

doses of from 0.12 to 0.65 gm. (℥ ij. to x.), diluted with at least an equal bulk of aqueous or syrupy vehicle. It should be kept in well-stoppered bottles and in a cool place away from light.

*Liquor Ferri et Ammonii Acetatis*, Solution of Iron and Ammonium Acetate, Basham's Mixture. This solution is an elegant elixir, containing a weak charge of iron in condition of acetate. It is compounded of tincture of chloride of iron (two per cent.), diluted acetic acid, solution of ammonium acetate, aromatic elixir, glycerin, and water. By reaction the iron becomes the acetate, and part of the ammonium acetate becomes ammonium chloride, but the greater part of the ammonium salt remains unchanged. The preparation is a beautifully clear, reddish solution of agreeable elixir taste, with scarcely a trace of ferruginous flavor. For its strength it is efficient, and may be given in doses of a tablespoonful three or four times a day. It decomposes spontaneously on keeping for any length of time, and accordingly should be freshly made, when wanted.

*Ferric Citrate*:  $\text{Fe}_2(\text{C}_6\text{H}_5\text{O}_7)_2 \cdot 6\text{H}_2\text{O}$ .

Normal ferric citrate is peculiar, among the group under consideration, in that it dissolves quite slowly, although fully, in cold water, and when once in solution is comparatively stable. Because of slow solubility it is peculiarly fitted for prescription in pill. The salt is official as follows:

*Liquor Ferri Citratis*, Solution of Ferric Citrate. "An aqueous solution of ferric citrate, corresponding to about 7.5 per cent. of metallic iron" (U. S. P.). Fresh and moist ferric hydroxide is mixed with citric acid, and the mixture heated, with stirring, until a solution results. Such solution is then evaporated at a gentle heat until reduced to standard strength. In this procedure ferric citrate forms by direct union of the radicals, and dissolves in the water entangled in the magma of the hydroxide. This solution may be used medicinally, given in doses of about 0.65 gm. (℥ x.), corresponding very nearly to 0.32 gm. (gr. v.) of the scaled preparation next to be described, but its essential purpose is to afford this same preparation, as follows:

*Ferri Citras*, Ferric Citrate. The above solution is evaporated, at a temperature not exceeding 60° C. (140° F.), to the consistence of syrup, and the syrupy fluid is then spread upon plates of glass and allowed to dry. A film of solid matter results, which breaks up into transparent garnet-red "scales," constituting the preparation in question. Such scales have the properties of ferric citrate as already described, and may be given in doses, three times daily, of 0.30 gm. (about gr. v.), being specially selected for administration in pill.

*Ferri et Quininae Citras*, Iron and Quinine Citrate. The above scaled preparation and quinine—the alkaloid, dried till it ceases to lose weight—in the proportion of eighty-five of the former to twelve of the latter, are dissolved together in water, with the addition of a little free citric acid, and the solution is then evaporated for the yielding of scales, as described in the foregoing example. The product is in transparent, reddish or yellowish-brown scales, bitter and mildly ferruginous in taste, and dissolving, as does the simple citrate, completely but slowly in cold water. The scales should be kept in the dark, in well-stoppered bottles. They represent the ingredients probably in simple mixture only. The preparation affords a means of giving a chalybeate in conjunction with quinine; convenient where the indication fits the one proportion between the constituents which these scales provide, but otherwise not. The dose averages 0.30 gm. (about gr. v.), representing rather less than 0.06 gm. (gr. i.) of quinine, given, by natural selection, in pill.

*Ammonio-ferric Citrate*.

If the official solution of citrate of iron be charged with one-fourth of its weight of water of ammonia, and the mixture then evaporated in the usual manner (see

*Ferri Citras*, above), scales will be obtained identical in characteristics with the scales of the citrate already described, except that they dissolve rapidly instead of slowly in cold water. Such scales are regarded as representing a double citrate of the two bases, but the exact chemical constitution, as is the case with all the composite scale preparations, is difficult to determine. The preparation is official as *Ferri et Ammonii Citras*, Citrate of Iron and Ammonium, and is medicinally convenient as a substitute for the simple citrate when the chalybeate is desired in solution. Pharmaceutically, it is the basis of the following:

*Vinum Ferri Citratis*, Wine of Ferric Citrate. Four per cent. of the ammonio-citrate scales is dissolved in a mixture of tincture of sweet orange-peel, syrup, and white wine. This wine makes a weak chalybeate elixir, to be given in doses of a teaspoonful, representing about 0.20 gm. (gr. iij.) of the iron compound.

*Ferri et Strychninae Citras*, Iron and Strychnine Citrate. Scales of the ammonio-citrate are dissolved in water, and the solution is mixed with a solution of strychnine citrate, made by adding strychnine and citric acid together to water. From the mixed solution scales are obtained in the usual way. The composite scales thus derived are indistinguishable in appearance and solubility from those of the plain ammonio-citrate, but declare themselves by their bitter taste. They contain two per cent. of the citrate of strychnine, equivalent to one per cent. of the alkaloid itself. The average dose is about 0.30 gm. (about gr. v.), representing 0.008 gm. of strychnine (gr.  $\frac{1}{10}$ ), given in pill, or, having due regard to the bitterness, in solution.

The ammonio-citrate also occurs in the following preparations:

*Ferri et Quininae Citras Solubilis*, Soluble Iron and Quinine Citrate. This preparation is made of the same ingredients and in the same way as the simple iron and quinine citrate, but, by the addition of ammonia water to the solution before evaporation, the ammonio-citrate forms, and the resulting scales are rapidly and completely soluble in cold water. This preparation, accordingly, is to be selected when the double citrate is wanted in solution instead of in pill. The scales are of a greenish-yellow color.

*Vinum Ferri Amarum*, Bitter Wine of Iron. This wine is compounded of five per cent. of the foregoing soluble iron and quinine citrate, made into an elixir with tincture of sweet orange peel, syrup, and white wine. It is given in teaspoonful doses.

*Potassio-ferric Tartrate*.

Although not selected for the making of fancy preparations, the potassio-tartrate of iron is a valuable chalybeate, being of little taste, perfectly bland, and, perhaps because of the potassium tartrate of its composition, less disposed to constipate than the average of iron salts. The salt is official under the title of *Ferri et Potassii Tartras*, Iron and Potassium Tartrate, as a scale preparation, gotten in the usual way (see *Ferri Citras*, above), from a solution resulting from admixture, in water, of fresh ferric hydroxide and acid potassium tartrate ("bitartrate"). The scales are garnet-red, similar in appearance to the scales of the citrate, and probably represent a double tartrate of the contained bases. The preparation is so bland that it may be given in comparatively large doses, ranging from 0.65 to 2 gm. (gr. x. to xxx.), most naturally in solution.

*Ammonio-ferric Tartrate*.

Ammonio-ferric tartrate is substantially a duplicate of the potassio-tartrate just described. It occurs in scales, derived from a solution wherein the salt is made by a process analogous to the foregoing. The preparation is official as *Ferri et Ammonii Tartras*, Iron and Ammonium Tartrate, and in appearance, solubility, and dose conforms to the example of the potassio-tartrate.

*(Sodio-) Ferric Phosphate*

Under the title *Ferri Phosphas Solubilis*, Soluble Ferric Phosphate, the United States Pharmacopœia makes official a scale preparation containing sodio-ferric phosphate and obtained out of a solution in which ferric citrate has been decomposed by the addition of uneffloresced sodium phosphate. The preparation must not be confounded with a formerly official "phosphate," which consisted of the slate-colored, insoluble ferrous-ferric phosphate that precipitates from reaction of ferrous sulphate and sodium phosphate in solution. The scales of the present preparation differ from those of the citrates and tartrates in being of a bright-green color instead of garnet-red. They are bland, of little taste, and make an excellent chalybeate of their kind. Dose, from 0.30 to 0.65 gm. (about from gr. v. to x.), in pill or solution.

Compounded from these scales and from quinine, strychnine, and phosphoric acid is an official syrup entitled *Syrupus Ferri, Quininae, et Strychninae Phosphatum*, Syrup of the Phosphates of Iron, Quinine, and Strychnine. The dose is limited, by the presence of strychnine, to a teaspoonful, which quantity contains about gr. i. of the iron compound, gr.  $\frac{1}{4}$  of the quinine, and gr.  $\frac{1}{10}$  of strychnine. This syrup does not keep well, and is at best an unnecessary preparation.

*(Sodio-) Ferric Pyrophosphate*.

Under the title of *Ferri Pyrophosphas Solubilis*, Soluble Ferric Pyrophosphate, a scale preparation is official in the United States Pharmacopœia, which is a twin brother of the "phosphate" described above, the mode of preparation being identical, except that sodium pyrophosphate is substituted for the ordinary orthophosphate. The present scales are apple-green in color, freely soluble, of little taste, and perfectly bland. They constitute, therefore, a favorite form for giving iron. Chemically, here, as also with the other "phosphate," the exact relation between the two acid and basic radicals represented in the two salts conjoined in the preparation is not known. Dose, from 0.12 to 0.30 gm. (gr. ij. to v.) three times a day, in pill or solution.

Passing from the scale preparations, other ferric compounds are as follows:

*Ferric Hypophosphate*:  $\text{Fe}_2(\text{H}_2\text{PO}_2)_6$ .

The salt is official as *Ferri Hypophosphis*, Ferric Hypophosphate. It is a grayish-white powder, of little taste, permanent in air, only sparingly soluble in water, and insoluble in alcohol. It was introduced into medicine as a means of combining the virtues of a hypophosphate, as such, with those of iron. From the point of view of its qualities as a chalybeate, it is mild in operation, but feeble in effect. Dose, from 0.30 to 0.65 gm. (gr. v. to x.) three times a day, in powder or pill.

*Ferric Valerianate*:  $\text{Fe}_2(\text{C}_8\text{H}_7\text{O}_2)_6$ .

This salt is official as *Ferri Valerianas*, Ferric Valerianate. It occurs as a fine, tile-red powder, insoluble in cold water, decomposed by boiling water, freely soluble in alcohol. It has little taste, but smells faintly of valerianic acid. It is designed to yield the double virtues of a valerianate and a chalybeate, but so far as the latter purpose is concerned it is feeble. Dose, from 0.06 to 0.20 gm. (gr. i. to iij.).

The remainder of the iron salts, again, form a natural group. They are all ferric salts of the stronger so-called mineral acids, and are characterized by free solubility in water, and the possession of intensely strong astringent, or even, most of them, styptic, qualities. Their taste is harsh and puckery, with a combined, strong, inky, and acidulous flavor—on the whole, very decidedly disagreeable. With the exception of the ammonio-sulphate, they yield solutions of a color ranging from a golden-yellow to a deep orange or reddish-brown. They comprise the

most powerful representatives, both of the chalybeate and hæmostatic virtues of iron, and in overdose are capable of producing irritant poisoning.

*Ferric Chloride*:  $\text{Fe}_2\text{Cl}_6 \cdot 12\text{H}_2\text{O}$ .

Ferric chloride, commonly called also *sesquichloride* and *perchloride*, is the most powerful known combined chalybeate and styptic, and has the qualities mentioned above developed to the highest degree. It is official as follows:

*Ferri Chloridum*, Ferric Chloride. Iron wire is treated with dilute hydrochloric acid, whereby ferrous chloride forms, with effervescence of hydrogen. The solution of the ferrous salt is then treated with additional hydrochloric acid, followed by nitric acid, by which means the ferrous is converted into the ferric chloride. The resulting solution, which under the details of the process is hot and concentrated, becomes a crystalline mass on cooling. Ferric chloride, thus derived, is in lumps of crystalline texture, orange-yellow in color, without smell, but of a harsh, chalybeate, and sour taste. It deliquesces with great readiness, dissolves freely in water, and is also soluble in alcohol and ether. The salt is convenient for ordering in solution for styptic purposes; it is a powerful but harsh hæmostatic. Applied to a bleeding part it forms, with the coagulable elements of the part, a reddish, slimy, pultaceous slough—an operation entailing a good deal of irritation. Because of such irritation, the so-called subsulphate of iron, which irritates much less, while it is hardly inferior in styptic power, is commonly preferred. If the chloride be used, and the bleeding area is small, as in the case of hemorrhage from a tooth socket, a concentrated application may be made by taking a drop or two of a deliquesced sample, or by mixing a small fragment of the solid stuff into a paste with a very little water. For more extended applications, solutions may be ordered of strengths ranging from five to twenty per cent., or so. Strong solutions, even so strong as fifty per cent., have been used to inject varicose aneurisms, but in some instances with fatal consequences.

*Liquor Ferri Chloridi*, Solution of Ferric Chloride. This is an original solution wherein ferric chloride is formed exactly as described above. It contains 37.8 per cent. of anhydrous salt, with some free hydrochloric acid, and is a dark-reddish fluid. It may be used as a strong solution for styptic purposes, or in doses of a few drops, very largely diluted, as a chalybeate medicine, but its essential purpose is to afford the preparation next to be described.

*Tinctura Ferri Chloridi*, Tincture of Ferric Chloride, "Muriated Tincture of Iron." The above solution of the chloride is diluted with three times its own volume of alcohol, and the mixture is ordered to be kept before dispensing for at least three months. The object of the latter requirement is to afford time for a slow reaction that takes place between the free hydrochloric acid derived from the original iron solution and the alcohol, whereby an ethereal body is formed, which imparts the peculiar flavor to the tincture, and is commonly accredited—perhaps justly—with having something to do with the somewhat peculiar effects of this preparation. Tincture of ferric chloride is a clear, yellowish-brown fluid, of a rough, astringent, acid, and ferruginous taste. It is decomposed by alkalies, alkaline earths and their carbonates, astringent vegetable infusions, and mucilage of acacia. In its effects it is strong enough in ferric chloride to be locally styptic, and, if swallowed in considerable quantity, to set up irritant poisoning. Its almost sole application is as a chalybeate medicine, in which rôle it is unsurpassed. Besides being of avail in anæmia and chlorosis, it often shows marked power in the individual diseases—acute tonsillitis, diphtheria, scarlet fever, and erysipelas—if given boldly in full doses. Moderate doses, furthermore, will often seem to oppose, so far as medicines can, the progress of kidney degeneration. In prescribing this tincture it must be borne in mind that it is a powerful medicine; that even in moderate doses it

tends to blacken, if not to injure, the teeth, to irritate the stomach, and constipate the bowels, while in large doses it may cause, in addition, headache and urino-genital irritation. Yet in the acute diseases mentioned above, in which large doses are so commonly prescribed, the medicine is remarkably well borne. The dose of the tincture ranges from  $\mathfrak{ij}$  to  $\mathfrak{x}$ , or so, three times a day, in anæmia, to a teaspoonful, or more even, every hour or two, in the grave diseases requiring full dosage. The medicine must be well diluted, at least fourfold, with water, and the addition of some glycerin—about twenty-five per cent. of the potion as swallowed—remarkably disguises the harsh, unpleasant taste of the draught without affecting its efficiency. The dose should be sucked through a glass tube and the mouth well rinsed after the swallowing, and the administration should be preferably a while after meals rather than before. In anæmia good results often follow the giving of small and copiously diluted doses of the tincture—two drops diffused through a tumblerful of water. And thus administered, the medicine is practically freed from the objectionable taste and irritant action on the stomach which often preclude its use in larger dosage.

*Basic Ferric Sulphate:*  $\text{Fe}_2\text{O}(\text{SO}_4)_2$ .

This salt closely resembles the chloride in intense styptic quality, yet differs from the same in the advantageous way of being decidedly less irritant. It is official in the United States Pharmacopœia only in an original solution, as follows:

*Liquor Ferri Subsulphatis*, Solution of Ferric Subsulphate, "Monsel's Solution." Ferrous sulphate in a fixed proportion is added to a mixture in fixed proportion of sulphuric and nitric acids, at the boiling temperature. Conversion of the ferrous to the ferric sulphate results, but, by virtue of the proportion of sulphuric acid taken, it is the basic salt that forms. After the reaction is complete the solution is brought, by the addition of distilled water, to the standard strength—a strength "corresponding to about 13.6 per cent. of metallic iron" (U. S. P.). This solution is a deep ruby-red fluid, analogous in all general characteristics to the solution of the chloride. It is especially intended and used as a styptic, in which capacity it is pre-eminent.

Solution of the subsulphate may be applied clear to parts within reach; may be swallowed in ten-drop doses, well diluted, in hæmatemesis, and inhaled in atomized spray, in a two-per-cent. aqueous dilution, in hæmoptysis. The solution is also, of course, a possible chalybeate medicine, but, having no especial advantage over the tincture of the chloride, is rarely used for its medical virtues. The dose would be ten drops or so, largely diluted. This solution is the one formerly known as "solution of persulphate of iron"; and is dispensed whenever such solution is prescribed.

*Normal Ferric Sulphate:*  $\text{Fe}_2(\text{SO}_4)_3$ .

The normal sulphate differs, medicinally, from the basic only in being more irritant in its local effects. It is official in the United States Pharmacopœia for pharmaceutical purposes only, and in the following original solution:

*Liquor Ferri Tersulphatis*, Solution of Ferric Sulphate. This solution is made in precisely the same manner as the foregoing, only with such proportion of the ingredients as to yield the normal instead of the basic sulphate. It is of a strength "corresponding to about eight per cent. of metallic iron" (U. S. P.). It is important as being the preparation out of which ferric hydroxide is made, both when this compound is called for as an antidote to arsenic, and also when it is required for the making of the scale preparations of iron, as already seen. This solution is efficient as a chalybeate and as a hemostatic, but, having no advantages for such application, is rarely so used.

*Ferric Nitrate:*  $\text{Fe}_2(\text{NO}_3)_6$ .

This salt is substantially an unnecessary duplicate of its congeners just considered. Like the ferric sulphates,

it is official in the United States Pharmacopœia only in an original solution, as follows:

*Liquor Ferri Nitratis*, Solution of Ferric Nitrate. Fresh and moist ferric hydroxide is treated with nitric acid, and the resulting solution of ferric nitrate is brought to standard strength ("about 6.2 per cent. of the anhydrous salt") by the addition of distilled water. The solution is a clear, amber or reddish-colored liquid, sour and styptic in taste. It has been given as a chalybeate, in doses of from ten to twenty-five drops.

*Ammonio-ferric Sulphate:*  $\text{Fe}_2(\text{NH}_4)_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$ .

The salt is official under the title *Ferri et Ammonii Sulphas*, Ferric Ammonium Sulphate, "Iron Alum." It has the chemical structure and, physiologically, the peculiar strong astringency, without excessive irritation, of the true alums. It occurs in octahedral crystals of a delicate lilac or violet color, which dissolve freely in water, but are insoluble in alcohol. It is used in strong solution, as a styptic, or internally, as a combined astringent and chalybeate, in cases of anæmia with passive discharges. Dose, from 0.30 to 0.65 gm. (gr. v. to  $\mathfrak{x}$ ) three times a day.

Besides the foregoing official preparations there are numerous others, not official either because now dismissed from the Pharmacopœia as obsolete, or because not deemed worthy of recognition, or because newly proposed. Of the first class, two ferrous salts were dismissed in the last (1890) revision of the United States Pharmacopœia, namely, *ferrous bromide* and *oxalate*. The *bromide* used to be official in a syrup which was substantially a duplicate in all ways of the syrup of the iodide, and the *oxalate* was official as the salt itself. *Ferrous oxalate* is a lemon-yellow crystalline powder, practically insoluble in water. It was proposed for chalybeate use on the strength of an assertion that it does not constipate, but it never found favor. It may be given in doses of a few grains.

*Dialyzed iron* at one time had considerable vogue in medicine, although never recognized by the United States Pharmacopœia. As a chalybeate it is bland, but feeble, and as an antidote to arsenic—its other possible application—it is considered inferior to the "hydrated oxide with magnesia," on the score that the insoluble compound that it forms with the arsenical is less stable in the presence of acids.

Dialyzed iron is substantially a solution in water of ferric oxychloride, whose composition varies from  $\text{Fe}_2\text{Cl}_6$ ,  $12\text{Fe}_2\text{O}_3$  to  $\text{Fe}_2\text{Cl}_6 \cdot 95\text{Fe}_2\text{O}_3$ . It is properly made by precipitating an aqueous solution of ferric chloride with water of ammonia, shaking until the precipitate redissolves (formation of oxychloride), and then dialyzing over water, continuing the dialysis, with frequent changing of the water, so long as any traces of hydrochloric acid appear. The product is then assayed, and, by addition of water, is brought to the standard strength of ten per cent. of dry oxychloride. Much of the dialyzed iron in market, however, is made not in this way, but simply by adding fresh ferric hydroxide to a solution of ferric chloride so long as it continues to dissolve, and then filtering. Such preparation is, of course, properly not *dialyzed iron* at all.

Genuine dialyzed iron is a clear, reddish-brown solution, odorless, practically tasteless, and perfectly bland and innocent. Any decidedly ferruginous or styptic taste probably means a sham specimen. The true article mixes in all proportions with distilled water, alcohol, glycerin, and simple syrup; but upon admixture with alkalis, many salts—notably sodium chloride—and most organic matters, it suddenly transforms itself into a soft gelatinous mass, in color and consistence much resembling clotted blood. Such reaction must inevitably ensue on swallowing, and in the colloidal state resulting the iron is incapable of absorption. What of dialyzed iron ever gets access to the blood must, therefore, be through some chemical attack upon it by the alimentary juices, with the development of new and soluble iron

compounds. The dose of dialyzed iron must be large if any effect at all is to be expected—at least a teaspoonful of the usual ten-per-cent. solution three times a day. As an antidote to arsenic, teaspoonful doses should be given every five minutes; and since now gelatinizing is of advantage, some common salt should follow each dose.

Dialyzed iron has been injected hypodermatically, but in some instances with the following of abscess at the site of puncture.

A distinct class of preparations is afforded by certain compounds of iron with *proteid* substances, designed to furnish iron in a condition allied to the "organic" iron of hæmoglobin, and this because of the notion that ordinary iron preparations are not capable of assimilation (see *ante*). Of these preparations the most important are those containing iron as an *albuminate* or a *peptonate*.

By reaction of solution of ferric chloride upon albumin *ferric albuminate* forms, which precipitates from the solution by addition of a solution of common salt. The precipitated albuminate, washed and dried, appears as a brown powder, soluble in water, especially under slight acidulation with hydrochloric acid. The preparation is bland, and may be prescribed as a chalybeate in doses of from 1.3 to 1.95 gm. (gr.  $\mathfrak{xx}$ . to  $\mathfrak{xxx}$ .), to be taken in pill or dissolved (freshly) in water. In this preparation the iron is not in the condition of "organic" iron, for a solution of the albuminate precipitates with alkaline sulphides the same as does a solution of an ordinary salt of iron.

*Ferric peptonate* can be obtained in the form of dried scales, resembling in character the scale preparations of ferric citrate (see *ante*). A solution of freshly peptonized albumin is treated with dialyzed iron under certain special pharmaceutical manipulations, and from the solution of ferric peptonate finally obtained scales are prepared in the usual way. These scales are brown in color, contain about one-quarter of their weight of iron, and dissolve slowly in cold water. They make a bland chalybeate, in which, however, as in the case of ferric albuminate, the iron is in "inorganic" and not "organic" condition.

Under the name of *ferratin* there has been offered a preparation of iron made to imitate the normal ferratin discovered by Schmiedeberg in the liver of the hog. Artificial ferratin is made by reaction of albumin with a double tartrate of iron and one of the alkali metals. The preparation is in the form of a brownish powder, almost insoluble in water but soluble in alkaline liquids. It contains from six to eight per cent. of iron. It is bland and may be given, as a chalybeate, in doses of a few grains several times daily. It is claimed that in ferratin the condition of the iron is certainly very near to that of natural "organic" iron, but yet the preparation reacts with the hæmatoxylin test, which true "organic" iron does not do.

*Carniferrin* is a preparation closely allied to ferratin in its properties and reactions. It is a compound of iron with phosphocarnic acid. It is in the form of powder, tasteless and bland; is soluble in alkaline fluids, and may be given as a chalybeate in doses of a few grains. It contains about thirty per cent. of iron.

*Ferralbumose* is another preparation in form of powder, obtained by precipitating with a solution of ferric chloride a solution of albumose derived from meat by treatment with artificial gastric juice.

The various proteid preparations of iron have the certain merit that they do not upset the stomach and that they are readily absorbed. They are, however, comparatively expensive, and it is not demonstrated that they cure chlorosis any more effectively than well-selected preparations from among the pharmacopœial list.

III. GENERAL THERAPEUTICS OF IRON COMPOUNDS.—Excepting certain special applications of individual compounds, the therapeutics of iron comprises the internal use for the cure of anæmic conditions, and the local employment for astringent or styptic purpose. Concerning the two applications, the following practical points are to be made:

*Anæmia*.—1. Except in pernicious anæmia, iron proves so serviceable that, given an anæmic state, the medicine is commonly held to be indicated, unless there be either fever or a tendency to active hemorrhage—conditions apt to be aggravated by iron. 2. In the matter of choice of preparations, in general, the astringent chalybeates are more powerful than the bland, but yet it will be wiser to try the latter kind first if either the stomach be over-irritable, the bowels strongly prone to constipation, the teeth fragile, or the patient of careless habits; or if, as with children, the disagreeable taste of the astringent preparations be particularly obnoxious. On the other hand, the astringent chalybeates are especially advantageous when the appetite is poor and yet the stomach is not unduly sensitive, or when there is general laxity of tissue, or a tendency to passive fluxes or hemorrhages. 3. In particular, concerning the preparations, if an astringent be wanted, the tincture of the chloride answers every purpose as a fluid form, and the dried sulphate (ferrous) as one for giving in solid form in pill. If a bland compound be required, there may be prescribed, in powder, reduced iron and the saccharate carbonate; in pill, reduced iron, pills of the carbonate, "Blaud's pills," and the citrate; and in solution, the potassio-tartrate or the pyrophosphate, with the others of the scaled preparations as substitutes. For the rest, the various compound salts and the fancy pharmaceutical preparations are often convenient, but are never indispensable. 4. The frequency of dosage is most conveniently fixed at three times a day, and the doses, as already given, are intended for such frequency. But in exceptional uses of iron, as of the tincture of the chloride in diphtheria, the frequency will be far different—according to the severity of the case, even to hourly administration, day and night. 5. The timing of the doses is best arranged to be at meal-hours, the administration to be rather after than before eating. This certainly with the astringent chalybeates, but with the very bland the rule need not be enforced.

*To Arrest Hemorrhage*.—1. In general, it must be remembered that arterial hemorrhage belongs by right to the domain of surgery, and that medicinal hæmostatics are only proper when the vessel is either too small for mechanical measures or is inaccessible. This rule needs especial observance in connection with the iron styptics, for if they fail to stop the bleeding the surgical search for the bleeding point, through the indiscriminately slough-obscured tissue resulting from the styptic application, is made exasperatingly difficult. Furthermore, this same slough caused by the styptic seriously interferes with speedy healing of the wound. 2. Of the styptic preparations the official solution of the subsulphate is generally the best, because the least irritant; but if extreme power be required, and the area to be subjected to the application is small, a drop or two of the deliquesced chloride may be allowed.

The individualized applications of iron compounds are of the hydroxide, as an antidote to arsenic; of ferrous sulphate, as a disinfectant; of the tincture of the chloride as a medicine of peculiar virtues; of the solution of ferric sulphate for purposes of pharmacy, and of the ammonio-sulphate as a pure astringent.

Edward Curtis.

<sup>1</sup> Willcocks: The Practitioner, vol. xxxi., pp. 7 and 94.

IRONDALE SPRINGS.—Preston County, West Virginia.

POST-OFFICE.—Independence.

ACCESS.—Via Baltimore and Ohio Railroad to Hardman's Siding, one and one-half miles west of Independence, thence by the Iron Valley Railroad three and one-half miles to the springs.

The Irontdale Springs occupy a very attractive location about 1,200 feet above the sea-level, but the place is not at present used as a resort. The water is bottled and used commercially, being recommended by physicians in many of the large Eastern cities. It has been analyzed