opisthotonos, exophthalmos, cyanosis, disturbed respiration, and death from general paralysis. The vaso-motor system is directly paralyzed, and blood pressure falls in spite of increased cardiac activity. Instilled into the eye in one- to ten-per-cent. solution, it produces salivation from its action on the secretory fibres of the chorda tympani; and, owing to paralysis of the nerves of the sphincter iridis, without affecting the sympathetic dilator fibres, mydriasis supervenes in fifteen to forty minutes, to disappear practically in two to eight hours, and completely in less than twenty-four hours. It also dilates the pupil when given internally.

Hinshelwood obtained the maximum dilatation from three separate drops of a five-per-cent. solution at two-minute intervals, this acting somewhat less promptly in one eye, than one-per-cent. homatropine solution in the

\*Therap. Monatsh., November, 1890.

other eye of the same patient. Euphthalmalmin acts more rapidly in young than in old people, causes no smarting or discomfort, weakens accommodation but little, has no appreciable effect on the conjunctival vessels or the corneal epithelium, and increases intra-ocular tension but slightly or not at all. The mydriasis is more complete in strong sunlight than that of cocaine or homatropine, yet there is such slight effect on accommodation that reading and writing are not materially interfered with. Jackson found no case in which the pupil was entirely without response to light, and noted that during the maximum effect about one-fourth of the total accommodation was lost. He prefers cocaine for ordinary ophthalmoscopic work, using euphthalmalmin for testing vision with strong light in cataract, or as a rapid mydriatic where iritis is suspected but still uncertain. He recommends a solution containing one per cent. each of euphthalmalmin and cocaine hydrochlorates. Knapp uses a ten-per-cent. solution for ordinary ophthalmoscopic examinations, stating, however, that it dilates the pupil less powerfully than atropine. Snéguieroff increased the speed of its action by a prior instillation of one per cent. holocain, this hastening the diffusion of fluids from the conjunctival sac into the anterior chamber. Some observers have used euphthalmalmin in glaucoma, claiming that its brief mydriasis does not allow of increased tension, yet its safety in this condition has not been proven. In glaucoma and in the aged, cocaine is a more suitable agent. As yet toxic effects from the drug have not been reported. Euphthalmalmin will act in one-per-cent. solution, but it requires repeated instillations to produce mydriasis, and it requires repeated instillations to produce mydriasis.

W. A. Bastedo.

**EUPYRIN.**—Vanillin-ethyl-carbonate-p-phenetidin. This substance belongs to the parphenetidin group which includes phenacetin, being a compound of parphenetidin with vanillin. It forms pale, greenish-yellow needles of vanilla-like odor and without taste. It is freely soluble in alcohol, ether, and chloroform, but with difficulty in water. This is an antipyretic, which, according to Overbach, possesses stimulating properties, as evidenced by the sensation of well-being which follows its ingestion. It is of no use in neuralgia, but is recommended as a mild, non-toxic antipyretic, especially suitable for old people or children, or in cases of fever with great weakness.

W. A. Bastedo.

**EUQUININE,** or Quinine-carbonic-ether (CO<sub>2</sub>OC<sub>2</sub>H<sub>5</sub>.OC<sub>2</sub>H<sub>5</sub>N<sub>2</sub>O), is the ethyl carbonic ester of quinine produced by the action of quinine on ethyl carbonyl chloride. It forms white needle-like crystals in fleecy masses which melt at 95° C. Its reaction is alkaline, and its taste flat with a slightly bitterish after-taste. It dissolves with difficulty in water, but readily in alcohol, ether, chloroform, and dilute acids, the acid solutions fluorescing like those of other quinine compounds. The hydrochlorate is the most soluble salt, the sulphate slightly soluble, and the tannate almost insoluble. Euquinine gives the thalleoquin reaction, but not the herapathite reaction of quinine.

Euquinine is a quinine compound which clinical reports show to possess all the valuable properties of the mother substance, without causing, in therapeutic dosage, ringing of the ears, nausea, headache, or other symptoms of cinchonism. As it is also practically tasteless, it can be administered to children with ease. It is said also to be borne well by those having an idiosyncrasy against quinine. Bernheim uses it in solution with ferric chloride for lavage in gastritis with dilatation, and as an enema in the stubborn diarrhoea of colitis. Golinier prefers it to quinine, acetanilid, antipyrin, or phenacetin in la grippe. For malaria it is best preceded by a mercurial laxative and combined with ginger or other aromatic. It is highly recommended in whooping-cough and the fevers of phthisis. The dose up to 2 or 3 gm. (gr. xxx-xlv.) is slightly larger than that of quinine sulphate, and it can be administered in soup, gruel, milk, cocoa, or flavored syrup.

W. A. Bastedo.

**EUREKA SPRINGS.**—Carroll County, Arkansas.  
POST-OFFICE.—Eureka Springs. Hotels: Crescent and Southern, and numerous smaller houses.  
ACCESS.—Via Eureka Springs, branch of the St. Louis and San Francisco Railroad.

The development of Eureka Springs affords a forcible object-lesson of the progress of civilization in the Western wilds of America. Where a few years ago was an uninhabited sterile mountain glen, now nestles a bright little city of more than 6,000 inhabitants, which number is greatly increased by the large floating population of visitors, tourists, business men, and invalids constantly coming and going. The city is lighted by gas and electricity, contains an electric railway system, and excellent schools, hotels, etc. The Interstate Summer Normal and Educational Assembly have erected a building with a seating capacity of five thousand persons, in which annual summer sessions are held and attended by visitors from all parts of the Union. The State District Normal School of Arkansas is also located here. The springs are sixty in number, the best known being as follows: The "Crescent," "Dairy," "Basin," "Magnetic," "Harding," "Little Eureka," "Sweet," "Grotto," "Mystic," "Oil," "Arsenic," "Cave," and "Cold" springs. The waters contain mainly carbonates of lime and magnesia, with a small proportion of sulphates and chlorides. They are not strongly mineralized, and differ but slightly from each other. The following table from the report of F. W. Clarke, Chief of Division of Chemistry, United States Geological Survey, and R. R. Riggs,\* shows the proportion of solids in four of the principal springs:

	Grains per United States gallon.
Crescent Spring	5.36
Dairy Spring	6.29
Basin Spring	6.97
Magnetic Spring	10.99

The following table sent us by Dr. John D. Jordan, of Eureka Springs, shows some of the climatic advantages of the resort:

Altitude above sea level	2,000 ft.	
Annual average precipitation	32.79 in.	
Mean temperature (Fahr.)	Spring	60.85°
	Summer	74.79°
	Autumn	58.01°
	Winter	42.08°
Annual average	58.93°	
Relative humidity (per cent.)	58.93	
Average number of days per annum	Clear weather	209
	Fair weather	90
	Cloudy weather	66
Death rate per annum	10.33 per 1,000	

The city is picturesquely located on the headwaters of the White River in the Ozark Mountains. A sojourn at Eureka Springs and the free use of its waters are stated to be beneficial in a wide range of affections, including rheumatism, skin, nervous, renal and bladder disorders, dyspepsia, hay fever, and general debility.

James K. Crook.

**EUREKA SPRINGS.**—Humboldt County, California.  
POST-OFFICE.—Eureka.

These springs are located near the town of Eureka. The waters belong to the muriated-sulphureted class, and were analyzed by Prof. W. D. Johnson in 1885, with the following result:

ONE UNITED STATES GALLON CONTAINS:	
Solids.	Grains.
Sodium chloride	1,403.00
Sodium carbonate	10.10
Sodium bromide	14.00
Potassium sulphate	12.20
Magnesium chloride	101.00
Magnesium sulphate	211.30
Calcium carbonate	3.80
Calcium sulphate	42.50
Alumina	1.30
Silica	.95
Ferrous carbonate	.12

\* February 15th, 1877.

Solids.	Grains.
Manganese	Trace.
Boric acid	Trace.
Iodine	Trace.
Lithium	Trace.
Total	1800.27
Carbonic acid gas	Small amount.
Sulphureted hydrogen	Saturated.

This water is now used extensively by the residents of the neighboring districts. It is also shipped to San Francisco. The action of the water is laxative and diuretic.

James K. Crook.

**EURESOL,** or resorcin monoacetate [C<sub>6</sub>H<sub>3</sub>(OH)<sub>2</sub>.CH<sub>3</sub>.CO], is a viscid, transparent mass of pleasant odor, and easily reduced to a powder. Kromayer has obtained good results in the treatment of over sixty cases of acne vulgaris, rosacea, sycosis, seborrhoea, seborrhoeic eczema, etc. It is used in acetone solution as a varnish, leaving a coating on the skin when dry.

W. A. Bastedo.

**EUROBIN,** or chrysarobin triacetate, is a dark powder, insoluble in water, but soluble in chloroform, acetone, ether, or acetic acid. Kromayer finds that it causes more reaction than chrysarobin on chronically inflamed skin, as in chronic eczema. He uses it in one to twenty per cent. acetone solution as a varnish. Euggallol or saligallol may be added with advantage.

W. A. Bastedo.

**EUROPHEN.**—This is one of the many compounds containing iodine and devoid of any disagreeable odor, that have been introduced as substitutes for iodoform. Chemically it is di-isobutylortho-cresol iodide, its formula being (C<sub>4</sub>H<sub>9</sub> > C<sub>6</sub>H<sub>5</sub>O)<sub>2</sub>HI. Its relation to cresol and iodine is much the same as that of aristol to thymol and iodine.

It is an extremely light amorphous yellow powder, being about five times as bulky as iodoform, with an aromatic odor resembling saffron. It contains 27.6 per cent. of iodine. It is insoluble in water and glycerin, soluble in alcohol up to thirty per cent., and in ether, chloroform, collodion, and fatty oils up to twenty-five per cent. It must be excluded from light and heat, as it is readily decomposed. In contact with water it is slowly decomposed, yielding free iodine.

The use of europphen is indicated in all cases in which iodoform is employed in wounds and ulcers and ulcerated surfaces, and in diseased conditions of the nasal and pharyngeal cavities of the vagina and uterus and all mucous surfaces. In various forms of skin disease it has proved beneficial, especially the acute and chronic eczemas. It is also administered internally in all stages of syphilitic disease, but is recommended as being most active in the third stage, and is thought to replace the iodide of potassium as a specific. The dose to commence with should be one-quarter of a grain, gradually to be increased to one or two grains. If it is administered too rapidly there is a danger of iodism manifesting itself. The same amount may be used hypodermically, a ten-per-cent. solution in oil being prepared for this purpose. For external use as an ointment the following has been selected as an excellent combination: Europphen, 3 parts; olive oil, 7 parts; vaseline, 60 parts; lanolin, 30 parts.

Beaumont Small.

**EUSTRONGYLUS GIGAS.** See *Nematodes*.

**EVOLUTION.**—(L. *evolutio*, an unrolling, from *evolvere*, to unroll or unfold.) The term *evolution* has been employed with various meanings:

1. It was used at first in its true etymological meaning of unrolling or unfolding to describe a supposed method of the individual development of organisms.

2. Later it was applied in a metaphorical sense to the origin of species, where it means simply continuous de-

scend with modification, or the origin of species by the alteration of pre-existing species.

3. Finally, we have the metaphysical sense of the word when used as the designation of a system of philosophy that attempts to explain the origin of all things by continuous change. The great exponent of the evolutionary philosophy is Herbert Spencer. The central points in his philosophy are the laws of the indestructibility of matter and the conservation of energy. According to Spencer, the result of these laws is rhythmic motion, manifested everywhere from the dance of molecules to gyrations of planets, and this produces an alternation of evolution and dissolution throughout the universe. Spencer defines this evolution as "change from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity, through continuous differentiations and integrations."

Metaphysics being beyond the scope of the present work, we will confine our attention to the two biological meanings of *evolution*.

**EVOLUTION IN ONTOGENY.**—Modern embryology may be said to have begun with the work on the development of the chick which Harvey described in his "Treatise on Generation" in 1651. By means of a hand lens he was able to trace the development of the chick in a general way back to the beginning of the second day. He found that the embryo arises from the light-colored spot in the yolk, called by Fabricius the *cicatricula*. Harvey saw this dilate and become divided into circles, forming what we now call the *area embryonalis*, and this he compared to the iris of the eye and called the *oculum ovi*. At the end of the third day he discovered a fine line of red around the edge of the spot, "and nearly in its centre there appears," he says, "a leaping point of the color of blood so small that when it contracts it almost entirely escapes the eye, when it dilates it shows like the smallest spark of fire. Such is the outset of animal life which the plastic force of nature puts in motion from the most insignificant beginnings." He was unable to distinguish any other parts of the embryo until the fifth day, and he describes in a very interesting way the gradual appearance of the various organs of the embryo as he saw them from that time until the perfect chick is formed.

One of the great generalizations that Harvey made as a result of his observations is known as the theory of *epigenesis*. This is, briefly, that the embryo is built up gradually from a simple beginning by the addition of part to part in a definite order. Harvey regarded the blood as "the first engendered part . . . the source and origin of all other parts . . . which thence obtain their vital heat and become subservient to it in its duties."

It was in opposition to this theory of epigenesis that the theory of *evolution* arose.

Malpighi, working a little later than Harvey, and probably having a better microscope, found that the blood is not the "first engendered part," for he could see an outline of the embryo before the appearance of the "punctum sanguineum." This small detail of observation led Malpighi to reject Harvey's whole theory of epigenesis. He asserted, instead, that the embryo as a whole is present in the egg before incubation, that it is *pre-delineated*. This led to a great discussion which lasted for more than a hundred years. Of course, if the whole embryo is predelineated in the egg, epigenesis is an impossibility; and development must be a process of *evolution*, an unfolding of the pre-existing embryo. The chief exponent of this theory was Bonnet, who carried it out to its logical conclusion (1762), and asserted that development is not only a process of evolution, but also that all germs have existed since the day of creation, and that each embryo contains in similar form the germs of all subsequent generations.

The theory of evolution seems, on the whole, to have prevailed as the generally accepted explanation of development until 1812, when Meckel called attention to a Latin treatise, "Theoria Generationis," published in 1759 by Caspar Frederick Wolff, as the dissertation for his doctor's degree. In this paper Wolff had traced the