

Moreover, acute osteomyelitis occurs almost constantly during adolescence and develops at an epiphyseal end. As a matter of fact it is really nothing more nor less than a phlegmon of bone; and its treatment is the same as for phlegmon of the soft parts.

In the case of phlegmons of Class II.—gas phlegmons—a very early diagnosis is of great importance for successful therapeutics. Bloodgood²⁰ has reviewed these cases from the surgical standpoint in a very thorough manner, and I quote from him.

"Unquestionably in gas-bacillus infections an early diagnosis is always possible, and not at all difficult. In any recent wound with symptoms of infection, one should at once make cover-slips from the fluid in the wound. The presence of large bacilli, morphologically like the gas bacillus, even with the absence of gas bubbles or emphysema, is practically, in the majority of cases, pathognomonic of a gas-bacillus infection. If one finds in addition air bubbles in the fluid, or emphysema in the tissues, plus the presence of bacilli in cover-slips, there is practically no question about the diagnosis."

Under the head of treatment I shall quote further remarks of Bloodgood, which are a corollary to the above.

I suppose we may assume that a phlegmonous erysipelas, *i. e.*, a phlegmon of the deeper structures developing by extension from a true erysipelas of the skin, is a pure streptococcus infection. If we have any faith in antistreptococcus serum, we must be careful in such cases not to overlook in the general phlegmon the coexistence of the cutaneous erysipelas; for in such cases, if in any, would the serum have a chance to do good.

PROGNOSIS.—The outlook in any of our three classes of phlegmon is usually grave; but by all odds gravest in the phlegmon of gas gangrene. The fulminating cases of ordinary phlegmon (Class I.), which kill in a few hours, are rare. More often the patient dies of the infection during the first week or two after the onset. If he escapes then, he may die later of chronic suppurative fever and pyæmia. If he recovers, he may be left with a functionally impotent limb.

In cases of gas gangrene (Class II.) the prognosis, without operation, is practically always toward a fatal ending. With early and proper treatment it is by no means so black as our predecessors have painted it; and it is yearly becoming less grave. The earlier and more thorough the operation is, the brighter becomes the outlook.

Welch⁷ says that results are better after amputation than after incisions only. Of the cases collected by him of emphysematous gangrene, affecting primarily the extremities, the recoveries numbered 68 per cent. after amputation, and 33½ per cent. after incision without amputation.

TREATMENT.—The treatment of phlegmon may be considered under the three headings—non-operative, operative, and serum-therapy.

Non-Operative.—Naturally this can be thought of only in the mildest cases. Take, for example, a cellulitis originating in an infection of the hand, and spreading with greater or less rapidity up the forearm. The surgeon incises such cases almost invariably as soon as he sees them, and counts the disfiguring scars—so disfiguring, especially on the back of the hand—as not to be weighed for a moment in the balance. Let us admit, upon the whole, that he is right. And yet, how often does the general practitioner apply in these cases hot antiseptic formentations alone, and see his conservatism, or the patient's disinclination to the knife, justified by the event! There is room here for the exercise of the nicest surgical judgment. The writer believes that in the early stages of these spreading cellulitis cases, mild types of phlegmon as they are, hot antiseptic applications or the hot continuous bath should be tried first; that, however, both the local and the constitutional symptoms should be watched carefully and almost continuously. If, after a variable number of hours, to be judged by the intensity of the process, the infection is evidently advancing, multiple incisions should be practised.

Some surgeons prefer cold applications, especially in phlegmons of the deeper regions, such as the periaryngeal or periesophageal. Elevation of the part and absolute rest are matters of course.

It may be mentioned at this point that Cr d 's ointment²⁷ (a salve containing fifteen per cent. of soluble metallic silver) has been strongly recommended by some in the treatment of septic infection of wounds. It is usually rubbed into the skin after the fashion of the mercurial ointment in the treatment of syphilis; and it is claimed that the formation in the blood of powerfully bactericidal silver salts effects a general antiseptics of the entire organism (Werler²⁸). The writer is unable from personal experience to give any opinion upon the question; but the method of treatment has not come into wide use.

Operative.—This will vary, according to the case, from a few superficial incisions to the amputation of a whole extremity. Multiple incisions are the rule in moderate cases. After incisions the parts should always be kept enveloped in hot, wet antiseptic dressings or in the continuous bath. The value of the latter in severe local infections has been particularly demonstrated by the experience of the great Hamburg clinic, and more lately by that of various hospitals elsewhere.

Incisions in the early stages must be numerous and they must enter the subcutaneous tissue, so as to allow of the escape of as much of the infected serous exudate as possible. In the later stages, with a large amount of pus present, they must be extensive enough to secure a free opening for the pus wherever it may happen to be; that is, the pus must be followed relentlessly into all recesses, and counter-openings must be freely made. Necrotic tissue should be removed as thoroughly as possible. Rubber drains of a good size should be inserted into the main openings. Copious hot irrigation with bichloride solution should be used. Care should be taken not to place the incisions too near each other, for fear of gangrene of the intervening skin from lack of blood supply.

Verneuil prefers to incise with the thermo-cautery in order to avoid the considerable bleeding which frequently occurs. This is of doubtful advantage. A certain amount of bleeding is more likely to do good than harm, by relieving the congestion of the part, and also by removing some part of the infective material.

The serious question of amputation must often be weighed. The tendency of the inflammation to spread rapidly and deeply over the larger part of the limb must be our main guide to the virulence of the infection and the necessity for amputation. The constitutional disturbance, in especial the height of the fever, has less significance, for in the grave asthenic cases reaction may be comparatively slight. In general it may be said that when we have an intense œdema, steadily and rapidly advancing, which has approached the proximal joint of the limb and which shows the dusky hue of threatening gangrene; and when the constitutional signs are severe, or when the patient is in an asthenic typhoid condition—in other words, when clinically we have before us the excessively severe, fulminating, or almost fulminating, type of infection, then amputation at the joint is urgently called for. In most of such cases the indication for such radical procedure will have been made absolute by the failure of previous multiple incisions to arrest the advance of the œdema. It will be a question for individual judgment whether an earlier amputation through the shaft of the humerus or the femur may not be advisable.

Even when the infection has spread beyond the limb on to the trunk, amputation at the joint should still be done; for recovery in such cases has been recorded, and indeed not so very infrequently. Amputation through the forearm or leg must be a rare thing. It might be considered in cases of fulminating gangrene or spreading emphysematous gangrene; but the lesion in such cases has usually spread beyond the knee or elbow by the time it is accurately diagnosed, so rapid is its advance.

The above remarks are applicable especially to cases of Class I., those of ordinary phlegmon. Cases of Class II., gas gangrene, require, from their especial virulence, con-

sideration apart. Bloodgood in his admirable article in "Progressive Medicine," 1900, has summed up the indications so well that I need only quote them:

"If the infection is recognized early and the destruction of the soft parts and bones is not extensive, free incisions with immediate continuous bath treatment should be tried. If the general symptoms of infection are not immediately relieved, amputation should be done. If, however, the infection is recognized late, one should take no risk, but amputate at once. An early diagnosis will often save life; and from many observations an amputation may not always be necessary."

The treatment of cases of Class III., urinary extravasation, is treated elsewhere in the HANDBOOK. Here it need only be said that multiple incisions and free drainage, as for any other kind of phlegmon, fulfil the main indications.

Serum-therapy.—The question of serum-therapy in streptococcus affections is one which is yet far from settled. It is well known that Marmorek prepared his original antistreptococcal serum from a streptococcus obtained from a case of pseudomembranous angina. Great expectations were entertained of the new serum in all diseases supposed to be caused by the streptococcus, and Marmorek went so far as to request of accoucheurs that it be used in puerperal sepsis to the exclusion of the tried clinical methods of curetting and irrigation. These early hopes were doomed to disappointment. Clinically it soon became evident that the new serum had but little curative power, while experimentally it was shown that Marmorek's serum was totally inefficacious against diseases of streptococcus causation other than that of the original one. Thus cases of phlegmon, erysipelas, and puerperal sepsis remained nearly always unbenefited.

Since these early experiences, large numbers of isolated cases of all kinds of supposedly streptococcus infection have been reported. With the exception of a certain number of favorable, occasionally even of brilliant results, these reports tend to demonstrate the general inefficiency of the serum. Petruschky examined the question especially in regard to phlegmon, and came to a conclusion entirely unfavorable to Marmorek's serum.

The conclusion generally arrived at¹⁷ was that the streptococcus genus was composed of a number of species, which, however similar in morphology or cultural characteristics, differed materially in the matter of their immune sera. Of late years a close study of the streptococci has discovered a considerable number of these more or less differentiated species. Van de Velde,¹⁸ in Denys' laboratory at Louvain, has endeavored by immunizing with a number of these different streptococci simultaneously, to overcome this difficulty, and to produce a serum which he calls "polyvalent"—a sort of shotgun serum which if it missed one streptococcus might hit another. This "polyvalent" serum, it is said, has met with slightly more success than the original, but has not come into general use.

On the other hand, within the last year or two, various workers have tried to demonstrate the essential unity of all the various streptococci with the exception of that of *Pferdedruse* (our *Strangles*). Streptococci cultivated from cases of tuberculosis, measles, erysipelas, scarlatinal angina, abscesses, phlegmons, puerperal sepsis, angina in acute rheumatism, ulcerative endocarditis, and *Pferdedruse*, were examined thoroughly by Meyer¹⁹ in respect to their morphology, virulence, hæmolysis, growth in filtrate of their own culture medium, and their specific immunizing sera. Similar investigations have been conducted by Widal and Besançon,²⁰ Menzer,²¹ and Marmorek.²² All tend to prove the "unity" of all the various streptococcus families, except that of *Pferdedruse*. If they are a unit, why then should any antistreptococcus serum fail to do good? Much further investigation is needed.

The whole question is beset with difficulties. There is the one already mentioned, that one variety of streptococcus apparently will not immunize against another. So long as it is impossible to say to which particular

streptococcus a given infection is due, the use of Marmorek's serum or of any other antistreptococcus serum remains largely a matter of chance. Further, it is becoming more and more evident that the streptococcus does not play such a dominating rôle in many infections as has been believed. Certainly in the case of phlegmons we have reason to believe that the staphylococcus, Welch's gas bacillus, the bacillus of malignant œdema, and other less known organisms, may either singly or in symbiosis with each other or with the streptococcus, cause infections which it has hitherto been the custom to ascribe, usually without thorough bacteriological investigation, to the streptococcus alone.

Phlegmons, in which bacteriological examination carefully conducted both aerobically and anaerobically has shown infection with but one organism, are rare; and it is reasonable to believe that in many cases in which antistreptococcus serum has been given with negative results the infection has been one, not of the streptococcus, but of one of the other organisms mentioned; or, at least, of a symbiosis of the streptococcus with these others in which the streptococcus played the minor part. In this connection a case²³ reported from St. Petersburg is interesting. It refers to a septicæmia treated without the least benefit with antistreptococcus serum. Following this in success, antistaphylococcus serum was administered, with brilliant results. The writer refers to another case in St. Petersburg, one of ulcerative endocarditis, in which antistaphylococcus serum gave a similar good result. Unfortunately cultures were not made; yet the facts are suggestive. We have been in the habit of ascribing without careful investigation the causation of many diseases to the streptococcus, and perhaps quite wrongly.

Another point which may explain the general in success of the serum is this: that if we are to believe Aronson,²⁴ the antistreptococcal sera on the market contain comparatively very small quantities of anti-bodies.

In view of all these difficulties, all that can be said is that the practitioner, in desperate cases, may use antistreptococcus serum on the off-chance of its doing good; but he must await more certain bacteriological knowledge before he can use it with judgment or with any sure hope of its success. His main reliance must be placed on early diagnosis, and prompt and thorough surgical treatment.

Edward Archibald.

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PHLORIDZIN.—C₂₁H₂₄O₁₀, 2H₂O. A glucoside obtained from the root-bark of the apple, pear, cherry, and other fruit trees. It forms in fine, colorless, silky needles,

soluble only in one thousand parts of cold water, but freely soluble in boiling water. It is only slightly soluble in alcohol. It melts at a temperature of 232° F., but becomes solid again at 226° F., and melts a second time at 335° F. Phloridzin is very similar to salicin, and heated with potash it yields phloretic acid, which is homologous with salicylic and anisic acids.

It has been employed as an antipyretic in doses of fifteen to thirty grains, but is not now used.

Phloridzin is utilized in physiological research, as it has been found to induce artificial diabetes. When given to the extent of eight grains per pound of body weight it causes polyuria and an excretion of sugar which continues for twenty-four or thirty hours, and is not influenced by diet. It sometimes produces diarrhoea, but no other ill effect has been detected, unless the drug is administered for a prolonged period, when marked emaciation and debility supervene. Phloridzin acts directly upon the renal epithelium, permitting the escape of sugar from the blood and lessening the amount of sugar held in solution in the blood.

Beaumont Small.

PHONATION. See *Larynx, Physiology of the.*

PHOSOTE—creosote phosphate—is a colorless syrupy liquid, containing eighty per cent. of creosote, but with only a slight odor and taste of this substance. It is employed in tuberculosis as an easily borne form of creosote, and is given in dose of 0.7–1.3 gm. (gr. x.–xx.) three times a day.

W. A. Bastedo.

PHOSPHATOL is a thick, reddish-yellow liquid prepared by the action of phosphorus trichloride on creosote in alcoholic soda solution. It has a burning taste, is slightly soluble in water, and is readily soluble in alcohol and oil. It can be given in milk or wine or in capsule in the same dosage as creosote.

W. A. Bastedo.

PHOSPHORIC ACID.—By *phosphoric acid* is signified, in medicine, a solution of common or orthophosphoric acid (H₃PO₄) in water. Two grades of strength of such solution are official in the United States Pharmacopœia, as follows:

Acidum Phosphoricum, Phosphoric Acid. This preparation represents eighty-five per cent., by weight, of orthophosphoric acid and fifteen per cent. of water. It is a colorless fluid, without odor, but with a strongly acid taste. Its specific gravity is 1.710. It mixes in all proportions with water or alcohol. It should be preserved in glass-stoppered bottles.

Phosphoric acid is intensely acid and irritant, but does not immediately corrode living tissues and coagulate albumin, as do the majority of the strong mineral acids. In any considerable quantity, however, this grade of the acid would prove a sharp, and very likely fatal, irritant poison if swallowed without dilution. This strength of acid is rarely prescribed in medicine, being official simply as a convenient solution to be kept in stock by the druggist for the making of the following, the commonly prescribed preparation:

Acidum Phosphoricum Dilutum, Diluted Phosphoric Acid. This grade of the acid is compounded by mixing one part, by weight, of the foregoing strong acid with seven and a half parts of distilled water. The solution thus contains ten per cent. of orthophosphoric acid, and has the specific gravity 1.057. This acid resembles in general properties the other diluted mineral acids (see *Sulphuric Acid*), but is distinguished by having a pleasant flavor (its acidity resembling that of the fruit acids) and by being, as a rule, better borne by the stomach than its congeners. It may, therefore, be used for the common purposes of the mineral acids, to allay thirst, improve digestion, repress tendencies to sour fermentation of the contents of stomach or bowels, and to check morbid sweating. By many it is further claimed that phosphoric acid, ingested, tends to revive an exhausted nervous system, to excite the sexual function, and generally to enhance nervous activity and power. By such

claimants the acid is regarded as the therapeutic equivalent of uncombined phosphorus; but certainly it fails in that most pronounced therapeutical of free phosphorus, the frequent cure of neuralgia. A special claim for phosphoric acid, of capability to lessen the excretion of sugar in diabetes, is now probably pretty generally abandoned. Diluted phosphoric acid may be given in doses of from twenty drops to a teaspoonful or more, three times a day, the dose to be largely diluted with water, or with syrup and water. The precaution obtaining with the giving of other mineral acids, of taking the draught through a tube and rinsing the mouth after the swallowing, need not be insisted upon in the case of this acid.

Edward Curtis.

PHOSPHORIDROSIS.—Luminous sweating is a decidedly rare affection. Cases have been reported in which this curious phenomenon was observed after the ingestion of phosphorus and the eating of phosphorescent fish. It is probable that the phosphorescence is due to bacilli; for several species of photobacteria have been found, most of them being derived from fish.

Charles Townsend Dade.

PHOSPHORUS.—Phosphorus is available for medicinal purposes in the form of the element itself, or as it occurs in the special compound *zinc phosphide*, a compound that readily yields free phosphorus upon swallowing, under the conditions present in the stomach. Phosphorus is official in the United States Pharmacopœia under the title *Phosphorus*, Phosphorus. It is a solid body, of the appearance and consistence of white wax. It has a peculiar and disagreeable odor. On exposure to air, it gives off white fumes, luminous in the dark and of a garlicky odor. Phosphorus is insoluble in water, but dissolves in 350 parts of absolute alcohol at 15° C. (59° F.), in 240 parts of boiling absolute alcohol, in 80 parts of absolute ether, in about 50 parts of any fatty oil, and very abundantly in carbon disulphide, the latter yielding a solution which must be handled with the greatest care to prevent danger from fire. If left exposed to the air, phosphorus takes fire spontaneously. Accordingly it must be kept carefully under water, in a secure and moderately cool place, protected from light.

In its physiological relations, as in its chemical, phosphorus is unique. It is locally exceedingly irritant—even corrosive, although, strangely enough, in some experiments bits of solid phosphorus have lain embedded in the connective tissue of animals for weeks without exciting any local reaction. Ordinarily, however, upon skin or mucous membrane phosphorus in substance excites inflammation, possibly followed by ulceration and gangrene of the area exposed to contact. Even the fumes of phosphorus may inflame exposed mucous membranes, such as the conjunctiva and the mucous membrane of the mouth and respiratory tract, and inflame even to consecutive necrosis any accessible periosteum. Thus used to arise in match factories, in the days before the use of allotropic phosphorus, cases of necrosis of the jaw, the periosteum being generally reached by the poisonous fumes through the avenue of some defective tooth. Taken internally, even therapeutic doses are very apt to irritate the stomach, as shown by loss of appetite, nausea, uneasiness, and even pain and tenderness at the epigastrium, or, in higher grade, by the additional symptoms of vomiting and diarrhoea. Flatulence and eructations of phosphoreted gases are further disagreeable local effects of the medicine upon the digestive apparatus. Phosphorus when swallowed is readily absorbed, but exactly in what chemical status has not been definitely proven. That it reaches the blood, in part at least, as uncombined phosphorus dissolved by the alkalies of the intestinal juices or by fats is, theoretically, certainly not impossible, and is the obvious suggestion of many chemical considerations. On the other hand, that some portions undergo various grades of oxidation is again perfectly possible and likely.

The constitutional effects that follow the internal tak-

ing of phosphorus are symptomatic of modifications of nutrition. In therapeutic dosage in health there is ordinarily little obvious derangement beyond what may be a reflex of the gastric irritation set up by the drug; and, anatomically, the most striking result of the medication is a tendency, proven by dissection of animals,¹ toward increased activity of development of bone. Cartilaginous epiphyses ossify with undue speed and completeness, spongy bone tissues increase in thickness, and compact bone in hardness. And a similar special tendency toward nutritive activity in *nervous* tissues, under the administration of phosphorus, is commonly, and probably rightly, inferred from the two facts, first, that in nerve tissue, as in that of bone, compounds of phosphorus are prominent normal constituents, and, secondly, that many morbid derangements of nerve function which are fairly referable to malnutrition or to exhaustion of nerve tissue, tend to abate under a régime of phosphorus medication. A special aphrodisiac action has been claimed for phosphorus, but cases in which any effect of this nature has been observed have probably been cases of previous debility or exhaustion of the sexual function, in which the renewed sexual desire is simply the natural consequence of restoration of power through improved nerve nutrition. In originally vigorous subjects several series of observations have shown that phosphorus does not produce any direct aphrodisiac effect.²

In over-doses, single or continued, phosphorus profoundly deranges nutrition, inducing fatty degeneration of glandular and other tissues, and hemorrhages. Death may result, or an impairment of health from which recovery is slow and difficult. For a detailed discussion of this singular poisonous operation of phosphorus see article *Phosphorus, Poisoning by*.

The therapeutic application of phosphorus is the internal administration of the drug for the bettering of deranged conditions of the nervous and the bony structures. Thus it is among the standard remedies to try in neuralgia. Naturally enough, the more recent the case, the greater the chance of relief and of cure, and unless relief comes within forty-eight hours, the medicine will probably fail altogether (Ashburton Thompson). In other nerve derangements it may be said, broadly, that in such as belong to the category of the naturally curable ones, recovery may perhaps be hastened by the use of phosphorus; but that in the incurable or difficultly curable nervous diseases the agent generally does little or no good. Thus the high hopes at one time formed of the avail of phosphorus in such maladies as epilepsy and locomotor ataxia have utterly failed of realization; but in such conditions as so-called nervous prostration, or incipient dementia, the drug is often of distinct benefit. Similarly phosphorus has been praised in osteomalacia and in rickets.

In the important matter of the *dose* of phosphorus, there is much difference in the practice of different physicians. Some confine their dosage to 0.0006 gm. (gr. $\frac{1}{160}$), thrice daily, while others begin at once with 0.003 gm. (gr. $\frac{1}{20}$), given with the same frequency, and aim to increase to double the amount, under guidance of the effects wrought—curative to the disease on the one hand, or irritative to the stomach on the other. Certainly, the larger of the doses cited are well borne in a very considerable number of cases, and certainly, also, the same may succeed, and speedily too, in curing a neuralgia, where the minute dose of the timid prescriber utterly fails of all impression upon the disease.

The *mode of administration* is an all-important matter in the case of phosphorus, since by faulty prescribing the dose may be unduly irritant or nauseous on the one hand, or inert on the other. In general, phosphorus must not be given in substance, no matter how extreme the subdivision, because of irritation; and in prescription in solution a solvent must be sought that will hold the phosphorus secure against oxidation, and at the same time not furnish too disgusting a potion. The most generally serviceable solvent, where the preparation is to retain the fluid condition, is a fixed oil, freed from contaminating

oxygen and water by a preliminary superheating. Squibb has strongly advocated cod-liver oil,³ fearing vegetable oils because of an alleged tendency of phosphorus in solution in the same to “develop poisonous properties,” presumed to be “due to the formation of hypophosphorous acid.” Sweet almond oil is, however, the most generally selected of fatty solvents, and has been adopted by the United States Pharmacopœia as the basis of the official oily preparation. Chloroform and ether are inconveniently volatile for the making of a permanent fluid preparation, and carbon disulphide is too disgusting and noxious. Absolute alcohol can be made the basis of an efficient fluid mixture, as in the official spirit of phosphorus and its derivate, elixir of phosphorus. For pills of phosphorus the plan should be followed of actually *dissolving* the phosphorus in some fluid, which either itself hardens, by cooling, to a solid, or which, incorporated with some indifferent powder, will form a pill mass. In either case, the indispensable feature is secured that phosphorus is in true solution still, although the pill as such is of course a solid. An obvious practice for the making of such pills is to dissolve phosphorus in melted resins, which on cooling reacquire the solid condition with, now, the phosphorus held in solution. But while these resinous pills are easy to make and to take, there is strong reason to fear that the contained phosphorus may easily be allowed and even helped to oxidize. The pharmacopœial procedure given below is probably as free from objection as any.

In whatever form or dose phosphorus be given, a cardinal rule, insisted upon by almost all who have had much experience with the medicine, is that the administration should never be upon an empty stomach, nor, on the other hand, *immediately* after eating.

The phosphorus preparations of the United States Pharmacopœia are as follows:

Oilum Phosphoratum, Phosphorated Oil. Phosphorus is dissolved by gentle heat in sweet almond oil which has been previously heated for fifteen minutes to a temperature of 250° C. (482° F.), and then cooled and filtered. After the phosphorus is fully dissolved and the solution cooled, a small charge of ether is added thereto. The finished product contains one per cent. of phosphorus and nine of ether. By measure, one minim represents about gr. $\frac{1}{15}$ of phosphorus (United States Dispensatory). Phosphorated oil should be clear and with a decided taste and smell of phosphorus, and the few drops which will constitute a dose (see remarks on dosage, above) may be given in capsule or in emulsion, flavored by a trace of oil of peppermint, or of gaultheria, or of bitter almond. The official emulsion of *almond* forms a convenient vehicle for an emulsion, flavored as just described. Phosphorated oil must be kept in small, glass-stoppered vials in a cool place, and the phosphorus keeps best when the vials are completely full.

Pilule Phosphori, Pills of Phosphorus. Phosphorus is dissolved in chloroform by gentle heat and the solution added to a mixture of acacia and althæa in a mortar. A little glycerin and a little water are next poured on, and the whole is rapidly beaten to a pill mass, which is immediately cut up into the proper number of pills. Each pill is then coated with a solution of balsam of tolu in ether, and when the coating is dry the pills are put up in well-stoppered bottles. These pills contain, each, 0.0006 gm. (gr. $\frac{1}{160}$) of phosphorus, and from one to five pills will constitute a dose. (See remarks on dosage, above.)

Spiritus Phosphori, Spirit of Phosphorus. This is a solution of phosphorus in absolute alcohol of the strength of 1.2 per cent. of phosphorus. It is official for the making of the elixir of phosphorus.

Elixir Phosphori, Elixir of Phosphorus. This preparation is a mixture of the spirit of phosphorus, glycerin, and aromatic elixir, with a flavoring of oil of anise. It is a transparent liquid, containing about 0.00025 gm. (gr. $\frac{1}{400}$) in each cubic centimetre (m̄ xvi.). Unofficial, but well known and much used, is an alcoholic solution of phosphorus devised by Ashburton Thompson, of England, and commonly called *Thompson's Solution of*