

ping for giving support and causing pressure in ulcers of the leg,—a most successful mode of treating them, and for which we are indebted to Mr. Baynton.

In pharmacy it serves as a basis for various other plasters.

EMPLASTRUM RESINÆ, Ph. Lond. *Emplastrum Lithargyri cum Resina*, Ph. Dubl. *Emplastrum Resinosum*, Ph. Ed. (Resin, Oss.; plaster of lead, Oij. M. Ph. Lond. The proportions used in the Dublin and Edinburgh Pharmacopœias are slightly different).—This is the common *adhesive plaster* (*emplastrum adhæsivum*), and is kept in the shops ready spread. It is employed to retain the lips of wounds in contact, as in cuts, surgical operations, &c. It is more adhesive than lead plaster, but at the same time somewhat more irritant, and occasionally causes excoriation. It is sometimes employed as a *strapping* for dressing ulcers, on Baynton's principles.

EMPLASTRUM SAPONIS, Ph. Lond. and Dub.—The lead plaster is a constituent of the soap plaster already described (p. 338).

UNGUENTUM PLUMBI COMPOSITUM, Ph. Lond. (Prepared chalk, ʒviiij.; distilled vinegar, fʒvj.; plaster of lead, lb. iij.; olive oil, Oj. Mix the chalk with the vinegar, and when the effervescence has ceased, add gradually the solution to the plaster and oil melted with a slow fire, and stir constantly until they are cooled).—By the action of the acetic acid on the chalk, an acetate of lime is procured, and carbonic acid evolved, and the acetate of lime is then mixed with lead plaster and oil. This compound is an imitation of *Kirkland's neutral cerate*, used as a dressing to indolent ulcers. It is employed by Mr. Higginbottom (*Essay on the Use of Nitrate of Silver*, 2d ed. p. 119), under the name of *neutral ointment*, as a defence for ulcers after the application of nitrate of silver.

ORDER 25.—ZINC AND ITS COMPOUNDS.

Zin'cum.—Zinc.

HISTORY.—Although the ancients were acquainted with the method of converting copper into brass by means of an ore of zinc, yet they were unacquainted with metallic zinc, one of the constituents of this alloy. Albertus Magnus, who died in 1280, is the first who expressly mentions this metal.

It has various appellations, such as *contrefeyn*, *golden marcasite*, *Indian tin* (*stannum indicum*), *spialtler*, *speltre* or *spelter* (*speltrum*).

NATURAL HISTORY.—It occurs only in the mineral kingdom. It is found in the form of oxide (*red zinc*), of sulphuret (*blende* or *black jack*), of carbonate (*calamine*), of sulphate (*white vitriol*), of silicate (*electric calamine*), and aluminate (*automalite* or *gahnite*).

PREPARATION.—It is obtained from the sulphuret, carbonate, and silicate. The sulphuret is roasted, by which part of the sulphur is expelled, and the metal oxidized: it is then mixed with some carbonaceous substance, introduced into an earthen crucible, the bottom of which is perforated by an iron tube which passes into a vessel of water situated in an apartment below. The zinc is reduced in the pot, sub-

limes, and passes through the tube, dropping into the water beneath. This is called *distillatio per decensum*. Zinc is also procured from the carbonate and silicate of this metal, by treating it as above described for roasted blende.

The zinc used in this country is principally imported in ingots and plates from Silesia, by way of Hamburg, Antwerp, Dantzic, &c. The only zinc-works at present in this country are at Maestag, near Margam, Glamorganshire.

PROPERTIES.—It is a bluish-white metal, of considerable lustre. It crystallizes in four-sided prisms and needles; its texture is lamellated and crystalline. Its sp. gr. is from 6·8 to 7·2. At common temperature it is tough; from 212° to 300° it is ductile and malleable, and may be readily rolled into thin leaves (*sheet zinc*); at 400° it is so soluble that it may be reduced to powder. It readily fuses, and, at a white heat, may be volatilized.

CHARACTERISTICS.—It is soluble in dilute sulphuric acid, with the evolution of hydrogen gas. Ferrocyanide of potassium forms, in this solution, a gelatinous white precipitate (ferrocyanide of zinc): if iron be present the precipitate is bluish-white. If the liquid be neutral, hydrosulphuric acid and the soluble hydrosulphates also occasion a white or yellowish-white precipitate (sulphuret of zinc). Alkalies and their carbonates likewise throw down white precipitates: that occasioned by the alkalies (oxide of zinc) is soluble in excess of alkali. The delicacy of these tests is, according to Devergie (*Méd. Lég.* ii. 787), as follows:—

	<i>Degree of Dilution.</i>
Ferrocyanide of Potassium	stops at . . 4,000
Ammonia	„ . . 6,000
Potash, or Carbonate of Ammonia	„ . . 8,000
Carbonate of Potash, or Hydrosulphate of Ammonia	„ . . 10,000
Hydrosulphuric Acid	„ . . 15,000

PHYSIOLOGICAL EFFECTS.—In the *metallic* state it is inert. The *compounds of zinc* are somewhat analogous, in their action on the system, to those of copper, silver, and bismuth, but are much less energetic. They act topically, according to their degree of concentration, as desiccatives, astringents, irritants, and caustics. Taken internally, they excite, more or less readily, nausea and vomiting, and in large doses operate as irritant and caustic poisons. They exercise a specific influence over the nervous system, though this is much less obvious than in the preparations of the other metals just referred to. The stupor and inactivity, mentioned by Orfila (*Toxicol. Gén.*), as being produced by the sulphate, are evidence of an affection of the nervous system. The antispasmodic power evinced by zinc, in certain diseases, can only be explained by referring it to the action of this metal on the nervous centres.

USES.—As *topical* agents we employ the compounds of zinc as caustics, astringents, and desiccatives. Thus the chloride is used as a caustic, the sulphate and acetate as an astringent, and the oxide and carbonate as a desiccative.

Internally, the zincic compounds are administered in large doses to excite vomiting; in smaller doses as tonics and antispasmodics in intermittent diseases and chronic affections of the nervous system.

pletely soluble in an excess of the precipitant. Oxide of cadmium has been sometimes found in it, and was once mistaken for arsenious acid (Thomson's *Hist. of Chem.* ii. 219). Iron and manganese (Liebig) are sometimes present in oxide of zinc, and communicate a yellow tinge to it.

PHYSIOLOGICAL EFFECTS. (a.) *On animals.*—Orfila (*Toxicol. Gén.*) gave from three to six drachms of it to small and weak dogs: they were attacked with vomitings, without suffering much.

(b.) *On man.*—Applied to ulcerated or other secreting surfaces, it acts as a desiccating and astringent substance. On account of its insolubility, the absorption of it must be very slow. Taken into the stomach in large doses, it acts as a slight irritant, and provokes vomiting, and sometimes purging. It is said to have also caused occasional giddiness and temporary inebriation. In small doses it may be taken for a considerable period without causing any obvious effects. Sometimes, under its employment, certain affections of the nervous system (as epilepsy, chorea, &c.) subside; from which we infer that it exercises some specific influence over this system; and it is, therefore, termed tonic, antispasmodic, and sedative. But the nature of its influence is not very obvious, and is inferred rather from analogy than observation. By long-continued use it acts as a slow poison, and produces *tabes sicca*. A gentleman, for the cure of epilepsy, took daily, at an average, twenty grains of oxide till he consumed 3246 grains, which must have taken him about five months. At the end of this time he was found of a pale, earthy hue, wasted away, and almost idiotical: his tongue was thickly coated, the bowels were constipated, the inferior extremities cold and œdematous, the abdomen tumid, the superior extremities cold and shrivelled, and their skin dry, like parchment; the pulse was about sixty, thready, and scarcely perceptible. Under the use of purgatives, a light nutritive diet, with tonic and diuretic medicines, he rapidly recovered, but he remained subject to epileptic attacks (*Brit. and For. Med. Rev.* July 1838, p. 221).

USES.—*Internally* it has been commended in some spasmodic diseases, viz. epilepsy, chorea, hysteria, catalepsy, and whooping-cough; and in some painful affections, as neuralgia and gastrodynia. Though occasionally serviceable in some of these maladies, it has so frequently failed that practitioners have ceased to place much confidence in it.

Externally it is employed in the form of powder, or lotion, or ointment. As a *dusting powder* it is useful, by its mild, absorbent, and desiccative properties, and is applied to impetiginous and other chronic diseases of the skin, attended with profuse secretion. It is also used to allay or prevent excoriation in children and bedridden persons, and to remove chaps and cracks of the nipples. In painful ulcers, with copious discharge, it is not unfrequently beneficial by its desiccative and sedative properties. *Diffused through water* or a *mucilaginous solution* (in the proportion of two drachms of the oxide to six or eight ounces of liquid), it is occasionally useful in chronic ophthalmia, especially *ophthalmi tarsi*. Sommé (*Archiv. Gén. de Méd.* i. 486) employed an injection composed of half an ounce of oxide and two pints of water in gonorrhœa and leucorrhœa, with success.

ADMINISTRATION.—*Internally* it is administered in the form of pill or powder, in doses of from two or three grains gradually increased to eight, ten, or more.

UNGUENTUM ZINCI, Ph. Lond. *Unguentum Zinci Oxydi*, Ph. Dub. and Ed. (Oxide of zinc, ʒj. ; lard, ʒvj. M. Ph. Lond. The Edinburgh College substitutes simple liniment for lard; the Dublin College uses eight parts of ointment of white wax to one part of the oxide).—This compound is employed as a mild drying ointment in porrigo, impetigo, and other skin diseases attended with profuse discharges, after extensive burns, blisters, sinapisms, &c.; to painful ulcers with excessive secretion, to chronic inflammation of the eye, &c.

ZINCI OXYDUM IMPURUM, Ph. Ed.—This substance is known in the shops under the name of *tutty* (*tutia* seu *tuthia*), or *furnace cadmia* (*cadmia fornacum seu factitia*). It is found in the chimney of the furnace in which zinc ores are roasted, or in which zinciferous lead ores are smelted. When prepared by levigation and elutriation it is called *prepared tutty* (*oxidum zinci impurum præparatum*, Ph. Ed.; *tutia præparata*.) It is applied as a dusting powder, or as a cooling ointment (*unguentum oxidi zinci impuri*, Ph. Ed.; composed of simple liniment, 5 parts; prepared impure oxide of zinc, 1 part, M.), to excoriated surfaces.

Zin'ci Chlo'ridum.—Chlo'ride of Zinc.

HISTORY.—This compound, which has been long known to chemists, was first introduced into medicine by Papenguth (*Russ. Samml. f. Naturw. u. Heilk.* H. i. S. 79, quoted by Richter, *Ausf. Arzneim.* iv. 526), and subsequently has been recommended by Professor Hancke of Breslau, (*Rust's Magazin*, 1826, Bd. 22, S. 373), and by Dr. Canquoin, of Paris (Dr. Alex. Ure, *Lond. Med. Gaz.* xvii. 391). It is termed *muriate*, *hydrochlorate*, or *butter of zinc*.

PREPARATION.—The easiest and cheapest method of obtaining it is by dissolving zinc, or its oxide, in hydrochloric acid, evaporating to dryness, and fusing in a glass vessel with a narrow mouth, as a Florence flask.

PROPERTIES.—It is a whitish grey semi-transparent mass, having the softness of wax. It is soluble in water, alcohol, and ether. It is fusible, and at a strong heat may be sublimed and crystallized in needles. It is very deliquescent. It unites with both albumen and gelatine to form difficultly soluble compounds, and hence it occasions precipitates with liquids containing these principles in solution.

CHARACTERISTICS.—Dissolved in water it may be recognised to be a chloride by nitrate of silver (*vide* 105). That zinc is the base of the salt may be shewn by the tests already mentioned for this metal (p. 521).

COMPOSITION.—Its composition is as follows:—

	Eq.	Eq. Wt.	Per Cent.	J. Davy.
Zinc	1	32	47	50
Chlorine	1	36	53	50
Chloride of Zinc	1	68	100	100

PHYSIOLOGICAL EFFECTS.—Its *local* action on living tissues is that of a caustic or escharotic, depending partly on its affinity for albumen and gelatine; so that when placed in contact with living parts into whose composition these organic compounds enter, the chloride exercising its affinity, first destroys the life of the part, and then unites with the albuminous and gelatinous matters present, and forms thus an eschar. Other chemical changes of a comparatively unimportant nature are also effected: thus, various salts found in the solids or liquids of the part

may be decomposed. For example, when the chloride is applied to a cancerous sore, it decomposes the carbonate and hydrosulphuret of ammonia found in the secretion of the sore. The effects produced by the application of chloride of zinc are the following:—Soon after it has been applied, a sensation of warmth is felt in the part, quickly followed by violent burning pain, which continues for seven or eight hours; that is, until the parts in contact with the chloride are dead. A white eschar is now observed, which usually separates in from eight to twelve days. Unless used in the neighbourhood of loose cellular tissue, there is rarely much swelling.

As a caustic, chloride of zinc is not inferior in power to chloride of antimony; nay, Vogt (*Pharmakodynamik*, i. 363, 2^{te} Aufl.) says, it appears to him to be more powerful, and to penetrate deeper. It decomposes the organic tissues as quickly as the nitrate of silver, but excites more burning, and for a longer time, owing to its action extending to parts placed more deeply, for it is well known that the operation of the nitrate is confined to superficial parts. Both Vogt and Canquoin agree that chloride of zinc, besides corroding the parts with which it is in contact, exercises an influence over the vital actions of neighbouring parts. To this circumstance is owing, in great part, the efficacy of the chloride in various diseases in which it has been applied, and the healthy appearance of the sore after the separation of the eschar. There is no danger of any constitutional disorder arising from the absorption of the poison, as is the case with the arsenical and mercurial caustics.

Taken *internally*, in *large doses*, it acts as an irritant or caustic poison, and affects the nervous system. Thus it produces a burning sensation in the stomach, nausea, vomiting, anxiety, short breathing, small quick pulse, cold sweats, fainting, and convulsions. Taken in *very small doses*, no obvious effects are produced, except sometimes the amelioration of certain diseases. It is supposed in these cases to influence the nervous system.

USES.—*Internally* chloride of zinc has been given in small but gradually increased doses in scrofula, epilepsy, chorea, and (in combination with hydrocyanic acid) in neuralgia of the face.

Commonly, however, it is employed *externally*: thus Papenguth used a dilute solution of it as a lotion in fistulous ulcers of a scrofulous nature. As a *caustic* it has been applied by Professor Hanke and Dr. Canquoin to produce an issue, to destroy *nævi materni*, and as an application to parts affected with malignant diseases, such as fungus hæmatodes and cancer, or to other intractable forms of disease, such as old syphilitic or scrofulous ulcers. The benefit is supposed not to depend merely on the escharotic effect, but on the chloride inducing a new action in the surrounding parts.

ADMINISTRATION.—*Internally*, it may be given in doses of one or two grains. Hufeland recommends it to be taken dissolved in ether; his formula for the *æther zinci*, as it is called, is the following:—℞. Zinci Chlor. ʒss.; Alcoholis, ʒj.; Ætheris Sulph. ʒij. Post aliquot dies decanta. The dose of this solution is from four to eight drops, taken twice daily.

Externally it has been used as a *lotion*, composed of two grains of the chloride and an ounce of water; or in the form of *paste*: this may be composed of one part of chloride of zinc, and from two to four parts of wheaten flour.

Zin'ci Sul'phas.—Sul'phate of Zinc.

HISTORY.—This salt is said by Schwartz (Pharm. Tabell. 2^{te} Ausg. 779), to have been known towards the end of the 13th, or at the commencement of the 14th century; but Beckmann affirms it was not known before the middle of the 16th century (*Hist. of Invent.* iii. 85). It has had various names, as *sal vitrioli*, *white vitriol*, and *Gilla Theophrasti*.

NATURAL HISTORY.—It occurs native at Rammelsberg, near Goslar, in the Harz; at Holywell, in Flintshire; and other places.

PREPARATION.—It is readily prepared by dissolving zinc in diluted sulphuric acid. The proportions, directed to be used in the London Pharmacopœia, are five ounces of zinc and two pints of diluted sulphuric acid. The solution is to be filtered, evaporated, and crystallized. In this process 1 equivalent or 9 parts of water are decomposed, an equivalent or 1 part of hydrogen escapes, while an equivalent or 8 parts of oxygen unite with 1 equivalent or 32 parts of zinc, to form 1 equivalent or 40 parts of the oxide, which, with 1 equivalent or 40 parts of sulphuric acid, form 1 equivalent or 80 parts of the sulphate. The zinc and the oxide thus formed combines with some sulphuric acid to form the sulphate.

REAGENTS.	RESULTS.
1 eq. Water 9	1 eq. Hydrogen
1 eq. Zinc	1 eq. Sulphate of Zinc .. 80
1 eq. Sulphuric Acid	
1 eq. Ox. Zinc 40	

By roasting blende (sulphuret of zinc) in reverberatory furnaces an impure sulphate is obtained, which is lixiviated, and the solution concentrated by evaporation, so that on cooling it forms a crystalline mass resembling lump sugar. This is distinguished among druggists by the name of *white vitriol*, a term which they confine to this commoner kind of sulphate. This impure salt contains iron, and usually copper and lead.

PROPERTIES.—The primary form of the crystals of sulphate of zinc is the right rhombic prism: they are transparent and colourless, and have a metallic astringent taste. They are soluble in $2\frac{2}{3}$ times their weight of cold water, and less than their own weight of boiling water. They are insoluble in alcohol. In dry and warm air they effloresce. When heated they undergo the watery fusion; and if the liquid be rapidly cooled, it congeals into a granular, crystalline, white mass: if the heat be continued the salt becomes anhydrous, and, at an intense heat, is decomposed, leaving a residue of zinc.

CHARACTERISTICS.—That this salt is a sulphate, is proved by the action of chloride of barium on it; a white precipitate is produced, insoluble in nitric acid. Acetate of lead also occasions a white precipitate. The presence of oxide of zinc in the solution is recognized by the tests already mentioned (p. 999.)

COMPOSITION.—This salt has the following composition:—

	Eq.	Eq. Wt.	Per Cent.	Berzelius	Mitscherlich.
Oxide of Zinc	1	40	28	32.585	} . 55.24
Sulphuric Acid	1	40	28	30.965	
Water	7	63	44	36.450	
Crystallized Sulphate of Zinc 1	143	100	100.000	100.000	100.00

PURITY.—Ammonia added to a solution of sulphate of zinc throws down the hydrated oxide of zinc; excess of ammonia re-dissolves the

oxide, and forms a colourless solution. If any oxide of iron or magnesia be present it remains undissolved; while any oxide of copper would form an azure blue solution. Arsenic or cadmium may be detected by adding excess of sulphuric acid to the solution of the sulphate, and then passing a stream of hydrosulphuric acid through it: the arsenicum and cadmium are thrown down in the form of sulphurets. The impure sulphate called *white vitriol* is in irregular masses, here and there stained yellow with the iron.

PHYSIOLOGICAL EFFECTS.—In *small and repeated doses* it acts as an astringent on the alimentary canal, checks secretion, and promotes a constipated condition of bowels. It exercises a specific influence over the nervous system, manifested by its power of removing certain spasmodic affections: hence it is reputed antispasmodic. To the same influence is to be referred its power of preventing the recurrence of intermittent maladies, from which it has principally derived its denomination of a tonic. Its astringent effect is not confined to the bowels, but is manifested in the pulmonary and urethral mucous membranes, the secretions from which it diminishes: hence the advantage of its use in catarrhal affections of these parts. It does not appear to possess any power of checking cutaneous exhalation.

In *full medicinal doses* it is a powerful but safe emetic; it excites speedy vomiting without giving rise to that distressing nausea occasioned by emetic tartar, though this statement is not in accordance with the experience of Dr. Cullen (*Treat. of the Mat. Med.*), who observes that “in order to render its effects certain, the dose must generally be large; and if this is not thrown out again immediately it is apt to continue a disagreeable nausea, or even a vomiting, longer than is necessary.” But this observation does not agree with the experience of other practitioners.

In *excessive doses* it acts as an irritant poison, causing vomiting, purging, coldness of the extremities, and fluttering pulse.

The *local action* of it is that of an astringent and desiccant, and in a concentrated form it is a powerful irritant and caustic. Its external use is said to have been found fatal in one case, by causing vomiting, purging, and convulsions (Christison, *op. cit.* p. 468).

USES.—As an *emetic* it is almost exclusively employed in poisoning, especially by narcotics. In these cases it is the best evacuant we can administer, on account of its prompt action. As an *internal astringent* it is administered in chronic dysentery (Impey, *Lond. Med. and Phys. Journ.* ix. 55, 1803) and diarrhœa, in chronic bronchial affections attended with profuse secretion, and in gleet and leucorrhœa. In the latter cases it is usually associated with terebinthinate medicines, and is sometimes decidedly beneficial. As an *antispasmodic* it has been employed with occasional success in epilepsy, chorea, hysteria, spasmodic asthma, and hooping-cough. I have little faith in its efficacy in any of these cases. As a *tonic* it has been sometimes serviceable in agues, but it is far inferior to sulphate of quinia or arsenious acid.

As a *topical astringent* sulphate of zinc is most extensively employed. We use its aqueous solution as a collyrium in chronic ophthalmia, as a wash for ulcers attended with profuse discharge, or with loose flabby granulations; as a gargle in ulcerations of the mouth, though I have found it for this purpose much inferior to a solution of sulphate of copper; as a lotion for chronic skin diseases; and as an injection in gleet and leucorrhœa.

ADMINISTRATION.—As an *emetic* the dose should be from ten to twenty grains; as a *tonic*, *antispasmodic*, or *expectorant*, from one to five grains.

For external use, solutions are made of various strengths. Half a grain of the sulphate to an ounce of water is the weakest. The strongest I ever knew employed consisted of a drachm of sulphate dissolved in an ounce of water: it was used with success as an injection in gleet. But solutions of this strength must be applied with great caution, as they are dangerous.

SOLUTIO SULPHATIS ZINCI, Ph. Ed. (Sulphate of zinc, gr. xvj.; water, ℥vij.; diluted sulphuric acid, gtt. xvj. M.)—This formula might be very properly omitted.

ANTIDOTES.—Promote the evacuation of the poison by demulcents. Afterwards allay hyperemesis by opium, blood-letting, and the usual antiphlogistic regimen. Vegetable astringents have been advised.

Zin'ci Ace'tas.—Ac'etate of Zinc.

HISTORY.—This salt was discovered by Glauber.

PREPARATION.—It may be procured by dissolving oxide of zinc in acetic acid, and crystallizing the saturated solution; or it may be readily obtained by double decomposition: 143 grains of crystallized sulphate of zinc, dissolved in water, and mixed with 190 grains of the acetate of lead, in solution, will produce 152 grains of sulphate of lead, which, being insoluble, precipitates, while 91 grains of the anhydrous acetate of zinc (equal to 154 grains of the crystallized acetate) are left in solution: or it may be procured by immersing a piece of zinc in a solution of acetate of lead until the liquid forms a white precipitate with hydro-sulphuric acid. In this process the lead is reduced to the metallic state (forming the *arbor Saturni* or *lead tree*), while the zinc replaces it in solution.

PROPERTIES.—It usually crystallizes in rhomboidal plates, having a pearly or silky lustre, closely resembling talc. The primary form of the crystals is the oblique rhombic prism. The salt is odourless, but has a bitter metallic taste. It dissolves readily in water, and is slightly efflorescent.

CHARACTERISTICS.—When heated it fuses, and gives out an inflammable vapour, having the odour of acetic acid. When sulphuric acid is added to the salt, the vapour of acetic acid is evolved: this is easily recognized by its odour. These characters show it to be an acetate. That it is a zincic salt is proved by the tests before mentioned for a solution of this salt (p. 522).

COMPOSITION.—Its composition is, according to Dr. Thomson, as follows:—

	Eq.	Eq. Wt.	Per Cent.
Oxide of Zinc	1	40	25·97
Acetic Acid	1	51	33·11
Water	7	63	40·90
Crystallized Acetate of Zinc . .	1	154	99·98

PHYSIOLOGICAL EFFECTS.—Its effects are analogous to, though milder than, the sulphate of zinc, but more energetic than the oxide. Its local action is astringent. Taken internally, in small doses, it acts as a tonic

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and antispasmodic; large doses occasion vomiting and purging. Devaux and Dejaer (Orfila, *Toxicol. Gén.*) deny that it is a poison, even in large doses.

USES.—It is rarely administered *internally*; but is applicable as an emetic, tonic, and antispasmodic, in the same cases in which the oxide or sulphate of zinc is employed.

As a *topical* remedy, it is used on account of its astringent qualities in chronic ophthalmia, gleet, and leucorrhœa. In the latter stages of gonorrhœa I have found it far more successful than the sulphate. Its beneficial effects were first described by the late Dr. Wm. Henry, of Manchester (*Lond. Med. and Phys. Jour.* ix. 53, 1803). Sir A. Cooper (*Lancet*, iii. 199) recommends, as the best injection which can be used in the third week of gonorrhœa, a mixture of six grains of sulphate of zinc and four ounces of liquor plumbi subacetatis dilutus. Of course double decomposition takes place, and the active ingredient is the acetate of zinc.

ADMINISTRATION.—When exhibited internally, as a tonic or antispasmodic, the dose is one or two grains gradually increased. As an emetic the dose is five to ten grains: its operation is very safe. As a lotion or injection it is employed in the form of aqueous solution, containing two or three or more grains of the salt to an ounce of water.

SOLUTIO ACETATIS ZINCI, Ph. Edinb. (Sulphate of zinc, ʒj.; acetate of lead, ℥iv.; distilled water, ʒxxx. [by weight]. Dissolve the salts separately, each in ten ounces of the water. Mix the solutions, and when the precipitate has subsided, filter the liquor.)—Double decomposition is effected, sulphate of lead falls down, and acetate of zinc remains in solution. Each fluidounce contains three grains of the acetate. Used as an injection in gonorrhœa.

ZINCI ACETATIS TINCTURA, Ph. Dubl. (Sulphate of zinc; acetate of potash, aa one part. Triturate them together, and add sixteen parts of rectified spirit; macerate for a week, with occasional agitation, and filter through paper.)—Here also we have double decomposition: sulphate of potash and acetate of zinc are formed. The first is precipitated, being insoluble in spirit, the second remains in solution. One drachm contains a quantity of acetate of zinc equal to about four grains of the crystallized acetate. When diluted with water, it is used as a collyrium and injection.

Zin'ci Car'bonas.—Car'bonate of Zinc.

HISTORY.—The native carbonate of zinc was perhaps known to the ancients, though they were unacquainted with its nature. The term *calamine* is applied both to the native carbonate and native silicate of zinc: the latter is termed by way of distinction *electric calamine*.

NATURAL HISTORY.—Native carbonate of zinc (*calamine*) is found in great abundance in several parts of England (in the counties of Somerset, Derby, Durham, &c.), as well as in various parts of the continent of Europe (in Carinthia, Hungary, Silesia, &c.) It occurs crystallized or in compact or earthy masses. Its colour varies, being more or less grey, yellow, or brown. Its sp. gr. is 4.2 to 4.5.

PREPARATION.—Calamine (*calamina*), or the impure carbonate of zinc (*carbonas zinci impura*, Ph. Lond.) is directed to be calcined, in order to make it pulverizable. But in this process water and more or less of the

carbonic acid is expelled. It is then reduced to a very fine powder (usually in mills), and is afterwards submitted to the process of elutriation. By this means we obtain *prepared calamine* (*calamina præparata*, Ph. Lond.; *Zinci carbonas impurum præparatum*, Ph. Dubl.)

PROPERTIES.—Prepared calamine is met with in the shops in the form of a heavy pinkish or flesh-coloured powder, or made up into little masses. When pure, it dissolves in nitric, hydrochloric, or sulphuric acid, with effervescence. Various impurities mixed with calamine are insoluble in these acids.

CHARACTERISTICS.—The effervescence with the mineral acids shews calamine to be a carbonate. The presence of zinc in the solution is determined by the tests before mentioned for this metal (p. 522). The action of these tests, however, is more or less impeded by the presence of foreign matters in calamine.

COMPOSITION.—Carbonate of zinc has the following composition:—

	Eq.	Eq. Wt.	Per Cent.	Smithson.	
				(Mendip Ore.)	(Derbyshire Ore.)
Oxide of Zinc	1	40	64·5	64·8 to	65·2
Carbonic Acid	1	22	35·5	35·2 to	34·8
Carbonate of Zinc	1	62	100·0	100·0 to	100·0

IMPURITIES.—The substance sold in the shops as prepared calamine frequently contains only traces of zinc. If hydrochloric acid be poured on it, effervescence (owing to the escape of carbonic and hydrosulphuric acids) takes place, and a portion is dissolved; but the greater part remains undissolved. Mr. Brett (*Lond. Med. Gaz.* xx. 72) found from 78 to 87·5 per cent. of sulphate of baryta. The remainder of the powder consisted of oxide of iron, carbonate of lime, lead (sulphuret of ?), and mere traces of zinc.

PHYSIOLOGICAL EFFECTS.—Pure carbonate of zinc is probably similar in its action to the oxide.

USES.—Calamine is employed as a dusting powder for children, and as a mild desiccant and astringent in excoriations, superficial ulceration, &c.

CERATUM CALAMINÆ, Ph. Lond.; *Unguentum calaminæ*, Ph. Dubl.; *Ceratum Carbonatis Zinci Impuri*, Ph. Ed. (Calamine; wax, $\frac{aa}{lb}$ ss.; olive oil, $\frac{f\bar{x}xvj}$. Add the calamine to the melted wax and oil when they begin to thicken, Ph. Lond. The *Edinburgh College* uses one part of carbonate to five of lard. The *Dublin College* uses one pound of carbonate and five pounds of ointment of yellow wax.) This is commonly called *Turner's Cerate*, or the *Ceratum epuloticum*. It is an excellent desiccative and astringent application (when prepared with good calamine) to burns, scalds, excoriations, superficial ulcerations, &c.

Zin'ci Cyan'idum.—*Cyanide of Zinc*.

HISTORY.—This salt, sometimes called *hydrocyanate* or *cyanuret of zinc*, has been introduced, by the German physicians, as a substitute for hydrocyanic acid.

PREPARATION.—It is prepared by adding recently-made oxide of zinc to hydrocyanic acid; or by adding a solution of sulphate of zinc to a solution of cyanide of potassium.

PROPERTIES.—Cyanide of zinc is a white powder, insoluble in water or alcohol.

CHARACTERS.—If a strong mineral acid be added to it, hydrocyanic acid is developed, and a soluble salt of zinc obtained. The latter is recognized by the tests before mentioned for a solution of zinc (p. 522).

COMPOSITION.—Its composition is as follows:—

	Eq.	Eq. Wt.	Per Cent.
Zinc	1	32	55·2
Cyanogen	1	26	44·8
Cyanide of Zinc	1	58	100·0

PHYSIOLOGICAL EFFECTS.—Its effects have not been carefully ascertained, but they are supposed to be similar to those of hydrocyanic acid.

USES.—It has been used principally in affections of the nervous system, as epilepsy, hysteria, and chorea. It has also been employed in cardialgia and cramps of the stomach, and as an anthelmintic in children.

ADMINISTRATION.—We may give it in doses of from a quarter of a grain to a grain and a half three times a day. It may be taken in the form of powder mixed with calcined magnesia.

ORDER 26.—IRON AND ITS COMPOUNDS.

Fer'rum.—Iron.

HISTORY.—This metal (called by the alchemists *Mars*) was known in the most ancient times. It was employed medicinally at a very early period, namely, above 3200 years ago. Indeed, it appears to have been the first mineral used internally; and a curious anecdote is given of its introduction into medicine. Melampus (a shepherd supposed to possess supernatural powers) being applied to by Iphicles, son of Philacus, for a remedy against impotence, slaughtered two bulls, the intestines of which he cut to pieces, in order to attract birds to an augury. Among the animals which came to the feast was a vulture, from whom Melampus pretended to learn that his patient, when a boy, had stuck a knife wet with the blood of some rams into a consecrated chestnut-tree, and that the bark had subsequently enveloped it. The vulture also indicated the remedy, namely, to procure the knife, scrape off the rust, and drink it in wine, for the space of ten days, by which time Iphicles would be lusty, and capable of begetting children. The advice thus given by Melampus is said to have been followed by the young prince with the most perfect success! (Le Clerc, *Hist. de la Médecine.*)

NATURAL HISTORY.—Iron is met with in both kingdoms of nature.

(a.) *In the inorganic kingdom.*—Few minerals are free from iron. It is found in the metallic state (*native iron*), in combination with oxygen (*hematite, micaceous iron, brown iron stone, and magnetic iron ore*), with sulphur (*iron pyrites, and magnetic pyrites*), with chlorine (*pyrosmalite*), with oxygen and an acid (*carbonate, phosphate, sulphate, arseniate, tungstate, tantalate, titanate, chromate, oxalate, and silicate.*)

(b.) *In the organic kingdom.*—It occurs in the ashes of most plants, and in the blood and some other parts of animals.

EXTRACTION.—In Sweden, iron is extracted from magnetic iron ore and micaceous iron: in England, principally from clay iron ore (carbonate of iron.)