

A more recent analysis made by Dr. Pons gives a somewhat different result, which is as follows:

|                             | Gms. per Litre. |
|-----------------------------|-----------------|
| Sulphate of calcium.....    | 1.300           |
| Chloride of sodium.....     | .020            |
| Carbonate of magnesium..... | .150            |
| Alumina.....                | .000            |
| Carbonate of calcium.....   | .008            |
| Sulphate of iron.....       |                 |
| Carbonate of iron peroxide  | .198            |
| Silica.....                 |                 |
| Nitrogen or organic matter  |                 |
| Total.....                  | 1.685           |

The Tigre Spring has not the volume of the others, but the bathing facilities are also good, the building at this spring containing separate apartments for men and women. The water is colder and has a larger amount of sulphate of iron.

The curative powers of the waters of these springs have long been known by the people of Cuba and they have been acknowledged also by the medical profession. In fact, they enjoy almost as much popularity as do those of San Diego. Dr. Pardini, resident physician and medical director of the bathing establishment at Madrugá Springs, has devoted much attention to the treatment of disease by these waters, and has furthermore published his experiences; I can therefore do no better than quote him. He finds the waters of most benefit in various forms of anemia, and he has published a series of cases in which the blood count has rapidly risen under their use from 3,200,000 to 4,000,000, or even 5,000,000, in less than two weeks.

Although it is well known that cold sulphur water baths are not generally indicated in the treatment of rheumatic conditions, it is nevertheless true that very few sufferers from affections of this nature have failed to derive some benefit from a course of treatment at these springs. Almost all the conditions coming under the heads of arthritis, scrofula, and herpetism seem to improve under their use. The records show numerous cases of bronchitis, dyspepsia, neuralgia, cholelithiasis, cystitis, etc., in which a cure has resulted from a course of treatment at this establishment. The next most common condition among the patients coming to these springs is the group of diseases termed "herpetism." The effect of the treatment on these troubles is truly remarkable, a cure sometimes following a short series of baths. The best results are obtained in the dry form of diseases of the skin. The baths are of course contraindicated during the acute or active period of these affections.

N. J. Ponce de Léon.

MADURA FOOT. See *Actinomyces*.

**MAGNESIUM.**—I. GENERAL MEDICINAL PROPERTIES OF COMPOUNDS OF MAGNESIUM.—Medicinally, magnesium is notable among metals for its inertness, its compounds exhibiting absolutely no specific effect individual to their basic radical. As a class, magnesian salts tend to be of low diffusion power and purgative, and, as compared with salts of potassium or of sodium with the same acid radicals, are less obnoxious to the taste and are generally milder in action.

II. THE COMPOUNDS OF MAGNESIUM USED IN MEDICINE.—The compounds of magnesium entering into preparations of the United States Pharmacopœia are the oxide ("magnesia"), hydroxide, carbonate, citrate, and sulphate.

*Magnesium Oxide*, MgO.—Magnesium oxide, the *magnesia* or *calcined magnesia* of common parlance, is easily obtained by exposing to a low red heat the so-called magnesium carbonate of pharmacy. According to special circumstances in the making, magnesia may be comparatively light or comparatively heavy. Two grades of magnesia thus occur in the markets, both of which are recognized by the United States Pharmacopœia. The *light* variety is officially entitled, simply, *Magnesia*, *Magnesia*, while the heavy grade is distinc-

tively styled *Magnesia Ponderosa*, Heavy Magnesia. The market brands of magnesia known, respectively, as *Henry's*, *Husband's*, and *Ellis's*, are examples of heavy magnesia.

Both varieties of the substance are in the form of an exceedingly fine white powder, very light in the case of the simple "magnesia," but dense in the case of the "heavy" article. In both cases the powder is odorless, but with an earthy, though not saline taste; is almost insoluble in water, and quite so in alcohol. In the case of the light variety, one part of magnesia mixed with fifteen parts of water and allowed to stand for half an hour will form a gelatinous magma of magnesium hydroxide. Heavy magnesia, on the contrary, does not readily react in this way. Magnesia slowly absorbs carbon dioxide from the atmosphere, and hence is directed by the Pharmacopœia to be kept in well-closed vessels.

Magnesia is strongly alkaline in respect of power of saturating acids, but, from its feeble solubility, shows scarcely a trace of the physiological properties exhibited by the soluble alkalis potassa and soda. Locally, magnesia has only the negative properties of a light, smooth, insoluble powder, but taken internally it neutralizes acids in the primæ viæ, and in the condition of a soluble magnesian salt thus resulting proves mildly laxative. As an internal medicine, in short, magnesia combines the properties of an antacid and a laxative, and is used exclusively for obtaining the effects of such virtues, either singly or together. Thus it may be prescribed as a simple laxative in constipation, a simple antacid in "sour stomach," or as a medicine of both virtues when, in the case of irritation of the intestines from the products of sour fermentation of the food, both an alkaline and a laxative effect are needed. When given as a simple laxative, it may be necessary to follow the dose of magnesia with a draught of lemonade to secure the necessary acid for the solution of the magnesia. As an antacid, magnesia is given in doses of from 0.65 to 2 gm. (gr. x.-xxx.) and as a laxative from 2 to 4 gm. (gr. xxx.-lx.). It is administered rubbed to a smooth cream with water or milk, and, in general, "heavy" magnesias are preferable to the "light" variety, by reason of their being more readily miscible with fluids. A mixture of magnesia with water, if not weaker than one part to fifteen, slowly gelatinizes on standing as stated above by formation of magnesium hydroxide, and if kept for a day or two may cake into lumps. And such concretions have been found, post mortem, in the human stomach, after habitual full dosing with magnesia.

*Magnesium Hydroxide*, Mg(OH)<sub>2</sub>.—Magnesium hydroxide, or *hydrate of magnesia*, is not official under its own form, but is an integral part of the composite so-called *carbonate* of the United States Pharmacopœia, and is what forms on allowing an aqueous mixture of magnesium oxide to stand, as above described. Magnesium hydroxide also occurs as a bulky gelatinous precipitate on decomposing, by caustic soda, magnesium sulphate (Epsom salt) in solution. Such a precipitate, washed and diffused in enough water to make the mixture of creamy consistence, constitutes a preparation that is exceedingly convenient as a means of administering magnesia, and which, if the hydroxide have been thoroughly washed and if the water employed for the dilution be perfectly pure, has a mild taste only, resembling that of milk, and will keep without change. A tablespoonful of such preparation is a full antacid dose for an adult, and two tablespoonfuls a laxative. Excellent articles of this preparation are in the market, under the title *milk of magnesia*.

*Magnesium Carbonate*, MgCO<sub>3</sub>.—Normal magnesium carbonate is not used in medicine, but under the title *Magnesi Carbonas*, Magnesium Carbonate, the United States Pharmacopœia makes official the well-known *magnesia alba* of the shops, a composite salt, which may be regarded as a compound, in variable proportions, of normal magnesium carbonate and magnesium hydroxide. The United States Pharmacopœia recognizes the composition represented by the formula (MgCO<sub>3</sub>)<sub>2</sub>, Mg(OH)<sub>2</sub>,

5H<sub>2</sub>O. This compound forms as a white precipitate on mixing solutions of magnesium sulphate (Epsom salt) and sodium carbonate. Collected, washed, and dried, it then appears as light, white, friable masses, or a light, white powder, odorless and tasteless, insoluble in alcohol, and almost insoluble in water, to which, however, it imparts a feebly alkaline reaction. When strongly heated, it loses water and carbonic acid gas, and is converted into magnesia. It is soluble in dilute acids with copious effervescence. Magnesia alba is made in two grades of density, technically known, respectively, as the *light* and *heavy*. The difference is said to be determined by the strength of the solutions used for the precipitation, concentrated solutions producing a heavy, and weak a light, product. The United States Pharmacopœia does not contradict the grades of density nor direct the process of manufacture, and, as a matter of fact, much of the commercial carbonate is prepared from dolomite.

Magnesia alba is practically identical in medicinal properties with magnesia, and may be used for the same purposes as that compound. The former is, however, the inferior remedy, first, because in its uniting with acids in the primæ viæ it necessarily evolves gas—an unpleasant circumstance; and secondly, because it needs to be given in double the doses of magnesia. Magnesia alba is administered, like magnesia, rubbed to a cream with water or milk, an operation which is greatly facilitated by first rubbing the powder with a little undiluted syrup.

*Acid Magnesium Citrate* (MgHC<sub>3</sub>H<sub>3</sub>O<sub>7</sub>).—This salt is official in the United States Pharmacopœia only in composite pharmaceutical preparations, as follows: *Liquor Magnesi Citratis*, Solution of Magnesium Citrate. The salt is formed in solution by adding the pharmacopœial carbonate to a solution of citric acid; the solution is flavored with syrup of citric acid, and the mixture being put into a twelve-ounce bottle, a small charge of acid potassium carbonate ("bicarbonate") is finally added, and the bottle instantly, thereupon, securely corked, the cork being fixed in place by twine. Reaction now takes place between an excess of citric acid present in the mixture and the potassium carbonate, whereby potassium citrate forms and carbon dioxide gas is evolved. But the bottle being stoppered, the gas is retained and remains in solution under pressure. Thus there is obtained an acidulous, sweetened, and actively effervescent aqueous solution of magnesium citrate, with a little potassium citrate. For the making, the quantity of 15 gm. (gr. cccxxxi.) of magnesium carbonate is ordered for each twelve-ounce bottleful. The solution, in taste, strongly resembles ordinary "lemon soda." *Magnesi Citras Effervescentes*, Effervescent Magnesium Citrate. To make this preparation, magnesium citrate is first formed by mixing magnesium carbonate and citric acid together with enough water to make a paste; the resulting mass is then dried, powdered, and mixed with some acid sodium carbonate, sugar, and additional citric acid, in powder. The whole is then dampened with alcohol, granulated, and again dried. The product is a white, coarsely granular salt, deliquescent on exposure to air, odorless, having a mildly acidulous, refreshing taste, and an acid reaction. It dissolves, with copious effervescence, in two parts of cold water, and is still more soluble in boiling water. It is insoluble in alcohol. This salt furnishes, substantially, in solid form, the ingredients of the foregoing solution of the citrate, and its solution, extemporaneously made, practically represents the official solution of the citrate. The preparation should be kept in well-closed bottles. The proportion of magnesian carbonate ordered for making the granulated compound is ten parts for one hundred of product.

Magnesium citrate is a simple saline purgative, mild in character, not disagreeable to taste, and generally very well borne by the stomach. The agreeable flavoring and effervescent property of the pharmaceutical representatives of the salt make the medicine an especially appropriate one for children, or for use in fevered states requiring the action of a purge. The official solution, it will be observed, comes only in twelve-ounce bottles.

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One bottleful is a purgative dose for an adult, but it is generally given only in wineglassful doses, sipped during the day, so that half a bottleful or more is consumed in the twenty-four hours. The fluid should be ice-cold, and the bottle should instantly be recorked after the drawing off of each dose, and kept, set upside down, in a cool place. But after once opening a bottle, the solution is not good for longer than a day. The granulated salt is to be given in doses of from one to three teaspoonfuls, dissolved, at the time of taking, in iced water, and the solution drunk during effervescence.

*Magnesium Sulphate* (MgSO<sub>4</sub>.7H<sub>2</sub>O).—Magnesium Sulphate—the well-known *Epsom Salt*—is official in the United States Pharmacopœia as *Magnesi Sulphas*, Magnesium Sulphate. It is a widely distributed salt, being an ingredient of sea-water, and of the water of some saline springs, and occurring also native. It is prepared for commerce in a number of ways. Magnesium Sulphate occurs in small, colorless, right-rhombic prisms, or circular needles, slowly efflorescent in dry air, odorless, having a cooling, saline, bitter and disagreeable taste, and a neutral reaction. It dissolves in one and a half parts of cold water and very freely in boiling water. It is insoluble in alcohol.

Magnesium sulphate is a typical saline purge, and, although of very disagreeable taste, is usually well borne by the stomach. In excessive dose, however, it induces nausea and vomiting in addition to profuse purging. In small, repeated doses the salt may prove slightly diuretic, and often in such doses it makes an excellent corrective in ordinary gastric derangement. A full purgative dose for an adult is 30 gm. (℥i.), but if taken, as preferably it should be, immediately upon rising in the morning, on an empty stomach, one-fourth of such amount may be sufficient for a purge. As a corrective, 0.30 gm. (gr. v.) may be given at a dose, repeated a number of times daily. The salt is best given dissolved in ice-cold lemon soda. Magnesium sulphate is by far the most commonly used saline purgative, and hence the non-distinctive phrase, *a dose of salts*, is commonly held to mean a dose of this particular salt. *Bitter purging salt*, and, simply *bitter salt*, are also common names for the sulphate. Epsom salt is an ingredient of the pharmacopœial *compound infusion of senna*.  
Edward Curtis.

**MAGNESIUM CREOSOTATE**, Kreosolid, creosote-magnesia, is a mixture of creosote and calcined magnesia which, being free from odor or taste of creosote, is a convenient means for administering this remedy. Dose gm. 0.5 (gr. viij.) three or four times a day.  
W. A. Bastedo.

**MAGNESIUM ICHTHYOLATE** is prepared by mixing 100 parts of recently calcined magnesia with 775 parts of ichthyol and evaporating to dryness. It is used with talc as an antiseptic dusting powder.  
W. A. Bastedo.

**MAGNESIUM LORETINATES**, basic and neutral, are substitutes for iodoform (see *Loretin*). The basic salt, MgI.O.C<sub>3</sub>H<sub>3</sub>N.SO<sub>3</sub>.5H<sub>2</sub>O, occurs as sparingly soluble yellow crystals, and the neutral salt, Mg(I.OH.C<sub>3</sub>H<sub>3</sub>N.SO<sub>3</sub>)<sub>2</sub>.7H<sub>2</sub>O, in readily soluble salmon-colored prisms.  
W. A. Bastedo.

**MAGNESIUM PHENOL-SULPHONATE**, or sulphophenate, occurs in the form of white, almost odorless needles of bitterish taste and alkaline reaction. It is soluble in 2 parts of water and 5 of alcohol, and in dose of 1 to 2 gm. (gr. xv.-xxx.) is recommended as a useful saline aperient similar to magnesium sulphate.  
W. A. Bastedo.

**MAGNETIC MINERAL SPRING.**—Vigo County, Indiana.

POST-OFFICE.—Terre Haute.  
This water is procured from an artesian well, 2,000 feet deep, at the foot of Walnut Street, in the city of Terre Haute. The point is accessible by any street-car

line in the city. A very elaborate natatorium and bath-house have been established. All kinds of hot, cold, vapor, swimming, or mud baths may be had under the direction of Dr. H. S. Tanner, of fasting fame. The water has been analyzed by Prof. W. A. Noyes, of the Rose Polytechnic Institute, with the following result:

| ONE UNITED STATES GALLON CONTAINS: |                   |
|------------------------------------|-------------------|
| Solids.                            | Grains.           |
| Silica.....                        | 0.71              |
| Alumina.....                       | 17                |
| Strontium chloride.....            | Trace             |
| Calcium chloride.....              | 16.27             |
| Calcium sulphide.....              | 2.07              |
| Calcium sulphate.....              | 27                |
| Calcium bicarbonate.....           | 21.94             |
| Calcium phosphate.....             | Trace             |
| Magnesium chloride.....            | 13.94             |
| Magnesium bicarbonate.....         | 16.44             |
| Lithium.....                       | More than a trace |
| Potassium chloride.....            | 3.35              |
| Sodium borate (borax).....         | Trace             |
| Sodium iodide.....                 | Trace             |
| Sodium bromide.....                | More than a trace |
| Sodium chloride.....               | 347.73            |
| Calcium phosphate.....             | 5.87              |
| Hydrogen sulphide.....             | More than a trace |
| Methane (marsh gas).....           | More than a trace |
| Total.....                         | 429.36            |
| Temperature of water, 50° F.       |                   |

The waters are mildly aperient, alterative, and tonic. They will be found useful in the disordered states usually benefited by this class of waters.

James K. Crook.

MAGNETISM, ANIMAL. See Hypnosis.

**MAGNOLIA and MAGNOLIACEÆ.** (*The Magnolia Family*).—This is a small family of trees and shrubs, mostly of warm temperate regions, many of them highly esteemed for their ornamental and fragrant properties. Some valuable timbers are yielded by the larger trees. The bark and herbage are generally permeated by volatile oil and amaroids, so that many of them have been rather extensively used as aromatic bitters. This is especially true of the bark of several species of *Magnolia*, containing *magnolin*, and *Liriodendron*, containing *liriodendrin*. Under the title of "*Magnolia*," *M. virginiana* L., *M. tripetala* L., and *M. acuminata* L., all of the Southern United States, were long official. Their bark is given in doses of 2 to 4 gm. (3 ss.-i.).

Henry H. Rusby.

**MAGNOLIA SPRING.**—Sumter County, Georgia.

Post-Office.—Plains of Dura.

Access.—Via Southwestern Railroad to Americus, thence by private conveyance to spring.

This spring has been known for many years, and has been steadily gaining in popularity as a place of local resort. No analysis of the water has been made, but it is said to contain iron and sulphur. There is some gas given off, probably carbonic acid. The iron is in sufficient quantity to impart its taste very distinctly to the water. The flow is large, being about fifty gallons per minute. There is a good bath-house, and visitors can find accommodations in private families.

James K. Crook.

**MALAKIN**, salicyl-para-phenetidin, salicylidene phenetidin (C<sub>9</sub>H<sub>9</sub>, OC<sub>2</sub>H<sub>5</sub>, N, CH<sub>2</sub>, C<sub>6</sub>H<sub>4</sub>, OH), is a combination of parphenetidin, the mother substance of phenacetin with salicylic aldehyde. It occurs in small odorless and tasteless silky yellow needles which are almost insoluble in water and cold alcohol but readily soluble in hot alcohol or ether. In a caustic soda solution it dissolves with intense yellow color; and with mineral acids or acid salts it is decomposed into its components, the salicylic aldehyde giving the well-known odor of meadow-sweet. About fifty per cent. of the compound is aldehyde. The urine contains salicyluric acid (Schmiedeberg).

Jacquet introduced malakin in 1893 as a remedy for acute rheumatism. As an antipyretic and sedative it resembles the other drugs of the phenacetin class, but it is

slowly absorbed, hence its action is slow and mild. It is split into its components by the gastric juice. As the dose of the drug is small, the amount of salicylic compound must be of little avail in acute rheumatism, though it may be suitable after the acute symptoms have subsided. Abernethy, of Edinburgh, finds it very useful as an antipyretic, but of only moderate value in rheumatism. Ottolenghi has proposed it as an anthelmintic. The dose is 4 to 6 gm. (3 i.-iss.) a day in capsules or powder.

W. A. Bastedo.

**MALARIA.** See *Plasmodium Malaria*.

**MALARIAL DISEASES.**—Malarial diseases consist, first, of *fevers*, intermittent or remittent, benign or pernicious, and, second, of a condition of chronic ill-health known as *malarial cachexia*.

The fevers are infectious in their nature, characterized by regular intermissions or less regular remissions, and are caused by the presence in the blood of certain protozoa or haemacytozoa, discovered by A. Laveran in 1880 and called by him the *plasmodium malaria*. The principal and perhaps the only way in which man is infected with this plasmodium is through the bite of a certain variety of the mosquito, known as the *Anopheles*. This *Anopheles* mosquito must previously have sucked the blood of a malarial patient and thus have become the "intermediate host" of the malarial parasite, which, having gone through with a certain necessary portion of its life and development within the organism of the mosquito, is now ready for re-introduction into and renewed life in the human blood.

From the earliest history of medicine to the present day malarial fevers have been known to be practically confined to marshy regions in certain portions of the temperate and tropical zones. They have been believed to be caused by emanations from the soil of such regions, known as "marsh miasms." The fact that the *Anopheles* mosquito which has sucked the blood of a malarial patient and which, after a certain length of time, bites a non-malarial subject, can thereby infect the latter with malaria has been proved beyond all question. But this does not establish the true origin of the malarial germ or parasite. Whence did the first man or the first mosquito obtain the malarial germ? This question is not yet answered by science. It is not unreasonable to suppose that the origin of the germ will yet be found to be in the soil or the water or the plant of a malarial region, beginning its existence outside of any animal body, even, though, perhaps, always introduced into man by the bite of the mosquito. Science has not yet spoken the last word on this subject.

For a full history and description of the malarial parasite the reader is referred to the article on *Plasmodium Malaria*, in Vol. VI. of this HANDBOOK.

The *mosquito*, as a disease-carrier, is fully treated of under the head of *Mosquitos in their Relation to Human Pathology*, in the present volume.

It therefore remains for this article to consider only the clinical history, the pathology, and the treatment of malarial diseases.

MALARIAL FEVERS are divided into (1) *ordinary or simple intermittent fevers*, which are benign, and (2) *irregular, remittent, or continued fevers*, which may be either benign or pernicious. The second class, whether benign or malignant, are now called "*æstivo-autumnal fevers*" (summer-autumn fevers), because in the neighborhood of Rome, where the organisms causing these fevers were first carefully studied, such fevers prevail in the summer and autumn alone. The only reason for retaining the name is because the variety of parasite giving rise to these continued or remittent fevers has, by most parasitologists, been designated as the *æstivo-autumnal parasite*.

While there is still a difference of opinion among authorities as to the number of species of malarial parasites that exist, there is a general consensus of opinion as to the existence of at least three well-defined species, viz.:

1st, the simple tertian; 2d, the simple quartan; and 3d, the *æstivo-autumnal parasite*, the latter being divided into two varieties: (a) the one producing true quotidian *æstivo-autumnal fever* and (b) the one producing the *æstivo-autumnal tertian*.

The first two species give rise to all the simple intermittent fevers and the third species to all the irregular, remittent, or continued fevers, whether benign or malignant. These different species can be distinguished from one another, by those familiar with the subject, by their size, growth, pigmentation, method of sporulation, etc.

**INTERMITTENT FEVER.**—This is the variety of fever characterized by a chill, fever, and sweat, occupying a part of the twenty-four hours, followed by an interval, before the next paroxysm, of some hours or days, during which there is no fever. The cause of a paroxysm of intermittent fever is the fact that a generation of malarial parasites, of sufficient number, in the blood corpuscles of the patient, arrive at maturity and sporulate. If these parasites be of the simple tertian species they will mature and sporulate every forty-eight hours or every other day. The terms tertian and quartan are misleading until we remember that the ancients counted every fever day both as a third or fourth day and as a new first day. A tertian, therefore, has one well day between two consecutive fever days, and a quartan has two well days between the fever days. Let us suppose that a man is infected with two separate generations of tertian parasites, maturing on successive days, which is a very frequent occurrence. Such a man has a double tertian intermittent, which means that he has a quotidian or daily fever, caused, however, by the tertian parasite, as is shown by the following diagram, where A and B represent the two generations.

Double tertian—

|             |   |   |   |   |   |   |   |   |
|-------------|---|---|---|---|---|---|---|---|
| A days..... | 1 | 2 | 3 | 2 | 3 | 2 | 3 | 2 |
|             | A | B | A | B | A | B | A | B |
| B days..... |   | 1 | 2 | 3 | 2 | 3 | 2 | 3 |

The quodidians may also be formed of a triple quartan, three generations of quartan parasites, A, B and C in the diagram, maturing on three successive days.

Triple quartan—

|             |   |   |   |   |   |   |   |   |   |
|-------------|---|---|---|---|---|---|---|---|---|
| A days..... | 1 | 2 | 3 | 4 | 2 | 3 | 4 | 2 | 3 |
|             | A | B | C | A | B | C | A | B | C |
| B days..... |   | 1 | 2 | 3 | 4 | 2 | 3 | 4 |   |
| C days..... |   |   | 1 | 2 | 3 | 4 | 2 | 3 | 4 |

There is no simple quotidian parasite. All quotidian fevers which are not *æstivo-autumnal* are either double tertians or triple quartans. A rarer form of duplication is that of the double quartan which gives us two successive fever days with an intervening free day. Mixed infections of simple tertian and quartan parasites may occur, causing much perplexity to the clinician, or a mixture of simple tertian and *æstivo-autumnal* parasites. In the latter case the simple form soon succumbs while the *æstivo-autumnal* survives.

**Symptoms.**—A paroxysm of intermittent fever presents three stages: the stage of chill, that of fever, and the sweating stage. The chill is sometimes preceded by prodromal symptoms of general uneasiness, yawning, stretching, possibly nausea or headache. With or without these prodromes, the patient then experiences sensations of cold which soon develop into slight rigors or into a prolonged, shaking chill, which may last but a few minutes or may be prolonged for an hour or more. During this stage, when the patient is shaking with cold, his nose and finger-tips blue and his extremities cold to the touch, the fever has actually begun and the temperature under the tongue may be as high as 104° or 105° F.

The chill is followed by sensations of heat and great heat of the surface of the body, although the temperature rises no higher than before. Headache and pain in the limbs are now common. The fever stage varies in

duration from an hour to six or eight hours. The termination of the fever is accompanied by more or less profuse sweating, lasting for from half an hour to two hours or more, during which stage the patient loses all his acute sufferings and quite commonly falls into a quiet sleep. On awakening he declares himself as feeling quite well, although perhaps a little weak. He continues to feel well until the onset of the next paroxysm.

*Herpes labialis* is quite a frequent accompaniment of intermittent fever and is of some diagnostic value because so rarely occurring in graver fevers.

*Dumb Ague*, as it is popularly called, is that form of paroxysm in which there is no chill, the hot stage being the first. This is more common among the older residents in malarial regions.

Sometimes an attack of intermittent fever will be so shrouded by intercurrent symptoms as to mislead the observer. There may be so much congestion of the bronchial mucous membrane, with short, difficult breathing, slight cough, fine mucous râles, and even a catching pain in the side, as to suggest the invasion of pneumonia. Violent vomiting and diarrhoea at the outset of the paroxysm may pass for a mere attack of cholera morbus. Severe pain in the back and limbs, often referred especially to one joint, which the patient is unwilling to move, crying out with pain when he does so, closely simulates rheumatism. In all such cases the unwary practitioner may flatter himself that he has been very successful in "breaking up" an attack of one kind or the other, only to find it recur in full force at the end of its appointed time.

In children under two years of age, and often in those of the age of three or four, there is no such thing as a shaking chill, and the first thing that may be noticed by the attendants is the fever. Careful observation, however, will detect the stage of chill by the fact of the lips and nails becoming blue, the nose and extremities cold, and the face pale and the eyes sunken. Sometimes the child will vomit two or three times in succession, and then it wants to go to sleep. After a little while the face grows flushed, and the surface of the body hot; the child becomes quite restless, throwing itself about in the bed; and in a certain number of cases convulsions supervene. Other children, again, pass from the cold to the hot stage without waking, but, on the contrary, fall into a profound sleep or semi-comatose condition, from which they gradually emerge during a brief sweating stage. Children are more liable to quotidian than to tertian attacks, and during the intermission they do not seem well, but are peevish, and perhaps drowsy, with a poor appetite and some disturbance of the stomach and bowels.

**Pathological Anatomy.**—Ordinary intermittent fever not being a fatal disorder offers no opportunity for post-mortem findings. An examination of the *blood*, however, reveals not only the presence of the malarial parasite, with its accompanying pigment, in the red blood corpuscles, but a loss of red corpuscles, sometimes very great, during the paroxysm of fever. This loss is usually, to a great degree, regained during the intermission, but few diseases cause so great anæmia as do malarial fevers, especially, of course, the prolonged forms. According to Kelsch, quoted by Marchiafava and Bignami in the "Twentieth Century Practice," vol. xix., "twenty days of fever may suffice to reduce the number of red corpuscles in a patient from five million in a cubic millimetre to one million or even less," and in pernicious infections, at the beginning of the disease, according to the same authority, "in a robust individual, in the course of one day only, the number may go from normal to one million per cubic millimetre."

There is never leucocytosis, unless it be dependent on the accidental presence of some inflammation; but, on the contrary, the number of leucocytes is greatly diminished. Pigmented leucocytes, which have swallowed the degenerated red cells with their contained parasites and pigment, are not infrequent.

The *spleen* is palpably enlarged during the paroxysm of fever, this enlargement subsiding during the intermis-