of other specific organisms, affecting the human body or that of animals, it would seem reasonable to hope and expect that further research may furnish an efficient remedy in the form of an antitoxin in anthrax, such as has been obtained in respect to some other of the bacterial infections, particularly human diphtheria.*

The discovery of such an antitoxin has not, however, been announced; and the treatment of anthrax must still be considered as largely empirical or entirely symptomatic. This will vary according to the seat of the primary lesion, the severity and rapidity of the development of the disease, the possibility of employing efficient remedies locally, and many other circumstances which will arise in each individual case.

The treatment of the conditions following the immediate effects of anthrax, such as inflammatory and suppurative affections of the lungs or of other organs, should be directed by the considerations and principles applicable to the treatment of similar conditions arising from other causes.

The only practicable prophylactic measures which are adapted for general use among those subject to domestic visitations of anthrax, are to prohibit the use of any product or part of diseased animals; to protect the bodies of infected animals from flies and other insects, and to bury them as early as possible deeply in the earth, or preferably to burn them. Care should also be taken that none of the fluids or secretions of diseased or dead animals be allowed to soil the stables or yards where they have been confined, nor to cling to implements, such as shovels, etc. The feces, being loaded with bacilli, should be carefully collected and buried. All stalls and stables visited or occupied by diseased animals should be carefully disinfected and whitewashed. Other suitable precautions which may be applicable to individual cases should be rigorously carried out, as the best safeguard against the spread of the disease among human beings is to control it among the lower animals. The precautions to be observed in relation to infected articles of commerce—hides, hairs, wool, rags, etc.—have been mentioned in an earlier part of this article.

Albert N. Blodgett.

The literature upon the subject of anthrax is very large, but among the most valuable contributions may be mentioned:

Heusinger: Die Milzbrandkrankheiten der Thiere u. des Menschen, Erlangen, 1850.
Bollinger: Art. Milzbrand in v. Ziemssen's Handbuch.
Waldeyer: Virchow's Arch., Bd. lii., S. 541.
Zuelzer: Berl. klin. Wochenschrift, 1874, No. 25; also in Eulenburg's Realencyclopädie, vol. ii., p. 679.
Quain: Dictionary of Medicine, p. 1302.
Forbes: International Encyclopedia of Surgery, vol. i., p. 228.
Holmes' System of Surgery, vol. v., p. 467.
John Henry Bell, in Allbutt's System of Medicine (contains a valuable list of references). Traité de Médecine. Charcot, Buchard, Brissaud, vol. i., p. 523.
Fagge: Principles of Practice of Medicine, vol. i., p. 367.
Twentieth Century Practice of Medicine, vol. xv., art. Anthrax.

ANTHROPOMETRY. See *Recruiting Service* and *Skull.*

ANTIARTHRIN is a condensation product of tannic acid and saligenin, one of the decomposition products of salicin. It has been found by Schaeffer to be of value in acute and chronic gout and acute rheumatism, it possessing the advantages of not deranging the stomach and not depressing the heart. The compound is very unstable, and, to prevent decomposition, it must be kept dry and free from admixture with other drugs. Dose: fifteen grains, from three to six times a day. *W. A. Bastedo.*

ANTIDIABETINUM.—Glycosolveol. A name applied to a series of three mixtures of mannite and saccharin, each mixture having a definite sweetness in proportion to that of cane sugar. Antidiabetinum No. 1 has the same sweetening power, No. 2 is ten times as sweet, and No. 3 is seventy times as sweet as sugar. They are used as substitutes for sugar in diabetes. *W. A. Bastedo.*

ANTIDOTES.—(Deriv., ἀντι and δίδωμι.) Antidotes are remedies which, acting mechanically, chemically, or physiologically, are capable of combating and neutralizing the effects of poisons on the system. They may be divided into three classes, according to their mode of action: (1) mechanical, (2) chemical, and (3) physiological or dynamic.

1. Mechanical Antidotes.—The functions of this class are the removal of poisons as such from the system and the mechanical prevention of absorption. In this class are included emetics, stomach tube, cathartics, injections, washes, poultices, ligature, tourniquet, etc.

The use of *emetics* is frequently rendered superfluous by the vomiting induced by the poison itself or by the diluent drinks already administered. Where there exists any considerable corrosion of the œsophagus or stomach, or severe abdominal inflammation, their use is contraindicated. When employed they should be administered without delay, and vomiting should be carried on to such completeness as circumstances will allow. The nature of the poison in each particular case must to a certain extent govern the choice of the emetic to be prescribed. Thus, common salt is contraindicated in poisoning by tartar emetic or by corrosive sublimate, and oily substances in poisoning by phosphorus, cantharides, and salts of copper. The emetics include sulphate of copper, sulphate of zinc, tartar emetic, ipecac, emetin, apomorphine, soapsuds, olive oil, melted fats, snuff, etc. In most cases, vomiting may be induced, encouraged, and supported by tickling the fauces with the finger.

Sulphate of copper may be administered in doses of 0.12 to 0.30 gm. in water. Sulphate of zinc is a very efficient emetic in doses of 1.0 to 2.0 gm. in 250 gm. of water. Tartar emetic is slow in action, and it exercises so depressing an effect on the system as to render its use inadvisable when emesis can be otherwise produced. If administered it should be given in 0.1 gm. doses, once or twice repeated if necessary. Ipecac is best given in the form of powder, the action of the wine and of the fluid extract being too uncertain. The powdered root may be given in 1 to 2 gm. doses in warm water, or it it may be combined with tartar emetic in the proportion of 1 to 0.05 gm. The alkaloid emetine is an efficient emetic in doses of 0.005 to 0.020 gm. Apomorphine is in many cases the only emetic possible to introduce, especially when there is resistance or trismus. It is not only a very powerful emetic, but it acts with great rapidity. It is administered by subcutaneous injection in doses of 0.004 to 0.010 gm. The common household remedies, salt, mustard, soapsuds, etc., are frequently of great assistance, and they possess the advantage of availability. Common salt is effective when given in the proportion of two tablespoonfuls to a pint of water; mustard in doses of two teaspoonfuls in a cup of warm water; snuff, one teaspoonful in warm water or claret. Olive oil, soapsuds, etc., require no especial mention.

It frequently happens, especially in poisoning by narcotics, that even the most powerful emetics are inoperative. In such cases the *stomach pump* is a very valuable aid. This instrument has certain advantages over the emetics; the object is attained more quickly, the patient is spared the weakening effects of the emetics, and fluids may be introduced not only for washing out the stomach but for their chemical action on any residuum adherent to the stomach wall. Should the instrument be not readily obtainable, one may use a common rubber tube to one end of which a funnel is attached. To use this very excellent substitute is a matter of no great difficulty; introduce the free end into the stomach, elevate the other end, and pour water or other fluid through the funnel until the stomach and tube are full; then lower the funnel end to make a siphon, and allow the contents of the stomach to escape into a proper vessel. The employment of the stomach pump is not permissible when the œsophagus and stomach are corroded, on account of the danger of perforation. The instrument is also of no value when the poisonous substance is in the solid form and in large pieces (meat, sausage, cheese, etc.).

Cathartics are frequently necessary when the poison has passed from the stomach into the intestine. Those in most common use are castor oil, croton oil, Epsom salts, senna, etc. Castor oil not only acts as a cathartic, but protects the mucous membranes and obstructs absorption. Its use is contraindicated in phosphorus and cantharides poisoning, since the absorption of these substances is materially assisted by fats and oils. Croton oil is valuable by reason of its rapid and powerful action. It is best given in pill form (bread crumb) in doses of one to four drops. Sulphate of magnesium in doses of 4 to 16 gm. (℥i.–iv.) is recommended in chronic lead poisoning, and in connection with certain of the chemical antidotes as an aid in the removal of the resulting compounds from the alimentary canal. Gamboge, croton oil, and other drastics are to be preferred to the cathartics of milder action in narcotic poisoning.

The other physical antidotes above mentioned are employed according to the circumstances of particular cases. Their use is limited almost wholly to poisoned wounds and bites.

2. Chemical Antidotes.—These constitute the class of true antidotes; they act on the poisons themselves rather than against their effects, differing in this respect from the dynamic or antagonistic antidotes. Their action depends upon their property of uniting chemically with poisonous substances, thus altering their chemical and physical character, converting soluble absorbable substances into insoluble or difficultly soluble non-absorbable compounds, or, as the case may be, into compounds which are soluble and absorbable, but harmless. Their use is restricted to those cases in which the nature of the poison is known. Good chemical antidotes should be themselves harmless, even in large excess, easily obtainable, and capable of rapid action. Their employment should not be unnecessarily delayed nor too long continued. They are usually administered in large doses, since it is as a rule impossible to determine the necessary amount with any exactness, but in certain cases the amount given must be carefully regulated, on account of the solubility of the resulting compound in an excess of the antidote; instances illustrative of this point are copper salts with albumin, and the alkaloids and their salts with tannin. In all cases the new-formed compounds, especially when only temporarily insoluble, or insoluble only in the stomach, must be removed by appropriate means with all possible despatch.

The antidotes of this class are divided into (*a*) Organic, and (*b*) Inorganic.

(*a*) *Organic Chemical Antidotes.*—These antidotes are derived from the animal and vegetable kingdoms, and include substances of widely diverse character. The most important are albumin, milk, gelatin, charcoal, soap, tannin, turpentine, oils, etc.

First in importance is *albumin*, which is adapted to very general use, especially against the inorganic poisons. It is in most cases very easily obtained, it never causes of itself any harm, and it forms more or less insoluble compounds with most metallic salts and mineral acids. Orfila recommended its invariable use, even on mere suspicion of poisoning. It is best administered in fairly dilute form, the whites of four eggs to a quart of lukewarm water. When taken in sufficiently large amounts, it not only unites with the poison to form insoluble compounds, but provides a protecting coating for the mucous membrane, and at the same time may induce vomiting. With hydrochloric, nitric, and sulphuric acids it produces coagula which are more or less soluble in large amounts of water; with phosphoric, acetic, tartaric, and the organic acids generally (tannic excepted), no precipitation occurs. With the corrosive alkalies albumin forms soluble, harmless compounds when given in copious draughts. It forms insoluble albuminates with the alkaline earths and soluble compounds with potassium and sodium. The alums, tartar emetic, and compounds of arsenic are not precipitated. Iodine, bromine, and chlorine unite directly and intimately with the antidote to form harmless compounds. With phosphorus its action is very limited, and of no especial value except as a diluent drink. The presence of any large excess of alkali acts in general to prevent the precipitation of the albumin compounds. The precipitates of albumin with the salts of the heavy metals consist either of a compound of albumin with a basic salt, or, as it is claimed, of a mixture of the metallic albuminate with a compound of albumin and the acid of the metallic salt. They are usually soluble in acids and alkalies, and insoluble in excess of albumin. Notable exceptions are the compounds with mercury and copper, which are soluble in a considerable excess of the antidote. The compounds with salts of lead, copper, and zinc are easily dissolved in lactic, acetic, and other organic acids, and in free alkalies. In the case of sulphate of zinc, however, which is precipitated only in very great excess of the antidote, the precipitation is hastened, and rendered more complete, by the addition of a small amount of free alkali. Silver salts are easily precipitated; the resulting compounds are partially soluble in excess of common salt. The precipitate with corrosive sublimate is easily soluble in mineral and organic acids, common salt and similar chlorides, somewhat soluble in sodic phosphate and in large excess of albumin. The precipitates of the other mercuric salts are less soluble in the same solvents; the mercurous salts are reduced to the metallic form. Other salts with which albumin unites are those of gold, platinum, zinc, antimony (except tartar emetic), and iron. Among the organic poisons which unite chemically with albumin are creosote, aniline, and alcoholic solutions of most of the alkaloids.

In case albumin is not obtainable, recourse may be had to *milk* as a substitute; its action is due to its casein, albumin, and free alkali. Administered lukewarm it is very valuable in poisoning by metallic salts, corrosive acids and alkalies (especially ammonia), and the alkaline earths. Its richness in fat contraindicates its use where fatty substances are to be avoided.

The value of *gelatin* as an antidote to many metallic salts would be greater if less time were required for its preparation in a suitable form for administration. It must be broken up into small pieces, covered with water, and allowed to soak for about an hour; more water is then added, and the mixture is heated with constant stirring until a fluid of the consistence of honey is obtained. Its chief value is in poisoning by iodine, bromine, and the alums.

Tannin, and substances containing it, act as efficient antidotes to many of the organic and inorganic poisons. Tannin forms more or less insoluble compounds with many metallic salts, but it cannot be considered as equal to albumin in efficiency as an antidote to this class of poisons. Tartar emetic is, however, a notable exception since it is unaffected by albumin, but rendered harmless by tannin, with which it forms an almost insoluble compound. Tannin has considerable value as an antidote to the vegetable poisons; it precipitates the alkaloids and their salts, and forms compounds which are dissolved only with difficulty. These compounds are of themselves poisonous, and hence must be removed from the system as soon as possible by emetics, drastic purges, or the stomach tube. Tannin may be given in doses of 0.1 to 0.3 gm. in two-per-cent. solution every quarter of an hour. Combined with about one-tenth of its weight of iodine its effect on the vegetable poisons is very much increased. Should tannin itself be not easily obtained, decoctions of substances containing it may be substituted. Among the large number of these may be mentioned tea, coffee, oak bark, willow, cinchona bark, nutgalls, kino, rhatany, and catechu.

Sugar has been recommended in poisoning by the alkaline bases, with which it is supposed to form sucrates. It has also been recommended in poisoning by salts of copper, but just what value it possesses in

* "How far this principle will be found capable of general application in infective diseases and whether pathologists will be successful in discovering the necessary modes of attenuation and cultivation the future will show. The outlook is certainly most hopeful."—Prof. J. A. Lindsay: Lancet, December 20, 1899, p. 1799.

such cases would be difficult of determination. It is perhaps safe to say that its value with copper salts is *nil*.

Oils possess more or less value in poisoning by corrosive alkalies, metallic oxides and salts, corrosive acids, and carbolic acid. They may be administered alone or with hot water. (Contraindicated by phosphorus and cantharides.) With the caustic alkalies they unite to form soaps with liberation of glycerin. Their action is, however, slow, and they are on this account of less value than the organic acids in poisoning by alkalies. They are also inferior in value to albumin in the treatment of poisoning by metallic salts. The oils most commonly used as antidotes are olive, cotton seed, linseed, and almond; also melted butter and lard.

Starch in the form of paste (one part of starch to ten or twenty of water) is a suitable antidote to iodine and bromine, with which it forms intimate and almost harmless compounds. Its affinity for iodine is less than that of albumin, and the latter is preferable when obtainable. It has some value, but by no means as much as albumin, in the treatment of poisoning by corrosive acids, corrosive sublimate, sulphate of copper, and sulphate of zinc.

Mucilage and mucilaginous drinks, though exerting more or less chemical action, are administered chiefly as protectives against corrosion. They are best made from gum arabic, which is rubbed up with water. Mucilage in copious draughts has been recommended specially for the treatment of poisoning by salts of bismuth.

The use of *turpentine* as an antidote is confined exclusively to poisoning by phosphorus, against which it is beyond question the most valuable remedy. To be capable of acting beneficially it must contain oxygen, which it absorbs with age. When needed, it should be given with all despatch, either alone or in hot water, in doses of about one hundred times the supposed amount of phosphorus ingested.

Charcoal. In addition to its power of absorbing gases, freshly prepared animal charcoal has, according to many writers, considerable antidotal value in poisoning by metallic salts, phosphorus, and many of the alkaloids. Many consider its value to be restricted to its protective influence on the walls of the stomach. The latter view would seem to be the more reasonable, especially when one considers that the antidote enters into no fixed compounds with mineral or vegetable poisons. Whatever its action on the poisons, however, it cannot be denied that their effects are postponed and considerably slowed. It may be administered in repeated doses of about a tablespoonful, in water, with or without sugar.

Whatever value it has as an antidote is possessed also by wood charcoal, though in a lesser degree.

Soap dissolved in warm water, and in this form administered by the cupful at intervals of a few minutes, is very useful in poisoning by acids and metallic salts, especially corrosive sublimate, bichromate of potassium, and salts of tin and zinc. In contact with inorganic acids the alkaline stearates, palmitates, etc., are decomposed with the liberation of the fatty acids and the union of the alkali of the soap with the acid against which the influence of the remedy is directed. The same result obtains with the metallic salts, except that the metal forms compounds with the fatty acids. This antidote is preferable to the caustic alkalies, since it exerts of itself no corrosive influence; it is, however, much inferior in value to albumin in most cases.

(*b*) *Inorganic Chemical Antidotes.*—In the administration of this class a more or less exact knowledge of the nature of the poison is even more necessary than for the exhibition of the organic class. The attempts which have been made to compound a universal antidote which would, of course, be equally valuable with or without the knowledge of the nature of the poison, are very numerous, but such an antidote has not been as yet, and it is safe to say never will be, discovered. These attempted general remedies have in most cases consisted chiefly of substances belonging to the class now under consideration, and several of them are of considerable value, especially when the nature of the poison is unknown. One of the number consists of equal parts of magnesia, oxide of iron, and wood charcoal; it may be administered freely in moderately large amounts of water. Another, suggested by Jeannel, consists of 2 parts of calcined magnesia, 1 part of washed animal charcoal, 20 parts of water; when administered it is to be mixed with 2.5 parts of ferrous sulphate solution (specific gravity, 1.450) and well shaken. Given in doses of a wineglassful it is itself harmless, and may be productive of much good. When the nature of the poison is, however, known, and an antidote of the inorganic class is indicated, the appropriate remedy is usually exhibited unmixed with other than inert substances (vehicles, diluents, etc.). The antidotes of this subdivision include the following:

Acids. The acid antidotes belong, strictly speaking, to both the subdivisions (*a*) and (*b*), since they include both organic and inorganic compounds. The organic acids indeed are the ones most commonly used, yet for convenience' sake, and on account of other obvious considerations, it would seem not inappropriate to consider both kinds together, with the single exception of tannic acid, which is of sufficient importance to be classed alone. Their principal use is in dilute form as neutralizing agents in poisoning by the alkalies and alkaline carbonates. For this purpose the most commonly used are acetic (vinegar), citric (lemon juice), and tartaric. Very dilute sulphuric acid (one per cent.) is used as a prophylactic against painter's colic, and also in the active treatment of poisoning by soluble salts of barium and lead, with which it forms insoluble sulphates. The vegetable acids are employed also dynamically in the after-treatment of narcotic poisoning.

Ammonia as an inhalation is valuable in poisoning by chlorine, bromine, vapors of corrosive acids, hydrocyanic acid, and nitrobenzol. It is best to dilute the remedy very considerably in order to lessen the pungency of the vapor.

Sodium and potassium carbonates in dilute form may be used as neutralizing agents in poisoning by acids, in the treatment of which, however, they are less valuable than the carbonate of magnesium, since they are less easily tolerated by the stomach. Their employment is still further prejudiced by the fact that in large doses they may cause more or less injury. The mildest in their effects are the bicarbonates, which are at the same time the more easily obtained. Their use as antacids is sometimes accompanied by the development of such an amount of carbonic acid as to cause distress by distending the stomach. They are contraindicated in poisoning by oxalic acid with which they form compounds equally dangerous. Besides their function as antacids they may be used very advantageously in poisoning by iodine and bromine, with which they form harmless salts. Bichromate of potassium, when treated with alkaline carbonates, is converted to the neutral chromate. The majority of poisonous metallic salts may be decomposed by the bicarbonates, the resulting products being basic carbonates and hydrates, which are insoluble in excess of the reagent. They are recommended particularly in poisoning by the salts of zinc, which are precipitated only incompletely by albumin in large amounts; these salts are immediately decomposed by the bicarbonates with which they form insoluble basic carbonates.

Hydrate and carbonate of calcium (lime water, chalk, egg shells, pounded oyster shells, etc.). These compounds are efficient antidotes in poisoning by the acids, both mineral and organic. They have especial value in poisoning by oxalic acid and the acid oxalates, which substances they not only neutralize, but convert to insoluble calcic oxalate. The sucrate of calcium has also been recommended, but it possesses no particular advantages.

The *hydrate and carbonate of magnesium* are beyond question the most efficient and valuable antidotes to the acids and acid salts. Whenever possible it is advisable

to administer these preparations in preference to the other antacids already mentioned, except with oxalic acid and the acid oxalates. In the absence of the calcium preparations, however, they may be productive of very good results in the treatment of oxalic poisoning, the resulting oxalate of magnesium being very nearly insoluble. They are superior in value to the carbonates of sodium and potassium in poisoning by bromine, iodine, and bichromate of potassium. The hydrate was recommended by Mandel as early as 1808 as an antidote to arsenic, and by Graf and Berzelius in 1814 as an antidote to arsenic and mercury. By Paulus and Schuchard it was recommended against corrosive sublimate and other metallic salts. It has been recommended also against phosphorus, especially in connection with the hypochlorite. In contact with solutions of metallic salts its action is to precipitate the corresponding oxides or basic salts. With the arsenic acids it combines to form compounds which are almost completely insoluble in the alimentary canal.

The so-called magnesia of the apothecaries is a compound of magnesic carbonate with magnesic hydrate and water, or a basic carbonate of magnesium. This substance when gently heated parts with its water and carbonic acid, leaving a residue of calcined magnesia, which is slightly soluble, and which, when mixed with about twenty-five times its weight of water, becomes gelatinized, and is then in the proper form for antidotal use. In the process of calcining it is essential that the temperature be kept as low as possible, since when prepared at a high temperature it loses its property of gelatinizing with water. The hydrate may be prepared by precipitating a solution of sulphate of magnesium with sodic hydrate free from carbonate. The precipitate, after being well washed, may be dried out of contact with the air at a temperature below 100° C.

In the administration, in case of poisoning by arsenic, the preparation made from pure calcined magnesia with twenty-five times its weight of warm water may be given in doses of about 45 to 60 gm. (℥ iss. to ij.) at short intervals, then, after a few doses, at longer intervals, until the immediate symptoms disappear, and the magnesium appears abundantly in the fæces. A large excess can do no harm; it acts, indeed, beneficially by stimulating catharsis. In the administration of the compounds of magnesium for their antacid effects it is well to give a considerable excess, which is tolerated without difficulty.

Sulphates of magnesium and sodium (Epsom and Glauber's salts) have especial value in poisoning by soluble salts of barium and lead. The removal of the insoluble sulphates which are precipitated is materially aided by the cathartic action of the excess of the antidote. Their administration may be continued until purging occurs or until the symptoms abate or disappear.

Chloride of sodium (common salt) is perhaps the best antidote to the soluble salts of silver. It should be given in somewhat dilute solution, since concentrated salt solution will dissolve considerable amounts of chloride of silver. By some writers albumin is considered preferable to salt; by others it is recommended to give both together; and by still others to administer both singly, the albumin following the salt.

Ferrocyanide of potassium forms insoluble or difficultly soluble compounds immediately on addition to solutions of many salts of the heavy metals. It is in itself a comparatively harmless substance; in large doses it may cause marked dizziness. It is especially valuable in poisoning by salts of copper, in the treatment of which Orfila found it to give as good results as are obtained with albumin. It is not, however, to be preferred to the latter, which is, if only equal in efficiency, certainly more easily obtained. The ferrocyanide may be given in repeated doses of 2 to 5 gm. in water.

Chlorine. The value of chlorine is considerably lessened by its very irritant effects on the mucous membranes. It may be used externally in the form of chlorine water, hypochlorite of sodium (Labarraque's fluid), or hypochlorite of potassium (eau de Javelle), as a wash for snake bites and other poisonous wounds. The above-named preparations may be used in dilute form, both internally and as sprays for inhalations; internally, in poisoning by alkaloids and vegetable and animal poisons; as inhalations, in poisoning by coal gas (carbonic oxide), ammonia, phosphoretted hydrogen, sulphuretted hydrogen, and prussic acid.

Chlorine water may be administered internally in doses of 4 to 16 gm. (℥ i. to iv.) largely diluted; as a spray for inhalation, a solution of five to ten drops in water. The hypochlorites of potassium and sodium may be administered in doses of 4 to 8 gm. (℥ i. to ij.), well diluted with water.

Iodine possesses considerable value in the treatment of poisoning by the alkaloids and their salts, by other vegetable poisons, and by snake bites. It unites with most of the alkaloids to form compounds which are insoluble in water and dilute acids but are decomposed by the caustic alkalies, alkaline carbonates, and strong acids. The compounds of the vegetable poisons with iodine are possessed of more or less poisonous properties, and are therefore to be expelled from the system by appropriate means; they are, of course, much less poisonous than the pure bases. Since iodine is itself a very energetic poison, it must be given in very dilute form. The preparation recommended by Bouchardat, and by him considered particularly effective against the vegetable poisons, consists of iodine, 0.20 gm.; iodide of potassium, 2 gm.; and distilled water, 360 gm.; the dose is from 50 to 100 gm., frequently repeated according to circumstances. Iodide of potassium is much used as an antidote in the elimination of lead and mercury from the system in cases of chronic poisoning.

Bibron's antidote to the poison of serpents is a mixture of iodide of potassium, 0.016; corrosive sublimate, 0.130; and bromine, 20 gm. Given in good season and in repeated doses of ten drops in wine or brandy, it has been proved to be effectual.

Hyposulphite of sodium in doses of 1 gm., well diluted and frequently repeated, is valuable in poisoning by bleaching powder (hypochlorite of calcium, "chloride of lime"), Labarraque's fluid (hypochlorite of sodium), and Javelle water (hypochlorite of potassium). Its action is to reduce the hypochlorites to chlorides, itself undergoing oxidation to the sulphate.

Sulphuretted hydrogen has been recommended as an antidote to arseniuretted hydrogen, but its efficacy is yet to be proven.

Iron. The hydrated sesquioxide of iron is the most efficient antidote to arsenic when the latter is ingested in soluble form. It was first recommended in this connection in 1834 by Bunsen and Berthold, who proved its efficiency by numerous experiments on dogs and other animals. With arsenious anhydride (white arsenic) it forms, according to Bunsen, a basic arsenite of iron, which is but slightly soluble in the fluids of the digestive tract, but which, on account of its not unpoisonous character, must be removed from the body with all despatch by promptly acting cathartics. By later writers the compound which is formed is considered to be a ferrous arseniate. The union with arsenic is very complete; if an amount of the antidote representing ten parts of ferric oxide be added to one part of arsenic, the filtrate will not reveal even a trace of the poison. In addition to its combining action, it possesses a certain value as a protection to the stomach and intestines against the injurious local effects of the poison. With the arsenic anhydride, and the arsenious and arsenic salts, the union is very limited, even with very large excess of the antidote; the effect is much increased by the addition of a small amount of ammonia or other caustic alkali. In poisoning by the arsenites and arseniates a mixture of the hydrated sesquioxide with basic acetate of iron is more effective. The hydrated sesquioxide is easily prepared by adding ammonia water, sodic or potassic hydrate, sodic or magnesic carbonate, to a solution of ferric chloride or sulphate, or to the tincture of the chlo-