MANGANUM.

Manganese.—*Mangan*, Ger. ; *manganèse*, Fr.

Mangani Oxidum Nigrum.—Black oxide of manganese. Dose, gr. ij—gr. x. In pill or powder.

Mangani Sulphas.—Sulphate of manganese. In colorless or pale rose-colored transparent crystals, freely soluble in water. Dose, gr. ij—gr. v.

Unofficial preparations :

Syrupus Ferri et Mangani Iodidi.—A pale straw-colored sirup. Dose, ♏ x — ʒ ss.

Ferri et Mangani Carbonas Sacch.—A tasteless, reddish-brown powder. Dose, gr. v—ʒj.

Syrupus Mangani Iodidi.—A sirup which corresponds in strength to the official sirup of the iodide of iron, and may be given in corresponding doses.

Besides the above, a carbonate, phosphate, tartrate, malate, and lactate have been proposed for use, but hitherto they have not attracted attention and are rarely employed. The official and unofficial preparations named above are all that, according to the present state of professional experience on the subject, will ever be required. It will be most convenient, however, to include with the manganic preparations the following :

Potassii Permanganas.—Permanganate of potassa. In needle-shaped crystals of a deep purple color. It is soluble in sixteen parts of cold water, and the solution has a deep purple to a rose-color, according to the state of dilution of the salt. Dose, gr. ss—gr. ij. In prescribing the permanganate, distilled water free from organic matter should be directed.

Physiological Actions.—The sulphate has an extremely disagreeable styptic and metallic taste ; the black oxide less so, and the saccharated carbonate is free from any taste except that of the sugar. The preparations of manganese are somewhat irritant to the gastro-intestinal mucous membrane, and the sulphate is emeto-cathartic in full doses. There seems to be no doubt that the sulphate has a decided cholagogue effect, for very large discharge of bile is a result of its cathartic action. In *small* doses the manganic salts promote the appetite and digestive function. They probably enter the blood as albuminates. The intimate association of manganese with iron throughout the economy of Nature is exemplified in the human body. They are found together in the blood, hair, bile, biliary concretions, and renal calculi. The proportion of manganese to iron in the red blood-corpuscles is as one to twenty. As an essential constituent of the blood, it undoubtedly has to do with the constructive metamorphosis of the body. Used in large doses and for a considerable period of time it produces effects analogous to those of zinc—progressive wasting and feebleness, a staggering gait

and paralysis (paraplegia). In toxic doses, according to the researches of Laschkewitsch, it causes in animals death by convulsions. In smaller doses it diminishes the pulse-rate, lowers the action of the heart, and lessens the blood-pressure. Like phosphorus, manganese induces acute fatty degeneration of the liver. When it is injected into the veins of animals, it causes tetanic cramp, dilatation of the pupil, exophthalmus, and death ; and after death the heart-muscle does not respond to electrical stimulation (Laschkewitsch).

Antagonists.—The preparations of manganese are not incompatible with the vegetable astringents. The salts of lead, silver, and mercury, and the caustic alkalies, are chemically incompatible with manganese.

Synergists.—Iron is synergistic as regards hæmatinic effects, and the salts of copper, silver, and zinc, as regards the effects on the nervous system.

Therapy.—Although manganese has not of itself been very useful in the treatment of *anæmia* and *chlorosis*, yet there is no doubt that its combination with iron much increases the efficacy of the latter. Some of the preparations named at the head of this article, especially the saccharated carbonate of manganese and iron, may be usefully prescribed in these diseases. Cachectic states arising from *syphilis, cancer, struma, gout, prolonged suppuration, chronic malarial infection*, etc., are successfully treated by the sirup of the iodide of iron and manganese.

Gastrodynia and *pyrosis*, according to Dr. Leared, are relieved by ten to fifteen grain doses of the black oxide—not the commercial article, but the oxide purified by washing with hydrochloric acid. In these disorders the effects of manganese are similar to those of bismuth (nitrate and carbonate), of zinc, and silver (oxide). Small doses of manganese (sulphate) may be usefully combined with iron and quinine when prescribed *to promote constructive metamorphosis.* ℞ Quininæ sulph., ferri sulph. exsic., mangani sulph. exsic., āā ʒj. M. Ft. pil. no. xx. Sig. : One pill three times a day. In *jaundice* of malarial origin, or from *catarrh* of the *biliary passages*, the author has seen excellent results from the use of manganese. ℞ Chinoidin., ʒ j ; mangani sulph. exsic., ʒij. M. Ft. pil. no. xx. Sig. : One three times a day in malarial jaundice. ℞ Fel. bovin. purif., ʒ j ; mangani sulph. exsic., ʒij ; resinæ podophylli, gr. v. M. Ft. pil. no. xx. Sig. : One three times a day in catarrhal jaundice. In the *disordered digestion of gouty subjects*, and to restore the activity of the assimilative functions after attacks of gout, manganese is most serviceable.

Manganese (chloride) has been used by Osborne with success in *hæmorrhage* (*epistaxis*), and the sulphate is one of the remedies for *chronic rheumatism, neuralgia, cholera*, and *syphilis.*

An ointment of the oxide (ʒ ij — ʒ j adeps suil.) has been used with

advantage in *tinea, scabies*, and other *chronic skin-diseases.* ℞ Mangani oxid., sulphuris, saponis dur., āā ʒ j ; adipis suilli, ʒ iij. M. Ointment for *porrigo.*

Actions and Uses of the Permanganate of Potassa.—This salt is a very powerful oxidizing agent, and yields up its oxygen readily in the form of ozone. Its use as an internal and external remedy is based on this chemical fact. That it parts with its oxygen so readily is held by some to demonstrate its entire inutility when administered by the stomach. Although it must instantly be decomposed on reaching the stomach, there are satisfactory reasons for believing that it exerts a favorable influence on certain diseases in which, theoretically considered, it may be indicated. The author has seen marked advantage from its use in the *dyspepsia* and *flatulence* so constantly attendant on obesity. It has also appeared to be very serviceable as a remedy for *an abnormal* and *excessive deposition of fat.* In the so-called *uric-acid diathesis* it favors the conversion of uric acid into urea, and thus prevents the formation of uric-acid calculi. Pain in the lumbar region, frequent micturition, acid urine, much brick-dust sediment, and intestinal indigestion, are associated symptoms relieved by the permanganate. Under the same conditions, it is probable *acute rheumatism* is developed, and to the action of the permanganate as an oxidizing agent is attributable the benefit which is sometimes obtained from its use in this disease. In *scarlatina* and *diphtheria* the permanganate is used with undoubted benefit, applied to the throat and taken by the stomach. In *erysipelas, puerperal fever, septicæmia*, it has been given with advantage. Lately it has been used with success as a remedy for the *bites of venomous snakes* and other *animal poisons*, applied locally and given internally. Drs. Ringer and Murrell have found it an effective remedy in the treatment of *amenorrhœa*, one or two grains being given in pill form three times a day. It is difficult to prepare the pills, and they are said to be liable to spontaneous combustion. For internal use the permanganate is best administered in pure distilled water, and the bottle containing the solution should be glass-stoppered. The dose for internal use is gr. ¼—gr. ij *ter die.*

Among the important uses of permanganate of potassa are its external applications as a *disinfectant.* It is a *deodorizer* as well as a disinfectant. It is very frequently used (ʒ j—Oj) to correct the fetor of *cancer, ulcers, caries, abscesses*, etc. It is used as an injection, or in the form of spray, to destroy the odor of the discharges and to alter the morbid action, in cases of *ozœna, otorrhœa*, etc. It is an elegant toilet preparation (gr. j—ʒ j) for destroying the *odor of a foul breath*, the *smell of the axilla*, and the *fetor of the sweat of the feet.* Its action is not lasting, and the effects must be maintained by frequent applications.

The permanganate of potassa in solution (gr. ij—ʒ j) is one of the numerous remedies prescribed in *gonorrhœa* and *leucorrhœa*, but it has no special advantages in these maladies.

When the permanganate is deoxidized it loses its rich purple color, becomes a dull red, and is reduced to the state of binoxide of manganese.

Authorities referred to :

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LASCHKEWITSCH, W. *Vergleichende Untersuchungen über die Wirkung der Mangan- und Eisensalze. Medicinische Centralblatt*, 1866, No. 24.

STILLÉ, DR. ALFRED. *Therapeutics and Materia Medica*, fourth edition, Philadelphia, 1874.

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CHALYBEATE MINERAL SPRINGS.

1. NORTH AMERICAN.

Bailey Springs, Lauderdale County, Alabama.

These springs contain carbonates of potassa, soda, magnesia, carbonic-acid gas, oxide of iron, etc.

Rawley Springs, Rockingham County, Virginia.

Carbonate of iron (0·203 grain) is the most important ingredient in these waters. They contain, also, carbonates of manganese, magnesia, lime, and lithia, and sulphates, etc.

Sweet Chalybeate Springs, Alleghany County, Virginia.

The name of this water is derived from its sweetish taste. It is highly charged with carbonic-acid gas, and contains sesquioxide of iron, with sulphate of lime (4·110 grains), sulphates of magnesia and soda, and chlorides of lime, sodium, magnesium, etc.

Rockbridge Alum Springs, Rockbridge County, Virginia.

Bath Alum, Bath County, Virginia.

These waters are remarkable for containing free sulphuric acid. They contain also sulphates of magnesia and lime, protoxide of iron, and carbonic-acid gas. The Bath Alum waters contain twice as much iron as the Rockbridge Alum.

Bedford Alum Springs, Bedford County, Virginia.

Similar in composition to the above, but contain a larger proportion of iron, and of the salts of potassa, magnesia, and lime.

Bedford Springs, Bedford County, Pennsylvania.

This water contains carbonate of iron (0·625 grain) associated with a large proportion of sulphate of magnesia (10 grains), and is, therefore, a laxative chalybeate.

2. EUROPEAN.

Bascombe, Bournemouth, Hampshire, England.

Chalybeate springs containing carbonic acid in combination.

Dorton, Buckinghamshire, England.

Contains sulphate of iron and is charged with carbonic acid. Requires dilution for drinking.

Hastings, Sussex, England.

Contains sulphates of iron, magnesia, lime, and soda.

Sandrock, Isle of Wight.

Is a strong aluminous chalybeate—41½ grains of sulphate of iron, and 31½ grains of sulphate of alumina in twenty ounces—and therefore requires dilution for drinking.

Tunbridge, Kent, England. Altitude, 289′; temperature, 50° Fahr.

This water contains one eighth of a grain of iron with carbonic acid, in twenty ounces.

Spa, Belgium. Altitude, 1,030′. Season, August and September. Temperature of water, 52° Fahr.

These waters contain carbonates of iron, manganese, soda, lime, and magnesia, etc., and are highly charged with carbonic acid.

Pyrmont, Waldeck. Altitude, 404′; mean annual temperature, 48·5° Fahr.

The quantity of carbonic-acid gas is unusually great in these waters. They contain sulphates of lime, soda, magnesia, and carbonates of iron, soda, magnesia, and lime.

Alexisbad, near Harzgerode, Germany.

Alexisbrunnen. Same.

Both contain iron and manganese in large quantity, and also carbonic-acid gas. The first named, being highly impregnated with chloride and sulphate of iron, is used for bathing, and the other for drinking.

Schwalbach, Nassau. Altitude, 909′. Season, June to September. Temperature, 64° Fahr.

According to the analysis of Fresenius, this valuable water contains bicarbonates of iron, manganese, soda, magnesia, and lime, sulphates of soda and potash, and chloride of sodium. It is very highly charged with carbonic acid.

St. Moritz, Upper Engadin, Switzerland. Altitude, 5,464′. Mean temperature of summer months, 51° Fahr.

These springs contain from ten to fourteen grains of solids in a pint, consisting of carbonates of lime, magnesia, manganese, iron, and soda, etc., and as much as 39·5 cubic inches of carbonic acid.

Therapy of Chalybeate Waters.—The uses of these waters are the same as the purely medicinal preparations of iron. They are indicated in *chlorosis* and *anæmia*, to supply to the blood the material in which it is deficient. For this purpose the milder waters, containing carbonate of iron and abundant carbonic acid, are most suitable; for example, in this country, Rawley Springs, Sweet Chalybeate, Bedford (Pennsylvania); in England, Bascombe and Tunbridge; on the Continent, Pyrmont, Spa, Schwalbach, St. Moritz. When *passive hæmorrhages*—the *hæmorrhagic diathesis*—require ferruginous waters, the alum and iron waters are more effective. *Amenorrhœa*, *hysteria*, and other *pelvic disorders*, when dependent on anæmia, the *paludal cachexia*, *leucocythemic-exophthalmic goitre*, are either cured or decidedly ameliorated by chalybeate waters.

The purgative iron waters are useful in *engorgement of the liver*, *hæmorrhoids*, and *dyspepsia of anæmic subjects*, in *albuminuria* and *dropsy*; the alum springs in *chronic diarrhœa* and *strumous diseases*.

Neuralgia, *chorea*, *cerebral anæmia*, and other *nervous disorders due to an impoverished condition of the blood*, are much improved by the use of the milder chalybeate waters.

In making selection of a chalybeate water, the psychical influences of mountain scenery, or other pleasant surroundings, should not be disregarded. For the anæmic pulmonary invalid, elevation of the spring and the absence of humidity are important considerations to determine a selection. Hence, the present popularity of St. Moritz. In this country a great variety is afforded—mountain scenery like Bedford, Pennsylvania, and the Virginia springs, or rolling upland like Bailey's and Sharon. As respects composition, the ferruginous springs of the United States are equal to any in the world.

For authorities referred to, *see articles on Alkaline and Saline Springs*.

None of the remedies heretofore considered, contained in the group of agents promoting constructive metamorphosis, are foreign to the organism. They are all necessary to and directly promote the formation of the blood and tissues.

In the same group, however, are remedies which, while they are tonic and reconstituent, do not enter into the composition of the body. They promote, in an indirect way, the constructive metamorphosis. Among these are bismuth, arsenic, the simple bitters, cinchona and its alkaloids. These agents having performed their office, are, after a variable period, eliminated from the organism. Their therapeutical effects can not be entirely comprehended in the process of constructive metamorphosis, and in the ultimate results of their physiological actions the destructive metamorphosis may be included.

BISMUTHUM.

Bismuth.—*Bismuthi subcarbonas.*—Subcarbonate of bismuth. A white or yellowish-white powder, without taste or smell, insoluble in water. Dose, gr. x — ʒ j, in powder or emulsion.

Bismuthi Subnitras.—Subnitrate of bismuth. A heavy, white pow-

der, with a faintly acid odor and taste, insoluble in water. Dose, gr. x — ʒ j, in powder or emulsion.

Bismuthi Citras.—Citrate of bismuth. "A white, amorphous powder, odorless and tasteless, insoluble in water or alcohol." Dose, gr. v—ʒj.

Bismuthi et Ammonii Citras.—Citrate of bismuth and ammonia. Small translucent scales, soluble in water. Dose, gr. v—gr. xv.

Besides these official preparations, various compounds of bismuth are prescribed. None of these present any advantages over the official forms, and most of them are objectionable from various considerations. The solutions of bismuth do not produce the effects of the insoluble subcarbonate and subnitrate, and the various trade preparations containing bismuth and pepsin, bismuth and strychnine, bismuth and calisaya, etc., are, to the last degree, unscientific and unreliable.

Physiological Actions.—The insoluble preparations have a very slightly metallic taste. They coat the tongue black by the formation of a sulphide. Given in suitable cases, they promote the appetite and increase the digestive power, and a gain in body-weight is one result of their administration. They are somewhat astringent, and retard the intestinal movements. As they are nearly insoluble, they pass down the intestinal tract and are converted into sulphides; hence the fæces under their use become a dark slate color. They are not entirely insoluble, for bismuth can be detected in the blood, urine, and other secretions, after a course of these medicines. Sufficient is absorbed under some circumstances, it is said, especially after prolonged administration, to cause toxic symptoms; but such a result must be due to accidental combinations, or to the presence of arsenic, which is a very constant impurity in the ordinary commercial preparations of subnitrate and subcarbonate of bismuth. Trousseaux and Pidoux remark, with regard to its presumed toxic effect, as follows: "When the subnitrate of bismuth has been prepared from the perfectly pure metal, precipitated and well washed, it may be given in single doses from one to four grammes (fifteen grains to a drachm) without producing the least *malaise*." According to the same authority, Dr. Monneret has often given as much as ten to sixty grammes a day, without any recognized ill effects. It may, therefore, be concluded that the action of bismuth is chiefly local.

Therapy.—In the *aphthæ* of children, *nursing sore-mouth*, the milder cases of *mercurial salivation*, and in those painful ulcers of the mucous membrane of the mouth due to disorders of digestion, bismuth applied freely to the affected parts is often very serviceable, by diminishing the pain and promoting the healing process. Bismuth allays the irritability of the mucous membrane in cases of *acute indigestion*, if given after the contents of the stomach are fully evacuated. It is especially indicated when there is not only *painful digestion*, but

a *tendency to diarrhœa*, the inclination for stool coming on soon after the food has been taken. It is given with great advantage in *subacute and chronic gastritis*, and in *gastralgia* arising from a state of irritation of the gastric mucous membrane. It is contraindicated, and is not beneficial, in the gastralgia produced by habitual constipation and in the gastralgia of chlorosis and hypochondria. The pain and vomiting attendant on *gastric ulcer* and *scirrhus of the stomach* are relieved by bismuth, and in the case of the former disease this remedy contributes to the cure. In these painful affections, the good effects of the bismuth are enhanced by combination with morphine. ℞ Bismuthi subnitrat., ʒ ij; morphinæ sulphat., gr. j. M. Ft. pulv. no. vj. Sig.: One three times a day in milk. When morphine is, from any cause, inadmissible, hydrocyanic acid may be given in a mixture with bismuth. ℞ Bismuthi subnitrat., ʒ ij; acid. hydrocyan. dil., ʒ ss; mucilag. acaciæ, aquæ menthæ pip., āā ℥ ij. M. Sig.: A tablespoonful three times a day. Although arsenic as an impurity is so objectionable that special pains are taken in the pharmaceutical process to separate it in the preparation of subnitrate, yet the author has witnessed excellent results from a combination of arsenic and bismuth in the more chronic stomach-disorders for which the latter is prescribed.

When bismuth is not well borne by the stomach, it may be combined with aromatic powder, or, when alkalies are indicated, it may be given with chalk or magnesia. When constipation is produced by it, bismuth can be administered with rhubarb or magnesia.

Bismuth is one of the remedies most frequently employed in the treatment of the *vomiting of teething children, cholera infantum, and summer diarrhœa*. Numerous combinations are employed: with pepsin, when these disorders appear to depend on the condition known as *apepsia*, the discharges containing masses of undigested casein; with rhubarb, when the symptoms are produced by undigested aliment, or when the stools are white and pasty; with soda and chalk, when the stools are acid and excoriate the buttocks. In cases of *vomiting of pregnancy*, the *vomiting of teething children*, *acidity*, and *pyrosis*, excellent results are sometimes obtained from bismuth and carbolic acid. ℞ Bismuthi subnitrat., ʒ ii; acid. carbol., gr. ij—gr. iv; mucil. acaciæ, ℥ j; aquæ menthæ pip., ℥ iij. M. Sig.: A tablespoonful for adults and a proportionate quantity for children three or four times a day.

The *diarrhœa of typhoid fever* is restrained by bismuth in scruple to half-drachm doses. In *chronic diarrhœa* large doses of bismuth are beneficial and often curative, but thirty to sixty grains must be given every three or four hours. Equally large doses check the *diarrhœa of phthisis*. In these doses, bismuth not only restrains the intestinal discharges, but improves the appetite and the digestion.

Bismuth is employed for a variety of purposes in the treatment of *external maladies*. It is a good application to the reddened surface of

the skin in cases of *acne rosacea*, and may be used as a cosmetic in this mortifying disease. The author has seen excellent results from the free application of bismuth in cases of *eczema* when there was much serous exudation. Under the crusts thus formed healing proceeded satisfactorily. In *intertrigo* and in the *erythema* which occurs about the genitals of infants, dusting the affected surface with bismuth soothes the pain and promotes healing. Bismuth is one of the numerous applications to the eye in cases of *chronic conjunctivitis* and *granular lids*. It is also used as an injection, mixed with mucilage, or with cocoa-butter in the form of a suppository, in *chronic gonorrhœa* and in *gleet*, and in *leucorrhœa*. ℞ Bismuthi subnitrat., gr. vj ; hydrarg. chlor. cor., gr. ss ; tinct. camphoræ, ♏ jss ; aquæ ad ℥ j. M. Lotion for skin-diseases.

The best vehicle for the administration of bismuth is milk. It should be given before meals as a rule when employed in stomach-disorders.

Authorities referred to :

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Nothnagel, Dr. Hermann. *Handbuch der Arzneimittellehre*, Berlin, 1870, p. 297, *et seq.*

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ARSENICUM.

Arsenic.—*Acidum arseniosum ; arsenious acid. Acide arsénieux*, Fr. ; *Arsenige Säure*, Ger. Dose, $\frac{1}{30}$—$\frac{1}{10}$ grain.

Arsenii Iodidum.—Iodide of arsenic. Is an orange-red, crystalline solid, entirely soluble in water, and wholly volatilized by heat. Dose, gr. $\frac{1}{20}$.

Liquor Acidi Arseniosi.—Solution of arsenious acid. Dose, ♏ ij—v.

Liquor Arsenii et Hydrargyri Iodidi.—Solution of iodide of arsenic and mercury ; Donovan's solution. Dose, ♏ ij—v.

Liquor Potassii Arsenitis.—Solution of arsenite of potassium ; Fowler's solution. (Arsenious acid, bicarbonate of potassium, compound spirit of lavender, and distilled water.) Dose, ♏ ij—x.

Liquor Sodii Arseniatis.—Solution of arseniate of sodium ; Pearson's solution. Dose, ♏ ij—xx.

Arsenic in solution is better for internal administration than the solid arsenious acid, and, of the three solutions (official) mentioned above, Fowler's is the best. Arsenious acid, when administered in the solid form and at short intervals, may act with unexpected violence.

When a course of arsenic is begun, large doses should be prescribed, and the quantity administered should be regularly reduced. In this way chronic arsenical poisoning is avoided. When continually increasing doses are given, the arsenic accumulates, and toxic symptoms are quickly induced. As a rule, unless very small doses are prescribed, arsenic should be taken after meals. Some subjects are soon seriously affected by even small doses of arsenic. For this reason, when the idiosyncrasies of the patient are unknown, it were better to make tentative experiments with a few small doses before beginning with large ones. A few drops of laudanum given with arsenic will enable it to be better borne by some susceptible subjects.

Antagonists and Incompatibles.—The salts of iron, magnesia, and lime, and astringents, are chemically incompatible. The arseniate of iron, although not actively so, does cause toxic symptoms if continued in full medicinal doses. The hydrated sesquioxide of iron, *freshly precipitated*, and in a soft magma, is the antidote to *arsenic in solution*. About eight grains of the antidote are required for each grain of the poison swallowed. As the hydrated sesquioxide of iron is harmless, it should be given in teaspoonful to tablespoonful doses, every few minutes. In every case of poisoning by arsenic, prompt efforts to secure evacuation of the contents of the stomach are necessary. Large doses of the antidote may be given with the emetic employed. In the absence of the hydrated sesquioxide of iron, magnesia, chalk, and lime-water may be given freely. These agents act in part, and probably chiefly, mechanically, by enveloping the particles of arsenic, and so hindering absorption. It is held by some that freshly precipitated hydrate of magnesia is more effective as an antidote than the hydrated sesquioxide of iron. Large draughts of oil, milk, and substances containing mucilage, by protecting the mucous membrane, render important service in cases of arsenical poisoning. Dialyzed iron, later experiences show, is quite as efficient as the hydrated sesquioxide, and is always ready. It is an important point to favor rapid elimination of the poison when the patient survives the acute symptoms. This is accomplished by the use of diluent drinks, skimmed milk, slightly alkaline mineral waters, etc.

Synergists.—All those agents which promote constructive metamorphosis are synergistic to arsenic.

Physiological Actions.—Applied to the tissues, arsenic excites violent inflammation and causes destruction of the part ; it is, therefore, an escharotic. Great pain attends its action. In consequence of the high degree of inflammation which it excites, when applied in sufficient strength, absorption does not follow its local use, but weak applications may excite dangerous symptoms by diffusion into the blood.