

BENZANILID.—(Phenyl benzamide.) This is one of the three anilids that have proved active medicinally. The others are salicylanilid and acetanilid. In benzanilid the salicylic acid or acetic acid of the others is replaced by benzoic acid. It occurs in small, white, shining scales, tasteless, odorless, insoluble in water, soluble in alcohol, 1 in 60. It is chemically and therapeutically allied to acetanilid. Kahn and Hepp, when investigating antifebrine, used it in a number of cases and found it to possess similar properties. The advantages claimed for it are that it possesses less toxic properties and after its use the rise of temperature is more slow, but notwithstanding these apparent advantages it has failed to become a popular remedy.

Its antipyretic action begins in from half an hour to one hour after it has been taken, and its maximum effect is reached in five or six hours. In ten or twelve hours its effect has quite passed away. It does not cause any disturbance of respiration or of digestion. The circulation is slowed, the vascular tension being reduced. In some cases large doses have altered the color of the urine, rendering it of a greenish tinge, which is increased after exposure to light. It is administered in doses of ten or fifteen grains; sixty to ninety grains, during the twenty-four hours, being well borne. *Beaumont Small.*

BENZENE.—Benzene, also called *benzol*, is the simplest hydrocarbon of the aromatic series, having the formula C_6H_6 . It is thus a definite chemical compound, and must carefully be distinguished from *benzin*, a composite substance obtained as a distillate from coal oil (see *Benzin*). Benzene or benzol is a thin, colorless fluid, very volatile and very inflammable, and, when pure, of a not disagreeable aromatic odor. It is practically insoluble in water, but dissolves in four parts of alcohol. It may be obtained by distilling a mixture of benzoic acid and lime, or by fractional distillation of the material known as *coal naphtha*, a derivative of coal tar.

Benzene is of more value in pharmacy than in medicine. For pharmaceutical purposes it is notable for its extensive solvent power, dissolving readily such comparatively insoluble substances as india rubber, gutta-percha, sulphur, phosphorus, iodine, many resins and many alkaloids dissolving readily in it. Physiologically, benzene has little local effect, but taken internally determines intoxication, coma, and anesthesia. It has been given internally in doses of a few drops in dyspepsia associated with fermentation of the ingesta, and also in trichinosis, but is rarely employed and is not official in the United States Pharmacopoeia. *Edward Curtis.*

BENZIN.—Under the title of *Benzinum*, Benzin, the United States Pharmacopoeia makes official the substance commonly known as *petroleum benzin* or *petroleum ether*. It is thus defined and described: "A purified distillate from American petroleum, consisting of hydrocarbons, chiefly of the marsh-gas series [C_2H_2 , C_4H_4 , and homologous compounds]. Benzin should be carefully kept in well-stoppered bottles or cans in a cool place, remote from lights or fire. A transparent, colorless, diffuse liquid, of a strong characteristic odor, slightly resembling that of petroleum, but much less disagreeable, and having a neutral reaction. Specific gravity: 0.670 to 0.675 at 15° C. (59° F.). Boiling point, 50° to 60° C. (122° to 140° F.). Insoluble in water; soluble in about six parts of alcohol, and readily soluble in ether, chloroform, benzol, and fixed and volatile oils. Benzin is highly inflammable, and its vapor, when mixed with air and ignited, explodes violently" (U. S. P.).

Much confusion arises from the similarity in name and general appearance between this substance—a mixture of hydrocarbons of the marsh-gas series—and the chemical body *benzene* or *benzol* (C_6H_6), a single hydrocarbon of the aromatic series (see *Benzene*). The two articles must carefully be distinguished.

Benzin is not used in medicine, but is useful to the pharmacist for its solvent powers over fats, resins, volatile oils, and other bodies *Edward Curtis.*

BENZOIC ACID AND BENZOATES.—*Benzoic Acid*, $HC_7H_5O_2$, formerly known as *flowers of benzoïn*, is a monatomic acid of the aromatic series, existing ready formed in a number of balsams and gum resins, notably in benzoïn, and also easily obtainable, artificially, by decomposition of hippuric acid or of derivatives of toluene or of naphthalin. The benzoic acids of commerce are derived from all these sources. Benzoic acid from benzoïn is characterized by a special degree of lightness and fluffiness, and by a distinct benzoïn odor. The acid derived from hippuric acid is manufactured out of the urine of cows and horses, and formerly was distinguishable by a urinous odor, but as at present made is quite pure and entirely free from such smell. The acid from this source is commonly known, commercially, as *German benzoic acid*.

Benzoic acid is official in the United States Pharmacopoeia under the title *Acidum Benzoicum*, Benzoic Acid. The source of the article is not prescribed, but the acid is said to be "usually obtained from benzoïn by sublimation, or prepared artificially, chiefly from toluol." Although no mention is made of the German acid manufactured out of horse urine, yet it is proper to say that the article so derived, if free from smell, is perfectly pure and decent for medical use. A benzoic acid made from toluene, and having an odor like that of bitter almonds, is probably not pure, and such a sample should be rejected. Benzoic acid is described officially as follows: "White or yellowish-white, lustrous scales or friable needles, odorless, or having a slight, characteristic odor resembling that of benzoïn, and of a warm, acid taste; somewhat volatile at a moderately warm temperature, and rendered darker by exposure to light. Soluble, when pure, in about 500 parts of water, and in 2 parts of alcohol at 15° C. (59° F.); in 15 parts of boiling water, and in 1 part of boiling alcohol. Also soluble in 3 parts of ether, 7 parts of chloroform, and readily soluble in carbon disulphide, benzol, fixed and volatile oils, but sparingly soluble in benzin. Benzoic acid volatilizes freely with the vapor of water. On heating it to 100° C. (212° F.), it begins to sublime. At 121.4° C. (250.5° F.) it melts, and at a higher temperature it is consumed without leaving a residue. The acid sublimed from benzoïn has a lower melting point and a greater solubility in water. Benzoic acid has an acid reaction" (U. S. P.).

Benzoic acid "should be kept in dark amber-colored, well-stoppered bottles, in a cool place." As to effects upon the animal system, benzoic acid is locally irritant to sensitive surfaces, its concentrated vapor, if inhaled, causing violent sneezing and coughing, and even bronchial inflammation. Yet, when swallowed, benzoic acid is singularly innocent. Even gram doses cause but a feeling of abdominal warmth and increase of bronchial mucus, and serious derangement is scarcely possible by any likely dosage, intentional or accidental. The action of benzoic acid, of interest in medicine, is upon the urine. Under the influence of the drug, given by the mouth, an acid urine tends to be of increased acidity, an alkaline to become acid, and a urine prone to decompose before voidance to lose such tendency. The increased acidity of urine determined by benzoic acid is mainly accounted for by the presence in the secretion of hippuric acid, undoubtedly derived, by chemical change, from the benzoic acid itself. This conversion of benzoic into hippuric acid is probably wrought in the kidneys (Meissner and Shepard). Arrest of putrefaction in urines by benzoic acid is probably simply an example of the general antiseptic action of the drug. Opposite statements have been made by investigators concerning the influence of benzoic acid, taken medicinally, upon urinary excretion of urea and uric acid, some finding the proportion of one or other of these excreta to be lessened, and others observing the same to be unaffected.

Besides the action upon the urine, benzoic acid is important for its antiseptic power, in which it probably stands on a par with salicylic acid.

The therapeutic applications of benzoic acid are principally the internal giving of the acid under its own form

for the acidifying of the urine in cases in which that secretion tends to be alkaline and unduly phosphatic, or for the prevention of decomposition of the urine in the bladder in cases of vesical catarrh. The acid may also be used as an antiseptic. In saline combination, principally as sodium benzoate, benzoic acid has also been employed in acute rheumatism, as an innocent but therapeutically effective substitute for salicylic acid or the salts thereof (Senator), and in pulmonary consumption, diphtheria, scarlet fever, and other diseases of that category. In these applications, however, the reputation of the medicine is, at the present writing, decidedly on the wane.

For its legitimate use in urinary disorders, benzoic acid may be given several times daily in doses of from 0.65 to 2.00 gm. (gr. x. to xxx.), administered in pill form, with soap as the excipient, or given in mixture. Free solution of benzoic acid in water can be determined by the addition of four parts of sodium phosphate or one and a half parts of borax. Solutions for antiseptic purposes should range from two-per-cent. strength upward, solution in water being effected by the additions just cited.

BENZOATES.—Such of the benzoates as are used in medicine are employed for the sake of the benzoic acid of their composition. Their discussion, therefore, belongs to this place. The benzoates official in the United States Pharmacopoeia are the *sodic*, *lithic*, and *ammoniac* salts.

Sodium Benzoate, $NaC_7H_5O_2$.—This salt is official as *Sodii Benzoas*, Sodium Benzoate, and is described as "a white, amorphous powder, odorless, or having a faint odor of benzoïn, and a sweetish, astringent taste. Permanent in the air. Soluble, at 15° C. (59° F.), in 1.8 parts of water and in 45 parts of alcohol; in 1.3 parts of boiling water, and in 20 parts of boiling alcohol. When heated, the salt melts, emits vapors having the odor of benzoic acid, then chars, and finally leaves a residue of sodium carbonate and carbon. To a non-luminous flame it imparts an intense yellow color. The aqueous solution is neutral to litmus paper" (U. S. P.). The salt should be kept in well-stoppered bottles. Sodium benzoate is made by treating a sodium carbonate, in hot saturated aqueous solution, with benzoic acid, and the quality of the salt will be determined by the quality of the benzoic acid used in its manufacture. The article described by the Pharmacopoeia is intended to be made from benzoïn-benzoic acid. Specimens made from hippuric-benzoic acid and from toluene-benzoic acid have been found to be less freely soluble in water than the above, and to yield pale yellow and turbid solutions of an acrid, bitter taste, and of an odor of horse sweat or of bitter almonds, according to the source of the benzoic acid.

Physiologically, sodium benzoate is about as harmless as a salt can be, but has been found to produce fully the curative action of benzoic acid itself in acute rheumatism, and has been loudly vaunted as of wonderful avail in pulmonary consumption, diphtheria, etc. It has been given internally in doses amounting to from 5 to 20 gm. (gr. lxxv. to ccc.) a day, without serious derangement, and for pronounced effect in acute rheumatism the fullest limit of such dosage may be necessary. In diphtheria, inhalations of atomized spray and insufflations of the powdered salt upon the diphtheritic patch have also been practised.

Lithium Benzoate, $LiC_7H_5O_2$.—The salt is official as *Lithii Benzoas*, Lithium Benzoate. It is thus described: "A light, white powder, or small, shining crystalline scales; odorless, or of faint benzoïn-like odor, and of a cooling, sweetish taste; permanent in the air. Soluble, at 15° C. (59° F.), in 4 parts of water, and in 12 parts of alcohol; in 2.5 parts of boiling water, and in 10 parts of boiling alcohol. The presence of sodium benzoate increases the solubility in water and lessens that in alcohol" (U. S. P.). The salt reacts to heat the same as does sodium benzoate, except that it colors a flame crimson instead of yellow.

Lithium benzoate is made by direct decomposition of lithium carbonate by benzoic acid; and, as in the case of the making of sodium benzoate, benzoïn-benzoic acid should be used for the manufacture.

Lithium benzoate is an innocent salt, seemingly yielding to a certain degree similar results to benzoic acid itself in urinary affections (see under Benzoic Acid, *ante*). It has been used in such conditions in the place of the uncombined acid, in doses of from 1 to 2 gm. (gr. xv. to xxx.) several times daily.

Ammonium Benzoate, $NH_4C_7H_5O_2$.—The salt is official as *Ammonii Benzoas*, Ammonium Benzoate. It is thus described: "Thin, white, four-sided, laminar crystals, odorless, or having a slight odor of benzoic acid, a saline, bitter, afterward slightly acid taste, and gradually losing ammonia on exposure to the air. Soluble at 15° C. (59° F.), in 5 parts of water and in 28 parts of alcohol; in 1.2 parts of boiling water and 7.6 parts of boiling alcohol. When strongly heated, the salt melts, emits vapors having the odor of ammonia and benzoic acid, and is finally completely dissipated" (U. S. P.). The salt is made by adding benzoic acid to water of ammonia, and, as in the case of the other benzoate, benzoïn-benzoic acid should be used in the making. This benzoate should be kept in well-stoppered bottles.

Ammonium benzoate is an innocent salt, and affects the urine after the manner of benzoic acid itself. It is used in place of the acid in urinary disorders (see Benzoic Acid, above), in doses of from 1 to 2 gm. (gr. xv. to xxx.) several times daily. It amounts, medicinally, to a soluble form of benzoic acid, and can readily be made extemporaneously in solution by saturating benzoic acid with water of ammonia. Let the amount of benzoic acid to be prescribed be mixed with a little water, then neutralized with water of ammonia, and the whole brought to a desired volume of solution by further addition of water (Squibb). *Edward Curtis.*

BENZOIN.—**BENZOINUM.** "*Gum Benjamin.*" "A balsamic resin obtained from *Styrax Benzoin* Dryander (fam. *Styracaceae*)" (U. S. P.). The tree here named is known to be the source of the *Sumatra* variety of benzoïn, but is probably not that of the *Siam* variety. It is a good-sized tree, rather widely distributed through the East India Islands, and to a considerable extent cultivated in Sumatra. At the age of about six years, when the tree is six to eight inches in diameter, collections begin. They are continued for from fifteen to twenty years, the product becoming darker and more inferior with each succeeding year. The sap exudes from incisions made for the purpose, as a milky juice which is collected in tears, at first whitish, then becoming yellow, or rusty brown, but still milky white when fractured. If this concrete product of the young trees is packed separately, it results in a more or less loosely constructed cake, of excellent quality. Ordinarily, however, there is a considerable quantity, often very large, of a darker substance which, run, or perhaps kneaded, into the interstices, and then hardening, converts the contents of the boxes in which it comes packed into a solid mass of a pinkish or reddish gray, or of a gray or sometimes gray-brown color, in which the white or yellowish tears are firmly embedded. It is believed that this interstitial substance consists of the soft product from old trees, or even of a very inferior substance obtained by barking and scraping the trunks. Even this inferior variety may be regarded as good in comparison with the very large quantity of adulterated benzoïn which reaches us. Adulteration was formerly practised by embedding large stones in the centre or ends of the mass, but the inspection of the blocks by splitting them diagonally in various directions checked this, and recourse is now had to fine gravel, sand, or other earthy matter, for the purpose. Benzoïn thus adulterated is called "drossy." Benzoïn, when cold, breaks with a sharp, brittle fracture, and a shining or sparkling surface, but becomes more or less plastic or adhesive in a warm atmosphere. It has a very pleasant balsamic odor and a rather mildly aromatic, somewhat acrid and unpleasant

taste. Benzoic acid sublimes from it. Five parts of warm alcohol should dissolve nearly all of it, if pure.

Siam benzoïn is packed in similar boxes, but consists of a porous mass of tears only, loosely cohering or separate. These tears are known in trade as "marbles" or "almonds" and the respective grades are known as "large" or "small marbled." The outer surface of these tears becomes of a darker yellow or brown than the Sumatra, but they also are white internally. They are much more fragrant, reminding one somewhat of vanilla. This variety is much more expensive than the Sumatra, and is little subject to adulteration.

Penang benzoïn was a very highly valued variety of Sumatra, but is now obsolete in commerce.

The principal constituent of benzoïn, as to percentage, constituting almost the whole of it, is resin, but its active constituent is benzoic acid, which see. There is a trace of cinnamic acid and a little volatile oil.

Action and Uses.—So far as the medicinal action and use of benzoïn is concerned, it is identical with benzoic acid, in proportion to its percentage. Otherwise it is used in pharmacy for perfuming medicinal substances or for rendering them antiseptic, and very largely in the manufacture of perfumery. The official preparations are the *Adeps Benzoïnatus*, or *benzoïnated lard*, which contains 2 per cent. of it, the tincture, of 20-per-cent. strength, which is the distinctly medicinal preparation, the dose 2 to 4 c.c. (fl. 3 ss. to i.), and the compound tincture or "Friar's Balsam," containing 12 per cent. of benzoïn, 8 per cent. of storax, 4 per cent. of balsam tolu, and 2 per cent. of purified aloes, the dose being the same as of the last.

Henry H. Rusby.

BENZO-IODO-HYDRIN.—Glyceryl-chlor-iodo-benzoate; chlor-iodo-benzoyl glycerin ester— $\text{CHC}_6\text{H}_4\text{CO}_2\text{H}_2$. It is a product of the interaction of benzoyl iodide and epichlorhydrin, and is a yellowish-brown fatty mass, insoluble in water and glycerin, and soluble in alcohol, ether, and petroleum oils. At the boiling point of water it is decomposed, iodine being liberated. It is claimed that this substance possesses the same value as potassium iodide without any tendency to produce iodism or to derange the digestion. Two grains of benzo-iodo-hydrin may be given with sixty grains of sugar, this dose being equivalent to fifteen grains of potassium iodide.

W. A. Bastedo.

BENZO-NAPHTHOL. BETA-NAPHTHOL BENZOATE— $(\text{C}_{10}\text{H}_7\text{O}, \text{C}_7\text{H}_5\text{O}_2)$. Obtained by the reaction that takes place between beta-naphthol and benzoic acid. It is a whitish, crystalline powder, very slightly soluble in water, freely soluble in chloroform and alcohol.

It is recommended as a substitute for salol or betol, having the advantages that benzoic acid possesses over carbolic or salicylic acid. When introduced into the intestines it breaks up into beta-naphthol and benzoic acid.

The former is not absorbed and remains in the intestines until excreted; the latter also exerts a local antiseptic action, but ultimately is absorbed and eliminated with the urine.

This is one of the newer intestinal antiseptics that have secured a favorable recognition. Its continued use has added to its repute, and it may now be looked upon as a remedy of decided value. It has proved of value in ordinary fermentative changes in the intestine, and in the diarrheas of children and adults, both acute and chronic. Reports show it to be of particular use in chronic conditions in which there are follicular disease and ulceration. In an epidemic of acute dysentery in Cuba it proved of marked value, the death rate in those cases in which it was employed being only two per cent., while under other methods of treatment it was nine per cent.

The ordinary dose is given as from five to ten grains three or four times a day, but when a more decided action is desired a larger dose must be administered—forty grains a day to children and from sixty to ninety grains to adults. No ill effects have been reported from the employment of this remedy.

Beaumont Small.

BENZO-PHENONEID.—Tetra-methyl-diapsido-benzo-phenoid. A non-irritating though powerful germicide, obtained by the decomposition of an aniline dye. It is similar to pyoktanin, is soluble in 100 parts of water, and is not caustic. Like yellow pyoktanin it has been used in corneal ulcers, pustular keratitis, and various ulcerative lesions of the skin and mucous membranes.

W. A. Bastedo.

BENZOYL-AMIDO-PHENYL-ACETIC ACID.— $\text{CHC}_6\text{H}_4\text{CO}_2\text{NHC}_6\text{H}_5\text{COOH}$. Amido-phenyl-acetic acid is dissolved in a twenty-five-per-cent. solution of sodium hydroxide, warmed, and benzoyl chloride added; this mixture is then poured into dilute hydrochloric acid, and the resulting precipitate washed and dried. It is in white, needle-shaped crystals, slightly soluble in water, and forming with the alkalies soluble salts. Both the acid and its salts are used as antiseptics in the alimentary tract, and they promise to be of value when putrefaction is taking place in the small intestine, with headache, indicanuria, etc. Clinical data are wanting.

W. A. Bastedo.

BENZOYL-EUGENOL.— $\text{C}_6\text{H}_5, \text{C}_2\text{H}_5, \text{OCH}_3, \text{OCOC}_6\text{H}_5$.—a combination of benzoic acid and eugenol, combining the antiseptic properties of oil of cloves with those of benzoic acid. It occurs in large colorless prisms or in small needle-shaped crystals, is odorless and tasteless, insoluble in water, and freely soluble in alcohol, ether, chloroform, and acetone. It is an intestinal antiseptic, and being to some extent eliminated by the lungs, it acts as a stimulant and antiseptic to the respiratory tract. So far its use has been confined to cases of pulmonary and intestinal tuberculosis. Dose, gr. viij. to xv. in powder or capsule, or mixed with milk.

W. A. Bastedo.

BENZOYL-TROPEINE.— $\text{C}_8\text{H}_9, \text{C}_6\text{H}_5\text{CONO}$. Tropine, the mother substance of atropine, is heated to 100° C. with benzoic acid and dilute hydrochloric acid. The resulting silky needles constitute benzoyl-tropeine. They are insoluble in water, have a strongly basic reaction, and with acids form soluble salts. This compound seems to stand chemically between cocaine and atropine, and it partakes of the nature of each. Thus Filehne found it to be a valuable local anesthetic when applied to the eye, it at the same time causing dilatation of the pupil. The soluble salts may be used in one to four per-cent. solution.

W. A. Bastedo.

BERBERINE.— $2(\text{C}_{20}\text{H}_{17}\text{NO}_4 + 9\text{H}_2\text{O})$. An alkaloid obtained chiefly from *Berberis vulgaris* L., but very common in other plants, especially in the families *Berberidaceæ*, *Ranunculaceæ*, and *Menispermaceæ*. It occurs in yellow, needle-shaped crystals, or as a yellow crystalline powder, and is soluble in alcohol and hot water. It forms numerous yellow crystalline salts. It is not poisonous. Aside from its effects as a simple bitter, its physiological action is rather weak. It is somewhat stimulant to unstriated muscular fibre, yet it causes a fall of blood pressure and slightly lowers the temperature. Large doses are irritant and may produce purgation. It is usually given as the sulphate. The dose as a tonic is 0.03 to 0.06 gm. (gr. ss. to i.). Doses of ten to fifteen times these amounts are antiperiodic.

H. H. R.

BERBERIS L.—BARBERRY. A genus of the family *Berberidaceæ*, containing more than one hundred species, very widely distributed throughout the north temperate zone and extending along the mountains into and through the tropics. They are beautiful erect or prostrate, yellow-flowered shrubs or small trees, the evergreen leaves mostly pinnate and usually spinulose-toothed. All parts are permeated by the alkaloid *berberine*, the largest percentage occurring in the bark, and more particularly in that of the root. In most places where the species grow they have gained a high reputation as bitter tonics.

B. vulgaris L. is an erect species of Europe and ad-

acent Asia, naturalized to some extent in North America, its scarlet fruit largely used in olden times as cranberries now are. Both the root and the bark have long been used medicinally as an antiperiodic, febrifuge, and tonic. Besides the berberine, it contains the alkaloids oxyacanthine and berbamine. Oxyacanthine is at first white, but turns yellow on exposure to light. The two last-named alkaloids apparently do not exert much influence, as the action of berberis is practically that of its berberine.

B. aquifolium Pursh, Oregon grape root or mountain grape, is a low, diffuse, blue-fruited species, very abundant in the Northwestern United States. It holds a remarkable place in the esteem of the miners and mountaineers, who rely chiefly upon this and the mountain sage (*Artemisia frigida*) in the treatment of fevers. Its constituents are about the same as those of *B. vulgaris*. The root is used. Very many reports agree in attributing to this drug, in addition to the ordinary tonic properties of a vegetable bitter, a special power in stimulating nutrition. The dose of both species is 0.2 to 0.6 gm. (gr. iij. to x.). Large doses are laxative. The best form of administration is the powder, fluid extract, or tincture.

In India, *B. aristata* D.C., *B. Lycium* Royle, and *B. Asiatica* Roxb. are similarly employed.

Henry H. Rusby.

BERCK-SUR-MER.—A sea-coast village in the Department of Pas-de-Calais, France, lying upon the shore of the English Channel. This place is mentioned only in order to call attention to the seaside hospital there existing, which has accommodations for five hundred patients. Lombard tells us, in his "Traité de climatologie médicale," vol. iv., p. 604, that this hospital was established in 1870, in consequence of the excellent results in the treatment of cases of scrofula and rickets obtained at the hospital, containing one hundred beds, that had been founded at this place by the city of Paris for the use of the poor. The present hospital contains eighty beds, intended for the children of such parents as can afford to pay the small sum of one franc eighty centimes (thirty-six cents) per diem for their board, lodging, and medical treatment. The idea of founding such establishments for the benefit of poor children, the victims of scrofula and kindred diseases, appears to have originated with the Italians; and no less than thirteen such charitable institutions exist upon the Mediterranean and Adriatic shores of the Italian peninsula. The reports of these hospitals show excellent results from this most admirable and commendable charity. At Biarritz, Cette, Cannes, Arcachon, Pen Bron, Cap Breton, Hyères-Giens, and Ver-sur-Mer, as well as at Berck-sur-Mer, the French have made further provision for this class of patients.

Huntington Richards.

[There are also hospitals or sanatoria for scrofulous children on the coasts of Holland, Belgium, Denmark, Austria, Germany, Russia, and England, the one at Margate having been founded in 1796.

It is well to emphasize here the great value of seaside residence for scrofulous or tuberculous children, and the importance of such establishments as these upon the coasts of the various European countries, where at the same time the children can receive proper attention and nourishing food. In this country the example of Europe might well be followed in this respect, and many of our admirable seaside resorts be utilized for this purpose.—*E. O. O.*]

BERGAMOT, OIL OF.—OLEUM BERGAMOTTE. "A volatile oil obtained by expression from the rind of the fresh fruit of *Citrus Bergamia* Risso et Poiteau (fam. *Rutaceæ*)" (U. S. P.). The bergamot tree is a small evergreen, very much like the bitter orange in almost all respects, but the leaves are obovate, with narrowly winged petioles, and the flowers are smaller and fewer. It is not known in a wild state—indeed, it was not known at all until about two hundred years ago, when it appeared in the south of Europe. There is no doubt it is a hybrid

or cross of some kind, probably between the bitter orange and the lemon or citron. The fruit is about as large as a small orange, and has the same general structure. It is rounded, pear-shaped, about as broad as long, with a broad, flat, or even depressed apex; the skin is soft, smooth, yellow, and very fragrant. The pulp is sour and bitter.

Bergamots are raised in the vicinity of Reggio, in the south of Italy, and in Sicily, and the oil is exported from Messina and Palermo. This is collected mechanically by rupturing the vesicles, sometimes by the old sponge process used with oranges and lemons in obtaining their oils, but more generally now by a sort of hand-mill, into which the fruits are put whole, and rolled and rubbed against a series of knives, which cut or scrape the surface and so liberate the oil. It flows to the bottom of the mill, and out through suitable apertures. One hundred fruits yield two and a half or three ounces of the oil (Flückiger).

It is a thin, mobile, pale-green, or greenish liquid, with a very fragrant, pleasant odor, and a bitter, aromatic taste. Its specific gravity is 0.883 to 0.886, its reaction slightly acid. Its active portion is linalyl acetate. Like the essential oils in general, it dissolves readily in alcohol, chloroform, ether, and fats, and only very sparingly in water. The green color is due to chlorophyll.

The medical properties of oil of bergamot are those of essential oils in general, but it is never used internally. On the other hand, its delicious odor has made it a universal favorite in perfumes and toilet preparations. The world-renowned Cologne water has it as its principal ingredient, modified by other aurantiaceous oils. There are numerous formulæ for making it; one, formerly official as *Spiritus Odoratus*, is as follows:

Oil of Bergamot	16 parts.
Oil of Lemon	8 "
Oil of Rosemary	8 "
Oil of Lavender Flowers	4 "
Oil of Orange Flowers	4 "
Acetic Ether	2 "
Water	158 "
Alcohol	800 "

1,000 parts.

W. P. Bolles.

BERIBERI. See *Neuritis*.

BERKELEY SPRINGS.—Morgan County, West Virginia.

Post-Office.—Berkeley Springs. Hotel.

Access.—Via Baltimore and Ohio Railroad to Hancock Station; thence by Berkeley Springs and Potomac Railroad direct to springs. Trains on the latter road make close connection with all day trains during the season. The location is six miles southwest of Potomac River and Hancock Station.

These historic old springs are situated in a narrow valley, about eight hundred feet above the sea level, and issue from the base of a steep ridge rising at this point about four hundred and fifty feet above the valley. Tradition has it that the waters here were well known to the aborigines, who, although generally at war among themselves, established a standing truce around the springs, that all might avail themselves of their potent virtues. They have been known and used by the whites since 1730, and it is said they were visited by George Washington while employed with a surveying expedition in 1748. The Father of his country was so appreciative of the many attractions of the neighborhood that he afterward acquired property immediately adjacent to the principal spring, on which he erected two "comfortable and convenient houses." General Horatio Gates, Charles Carroll of Carrollton, and other well-known figures of Revolutionary days were also represented among the owners in the old town established in 1776.