William Sinclair

1864.

On the Acetate of Lead.—

The Acetate of Lead

appears to be a salt of some antiquity, having been discovered about the twelfth or thirteenth centuries. The exact date of its discovery, and by whom it was discovered, seems however to be involved in obscurity. It is believed to have been known to Raymond Lully, Isaac Hollandus and Basil Valentine, and we find it mentioned in Lord Bacons' Secrets published

published above 200 years ago (1651) that "when Saturn
"shall be calcined and dissolved in Vinegar
"and his salt taken forth, and then that
"salt dissolved in our Quintessence" (Mercurial)
"will help many infirmities, especially those
"that are caused of humidities and calidities
"because it dryeth and cooleth by its nature
"Also an Unguent made of the Calx of
"Lead serveth against divers sorts of sores.-
From this it would appear that it was well
known, and that its virtues had been
ascertained, at least by some of the Alchemists
who had lived prior to that periods. From
this it will also be seen, that, although known
to some, it had not as yet come into general
use, it being still called and published by
Lord Bricourtes as a secret, it being headed
"A secret of Saturn".- It has gone under

under a variety of names, among which are the following Saccharum Saturni, Sel de Saturne, Acetated Cerusa, Superacetate of Lead and Sugar of Lead.- It was introduced as a remedial agent by Paracelsus; and is greatly used in the present day both in Medicine and the Arts.-

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II Chemistry.-

The Oxide of Lead PbO and Acetic Acid $C_4 H_3 O_3 + HO$ unite in various proportions to form the several Acetates of Lead.- Of these the most important, both as regards its uses in Medicine, and for other purposes, is the Neutral Acetate, which has the formula $PbO, C_4 H_3 O_3 + 3HO$, and is formed by one atom of the Protoxide of Lead uniting with one of Acetic Acid, 3 atoms of water of crystallization also being present.- When properly manufactured

its percentage composition is as follows:-

Symbols.	Equivalents	Equivalent Weight	Pereira	Ure	Bergelius.
PbO	1	112	58·9	58·71	58·71
$C_4H_3O_3$	1	51	26·8	27·08	26·97
3HO.	3	27	14·3	14·21	14·32
PbO.$C_4H_3O_3$.3HO	5	190	100·0	100·00	100·00.

III. Preparation

Many methods have been followed in its preparation, and these mostly on the same principle, and, although the process for its manufacture is still retained in the British Pharmacopeia, it is never prepared by the druggist, but is made in large quantities by the manufacturing chemist. It may be prepared by dissolving pure oxide of lead or the Carbonate, in Acetic Acid, but on the large scale, litharge is employed. Another method is by placing thin sheets of lead in a confined chamber, and allowing the vapour of Acetic Acid to act on them.- A mixture

of

Acetate and Carbonate is thus obtained which is detached from the sheets by rolling them under water - More Acetic Acid is then added which neutralizes the remaining Carbonate. The water on being evaporated leaves the Acetate in a crystalline form.

It may be made brown or white, the process of manufacture in both cases being alike, with the exception that in the preparation of the brown, Pyroligneous acid is used, in the white, Acetic Acid.- The Litharge is added to the Acid, until it is saturated, allowing it to settle and boiling it in a cast-iron pan, and evaporating down till it is so strong that it almost crystallizes. Great precaution is used in this manufacture, in order to prevent the Acetate of Lead and Acetic Acid entering the respiratory and digestive systems of the workmen. The evaporation takes place in a closed boiler, the ventilation of the manufactory

is or should be very complete that the vapours may be carried away by a communication with the chimney of the furnace, and that the number of men in that part of the works are as few as possible After evaporation it is boiled, and purified by about three times its bulk of water being run in, constantly skimmed to remove the impurities, after which it is evaporated and crystallized in large shallow pans. The crystallized lumps are then lifted out and drained on drying racks, when they are ready for the market - In the latter part of this process, viz; the drying, the manufacturer is careful that the temperature of the drying house should not exceed 90° - In some cases heated air in others steam is used in the drying house .. Lead is the metal mostly employed for vessels used in the manufacture but in some cases Copper is used having

strips

strips of lead affixed to it, to prevent by keeping up an electrical action between the metals, the action which the Acetic Acid would exert upon the copper. The salt as already mentioned is crystallized in large iron pans, but wooden troughs lined with thin copper sheeting sloping at the edges are also used.- Stoneware vessels, salt glazed are in other cases substituted in this process, their edges being greased to prevent the salt creeping over in crystallizing but they are objectionable, as they contain Oxide of Lead in the glaze, and are consequently apt to lead to the adulteration of the Acetate, by the acid dissolving out the Oxide.- The Mother liquors may be rendered useful by decomposing them with lime or Carbonate of Soda, in the former case an oxide, and in the latter a Carbonate of Lead is obtained either of which would be applicable for commencing the process anew while

while the Acetate of Soda formed in the doubles decomposition, would be available for the extraction of Acetic Acid. — If the Acetate is coloured it can be purified by filtering through Animal Charcoal. — By Berard's method for the preparation of the Acetate granulated lead is placed in vessels about 8 in number ranged above and communicating with each other. The Acetic Acid being placed with the lead in the upper vessel is allowed to remain in contact with it for about half an hour, when it is is run off into the second in which it remains for another half hour and so on through the others. By the action of the Acetic Acid the lead left exposed to the air absorbs oxygen and forms oxide, and with the Acetic Acid, acetate, and the acid being again run over it carries away the acetate which has been formed. On being run off in this way, the solution is so strong as immediately to crystallize In this process a strong acid must be used to prevent

prevent a basic salt being formed, and also for the sake of economy.- Another method is by a patented process, in which vapour of Acetic Acid is passed through a perforated plate upon which the litharge or lead compound is placed.- This perforated plate lies in a cylinder having no opening at the top, except a stopcock from which the waste steam escapes.- This stopcock is connected with a pipe leading to another cylinder, so that none of the acid in the steam is lost. The Acetate formed falls down through the perforated plate into a vessel placed below to receive it and in which it crystallizes, the crystals being usually of superfine quality.—

IV - Properties.—

The properties of the Acetate of Lead are that its crystals are transparent, in the form of the right rhombic prisms, with dihedral summits and are of a sweetish astringent taste.- It

is

is, when pure, soluble in twice its weight of Water at 60° or in eight parts of Alcohol.— Its specific gravity is 2·345— In dry air the crystals of this salt effloresces, and when heated to 136° are fused, and giving off their water of crystallization, become again solidified into a dry salt of an Amorphous form.— This upon being heated to a higher temperature, is again fused, and decomposes into the usual products of the decomposition of Acetic Acid. viz: Acetone and Carbonic Acid, with the Sesquibasic Acetate of Lead or in symbols

$$3(PbO\ C_4H_3O_3) = CO_2 + C_3H_3O + 3\ PbO,\ 2\ C_4H_3O_3.$$

The Sesquibasic Acetate left in this decomposition on being subjected to a still higher temperature is transformed into a brownish black mass with the evolution of inflammable gas, and eventually into metallic Lead.— A green colour is given to the juices of violets by the solution of the Acetate

Acetate it also feebly reddens Litmus.— When to its solution Carbonic Acid is added a precipitate of the Carbonate is thrown down from an excess of the oxide of Lead in the Acetate.— On acetic Acid being added this precipitate is re-dissolved, so that in dissolving Sugar of Lead in water containing Carbonic acid (and carbonates with Carbonic Acids are contained in nearly all waters, it must be remembered that a precipitate will be thrown down causing the solution to have a bluish-white turbidity.—

V.— Tests.—

The Tests for the Acetate of Lead and indeed for all the salts of Lead are numerous and well defined, leading at once to their recognition, so that a very minute quantity may be detected in solution.— When examination is made for Lead in the course of a chemical analysis for medico-legal investigation the merest trace as the $\frac{1}{20}$th of

of a grain in 20.000 parts of water, may be detected by the experienced analyst.- So well is this known, that although understood by the public to be a most deadly poison, we rarely find it given for that purpose, the more powerful or more insidious poisons being ofter employed.-

In testing for the Acetate of Lead we usually examine first for the base and then for the Acid.- For the detection of the base the addition of HCl to the solution by giving a white precipitate at once separates it from all other bases except those of Silver and the subsalts of mercury which likewise give white precipates with HCl. From these bases it is known by being unaltered on the addition of Ammonia, the Chloride of Silver being dissolved and the Subsalts of Mercury being blackened by that reagent The Pb Cl may be dissolved in boiling water and again thrown down by $HO.IO_3$, which entirely

removes

removes the lead from the solution. The following is a short statement of the usual tests for Lead Salts:-

1st. A solution of KO or NH_3 gives a white precipitate soluble in excess of KO but insoluble in excess of NH_3. The Ammonia test does not at once produce this precipitate in Solutions of the Acetates due to the formation of a soluble triacetate of Lead. -

2nd. H_2S or NH_4S. Black prec. sol in cold dilute acids and alkalies but decomposed in boiling Nitric acid. -

3rd. $HO.SO_3$ white prec of $PbO.SO_3$. - 4th. HCl white prec sol in excess of water and unchanged when Ammonia is added. -

5th. HI yellow precip of PbI. - delicate test

6th Reduced to metallic state by exposure to the inner flame of the blowpipe with $NaO.CO_2$ & Charcoal. -

7th. A yellow precip with Bichromate of Potash, sol in KO - insol in $HO.NO_5$ -

8th. A plate of Zinc suspended in a solution, the lead takes the place of the Zinc in the form of Arborescent crystals. - (Lead Tree)

For the detection of the Acid the three following tests are used. 1st $HOSO_3$ causes evolution of the odour of Vinegar If alcohol be first added and then $HO.SO_3$ the fruity odour of

of Acetic Ether is evolved.— 2nd Dark red colour on the addition of Fe_2Cl_3 and NH_3, and on the addition of HCl to the first a yellow precipitate is obtained.— If boiled yellowish brown basic acetates of Iron is thrown down 3rd $AgONO_5$ - free of $AgO\ C_4H_3O_3$ in boiling but not in cold water.—

VI Adulterations.—

The adulterations to which this salt is subject are not so numerous and not carried on to so great an extent as they would undoubtedly be, were these adulterations when practised not most easily detected, the colour of the Acetate being such as to prevent any fraud by admixture with a coloured salt, which we often find to be the case in other drugs which are opaque and coloured; and also its density and general appearance protect it from adult= -eration with lighter and cheaper salts.— For

For instances, Copper might, and is said to be used in some instances to adulterate this salt, but the colour of the Acetate of Copper would not fail to attract attention, it being of an azure blue colour.. If the acid with which it is made be impure it gives to the crystals a yellow tint The tests for its purity as given by the British Pharmacopeia, is, that "its solution in distilled water is "clear, or has only a slight muddiness which disappears "on the addition of Acetic acid - Thirty eight grains "dissolved in water require for complete precipitation "twenty measures of the volumetric solution of "Oxalic Acid .. The first part of this quotation is the same test adopted in the Edinburgh Pharmacopeia, the other test of the Edinburgh College being, that 48 grains of Acetate were not entirely precipitated by 30 grains of the Phosphate of Soda. This test is stated by Dr Christison to be so delicate that it will detect an hundredth part of impurity —

VII

VII. Actions.—

1st On the Action of Acetate of Lead on Vegetable productions.—

The results of the experiments of M. Marcet and the opinions of M. Weigmann mentioned in the Physiologie Végétale of M. Decandolle with reference to the action of the Acetate of Lead upon plants are entirely opposed to each other. M Marcet found that a Branch bean, having its roots placed in a solution of Acetate of Lead in the proportion of six grains of the Acetate to one ounce of water, was affected on the second day, and perished on the third; while M. Weigmann, on the contrary states, that the Acetate had no bad effect on the growth of a willow, which statement he vindicates by arguing that the Carbonic Acid given off by the roots of the plant precipitated the lead in the form of Carbonate, which being insoluble mixed with the surrounding earth, and was not absorbed. The difference in the vital

vital power of the plants experimented upon might however occasion the differences in the results, as in the one case a tree was the subject of experiment an herbaceous plant.- The quantity of Carbonic Acid exhaled is also of importance, for if the Willow exhaled more than the Bean, the Acetate would in the former case, be more quickly and certainly neutralized than in the latter, in which the root immediately was acted on by by the solution of the salt before the Carbonic Acid could have time to effect the change of Acetate into Carbonate. Besides the effect of placing the Haricot in the water would be promptly to increase its absorptive action, which in the other case would be carried on with much less difficulty in the soil.- Accordingly, it would appear that the Acetate of Lead has an action, which is destructive to plants, causing them to perish in a short time after the absorption of the salt.-

2.ª

2nd On the Actions of Acetate of Lead upon Animals.-

With regard to the actions of this salt upon animals, much discussion has taken places. Dr Christison (Treatise on Poisons 1832) says that it is probable that it is poisonous. Orfila experimenting on dogs found that acted as an irritant poison in large doses.- In smaller doses it was absorbed, causing an affection of the nervous system and sometimes convulsive movements.- Dr Christison also states that Schloepfer produced in animals the characteristic symptoms of Lead by injection into the windpipe of successive doses of 10 grains while Dr A. T. Thomson in his paper in the London Medical Gazette (Sept 1832) believes that the Acetate is not a poison to Animals except by Acrimony when the dose given is very large, he having within a week given doses of two four and six drachms to a dog without any effect whatever. Tanquerel

des.

Traite de Maladies de Plomb par M. Tanquerel des Planches.

des Planches gives some experiments which he and Dr. Maigne performed on dogs injecting 40 grains of the Acetate in Solution into the cellular tissues, in another case 24-30 grains into the right crural vein, and in another 30-35 grains into the belly without the effect of producing Saturnine paralysis.- These results have however been contradicted by the administration of similar doses with destructive effects, and it is now universally allowed that animals may contract the disease of lead colic and plumbism, by the gradual introduction into their bodies of quantities of lead as in the case of cats, dogs, and other animals in places where lead is prepared or manufactured, and I have no doubt that, were a sufficient quantity given in repeated doses to dogs or other animals, ~~them~~ its effects would very soon become visible, and would lead to the ultimate destruction of the animal, as it would in the case of Man.- go

3rd On the Actions of the Acetate of Lead on Man.—

The effects of the administration of the Acetate of Lead to Man are produced in at least three ways:—

1st By entering the blood and being carried in the circulation to the organs and tissues which it affects;

2nd By causing changes in the blood itself; and

3rd By its astringent and sedative action directly to parts with which it comes in contact.

These effects consist in the gradual production if the lead be administered continuously in small quantity of a disease which has been known by the names of Colica Pictonum, Plumbism, Colica Saturnina, Painters, Devonshire and Lead Colics and the Dry Bellyache of the West Indies. This disease may assume a variety of appearances, according to the strength of constitution of the patient, the

the quantity of lead ingested and other concomitant circumstances.- We will now consider and describe these various actions under the following heads:-

1st Its action on the Circulatory system.-
2nd " " " " Alimentary Canal.-
3rd " " " " Secretions and Excretions.-
4th " " " " Nervous System &c.

1st Its action on the Circulatory system:-

a. On the Blood.- The changes which are caused by Acetates of Lead on the Blood are 1st Changes in its quality - 2nd A change in the rapidity of its circulation - Andral and Gavaret state that the Blood is found to be deficient in red corpuscles on the long continuance of small doses of Acetate of Lead, acting as a Spanaemia causing great reduction in its quality. Dr. Pareira (Materia Medica) has given the following analysis quoted from

from the Annales de Chimie et de Physique showing the difference between this and the healthy condition of the blood.

	Healthy Blood.	Deteriorated B.
Fibrin	3	2·8
Blood Corpuscles	127	83·8
Solid Residue of the Serum	80	78·1
Water	790	835·3
	1000.	1000·0

From this it will be seen that the deficiency of the solids, is replaced by the excess of water in the blood.— Professor Cozzi states that the lead in the blood in a case of lead colic was united with the Albumen and not with the fibrin or Haematosin.— The serum of the blood is stated by Andral and Gavaret to be of an unnaturally yellowish colour.— This diminution in the blood corpuscles and consequent deterioration in the quality, in conjunction with the lead salt in the blood, undoubtedly exercises an action upon and

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and disturbs the nervous system, and as Physiology teaches us, that a diminution of stimulus to the nervous centres, causes in them a loss or perversion of function, the production of Epilepsy and other nervous symptoms which we find in those who suffer from lead poisoning, are induced. (The local paralysis in printers and those who handle lead is probably due to the same cause, but affecting the peripheries, instead of the nervous centres.) Dr. Watson observes that "it is

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" a curious but unquestionable fact that Anæmia
" of the Brain, or a diminution of its natural
" supply of red blood, an exhaustion of the nervous
" power, will produce symptoms much resembling
those from the diametrically opposite condition —
This explains the anomaly which we find
in cases of lead affections, for in one case we
have a furious attack of delirium and in

another

another of Epilepsy - It is not by any means easy to say, how much of this action upon the nervous system to the lead in the blood and how much depends on the constriction of the bloodvessels and quality of the blood itself. -

b. On the Bloodvessels and Pulse. - The arterial system and probably also the Venous and Lymphatic, (though this is more difficult to determine), are much affected, their coats being constricted, causing a diminution in the calibre of the vessels. - Discharges of blood become stopped in consequence, and the temperature of the body is reduced. The pulse is in many cases increased in frequency and becomes full and hard, but after the disease has continued for some time, or Coma and Convulsions have supervened, it is small soft and irregular. Dr Christison says that the rising of the first stage of lead colic is denied by Merat

Dr Boisms 2nd Edit 1832.

Merat.- Other authors, however, as Frouchin have found the same results as Dr. Christison, while Jonquerel des Planches states that out of 1200 cases, 300 had a pulse beating from 60 to 70 beats a minute, and 150 beat from 80 to 100 beats a minute where there was no inflammatory complication.— The constrictions of the Lymphatic system assists in keeping up the deficient quality of the blood and consequent falling off in the strength of constitution of the patient - termed Tabes Saturnina.—

2nd Its actions on the Alimentary Canal.—

a. On the Gums and Teeth.- The actions on the Gums and Teeth which attends the reception into the system of Lead in any form are the first symptoms observed when this salt has been given for some time. These actions are very characteristic of Lead salts although this has been denied by Dr. Chowne who asserts that he had seen

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cases of Lead Colic where there was no blue line on the Gums, and that he had seen the blueness of the gums caused where he had reason to believe no lead had been taken into the system -- Jarquerel des Planches observes (p 500) that the blue line on the Gums is not ~~observed~~ seen in cases where the person affected uses Tobacco.--

Dr. Jones says that he suspects that other metals besides Lead cause the blue discolouration, while Dr. Smith, who traced the presence of Acetate of Lead to Sugar supplied to our troops in Ceylon, in a Lead colic epidemic among them in 1832, believes it to be caused by Lead and Lead only. The cause of this blueness in the mouth is due to the Lead forming a Sulphuret of Lead with the Sulphocyanides in the saliva or the Sulphuretted Hydrogen in the breath.-- The line on the Gums is about $\frac{1}{20}^{th}$ of an inch in breadth and is on the edge

edge of the gums close to the teeth, the rest of the gums being turgid and of a reddish blue tint. The turgidity of the gums is denied by Dr. Burton.-

The teeth are at their necks of a brown colour and their crowns are of a dark blue. The mucous membrane of the mouth participates in the change, and also becomes of a bluish violet colour, its secretion being reduced in quantity.- Dr. Christison states that the Saliva is of a blue colour.- The nutrition of the gums is interfered with and the parts which dip between the teeth in great part dissapears.- It is considered by some that Tartar on the teeth is necessary for the production of their blueness.-

b.- On the Stomach and Intestines.-

In large doses, the Acetate of Lead is in most cases, an instant poison although it is affirmed that ℥j has been given without producing evil

evil consequences.- There is no doubt that ~~these~~ its poisonous effects have been much overrated but when given in very large doses it causes the usual symptoms of irritant poisons; vomiting gastric irritation, Enteritis, severe burning pain and cramps, &c - In small doses it acts as an astringent, by this action it constipates the bowels, increasing the action of the muscular fibres of the intestines and especially of the sphincters at the anus and the pyloric end of the stomach, the later symptoms being preceded by a disturbance of digestion.- Long continued it produces the Saturnine Cachexy and Lead colic (which may be known from true colic, by the length and severity of the pain, along with the other symptoms of lead) a spasmodic and paralytic condition of the muscles being the ultimate result.-

Imerat found the large bowels contracted after

after death.. Andral, however, states that in five cases in which he had an opportunity of examining the bodies of patients who had had painters colic, no inflammation was observed and the bowel was neither contracted nor dilated. The action is probably spasmodic, this fact having been observed, that when Opium is given the bowels frequently empty themselves without any assistance in the shape of a purgative, the spasm being relieved.—

Of the method of its absorption, Mialhe supposes that on reaching the stomach, the lead is entirely precipitated by the Hydrochloric acid of the Gastric juices as the insoluble chloride of lead, and that this precipitate is redissolved by some more of the Alkaline Chlorides and absorbed.— This Dr. Headland remarks may be true but he does not consider it has been proved to

to be so, as he says, that, even were the chlorides of lead produced, it is to some extent soluble in water; and Ottinger says that it is doubtful if the soluble chlorides of the gastric juices would be sufficient for the resolution of the chlorides which had been formed. - In this way people who take much salt with their food, are known, to be much more liable to be, and are, most easily poisoned by lead. Dr. Headland considers that it may be and in many cases is, ~~used~~ at once absorbed from the stomach, and does not reach the intestines, except as the albuminates or metallic coagulums, in which case, they will be redissolved by the action of the alkaline secretion - and then be absorbed - But I am inclined to think that the absorption will be at least partially carried on in the manner supposed by Mialhe; and also in the way suggested by Dr. Headland

Headland. As to Dr. Todds views in the Medical Gazette that the Acetate is entirely transformed into the Carbonate and then absorbed, we have no reason to suppose that this change takes place to any extent.—

3rd. Its Action on the Secretions and Excretions.—

The skin is affected by the Acetate in consequence of its constringing effect on the capillaries, and the altered quality of the blood, producing a sallow and emaciated appearance. This is well observed in the countenance of the patient, who has a gloomy, thin, and often haggard look. This yellowish hue is shared by the conjunctivae. The temperature of the skin is usually less than normal, often it is but little altered, as the smaller quantity of blood in the capillaries is compensated by the rising in the rate of circulation. When applied to the skin, the cuticle being whole

whole; some say that it is not absorbed, but this is doubted by many authors, as instances of its absorption have been noted - If the cuticle be raised it is absorbed. When Plumbism has taken place, the lead is eliminated from the body by the skin, which is shewn by the formation of Sulphuret of Lead, when the patient is using Sulphuretted baths.- The sweat, like the temperature is usually diminished in quantity but may be normal.-

As I have before remarked, the mucous membrane of the mouth is changed in colour and turgid. The secretions of mucous membranes generally, are diminished.- That absorption of the acetate takes place by these channels is certain, as persons who are, (or rather were) employed in the manufacture in rolling the lead plates on which a coating of lead had.

been

been formed by the Action of Acetic Acid, were found to be subjected to all the symptoms of Plumbism by the inhalation of the air in which particles of the dust was floating.— This risk is now obviated where the Acetate is manufactured in this way by rolling the plates under water.

The Glandular secretions are all diminished in quantity.— The lead has been detected in the Milk and Urine, which assist in its elimination from the body. The neck of the bladder is in many cases constricted, so that pain is felt in micturition, and a catheter is passed with difficulty.— The Urines and faeces are diminished in quantity, the stools being of a pale yellow colour.—

4th: Its Action on the Nervous System &c.—

The nervous system greatly suffers, especially in the more advanced stages of Plumbism. The

The first symptoms observed are usually a numbness of the esterisor muscles of the wrist which increases until paralysis takes places, constituting drop wrist. - The muscles of the upper extremity usually suffer most, the other voluntary muscles throughout the body not being generally affected so much. - This paralysis differs from wasting palsy in the suddenness of its attack, as it may reach its height in a very short period, while the other gradually advances, just in proportion as the size of the muscle decreases. But the symptoms and history of the case will also lead to the differential diagnosis - As the disease proceeds the usual symptoms observed are Coma, Neuralgia, and Convulsive affections like Epilepsy; the paralysis accompanying these affections which are in almost every cases preceded by the lead colic - The muscles are much emaciated

emaciated, and present a dry yellowish cream-coloured appearance, and the Lead has been detected in their Substances by Dr. Todd. This affection of the nerves is believed to begin at their peripheries, and advancing towards the nervous centres, and this view is considered to be proved by the fact, that the local Paralysis is followed by the occurrence of the epileptic convulsions. Dr. Todd has discovered the presence of Lead in the brain and Wibmer has found it in the Liver and Spinal Cord.-

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VIII. Uses in Medicine.-

The Acetate of Lead is used in Medicine principally as an astringent, but it is also a more marked Sedative than other astringents in its action.- These uses mainly depend on its power of causing contraction

contractions and diminution in the calibre of the bloodvessels already described :- It is used

Externally in

1st In local inflammations .- In Opthalmia: it is an extremely common practice to use a solution of this salt as a collyrium in cases of opthalmia as in Simple vascular Conjunctivae or Chronic conjunctivitis but it is not to be used in Purulent or Pustular Opthalmia as a white compound is formed which adheres closely to the cornea .- In most of the Superficial inflammatory affections as erythema it is very often used, and in many cases with great service when the inflammation is in its incipient state .- In erysipelatous inflammations it is constantly used, combined with Opium, 4 grains of each to ℥j of Water, both in Hospital and private practice .- In some cutaneous eruptions it is employed with great benefit - (I used it in Dispensary practice in a case of Pompholyx with great

benefit, as a lotion where there was much redness and heat round the central vesicles, and tendency to spreading inflammation.— The ointment of the Sub-acetate of Lead is mostly employed in cutaneous eruptions, and to diminish the inflammation of ulcers it is used in the form of lotion.— For allaying the heat and itching of Chilblains while they continue unbroken, it is very good, but for this the Liquor Plumbi Diacetatis is more employed.—

It is also (but rarely) used, as powder or strong solution to profusely discharging ulcers, its astringent effect being sought for, and also as a Styptic in External Hemmorhages, but it has almost been discontinued for this purpose better and more sure applications being now employed.—

2nd Use As a Delacteate for restraining the secretion of milk after delivery it is greatly used and is I believe very certain in its action so much

so, that a gentleman of long professional standing in Edinburgh stated to me that he had used it for a long time and had never known it to fail. The manner in which he employs it is by dissolving ℥ij in ℥vj of Vinegar and applying this solution to the breasts.— It has also been used as lotion to excoriated nipples

Internally:—

In chronic dysentery and diarrhoea, as an astringent and sedative on the muscles of the intestines it is much used, and in many cases is preferred to all other methods of treatment. It is given in the form of pills, but an equally common method is to administer it in an enema which is given after every loose stool and is composed thus ℞ Plumbi Acetatis ℈j ad ℥ss, Aquae Destillatae ℥iss Sol: Mur: Morphiae vel Tinct Opii ℥ss ℏs.— When given as pills the Pilula Acetatis Plumbi cum Opio is used, and if given for any length of time

times, it is well to watch its effects as it might give rise to the symptoms of Plumbism. When thus given it is found to be very effectual in arresting the discharge and relieving the pain attending these diseases.—

In Internal Hemorrhages :- It has been found to be of great service in arresting internals haemorrhage as Hemoptysis, Haematemisis, Epistaxis and especially Menorrhagia.— In the latter it is recommended that it should be given in large doses - ten grains every second hour, either combined with Opium or separately - This mode of treatment Dr. Conquest speaks favourably of, and Professor Simpson recommends the pills with Opium as the best hemostatic in unavoidable haemorrhage - after Ice.— In all these cases its usefulness depends on its general haemostatic action reducing the calibre of the Bloodvessels.—

In

In Mucous discharges.- It has been, but is not now used so much, for lessening excessive discharges from mucous membranes as in Chronic Bronchitis &c It has also been recommended for lessening the expectoration in Phthisis pulmonalis, and also to stop the night sweats and diarrhoea which so often distress the patient, but for these purposes other remedies are now employed.- The use of it as a remedy in Phthisis was at one time highly thought of but like the most of the other remedies for this disease it had fallen into disuse, when the subject was again revived by M Beau in a lectures delivered at the Charité in Paris, in which he stated, that according to observations he had been making for sometime in the cases of persons who were affected with Phthisis, the symptoms of the disease were much relieved, on the person being affected with Lead colic.- He also stated that

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that although he had observed workers in lead in many cases to be greatly reduced and emaciated yet in no instance was one of them phthisical, which had confirmed him in his ideas as to its utility and by administering it he had succeeded beyond his expectations in arresting the disease upon several occasions.— The mode of administration which he employs is in the first place to give an emetic in order to rouse the stomach to action; a week after this a pill containing two grains of the Acetate or the Carbonate of Lead are given.— The number of these pills are gradually increased until six pills are taken daily, taking them before meals This treatment with good diet is to be continued until the system of the patient is thoroughly impregnated with lead. M. Beau prefers to use the Carbonate as being least likely to cause vomiting and irritation of the stomach.— It has also been employed as a remedy for

checking mercurial salivations, but for this its use is discontinued.— In epilepsy also it has been tried but has given place to other, and superior medicines.—

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In Strangulated Hernia it has been highly recommended by Dr. Neuhold, to be given in the form of enemata of 10 grains of the salt to ℥vj of water. This he states is so certain in causing reduction of the hernia, that if more employed in this disease operations would diminish in frequency.— He gives cases of strangulated hernia which had resisted the ordinary taxis for a long period, treated in this manner with several enemata of the acetate of lead with the greatest success the pulse and condition of the patients improving with each repetition of the enema, the bowel easily returning and never attended with harm in any case.— This method of treatment is worthy of a more extensive trial than it has yet received.—

IX. Preparations and Doses.—

The forms in which the Acetate is administered or used in Medicines are the following as they are given in the New British Pharmacopiea. 1st The Acetate of Lead. 2nd The Liquor Plumbi Subacetatis and Liquor Plumbi Subacetatis dilutus :- 3rd The Pilulæ Plumbi acetatis cum Opio containing in 4 grain pills gr ½ of Opium and 3 grains of Acetate.- 4th The Ungt. Plumbi subacetatis compounded of Solution of subacetate of Lead, Camphor, White wax and Olive Oil. As to the doses of Acetate of Lead it may be said that it at present is, and has been given in too small quantities.- The usual dose in the form of Pill is that given in the new Pharmacopeia given twice daily. As it is cumulative in the system, if given in even this dose and continued for any length of time it will produce its constitutional effects. It is accordingly

accordingly advisable when the first of these appear viz the Blue line on the Gums to stop its administration.— But much larger doses might be given at once, as recommended, with correspondingly greater results, and it has been given by Professor Christison and others without harm accruing to the patient.— Dr. Christison has given 18 grains of this salt for some time without producing any symptoms except slight colic in one or two cases.— As a Lotion externally the Stronger or milder Solution may be used. The Diacetate was Superseded by the Acetate and the Subacetate is now selected both for ointment and lotions Professor Christison gives the following forms in which the Lead and Opium may be used as a Lotion

℞ Tinct Opii ℥ß Plumbi Acet ℈j Aquae ℥ivß ~~[illegible]~~	vel	℞ Morphiae Acet. gr i or iß Plumbi Mur ℈j Aquae ℥j ad ℥v ~~[illegible]~~

X Antidotes

When the Acetate of Lead is taken by mistake or given criminally for the purpose of poisoning, the symptoms as already described are very alarming and the medical attendant will most likely be called in at once on the discovery that a poison, at least a substance popularly known as such has been received into the system. - In such circumstances as these, it is well that the person called should know how to treat such a case, with reference to the removal at once from the body, or the neutralization of the irritant substance which has been taken, as, if he is not aware of the antidotes to be instantly employed, the most serious, nay, fatal results may accrue to the sufferer from the effects of the poison, before the requisite means be used to prevent these, or at least to modify them. —

Antidotes and Treatment ..

1st Of large doses .. In the case therefore of Acetate of Lead having been swallowed in large quantity, we have the usual irritant effects and symptoms, (if these be not immediately counteracted after the ingestion of the salt), which such a poisonous salt produces. The Vomiting which will most likely be at once set up, should be favoured by draughts of tepid water combined with a full dose of Sulphate of Magnesia, which, by forming an insoluble Sulphate of Lead, prevents its further irritant action.. Should vomiting not come on an emetic of Sulphate of Zinc may be given, at the same time also giving the Sulphate of Magnesia. After the stomach has been emptied of its contents, and of the greater part of the poison, a dose of Castor Oil or another dose of Epsom salts administered will serve the purposes. 1st Of counteracting the astringent and constipating action on the

the intestines of any portion of the poison which may have been absorbed. Secondly of neutralizing and rendering innocuous any of the salt which has not been acted upon by the first dose of Epsom Salts - Thirdly Of carrying out of the body the residue of Sulphate of Lead .- In cases of emergency the Sulphate of Zinc as an Emetic or the Sulphate of Magnesia as an Antidote may not be at hand. - In such cases instead of the former the Sulphate of Copper may be used as an emetic or the stomach pump may be had recourse to, and in place of the latter the Sulphates of Soda Potash or Alum may be used, or if Sulphuric Acid be at hand it may be used very much diluted with water, giving the patient plenty of the acidulated water to drink. In using the Sulphuric Acid of course great care must be taken to reduce it with

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a sufficiently large volume of water before administering it. At the same time the vomiting might be excited by tickling the fauces with a feather, and giving the medicines in tepid water

2nd Of Colica Pictonum.- The principals indications in the treatment of Lead colic is to overcome the constipation, to clear the lead out of the system, and to relieve the spasm and pain attendant on the colic.- For this purpose the remedies now used are Opium combined with or followed by aperients.- The aperients used for this purpose are Epsom Salts, Glaubers Salts Sulphate of Alum, Castor Oil and diluted Sulphuric Acid.- The Sulphate of Alum as a remedy in doses of ℈j to ℥j every 3 or 4 hours has been highly lauded by many who have been successful in its employment but they disagree as to its mode of action

Thus.

Pereira Thus one says that its action depends on the formation of Sulphate of Lead, favouring the expulsion of the lead salt from the system, another that it Kopp. cannot be due to this as it has been successful in cases of colic not depending on lead, and a Copland third that its action is to stimulate the half paralysed bowel to action, and get rid of the noxious matters.- It is most probable that the action mainly depends on the first mentioned and the last may also contribute to the success of the remedy.- Whether this be the case or not there is no doubt that the Sulphates mentioned have all been found highly successful in the treatment of this complaint. The Iodide of Potassium is greatly used when of long standing.- Also if there be much vomiting the Opium administered will allay it.- The Hot bath has been used with advantage in these cases either simple or medicated as Sulphuretted baths

Enemata of hot water are also recommended.—

3rd. When Paralysis has taken place Galvanism is used to assist in the restoration of the lost power to the muscles, and the paralysed hand should be put up in a splint with the fingers extended (Watson) Strychnia and Brucia have also been said to have succeeded in the treatment of this disorder but are now seldom used.—

For the prevention of these actions - Cleanliness prevention of its admission into the system by air or food and drink and the imbibition of Sulphuric Acid Lemonade as recommended by Liebig are the means proposed and adopted with the best results.— Care must also be taken that food containing vegetable acids is not cooked in leaden vessels.—

Uses in Pharmacy and the Arts.—

The Acetate of Lead is greatly used in Pharmacy and the Arts. In the former it is used on account of its chemical reaction in the preparation of some of the Alkaloids, and in the latter, on account of its strong affinity for the Colouring matters of the vegetable world. It is used in the preparation of the Acetate from the Meconate of Morphia, the meconate of Lead being formed, and the Acetate of Morphia.. Also in the preparation of Strychnia, Aloëssin, Meconic Acid &c. In the Arts it is used in Calico Printing — It has been also used for the purpose of sweetening Wines, and as an adulteration to Rum and Cyder.— These adulterations have been minutely investigated by eminent persons, and some of them have been found to be accidental, but many of them depending on the intentional addition of the Lead for the purpose of adulteration.—