

ing-place which they would totally ignore under treatment at home. The same may be said of the treatment at the so-called "hydropathic" or "water-cure" establishments. As a rule, those springs will prove of most value which are furthest removed from the patient's residence,—for "distance lends enchantment" in these matters as well as in many others. Invalids whose homes are in the vicinity of some wonder-working spring will not usually derive much benefit from its water, but will by that of another spring, similar in constituents, but located several hundred miles away.

The principal affections in which mineral waters are esteemed most highly are the following: dyspepsia, cirrhosis of the liver, gout, rheumatism, lithiasis, diabetes of hepatic origin, constipation, strumous disorders, obesity, plethora of the pelvic organs, hypochondriasis, skin diseases, especially those dependent on gastric derangement, phthisis, constitutional syphilis, and metallic poisoning, in all of which the influences above mentioned are especially efficacious, and are no doubt the chief factors in producing any benefit which may be attainable. Aperient and purgative waters are useful in many cases where a prejudice exists against purgative medicine, but none against the same agents in a natural water. The strong saline-aperient waters, as Carlsbad, Hunyadi, and Friedrichshall, have considerable repute in the treatment of the uric-acid diathesis and calculous affections, and the waters of St. Catherine's wells are credited with decided influence upon local and chronic rheumatism.

The special therapeutics of mineral waters are found in this volume under the heads of their principal constituents, as Acidum Carbonicum, Sodium Chloride, Sodium Sulphate, Magnesium Sulphate, etc.; also in the therapeutical part of the book.

**ARGENTUM, Silver, Ag**,—is a white, lustrous metal, which occurs in the free state, also as a sulphide, a chloride, and other compounds. It resists the action of oxygen and caustic alkalies, but is attacked by sulphur, sulphides, and nitric acid. In medicine it is represented by three official salts, and several unofficial compounds.

*Official Salts of Silver.*

**Argenti Nitras, Silver Nitrate, AgNO<sub>3</sub>**,—occurs in colorless rhombic crystals, of bitter caustic taste and neutral reaction, soluble in 0.6 of water and in 26 of alcohol. Is best given in pill with Kaolin, or in distilled water; never with tannin or a vegetable extract, lest an explosive compound result. Dose, gr.  $\frac{1}{4}$ – $\frac{1}{2}$ , [av. gr.  $\frac{1}{4}$ .]—if watched, up to gr. j may be given. When melted with 4 per cent. of Hydrochloric Acid, it makes—

**Argenti Nitras Fusus, Moulded Silver Nitrate, (Lunar Caustic)**,—for local use as a mild caustic and astringent. **Argenti Nitras Mitigatus, Mitigated Silver Nitrate**,—is the same salt melted with twice its weight of Potassium Nitrate. It is used locally by ophthalmologists.

**Argenti Cyanidum, Silver Cyanide, AgCN**,—has no medicinal use except for the temporary preparation of Hydrocyanic Acid. (See p. 73.)

**Argenti Oxidum, Silver Oxide, Ag<sub>2</sub>O**,—a brownish black powder, nearly insoluble in water and insoluble in alcohol. It is liable to decompose with violence when mixed or triturated with readily oxidizable or combustible substances, as creosote, phenol, potassium permanganate and many others. It should not be brought into contact with ammonia. Dose, gr.  $\frac{1}{2}$ –ij [av. gr. j.] in pill with Kaolin. It is not a dangerous internal remedy. All the silver salts should be protected from light in dark blue or amber-colored vials.

*Incompatibles.*

Incompatible with the *Nitrate* are: Acetates, Alkalies, Alcohol, Antimony salts, Arsenites, Bromides, Carbonates, Chlorides, Chromates, Creosote, Cyanides, Copper salts, Ferrous Sulphate, Glucose, Hypophosphites, Iodides, Morphine salts, Oils, Manganous salts, Organic substances, Phosphates, Sulphides, Sulphates, Tartrates, Vegetable astringent infusions and decoctions. Incompatible with the *Oxide* are: Antimony and Arsenic Sulphides; Salts of Bismuth, Copper, Iron and Mercury; Creosote, Iodine, Organic substances, Phosphorus, Tannic Acid.

*Unofficial Silver Compounds.*

**Actol, Silver Lactate**,—is a white, inodorous and tasteless powder, which coagulates albumin and is soluble in 20 of water. It lessens putrefaction in the bowel and constipates to some extent. A solution of 1 in 1000 destroys pathogenic microbes within five minutes. For gargles, mouth-washes, etc., solutions of 1 in 8000 to 1 in 4000 are used, though stronger ones do not irritate. In surgical affections it may be employed hypodermically. In erysipelas the amount thus administered daily ranges from 7 to 20 grains, but the solution used must not be stronger than 1 in 200, lest coagula of the albumin form and prevent the remedy getting into the circulation.

**Argentamin**,—is a patented preparation consisting of Silver Phosphate 10 per cent., dissolved in a 10 per cent. solution of Ethylene-diamine. It is an efficient antiseptic and astringent, but the alkaline diamine renders it somewhat irritant. Aqueous solutions of various strengths, from 1 in 5000 to 1 in 1000, are recommended as urethral injections in gonorrhoea.

**Argentol, Silver Oxy-chinolin-sulphonate**,—is a combination of Silver and Quinaseptol, and occurs as a sparingly soluble yellowish powder, which is used as a substitute for iodoform in wounds, skin diseases, syphilitic sores, etc., also as an injection for gonorrhoea. In ointment the usual strength is 1 or 2 per cent., for injections 1 to 3 in 1000.

**Argonin**,—is a patented combination of Silver (4 per cent.), Casein and an alkali, occurring as a white powder which is soluble in hot water, non-irritant, not precipitated by chlorides or albumin, and does not stain the hands or clothing. It is a weaker antiseptic than argentamin or silver nitrate, and has no effect on intestinal microbes. In the conjunctival sac its solutions are non-irritant, but it is said to give good results in catarrhal and purulent conjunctivitis. In gonorrhoea a 2 per cent. aqueous solution is first used, the strength being gradually increased up to 10 per cent. Its solutions should be protected from the action of light.

**Argyrol, Silver Vitellin**,—contains 30 per cent. of silver, and is very soluble in water. It is absolutely painless and non-irritant, even in concentrated solutions on the conjunctiva. Solutions of 2 to 10 or 20 per cent. strength are used as local astringents, of 1 in 1000 for irrigating the vagina, bladder, and urethra. It is strongly bactericidal and has great penetrative power.

**Collargol, Soluble Metallic Silver, Colloidal Silver**,—is an allotropic form of silver, containing 97 per cent. of the metal. It is soluble in 25 of water. Solutions of 1 in 10,000 to 1 in 5,000 are used for irrigating the bladder, and as dressings. Dose, by the mouth, gr. ij–v; intravenously gr. iij–vij, in  $\frac{1}{2}$  to 1 per cent. solutions in distilled water.

**Unguentum Credé**,—is an ointment containing 15 per cent. of Collargol, used for the endermic administration of silver. Dose, by inunction, gr. xxx–xlv, thrice daily.

**Ichthargan, Ichthyol Silver**,—a compound of silver and ichthyol-sulphonic acid, contains 30 per cent. of metallic silver in organic combination. Solutions of 1 in 2000 to 1 in 500 are used in gonorrhoea. It is freely soluble in water, diluted alcohol, or glycerin, and is claimed to be more strongly bactericidal than Silver Nitrate and far less toxic.

**Itrol, Silver Citrate**,—is a fine, light, inodorous and tasteless powder, soluble in 3800 of water. Even in very weak solutions it is an energetic antiseptic, disinfectant and germicide, has a powerfully destructive action on gonococci, is readily borne by the urethral mucous membrane, has deep-reaching power but no injurious effect on the tissues, and therefore meets all the requirements of an efficient injection for gonorrhoea (Werler). In that affection the solutions should be very weak at first, 1 in 8000, gradually increased as the inflammation subsides until the full strength of 1 in 3800 is reached.

**Largin**,—is an albumin-silver compound, containing in the air-dried condition 11 per cent. of silver. It occurs as a gray powder, soluble in 10 of water, and is a powerful astringent and germicide, non-irritant and not precipitated by chlorides or albumin. It is used in

gonorrhoea, the solutions being of  $\frac{1}{4}$  to  $1\frac{1}{2}$  per cent. strength, according to the stage of the affection.

**Nargol**,—a compound of silver and nucleic acid, contains 10 per cent. of silver, is very stable, soluble in water, and is used in 1 to 5 or 10 per cent. solutions. It is more stable than Protargol and less irritant, in solutions of equal strength.

**Picratol**, *Silver Trinitro-phenolate*,—is a combination of silver and picric acid, contains 30 per cent. of silver, and is soluble in 50 of water, also in alcohol, glycerin, ether and chloroform. It is markedly antiseptic, alterative, and analgesic.

**Protargol**,—is a protein-silver compound, containing 8 per cent. of metallic silver, and occurring as a yellow powder, readily soluble in water. It is claimed to be absolutely non-irritant, either in the conjunctival sac or the urethra, but its effective solutions are somewhat painful. It is highly praised as an antiseptic and astringent application in  $\frac{1}{4}$  to 2 per cent. solutions for affections of the conjunctiva, also for wounds and gonorrhoea.

**Silver and Sodium Hyposulphite**,—is very soluble in water, does not coagulate albumin, and may be given by the stomach or hypodermically. It has been used internally for locomotor ataxia and is preferred to silver nitrate for local application to the throat, being more agreeable to the taste. It does not stain the skin or the clothing. Dose, by the mouth, gr. ss-ijj; hypodermically, gr.  $\frac{1}{4}$ - $\frac{1}{2}$  daily.

#### PHYSIOLOGICAL ACTION.

Metallic Silver is antiseptic, probably by forming a lactate with the lactic acid produced by microbes. In contact with colonies of germs it kills them without exercising any inimical action on the animal tissues (Credé). Locally the silver salts are antiseptic, astringent, irritant and caustic, according to the strength of the applications. They are less irritant than the salts of mercury and more so than the salts of lead. The soluble salts of silver, taken internally in medicinal doses, are tonics to the nervous system, increase tissue change and promote the secretion of bile; in larger doses they depress the heart, reduce the temperature and impair the respiration; in overdoses they act upon the central nervous system, producing tetanic convulsions or paralysis. In mammals they affect the medullary centres particularly, at first stimulating and then depressing them, causing a primary rise of blood-pressure which afterwards falls, also slowing and embarrassing the respiration, which finally fails from paralysis of the respiratory centre. The heart is but slightly affected and often continues to beat for some time after the breathing has stopped. The mucous membrane of the stomach and intestines shows congestion, ecchymoses and ulceration, the kidneys are irritated and edema of the lungs often occurs. None of these effects have been observed in man, but in him the prolonged use of the silver salts will produce chronic silver poisoning, known as *Argyria*. The first sign of this condition is a slate-colored line along the margin of the gums, with some inflammatory swelling. Subsequently grayish patches appear on various parts of the skin and mucous membranes, and extend over the whole integument, which becomes slate-colored. No organ of the body, except the parenchymatous cells and the epidermis, is exempt from this pigmentation, which is due to the deposit of silver, either in the metallic state or as an oxide or some organic compound, in the connective tissues. In the skin it is found in the derma, not in the epidermis. As a rule argyria does not produce any serious effect upon the health of the subject, though some authorities have ascribed to it gastro-intestinal catarrh, faulty assimilation,

changes in the blood, and fatty degeneration of the heart, liver, and kidneys. It is probable that in most cases some degree of deranged nutrition is produced. A local argyria may be caused by the frequent topical application of a soluble silver salt for a long time. In a few cases general argyria has resulted from the local use of a silver salt, usually in the mouth or throat; and it appears in workers in the manufacture of artificial pearls, who use silver as a pigment. Argyria is incurable, though many attempts have been made to remove the discoloration by the administration of iodides. The only solvent is potassium cyanide, which is inadmissible by reason of its violent toxicity.

Silver salts unite with albumin to form albuminates, which are soluble in the digestive fluids, but it is not certain that silver is thus absorbed. According to some authorities the salts are reduced in the stomach and also in the intestinal canal, the tendency of such action being towards the separation of the metal, most of which passes through the alimentary canal unabsorbed, a very small portion finding its way through the lymphatics to the tissues and remaining imbedded therein indefinitely.

The Nitrate is the most soluble of the silver salts. It is antiseptic, astringent, hemostatic, irritant, and a limited escharotic, also antiphlogistic, antispasmodic and tonic. It has a strong affinity for albumin, with which it unites to form an albuminate. Locally applied in dilute solution it causes a marked contraction of the bloodvessels, but in stronger solutions it is irritant, dilating the vessels and acting as a superficial caustic by coagulating the albumin of the tissues to which it is applied and destroying their vitality. A dense layer is thus formed which prevents the further penetration of the salt and limits its escharotic action. This albuminous coating is at first white but soon turns black under the influence of light. The stains made by handling or applying it to the skin may be removed by washing with a strong solution of potassium cyanide, and may in great part be prevented by immediately neutralizing the silver salt with a solution of common salt. Internally, in small doses, the Nitrate stimulates the heart, promotes nutrition and acts as a nerve tonic. In large doses it produces violent gastro-enteritis, corrosion and ulceration of the gastrointestinal mucous membrane, due to thrombosis of its veins. Burning pain is felt in the throat and stomach, followed by nausea, vomiting and often by purging. Central impairment of the nervous system may occur, with loss of co-ordination power and paralysis. Collapse follows, with weak pulse, pinched face, coldness of the surface and shallow respiration; and this condition may be followed by coma, convulsions, and finally death from paralysis of the respiratory centre. The lethal dose has not been determined.

#### THERAPEUTICS.

The local uses of Silver Nitrate, which are the most important, depend on its antiseptic, hemostatic, astringent, caustic and stimulant properties. As an antiseptic it has proved an efficient prophylactic against ophthalmia neonatorum,

a drop of a 1 per cent. solution being instilled into each eye of the new-born infant. In this disease, when the discharge is purulent, a similar solution should be applied to the conjunctiva daily, and when the discharge is very profuse a 2 per cent. solution is not too strong. A solution of the latter strength is commonly employed in the purulent conjunctivitis of adults, applied once daily to the everted lids by a brush, after cleansing and drying the surface; the excess being removed by washing with warm water or by neutralization with a solution of common salt. When the cornea is intact a solution of  $\frac{1}{4}$  to  $\frac{1}{3}$  of one per cent. strength may be occasionally dropped into the conjunctival sac, but care must be taken that it does not come in contact with an inflamed or ulcerated cornea, as it is not well borne in such cases and may cause a permanent corneal opacity by the deposit of silver.

In chronic purulent inflammation of the middle ear Silver Nitrate is one of the most valuable applications, in solutions varying from  $\frac{1}{4}$  of one per cent. to saturation, applied by a special syringe through the perforated tympanic membrane or by dropping into the external meatus. Aural polypi have been successfully treated with solutions of from 6 to 20 per cent. strength. Weak solutions are useful in eczema of the ear and in external otitis, also for chronic inflammation of the lining membrane of the Eustachian tube, to abort aural furuncles, and to relieve pruritus of the external auditory meatus.

In the local treatment of the nose and throat Silver Nitrate is useful but should be employed with care. The stick of caustic is brittle and liable to break off while in use, hence it might be swallowed and produce acute poisoning. The danger of general argyria occurring from the prolonged use of the salt in this situation should be remembered. For ulcers on the nasal septum, vascular granulations arising after operations on the nose, fissures of the tongue and lips, and mucous patches and ulcers of the mouth, the fused stick or a moderately strong solution is a good application. In subacute and chronic laryngitis a weak solution is sometimes very effective, as it is also in ulcer of the larynx when not due to laryngeal tuberculosis.

In genito-urinary surgery Silver Nitrate has many uses. In solutions of various strengths, 1 in 2000 to 1 in 500, it is an old remedy for gonorrhoea, applied to the urethra during the course of the disease. Stronger solutions, up to 5 per cent., have been employed in the early stage with the view of aborting the inflammation, but this procedure causes great pain and has many opponents as well as many advocates. If it fails to cut the disease short it will probably aggravate the inflammation considerably. The milder solutions are useful applications in chronic gleet, prostaticorrhoea, urethritis, vaginitis and chronic cystitis. In the form of gelatin bougies impregnated with the salt it may be applied to the urethral mucous membrane with more facility and with better results than by injection with a syringe. A 2 per cent. solution injected into the substance of buboes in their early stage has given satisfaction. Indolent sinuses from buboes or abscesses may be stimulated to healing by the appli-

cation of lunar caustic lightly or a strong solution of the salt. It has been much used in the treatment of cervical endometritis and erosion of the os uteri.

In diseases of the skin the Nitrate is employed to destroy parasitic fungi, to cause exfoliation of the epidermis and for stimulant effect upon indolent ulcers and sores. Lunar caustic is used to destroy warts and other small growths, to arrest capillary hemorrhage, and for other similar purposes. Solutions of various strengths are useful in some forms of eczema, relieve the itching in prurigo and lichen, and are said to prevent pitting in variola. It is a very efficient application in pemphigus, if used in a 4 per cent. solution to the surface of the derma, after removing the epidermis over the blebs and cleansing their bases of all secretion. Chilblains may be painted with a strong solution to relieve the irritation, and in lupus, psoriasis, erythema and ringworm, solutions of this salt have been applied with satisfactory results. In erysipelas a concentrated solution, 20 grains to the drachm, was formerly applied on the inflamed surface and over the healthy skin beyond, to the extent of two or three inches, after washing and drying the part, with the object of checking the spreading inflammation or at least rendering it less severe; but this procedure has been superseded by other methods of treatment. For application to the skin a solution in Spirit of Nitrous Ether is recommended. This solution deposits a light-colored precipitate but itself does not turn black like the simple alcoholic solution. It blackens the skin however in a shorter time than any other solution.

In general surgery the moulded stick (lunar caustic) is much employed to cut down exuberant granulations in suppurating wounds, and to stimulate the healing of indolent ulcers, sores and sinuses. Bedsores may often be prevented by painting the red but unbroken skin with a 2 to 4 per cent. solution. Cysts and hydroceles may be cured by the injection of a strong solution into them after evacuating their contents, the result being the exciting of an adhesive inflammation which obliterates the sac.

The internal use of Silver Nitrate is almost wholly confined to the treatment of affections of the gastro-intestinal tract. Its astringent and tonic actions are sometimes very efficient in cases of weak and irritable stomach accompanied by great depression of spirits, morbid apprehensions and want of courage. It is employed in persistent vomiting, in chronic gastric catarrh, in hematemesis, and in gastric ulcer. When given for stomach affections it should be administered when the viscus is empty. Chronic gastritis has been treated with benefit by irrigating the stomach with solutions of various strengths, from 2 to 4 grains gradually increased to 20 grains in 6 drachms of water, immediately followed by a 3 to 5 per cent. solution of common salt. The Nitrate has often proved of value in chronic inflammation of the large and small intestine, especially where there was ulceration of the intestinal mucous membrane. It has done good service as an internal remedy in acute dysentery, and in chronic dysentery a solution of 20 to 30 grains to the pint of distilled water as an injec-

tion into the colon has given satisfactory results in many cases, and is considered one of the most valuable methods for the treatment of that affection. As an internal remedy it has rendered good service in cholera infantum after the acute symptoms abated, and has given marked relief to the pain in catarrh of the biliary ducts. Its employment in spinal sclerosis, glosso-labio-laryngeal paralysis and similar affections has not proved very successful, but it is said to be one of the few remedies which are of any service in locomotor ataxia. It was formerly used as a nerve tonic in epilepsy, but has been superseded by other agents which are less objectionable and more efficient. It has cured epilepsy where the bromides have failed, and it is an established fact that patients who have been subjected to a course of silver medication which has produced a deposit of the metal in the tissues possess a remarkable degree of immunity from various minor nervous ailments. It may be inferred that a remedy which is deposited in the tissues may interfere by its presence with the chemical activity of adjacent atoms, preventing their explosive union (Murray).

Several silver compounds have been introduced as substitutes for the Nitrate, with the view of obtaining greater penetrative local action, as the latter salt is decomposed by the proteids and chlorides of the tissues and possesses only limited powers as an antiseptic and astringent. These compounds are marketed under various trade-names (see pages 151 and 152), and are used with satisfaction as local applications in gonorrhœa, conjunctivitis, otitis media, laryngitis, pharyngitis, dysentery, erysipelas, empyema of the antrum, cystitis, and other inflammatory and suppurative affections. Protargol has probably been the most popular, though Neissen states that the results of 870 cases of gonorrhœa treated therewith show that the average duration of the disease is not lessened by this agent more than by other recognized methods of treatment. Collargol has been used internally, by inunction, and by intravenous injection. It is said to cause marked and rapid leucocytosis, to be completely excreted within a month, to be incapable of producing argyria, and to have inhibitory action in the blood on bacteria. It has been used with benefit in skin and venereal diseases, local suppurations, and septic disorders; also in diphtheria, scarlet fever, pneumonia, pericarditis, and typhoid fever.

The Oxide is the least irritant of the silver salts and does not discolor the skin so quickly as the nitrate, but eventually the same result follows its continued administration. It has been employed with more or less success in gastric neuralgia, irritable dyspepsia, pyrosis, gastric and pulmonary hemorrhages, dysmenorrhœa, menorrhagia and other uterine affections, also to check profuse sweating, to relieve vomiting even in severe gastritis, and to control diarrhea depending on reflex nervous irritation. As an ointment, 5 to 10 grains to the drachm of lard, it is employed for application to venereal sores and to the urethra in gonorrhœa.

A course of silver medication should be regulated by suspending the remedy after 5 or 6 weeks' use, then promoting elimination by purgatives, diuretics and baths. To prevent the general discoloration Potassium Iodide may be given conjointly with the silver, and

baths of Sodium Hyposulphite used frequently. The dark line at the margin of the gums is removable by a course of the Acid Tartrate of Potassium. Argyria has been produced in three months and after the use of 3ss-j of the nitrate.

**ARNICA, Arnica**,—is the dried flower-heads of *Arnica montana*, Leopard's Bane, a perennial of the nat. ord. Compositæ, indigenous to the mountains of Northern Europe and Siberia, and said to have been found in the mountains about the headwaters of the Missouri and Columbia rivers. It has large orange-yellow flowers and a small, curved rhizome with several rootlets. It contains two alkaloids, *Arnicine* and *Cytisine*, the latter being probably identical with the active principle of *Cytisus laburnum*, the Laburnum; also *Trimethylamine* ( $\text{CH}_3)_3\text{N}$ , an ammoniacal alkaloidal principle, which has been looked upon as the active ingredient. Arnica also contains *Inulin*, *Capronic* and *Caprylic Acids*, tannin, mucilage, resins, and two essential oils, one in the flowers, the other in the root. Dose, gr. v-xx, [av. gr. xv.]

*Preparations.*

**Tinctura Arnicæ, Tincture of Arnica**,—strength 20 per cent. Dose, ʒv-xxx, [av. ʒxxv.]

**Infusum Arnicæ, Infusion of Arnica** (Unofficial),—Arnica flowers 20, to 100 parts of water, is thought by many observers to be the best form for local use, as it does not excite dermatitis, probably from containing none of the Volatile Oil.

**Trimethylamina, Trimethylamine**,  $\text{C}_3\text{H}_9\text{N}$  (Unofficial),—is a thin, colorless, strongly alkaline liquid, boiling at 49° F., and at ordinary temperatures a colorless, inflammable gas. The Hydrochloride is the most stable salt, crystallizing in white or colorless prisms, nearly odorless, of pungent taste, very deliquescent, freely soluble in water and in alcohol. Dose, gr. ij-ijj in syrup every 2 hours.

Trimethylamine has been obtained from Arnica flowers and those of several other plants, from Ergot, Hops, Codeine, Cod-liver Oil, and decomposing albuminous substances, such as human urine, herring-pickle, and the residue left in making sugar from beets. It is sometimes incorrectly named *Propylamine*, a term also applied to an impure trimethylamine, but in reality an allied and isomeric compound.

*Incompatibles.*

Incompatible with *Arnica* preparations are: Acids (mineral), Ferrous Sulphate, Lead Acetate, Zinc Sulphate.

PHYSIOLOGICAL ACTION AND THERAPEUTICS.

Arnica is irritant, stimulant, depressant, antipyretic, diuretic and vulnerary. It irritates the gastro-intestinal tract, and in some persons the local use of alcoholic preparations of the flowers will excite erysipelatous inflammation of the skin, though those of the root have not been observed to do so. In small doses internally it increases the action of the heart, raises the arterial tension and stimulates the action of the skin and the kidneys. Large doses produce a transient excitement, followed by depression of the circulation, respiration, and nerve-centres; headache, unconsciousness, and even convulsions being induced, the body-temperature lowered, the pupils dilated, and muscular paralysis produced. A toxic dose paralyzes the nervous systems of animal and organic life, causing collapse and death. Cytisine is a powerful central emetic, and in large doses paralyzes the motor nerves. Its direct action on the circu-