

administered and the time of administration by the effect produced. Minim-doses of the alkaloid may be given every two hours by the stomach, or two minims by the rectum (Haughton). When it acts favorably, it relaxes the trismus so that nutriment may be taken, and suspends the tonic convulsions. Care must be used not to introduce a lethal quantity, and produce death by asphyxia. The author has known the wine of tobacco to be used successfully in a severe case of tetanus, the quantity administered being regulated by the effect of the remedy on the convulsions.

The experiments of Haughton having demonstrated an antagonism between nicotine and strychnine, he proposed the use of nicotine in *strychnine-poisoning*, and cases have occurred in which it proved entirely successful. As the effects of nicotine are so nearly instantaneous, the stomach administration—if the spasms do not prevent—will suffice, but rectal and even hypodermatic injections may be resorted to if necessary. The following formula of Erlenmeyer may be used for the subcutaneous injection in strychnine-poisoning and in tetanus: ℞ Nicotinæ, gr. ss; aquæ destil., ʒ ij. M. Sig.: *Ten minims contain ¼ of a grain.* The cases of strychnine-poisoning in which tobacco was used successfully were treated by the infusion.

Tobacco was formerly employed in the treatment of *dropsy*. It is adapted to those cases in which digitalis is now used. It promotes free diuresis, and is at the same time laxative—effects especially serviceable in cardiac dropsy. It is, however, so disagreeable in action that few practitioners have the temerity to prescribe it, and few patients are willing to swallow it.

There is no doubt that excessive use of tobacco lessens the *venereal appetite*. Slightly nauseating doses of the wine of tobacco will check *chordee* and *priapism*. *Satyriasis* is effectively quenched in tobacco-*nausea*. *Nocturnal pollutions*, due to repletion and to continence, are also usually suspended by the use of this remedy; but it is, unfortunately, so horribly depressing that the remedy may be justly considered the greater evil.

LOCAL USES OF TOBACCO.—So many unfortunate accidents have resulted from the external application of tobacco, that its use in this way is rarely justifiable. The infusion and an ointment have been employed with success in *tinea*, *scabies*, *prurigo*, *pityriasis*, etc. An injection of tobacco will destroy *ascarides*, but it is unsafe. Other and more manageable remedies have entirely taken the place of tobacco in the local diseases above named.

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**Lobelia.**—*Lobelia*. The leaves and tops of *Lobelia inflata* Linné (Nat. Ord. *Lobeliaceæ*), collected after a portion of the capsules have become inflated. (U. S. P.) Indian tobacco. *Lobélie enflée*, Fr.; *Lobeliakraut*, Ger.

**Acetum Lobeliæ.**—Vinegar of lobelia. (Lobelia, ten parts—diluted acetic acid to make one hundred parts.) Dose, ℥ v—ʒ j.

**Tinctura Lobeliæ.**—Tincture of lobelia. (Lobelia, twenty parts—diluted alcohol sufficient to make one hundred parts.) Dose, ℥ v—ʒ j.

**Extractum Lobeliæ Fluidum.**—Fluid extract of lobelia. Dose, ℥ j—ʒ ss.

COMPOSITION.—The effects of lobelia are due to the presence in it of a peculiar alkaloid—*lobeline*. This principle is oily in consistence, has a pungent, rather acrid taste, a tobacco-like odor, and is strongly alkaline in reaction. It is slightly soluble in water, but more freely soluble in alcohol and ether. It combines with acids to form crystallizable salts, which are soluble in water and in alcohol. The active principle—lobeline—is combined in the plant with *lobelic acid*.

ANTAGONISTS AND INCOMPATIBLES.—The caustic alkalies decompose lobeline; hence these are incompatible. The depressing effects of lobelia on the circulation are counteracted by digitalis, belladonna, ergot, and other vaso-motor excitants, by alcohol, ether, ammonia, etc.; on the nervous system of animal life, by strychnine, picrotoxin, thebaine, etc.

SYNERGISTS.—All of the motor depressants increase the effects of lobelia.

PHYSIOLOGICAL ACTIONS.—The taste of lobelia is pungent and acrid, and it persists for a long time in the fauces. The leaves chewed excite a very abundant flow of saliva, and soon cause a feeling of epigastric

depression and nausea, with giddiness and headache. The preparations of lobelia administered by the stomach produce, in considerable doses, a degree of nausea and depression which amounts to anguish. An abundant outpouring of gastric mucus takes place, and vomiting ensues, with great straining and distress. The action of the heart is enfeebled; headache and vertigo are experienced; a profuse sweat breaks out on the surface of the body; the intestinal canal is relaxed, and the discharge of urine is increased. When a lethal dose is taken, especially if vomiting do not occur, the effects are chiefly expended on the nervous system of animal life. Muscular weakness and trembling, shallow respiration, coldness of the surface, feeble circulation, insensibility, and sometimes convulsions, have occurred. Death ensues from paralysis of the muscles of respiration—the action of the heart continuing after respiration has ceased. The insensibility is doubtless produced in the same way as by tobacco, and the cerebral effects are not the result of a direct action of the poison.

According to the investigations of Ott, lobeline, in moderate doses, first “increases the blood-pressure by acting as an excitant on the peripheral vaso-motor nervous system.” This primary effect is not of long duration, a fall in the blood-pressure soon occurs, the peripheral circulation is so embarrassed from weakened power of the heart, and obstructed pulmonary circulation, that oxygenation of the tissues is rapidly impaired, and a marked reduction of temperature takes place. Lobeline affects chiefly the motor nervous system, and especially the medulla oblongata and its respiratory center (nucleus of pneumogastric).

**THERAPY.**—Lobelia is much employed by the self-styled physio-medical practitioners as a “sanative agent.” The great quantity of mucus discharged from the stomach under its emetic action is considered by them a proof of its power as an eliminating agent. As an *emetic*, lobelia is entirely too harsh and depressant to justify its use for this purpose. In *habitual constipation*, dependent on atony of the muscular layer of the bowel and deficient secretion of the mucous membrane, good results are sometimes obtained by small doses of the tincture—ten minims—administered at bedtime. *Impaction of the cæcum*, when inflammation has not occurred, may be removed, and the bowels induced to act, by small doses, frequently repeated, of the tincture of lobelia (two drops every hour). This remedy can be used when purgatives would produce serious mischief. An infusion of lobelia as an enema has succeeded in relieving *strangulated hernia*, *intussusception*, and *fecal impactions*. This use of the agent is the same as for the corresponding administration of tobacco; it is much safer than tobacco, and may be used to produce as decided therapeutic effects.

Unquestionably the most important application of lobelia is to the treatment of the *asthmatic paroxysm*. It gives relief in a few minutes

to violent attacks of spasmodic asthma, and it sometimes happens that the relief is permanent. Frequent repetition of this remedy in the same individual, however, lessens its effects, and it may finally cease to afford any relief. To be effective in asthma, a teaspoonful dose of the acetum or tincture must be administered every fifteen minutes until nausea is induced. Free expectoration and abundant gaseous eructations take place, and the breathing soon becomes easy and calm. The efficiency of lobelia is increased by the addition of iodide and bromide of ammonium. ℞ Tinct. lobeliæ, ℥ j; ammonii iodidi, ℥ ij; ammonii bromidi, ℥ iij; syrup. toltan., ℥ ij. M. Sig.: *A teaspoonful every one, two, three, or four hours.*

*Whooping-cough*, especially after the cessation of the catarrhal stage, has been treated successfully by lobelia, but we now possess other agents more effective and less disagreeable in action. Lobelia is, however, an excellent *expectorant*. It is adapted to cases in which the cough is dry, resonant, and spasmodic. It succeeds best in those who have attacks of cough with spasmodic difficulty of breathing, and who get up a little tough mucus after long and painful paroxysms of coughing.

A lobelia-emetic will cut short an attack of *spasmodic croup*, but it is too harsh and dangerous a remedy to be employed for this purpose.

Lobelia may be used instead of tobacco in *tetanus*, *strychnine-poisoning*, and allied states.

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**Acidum Hydrocyanicum.**—*Hydrocyanic or Prussic Acid.* *Acide hydrocyanique*, Fr.; *Blausäure*, Ger.

**Acidum Hydrocyanicum Dilutum.**—Diluted hydrocyanic acid. A colorless liquid, having a peculiar odor, and wholly volatilized by heat. It imparts a faint, evanescent red color to litmus, and is not discolored by hydrosulphuric acid. With solution of nitrate of silver, added in slight excess, one hundred grains of it produce a white precipitate, which, when washed with water until the washings are tasteless, and dried at a temperature not exceeding 212°, weighs ten grains, and is wholly soluble in boiling nitric acid.

The official diluted acid contains two per cent of anhydrous acid and ninety-eight per cent of alcohol and water. (U. S. P.) Dose, ℥ j — ℥ v.

**ANTAGONISTS AND INCOMPATIBLES.**—The metallic salts are, gener-

ally, incompatible; also the red oxide of mercury and the sulphides. Freshly-precipitated oxide of iron (hydrated sesquioxide) has been proposed as a chemical antidote, but its action is too slow. In cases of poisoning, the remedies of the greatest utility are cold affusion to the spine, the inhalation of ammonia, the stomach administration, as also the intra-venous injection of this substance, and the subcutaneous injection of ether. Atropine has been proposed as a physiological antagonist by Preyer; but the rate at which atropine is diffused, as compared with the diffusion of prussic acid, obviously will render such antagonism powerless, how much soever it may be approved on theoretical grounds. The results of experiments, as the author and others have shown, are, however, opposed to the existence of this antagonism. In addition to these measures, artificial respiration should be practiced.

**PHYSIOLOGICAL EFFECTS.**—Applied to the unbroken skin, it is doubtful whether hydrocyanic acid is absorbed, but in contact with a wound or an abrasion, and with the mucous membrane, it diffuses into the blood with great rapidity.

The vapor has a rather fragrant odor, similar to that of bitter almonds. Inhaled, it has speedily caused death. When the effects of the vapor are short of lethal, giddiness, faintness, embarrassed breathing, a weak, small pulse, and great muscular weakness, are produced; and there may be even coma and profound insensibility, and yet recovery ensue (Taylor).

In small medicinal doses, beyond a fugitive and very slight calmative effect, no symptoms are produced by it. When the dose somewhat exceeds the medicinal standard, there may occur transient giddiness, nausea, faintness, a feeble pulse, and general muscular weakness. The effects follow very speedily. When a very large toxic dose is taken, a few seconds only intervene from the act of swallowing until its effects are manifest, and death may ensue in two minutes or be postponed to five. Under these circumstances, the following phenomena have been observed: sudden insensibility; eyes protruding and glistening; pupils dilated and unaffected by light; extremities cold, relaxed; the skin covered with a clammy sweat; breathing convulsive, slow; the pulse extremely feeble or imperceptible; evacuations involuntary (Taylor). When the effects are slower, in consequence of the ingestion of a merely lethal dose, there are occasionally tetanic convulsions, opisthotonos, trismus, etc.

Although the effects of prussic acid are exceedingly rapid, a fatal result is not instantaneous. Various acts of volition may be gone through, provided but a few seconds are required for their performance. Several instructive instances of this kind are narrated by Taylor. The effects of hydrocyanic acid are not more rapid than can be accounted for by its distribution through the blood.

Most contradictory opinions have been expressed as to the action of prussic acid on the blood: that it at first arterializes and afterward arrests decarbonization of the blood; that it destroys the ozonizing power, and does not impair the capacity of the red blood-globules to carry and to yield up oxygen; that cyanohæmoglobin is formed by the combination of the acid with hæmoglobin, and that this combination can not take place, owing to the rapidity of the action of the poison. From this chaotic state of scientific opinion the following may be evolved: the blood is dark, owing to deficient decarbonization, but this is probably due to a spasm of the pulmonary arterioles and paresis of the muscles of respiration, whence it follows that rapid asphyxia ensues. The primary action of prussic acid on the terminal filaments of the pneumogastric, as shown by Preyer, is confirmatory of this view.

Although the action of the heart ceases after respiration, prussic acid undoubtedly exerts a direct paralyzing action on the cardiac ganglia.

The cerebral effects of this poison are, probably, indirect, the result of rapid carbonic-acid poisoning, and the sudden withdrawal of oxygen from the cerebral tissues. Direct application of prussic acid to the medulla oblongata causes (in the alligator) a sudden and complete expiration, and collapse of the lung (Jones). The tetanic convulsions which have been observed in many cases of poisoning, in animals and in man, indicate a direct action of this agent on the spasm-center; but the disappearance of the excitability of the motor nerves, and of the contractility of muscles which it causes, shows that it quickly exhausts the irritability of the spinal cord. These effects on the cord, on the nerve-trunks, and on the muscles, are also, probably, in part due to the circulation through them of blood deprived of oxygen and charged with carbonic acid. The fact that instances of recovery from a condition of profound insensibility are numerous, is confirmatory of the view just expressed. Moreover, artificial respiration exerts an undeniable influence over the lethal effects of the acid in animals (Preyer), whence it may be concluded that to supply oxygen to the blood is sufficient to arrest all of the symptoms produced by the want of oxygen and by the excess of carbonic acid.

*Post-mortem* rigidity sets in early after death from prussic acid, and is very pronounced. The fingers are tightly closed, the toes strongly flexed, the jaws rigid, the eyes prominent and staring. The blood is dark-colored, fluid, and the venous trunks and the cerebral sinuses are gorged.

The quantity of medicinal, diluted hydrocyanic acid necessary to produce death will vary with the age, size, and bodily vigor. Habit, also, influences to a remarkable degree the susceptibility to its toxic influence. A quantity equivalent to forty minims of the diluted hy-

drocyanic acid (United States Pharmacopœia) has proved fatal. As the effects of a medicinal dose are expended in a half hour to one hour, the repetition of the doses hourly will not be unsafe. Hydrocyanic acid is not a cumulative poison.

**THERAPY.**—Hydrocyanic acid is a remedy of very considerable utility in certain affections involving the functions of the pneumogastric nerve. It is often highly serviceable in various kinds of *nervous vomiting*; for example, the *vomiting of pregnancy*, the *vomiting which accompanies some cerebral disorders*, and the *reflex vomiting of phthisis*. The good effects are quickly, if at all, produced; hence, if no result is attained after some days' administration, no advantage can be expected from its continued administration. ℞ Acid. hydrocyan. dil., ʒj; aquæ laur.-cerasi, ʒij. M. Sig.: *A teaspoonful every two to four hours.*

*Gastralgia*, when it is a truly neuralgic affection of the gastric nerves, is occasionally very quickly cured by this agent. Sometimes cases, apparently in every way suitable for its use, are not improved by it. If a few doses do not effect any amelioration, it will be useless to continue it. Cases of *indigestion accompanied by pain in the nucha*, and *attacks of giddiness* (stomachal vertigo), are sometimes remarkably relieved by prussic acid. *Irritative dyspepsia*, manifested by these symptoms, a red-glazed tongue, pain, epigastric tenderness, and a feeling of weight and oppression, may be, not unfrequently, much benefited, and, indeed, cured; but while the results are often brilliant, failures are also frequent. *Enteralgia*, a malady often extremely rebellious to remedies, not unfrequently yields promptly to prussic acid.

Considerable medicinal doses of this agent are very fatal to *round worms* (lumbrioides).

Hydrocyanic acid is a successful remedy in *whooping-cough*, after the subsidence of the catarrhal symptoms. It acts by allaying irritability of the pneumogastric, and is successful just in proportion to the preponderance of the nervous symptoms. The cases in which the author has witnessed the best results were cases of *cough by habit*, after the cessation of the whooping-cough proper. The *nervous cough* of mothers, which exists during the presence of whooping-cough in the household, may be allayed by this agent. ℞ Acid. hydrocyan. dil., ʒj; tinct. sanguinariæ, ʒiv; syr. senegæ, ʒss; syr. toltan., ʒij; aquæ lauro-cerasi, ʒvij. M. Sig.: *One or two teaspoonfuls, according to age, every three or four hours. For irritable cough.* It sometimes happens that this agent will greatly relieve the *cough of phthisis*, but only when it is chiefly nervous.

To allay *cerebral irritation and excitement*, prussic acid has been employed with benefit (McLeod). In forty cases of *mental disorder* observed by McLeod, there was "slight or temporary amelioration" in

ten; a "more decided and permanent effect," the disease being still stationary or progressive, in nineteen; and in eight cases, six of *acute mania*, and two of *acute melancholia*, "the drug has been a factor, and a very main one, in rapid restoration to reason." In the treatment of these cases, McLeod used from two to five minims of Scheele's dilute acid, which contains five per cent of anhydrous acid. His method of administration consisted in giving it at first at short intervals (every quarter of an hour), and, when effects were produced, every hour or two. He also employed it subcutaneously, in five-minim doses.

**EXTERNAL USES.**—In various cutaneous diseases characterized by *itching*, the local application of prussic acid affords relief. The following formulæ, from Fox, represent serviceable combinations: ℞ Bichloride of mercury, gr. j; dilute hydrocyanic acid, ʒj; emulsion of almonds, ʒvj. M. *Use in itching, in lichen, in the syphilodermata.* ℞ Dilute hydrocyanic acid, ʒss to ʒj; infusion of marsh-mallow, ʒv to ʒviii. M. *Use in pruritus.* ℞ Acetate of ammonia, ʒj; dilute prussic acid, ʒjss; infusion of tobacco, ʒviii. M. Sig.: *To be sponged on the part twice a day in pruritus ani or p. vulvæ.* ℞ Borax, ʒj; prussic acid, ʒij; rose-water, ʒviii. M. *In the pruritus of old people.*

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**Potassii Cyanidum.**—*Cyanide of Potassium.* In white, opaque, amorphous pieces, having a sharp, somewhat alkaline and bitter-almond taste, and an alkaline reaction. It is deliquescent in moist air, readily soluble in water when reduced to powder, and sparingly soluble in alcohol. Dose, gr.  $\frac{1}{10}$ —gr.  $\frac{1}{2}$ . (U. S. P.)

**ANTAGONISTS AND INCOMPATIBLES.**—Acids decompose it and set free hydrocyanic acid. As respects its physiological properties, its antagonists are the same as those of hydrocyanic acid.

**SYNERGISTS.**—Same as for hydrocyanic acid.

**PHYSIOLOGICAL ACTIONS.**—The effects of this salt have been already mentioned in sufficient detail in the preceding article, so far as they correspond to hydrocyanic acid. It has, however, some special physical

properties which separate it slightly from the powerful agent which enters into its composition.

Applied to the unbroken epidermis, the cyanide of potassium produces at first a sensation of coldness, followed by tingling and itching, and in a half-hour the skin is found to be somewhat reddened. Prolonged contact produces a phlyctenular or eczematous eruption.

Systemic effects are produced by the local and external use of the cyanide of potassium, viz., slowing of the pulse and respiration, muscular weakness, drowsiness, and coldness. Lethal effects may follow prolonged contact with the skin, even when the epidermis is unbroken. Applied to a wound or abraded surface, this salt causes a burning pain, excites a high degree of inflammation, and produces prompt lethal effects.

**THERAPY.**—Cyanide of potassium may be prescribed as a substitute for hydrocyanic acid in all of the maladies for which the latter is used. This salt has, however, some special applications which we owe to Trousseau. This eminent observer has shown that a solution of the cyanide applied to the seat of painful sensations gives great relief in various forms of *reflex headache*, gastric, cardiac, pulmonary, and menstrual. The headache which accompanies the pyretic state is, according to the same authority, cured or greatly alleviated by the cyanide solution, while at the same time a favorable influence is exerted over the temperature.  $\mathcal{R}$  Potassii cyanidi, gr. x— $\mathcal{D}$  j; aquæ lauro-cerasi,  $\mathcal{Z}$  iv. **M. Sig.:** *A compress, moistened with the solution, to be applied to the seat of pain.* From a quarter to a half hour of contact with the skin usually suffices.

A solution of the cyanide of potassium, of the strength given above, will remove the stains of nitrate of silver, and also the dissecting-room odor, from the hands.

Cyanide of potassium, in the form of ointment or solution, is an excellent remedy for allaying irritation in various cutaneous diseases. In *pruritus* and *urticaria*, the following formula (McCall Anderson) gives relief:  $\mathcal{R}$  Potassii cyanidi, gr. vj; pulv. cocci, gr. j; ungu. aq. rosæ,  $\mathcal{Z}$  j. **M. Sig.:** *Ointment.* In *eczema with pruritus*, the same authority recommends the following:  $\mathcal{R}$  Potassii cyanidi, gr. v; sulphuris, potassii bicarb.,  $\mathring{a}\mathring{a}$   $\mathcal{Z}$  ss; pulv. cocci, gr. vj; axungiæ,  $\mathcal{Z}$  j. **M. Sig.:** *Ointment.* A solution of the cyanide of potassium is one of the most effective applications for that very troublesome disorder, *pruritus pudendi*.  $\mathcal{R}$  Potassii cyanidi, gr. xv; aquæ lauro-cerasi,  $\mathcal{Z}$  viij. **M. Sig.:** *Lotion.* This formula is also serviceable in *lichen* and *prurigo* (Hardy).

Entomologists make use of the cyanide to destroy insects without injuring their structures. One part of the cyanide, two parts of plaster of Paris, and one and a half part of water, made into a paste and

poured into a wide-mouthed bottle, sets into a solid mass, which gives off the vapor of hydrocyanic acid (Squire).

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**Amyl Nitris.**—Nitrite of amyl. *Nitrite d'amyle*, Fr.; *Amylnitrit*, Ger.

**PROPERTIES.**—A yellowish or reddish-yellow liquid, rather oily in consistence, very volatile, and having a peculiar and very diffusive ethereal odor. It is insoluble in water, but soluble in all proportions in alcohol, ether, chloroform, benzol and benzin. It has a neutral or a slightly acid reaction. It may contain, as impurities, nitric acid, amyl-nitric ether, amylvalerianic ether, and hydrocyanic acid. The specific gravity is .877. Dose,  $\mathfrak{m}$  ij— $\mathfrak{m}$  v, by inhalation or subcutaneously.

**ANTAGONISTS.**—The actions of the nitrite of amyl are antagonized by all those agents which increase the functional activity of the spinal cord and sympathetic—as strychnine, brucine, picrotoxin, digitalis, ergot, belladonna, and, as McCullough has shown, it is an efficient remedy in chloral-poisoning. The opposing action of amyl nitrite and ergot has been demonstrated clinically by Dr. Fancourt Barnes, in cases of hour-glass contraction induced by ergot. This antagonism may not be available, owing to the difference in the rate at which they are diffused, to affect the system.

**SYNERGISTS.**—All of the motor depressants increase the effects of the nitrite of amyl.

**PHYSIOLOGICAL ACTIONS.**—The following are the symptoms produced by nitrite of amyl when inhaled: acceleration of the action of the heart; sudden flushing of the face; dilatation of the arterioles in consequence of paresis of the muscular layer of these vessels; a sense of extreme fullness of the brain, with vertigo; fall in the blood-pressure; lowering of the temperature; complete resolution of the muscular system of animal life. The vapor of nitrite of amyl applied directly to the tissues—muscular or nervous—suspends or completely arrests functional activity. Circulating in the blood, it undoubtedly affects most the vaso-motor nervous system and unstriped muscular fiber.

The marked acceleration of the heart (Pick) is in part consecutive, doubtless, to the sudden dilatation of the arterioles, permitting such an increased quantity of the blood to enter these vessels as to require renewed effort on the part of the heart to supply it; in part also to the parietic state which it induces in the inhibitory apparatus. The great fall in the blood-pressure noted by Brunton, Wood, and Amesz-Droz, is also due to dilatation of the arterioles, and consequent dimi-