from tuberculous processes in the lungs; as a primary affection it is very rare. The main avenue of infection in children is the respiratory tract. In the tables of Northrup and the writer,[8] out of two hundred autopsies on cases of tuberculosis in children, in three only were the intestines the port of entry, the remainder being all cases of primary infection of the bronchial lymph nodes. Therefore, while recognizing the possibility of intestinal infection from tuberculous milk or meat and taking every precaution to prevent entrance by that route, we shall not check the ravages of tuberculosis among children till we have solved the problem of preventing infection through the air they breathe.

Mortality.—The mortality of the early years of childhood (*i.e.*, from the second to the fifth year) is still high, but not at all comparable to that of infancy. Thus in round numbers the death records of New York City for 1899 in a population somewhat over 3,500,000 show 20,000 deaths in the first two years of life, 4,000 in the succeeding three years. In three years we have but one-fifth the number of deaths credited to the first two years of life. The contrast is even more remarkable with the later years of childhood. After the fifth year the number of deaths is calculated only for periods of five years each.

In 1899 in New York City there were but 1,815 deaths in children from five to ten years of age, while of those from ten to fifteen years but 788 died. As there is no means of calculating the numbers of children living of these several ages, we cannot calculate the ratio of deaths to the number of living. It is evident, however, from the data obtainable that the period from the tenth to the fifteenth year shows the lowest death rate of any equal period of life. Coincident with the fall in the mortality lists after the second year, there is a change in the causes of death. In infancy diarrhœal diseases are the great cause of death, while the acute infectious diseases take the first rank in childhood. Of these it is generally agreed that diphtheria and scarlet fever are the most malignant. Measles is not generally regarded as a dangerous disease, but in the same year, 1899, in New York City, there were 533 deaths from scarlet fever and 587 from measles. Upon the basis of cases of these diseases reported during the year, 7,387 for scarlet fever and 12,530 for measles, the death rate for scarlet fever is about 7.2 per cent., for measles, 4.6 per cent., yet the total loss to the community from measles is greater than that from scarlet fever. Doubtless the lack of appreciation of the malignity of measles is due to the fact that its ravages are greatest in hospitals or asylums, while in private families the disease is usually of a milder type; there is no such difference in the action of scarlet fever. Inasmuch as the deaths from diseases are not tabulated according to the ages of the victims, we have been obliged to assume that the total figures as given for all ages would have the same relations as those of childhood alone; considering the known predilection of these diseases for the years of childhood, this is probably true.

Next to the acute infectious diseases, the worst enemies of childhood are pneumonia and tuberculosis. There is nothing peculiar in the relation of pneumonia to childhood; it is the scourge of all ages. Tuberculosis in the early years, in a fatal form, is generally, as previously noted, either a diffuse process, affecting many parts, or tuberculous meningitis. As age increases a change is noticeable, and in the latter part of childhood pulmonary tuberculosis becomes the more common and deadly form of the disease.

It would be improper to leave this subject with the thought that the only importance of disease in childhood is the number of deaths caused thereby. The affections of childhood assume a new and greater importance when we consider the number of those affected who are destined, by reason of the permanent damages produced by disease, to enter the battle of life with impaired vitality and possibly a crippled body. The waste, the suffering, the torture produced in this way is beyond computation.

David Bovaird, Jr.

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CHILLIES. See *Capsicum, sp.*

CHINAPHTOL.—$(C_{10}H_6OHSO_3H)_2,C_{20}H_{24}N_2O_2$. Betanaphtol alpha-monosulphonate of quinine. This is a yellow crystalline powder of bitter taste, insoluble in cold water, somewhat soluble in hot water and alcohol, and containing about forty-two per cent. of quinine. Riegler states that in the intestines it is decomposed into quinine and naphtol-sulphonic acid, and therefore is both an intestinal antiseptic and an antipyretic. He has used it with satisfaction in typhoid fever, dysentery, intestinal tuberculosis, and acute rheumatism, in daily dosage of .5 to 5 gm. (gr. viij. to lxxv.). *W. A. Bastedo.*

CHINASEPTOL. — $(C_9H_5,OH,SO_3H,N.)$ Diaphtol, ortho-oxychinolin-meta-sulphonic acid. This occurs in yellowish crystals melting at 295° C. (563° F.), and is slightly soluble in water, the solution turning green with ferric chloride. Chemically it bears the same relation to chinolin as phenol-sulphonic acid bears to benzol. It is used as a non-poisonous antiseptic or as a substitute for salol. *W. A. Bastedo.*

CHINO, EL. — Within the municipality of Ucareo, Michoacan, Mexico, there are several springs—Laguna Verde, Nopalito Marítaro, Laguna Seca, etc. The only one that enjoys any reputation is "El Chino," to which people resort when suffering from rheumatism, sciatica, and other disorders. Bathers are compelled to erect their own tents if they wish protection from the weather and the curious. *N. J. Ponce de Léon.*

CHINOIDINE. See *Cinchona.*

CHINOLINE.—Chinoline, or *quinoline*, as it is also called, is a non-oxygenated basic body represented by the formula C_9H_7N, and obtained by the distillation of certain natural alkaloids—notably quinine and cinchonine—with potassium hydroxide, and also, synthetically, by a patented process (Skraup's), from a mixture of aniline, nitrobenzol, glycerin, and sulphuric acid. An isomeric body—*leucoline*—obtained from coal tar responds to chemical tests differently from chinoline, and is to be regarded as a distinct compound.

Chinoline is a colorless limpid fluid, of alkaline reaction, forming, with acids, crystallizable salts. Of such salts, those of the so-called mineral acids are mostly too deliquescent for convenient medicinal use, but chinoline *tartrate* is free from this objection and is available as a medicine. Chinoline tartrate is in minute, white, silky crystals, which, in a specimen made by Merck, of Darmstadt, the writer found to be of a faint combined bitter-almond and coal-gas odor, of a peculiar, sharp, yet cooling taste, having a flavor as of kerosene with a *soupçon* of peppermint, and to be slowly soluble in about twenty-five parts of cold water.

The effects of chinoline tartrate are analogous to those of salts of quinine. In solutions ranging from 0.2 to 0.4 per cent. it has been said to inhibit fermentative and putrefactive processes (Donath), and in doses such as would be given of quinine, to prove antipyretic and antiperiodic after the manner of that alkaloid (Donath, Loewy, and others). As against quinine, chinoline tartrate has the advantage of comparatively low price; but the disadvantage of a decided tendency to sicken, vomiting being quite a common consequence of a medicinal dose. Furthermore, later experience has failed to confirm the claim of antiperiodic powers at first asserted. The drug is best given in a sweetened aromatic water, and a teaspoonful of lemon juice or a lump of ice after the dose is said to lessen the tendency to nauseate.

Neither chinoline nor any of its salts is official in the United States Pharmacopœia. *Edward Curtis.*

CHINOSOL.—$(C_9H_6NO,SO_3K + Aq.)$ Oxy-chinoline sulphonate of potassium. This is a yellow crystalline powder of feebly aromatic odor, freely soluble in water and insoluble in alcohol and ether. Its dilute aqueous solution turns green with ferric chloride, and forms a green coating on steel instruments. It is stated to be a more powerful antiseptic than bichloride of mercury, with great penetrating power, and is highly spoken of by European clinicians; a 1-to-500 solution killed the plague bacillus in ten minutes. It has been used with advantage by Gilles in vaginitis in strength of 1 to 8,000 to 1 to 1,000, also in leprosy and bone tuberculosis. Mixed with five to ten per cent. of boric acid it may be used as an antiseptic powder in place of iodoform. Hobday found it a powerful disinfectant for the hands, the site of operation, and sutures, a solution of 1 to 60 producing no irritation. For cellulitis or other severe infection it should be used in strength of 1 to 500, but for ordinary use 1 to 1,000 is better. Cipriani recommends it by mouth and hypodermically for tuberculosis. It has also been used as an antipyretic. Hobday's experiments on cats indicate the limit of safe dosage to be .0037 gm. (gr. $\frac{1}{16}$) per 500 gm. (1 lb.) of body weight. Cadavers are said to be effectively preserved by intra-arterial injection of five-per-cent. solution.

Pulvis chinosol comp. consists of chinosol, chinaseptol, talc, and silica. *W. A. Bastedo.*

CHIRATA.—*Chiretta.* "The entire plant, *Swertia Chirayita* (Roxb.) Hamilton (fam. *Gentianaceæ*)" (U. S. P.) (It is spelled "Chirata" by Hamilton.) The following is the official description of this herb:

"Root nearly simple, about 7 cm. long; stem branched, nearly 1 metre long, slightly quadrangular above; containing a narrow wood circle and a large yellowish pith. Leaves opposite, sessile, ovate, entire, five-nerved. Flowers numerous, small, with a four-lobed calyx and corolla. The whole plant smooth, pale brown, inodorous, and intensely bitter."

Special attention should be given to this large pith, as there is a spurious article which is destitute of it, being quite hollow.

Chirata is a native of Northern India, especially in mountainous districts in Nepal, where it is found at an elevation of from five to nine thousand feet (Bentley and Trimen). Its use was introduced from India, where it has been long employed, into European medicine about fifty years ago.

The plant is gathered when fully grown; the flowering stems being pulled up entire, dried, and tied into long bundles.

In composition, Chirata is almost the exact equivalent of gentian, as it is also in properties and uses. Bitter *ophelic acid* ($C_{13}H_{20}O_{10}$), soluble in both alcohol and water, replaces the gentisic acid of the latter, *chiratin* ($C_{26}H_{18}O_{15}$), a yellow, bitter, crystalline glucoside, soluble in warm water and alcohol, replaces gentiopicrin, and as with gentian, there is no tannin, though ferric salts produce a dark color, without inky precipitate.

Chirata is a simple bitter and tonic. We have official a fluid extract, dose 1 to 4 c.c. (fl. ʒ ¼ to i.) and a ten-per-cent. tincture, made with sixty-five-per-cent alcohol, dose 1 to 8 c.c. (fl. ʒ ¼ to ij.). The latter is much the better preparation, especially in small doses.

Henry H. Rusby.

CHIROL is a solution of various oils and resins in ether and alcohol, forming an antiseptic varnish for the surgeon's hands. It is applied by immersing the hands, opening and shutting them a few times and spreading the fingers, then exposing them to the air for two or three minutes to dry. The pellicle formed is said to wash off easily, not to peel or crack, and not to be sticky. It covers the hands with a flexible, impermeable coating like a rubber glove. It has also been used for preliminary sterilization of the surface to be operated upon.

W. A. Bastedo.

CHITTENANGO SULPHUR SPRINGS. — Madison County, N. Y.

Post-Office.—Chittenango.

Access.—This pleasant summer resort is located about 3 miles south of the Chittenango station, on the New York Central and on the New York, West Shore, and Buffalo railroads, between the beautiful villages of Chittenango and Cazenovia. The Springs are reached from Chittenango by an electric railroad, by carriage, and by a stage line.

The country surrounding the Springs is hilly and covered by a growth of hemlock, pine, beech, and maple. Through the valley between the hills flows the outlet of Cazenovia Lake to Oneida Lake, affording a stream twenty to seventy feet in width and well stocked with California, German, and brook trout. The hotel is large and commodious, with extensive verandas, spacious parlors, and high and well-ventilated rooms, capable of accommodating three hundred guests. The hillside grounds, in the rear of the hotel, including several acres, are covered with wild woods, intersected with walks, affording a cool and delightful strolling place in hot summer days. The Springs are three in number, known as the "White Sulphur," the "Magnesium Sulphur," and the "Lithium Sulphur" Springs. The following analyses were made by Professor Chandler, of New York:

One United States Gallon Contains:

Solids.	White Sulphur Spring. Grains.	Lithium Sulphur or Cave Spring. Grains.	Magnesia Sulphur Spring. Grains.
Magnesium carbonate	22.02	23.97	
Iron carbonate	.....	.....	20.78
Iron bicarbonate	.08	.16	.32
Sodium hyposulphite	.....	.26	.02
Sodium sulphate	.21		
Calcium sulphate	81.42	106.12	115.09
Strontium sulphate	Trace.	Trace.	Trace.
Magnesium sulphate	1.95	7.59	12.72
Sodium chloride	1.04	1.57	1.83
Potassium chloride	.16	.23	.33
Lithium chloride	Trace.	Trace.	Trace.
Sodium sulphide	.12	.39	.75
Calcium sulphide	.....	1.12	.33
Alumina	.08	.22	Trace.
Silica	.28	.52	.58
Total	107.36	142.15	153.35
Gases.	**Cubic ins.**	**Cubic ins.**	**Cubic ins.**
Sulphureted hydrogen	0.88	2.75	5.62
Carbonic acid	20.48	15.93	19.43

Temperature of water, 45° F.

The water of the White Sulphur Spring also contains a trace of free sulphur, which accounts for its pearly-white hue. This water is recommended for rheumatism, neuralgia, gout, and skin diseases. The magnesia water is transparent, but deposits a sediment said to consist of magnesia, yellow sulphur, and a chloride of potassium. This water possesses marked tonic properties, and is much used in general debility, nervous affections, and insomnia. The water of the Lithium Spring is also perfectly clear and very pleasant to the taste. It has enjoyed much reputation in the treatment of kidney affections. There is a large bath-house in connection with the Springs, in which hot mineral water, vapor, and electric baths are furnished. *James K. Crook.*

CHLOASMA.—(Synonyms: Liver Spot, Moth Patch, Mask; Fr., *Chloasme*; Ger., *Pigmentflecken.*)

Definition.—An abnormal pigmentation of the skin

occurring usually in patches of yellow, brown, or black color, of various shapes and sizes.

It is used as a generic term and includes all discolorations of the skin, either circumscribed or diffuse, which are not accompanied by any other apparent objective changes. The color is of a yellow, brown, or black, changing in some conditions to a bronze or black (melanoderma). The discolorations may be unilateral, irregular, or symmetrical in their distribution, consisting of patches or of more or less diffuse pigmentations, stopping abruptly at the border, or they may shade off into the normal color of the part.

From the generic use of the term, chloasma is usually divided into the idiopathic or the symptomatic varieties.

Idiopathic chloasma is due to external causes or irritants: (1) Mechanical; (2) chemical; (3) thermal; (4) parasitic.

1. *Mechanical.*—As a result of abrasions and of trauma, and also in consequence of scratching, in pruritus senilis, prurigo, and other pruriginous diseases, deep pigmentation occurs in certain individuals, especially the run-down and elderly.

2. *Chemical.*—In this class may be placed those cases in which pigmentation follows sinapisms, vesicants, and counter-irritants. It is a question whether this is due directly to chemical effect or merely to the irritation. Tattooing may be placed here.

3. *Thermal.*—Bronzing following the erythematous stage of sunburn is not a true chloasma; it is simply a pigmentation of the exposed parts—deep brown in the case of blondes—produced by the sun's rays, and occurring generally in rather large and well-defined areas. Older people of a certain type have a tendency toward patchy pigmentation of the neck, arms, hands, and face, which is undoubtedly excited and increased by the sun's rays. Stokers and those exposed to hot fires often have peculiar darkened areas upon the exposed parts. Cold has been known to produce like conditions.

4. *Parasitic.*—De Amicis has lately described a peculiar café-au-lait pigmentation upon the chin and lip, due to the demodex folliculorum. Majocchi has likewise seen two cases. Pityriasis nigricans (Willan) is the deep pigmentation seen in vagrants and tramps, produced by scratching and generally due to pediculi corporis.

The various fungi which flourish upon the skin and cause yellowish or brownish spots, such as tinea versicolor, erythrasma, mal del pinto, are described under their respective titles.

Symptomatic chloasma may be a sequel of, or accompany, certain physiological or pathological conditions of the system.

After certain inflammatory skin diseases—*e.g.*, dermatitis herpetiformis, psoriasis, lichen planus, eczema, syphilitic eruptions, etc.—the sites occupied by the former eruption often display a yellow or brown pigmentation, a part of which is of hæmatogenous origin, while another part comes from the cells of the locality.

In cases of varicose veins the legs often have a deep patchy brown color, beginning about the follicles.

Chloasma uterinum is either a physiological or a pathological condition. Pregnant women usually have a deepening of the color, in pigmented portions of the body, of a greater or less degree. They also sometimes are affected with an abnormal deposit of pigment, which occurs in patches of a dirty yellow to brown color over the face, especially on the forehead, cheeks, and chin. Often it becomes diffuse in the shape of a sharply defined mask, the so-called *masque des femmes enceintes*.

In uterine and ovarian diseases a similar condition may be seen, the pigmentation occurring either in spots or in the form of a diffuse mask. In the latter case the neck is especially involved, though in this location the rough and tightly fitting ruffle or neck ornament may be a contributing factor.

In all cases of pigmentation of the face and neck the uterus and ovaries should be examined.

Various blood diseases of unknown origin (hæmatochromatoses of von Recklinghausen) are sometimes accompanied by abnormal pigmentation of the skin.

In exophthalmic goitre, abnormal pigmentation, in the form of patchy or diffuse freckles, is quite common, especially along the course of the musculo-cutaneous nerves on the hands and arms, and over those parts of the face which are supplied by the fifth nerve (Blake).

In abdominal tumors, tuberculosis, cancer, and lymphoma, pigment is common on the face and hands.

Diseases of the liver give rise more often to jaundice, but they are also accompanied by a patchy or diffuse pigmentation of the skin, often simulating, in this respect, Addison's disease, as is seen in diabetic cirrhosis.

It was formerly the fashion to ascribe, in a general way, all "moth spots" or patchy pigmentations to liver disorders (so-called "liver spots"). This idea was erroneous, for the pigment due to liver diseases is deposited more or less generally, and not in sharply circumscribed spots or patches, as is the case in the so-called "liver spots." These remarks may be also applied to malarial pigmentations, which are produced by chronic malarial poisoning.

Diseases of certain glands—*e.g.*, the suprarenal (Addison's disease) and the thyroid (Graves' disease) glands—are accompanied by dyschromias.

Pigmentations of varying degree and extent have been observed in cases of melanotic cancer and also in those of other forms of malignant growths.

Cachectic conditions often produce a universal deepening of pigment, from a sallow yellow to a yellowish-brown color. This is particularly true of tuberculosis, chronic rheumatism, syphilis, and leprosy; in the last-named disease the pigmentation is quite marked about the face and extremities in the late stages.

It is a fact which is often overlooked, that gastro-intestinal disorders play a rôle in certain cases of chloasma. Chronic constipation and intestinal and gastric fermentation of a chronic character, in which certain poisonous bodies are absorbed, produce besides other symptoms a patchy pigmentation of the face and hands, which is almost always symmetrically distributed.

Syphilitic pigmentation of the neck, usually seen in women, is accompanied by other local symptoms and does not belong here.

In respect to drugs, the most important discoloration is produced by nitrate of silver, for which see *Argyria*.

Arsenic also produces a brown or bronze pigmentation of the face, neck, and abdomen after prolonged administration of the drug, but, as I have endeavored to show, this is not an essential primary pigmentation, for it is always preceded by a sensible degree of inflammation of the skin

Little is known of the histopathology of chloasma. The pigment, in the more superficial forms, is deposited in the epidermis, either as something which was not there before, or else as an addition to a previously existing deposit; but in many varieties the cutis also contains a great amount of yellow granules, either in connective-tissue cells, which may form pigment themselves, or in the lymph spaces.

Van der Vegt found that in sections the epidermic pigment was soluble in a weak solution of caustic potash in peroxide of hydrogen, while that of the cutis was not soluble in this solution, though perfectly so in strong hydrochloric acid.

The *treatment* of chloasma consists simply in properly treating the cause or the disease upon which it is dependent. Consequently the reader is referred to the different articles which treat of the various conditions above mentioned. But no matter what the cause may be, the pigment is always slow to disappear; however, local treatment may in some cases assist in its removal. The results from local treatment depend, of course, upon the depth or location of the pigment. The remedies commonly used for this purpose cause desquamation of the epidermis, thus attempting by the desquamation to remove the pigmented cells. Some of these remedies are also supposed to have a bleaching effect, which at least is doubtful.

If after a thorough trial of the usual remedies no

marked improvement is perceptible, treatment should be discontinued, as this probably shows that there is a deposit in the cutis, and such a deposit is often increased by continued irritation. Even in cases in which the spots are removed, there is often a reappearance with increased pigmentation.

The smaller areas can be very effectually removed by electrolysis, by inserting the needle just to the cutis margin, or by quick successive superficial stabs of the instrument.

Peroxide of hydrogen is recommended. It should be applied on cotton and allowed to remain on the spot several minutes. This procedure may be repeated several times a day.

The various scaling agents used are: salicylic acid in a saturated alcohol solution or in a paste; resorcin in from ten to twenty per cent. solution in alcohol or in a paste; corrosive sublimate, one per cent. in almond emulsion; and nightly frictions of green soap. The following prescription is to be recommended:

℞ Hydrargyri ammoniati..... ℈ij.
Bismuthi subnitratis..... ℈ij.
Vaselini ..... ℥ i.
Olei rosæ ..... q.s.
M. Sig.: Apply gently to the discolorations at night, and wash off in the morning with green soap.

This ointment in the course of time will materially lighten the patches, and is greatly to be preferred to the strong lotions of corrosive sublimate, which often produce disastrous results. *W. A. Hardaway.*

CHLORAL.—By the title *Chloral*, Chloral, the United States Pharmacopœia recognizes not what is, chemically speaking, *chloral* proper, but an entirely distinct body, *chloral hydrate*. Chloral proper, C_2HCl_3O, is, chemically, acetic aldehyde (common aldehyde) with three atoms of hydrogen in the molecule replaced by chlorine. It is a thin, oily, colorless, heavy fluid. On mixing chloral with water the two bodies unite, forming a crystalline hydrate of chloral, C_2HCl_3O,H_2O, which is the substance used in medicine under the misnomer *chloral*. Chloral hydrate, or "chloral," appears in "separate, rhomboidal, colorless, and transparent crystals, having an aromatic, penetrating, and slightly acrid odor, and a bitterish, caustic taste; slowly volatilized when exposed to the air. Freely soluble in water, alcohol, or ether; also in chloroform, benzol, benzin, carbon disulphide, fixed and volatile oils. It liquefies when triturated with about an equal quantity of camphor, menthol, thymol, or carbolic acid. When heated to about 58° C. (136.4° F.) it melts, forming a liquid having a specific gravity of about 1.575, which at a higher temperature should not evolve inflammable vapors. Liquefied chloral solidifies to a crystalline mass between 35° and 50° C. (95° and 122° F.). Chloral is decomposd by caustic alkalies, alkaline earths, and ammonia, chloroform being formed, and a formate of the base produced. A freshly prepared aqueous solution of chloral is neutral, but gradually acquires an acid reaction" (U. S. P.). Chloral hydrate should be kept in glass-stoppered bottles in a cool and dark place.

Chloral hydrate was proposed as a medicine by Liebreich, in 1869, on the theoretical assumption that when absorbed into the circulation it would, by virtue of the warmth and alkalinity of the blood, undergo decomposition and conversion into chloroform. But, though chloral hydrate has proved itself a valuable medicine, it is now certainly known not to undergo the assumed decomposition in the circulation, so that its effects are those of itself as such, and not of chloroform.

The effects of chloral hydrate upon the animal economy, while much resembling those of chloroform, yet differ therefrom in many marked respects. Chloral hydrate, like chloroform, is locally a sharp irritant, and constitutionally a powerful neurotic, capable of producing arrest of the more important of the nervous functions, and so death. The most important difference between the action of chloral and that of chloroform is that the former drug has, relatively, a greater tendency to determine sleep, depression of respiration, and fall of temperature, and a distinctly less pronounced power to dull sensation, than has chloroform. In ordinary medicinal dosage (a single dose of from 2 to 3 gm., equivalent to from gr. xxx. to xlv.) the only marked effect of chloral hydrate is a gentle, calm, agreeable, dreamless sleep, which, if induced at bedtime, will, unless there be special reasons to the contrary, probably last till morning, and from which the waking will be natural, unattended by the disagreeable by-effects of an opiate. During the chloral sleep, forced awakening is as easy as during a natural heavy sleep, and the subject, when roused, is perfectly rational. Pulse and respiration are a little slowed, but otherwise the functions are not obviously affected. In increased dosage natural sleep deepens into coma; respiration, blood pressure, and pulse rate are markedly depressed, or the heart's action may be rapid while weak; temperature distinctly falls; sensation, after an initial temporary hyperæsthesia, becomes moderately blunted; motor paralysis, voluntary and reflex, comes on, and, if the dose has been sufficiently large, death ensues by failure of respiration; or, if the action has been sudden and overwhelming, death is by syncope, as in shock. The principal post-mortem revelation in fatal chloral poisoning is congestion of the lungs and of the cerebro-spinal axis. These various phenomena are undoubtedly produced by a direct action of the poison upon the nerve centres presiding over the functions deranged. Of the effects, those of greatest clinical importance are the hypnotism and the paresis of the respiratory centre and of the motor tract of the spinal cord generally.

When chloral hydrate is taken habitually, certain peculiar effects may follow. Perhaps the most common is some form of skin eruption, which is generally erythematous, though sometimes papular. In certain subjects, urticaria or purpura may result; in other cases, conjunctival or faucial irritation; in still others, dyspnœa; and in unique cases, pains in all the limbs and partial paraplegia have clearly been traced to chloral poisoning (Anstie). Quite a common effect, seen even in cases of single dosage, is one where chloral and alcohol have been taken together, namely, deep flushing of the face and throbbing of the vessels, exactly as produced by amyl nitrite. Prolonged habitual use of the drug probably tends to debase the mind and morals of the subject in the same manner as indulgence in alcohol, ether, or chloroform; and sudden discontinuance, after a fixed habit of excess, may naturally lead to the same consequences as the sudden breaking of a pronounced alcohol habit.

In the matter of toxicology, cases of fatal or of even dangerous poisoning have generally resulted from inadvertent medicinal overdosage. The smallest authenticated fatal dose is twenty grains (1.30 gm.), and the fact that such dose—one less than the usual medicinal dose—has killed only emphasizes the fact, now pretty generally recognized by the profession, that individuals show very different degrees of susceptibility to the action of chloral hydrate. The condition of dangerous poisoning is one of narcosis, distinguishable from the narcosis of opium, with which it is most likely to be confounded, by the conditions of the pupils. The pupils, in chloral poisoning, are either dilated, or if contracted are but moderately so, and dilate upon the subject's awakening. Very often, also, in chloral narcosis, the face is deeply flushed and somewhat bloated, the lips and eyelids swollen, and the eyes blood-shot. The treatment of poisoning by chloral hydrate is to evacuate the stomach, best by the stomach pump, and to sustain the flagging lungs and heart by artificial respiration. Medicinal respiratory and cardiac stimulants, though theoretically indicated, are practically of little use, because of the already hopelessly paralyzed condition of the tissue upon which they are to act.

Therapeutically, chloral hydrate is available to procure sleep, to oppose spasm, and to blunt pain. As a hypnotic it takes front rank among medicines, because

of the combined certainty and yet pleasantness of its action. Yet the indiscriminate use of the drug in all conditions of wakefulness may easily work great harm. Thus, remembering the strong specific action of chloral hydrate to depress respiratory activity, it is plain that in the restlessness and wakefulness that result from dyspnœa, in such conditions as congestion of the lungs, emphysema, or bronchitis with obstructed circulation, the drug is the most improper thing that could be prescribed. Similarly, from its associated cardiac depression, all conditions caused or attended by feeble or embarrassed circulation contraindicate chloral. As an antispasmodic, chloral hydrate is peculiarly appropriate where the cause of the spasms is morbidly excited reflex irritability of the nerve centres. In tetanus it has thus worked many cures. As an anodyne this remedy is inferior to many others, as might be inferred from the fact, already mentioned, that anæsthesia is not a very pronounced element of its physiological operation.

A special use of chloral hydrate, not medicinal, yet utilized by the physician, is as a preservative. Like the related substances, the volatile alcohols and ethers, chloral hydrate is markedly antiseptic, and possesses the peculiar feature that, while preserving putrefiable tissues from decay, it yet does not obviously change the physical appearance of even the most delicate structures. The agent is, therefore, peculiarly useful as a preservative for urines set aside for microscopical examination. As much of the drug in crystals as will lie on the thumb-nail added to about 100 c.c. (about fl. ʒ iij.) of urine will preserve the same perfectly for days or even weeks, and that, too, without affecting the ready recognizability of casts, blood or pus corpuscles, epithelial scales, or spermatozoa. The addition does not affect the heat and nitric acid test for albumin, but it vitiates the test for sugar by Fehling's solution, since a solution of chloral hydrate of sufficient concentration will itself reduce the copper of that test fluid. The antiseptic action of chloral hydrate is available for use in surgery, and lotions of from one to three per cent. strength have been proposed for wounds. Such weak percentages are necessary, else the application will smart and perchance develop constitutional poisoning by absorption.

Lastly, chloral hydrate has been suggested as an anæsthetic for surgical use, by the procedure of injecting an aqueous solution directly into a vein. The quantity of one hundred grains has been so injected, with the effect of producing in eight minutes a complete anæsthesia that lasted an hour, and was followed by a deep sleep, with blunted sensibility, for fourteen hours. In other cases death has been reported as a consequence, as might naturally have been anticipated, and the procedure is little likely to find favor with conscientious surgeons.

For medicinal giving for its legitimate purposes, the dose of chloral hydrate for an adult should not at first exceed 1.30 gm. (gr. xx.). Often twice and three times that quantity is perfectly well borne, but, until the individual susceptibility of a given subject is tested, it is best to prescribe the smaller doses. The remedy is given in solution, with the sharp twang of the taste disguised by some syrupy and aromatic addition.

Edward Curtis.

CHLORAL ACETO-PHENON-OXIME.—$C_6H_5CH_3,C,NO,CH,OHCCl_3$. This is obtained by the interaction of chloral and acetophenonoxime at low temperatures. It occurs in colorless, prismatic crystals, insoluble in water, soluble in alcohol and ether, and decomposed by acids. It is hypnotic, and has been used in epilepsy and tetanus, but its effective dose has not yet been determined.

W. A. Bastedo.

CHLORAL ALCOHOLATE.—This body, C_2HCl_3O, C_2H_6O, forms during the process of manufacture of chloral from alcohol. It is in white crystals, distinguished from those of chloral hydrate by their insolubility in cold water, although they melt on admixture with hot water. This body is not used as a medicine, and needs mention only because it may possibly be mistaken in the market for chloral hydrate.

Edward Curtis.

CHLORAL-AMMONIUM is obtained by passing dry ammonia gas through a solution of chloral in chloroform. It forms colorless needles melting at 84° C. (183.2° F.) and is almost insoluble in water. Boiled with water it forms chloroform and ammonium formate. It is given as an analgesic and hypnotic in dose of 1–2 gm. (gr. xv.–xxx.).

W. A. Bastedo.

CHLORAL CAMPHOR.—This name has been applied to the clear fluid that results from trituration of equal parts of chloral hydrate and camphor. The fluid is soluble in alcohol, ether, glycerin, and fixed oils, but on mixture with water suffers precipitation of the camphor. It possesses the medicinal properties of its ingredients, and in a teaspoonful dose in one case produced severe, irritant, and narcotic poisoning. The compound is not official, but has been used medicinally as a nervous sedative in doses of from gtt. x. to xx.

Edward Curtis.

CHLORAL CYANHYDRATE.—CCl_3COH,HCN, chloral hydrocyanin, chloral cyanhydrin. It occurs in small crystals or a crystalline powder having a mixed odor of hydrocyanic acid and chloral and readily soluble in water, alcohol, and ether. Its aqueous solution is only fairly stable, and it is decomposed by alkalies or boiling water. Hermes states that it has the action of hydrocyanic acid with about one-seventh its strength. A solution of 14.4 parts in sufficient water to make 100 parts corresponds with the Acidum Hydrocyanicum Dilutum of the United States Pharmacopœia. Six parts in 1,000 make a solution equivalent to the German Pharmacopœia bitter almond water.

W. A. Bastedo.

CHLORALOSE.—$C_6H_{11}Cl_3O_6$, anhydro-gluco-chloral. By heating chloral and glucose together for an hour at about 96° C., chloralose and parachloralose are formed. The latter is not used in medicine. Chloralose occurs in fine, colorless needles or small crystals of bitter, unpleasant taste, soluble in 170 parts of cold water and readily soluble in hot water or alcohol. The crystals melt at 184°–186° C. (363.2°–366.8° F.). Following experiments on dogs, it was introduced in 1893 by Hanriot and Richet as a certain hypnotic devoid of depressing effects on respiration and circulation. In 1897 following experiments on man, Richet again recommended it highly, yet subsequent investigations have shown it to be extremely variable in its effects, and even unsafe in so small a dose as eight or ten grains. It is said to cause nausea, vomiting, slow weak heart, involuntary urination during sleep, and various nervous symptoms, such as delirium, tremors, and paralysis. The dose is 0.2–0.5 gm. (gr. iij.–viij.).

By treating arabinose and xylose in the same manner as glucose, the above investigators have obtained analogous compounds named respectively arabinochloralose and xylochloralose. The former is stated to produce quiet sleep without nervous symptoms and to be much less toxic than chloralose. Xylochloralose, however, was found to be more toxic and less hypnotic.

W. A. Bastedo.

CHLORALOXIMES are compounds of chloral with various oximes and are nearly insoluble in water, decomposed by hot water, and soluble in alcohol. The principal ones are chloralacetoxime, chloralcamphoroxime, chloral acetaldoxime, chloral nitroso-betanaphtoloxime, chloral benzaldoxime, and chloral acetophenonoxime. They all act as hypnotics (see *Chloral aceto-phenon-oxime*).

W. A. Bastedo.

END OF VOLUME II.