

medica of the Dublin Pharmacopœia, but for what reason I cannot divine, since it is never used in medicine.

ORDER 22.—BISMUTH AND ITS COMPOUNDS.

Bismu'thum.—*Bis'muth.*

HISTORY.—This metal is first mentioned by Agricola, in 1529. It has been termed *Marcasita*, *Tectum Argenti*, or, by the Germans, *Wismuth*. "The old miners called it Wismuth," says Matthesius, "because it blooms as a beautiful meadow (*Wiesematte*), on which variegated flowers of all kinds are glittering," (Schwartz, *Pharm. Tabellen*).

NATURAL HISTORY.—Bismuth occurs only in the mineral kingdom. It is found in Cornwall, Saxony, Bohemia, &c. It is met with in the metallic state nearly pure (*native bismuth*), and in combination with sulphur and with oxygen.

PREPARATION.—It is chiefly obtained from native bismuth by melting the metal out of its gangue.

PROPERTIES.—It is a reddish white metal, without taste or smell, composed of brilliant broad plates, and readily crystallizable in cubes or regular octahedrons. Its sp. gr. is 9.83 to 9.88. It is moderately hard, brittle, pulverizable, fusible at 476° F. When strongly heated in the air it takes fire, and burns with a faint blue flame, emitting a yellow smoke (the oxide). In close vessels it may be volatilized. Its equivalent is 72.

CHARACTERISTICS.—It is distinguished by its brittleness, its ready fusibility, its solubility in nitric acid, and by the characters of the nitric solution, which throws down a white precipitate on the addition of water, and a black one when hydrosulphuric acid or the hydrosulphates are added to it.

PURITY.—Any arsenicum, which may be mixed with bismuth, is insoluble in nitric acid: it is converted by the acid into an insoluble arseniate. Copper may be detected by precipitating the nitric solution with ammonia; the supernatant liquor is blue if copper be present.

PHYSIOLOGICAL EFFECTS AND USES.—In the metallic state, bismuth is inert. Its only use is in the preparation of the trisnitrate.

Bismu'thi Trisni'tras.—*Trisni'trate of Bis'muth.*

HISTORY.—This compound was first prepared by Lemery. It has had various appellations, such as *pearl* or *flake white*, *magistery of bismuth* (also a name for submuriate of bismuth), *Spanish white*, *subnitrate* or *tetarto-nitrate of bismuth*.

PREPARATION.—In the London Pharmacopœia it is directed to be prepared by dissolving one ounce of bismuth in a fluid ounce and a half of nitric acid, to which six drachms of water have been added. After the solution has been filtered, about three pints of distilled water are to be added: the subnitrate precipitates, and is to be collected, washed, and dried.

In the Dublin Pharmacopœia, seven parts of bismuth are dissolved in twenty parts of diluted nitric acid, and the solution added to a hundred parts of water.

In the first part of this process we obtain a nitrate of bismuth by the

re-action of three equivalents or 216 parts of bismuth, on four equivalents or 216 parts of nitric acid. One equivalent or 30 parts of binoxide of nitrogen are evolved, and three equivalents or 402 parts of nitrate of bismuth formed.

REAGENTS.		RESULTS.
1 eq. Nitric Acid 54	} 1 eq. Binox. Nitrog. 30 } 3 eq. Oxygen 24	1 eq. Binox. Nitrog. 30
3 eq. Bismuth 216		
3 eq. Nitric Acid 162	3 eq. Ox. Bism ^h . 240	3 eq. Nitrate Bism. 402

When nitrate of bismuth is mixed with water, two bismuthic salts are produced; a soluble supersalt (*ternitrate*), and an insoluble subsalt (*trisnitrate*).

REAGENTS.		RESULTS.
1 eq. Nitrate Bismuth = 134	} 2 eq. Nitric Acid 108 } 1 eq. Nitric Acid 54 } 3 eq. Oxide Bismuth = 240	1 eq. Ternitrate Bismuth = 242
3 eq. Nitrate Bismuth = 402		1 eq. Trisnitrate Bismuth = 294

PROPERTIES.—It is a dull white, inodorous, tasteless powder, which consists of very fine silky needles. It is nearly insoluble in water, but is readily dissolved by nitric acid. By exposure to light it becomes greyish.

CHARACTERISTICS.—Hydrosulphuric acid, or the hydrosulphates, blacken it, by forming the sulphuret of bismuth. It dissolves in nitric acid without effervescence. Heated on charcoal by the blowpipe flame it gives out nitrous acid, and yields the yellow oxide of bismuth; and, by a continuance of the heat, the oxide is reduced, globules of metallic bismuth being obtained, which may be readily distinguished from globules of lead by their brittleness; for, when struck sharply by a hammer on an anvil, they fly to pieces: from antimony they are distinguished by their solubility in nitric acid.

COMPOSITION.—Its composition, according to Mr. Phillips (*Phil. Mag.* Dec. 1830, p. 409,) is as follows:—

	Eq.	Eq. Wt.	Per Cent.	R. Phillips.
Oxide of Bismuth	3	240	81·64	81·92
Nitric Acid	1	54	18·36	18·28
Trisnitrate of Bismuth	1	294	100·00	100·00

PURITY.—Its freedom from any carbonate (as of lead) is distinguished by its solution in nitric acid without effervescence. Sulphuric acid added to the solution throws down a white precipitate, if lead be present.

PHYSIOLOGICAL EFFECTS. (a.) *On animals.*—It acts as a local irritant and caustic poison. Moreover it appears to exercise a specific influence over the lungs and nervous system (*Orfila, Toxicol. Gén.*)

(b.) *On man.*—In *small doses* it acts locally as an astringent, diminishing secretion. On account of the frequent relief given by it in painful affections of the stomach, it is supposed to act on the nerves of this viscus as a sedative. It has also been denominated tonic and antispasmodic. Vogt (*Pharmakodynamik*, i. 288, 2^o Aufl.) says, that when used as a cosmetic, it has produced a spasmodic trembling of the muscles of the face, ending in paralysis.

Large medicinal doses disorder the digestive organs, occasioning pain, vomiting, purging, &c.; and sometimes affecting the nervous system, and producing giddiness, insensibility, cramps of the extremities, &c.

The following is the only reported case of poisoning with it. A man took two drachms by mistake, and died therefrom on the ninth day. In

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 alchemists 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