FEBRILE EXHAUSTION.—A so-called "fever of exhaustion" has been described by Coustan and others. The affection often occurs in troops during campaign or hard marches, especially in warm weather. It occurs chiefly in infantry after rapid marching, but mounted soldiers are not infrequently affected. Recruits are particularly liable to its occurrence. The symptoms are somewhat variable, but include a remittent temperature, a tendency to adynamia and marked nervous depression. Usually there are headache, insomnia, restlessness and severe lumbar pains. The urine is scanty, red, and turbid, but becomes clear in about twenty-four hours. The muscles which have been excessively fatigued are sometimes sore to the touch for several days. Diarrhœa is a prominent symptom, and during a severe march the alvine discharges of the men become noticeably frequent and watery. Vomiting not rarely occurs. The condition is generally regarded as being due to an excess of acid produced in the muscles under the influence of muscular work, and in its action on the muscular fibres it diminishes their contractility. The local pains are thought by some to be due to minute lesions occurring in the muscles as a result of excessive use, and resembling those which occur from prolonged massage. The substances given off as a result of muscular work may affect the nervous centres in the production of nervous depression and fever; while the diarrhœa probably depends upon relaxation of the mucous membrane and upon the large amounts of fluid drunk to replace the losses by perspiration.

The prevention of this affection obviously depends upon proper conduction of the march. The treatment includes rest, with sometimes warm baths.

FEIGNED DISEASES.—No reference to the diseases of the soldier would be complete without mention of the intentional simulation of disease—not uncommonly observed in the military service, and for the detection of which medical officers are constantly on the alert. The feigning of diseased conditions of mind or body has always been a favorite method with all classes of people for securing betterment of condition, relief from distasteful duty or the evasion of punishment, and this is particularly the case among soldiers, whose medical assistance is gratuitous and whose pay and subsistence are assured without the necessity of securing them by constant personal effort.

By far the most elaborate and persistent efforts at deception are those which occur in time of war, when recruits endeavor to escape draft or to avoid duty on the firing line. In time of peace the conditions simulated are usually simple, and the claims as to their existence are not long continued. Sometimes, however, as where an effort is made to secure discharge from the service, the symptoms feigned are extremely complex and are maintained with great pertinacity. The disease selected for simulation, and the persistency with which its symptoms are exhibited, are for the most part determined by the familiarity possessed, or thought to be possessed, by the malingerer with reference to it. In general, some morbid condition the symptoms of which are largely subjective, as muscular rheumatism or neuralgia, is selected. Another condition not infrequently simulated is that of involuntary nocturnal enuresis, and this fraud, with the above, is especially difficult of demonstration. Among the affections feigned may also be mentioned various fevers, diarrhœa, dysentery, chorea, epilepsy, hysteria, hemorrhages, apoplexy, imbecility, insanity, coma and even death—in fact, the diseases simulated belong to every department of medicine. Not infrequently such a varied array of symptoms is presented to the medical officer as would scarcely suggest any known affection. The degree of success of the attempt at simulation naturally depends upon the skill with which it is executed, and this is influenced by a more or less comprehensive knowledge of the symptoms of the affection selected and the degree of natural cunning possessed by the malingerer. Usually the imitation is imperfect and readily to be detected; but occasionally an instance is found in which every effort to prove the case to be fraudulent, even where it is a moral certainty that such is the fact, meets with only negative results. In most instances, careful questioning and observation suffice to expose the fraud. In other cases it often becomes necessary, while apparently agreeing as to the reality of the affection, to confine the patient to bed, place him on low diet and administer disagreeable potions. Under such treatment recovery is usually rapid. Where rheumatism or neuralgia is simulated the use of the actual cautery may be advisable, but in general every case must be treated according to circumstances. At times the inconvenience and suffering unhesitatingly endured by the malingerer are truly remarkable.

The prevention of malingering can be largely accomplished by careful investigation of each case on the part of the medical officer, whose knowledge of the personal character of the individual, gained by contact or by inquiry of his company officers, will largely aid him in arriving at a correct conclusion. Men of unstable or undesirable character, who present no objective symptoms of disease, should in general be promptly returned to duty. Where conditions are such that the fraud can be definitely proven—which, unfortunately, is rarely the case—the offender should be tried by court-martial and severely disciplined. In general, the personality of the medical officer is a factor of no small importance in determining the amount of malingering in a command.

*Edward L. Munson.*

**CAMPANULACEÆ.**—(The Harebell or Lobelia Family.) This family, of some two score genera and more than a thousand species, is of greater interest through its poisonous species than through its medicinal value. Its plants represent every habit, though the most of them are herbs and there are no large trees among them. The juice is milky and the flowers are mostly showy. They inhabit all except very cold countries. Of the three sub-families, the first, *Campanuloïdæ*, is much more closely related, in composition and properties, to the distinct family *Cichoriaceæ* than to the remainder of its own family, and it appears, from various considerations, to be a mistake to class these and the third sub-family, *Lobelioïdæ*, in the same family. The Campanuloïdæ are not poisonous, but, on the contrary, produce numerous wholesome and nutritious roots, containing inulin, and some of their fruits also are edible. Of the Lobelioïdæ, on the other hand, one or more species will be found recognized in almost every country as deadly poisons. The poisonous constituents are chiefly alkaloids. As poisons, they are classed as acrid narcotics, and act generally like *Lobelia inflata*, which see.

*Henry H. Rusby.*

**CAMPHOID** is a substitute for collodion made by dissolving 1 part of soluble gun cotton (pyroxylon) in alcohol containing 20 parts of camphor. It is a thick, colorless liquid which dries very rapidly, and when painted on the skin leaves a thin impervious film. It may be applied as a protective, or as a vehicle for iodoform, chrysarobin, tannic acid, etc.

*W. A. Bastedo.*

**CAMPHOR.**—*Camphora*, U. S. P., Br. P., $C_{10}H_{16}O$. A stearoptene imported in a crude state and purified in this country, by sublimation. The tree from which camphor is obtained is a member of the order Lauraceæ, and was named by Linnæus *Laurus camphora*. Nees and Ebermair classed it with cinnamon as *Cinnamomum camphora*, and later Nees separated it into a special genus as *Camphora officinarum*. It is a large tree, of slender habit, with long, horizontal, smooth, green branches, and a hard, light-colored, very fragrant and valuable wood. The alternate evergreen leaves are dark and shining above, lighter, glaucous-green beneath, ovate acuminate entire, three-nerved. Flowers minute, greenish-yellow, in small axillary panicles. Perianth thick, six-lobed stamens, nine with four-celled anthers opening by valves. Staminoides six. Ovary free, one-celled, one-seeded. Fruit about as large as a pea, surrounded by the persistent perianth tube. This tree grows extensively and abundantly in Formosa and the Japanese islands, from which places all the camphor of European and American commerce is obtained; and in Central China. It has also been transplanted and flourishes in most tropical or sub-tropical countries of both hemispheres.





Camphor is also obtained from other sources. The best known are the Borneo and Ngai camphors. The former is collected on the islands of Borneo and Sumatra from *Dryobalanops camphora*, the latter from *Blumea balsamifera*, which grows abundantly throughout China and India.

FIG. 1097.—Camphor Tree, Flowering Branch. (Baillon.)

The increasing demand for camphor in the arts, particularly in the manufacture of celluloïd and smokeless powder, is directing attention to its production, as the demand is exceeding the natural supply. To replace this deficiency the manufacture of artificial camphor is being improved, and the market will probably be supplied with camphor prepared from some of the turpentines, quite independently of the present source.

Camphor is a constituent, or more properly, an oxidation product of the essential oil of camphor, which is abundantly present in all parts of the plant. Very frequently the camphor is found in a more or less pure state beneath the bark, having separated from the oil. It is separated from the leaves, smaller branches, and chopped wood by a crude method of sublimation, in which impure condition it is exported. In this country it is resublimed.

Camphor occurs "in white, translucent masses, of a tough consistence and a crystalline structure, readily pulverizable in the presence of a little alcohol, ether, or chloroform; having a penetrating, characteristic odor, and a pungently aromatic taste. Specific gravity, 0.995 at 15° C. Very sparingly soluble in water, but readily soluble in alcohol, ether, chloroform, carbon disulphide, benzin, and in fixed and volatile oils. It melts at 175° C., boils at 204° C., and is inflammable, burning with luminous, smoky flame. On exposure to the air it evaporates more or less rapidly at ordinary temperature, and, when moderately heated, it sublimes without leaving a residue" (U. S. P.). The solubility of camphor in water is about 1 part in 1,300; this is increased by the presence of sugar, magnesia, carbonic acid, and spirits of nitrous ether. When camphor is mixed with menthol and similar products, in definite proportions, the two substances become a liquid. The following are some of the combinations: camphor 1 part—with menthol 3, with thymol 1, with chloral hydrate 1, with salol 1.5; camphor 2 parts—with naphthol 1; camphor 4 parts—with phenol 12 to which water, 1 part, has been added. With certain resins and gums, camphor forms a soft mass of pilular consistence, which lasts for a variable length of time according to the gum selected. Guaiac, asafœtida, galbanum, benzoin, and tolu are some that are of pharmaceutical importance.

The oil of camphor of commerce is separated during the first sublimation and is obtained as a thin fluid, varying in color from a light yellow to a reddish-brown according to age. It has a strong odor and taste resembling those of camphor. It is very variable in character, the percentage of camphor that may be present is uncertain, some samples being entirely free from it. The oil is not of much therapeutic value in this country, although thought much of in China and other Eastern countries, where it is employed not only for its remedial properties but also as a turpentine in the preparation of india ink and varnishes. It is also used as an illuminant. Its action is similar to that of camphor, and it is recommended in the same conditions in doses of from gtt. i. to gtt. iij.

Camphoric acid, $C_{10}H_{16}O_4$, is a product of camphor that is of much therapeutic interest. It is an oxidation product of camphor, and may be prepared by heating camphor with nitric acid. The acid forms in small colorless needles or plates, odor faintly aromatic, taste acid and bitter, very sparingly soluble in cold water, more soluble in hot, soluble in alcohol and ether. Ten per cent. of alcohol added to hot aqueous solution prevents the acid from being deposited on cooling. This acid has long been known, but it is only during the last few years that its therapeutic properties have been utilized. Its chief use is in the treatment of diseases of the respiratory tract and as a preventive of night sweats. For the latter purpose it promises to be one of the most valuable additions to our materia medica.

Compared with atropine, its effect is more certain and more prolonged, while it does not produce the difficulty in swallowing, dryness of the pharynx, disturbed sleep, and vertigo, which often accompany the use of the latter drug. Its mode of action differs from that of atropine, as its beneficial effect is thought to be due to its power of destroying the ptomaïns in the blood which cause this distressing symptom.

The dose as an anhydrotic is gr. xxx, at bedtime, or gr. xv, during the afternoon and the same dose repeated at bedtime. The action is not rapid, and in some instances no effect has been noticed until the following day. The effect of a single dose often continues for several days. The reports of cases treated show beneficial results in a great majority of them; it does not in any way interfere with the appetite or digestion, and in most instances a quiet sleep follows its use. As the taste is somewhat disagreeable, it is best administered in wafers or capsules.

In diseases of the mucous membrane of the respiratory tract, camphoric acid is used by applying locally and as a spray. In acute coryza, pharyngitis, and laryngitis, a half- to one-per-cent. solution may be used every three hours, or tampons saturated in the solution may be introduced into the nasal cavities; in ulcerated throat, a solution of two to six per cent. may be applied. This drug has no corrosive action; it possesses antiseptic properties and produces contraction of the blood-vessels of the mucous membrane.

Internally, it is also used for intestinal diarrhœa of a catarrhal character, and where intestinal antisepsis is desired, the dose is from gr. v. to gr. x.–xv. It is excreted by the kidneys and renders the urine clear and acid in two or three hours.

In cystitis, when the urine is alkaline, it has proved of benefit. In this condition it is also used as a wash in a half of one-per-cent. solution. The bladder is to be irrigated twice a day, about an ounce of the solution being left behind.

Camphor is absorbed from the skin and mucous membrane, and is found unchanged in the blood and the various organs and tissues. The kidneys do not excrete it unchanged, but it is thought to be excreted by the lungs and skin. In its action camphor is antiseptic and stimulant, with a sedative effect following the primary stimulation. This action is exercised upon the surface when applied externally, and when administered internally, the same effect is directed to the mucous surfaces with which it comes in contact. In the stomach it stimulates the muscular coats, adds a sense of warmth, and reflexly stimulates the heart and abdominal circulation. After absorption its action is directed to the cerebral and spinal centres through which it influences the heart and vascular system.

Camphor is not now employed to the extent that it was formerly. The difficulty of giving it in suitable doses, without deranging the stomach, has proved a serious obstacle, and other remedies have supplanted its use. When given in pill form, or in its pure state, it proves irritating to the stomach and has been charged with producing gastritis and ulcerations. When given as an emulsion, with sugar, gum arabic, and water, it forms a nauseous mixture. At present it is given in small doses, combined with other remedies, and the former doses of gr. x. and xv. are rarely heard of. It is of value in cardiac and circulatory depression, and in all conditions in which rapid stimulation is required; as in typhoid conditions, pneumonia, œdema of the lungs, and dilatation of the heart. In chronic depression of the nervous system when there is a loss of control it is a useful stimulant in repeated small doses. Hysteria, chorea, epilepsy, spermatorrhœa, and melancholia are some of the conditions in which it has been much employed. Its excretion by the skin and bronchial mucous membrane has made it a very useful diaphoretic and expectorant, and in febrile states, particularly when combined with opium and other diaphoretics, it has always been recognized as of much service. Its action upon the genito-urinary organs has been a disputed point. It is supposed to have a sedative action and also to possess anaphrodisiac properties. After its continued use it certainly acts as an anaphrodisiac. As a sedative it is combined with bromides, opium, and hyoscyamus. After its continued use and in large doses it excites the brain and produces a form of intoxication. Its continued use produces a craving for the drug, and it has been shown that a camphor habit may be acquired. In toxic doses there is over-stimulation, which is of very short duration and is rapidly succeeded by depression, with stupor or coma, paralysis, cold surface, clammy perspiration, and other symptoms of collapse, which may terminate in death.

Formerly camphor was given in doses of gr. x. and xv. It is now given in one-, two-, and three-grain doses, rarely exceeding five grains. It may be administered hypodermically, particularly in conditions of collapse. It may be given in pills or capsules, or in powder with sugar, or the spirits of camphor may be given in wine. The camphor may also be dissolved in ether and added to wine. The following forms a good emulsion: camphor, gr. xv.; ol. olivæ, ʒ ij.; mucil. acaciæ, ʒ v.; syr. simplicis, ʒ i. For hypodermic use, the spirits, ethereal solution, or camphorated oil may be selected.

*Monobromated Camphor*, $C_{10}H_{15}BrO$, is a substitution compound of camphor in which one atom of hydrogen is replaced by one of bromine. It is official in the United States Pharmacopœia. It occurs in colorless prisms, with a taste and odor of camphor. It is almost insoluble in water, but soluble in alcohol and fixed oils. It is permanent in the air and unaffected by light.

This camphor compound was introduced as a nervous sedative and antispasmodic. It has been employed in delirium tremens, hysteria, epilepsy, whooping-cough, chordee, spermatorrhœa, and numerous other conditions arising from disturbance of the nervous system. It has also been used as an hypnotic in insomnia of the same character. In all these conditions it has proved of service, but appears to be of most value in the milder forms of epilepsy. The dose is from gr. v. to gr. x., once or twice in twenty-four hours and gradually increased until the dose is repeated four or five times a day. When its administration is being pushed its effect requires to be watched, as when given in excessive doses to animals it produces muscular weakness, paralyses, and depression of the vital centres.

On account of its disagreeable taste it is administered in pill form, or in capsules, or perles. Elixirs are prepared by dissolving it in spirits and adding aromatics and syrup. An emulsion may also be formed by dissolving in sweet almond oil and forming an emulsion with gum and water.

*Beaumont Small.*

**CAMPHOR SALICYLATE.**—This is a compound of 84 parts of camphor with 65 parts of salicylic acid. It occurs as a crystalline, camphor-like mass, or it may be made to crystallize out from its solution in benzol. It is insoluble in water and glycerin, soluble in alcohol, in mineral oils, and in 20 parts of olive oil. Used internally as an intestinal antiseptic and carminative, it acts in the alimentary tract much like salol. Its systemic effect, however, is not marked, and its internal use has up to the present been confined mostly to the summer diarrhœas. The dose is gr. i. to v. In lupus and other skin diseases it is applied locally in the form of an ointment or liniment of from five- to twenty-per-cent. strength.

*W. A. Bastedo.*

**CAMPHORONIC ACID.**—Iso-propyl-carballylic acid —$C_6H_{11}(COOH)_2$. Obtained by the oxidation of campholic acid, it forms white, acicular crystals, soluble in water, and very hygroscopic. It is recommended as an antiseptic in aqueous solution.

*W. A. Bastedo.*

**CANADA BALSAM.**—*Balsam of Fir.* Spurious Balm of Gilead. The liquid oleoresin obtained from lacunæ in the bark of *Abies balsamea* (L.) Miller. This fine, tall tree is abundant in the Northeastern United States, northward and northwestward. Its leaves are much in demand for making "balsam pillows," which are deliciously fragrant. Its buds are often sold as balm of Gilead buds, but this name properly applies to those of *Populus candicans*. The oleoresin is collected by breaking the blisters upon the bark and catching the exudation. It is of a pale-yellow color, absolutely clear and transparent, somewhat viscid, aromatic, and bitter. It is insoluble in alcohol and water, but dissolves in ether and chloroform. It possesses the ordinary stimulant antiseptic and expectorant properties of the family (see *Coniferæ*), and is given in doses of .3 to 2 gm. (gr. v. to xxx.). It is more largely used in microscopical mounting than otherwise, for which its perfect transparency peculiarly fits it.

*Henry H. Rusby.*

**CANADIAN HEMP.** See *Apocynum*.

**CANARY ISLANDS.**—These islands, justly celebrated for their admirable climate and beautiful scenery, lie between the 27th and 28th north parallels of latitude, five degrees north of the tropics, and in longitude 13° to 18° W. They are in about the same latitude as Florida, Southern California, Southern Texas, Northern Egypt, and the Desert of Sahara. They are from 120 to 170 miles distant from Africa, and may be reached by steamer from Plymouth or Southampton, England, in from five to eight days; and from Cadiz, Lisbon, Gibraltar, Marseilles, or Genoa, in three or more days. The islands (of volcanic origin) are seven in number; but the two generally visited by invalids and always meant when the Canary Islands are referred to, are Tenerife and Gran Canaria, about 30 miles from each other. In these islands Las Palmas in Gran Canaria, and Orotava in Tenerife are the towns usually resorted to. The climate is characterized by medium dryness, a large amount of sunshine, equableness, and a stimulating quality; in brief, it is a moderately dry marine climate. "The Canaries lie in the region of the dry, northerly trade winds, which are the prevailing winds throughout the year, usually blowing about 240 days out of the 365, but more strongly and almost without break during the summer months; hence the mean maximum temperature of the summer months, which is about 77°, is lower than might be expected for the latitude" (Melland, "Climatic Treatment in Grand Canary," *Medical Chronicle*, Manchester, 1897, vol. viii., p. 321).

As both Tenerife and Gran Canaria are mountainous, the mountains rising to the height of 6,000 feet or more, there is both a shore and a mountain climate. For the summer, Melland considers the mountain climate superior to that of the shore in the treatment of lung diseases, and already hotels adapted for invalids have been erected in these higher regions. During the winter months Las





Palmas, of which Melland especially writes, is to be preferred, he says, for cases of early phthisis and rheumatism, to some of the other health resorts of the island, on account of the clear sky, free radiation, and abundance of sunlight. These advantages of Las Palmas are due to its geographical position away from mountains and northern slopes. The vegetation of these islands is rich and varied; the date, palm, pepper, and eucalyptus are some of the trees found there; and of fruits there are oranges, apples, pears, peaches, plums, figs, grapes, guavas, bananas, pomegranates, and prickly pears. The flora is very extensive and the variety of plants great. "Anything put into the ground will grow," says Mrs. Stone ("Tenerife and Its Six Satellites," by Olivia M. Stone; 2 vols., 1887).

The meteorological observations, taken at Las Palmas, are given by Melland as follows:

| 1889–93. | Shade Temperatures. | | | | Bright sunshine, hours per diem. | | Rain, inches. | Relative humidity, per cent. | Number of days any rain fell. |
|---|---|---|---|---|---|---|---|---|---|
| | Mean maximum. | Mean minimum. | Mean. | Range. | Hrs. | Min. | | | |
| October..... | 73.4 | 65.8 | 69.6 | 7.6 | 5 | 30 | 3.22 | 73 | 7 |
| November . | 71.3 | 62.3 | 66.8 | 9 | 5 | 38 | 1.87 | 68.5 | 10 |
| December .. | 67.6 | 57.2 | 62.7 | 9.7 | 4 | 50 | 1.86 | 68 | 12 |
| January ... | 66.5 | 57.3 | 61.7 | 8.8 | 5 | 3 | 1.41 | 66.6 | 8.5 |
| February .. | 66.5 | 55.7 | 61.2 | 10.7 | 6 | 9 | .51 | 65.8 | 3.5 |
| March ..... | 67.4 | 56.5 | 62.1 | 11.2 | 5 | 57 | .84 | 67.6 | 5 |
| April..... | 69.3 | 59.1 | 64.2 | 10.2 | 6 | 23 | .34 | 67.3 | 4.5 |
| May..... | 69.2 | 61.3 | 65.4 | 8.4 | 6 | 43 | .38 | 67 | 4 |
| Average for winter... | 68.5 | 58.8 | 63.6 | 9.7 | 5 | 41 | 8.15* | 67.1 | 49* |

*Total.

The small diurnal range of temperature is to be especially noted, as well as the slight variations from one month to another. The rainfall is very inconsiderable, and there is the small number of forty-nine days upon which any rain fell. Each day gave an average of over five hours and a half of sunshine. The relative humidity greatly decreases as one ascends into the mountain regions.

The following observations for Orotava are condensed from various observers:

| Months of winter. | Average temperature, degrees. | Mean daily range, degrees. | Daily sunshine, hours per diem. | | Relative humidity, per cent. |
|---|---|---|---|---|---|
| | | | Hrs. | Min. | |
| November..... | 66.97 | 11.8 | .. | .. | 67.3 |
| December..... | 65.05 | 11.2 | 5 | 48 | 63.2 |
| January..... | 62.88 | 11.2 | 5 | 42 | 61.5 |
| February..... | 61.1 | 12.1 | 5 | 47 | 68.6 |
| March..... | 62.7 | 11.9 | 7 | 32 | 66.9 |
| Average for winter | 63.74 | 11.6 | 6 | 12 | 65.5 |

The temperature of Orotava, says Gihon (Transactions of the American Climatological Association, 1889), never falls below 50° F. or rises above 82° F., and attains these extremes only on rare occasions.

"The February of Orotava," continues the same writer, "is the June of London, the May of Paris, and the April of Rome, Nice, and Cannes." In Orotava storms are unknown, and linen garments may be worn the entire year. "Here, if anywhere," to again quote Gihon, "reigns perpetual spring, without fogs and frosts, where the sap never dies, where rain seldom falls, winds and storm are scarcely known, and burning heat is never felt."

From observations taken at Las Palmas, it is seen that the six warmest months are from June to November, with a mean temperature of 71.7° F.; and that the six coldest months are from December to May, with a mean temperature of 63.5° F. September and October are the hottest months, with a mean temperature of 73.5° F.; but they differ from the coldest month, February, by only 13.5° F.

The mountain climate of the Canaries, at an altitude of from 1,300 to 5,000 feet, differs from that on the coast by increased dryness—the relative humidity at the village of Villa Flor (4,300 feet) for the month of August being 35 per cent.; by the absence of the northerly trade winds; by the absence of rain during the summer; by a greater range of temperature; by a more invigorating atmosphere; and by almost continuous blue skies. The summer is the proper season for visiting the highlands, as the climate is then at its best. "Here," says Brown ("Madeira and the Canary Islands," by A. Lander Brown, London, 1896), "the invalid may live for months under a rainless blue sky and in a genial climate, wandering among gorgeous forests and magnificent precipices; below him a vast sea of billowy cloud out of which the summits of the other islands rise, beckoning him to new explorations." Melland considers the mountain climate much more rapidly curative in cases of early phthisis than that of the coast. In some of the mountain stations, as at Laguna (1,800 feet) in Tenerife, there are good accommodations, and camping is also not an infrequent method of living in the higher altitudes. Orotava consists of the town, or villa de la Orotava, at an altitude of 1,100 feet, and three miles distant from this is the Puerto de la Orotava on the coast; it is the latter locality to which invalids resort. Round about these two Orotavas and including them is the famous Orotava valley, which Humboldt considers "the loveliest scene in the world," and of which M. J. Leclercq, in the *Annuaire du Club Alpin Française*, 1879, writes: "I have seen sights more varied, more striking, and a more brilliant sky; vegetation is more thoroughly green in the celebrated Cintra Valley in Portugal, which Bryon considered the most delicious locality in Europe; but where can be found those mountains and classic beauty, those velvety tints, that soft and balmy atmosphere, that moderate temperature, notwithstanding the vicinity of the torrid zone, that charm impossible to define?"

And of its climate W. Vignal writes (*British Medical Journal*, 1893): "I do not think it possible to find anywhere a more perfect climate, and as far as I know there is none comparable to it."

From May to August there is no rainfall at Orotava, and the annual precipitation is 13 inches. The average number of rainy days is 51; and the rain falls most frequently at night. The temperature of the sea water is lowest in March, 64°; and highest in July, 68° (Solly, "Medical Climatology").

In comparing the Canaries with Madeira, the former have in common with the latter the equability of climate, but they have a slightly higher temperature and are considerably drier, the relative humidity from November to April at Orotava being 64.9 per cent., and at Funchal, Madeira, during the same time, 72 per cent. The Canaries, say Weber and Foster, "have a greater claim as health resorts than Madeira and offer good accommodations, but are much wanting in means of amusement." The accommodations at Las Palmas and Orotava, and at some of the other towns in the islands, are good and abundant. The water-supply at Las Palmas and Orotava is brought from the mountain, and is of good quality. There is no general drainage system, but each hotel has its own private water drainage system; in general, cesspools prevail. The soil is porous and dries rapidly after rain. Zymotic diseases are not common. At Las Palmas quite recently a cold-storage and freezing establishment has been opened, and a building estate developed, with villas suitable for residents and visitors. At present most of the invalids and visitors come from England.

The diseases for which the climate of the Canaries is favorable are incipient phthisis—Las Palmas or the port of Orotava in the winter, and the mountains in the summer,—scrofula, chronic bronchitis, heart diseases and Bright's disease, and rheumatism.

While we have a climate in many respects similar to

that of the Canaries, in Southern California, more especially inland, and in some portions of the Southwest, the novelty of the change, the ocean voyage, and the variety and beauty of the scenery of the "fortunate isles" may tempt some invalids to try its mild, sunny climate and pure atmosphere, and enjoy the "*equability* of an island climate combined with the *dryness* of a continental one."

For a more extended account of the Canaries the reader is referred to: "Tenerife and Its Six Satellites," by Olivia M. Stone, 1887; "Madeira and the Canary Islands," by A. Lander Brown, 1896; "The Canaries for Consumptives," by E. Paget Thurstan, 1889; "Climatic Treatment in Grand Canary," by Brian Melland: *The Medical Chronicle*, Manchester, England, 1897; "The Canary Islands as a Health Resort," by John Whitford, 1890; "The Therapy of Ocean Climate," by Albert H. Gihon, M.D.; Transactions of the American Climatological Association, 1889. *Edward O. Otis.*

**CANCER. (CLINICAL.)**—In the first place it is well to have a clear understanding as to what we mean by the term "cancer." I believe that the time has come when we should give up trying to limit the term "cancer" to tumors of epithelial origin, excluding those arising from connective tissues, though the latter may, and frequently do, equal or even surpass the former in malignancy. There is really no good reason for this distinction, and it is far better to go back to the older use of the word in which cancer included all varieties of malignant tumors, whether carcinoma or sarcoma; the feature of malignancy should really be the determining factor, and not some microscopic distinction in histological structure that is often so finely drawn that the trained pathologist is unable to decide upon the proper classification. At present, though we often are able to give some temporary comfort to a patient with sarcoma by assuring him that his trouble is not cancer, yet, if he happens to be suffering from a subperiosteal sarcoma of the femur and knew that of sixty-eight cases treated by the most extensive operation, viz., hip-joint, or very high amputation, but one was known to have been cured, he might readily wish to exchange places with his neighbor who has a well-marked cancer of the lip with one chance in two of being cured by a small operation.

General Consideration.—While the problem of the etiology of malignant disease comes hardly within the province of this article, it is so intimately connected with the clinical history and rational treatment that a few lines may not be out of place.

As having a more or less direct and very important bearing upon the etiology of cancer, should be mentioned (1) its local distribution; (2) its rapid increase during recent years; and (3) the influence of injury as a direct or predisposing factor in its development.

*Local Distribution.*—Much has been written in proof of the fact that cancer is far more prevalent in some countries than in others, and in some localities in the same countries than in others, but we are more deeply indebted to Mr. Alfred Haviland than to any other writer for accurate and detailed data concerning this varied distribution.

In 1868, in his first paper, read before the Medical Society of London, on the "Geographical Distribution of Cancer among Females throughout England and Wales during 1851–60," he found that 4.33 cases of cancer occurred in every 10,000 females and only 1.94 in every 10,000 males.

In a recent paper (1899) he has found in the period 1881–90, 7.30 cases in every 10,000 females and 4.30 cases in every 10,000 males. That is, the number of cases in females has nearly doubled and the number in males has more than doubled during a period of thirty years.

Roswell Park, of Buffalo, is a firm believer in the increase of cancer, and in a recent paper he makes the statement that in England and Wales from 1840 to 1890 the death rate has increased four or five times, and he further adds: "A careful study of all these tables permits one to make the following startling prophecy: If for the next ten years the relative death rates are maintained, we shall find that in ten years from now, viz., in 1909, there will be more deaths in New York State from cancer than from consumption, smallpox, and typhoid fever combined."

It is true certain writers, among the ablest of whom may be mentioned Newsholme,* attempt to show that this increase is more apparent than real, and may be largely explained by greater accuracy in diagnosis at present than in preceding years, and in the increasing number of autopsies. I prefer to believe with Mitchell Banks, in his recent and most valuable lectures on "Cancer of the Breast"† that these explanations account for but a very small part of the increase, and that it is as real as it is alarming.

Haviland's latest conclusions upon the local distribution of cancer, based upon the most careful study of more than a third of a century, are as follows:

"1. That districts having the highest death rates from cancer among females were invariably associated with seasonably flooded areas traversed by, or in close propinquity to, seasonably flooded rivers.

"2. That geologically these high mortality districts were characterized by alluviums and subsoils of clays of every variety of formation.

"3. That districts having the lowest mortality were situated on an elevated land where drainage was good.

"4. That geologically these low-mortality districts were characterized by the oldest paleozoic rocks, especially those of the carboniferous limestone period."

This question that Haviland first brought before the medical public in 1868, "How is it that limestones are always associated in England and Wales with the lowest mortality from cancer and *flooded clays* with the highest?" he is still unable to answer, but when it is answered, he believes much light will fall upon the cause of cancer.

The most complete of recent statistics on cancer are found in the elaborate paper of G. Heiman, of Berlin (*Archiv f. klin. Chir.*, Bd. 57 and 58). These statistics confirm the view that cancer is rapidly increasing.

In the year 1877 there were 6,971 deaths from cancer in Prussia, and in the year 1896 17,643, an increase of 153 per cent. Of 10,000 living in 1877 the mortality from cancer was 2.66, while in 1896 it was 5.53.

Heiman has also made separate statistics for the mortality in cities and the country districts: In 1876 in the cities it was 3.62, in the country, 1.82; in 1881 in the cities it was 4.70, in the country, 2.25; in 1886 in the cities it was 5.71, in the country, 6.43; in 1891 in the cities it was 6.43, in the country, 3.24; in 1896 in the cities it was 7.9, in the country, 3.8.

In still further confirmation of the opinion that cancer is increasing may be cited the mortality records of the Mutual Life Insurance Company of New York, as recently quoted by Oliver, London *Lancet*, November 10th, 1900, p. 1341. The statistics show that in 1879 the percentage of deaths from cancer in patients between fifty and seventy years of age was 4.23; in 1889 it was 6.22, and in 1898, 7.59. In further support of this view, Oliver refers to the statistics of the Scottish Widows' Fund, collected by Claude Muirhead. Between 1815 and 1845 the deaths from cancer were .93 per cent. of the whole number; from 1845 to 1852, .72 per cent.; from 1852 to 1859, 2.87 per cent.; from 1859 to 1867, 3 per cent.; from 1867 to 1873, 4.56 per cent.; from 1873 to 1880, 4.34 per cent.; from 1880 to 1887, 5.23 per cent. Muirhead states that, "allowing for greater accuracy in returns, the number of deaths from this cause has increased enormously."

As to the question of heredity, the statistics of the Scottish Widows' Fund show that 9.5 per cent. gave a history of malignant disease in parents.

The difference between the prevalence of cancer in the city and the country is very striking. This steady increase cannot, I think, be explained by increasing skill in diagnosis.

* Practitioner, London, April, 1899. † *Loc. cit.*, March 10th, 1900.





As Mitchell Banks has pointed out, in 1861 such men as Miller, Syme, Spencer, and Wilson, the leading surgical teachers of Edinburgh, were the equal of any of the present day in diagnostic skill as regards both external and internal cancer.

*The Parasitic or Infectious Theory of the Origin of Cancer.*—The embryonic theory of Cohnheim which has long been accepted by most pathologists falls far short of explaining many important points in the etiology of cancer, and must, I believe, soon be abandoned. While the result of the long and patient investigations of Russell, Plimmer, and San Felice and Leopold in Europe, and of Park and Gaylord in this country, have not yet absolutely demonstrated that cancer is of a parasitic origin, we are, according to Park, justified "at least in maintaining that some cancers are of such origin." And if it can be demonstrated that some are, there is strong probability that all are. The almost constant presence of these peculiar bodies in all cancers including sarcoma, and especially in the advancing and growing borders, as proven by Plimmer, whether they prove to be blastomyces or protozoa, furnishes strong presumptive evidence that they may have some bearing upon the causation of the tumor. Now that pure cultures of these organisms have at last been made, and that actual carcinoma has been experimentally produced in animals by these cultures, it would seem that the parasitic or infectious theory of cancer has passed beyond the stage of ridicule and is worthy of serious consideration. It explains far better than any other theory the geographical differences in the prevalence of cancer, as well as the increasing mortality. Furthermore, cancer closely resembles other diseases, *e.g.*, tuberculosis and syphilis, which are known to be of infectious origin. If we admit the origin it is easy to explain the various types of the disease, from the slow-growing epithelioma of the face to the rapidly fatal sarcoma of the testis or orbit, by supposing that the infectious agent, like the malarial organism, varies as to its morphology within wide limits, different types of the germ (or different conditions) causing very different clinical manifestations. The whole clinical course of cancer is strikingly suggestive of an infectious disease. The question of the infectious or parasitic nature of cancer has very recently and ably been discussed by Mitchell Banks in the last of his three lectures on "Cancer of the Breast" (*loc. cit.*). He calls attention to the fact that the first notable step in advance was made by W. Russell, of Edinburgh, in 1890, whose paper on "Characteristic Organisms of Cancer" excited profound interest. These so-called "fuchsin bodies" of Russell, which he described as both intracellular and extracellular, were even then regarded by Russell himself as blastomycetes, a variety of saccharomycetes or yeasts. While the great majority of pathologists in different countries have been of the opinion that these bodies described by Russell are not "characteristic organisms of cancer" but rather certain forms of cell degeneration, there have always been notable exceptions on the other side, and the question has remained an open one until at present the weight of evidence is strongly in favor of regarding them as separate organisms.

In 1892, Soudakewitch, of Kieff, and Armand and Ruffer, of London, published papers describing bodies similar to those described by Russell. Specimens of these bodies were carefully examined by the distinguished Metchnikoff, who believed them to be "parasitic protozoa." The original opinion of Russell that they are blastomycetes has recently been revived and strongly advocated by the well-known Italian investigators, San Felice and Roncali. These bodies are of various size, estimated by Plimmer at from .004 to .04 mm., and they may be stained in several different ways. The Ehrlich B triple stain or the Ehrlich acid hæmatoxylin, in distilled water rendered faintly alkaline with lithium carbonate, may be mentioned as most satisfactory.

The latest researches of Leopold* along the same lines are strongly confirmatory of the work of Plimmer and San Felice. Leopold's paper is the result of diligent labor extending over many years. He has examined several hundred carcinomata of numerous localities, excluding as far as possible ulcerating tumors. Leopold found the organisms variously described by others, and believes them to be blastomycetes. In twenty cases he tried to cultivate blastomycetes from the carcinomatous tissue and met with greater success than any of his predecessors. In four cases he obtained pure cultures from malignant tumors. In attempting to inoculate animals he had three positive successes. A curious fact was observed that, while the culture of blastomycetes had been obtained from carcinomatous tissue, the tumors in two instances resulting from inoculation were sarcomatous. This fact, if further confirmed, together with the fact that hereditary malignant disease not infrequently takes the form of carcinoma in some member of a family and of sarcoma in others, would go to show that the etiological relationship is exceedingly close.

* Leopold, "Researches as to the Etiology of Carcinoma and Pathogenic Blastomycetes." Archiv f. Gynäkologie, vol. lxi., No. 1.

### Symptomatology and Treatment of Cancer.

Diagnosis.—There is no department in surgery in which there is greater need of large clinical experience and well-trained powers of observation than in the diagnosis of malignant tumors. In every suspicious case a careful history of the patient should be obtained before a diagnosis is attempted. Among the most important points to be elicited may be mentioned: hereditary influence, the anatomical situation of the tumor, its duration, and the rapidity of its growth. Too much stress should not be laid upon the apparent duration of the tumor, inasmuch as in not a few instances it may have existed for a considerable time before it was observed by the patient. The situation of the tumor is often of great aid in diagnosis. If it is first observed in the glands—for example, the cervical, axillary, or inguinal—there is a strong probability that it may be a secondary growth, and careful search should be made for a primary growth in the mouth or throat, the breast, rectum, or pelvic organs, or even the extremities. I have myself observed a large fungating sarcoma of the groin, supposed to originate in the inguinal glands, and although the patient stated that he had never had any swelling in the leg or foot, careful inquiry showed that two years previously he had had a small ulcerated area upon the ball of the foot, produced by the irritation of a projecting nail in the shoe. This apparently healed, but from time to time there was a recurrent ulceration and a slight discharge. A small indurated area remained, but gave such slight symptoms that the patient never thought of connecting it with the trouble in the groin. The patient soon died of general metastases. At autopsy the area in the ball of the foot was excised and found to be the primary pigmented sarcoma.

On examining the tumor itself, the surrounding tissue should be carefully palpated in order to determine its relation to the skin, the muscles, or the underlying bony structures. The size of the tumor, and the rapidity of growth, are very important points to be noted. Pain and tenderness, while far less important than many writers have led us to believe, should nevertheless be always noted. While in most cases of malignant disease, especially in carcinoma of the breast, pain is rarely present in the early stages, it is seldom absent after the tumor has become well developed. Pain is much more important in the diagnosis of recurrent than in that of primary tumors. In many cases of recurrent cancer the patient based her suspicion solely upon the peculiar stinging pain resembling that which she had experienced during the existence of the primary tumor, and in almost every case I have found these suspicions well founded. Therefore, in suspected recurrent cancer, one cannot be too careful in considering the symptom of pain. In some localities the primary tumor naturally is attended with marked pain. This is especially the case in malignant tumors originating in the spine or in the pelvic bones.