The hyperpyrexial cases demand the most active and immediate treatment. Various forms of cold baths have been used. An ice bath consists of a tub of water in which about half a bushel of cracked ice is floating. Just before the patient is lowered into the bath the ice should be removed, as sometimes the sudden contact with the ice causes intense rigidity of the patient which brings on suffocation. This is rare, but it does occur; therefore the ice should be taken out of the bath before the patient is put in, but if the patient is put in ordinary tap water and rubbed a few moments, the ice can be placed in the bath while the patient is in it. During his stay in the bath the patient should be rubbed vigorously with rough mittens or the bare hand; sponges do not afford sufficient irritation; and as long as the patient is in the bath the rubbing should not cease. His head should be supported and cold water continually poured upon it. A towel folded over the forehead will prevent the water running into his eyes. Such a bath in a few minutes will cause the cyanotic skin of the patient to appear flushed and rosy; an unconscious patient may come to in the bath and the temperature will quickly fall toward normal. A thermometer should be constantly kept in the rectum of the patient in the bath, and the temperature should not be allowed to fall below 103° F. When this is reached the patient should be quickly taken from the water, rubbed dry, and covered up warmly. Hypodermic stimulation will be required in these patients. The ordinary results of this stimulation do not seem to be observed while the temperature remains excessively high. This should be remembered, as overstimulation can easily be brought about, and this will occur when the temperature falls to a point near normal. For cardiac stimulation a dose of morphine, gr. $\frac{1}{4}$ to $\frac{1}{2}$, with gr. $\frac{1}{150}$ atropine, will be most beneficial. It diminishes the convulsions which are apt to follow and produces a sleep from which the patient wakes refreshed. Strychnine increases the tendency to convulsions, although it does not cause all the convulsions following sunstroke, as has been stated. Convulsions will occur in patients who have never had strychnine, but they do not appear so frequently as when strychnine has been used.

The length of time necessary for the reduction of temperature by these cold baths cannot be stated. It depends upon the amount of heat being produced, and not at all upon the height to which the temperature has gone. It may take twenty minutes to reduce a temperature from 106° to 103°, while a temperature of 110° may drop to 103° in five minutes.

Another method of reducing temperature is to place the patient on a rubber sheet and rub with ice. This takes much longer, and it only allows friction of the upper surface of the body and it does not reduce temperature so quickly or so effectively.

Still another method is to place the patient on a cot on a rubber sheet and throw dipperfuls of cold water over him from a distance of several feet. The impact of the water causes the necessary friction, and it is not an ineffective method. While it takes longer to reduce temperature, the reactions following it are not so marked as in the case of the ice bath, and when ice cannot be obtained it is the quickest substitute. While the water is being dashed over the body of the patient, cold water should be poured upon the middle of his forehead from a pitcher held six or eight feet above his head; this is most beneficial in bringing the patient back to consciousness. A very excellent method, perhaps the best, is to place the patient in a tub or on a cot or simply lay him on the floor and play a hose on him through a fine needle-spray nozzle. Where the head of water is sufficiently strong this is a most excellent method. It causes the physical irritation to the skin which is so essential to overcome the stasis in the capillaries. This stasis, according to Winternitz, prevents ninety-four per cent. of radiation of heat from the skin.

Patients treated in this manner should be allowed to have their temperatures fall to 102° or 101°; then they should be taken up, dried, blanketed, and put to bed. In severe cases the reaction following this method does not seem to be so intense as with the ice baths, nor so apt to fall below the normal. When the reaction occurs and the temperature goes to 105° the treatment should be repeated; an ordinary tub bath at 65° will sometimes control it. Warm baths have not proved so successful as the cold ones for reducing the temperature.

No treatment seems to prevent the thermic fever. A useful method of controlling this fever is to place small bladders filled with ice in the axillæ and groins; this seems more effective in women than in men.

After the patients are in bed, liquor ammonii acetatis is a most excellent stimulant and produces both diaphoresis and diuresis. Digitalis, ether, and spirits of ammonia are also excellent for rapid stimulation.

Among alcoholics the question arises as to the desirability of giving alcohol. When delirium tremens seems about to develop, as it so often does, a mixture of half an ounce of whiskey with one or two drachms of paraldehyde, repeated in an hour if necessary, will often produce sleep from which the patient will wake much improved.

It is best for twenty-four or forty-eight hours to keep the patient on milk, or at least fluid diet, followed by eggs, cereals, milk, and broth. Where there is severe thirst an abundance of water can be given. The liquor ammonii acetatis is useful in this connection to allay thirst. The sequelæ or complications of sunstroke should be treated as the same diseases under ordinary circumstances. The nervousness, weakness, and loss of appetite can be overcome by a mixture of tincture of nux vomica and compound tincture of cinchona, five to ten drops each, in compound tincture of gentian as a menstruum. For alcoholics, one or two drops of capsicum and sometimes ginger can be added to this mixture. Meningitis following sunstroke may have to be treated by a merciless use of the actual cautery. Patients suffering from sunstroke in the tropics may have to go to a more temperate climate or they may become helpless invalids. Such patients may develop some form of insanity, and it is well to remember the possibility of suicidal tendencies and never allow them to travel alone. The anæmia and general lack of nerve force following sunstroke can often be treated with cod-liver oil and small doses of tincture of iron. Of the latter, three drops should be put in a tumblerful of water and sipped with meals. This does not derange digestion and is preferable to large doses. Blaud pills or any other form of iron may be used.

The numbness and tingling so often complained of can often be benefited by the Charcot douche to the spine.

It is remarkable how long the sequelæ of sun-stroke may persist, and they are often discouraging to deal with. It is often years before exposure to heat can be withstood without recurrent headache and prostration.

Alexander Lambert.

HEAT, THERAPEUTICS OF.—Although heat has always been recognized as one of the most valuable therapeutic agents, it has never been so widely used as at the present time. It is one of the safest and simplest remedies known. Its good effects are varied and the methods of applying it are numerous. The results of the therapeutic use of heat are dependent upon various conditions, chief among which are the manner of its application and the temperature used. A far higher temperature can be borne when the heat is dry than when it is moist. For example, hot water becomes painful at 115° F. Steam or vapor cannot be borne above 120°, while hot dry air can be used at a temperature of 300° and higher. The vaso-dilator nerves are stimulated by heat, while the vaso-constrictors are inhibited.* The cutaneous capillaries are dilated by a slow application of heat, but if the application is sudden the primary effect corresponds to that of cold, the skin is blanched and even wrinkled.

When the cutaneous capillaries are dilated the skin becomes reddened, and if the temperature is not higher than 104° F. cutaneous sensibility is increased. When, however, the temperature is increased to between 110° and 120°, sensibility is diminished or even abolished.

The nervous system is soothed by a moderate degree of heat, but untoward effects such as headache and vertigo are caused by a high degree if the air is not dry. The nerves to the sweat glands are excited by the application of heat, consequently the functional activity of these glands is increased and abundant perspiration is the result. The secretion of urine is proportionally decreased. The difference in the effects of dry and moist heat upon the perspiratory function depends upon the following facts. The body absorbs less heat from air than from water, and the skin perspires more freely in air than in water—the evaporation of the perspiration abstracting the heat—so that it is clear why it is possible to bear a higher degree of dry than of moist heat. The number of respirations is decreased by dry heat, but increased by a high degree of moist heat.

Although muscular activity is favored by a moderate degree of heat, a high temperature is depressing, and under its influence the muscular system becomes less able to support fatigue, especially if this is continued. A practical application of this fact is made in the treatment of the various muscular spasms, including chorea.

The effects of a hot climate depend upon the individual concerned and upon the various conditions of his life, such as diet, etc. It has been frequently noticed that debilitated persons are stimulated by a hot climate, becoming stronger and more able to ward off disease. Normal individuals are depressed, the effects being quickly seen in all of the functions of the body. In a temperature higher than that of the human body, body weight is diminished and in proportion to the degree of heat and the length of time of its application. This effect is less in dry heat than in moist heat. Hot applications to the abdomen cause constipation. This may be from two factors: from the decrease in intestinal secretions or from the decrease in peristaltic action of the intestinal musculature. Heat hastens eruptions.

There are many methods of applying heat, some of the appliances being as follows: bricks, water-bags, flat-irons, sand bags, Leiter's coils, and Paquelin's thermo-electric cautery. Moist heat may be applied by means of baths, both water and steam; douches, fomentations, and poultices; besides all of these methods there is the hot-air bath. The use of the hot flat-iron in such troubles as rheumatism gives astonishing results. The effects seem often magical, the relief afforded by this homely household remedy being greater than by many of the methods which are in more general use. The affected part should be protected by several layers of flannel, and in applying the iron it should be held carefully so that the weight is supported by the hand of the operator while the patient obtains the full benefit of the heat. The Paquelin cautery offers one of the best ways of applying counter-irritation. The hot bath produces various effects on the organism: by it the absorption of oxygen as well as the exhalation of carbonic acid is decreased; oxyhæmoglobin is reduced; so are the leucocytes; the excretion of nitrogenous products is increased. By means of hot baths interstitial combustion is diminished. In Bright's disease hot baths, on account of their weakening effect if often repeated, should not be employed unless dropsy or uræmia is present. When uræmia exists, however, the cerebral symptoms are often entirely relieved by the hot-water or vapor bath, for by this means not only the skin acts freely, but the effect on the whole organism is sedative, pain and irritability being allayed. Especially in childhood, various affections of the respiratory tract, such as bronchial catarrh, are relieved by this treatment. The sedative effect brings sleep and makes breathing less labored. The affected membranes are relieved of the surplus of blood, which is drawn to the periphery. The patient must be carefully watched and not be allowed to become weak from the treatment, as the secondary effects of a too long-continued hot bath are debilitating. However, continuous baths of moderate temperature are used in some affections, such as sloughing wounds and eczema; the patient eats and sleeps in the bath with the greatest comfort. For many years Kaposi, of Vienna, has employed the continuous bath in his wards with great success. Inhalation of warm vapor greatly relieves laryngismus stridulus. Diabetics should bathe in water of only a moderate temperature, and the bath must not be too long continued since this treatment may cause or increase glycosuria. One of the best methods of treating a strained joint, if seen early, is by the hot baths. Burns and phagedæna are much benefited by this method of treatment. Hot baths relieve the various forms of abdominal colic, as renal and hepatic; also inflammation of the urinary apparatus. In dysmenorrhœa, the hot foot bath is valuable. Heat applied to various regions of the spinal cord affects the organs which these nerves supply. This method is often successful in the treatment of metrorrhagia and menorrhagia. The Turkish and Russian baths are well known for their good effects in the treatment of many affections, such as coryza, gout, rheumatism, etc. But recently various new devices have been introduced by means of which the patient may be exposed with comfort to the beneficial effects of an extremely high temperature, for example 350° F., because the air is kept dry. Before apparatus was devised by means of which the air could be kept dry, the evaporated perspiration gradually rendered the surrounding atmosphere moist, and the perspiration on the skin actually scalded it. On this account the Turkish bath cannot practically be higher than about 170° F. The diseases that have of late years been treated with benefit by the new apparatus are the arthritic diseases—rheumatic arthritis, gout, rheumatism, etc.; joint affections, such as sprains; affections of the nerves, as neuralgia, sciatica, etc.; certain skin diseases; chronic ulcers, and flat foot.

There is other apparatus by means of which the body is subjected to the action of radiant heat. The diaphoretic effects of combined heat and light are said to be much greater than the same degree of non-luminous heat. The effect of the electric heat waves is invigorating and tonic. One result of these exposures to extremely high temperatures, one that is contradictory to former physiological teaching, is that the body temperature is raised several degrees. The following suggestion has been made in explanation of cases in which certain parts of the body are exposed to the heat: "It is probably due to imperfectly co-ordinated diaphoresis in parts of the body other than that exposed to the direct heat of the bath—that is to say, the blood as it flows through the heated area is not completely cooled down before it passes on to other areas, where the conditions are different, and where reflex, superficial, vascular dilatation, and consequent diaphoresis, are not correspondingly established." In the application of these new methods just mentioned, the apparatus is so arranged that the head of the patient remains free in the normal room temperature. Besides great local benefit, the general health is improved by these hot baths. In the radiant-heat bath the perspiration, as soon as it appears, is evaporated by the hot dry air. If this heat is applied locally, the circulation of the

*This statement demands proper modification to express the facts as they appear. These are given in somewhat detailed manner in Armstrong's article on Baths in Foster's "Practical Therapeutics," and it is from this source that I have derived the information which is furnished in the following explanation:

In order that heat shall simultaneously cause stimulation of the vaso-dilator nerves and inhibition of the vaso-constrictors the temperature employed must not be above 104° F., for it must be remembered that it is a *moderate* degree of heat that stimulates the vaso-dilator nerves and inhibits the vaso-constrictors. The cutaneous sensibility is increased and the skin is reddened. When the temperature is increased from 110° to 120° F., sensibility is abolished or decreased. It is from the knowledge of this fact that certain diseases of the nervous system are treated by the application of great heat. The effects also vary according to whether the application is slow or sudden. In the first instance the capillaries are dilated; in the latter the vessels of the skin are contracted and the skin becomes pale as in the application of cold. This fact is taken advantage of in bathing, where *very* hot water applied for a very short space of time stimulates the cutaneous nerves but does not call for the same vigorous reaction as a cold bath demands.

part treated is increased and not only is extra nutrition supplied, but a greater amount of blood is carried away from the part; and it is probable that this blood takes away from the diseased area many morbid products in solution. When radiant heat is produced by electricity, the advantages can be clearly seen, as there is no combustion and the patient breathes perfectly pure air. Among the affections treated with benefit by this method are the following: rheumatoid arthritis, gout, chronic cramp, sciatica, fixed joints, inflammation of the veins, adhesions following fracture, chronic articular rheumatism, chronic alcoholism, rheumatic gout, stiffness following injury, gonorrhœal rheumatism, vaso-motor disease, epilepsy, chronic Bright's disease, asthma, bronchitis, strumous ulcers, fracture, spinal disease, chorea, and peripheral neuritis. The general effect of the radiant-heat and light bath is soothing, as it allays pain and imparts a feeling of well-being.

The douche is used chiefly in gynæcological, nasal, and aural troubles. For pelvic inflammations and congestion the hot douche is most valuable. The good effects are dependent upon the temperature used, and upon the length and the manner of application. The temperature of the irrigating fluid should be as hot as can be borne. The application should continue for at least twenty minutes and the patient should lie on the back with the hips elevated.

By fomentation or cataplasm is meant the application of cloths wet with whatever liquid is used and applied to the part. The heat may be maintained either by renewing the cloths or by applying a hot object, such as a water bag or a brick to the cloths.

Poultices are not used now nearly so extensively as they were formerly. If they remain on the part too long they will lower the vitality and produce vesication or pustulation.

Heat has many specific uses, some of the principal being as cardiac stimulant, counter-irritant, diaphoretic, general sedative, general stimulant, germicide, hæmostatic, hypnotic, local anæsthetic, and local sedative.

Some of these effects have already been touched upon. As a cardiac stimulant heat is used universally in cases of shock and collapse, in drowning, exhaustion, asphyxia or debility of the new-born, narcotic and other forms of poisoning, in chilling if the patient is not frozen, and in any condition of heart failure. It may be applied in the form of baths, enemata, drinks, cloths, bags, bricks, friction, etc. In the algid state of cholera, for example, it must be remembered that clothing does not supply heat, it simply prevents its dissipation, so that special measures should be taken to impart heat to the body, as surrounding it with hot-water bags and the like. Death from chloroform anæsthesia is nearly always in consequence of heart failure. In such a case hot applications should be made to the cardiac region. External heat draws the blood to the periphery and thus relieves the heart.

As counter-irritant, it promotes absorption and hastens repair; it also removes passive congestion. In this connection it is often applied in the form of the actual cautery. This treatment is more valuable in chronic than in acute inflammation. It is sometimes indicated in deep-seated inflammation of the joints. The superficial layers of the skin only should be irritated. The cautery should be brushed over the part lightly, and be used at a white heat when vigorous counter-irritation is desired, but at a cherry-red heat for hemorrhage. The relief from its use is often as great as it is sudden. It is indicated in neuralgia and rheumatism. Its action may be reflex through the nerves, producing a change in the nutrition of the part, with promotion of absorption.

The value of heat as a diaphoretic has already been spoken of.

It is a good general and local sedative. It draws the blood away from the great vessels to the periphery, dilating the vessels of this region and producing a feeling of general comfort. It is also used in the treatment of neuroses. Hot applications to the face in toothache are very soothing. This treatment also relieves itching.

Its general stimulating effects have been spoken of.

Heat is the most trustworthy germicide that we have. It may be used in the form of fire, dry heat, boiling, streaming or live steam, and steam under pressure. Fire is used only to destroy articles. All pathogenic organisms and their spores are destroyed in boiling water in five minutes. Streaming or live steam is utilized in the ordinary sterilizer or disinfector. Steam under pressure is used to disinfect bulky objects such as bales of goods.

Heat is used as a hæmostatic in the form of the actual cautery or of water raised to the temperature of 120° to 140° F. If the bleeding surface is large, the oozing should first be treated by compression with hot cloths to stop the capillary hemorrhage before the cautery is applied. The clamp and cautery method of treating hemorrhoids is well known.

Heat is hypnotic, hot baths being very beneficial in acute and chronic insomnia.

A high degree of heat may be used as a local anæsthetic, since it has the faculty of blunting the perception of different kinds of sensation at certain temperatures, as mentioned before.

Although the uses of heat are at present so varied and valuable, this field is probably yet but in its infancy, as new discoveries and improvements are constantly being made in this department of therapeutics.

Emma E. Walker.

HEDONAL, methyl-propyl-carbinol urethane, occurs as a white, crystalline powder insoluble in cold water, slightly soluble in warm water, and somewhat more so in alcohol. It has a persistent, rather unpleasant taste suggesting mint, and on boiling with an alkali decomposes, forming ammonia, carbon dioxide, and methyl-propyl-carbinol. There are many reports on the hypnotic properties of this substance, Goldmann, Nawrateski, Arndt, and others claiming for it valuable powers without any undesirable after-effects. Brownrigg, also Schüler, found it a feeble hypnotic, useful only in cases of moderate nervous irritability. In nine of Brownrigg's thirty-five cases, and in five of Schüler's twenty-one, no sleep resulted from its administration. Raimann found the lethal dose in a series of animals to be 1 gm. per kilogram of body weight. Moderately large doses were followed by depression of circulation, respiration, and temperature. Nawrateski and Arndt point out that the drug is so diuretic that it may cause such a desire to urinate as to arouse the patient. All things considered, this drug is of less value than its congener, ethyl-urethane. The dose is from 1 to 3 gm. (gr. xv.–xlv.) given dry on the tongue and washed down with aromatic water, or given in syrup, in capsule, or in cachet.

W. A. Bastedo.

HEILBRONN MINERAL SPRINGS.—Bradford County, Florida.

Post-Office.—Starke. Hotels and boarding-houses in Starke.

Access.—Viâ the main line of the fifth division of Seaboard Air-Line Railroad, forty-five miles from Jacksonville. Also viâ Suwannee River Division of the same system. Starke, the county seat of Bradford County, is located on the elevated backbone of the Florida peninsula at an elevation of 180 feet above the ocean level. The location is surrounded on all sides by an almost unbroken pine forest stretching to the Atlantic on the east and the Gulf on the west, about fifty miles in either direction. The waters to the west flow into the Suwannee River and thence into the Gulf, while those to the east find their way into the St. John's River and ultimately reach the Atlantic. The situation thus unites many of the advantages of a well-favored natural sanatorium and offers an attractive resting place for the winter tourist in search of a genial and balmy climate. The mean temperature for the months of December, January, and February during a recent winter was 52° F. The

rainfall for this period was 10.22 inches. Starke has a population of about 1,200 and is well supplied with schools, churches, livery stables, banks, hotels, boarding-houses, etc. The springs are located about five and one-half miles northwest from Starke on a picturesque stream known as the Wateroak, from the presence of numerous trees which adorn its banks. They are reached by an excellent road. The springs are two in number, known as No. 1 and No. 2. No. 1 yields about one hundred and fifty gallons and No. 2, fifty gallons per minute. The following analyses were made by Prof. Henry Leffmann of Philadelphia:

One United States Gallon Contains:

Solids.	Spring No. 1. Grains.	Spring No. 2. Grains.
Sodium chloride	2.08	1.42
Sodium carbonate	.40	.60
Potassium carbonate	.20	
Potassium sulphate	.17	
Calcium carbonate	5.13	5.83
Magnesium carbonate	.20	3.73
Ferrous carbonate	.33	
Silica	1.51	1.51
Nitrogen by permanganate	.20	Trace.
Iron oxide and alumina	....	.23
Total	10.22	13.32
Gases.		
Dissolved oxygen	.92	.67
Dissolved carbon dioxide	11.70	12.30

These are excellent waters of the light saline calcic type. No. 1 also possesses ferruginous properties. We have carefully examined the water of No. 1 and find it to be very palatable and well adapted to table uses. Though not heavily mineralized these waters have acquired an extensive reputation among Florida physicians in the treatment of dyspepsia, chronic skin diseases, and rheumatism. Many practitioners recommend their local use as a lotion in ill-conditioned sores and indolent ulcerations. The waters are now used commercially and are bottled and shipped to distant points.

James K. Crook.

HELLEBORE, AMERICAN. Veratrum Viride. *Indian Poke, Itch-weed.* ("Green hellebore," but not to be confused with *Helleborus viridis.*) The dried rhizome and roots of *Veratrum viride* Ait. (fam. *Melanthaceæ* ["*Liliaceæ*," U. S. P.]). The plant is a large, conspicuous swamp herb, having a simple upright, leafy stem, from 50 to 150 cm. high (2 to 5 feet), and terminating in a large spicate panicle. Leaves, 3-ranked, large, ovate, or broadly oval, pointed, sessile, clasping at the base, from 15 to 40 cm. long. Flowers monœciously polygamous, regular, 1 or 2 cm. across, spreading. Perianth of six narrow, pointed segments; stamens six; anthers extrorse, opening transversely across the top; carpels three; fruit of three many-seeded follicles. The whole plant is slightly pubescent, and of a bright, light-green color, flowers and all. It grows abundantly in marshes and along brook-sides in the cooler parts of North America—the Northern United States, Canada, and Alaska. Its common neighbor, and a plant which might be mistaken for it, is the skunk cabbage, but that has subrotund leaves, at least as broad as long, and they lack the conspicuous plaits of veratrum. The hairs of veratrum are slightly irritating to the skin of many persons, whence the name "itch-weed." Varieties apparently identical with it are found in Alpine districts in Europe and in Eastern Asia. The type of the species, *V. album*, replaces it in Europe and Asia generally.

The poisonous properties of this plant are said to have been known to the aborigines, by some tribes of whom it was used as a sort of ordeal to test their strength and vigor. "He whose stomach made the most vigorous resistance, or soonest recovered from its effects, was considered the stoutest of the party and entitled to command the rest" (Bigelow, "Med. Bot.," quoting Josselyn). It was also one of the numerous things used by the early settlers to poison seed corn for protection against birds; it is still occasionally so used. In the early part of this century it was employed as a substitute for *V. album* in gout, rheumatism, etc., in the treatment of which that substance was then popular, and also as a parasiticide, for which purpose both have been superseded by veratrine and other things. Its modern use as a cardiac depressant is of the last half-century only.

The rhizome, which is the part used, is collected in the autumn and generally split longitudinally to facilitate drying, but it may be variously cut or left whole; the roots, to the length of 10 or 15 cm., are left attached, and dry in a skein around its lower end. The official description is as follows:

Rhizome upright, ovoid or obconical, 2.5 to 7 cm. (1 to 3 in.) long and two-thirds as broad, externally light- to dark-brown or blackish, frequently bearing at the summit some coarsely fibrous remains of leaf-bases, densely clothed at the sides with coarse roots; internally grayish- or yellowish-white, exhibiting numerous short, irregular wood-bundles; roots about 10 to 20 cm. (4 to 8 in.) long and about 1 or 2 mm. ($\frac{1}{25}$ to $\frac{1}{12}$ in.) thick, light yellowish-brown, much shrivelled, the surface somewhat reticulate-wrinkled; inodorous, but the powder highly sternutatory; taste bitterish, and very acrid.

It is very difficult to distinguish the *V. album* from this, and impossible when they are powdered. *V. album*, if fresh, is lighter-colored, and its roots are thicker, fewer, more spongy, and more reticulate-wrinkled. The properties are apparently identical.

Besides containing resin and starch, veratrum has a complex alkaloidal composition, regarding which authors are not agreed. The individual alkaloids are only of theoretical interest, as they are not used, only one of them (jervine) being listed, and that for experimental purposes.

Jervine ($C_{26}H_{37}NO_3 + 2H_2O$) is a whitish powder, soluble in alcohol.

Pseudojervine ($C_{29}H_{49}NO_{12}$) is very similar to it and slightly soluble in absolute alcohol, while *Veratroidine* ($C_{21}H_{78}N_2O_{16}$) is alcohol-soluble. There is a very little *rubijervine*, which strongly resembles the last.

Action and Use.—The action has been studied with care by several Americans, especially by Dr. H. C. Wood, from whose "Therapeutics" this paragraph is largely condensed. His experiments were made with jervine and Bullock's "veratroidine."

The symptoms of poisoning with the former in animals are sluggishness, muscular weakness, and tremblings, followed shortly after by violent convulsions and great prostration. Sensation is affected only very late, and consciousness almost not at all. There is no purging or vomiting, but always profuse salivation. Death occurs from cessation of respiration. Jervine is an intense cardiac sedative, acting both directly upon the muscle of the heart or its local ganglia, and indirectly through the general vaso-motor system. It reduces the force of the heart beats and the arterial pressure to a very great degree. The rapidity of the heart is also diminished while the animal is quiet, but even slight exertion raises it to rapid and incoherent action. There is also in jervine poisoning a marked reduction of spinal reflex. It is not locally irritating. The other alkaloid, "veratroidine," resembles jervine in its general action, but is a local irritant like veratrine and produces generally vomiting and diarrhœa, which the other does not. It stimulates the pneumogastric, and for a while increases the arterial pressure. The crude drug has naturally the combined action of its two alkaloids, and within its medical limits produces in man weakening and infrequency of the pulse, lassitude, and increase of salivary and cutaneous secretions, lowering of temperature, and sometimes vomiting. None of these effects should be pressed beyond a moderate degree. Its utility is limited by conditions requiring these modifications—that is, quick, hard-bounding pulse, febrile excitement, high temperature,

and dry skin—conditions found only in the early stages of acute febrile diseases in robust or plethoric patients—in the beginning of pneumonia, pleurisy, rheumatism, etc.; in the hypertrophic stage of cardiac disease it may be needed, but not often; in typhoid, septic, and other adynamic febrile conditions it should never be given, nor as an emetic.

In overdoses the vomiting, purging, and prostration are best combated by opium and stimulants, with a strictly enforced recumbent position.

ADMINISTRATION.—The dose of the substance itself is about a decigram (gr. iss.), repeated rather frequently and in increasing doses until the pulse is affected. During the administration the patient should be carefully watched. Once an hour is a good interval for the first few doses. The following good preparations are official: The fluid extract (*Extractum Veratri Viridis Fluidum*, U. S. P.), and a tincture (*Tinctura Veratri Viridis*, U. S. P.), strength 40 per cent., dose ♏ ij. to x.

W. P. Bolles.

HELLEBORE, BLACK.—HELLEBORUS NIGER. *Christmas Rose.* The dried rhizome of *Helleborus niger* L. (fam. *Ranunculaceæ*). This is a low perennial herb of Southern Europe, mostly in the mountains, and largely cultivated for its winter bloom.

The drug much resembles cimicifuga or black cohosh, but is rather smaller, blacker, and more tortuous, with fewer and broader wood-wedges in the rhizomes, and those of the roots less conspicuously stellate. It contains the two poisonous glucosides helleborin and helleborein, and has been used as a drastic. In overdoses it is an emetico-cathartic poison. It is now little used. The dose is 0.5 to 1.5 gm. (gr. viij.–xx.).

The rhizome of *H. viridis* L. or green hellebore (but not to be confused with *veratrum viride*, also so called), is very similar, and even more highly acrid and poisonous.

Henry H. Rusby.

HELLEBORE. (TOXICOLOGICAL.)—Green Hellebore (Veratrum viride), *American hellebore, Indian poke*, and White Hellebore (Veratrum album), the European species, owe their poisonous properties to several alkaloids which have been examined by a number of investigators. The results are not entirely accordant, and what is doubtless the same substance has received different names from the different writers. The researches of Wright and Luff and of Salzberger are of particular value. Wright and Luff found in veratrum viride, jervin, cevadin (crystalline veratrin), pseudojervin, with traces of rubijervin and veratralbin. Salzberger found in V. album, jervin, the pseudojervin and rubijervin of Wright and Luff, and two other bases, protoveratrin and protoveratridin, but no veratrin.

The official veratrin, obtained from sabadilla, and which melts at about 147° C., is a mixture of two isomeric alkaloids—the crystalline veratrin or cevadin of Wright, which melts at 205° C., and amorphous veratridin, melting at 143–148° C. Crystalline veratrin or cevadin crystallizes with difficulty, is readily soluble in alcohol, ether, and chloroform, and insoluble in cold water. It has a bitter, disagreeable taste and excites violent sneezing. It combines with acids to form salts, which are generally non-crystalline. The reactions for the official alkaloid and crystalline veratrin are substantially the same. Sulfuric acid gives a series of colors—yellow, orange red, carmine red. If heated, the latter appears at once. Hydrochloric acid produces no color in the cold, but on heating a fine red is obtained which is quite permanent. Sulfuric acid with sugar or with furfural gives a yellow, changing to an indistinct green, dark blue, and finally to violet. Nitric acid gives a transient rose pink; on evaporation and moistening with alcoholic potash a brown color is obtained.

Physiological Test: A minute quantity of veratrin injected hypodermically in a frog causes vomiting, slowing of heart beat, and contractions of the muscles, suggesting the tetanic convulsions of strychnine.

Jervin forms white crystals which melt at 238° C., and have a bitter, acrid taste. The alkaloid is non-sternutatory. It is readily soluble in alcohol and chloroform, less soluble in ether, and insoluble in cold water. Sulfuric acid gives a yellow, changing to greenish-yellow and greenish-brown with green at edges. On heating, a mahogany-brown appears at once. Sulfuric acid with sugar or with furfural gives a brownish color, changing to a deep blue and then to an indistinct violet. Hydrochloric acid gives no color in the cold; on heating, a yellow is obtained. Nitric acid, followed by alcoholic potash, gives the same reaction as does veratrin.

Experiments upon animals show that both hellebores first excite, then paralyze the sensory nerves of the skin and of the mucous membranes of the nose and alimentary tract. Both respiration and the action of the heart are first accelerated, then retarded, and finally paralyzed. The symptoms, which usually appear soon after taking, are burning in the mouth extending to the stomach, difficulty of swallowing, intense nausea, violent vomiting, and later purging, usually accompanied by tenesmus. Great prostration follows, headache and giddiness are frequently present, the pupils are slightly dilated, the pulse is feeble, respiration is difficult and sometimes fails entirely. Death may occur from heart failure or from exhaustion caused by vomiting.

Several homicidal cases have occurred in Europe, notably in France, but the only cases reported in this country are accidental. Thirty-six drops of the tincture of veratrum viride, taken in divided doses, caused the death of a child of one and one-half years. A teaspoonful of the tincture, seventy-five drops of Tilden's fluid extract, sixty drops of Norwood's tincture in divided doses, and an unknown quantity of the tincture, taken by mistake for whiskey, have caused the death of adults. Recovery has followed the taking of much larger quantities. On several occasions, a teaspoonful of the fluid extract (H. C. Wood) and a tumblerful of the tincture have been taken without fatal results. One-half ounce of powdered white hellebore has been taken with recovery. No death from veratrin is on record. The different preparations are evidently of greatly varying strength. One sixteenth of a grain nearly caused death, while recovery has occurred after taking three grains in a liniment and thirty grains of the crude alkaloid.

The treatment of a case of poisoning will vary with the nature of the symptoms. Vomiting, so commonly present, will have emptied the stomach; if it has not occurred, it should be induced until the object is reached, then restrained. Warm drinks and external warmth are used to raise the temperature and opiates to control pain. Alcohol and aromatic spirits of ammonia are useful in meeting the extreme prostration. The latter precipitates the insoluble alkaloids and thus retards absorption. Artificial respiration may be required.

Post-mortem examination discloses the intestinal tract usually congested and the viscera filled with blood, as occurs with many other poisons. There is an absence of characteristic appearances.

For the recovery of the poison, the contents of the stomach, or the tissues, after suitable comminution, are digested on the water bath with alcohol and acetic acid for some time, filtered, and the alcohol is removed by evaporation. The residue is extracted with water, filtered, and shaken with ether to remove fatty matters and extractives. It is then shaken with chloroform, rendered alkaline with sodium hydroxid, and after repeated shaking the chloroform layer is separated and evaporated. It is generally advisable to repeat this process to remove impurities, and on evaporation the veratrin will be found sufficiently pure for the application of the tests.

Brouardel isolated from a corpse of eighteen months, a ptomaïn which was extracted from alkaline solution with ether. It gave a violet color when heated with sulfuric acid and a cherry red on boiling with hydrochloric acid. This suggests the importance of confirming the chemical tests by the physiological test.

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HEMERALOPIA AND NYCTALOPIA, respectively, day-vision=*night-blindness*, and night-vision=*day blindness*, from ἡμέρα, day, νύξ, night, respectively, and ὤψ, eye, are names used by the older medical writers in opposite senses, to the great confusion of the literature of the subject. Following Hippocrates, Aristotle, and Galen, although in opposition to the usage of later Greek authors,[1] nyctalopia is a condition in which vision is comparatively good at night, or in a very feeble light, but is defective in strong daylight; and, conversely, hemeralopia (used, in contradistinction to nyctalopia, in a single passage in Galen[2]) is a condition in which vision is acute by daylight, but falls off disproportionately at night. If certain recorded observations are to be accepted as trustworthy, it would seem necessary to admit that hemeralopia may occur under two types, the one marked by a quasi-diurnal fluctuation in the perceptive power of the retina, the other directly dependent on changes in illumination. Thus, it has been stated that the acuteness of vision increases from early dawn to the middle of the day, and diminishes as the sun declines toward evening,[3] falling to its minimum as twilight deepens into night, or, according to some writers, not until midnight;[4] that the blindness is less marked in the early dawn than in twilight,[5] and that in aggravated cases the flame of a candle, the stars, and even the moon are either totally obscured or are seen as through a thick smoke or fog (Nachtnebel[6]). As a rule, however, luminous bodies are seen distinctly, while objects at a little distance from the lamp appear enveloped in deep gloom, so that the light of the full moon may be insufficient to enable the hemeralope to see his way.[7] By concentrating the light of a powerful lamp upon the book, the hemeralope may be able to read large print; in other cases reading by artificial light is impossible.[8] That the falling off in vision at night is closely related to the defective illumination is proved by the fact that it occurs in the daytime on entering a dark room, although with some persons, as it would seem, in a lesser degree than at night.[9] Experimental tests of the vision of hemeralopes, by varying degrees of illumination, have shown that it begins to fail under nearly the same conditions as with normal-seeing persons, but that on further diminishing the light the falling off in vision, as measured by the size of the test objects which can be discerned, is much more rapid.[10] The hemeralope requires also a relatively long time to attain his maximum of visual acuteness on going from full daylight into a darkened room;[11] on the other hand, some hemeralopes suffer from dazzling of the eyes on first going out into the sunlight.[12] The condition would appear, therefore, to be essentially one of dulled perceptive power (*torpor retinæ*), which may, in certain cases, be conjoined with some degree of retinal irritability. This view is, moreover, in accord with the seemingly well-attested fact that the same combination of causes may give rise to hemeralopia in certain persons, and to more or less distinctly marked nyctalopic symptoms in others.[13]

Hemeralopia is an almost constant symptom in certain affections of the retina, notably in retinal degeneration with stellate deposits of pigment (*retinitis pigmentosa*), in syphilitic retinitis, and in incipient detachment of the retina; and it is then associated with particular limitations of the visual field, characteristic of the special retinal disease, and very often also with marked falling off in the acuteness of vision in full daylight (see *Retina, Diseases of*). Rarely it is congenital, and it may then be an early symptom of pigmented retina, or perhaps of retinal degeneration in which the usually characteristic pigmentation may be absent.[14]

Idiopathic hemeralopia has been oftenest observed as an acute epidemic affection attacking large numbers of persons living under nearly identical abnormal conditions. De Sauvages mentions such an epidemic as having broken out among the soldiers in several garrison towns bordering on one of the smaller rivers in the south of France, not far from Montpellier.[15] Other extensive epidemics have been observed, occuring almost always in large bodies of men crowded together under unfavorable hygienic conditions conjoined with excessive exposure to the direct influence of strong sunlight. Thus soldiers in garrison, going habitually from crowded, and often very dark, quarters in casemates to drill for hours together on confined and unsheltered parade-grounds, seamen and marines on tropical stations, prisoners employed in stone-breaking or other outdoor work in courtyards enclosed by high whitewashed walls, also children in great public orphan-houses, have been especially subject to these visitations, while the officers, whose duties ordinarily involve much less exposure, and who are better nourished and lodged, also the inhabitants of garrison towns, have generally escaped. Hemeralopia has been described as endemic in certain localities in the East and West Indies, in Brazil, on rice plantations in China, in several provinces of France, in the countries bordering on the Mediterranean, in Podolia toward the end of winter, and also in midsummer among the harvesters of both sexes;[16] also in the Russian provinces bordering on the Baltic, at the period of the very strict Lenten fasts of the Greek Church.[17] An outbreak of hemeralopia, associated with cases described as nyctalopia, is reported by Carron du Villards as having been observed by his father, in 1793, in the Piedmontese army while encamped at a high elevation on the Mount Cenis and Little St. Bernard passes.[18]

From very early times both hemeralopia and nyctalopia have been attributed to "redundancy of humors in the system." Celsus repeats in connection with night-blindness[19] the observation made by Hippocrates regarding nyctalopia,[20] that it does not occur in women whose menses are regular. De Sauvages lays stress on the exposure incident to guard-mounting by day and night in a humid and nebulous atmosphere.[21] Demours particularly mentions exposure to the night air.[22] Hemeralopia is called moon-blindness by sailors, and is attributed by them to a morbific influence emanating from that planet, especially affecting such persons as commit the imprudence of sleeping on deck. In Brazil it has been described as endemic among the negroes;[23] it has also been said to affect especially persons with darkly pigmented eyes,[24] an observation which was made by Aristotle in connection with nyctalopia.[25] Stellwag observed numerous cases of night-blindness occurring in an asylum in Vienna, but almost exclusively in two pavilions which were exposed to the light on three sides,[26] and he cites this instance in support of the opinion that sleeping with the face turned toward the window may be an exciting cause of the affection. On shipboard it is often associated with scurvy, and the same connection was observed in the war in the Crimea.[27] In certain epidemics pregnant women have been especially affected.[28] As a rule, whether in epidemics of night-blindness or in the conditions prevailing in localities in which it has been observed as endemic at certain seasons of the year, also in most of the sporadic cases which have been reported, two principal factors are to be distinguished, namely, impaired nutrition and long-continued exposure to strong sunlight, often intensified by reflection from large bodies of water, snow, or sand; and it appears most rational to regard the former as a predisposing, and the latter as the chief exciting, cause of the affection. Simulation has doubtless often played a part in swelling the number of supposed cases in outbreaks which have occurred in garrisons, on ships, in workhouses, etc., and this probability must be considered in judging of some of the remarkably prompt cures which have followed very diverse plans of treatment.

Of the objective signs of hemeralopia, that upon which the most stress has been laid by military and naval surgeons is a considerable dilatation of the pupils, generally most conspicuous at night; also the sluggish response of the pupils to changes of illumination. Dryness of the scleral conjunctiva with formation of scaly patches, a dulled appearance of the corneal epithelium, even xerosis of the conjunctiva and cornea, also conjunctival hyperæmia with lachrymation and photophobia, a staring expression of the eyes, with the eyelids widely separated,