addition to the usual symptoms of gastro-enteritis, there was a disordered condition of the nervous system, indicated by cramps of the hands and feet, disordered vision, and delirium. It is deserving also of remark, that there were difficulty of breathing, and salivation. Post-mortem examination showed inflammation throughout the alimentary canal; the spinal vessels were gorged with blood, particularly towards the cauda equina; there was fluid in the cerebral ventricles; and the inner surface of both ventricles of the heart was very red (Christison's *Treatise on Poisons*).

We have not at present sufficient evidence before us to determine whether this medicine affects the general system by absorption or through the intervention of the nervous system: its insolubility has led to the conclusion that it does not become absorbed.

Use.—It has been principally employed in those chronic affections of the stomach which are unaccompanied with any organic disease, but which apparently depend on some disordered condition of the nerves of this viscus; and hence the efficacy of the remedy is referred to its supposed action on these parts. It has been particularly used and recommended to relieve gastrodynia and cramp of the stomach, to allay sickness and vomiting, and as a remedy for the waterbrash. It has also been administered in intermittent fever, in spasmodic asthma, &c. Hahnemann has recommended a portion to be introduced into a hollow tooth, to allay tooth-ache. I have used it, with advantage, in the form of ointment, applied to the septum nasi, in ulceration of this part, and as a local remedy in chronic skin diseases.

Administration.—The usual dose of this remedy is from five grains to a scruple, exhibited in the form of a pill. The ointment which I have just referred to was composed of one drachm of the subnitrate, and half an ounce of spermaceti ointment.

Antidotes.—No chemical antidote is known. Emollient drinks should be administered, and the poison evacuated from the stomach as speedily as possible. The antiphlogistic plan is to be adopted, to obviate inflammation.

Order 23.—Tin.

Stan'num—Tin.

History.—Tin has been known from the most remote periods of antiquity. It is mentioned by Moses (*Numbers*, xxxi. 22) and by Homer (*Iliad*, xi. 25). The alchymists called it *Jove*, or *Jupiter*.

Natural History.—It is peculiar to the mineral kingdom. It occurs in two states; as an oxide (the *tin stone* and *wood tin* of mineralogists), and as a sulphuret (*tin pyrites*). It is found in both states in Cornwall, which has long been celebrated for its tin works. The Phœnicians, who were perhaps the first people who carried on commerce by sea, traded with England and Spain for tin at least 1000 years before Christ.

Preparation.—In Cornwall, *stream tin* (a variety of *tin stone*) is smelted with charcoal. The metal thus procured is subsequently made hot, and then let fall from a height, by which it splits into a number of irregular prisms, somewhat like a basalt pillar. This is called *grain tin*. *Mine tin* (another variety of *tin stone*) is ground, washed, roasted, and

afterwards smelted with Welsh culm and limestone, by which *block tin* is procured; the finest kind of which is called *refined tin* (Mr. John Taylor, *Ann. Phil.* iii. 449).

Besides the two varieties of tin just described, other kinds are met with in commerce. *Malacca tin* occurs in quadrangular pyramids, with flattened bases. *Banca tin* is met with in wedge-shaped pieces.

Properties. — In its massive form it is a yellowish-white metal, having a peculiar odour when rubbed or handled. Its sp. gr. is 7·29. It melts at 442° F. and at a white heat is volatilized. It is malleable, and forms *sheet tin* and *tin foil* (*stannum foliatum*), but is sparingly ductile. Its equivalent is 58.

Tin may be reduced to powder, by pouring melted tin into an iron mortar, and rubbing until it is cold; or by shaking melted tin in a wooden box, the inside of which has been rubbed with chalk. In this state it constitutes *powdered* or *granulated tin* (*pulvis stanni*, Ph. Dub., Ed. and U. S.) This as well as *tin filings* (*stanni limatura*, Ph. Ed. seu *rasura stanni*) have been used in medicine.

Characteristics.—Boiled in strong hydrochloric acid, we obtain a solution of protochloride of tin, which possesses the following characters:—Potash causes a white precipitate, soluble in excess of the precipitant; hydrosulphuric acid, a brown; and chloride of gold, a purple precipitate (the *purple powder of Cassius*). If protochloride of tin be heated with nitric acid, we obtain a perchloride which causes a yellowish precipitate with hydrosulphuric acid.

Physiological Effects.—In the mass, tin has no operation on the body, except that arising from its form and weight. Powdered tin is not known to produce any disorder in the functions of the body. It appears, however, that acid, fatty, saline, and even albuminous substances, may occasion colic and vomiting by having remained for some time in tin vessels. Oxide of tin is poisonous, according to Orfila (*Toxicol. Gén.*); but Schubarth (quoted by Dr. Christison, *Treat. on Poisons*) found it inactive.

Uses.—Powdered tin has been employed with great success by various eminent practitioners, as a vermifuge, particularly in tape-worm. Dr. Alston (*Med. Essays*, v. 89, 92; also *Lect. on Mat. Med.* i. 150) explains its operation on mechanical principles: he supposes that the powder of tin gets betwixt the worms and the inner coat of the alimentary canal, and causes them to quit their hold, so that purgatives easily carry them away with the fæces. It has, however, been asserted that water in which tin has been boiled is anthelmintic, at least so says Pitcairn and Pietsch (quoted by Richter, *Ausf. Arzneim.* iv. 553); wine which has been digested in a tin vessel is also said to be noxious to worms. If these statements be true, the before-mentioned mechanical explanation is inadmissible. Some have, therefore, supposed that the efficacy must depend on the tin becoming oxidized in the alimentary canal; others have fancied that arsenic, which is frequently found in tin, is the active agent; while, lastly, some have imagined that the metal, by its action on the fluids of the canal, generated hydrogen, or hydrosulphuric acid, which destroyed these parasites.

Dr. D. Monro (*Treat. on Med. and Pharm. Chem.* i. 289), Fothergill, and Richter, have used powdered tin in epilepsy produced by worms, and, as it is stated, with advantage.

ADMINISTRATION.—The usual mode of exhibiting it is mixed with treacle: the dose usually stated in pharmacological works is one or two drachms, but Alston gave much larger quantities; his mode of employing it as a vermifuge was the following:—The patient was well purged with senna, and on the following morning *one ounce* of tin powder was given in four ounces of treacle; on each of the two following days half this quantity was taken, and then the patient again purged. However, tin powder is certainly much inferior to oil of turpentine as a remedy for tape-worm.

ORDER 24.—LEAD AND ITS COMPOUNDS.

Plum'bum.—Lead.

HISTORY.—This metal was known in the most remote ages of antiquity. It is mentioned by Moses (*Job*, xix. 23, 24.) The Greeks called it μόλιβδος; the alchymists, *Saturn*.

NATURAL HISTORY.—It is found in the metallic state (*native lead*), combined with sulphur (*galena*), with selenium, with chlorine (*horn lead*), with oxygen (*native minium*), and with oxygen and an acid, forming an oxy-salt (*carbonate, phosphate, sulphate, tungstate, molybdate, chromate, arseniate*, and *aluminate*.)

PREPARATION.—It is usually extracted from galena, which is roasted in reverberatory furnaces, by which it is converted into a mixture of sulphate and oxide of lead, and afterwards smelted with coal and lime, the first to abstract oxygen, the second to remove the sulphur.

PROPERTIES.—It has a bluish-gray colour and considerable brilliancy. It may be crystallized by cooling in four-sided pyramids. It is malleable, but not ductile. Its sp. gr. 11·35. It has a peculiar odour when handled. It fuses at 612° F. and at a red heat boils and evaporates. Its equivalent is 104. By exposure to the air it attracts, first oxygen, and then carbonic acid, so as to form carbonate of lead.

Pure distilled water has no action on lead, if the gases (as air and carbonic acid) be excluded; but if these be admitted, a thin crust of carbonate is soon formed. It is remarkable that the presence of most neutral salts—sulphate of soda and chloride of sodium, for example—impairs the corrosive action of air and water. Hence, therefore, we can easily comprehend the reason why leaden cisterns and pipes do not more frequently give a metallic impregnation to water; and why rain-water is more apt than spring-water to become impregnated with lead. The latter, however, by long keeping in leaden vessels, may also become contaminated with lead.

CHARACTERISTICS.—If lead be dissolved in nitric acid, we may easily recognise its presence in the solution by the following tests:—Alkalies, their carbonates, sulphuric acid and the sulphates, and ferrocyanide of potassium, produce white precipitates; chromate of potash and iodide of potassium occasion yellow precipitates; hydrosulphuric acid and the hydrosulphates form black precipitates of the sulphuret of lead; lastly, a piece of zinc throws down metallic lead in an arborescent form.

The delicacy of these tests is, according to Devergie (*Méd. Lég.* ii. 779), as follows:—