

## SULPHUROUS ACID AND THE SULPHITES.

**Acidum Sulphurosum.**—Sulphurous acid. A colorless liquid, having the odor of burning sulphur, and a sulphurous, sour, and somewhat astringent taste. Dose,  $\mathfrak{m}$   $\nu$ — $3$   $j$ .

**Sodii Hyposulphis.**—Hyposulphite of sodium. In large, colorless, transparent crystals, having a bitter, slightly alkaline, and sulphurous taste. It is soluble in one and a half part of water at  $60^{\circ}$ , and insoluble in alcohol. Dose, grs.  $\nu$ — $\mathfrak{D}$   $j$ .

**Sodii Sulphis.**—Sulphite of sodium. In white, efflorescent, prismatic crystals, soluble in four parts of cold and in less than one part of boiling water. It has a sulphurous taste, and a feeble alkaline reaction. Dose, grs.  $\nu$ — $\mathfrak{D}$   $j$ .

**Sodii Bisulphis.**—Bisulphite of sodium. Opaque, prismatic crystals, or a crystalline or granular powder, slowly oxidized and losing sulphurous acid on exposure to air, having a faint sulphurous odor and taste, and an acid reaction; soluble in four parts of water at  $60^{\circ}$  Fahr., and in two parts of boiling water. Dose, grs.  $iiij$ —grs.  $x$ .

**Potassii Sulphis.**—Sulphite of potassium. In white, opaque fragments or powder, very soluble in water. It has a saline and sulphurous taste. Dose, grs.  $iiij$ —grs.  $x$ .

**Magnesi Sulphis.**—Sulphite of magnesium. "A white, crystalline powder, gradually becoming oxidized on exposure to air, odorless, having a slightly bitter, somewhat sulphurous taste, and a neutral or slightly alkaline reaction." It is insoluble in alcohol but is soluble in twenty parts of water at  $60^{\circ}$  Fahr. Dose, grs.  $\nu$ — $\mathfrak{D}$   $j$ .

**ANTAGONISTS AND INCOMPATIBLES.**—The mineral acids—including sulphuric—decompose the sulphites and hyposulphites. All oxidizing substances are incompatible. These preparations have a great affinity for oxygen, and the sulphites readily become sulphates.

**SYNERGISTS.**—All remedial agents which arrest fermentative processes promote the therapeutical activity of sulphurous acid and the sulphites.

**PHYSIOLOGICAL ACTIONS.**—Sulphurous acid is a disinfectant and deodorizer. It attacks organic matter with energy, by virtue of its affinity for oxygen. It is very destructive to the lower forms of life, bacteria, fungi, etc. Sulphurous-acid gas inspired produces great irritation of the glottis, and an intensely suffocative feeling. In sufficient quantity it produces violent inflammation of the air-passages. As by combination with oxygen sulphuric acid is formed, the destructive effect ascribed to sulphurous acid is in reality chiefly due to sulphuric.

The sulphites exposed to the air rapidly absorb oxygen, and pass to the state of sulphates. The hyposulphites are more constant than the sulphites. In the stomach, by the acid of the gastric juice, these salts are in part decomposed and sulphurous acid is given off; in part they

are converted into sulphates. They are undoubtedly absorbed as sulphates, and are eliminated partly by the intestinal canal, but chiefly by the kidneys, as sulphates. The author demonstrated these facts soon after the publications of Dr. Polli led to an enthusiastic administration of these remedies in the zymotic diseases.

**THERAPY.**—Dilute sulphurous acid is one of the numerous local applications considered efficacious in *mercurial stomatitis*, *aphthæ*, *mucous patches*, *ulcers of the tonsils*, and in *diphtheria*. In all of these affections the diluted acid may be applied directly to the diseased surface by a mop, a sponge-probang, or in the form of spray. A more easily-managed application is a solution of the sulphite of soda ( $3$   $j$ — $3$   $j$  in water). Sulphurous-acid spray is a good local application in *syphilitic* and *tuberculous laryngitis*. Cases of *chronic bronchitis*, with profuse expectoration of a fetid character (bronchorrhœa), are sometimes improved by inhalations of sulphurous-acid gas, or of the acid in the form of spray. Notwithstanding the confident assertions of Dewar, there is no reason to suppose that sulphurous-acid-gas inhalations can actually cure or even arrest the progress of *phthisis*.

In certain kinds of *vomiting* of a yeast-like material, especially when *sarcina* are present in the vomited matters, the sulphites are often curative. Vomiting of *acid matters*, *pyrosis*, and *indigestion*, due to *acid fermentation* of the starchy and saccharine elements of the food, are relieved by sulphurous acid ( $\mathfrak{m}$   $\nu$ — $3$   $j$ , well diluted), or, but less efficiently, by sulphite of soda ( $\mathfrak{D}$   $j$ — $3$   $j$ ). The result in these cases is, no doubt, due to the power which sulphurous acid has of arresting the fermentation processes.

After the publications of Dr. Polli, of Milan, extravagant expectations were entertained of the curative power of the sulphites in the *zymotic diseases* generally, and in all the various forms of *septic diseases*. Unfortunately, these expectations have not been realized, and the sulphites are no longer employed with this view in any of these disorders; and, as Braun and Bernatzik have shown, they are not only nauseous in taste but they produce more or less irritation of the intestinal canal, and do not in any case modify the course of the disease.

*Externally* applied, sulphurous acid and the hyposulphites and sulphites are in some maladies extremely serviceable.

As a *disinfectant* and *deodorizer* sulphurous acid is at the same time efficient, easily managed, and economical. Sulphurous acid is the product of the combustion of sulphur in the open air; hence, to disinfect rooms, it is necessary only to close all egress and fill them with the fumes of burning sulphur. It is to be remembered that sulphurous acid is injurious to many fabrics: the sulphites are colorless and soluble.

Sulphurous acid is an efficient application to *chilblains*:  $\mathfrak{R}$  Acid. sulphurosi,  $3$   $iiij$ ; glycerini,  $3$   $j$ ; aquæ,  $3$   $jss$ .  $M$ . In *parasitic skin-diseases*, the sulphites, hyposulphites, and sulphurous acid, are used to

destroy the parasites. The following formula is employed by Startin in these affections: ℞ Sodii hyposulphitis, ℥ iij; acid. sulphurosi dil., ℥ ss; aquæ q. s. ad ℥ xvi. Fox recommends the following formula in *tinea versicolor* and in *pruritus vulvæ*: ℞ Sodii hyposulphitis, ℥ iv; glycerini, ℥ ij; aquæ destil. ad ℥ vi.

Sulphurous acid is an excellent application to *ill-conditioned, sloughing, or gangrenous wounds*. It was found to be very successful in these cases, at the English hospital at Metz, during the Franco-German War.

Authorities referred to:

- BARTHOLOW, DR. ROBERTS. *The Lancet and Observer*, Cincinnati, 1865.  
 BRAUN AND BERNATZIK, PROFS. *Wiener med. Wochenschrift*, Nos. 94-99, 1869.  
 BIRD, DR. ROBERT. *The Practitioner*, vol. ii, p. 247.  
 DRYSDALE, DR. CHARLES R. *The Lancet*, July 24, 1869.  
 DEWAR, DR. JAMES. *On the Application of Sulphurous-Acid Gas to the Prevention, Limitation, and Cure of Contagious Diseases*, Edinburgh, 1866.  
 FERGUS, MR. *The Lancet*, November 26, 1860.  
 FOX, DR. TILBURY. *Skin Diseases*, New York, 1873.  
 MILLER, DR. *Edinburgh Medical Journal*, September, 1869.  
 POLLI, PROF. *Various Papers. Abstracts in Schmidt's Jahrbücher der gesammten Medicin*, etc.  
 PURDON, DR. H. S. *British Medical Journal*, May 9, 1868.

**Sulphur and Sulphides (Sulphurets).**—*Potassa Sulphurata*. Sulphurated potassa has a brownish-yellow color when freshly broken. It dissolves in water, with the exception of a slight residue, and forms an orange-yellow solution, which exhales the odor of hydrosulphuric acid. Dose, gr. j—gr. v.

*Calx Sulphurata*.—Sulphurated lime. A greenish-gray powder, having a strong odor of sulphureted hydrogen. Dose, gr. j—gr. v.

**ANTAGONISTS AND INCOMPATIBLES.**—Solutions of the sulphides are decomposed by the mineral acids, sulphureted hydrogen being liberated and sulphur precipitated. Solutions of the metals, generally, are also incompatible with the sulphides of potassium and calcium, for, in the decomposition which ensues, the metals are precipitated in the form of insoluble sulphides. Hence it is that these preparations have been proposed as antidotes to the metallic poisons. Chlorine-water, chlorides of sodium and potassium, sulphate of iron, etc., are chemical antidotes.

**SYNERGISTS.**—All agents promoting waste are, therapeutically considered, synergistic. Alkalies favor their action, both chemically and physiologically.

**PHYSIOLOGICAL ACTIONS.**—These preparations have a decidedly nauseous taste and smell, and are somewhat irritant. In the stomach they excite a sense of heat, and in sufficient quantity cause gastro-enteritis, with all the attendant symptoms belonging to irritant poisons. Dis-

agreeable eructations of sulphureted hydrogen take place when they are administered medicinally, owing to the reactions in the presence of an acid alluded to above. They increase secretion from the gastrointestinal canal, and are laxative. The fetor of the stools is increased by their use, a result not altogether due to the evolved sulphureted hydrogen, but to the increased action of those intestinal glands concerned in elimination. As the sulphides pass easily to the state of sulphates by the action of oxygen, it may be assumed that a part of their physiological effects is produced by the latter salts. They, however, undoubtedly exercise a toxic action on the blood, impairing the red blood-globules, and increasing the amount of effete material. Emaciation, muscular weakness, and trembling, and a feeble circulation, are results of their use in large amount, or for lengthened periods. It is true that some acceleration of the pulse-rate and increase of secretion of the mucous surfaces follow their medicinal administration for a short period and in moderate doses; but the prolonged inhalation of sulphureted hydrogen, or the prolonged internal use of the sulphides, causes great anæmia, wasting, and debility.

**THERAPY.**—Although the sulphides are indicated as remedies when the secretions of the intestinal glandular appendages are deficient, they are too disagreeable to be prescribed under ordinary circumstances. The water of the well-known Blue Lick Spring, of Kentucky, which is almost identical in composition with the famous Harrogate, of England, may be substituted for the sulphides in many of the cases in which the latter are useful.

The Blue Lick water, like the Harrogate, is useful in *abdominal plethora*. A pint taken before breakfast is an *efficient laxative*, which is indicated in cases of habitual constipation from deficient secretion of the intestinal juices. Four ounces taken before each meal is an excellent remedy for *obesity*. *Engorgement of the pelvic viscera* in women, *hæmorrhoids* in both sexes, when due to torpor of the portal circulation, are relieved by the same agent. For these purposes the Blue Lick water may be taken for several weeks or even months, but its use should be discontinued when anæmia is threatened. In anæmic subjects, chalybeates and a generous diet should be conjointly administered. The author has observed excellent results from the prolonged use of this water in *glandular affections, hepatic, splenic, uterine, and of the prostate*.

A succession of *common boils, scrofulous and other abscesses*, are, it is said, made to mature, and the expulsion of the pus is favored by the use of the sulphides. When abscesses are threatened, and before matter is formed, the sulphides, it is claimed, may cause them to abort. Small doses (gr. ss—gr. j) frequently repeated (every hour or two) are said to be most effective under these circumstances.

**EXTERNAL USES OF THE SULPHIDES.**—A solution of the sulphide of

potassium (3 ss— $\bar{z}$  j) is an efficient application in *scabies*. An extemporaneous sulphide may be made by boiling one part of quicklime and two parts of sublimed sulphur in ten parts of water. With this solution the parts affected by *scabies* may be painted over, after preliminary cleansing with a warm bath. Sulphur-baths (solution of sulphide of potassium in water, as above mentioned) are very excellent applications in the *chronic* forms of *psoriasis* and *eczema*. The following formula is recommended by Fox in *scabies* and *prurigo*:  $\bar{R}$  Potassii sulphureti,  $\bar{z}$  vi; sapon. alb.,  $\bar{B}$  ij; ol. olivæ, Oij; ol. thymi,  $\bar{z}$  ij. M. A milder preparation is the following:  $\bar{R}$  Potassii sulphureti,  $\bar{z}$  iij; sapon. moll.,  $\bar{z}$  j; aquæ calcis,  $\bar{z}$  viij; alcohol,  $\bar{z}$  ij. M. Or the following:  $\bar{R}$  Potassii sulphureti,  $\bar{z}$  ss; aquæ calcis,  $\bar{z}$  xvj. M. For the relief of  *pityriasis* and  *parasitic skin-diseases*.

The sulphide of sodium (unofficial) being more stable, is better suited for the preparation of sulphurous baths. An artificial sulphurous water, in imitation of the *Barèges*, is made as follows:  $\bar{R}$  Sulphidi sodii, sodæ, sodii chloridi,  $\bar{a}\bar{a}$   $\bar{z}$  ij. M. Sig.: A sufficient quantity for one bath. The *Pommade de Barèges* of the French is constituted as follows:  $\bar{R}$  Sodii sulphureti, sodii carbonat.,  $\bar{a}\bar{a}$   $\bar{z}$  ij; axungiæ,  $\bar{z}$  ijss. M.

Sulphur-baths are frequently employed to favor the elimination of lead, in cases of *saturnine disease*. For this purpose, from three to five drachms of sulphide of potassium may be dissolved in sufficient water for a bath. A sulphide of lead is formed on the skin; but that the sulphur-bath promotes the elimination of lead by the sweat-glands more than a simple warm bath, seems hardly credible.

The disagreeable odor of the sulphides, in ointment or solution, may, it is said, be much modified by the addition of a little oil of anise-seed.

#### Authorities referred to:

FOX, DR. TILBURY. *Skin Diseases: Their Description, Pathology, etc.*, second American edition.

GUBLER, DR. ADOLPH. *Commentaires Thérapeutiques du Codex Medicamentarius*, Paris, 1868, p. 502.

LEWIS, LOUIS. *The Lancet*, March 14, 1874, p. 393.

MACPHERSON, DR. JOHN. *The Baths and Wells of Europe*, London, 1873.

RINGER, DR. SIDNEY. *A Handbook of Therapeutics*, New York, 1872, p. 66.

TROUSSEAU ET PIDOUX. *Traité de Thérapeutique et de Matière Médicale*, vol. ii, p. 863, et seq.

### SULPHUROUS MINERAL WATERS.

#### 1. NORTH AMERICA.

##### French-Lick Springs.

West-Baden Springs, Orange County, Indiana.

Indian Springs, Martin County, Indiana.

These waters contain carbonates of soda, potassa, magnesia, and lime, and chlorides of sodium, potassium, magnesium, and calcium,

and sulphates of soda, magnesia, lime, and potassa. The gases are sulphureted hydrogen and carbonic-acid gas.

Upper Blue-Lick Springs, Nicholas County, Kentucky.

Lower Blue-Lick Springs, Nicholas County, Kentucky.

Big-Bone Springs, Boone County, Kentucky.

Paroquet Springs, Bullitt County, Kentucky.

These waters are remarkable for the quantity of sulphureted hydrogen which they contain (from 1.02 cubic inch to 3.75). They are rich in the chloride of sodium (from 38.700 grains to the pint to 64.567 grains). They contain also chlorides of potassium, sodium, magnesium, and calcium, carbonates of soda, magnesia, iron, and lime, sulphates of soda, potassa, and magnesia, and appreciable quantities of iodides and bromides.

Alpena Well, Alpena County, Michigan.

This water contains the large quantity of 4.42 cubic inches of sulphureted hydrogen to the pint. The proportion of chloride of sodium is small (8.532 grains to the pint). The other ingredients are carbonates of soda, magnesia, iron, and lime, and sulphate of lime.

Sharon Springs, Schoharie County, New York.

Avon Springs, Livingston County, New York.

Mild sulphureted waters. The principal salt is sulphate of lime, which is found in the different springs, ranging from 11.687 grains to 13.95 grains to the pint (Sharon).

Yellow-Sulphur Springs, Montgomery County, Virginia.

The most important constituents of these waters are sulphates of lime, magnesia, soda, potassa, and alumina, and carbonates of lime, magnesia, and iron. The gas is carbonic acid and sulphureted hydrogen.

Greenbrier White-Sulphur Springs, West Virginia.

Salt-Sulphur Springs, Monroe County, West Virginia.

Red-Sulphur Springs, Monroe County, West Virginia.

These springs are nearly alike as respects the composition of their waters. They contain chlorides and sulphates, but their principal constituents are sulphate of lime, sulphate of soda, and sulphate of magnesia. The Greenbrier Spring and the Red-Sulphur Spring waters contain also a peculiar sulphur compound, in regard to the nature of which but little is known.

#### 2. EUROPEAN.

Harrogate, Yorkshire, England. Season from May to September.

These waters contain chlorides of calcium, magnesium, potassium, and sodium, carbonic-acid gas, and sulphureted hydrogen.

Llandrindod, Wales.

Saline, chalybeate, and sulphur waters; rich in chlorides, especially of sodium.

Strathpeffer, Ross-shire, Scotland.