

LECTURE XVI.

ARSENICUM ALBUM.

(Oxide of Arsenic, white oxide of Arsenic, Arsenious acid).

This is the only arsenical preparation which has been so far used by homoeopathic physicians. Metallic Arsenic has been experimented with to some extent upon the healthy organism, but we are not as yet in possession of much clinical experience regarding the therapeutic virtues of this agent.

Arsenic combines naturally with oxygen and sulphur. We have two natural compounds of Arsenic with oxygen, viz.: arsenious acid and arsenic acid. The latter is met with in combination with bases, such as arseniate of silver, soda, iron, lime, etc.

There are two native compounds of Arsenic with sulphur, one termed *orpiment*, the other *realgar*.

Orpiment, also termed King's yellow, is the French name for auripigmentura or gold-paint. It was so named on account of its yellow color, and also because it was supposed to contain gold. Orpiment is used as an ingredient of the so-called "*poudre subtile*," which is extensively advertised in our newspapers as a beautifying depilatory agent.

Realgar, red Arsenic or the red sulphuret of Arsenic, was used by the Greeks, Romans and Arabians, and named *sandaraka*, *sandarach*. This preparation is no longer used in medicine, but is employed by pyrotechnists and as a dye-stuff. In the arts, Arsenic has been employed in the earliest ages. Herodotus informs us that the pinnacles of a portion of the walls of Ecbatana, the capital of the Medes, were painted with sandarach.

In the work "on Ulcers," attributed to Hippocrates, Arsenic is mentioned as a therapeutic agent. Dioscorides, however, is the first author who makes use of the term "*Arsenikon*."

In the following extract the therapeutic properties of Arsenic are thus described by this author: "Arsenic (by which he seems to mean the yellow sulphuret or orpiment), has an antiseptic, styptic and escharotic power, causing a violent smarting and burning; at the same time it has constringent properties, and takes off the hair. Sandarach has the same virtues; moreover an ointment of

red arsenic and pitch cures baldness and leprosy, and, if mixed with oil, it cures phthiriasis. In combination with the oil of roses, it is useful for ulcers of the nostrils and mouth, and for exanthemata and condylomata. It is also given (internally) in the shape of an emulsion for suppuration of the lungs. It is also inhaled, in addition with resin, for inveterate cough, the vapor being drawn in through a tube inserted in the mouth. Prepared with honey it clears the voice, and is given to asthmatic patients in the shape of a drink, in combination with resin."

Plinius, Celsua, Scribonius Largus, and afterwards the followers of Galen acknowledge similar properties of Arsenic.

The Arabian physicians who were the first to mention the white oxide, particularly Khazes, Mesne, Serapion, Avicenna, state that "all the arsenical preparations are heating and burning. They are a cure for the itch, putrid ulcers, ulcerous lepra, spreading herpes, lice, and likewise asthma; we use them either in the shape of an ointment, or inhale the vapors." This is the doctrine of Rhazes; Avicenna teaches the same thing. One fact may seem exceedingly interesting to a homeopathic physician; it is this: that Arsenic, according to the statement of these ancient Greek and Arabian authors, clears the skin of all superfluous hair, and yet cures baldness. It may be argued that the depilatory action of Arsenic is owing to its escharotic property; but we shall afterwards learn, that baldness is a dynamic effect of poisonous doses of Arsenic, and that a cure of baldness by means of Arsenic takes place in virtue of the great law "Similia similibus curantur."

Van Helmont recommended Arsenic as an external application to ulcers, but he positively opposed the internal use of this drug.

Lemery and Wepfer, author of an interesting treatise on hemlock, opposed the internal use of Arsenic, especially in intermittent fever, with all their might. Many pamphlets appeared in the 18th century in favor of using Arsenic in intermittent fever, but this doctrine was most violently opposed by Stoerek who had himself introduced the use of a number of vegetable poisons with passionate eagerness.

In consequence of this violent opposition on the part of Stoerek and others, Arsenic sank into discredit, until Fowler and other English physicians restored it to a suitable rank among therapeutic agents at the close of the last century.

In 1811 Harless published his interesting memoir on Arsenic in Nuremberg, Germany. He advocates the claims of this agent as eloquently as they were denied by Dierbach and Hufeland with uncompromising hostility.

It is indeed true that Arsenic seems to poison the very fountain of life; but may it not be made serviceable as a therapeutic agent even in proportion to the intensity of its deleterious powers? Vogt, in his great work on Pharmacodynamics, recommends Arsenic as a strengthening agent which promotes digestion, assimilation and secretion and stimulates nervous and muscular activity. This recommendation is based upon the supposed stimulating effect of small doses of Arsenic on the living tissues. Trousseau and Pidoux experimented upon themselves with one-eighth of a grain doses. They experienced a general stimulation such as is sometimes caused by strong coffee. Another striking effect of small doses of Arsenic was to produce a remarkable feeling of vigor in the lower limbs, enabling them to take long walks without feeling tired. The same effect was experienced by Masselot, and described by him in these terms: *Remarkable ability to walk.*

It is said that there exists in some parts of the Austrian Empire, and more particularly in Styria, a class of men who eat Arsenic for the purpose of giving themselves a finer appearance, and increasing their fleshiness.

It is likewise affirmed that the use of Arsenic facilitates the process of respiration during a long walk up the mountains.

At first these toxicophagi are said to eat a little less than half a grain, two or three times a week, swallowing this dose in the morning before breakfast. This quantity is increased very gradually in proportion as the smaller dose loses its effect.

It does not appear that symptoms of an arsenical cachexia are perceived in those who know how to proportion the quantity of the poison to their constitution and degree of tolerance. History records the case of Mithridates, the old King of the Parthians, who had so accustomed himself to the use of Arsenic that this poison had lost all effect upon him. He had contracted the habit of Arsenic-eating as a protection against the poison in case it should be administered to him from evil designs.

It is stated that Arsenic-eaters are affected by the discontinuance of the use of Arsenic similarly to what opium-eaters are, if they are deprived of their stimulant, or topers if they do not imbibe their accustomed potion. After the Arsenic is discontinued, symptoms of an arsenical cachexia become apparent,

which Trousseau and Pidoux sum up in these words: "Great indifference for all their surroundings, anxiety for their own persons, gastric derangements, anorexia, souse of repletion in the stomach, vomiting of glairy mucous early in the morning, with pytalism; pyrosis, spasmodic constriction of the pharynx, difficulty of breathing. These effects can only be removed by resuming the habit of eating the poison."

It is likewise stated that Arsenic is given to horses and hogs in order to make them appear fat and healthy before offering them for sale.

Doctor Koepel, in a communication to the Medical Society of Brussels concerning a memoir of Doctor Tschudi on the Arsenic-eaters of Styria and Lower Austria, relates the following curious fact:

" A servant in a noble family wanted to get rid of a rather rigid overseeress. In order to accomplish this object he mixed for a long time small doses of Arsenic in the food of the lady, fancying that the slow effects of the poison would prevent all suspicion. To his amazement he noticed for several months that this lady gained in flesh, and looked bright and cheerful. Seeing that the small doses produced an opposite effect from what he had desired, he mixed a much larger quantity of Arsenic in a chicken fricassee. The poison acted with so much intensity that the cause of the trouble was soon discovered. (Related by Trousseau and Pidoux.)"

Some critics, and more particularly Christison, Kesteren and others, doubt the authenticity of the statements made with reference to the Arsenicophagi of the Austrian Empire. Their doubts are based upon the absence of all positive, irrefutable documentary evidence concerning the subject. One, to me, very important reason for considering these statements about the vice of Arsenic-eating exaggerated, is the strictness of the police-regulations, by means of which the indiscriminate use of such a powerful poison as Arsenic is known to be, is rendered impossible in countries like Austria, where the police holds supreme sway, and where no poison can be sold by a druggist without an order duly signed by a physician.

If, however, the practice of arsenic-eating does actually prevail, and is attended with such a general exaltation of the vital powers as we have stated, this effect can only be accounted for upon grounds such as we have endeavored to explain in former lectures. The primary effect of poisonous doses of arsenic is an universal prostration of the vital energies, the specific character of which we shall delineate in a series of cases of poisoning; the effect of very small doses may therefore be a seeming exaltation of the vital functions, in consequence of the

organic reaction overcoming the specific disturbing action of the poison, before it has had time to develop its inherent effects; indeed the original quantity was too small to accomplish such a result. It stands to reason that in the case of a confirmed Arsenic-eater, as in the case of an Opium-chewer, an inveterate smoker or toper, the signs of an artificial poisonous dycrasia will make their appearance. I am astonished that Mr. Kestern should have overlooked the physiological law of which Opium-eating and tobacco-chewing furnish such universal and striking illustrations, so far as to predicate his doubt of the actuality of Arsenic-eating upon the alleged fact, that the Styrian peasants who are said to be addicted to this vice exhibit symptoms of poisoning after the discontinuance of the stimulant, which have to be hushed up by resuming its use. The same results, as we said before, are observed from other stimulants, such as: Opium, Brandy and Tobacco.

Pereira gives a very accurate and complete description of the process of obtaining arsenious acid on a large scale from arsenical iron. This process is resorted to at Altenburg, in Silesia, where this ore is obtained. It consists of a series of very simple operations:

1. Reducing the ore to powder.
2. Roasting this powdered ore in a muffled furnace.
3. Conveying the resulting vapors of arsenious acid into a condensing chamber, where the vapors are deposited in a pulverulent form. These vapors of arsenious acid are called by the German miners *flowers of arsenic* or *smelting house smoke* (Huttenrauch), the condensed vapors are named *poison-flour* (Giftmehl).
4. Refining the rough acid by sublimation. The glassy mass thus collected on the sides of the iron vessels in which the refining process is conducted, is termed *white arsenic glass*, *weisse Arsenik-glass*; this is sometimes purified by a second and even a third sublimation.

In some parts of Saxony, Arsenic is obtained as a secondary product in the roasting of cobalt ores, arseniurcts of cobalt. It is deposited in long horizontal flues, so-called poison flues (*Giftfunken*), and is purified by sublimation.

Arsenious acid is also manufactured in Cornwall, from the white *murolic* or *mispickel* found with the tin-ore. Mispickel is the name which the German miners give to arsenical iron.

Arsenious acid occurs both in the shape of regular crystals and in an amorphous condition. The crystals are either octahedrons or tetrahedrons. In the amorphous condition, arsenious acid occurs in large, glassy, colorless or yellowish, transparent cakes (*vitreous or glacial arsenious acid*). These masses soon lose their transparency, the opacity gradually extending towards the centre; in some cases, the acid becomes friable and pulverulent. Krueger ascribes this change to the absorption of water, from the atmosphere; he says that such a change only takes place in moist air, and that the weight of the arsenious mass increases in consequence of this transformation. Pereira mentions a fact which seems to confirm this theory; he had arsenious acid enclosed in a glass tube hermetically sealed without its transparency being affected in the least; the tube was subsequently cracked, and the acid soon became opaque.

Arsenious acid is soluble in 80 parts of water at a temperature of 59°, or in 7.72 parts of boiling water. Do not forget that arsenious acid is readily soluble in warm water. A physician who is ignorant or forgetful of this fact, might order warm water in a case of poisoning with Arsenic, for the purpose of promoting vomiting. The effect of such treatment would inevitably be to effect the solution of the poison and to increase its virulence to a fatal degree of intensity.

Arsenious acid is also soluble in alcohol. An alcoholic solution of this acid is used by some homoeopathic practitioners.

Arsenious acid has little or no taste, as Plenck, Addison and Christian have remarked. Simon, however, has discovered a sweetish taste to the acid. Both the solid and liquid arsenious acid is inodorous.

A description of the characteristic of arsenious acid in its different forms, solid, pure, liquid, and in organic mixtures, belongs to the domain of toxicology. The solid acid is distinguished

1. "*By its volatility*. Heated on the point of a pen-knife in the flame of a spirit lamp, arsenious acid produces a white smoke which speedily disappears.

2. Its *garlic odor*. If arsenious acid be burnt on red-hot charcoal placed in a saucer, metallic arsenic is evolved in the form of vapor, having a garlic odor. At the distance of an inch or two from the embers, this scarcely-perceptible vapor is converted into a dense, white, odorless smoke.

The garlic odor is not peculiar to arsenic; for Orfila has shown that a compound of albumen and fat exhales this odor when heated.

3. *Formation of a metallic crust*. If arsenious acid be mixed with recently-ignited charcoal that has, however, been allowed to cool and to which some carbonate of soda may be added; and if this mixture be heated in the bulb of one of Berzelius'

reduction tubes, the deoxidized acid is sublimated, and the condensed vapor is deposited in a cooler portion of the tube in the shape of a crust which is metallic Arsenic and is distinguishable by its brilliancy externally, by its crystalline appearance and grayish-white color within, by its volatility and by the results it yields when treated with the various and well-known tests for Arsenic. These tests are described in works on chemistry, and will be fully shown and explained by the Chemical Chair.

For homoeopathic purposes we never use the so-called flowers of Arsenic to which allusion has been made previously, for they are frequently found adulterated by admixture with other substances; we use the solid Arsenic, of which we make triturations in the proportion of one to ninety-nine, or one to ten. The physiologico-therapeutical range of Arsenic is only rivaled by the wonderful health-disturbing, and therefore health-restoring properties of Aconite. To the careful observer the symptomatic resemblances of Aconite and Arsenic must seem striking. The part which Aconite seems to play on the surface of the organic functions, is enacted by Arsenic in the inmost recesses of vitality. The Aconite-fever is evanescent, a chill, or some chilly creepings or shiverings along the back, followed by a moderate degree of heat and moisture corresponding in quantity with the intensity of the previous rise of temperature. The Arsenic-chill, on the contrary, seems to freeze the vital blood in the very laboratory of the heart; the subsequent heat, is like a consuming fire burning up the vital moisture of the pores, until a soaking, debilitating perspiration is supplied by the reactive forces of the organism as a restorer of their disturbed harmony.

We may mention typhoid fever as another lesion strikingly illustrative of the differences of action between Aconite and Arsenic. Either of these agents maybe adapted to a pathological lesion which we may designate as typhoid fever. And yet how much more intensely is the vitality of the organism prostrated in typhoid fever for which Arsenic is required than in typhoid fever which may be controlled with Aconite. The latter form of typhoid fever may not seem much worse than a severe attack of influenza, with mild exacerbations of the fever every evening or afternoon, which are followed by more or less copious perspiration. Other symptoms of a typhoid condition of the system may be: dizziness and dull pain in the head; soreness and inflammation of the edges of the tongue, with dryness, and dirty-looking gray or brownish coating of this organ; unnatural dryness of the skin; soreness and dull expression of the eyes, lachrymation, great nervousness, tendency to start, uneasy sleep, debility.

In typhoid fever, to which Arsenic is homoeopathic, all these symptoms would be much more marked; the chill is more racking, the subsequent fever-heat more burning, and the sweats more debilitating. The vital fluids are much more deeply affected by the morbid process; the signs of decomposition more evident; there is a more manifest tendency to the formation of sores and petechia); the bowels are either more tympanitic and torpid, or else the diarrhea is more offensive and prostrating; in the Arsenic typhoid fever the urine is dark-brown, foul and

scanty; in the Aconite form of this fever, the urine may simply have a deeper color and some sediment, without the quantity being altered.

We may draw a similar parallel in every disease to which both Aconite and Arsenic are homoeopathic. Take a case of *cholera*. A simple attack, with a moderate degree of coldness, debility, cramps in the calves, vomiting of bile and mucus, alvine discharges of serum and mucus, sinking pulse, may often be controlled with Aconite; but would Aconite be sufficient to control an attack characterized by intense burning in the pyloric region, praecordial anguish, excessive retching and vomiting, copious and frequent alvine evacuations followed by sudden and excessive prostration, and attended with marble coldness of the skin, collapse of pulse, unquenchable thirst, most violent and distressing cramps in the extremities? No indeed, Arsenic would have to be exhibited.

It seems needless to continue the contrast any further for the purpose of impressing upon your minds the extraordinary power of Arsenic to penetrate to the inmost fountain of organic life and poison the *very* emanations of vitality as they diffuse themselves through the tissues. Knowing these deleterious effects of Arsenic, we cannot wonder that this heroic agent should have been proscribed by Lemercy, Hufeland, and a host of lesser lights. The wish has frequently been expressed before judicial tribunals, that the use of Arsenic, being a dangerous rather than a useful agent, might be altogether discontinued in medicine. Hufeland condemns the use of Arsenic in this extraordinary language: " It is my maxim never to make use of Arsenic in intermittent fever, because its destructive effects, even in the smallest doses, of one-tenth of a grain for instance, are incalculable; a cure effected with such doses, is therefore a mere suppression, a pathological death.

One-tenth of a grain is the smallest dose that occurs to the mind of such a veteran practitioner as Hufeland. This good man was like his brethren, tainted with the pernicious notion that a medicine cannot be depended upon as a therapeutic agent, unless it is given in doses large enough to produce medicinal effects. If this doctrine be true, it may necessarily follow that Arsenic may have to be given in sufficient quantity to act not only as a medicine, but likewise as a poison. I have shown that this doctrine is essentially false, and that a cure is not effected by means of an artificial malady being set up in the tissues, but in virtue of the law that *there exists a higher degree of affinity between the morbid essence and the remedial agent, which is its material type, than between the morbid essence and the organic tissues*. A remedial agent selected and administered in accordance with this law, may be given in a very small dose, so small that this infinitesimal dose may excite the risibility of such silly poetasters as Holmes & Co.

Gentlemen, if you ever feel tempted to try the highest potencies, select Arsenic for your first experiment. If your medicine is perfectly homoeopathic to the case, you may see beautiful effects even from the two hundredth potency. In a case of malignant impetigo, Arsenic effected a most wonderful cure. A baby had been

vaccinated with bad lymph. A black pustule formed, of the size of a small walnut, filled with the most destructive ichor. Wherever the ichor touched the sound skin, it formed a phagedenic ulcer. In the space of three days, the whole arm of the baby, the forehead, face, neck, and a portion of the chest and scalp were covered with the most loathsome and dangerous eruption. The eyes were closed. The face looked like one hideous sore. The mother too had caught the disease. Two globules of Arsenic 200 were given dry on the tongue. Twenty-four hours after the medicine had been taken, the eruption had dried up, and in three days the crusts fell off, leaving a sound skin behind. It is not necessary, however, to be frightened, if we should have to give a larger dose; one-tenth and even one-fifth of a grain may be given without causing any untoward symptoms.

There are few agents in Medicine the effects of which upon the healthy body are as well known as those of Arsenic. Unfortunately this knowledge has been obtained through great sacrifice of human life and an incalculable amount of tortures. In the history of poisoning, Arsenic stands recorded as the most common, and the most effectual means of murder and self-destruction. Pope Alexander VI. committed most of his murders with Arsenic. The principal ingredient of the famous *Aqua toffana* or of the *Cantarella*, a popular name for the fatal poison which destroyed hundreds of the first lives of Italy during the reign of Alexander VI., was *arsenious acid*.

In a legal point of view, it is important to know how small a dose may produce poisonous effects, and how long a period of time may elapse before the poison manifests its deleterious effects.

In regard to the first point, there are many facts going to show that a very small dose is sometimes sufficient to produce poisonous symptoms and even to destroy life. Fodere has seen a case where half a grain of arsenious acid caused violent griping pains in the stomach, colic and dysentery; these symptoms continued until the eighth day. Christison states that five persons were attacked with very serious symptoms from one grain of Arsenic which each of them took in wine. In a case mentioned by Taylor, a child of six months took one third of a grain of arsenious acid; a woman took one grain and a half, and her husband two grains and a half. All experienced vomiting and violent prostration. The man remained sick for several days.

Lacheze of Angers, a French physiologist, has seen death result from two grains of Arsenic. This quantity was taken in four doses, and within the space of two days. One person died in seven, and another person in ten weeks. Both Christison and Hahnemann affirm that two grains, and even one, are sufficient to cause death in a few days. Dr. Alfred Taylor likewise affirms that from two to three grains may be regarded as a fatal dose.

On the other hand, very large quantities of Arsenic have been swallowed without causing death. Pereira states that on one occasion he opened the body of a man who had destroyed himself with Arsenic. The doctor was informed by the friends of the dead man that a fortnight ago he had made a fruitless attempt at

suicide by swallowing half an ounce of Arsenic. The poison was taken immediately after dinner, and the only effect produced was violent vomiting.

Arsenic may be taken for a long time without producing fatal consequences. Kenault and Orfila report the case of a servant-girl who was poisoned by her jealous companion. Everyday she mixed a little. Arsenic in her enemy's dinner. A few minutes after eating her dinner, it was thrown up again before the poison had time to act. This continued for six weeks. The symptoms gradually became worse; violent colicky pains set in, the patient wasted away, the least exposure to a current of air caused spasms and convulsions. She went into the country and gradually recovered her health. The criminal attempt was discovered.

In regard to the time which has to elapse before the poison manifests its effects a good deal depends upon the quantity of the dose; upon the condition of the stomach, whether full or empty; upon the degree of solubility and perhaps upon peculiar idiosyncrasies of the patient. The effects of a large dose may be almost instantaneous. A smaller dose of several grains may not exhibit its poisonous effects until several hours after the administration of the poison. In the case of a French lady, Madame Gerard, who had arsenical ointment applied to a scarified tumor of the breast, the first symptoms of poisoning were not perceived until about ten hours after the application of the drug. In this case the poison acted by absorption.

Arsenic exercises its poisonous effects not only on man, but likewise on plants. Jaeger whose experiments are communicated in an inaugural thesis published at Tubingen in 1808, states that seeds which have been soaked for some time in arsenious acid, are incapable of germinating, and that buds which have been plunged in it, are no longer capable of expanding.

Chatin poured upon the denuded roots of a plant a few quarts of a watery solution of Arsenic; in a few days, the plant turned *yellow* from below upwards. If only a small quantity of the solution was used; or if the plant, after the first symptoms of poisoning had made their appearance, was transplanted into fresh soil it soon recovered its health. The application of warmth likewise affected the restoration of the plant. A chemical analysis of the different parts of the plant showed that the poison had been absorbed, but that it was not uniformly distributed through every part of the plant.

According to Jaeger's experiments, infusoria are destroyed in an arsenical solution. The extensive investigations of this experimenter show that all animals are liable to the poisonous action of Arsenic. In all of them it convulses the stomach and irritates the mucous lining of the intestines, causing vomiting and increased alvine evacuations. The power of voluntary motion, with the irritability of the muscular fibre, is destroyed by Arsenic; after the death of the animals which Jaeger experimented upon with Arsenic, the muscles soon ceased to be influenced by the galvanic battery. In animals which breathe by lungs,

respiration became difficult and laborious; and in warm-blooded animals great thirst was experienced.

It is well to note these effects of Arsenic upon the respiratory system and upon the mucous lining of the alimentary canal, as we shall afterwards see that in diseases of the organs of respiration and digestion Arsenic constitutes one of our main remedies.

It appears that horses can bear enormous quantities of arsenious acid without any injurious effects. Pereira states that Berthe, a French Veterinary Surgeon, gave two and afterwards three drachms to a mare for the cure of an obstinate skin-disease, without any injurious effects. It appears from experiments by *lieksunhiru* and *Dalemonde* that it takes from one to two ounces of Arsenic dissolved in water to destroy a horse.

On the subject of poisoning with Arsenic, Hahnemann is recognized as an authority even by Old-School physicians. He is frequently quoted by Christison, Taylor, Flandin and other toxicologists. In his Essay on Arsenic he quotes a host of medical writers, which makes this highly interesting volume one of the most valuable contributions to the vast domain of toxicology. In the November number, 1858, of the North American Journal of Homoeopathy, we find an abstract of the contents of this work, for which we are indebted to the indefatigable industry of Dr. Peters, one of the Editors of this instructive periodical. We will transfer this abstract to our pages, with some slight modifications.

Hahnemann distinguishes three degrees of poisoning:

The *first degree* is, where a large quantity is taken under circumstances favoring its full effect; viz.: on an empty stomach, or with heating liquors, in persons with irritable nerves and choleric temperaments, subject to spasmodic and inflammatory affections, or shattered by anger, grief, jealousy or fear, overloaded with acrid bile, or affected with chronic disease.

The poisoned person *first* experiences a cold shuddering which seems to pervade the whole body; while an inexpressible anxiety, or nausea, which seems to oppress the chest as well as the stomach, a cold deathlike sweat, and a general trembling of the limbs, alternate with one another in frequent paroxysms.

Second, the hands, feet and tip of the nose become cold; blue circles form around the eyes, while the oppressed pulse gains in hardness and quickness.

Third, follow violent attempts at vomiting, which, although very forcible, are fruitless at first, and finally become almost ineffectual from spasmodic closure of the cardiac orifice, and emptiness of the stomach of everything but Arsenic which is tenaciously plastered on its walls. The patient complains of burning and tearing pains in his throat, esophagus and stomach, and knows not what to do with himself.

Fourth, the Arsenic continues to ravage and destroy the stomach without compelling it to full and relief-affording vomiting; it clings fast to the villi of the mucous membrane, and contracts it as boiling water would. The whole nervous system trembles and struggles.

Fifth, the fruitless retchings, the fever, the frightful chills, the anxiety, the internal heat and unquenchable thirst increase; the breathing becomes quicker and hotter, more spasmodic and violent; and the glistening eyes project from their sockets. The inexpressible anxiety, and the burning, rending and overpowering pain in the epigastrium, torture the patient more and more as they progressively increase.

Sixth, at first the abdomen is contracted; afterwards, when inflammation and irritation of the stomach, liver and spleen occur, it becomes hot and distended; the attempt at vomiting becomes irresistible and incessant; the panting and gasping lungs, the dry and parched tongue, the gaping mouth seek refreshment from cool air and water. The stools and urine are suppressed; the substances ejected from the stomach have a disgusting smell and color, and may be mixed with blood. Cutting and griping pains in the bowels ensue, especially around the navel; the patient is beside himself, so that he neither hears nor sees correctly, while his expression is frightfully anxious and fearful.

Seventh, we now see the evidences of the ascendancy of the corrosive destroyer, which persists in its internal ravages without check or mercy, in the livid, frothy lips, the swollen and trembling tongue, the agonizing expression of the bloated face, the viscid sweat on the cold forehead, and the lead-colored circles around the staring eyes.

Eighth, the miserable sufferer no longer looks like himself, but seems a wretched and tortured stranger from another sphere; he screams frightfully, or whimpers despairingly in broken or angry words for help from agony, fire and death; then turns and struggles violently.

Ninth, soon after this we see signs of loss of feeling and sensation; he becomes more quiet; his heart heaves less frequently; the vomiting ceases; his black parched lips tremble, his pulse becomes extinguished, and involuntary putrid stools of a most offensive smell and appearance occur.

Tenth, the pupils dilate; the death-rattle is heard in the throat of the dying and unconscious sufferer; jerks and spasms convulse his stiffening limbs and his icy-cold face; his stertorous breathing becomes fearfully slower and slower, and

finally, with a last spasmodic gasp a ghastly corpse alone is left, the staring eyes and gaping mouth of which fill us with horror.

This graphic description of the effects of poisoning with a fatal dose of Arsenic is so characteristic of an acute attack of Asiatic Cholera, that we may already at this stage direct your attention to the extraordinary therapeutic powers of Arsenic in this dreadful scourge.

In Hahnemann's *second degree* of poisoning with Arsenic, life may persist for several days; this degree requires more than four grains to produce it; it is most apt to occur in not very impressible, fully grown and not unhealthy persons, especially those who have much mucous in their stomach, or have taken food just before or with the Arsenic, or have drunk freely of simple diluent drinks, and have not been harassed with aggravating mental troubles. The phenomena of this degree are similar to those of the first degree, only they occur less rapidly, have various less violent episodes, and intercurrent remissions. The cutting, gnawing and burning sensations of the first degree, are more intermixed with twisting, aching, colicky, griping and gnawing pains; the face swells more; the abdomen is harder, and aphthous vesicles arise in the mouth.

This second degree is characterized by more frequent, offensive and bloody discharges from the bowels, with gradually increasing gripings and less frequent vomitings. The strength of the patient fails more gradually, and his consciousness remains until the last, when convulsions may occur, and incessant hiccough which admits of no palliation or relief. This degree has peculiar agonies which are sometimes wanting in the first. As the pains are less severe and constant, there is more opportunity for the occurrence of remorse, despair, grief, contrition and other mental emotions which harass the soul. The strange admixture of bodily pain and mental agony often finishes what the poison alone was too weak to accomplish, and the more stealthy approaches of death are aided by regret for the past and hopelessness for the future.

Gentlemen, there is no toxicological agent that I am acquainted with, which is possessed of the power of plunging the mind into a state of hopeless despair in the same extraordinary degree as Arsenic. You may therefore note the fact, even at this stage of our pathogenetic tableau, that Arsenic may be employed with signal advantage in mental derangements of a religious character characterized by apprehensions for one's future fate, despair of salvation.

Hahnemann's *third degree* of poisoning with arsenic may arise from the second degree in consequence of insufficient treatment. In this degree the patient may remain alive, but a long-lasting chronic disorder may ensue. Remitting, but oft-

recurring cramps occur in the limbs, but especially in the feet; repeated paroxysms of fever set in, attended with colicky pains, spasmodic contraction of the abdomen, intermingled with headache, heat and thirst. After one of these feverish attacks, in which both vomiting and diarrhea are apt to recur, the whole remaining force of the poison is apt to be thrown upon the limbs; they become paralyzed, or so much contracted that the patient cannot extend them, at least not the legs. If proper evacuations are neglected, the irregular attacks of fever occur more frequently, the pulse becomes intermittent, the eyes become dim or fixed and sallow, the mouth bitter, the headache and oppression of the heart and chest insupportable, and the contracted limbs are visited with burning, itching-neuralgic pains somewhat similar to those of gout, but not followed by alleviation of the other symptoms. These may be succeeded by a very violent attack of fever, and a miliary eruption over the whole body, the vesicles of which often become confluent and contain an exceedingly acrid fluid. At times the whole affection is terminated happily by one of those critical fevers and eruptions, but more frequently it is not, and the whole aggregate of sufferings is increased, because the remains of the unantidoted or unremoved poison are still considerable. In the latter case, the contraction of the limbs are followed by absolute paralysis; the gout-like pains still rage violently, but the eruption dries up, and the skin peels off; the surface remains tender for a longtime; the limbs, especially the feet swell; the irregular attacks of fever still recur, and are attended with stomach-ache and colic; palpitations are not uncommon; and opisthotonos, or the eclampsia of Sauvage, in which there is violent bending of the body backwards, with convulsions and retention of consciousness, may occur. The patient may recover from this, but remain feeble, cachectic, with irregular febrile chills, oppression of the stomach from the slightest food or drink, or with attacks of vomiting directly after meals, bitter unpleasant taste in the mouth, pains in the head, dryness of the skin and eyes, painful and irregular discharges from the bowels, restlessness, dejection of spirits, dropsical swellings, night-sweats, etc. All these symptoms point to the scaling off of eschars and consequent suppurating patches in the stomach or bowels. If these corrosions were not very deep they may heal over and the patient may finally recover.

This third degree of poisoning exhibits the disorganizing powers of Arsenic in a variety of forms. In this last degree of the Arsenic disease, when this agent acts as a slow poison, contaminating life in its inmost principles as it were, the functions of the nervous system are most unmercifully disturbed by the dire destroyer. Contractions and paralysis, fierce neuralgic pains, opisthotonic spasms, mark the presence of the poison; deep-seated gastric derangements, such as have been grouped by pathologists under the names of dyspepsia, gastralgia, colico-dynia, chronic gastritis or gastro-enteritis, chronic diarrhea and dysentery, are permanently entailed upon the organism; emaciation and an utter prostration of

strength, chronic jaundice, dropsy, hypochondria, hectic fever, night-sweats, etc., are the constant companion of the miserable victim.

Hahnemann graphically sums up the effect of slow poisoning by Arsenic as a gradual sinking of the powers of life, without any violent symptoms; a nameless feeling of illness, failure of the strength, an aversion to food and drink, and all the other enjoyments of life.

According to Pereira, the symptoms of long-continued small doses of Arsenic may be summed up as follows: disorder of the digestive functions characterized by flatulence, sensation of warmth, or actual pain, in the stomach and bowels; loss of appetite; thirst, nausea and vomiting, purging, or at least a relaxed condition of the bowels, and griping; furred tongue, with dryness and tightness of the mouth and throat, or with salivation. Quick, small and sometimes irregular pulse; oppressed respiration, with a dry cough. The body wastes; the stomach is often so irritable that no food can be retained in it. Headache, giddiness and want of sleep are frequently observed. The limbs become painful, feeble, trembling, subject to convulsions; occasionally benumbed and ultimately paralyzed. An eruption makes its appearance upon the skin, and now and then the hair and nails fall of. Swelling of the feet and face is not infrequent; and the patient gradually sinks, in some cases retaining his consciousness to the last, but at other times delirium and stupor supervening.

Of the acute form of poisoning both Christison and Pereira distinguish three varieties, of which Pereira furnishes the following description:

First form with acute symptoms of gastro-enteritis: there is burning pain in the throat and stomach, which soon extends over the whole abdomen. Pain and vomiting are not invariably present. The matters vomited are sometimes bilious, sometimes tinged with blood. Frequently there is a sense of heat, dryness, tightness and constriction of the throat, accompanied with incessant thirst, and occasionally with an almost hydrophobic difficulty of swallowing. The lower part of the intestinal canal soon becomes affected, as indicated by the burning pain which is increased on pressure, by the hard and tense condition of the abdomen, by the diarrhea which is sometimes bloody, by "the tenesmus, and by the occasional heat and excoriation of the anus. There may be difficulty in passing water, with burning pain in the genital organs. The urine is frequently diminished and sometimes suppressed. The pulse is quick, small, feeble and irregular; cold, clammy sweat; irregular action of the heart, giving rise to palpitation; breathing short, laborious and often painful; tongue dry and furred; the membrane lining the air-passages feels hot, and oftentimes painful. Although the symptoms of gastroenteritis predominate, yet we have symptoms of nervous

disorder, sometimes in the form of tremblings and cramps of the limbs, or delirium, and even in the last stage, insensibility; occasionally eruptions; death in twenty-four hours.

Prom among numberless cases of this kind, we may select the following as illustrative of the irritating action of Arsenic upon the intestinal mucus lining. The case is extracted from Prank's Physiological Magazine.

"A man put two ounces of Arsenic in his wife's soup. She took but little of it as it tasted badly. Half an hour after, she was attacked with violent burning in the throat, and severe pains in the abdomen; the evening and night were passed in great agony, with violent vomitings and burning thirst. She was left until the third day without medical advice, and was then found exceedingly exhausted, with blue circles around her eyes, her tongue and mouth dry and inflamed; she had burning thirst, was excessively fearful, had pains and tremblings in all her limbs, tearing pains in the stomach and bowels, frequent attacks of ineffectual retching, violent paroxysms of vomiting and incessant diarrhea; the alvine discharges consisted of mucous and greenish substances. She died on the sixth day. A post-mortem examination revealed the following symptoms:

"Tongue lined with a dirty, yellow coating; the anus gaped open and a greenish substance flowed from it; the blood in every part of the body was black and fluid; the peritoneum was reddened throughout its whole extent; the inner surface of the stomach was almost black, and as if swollen and thickened; the internal surface of the duodenum and upper part of the jejunum were dark-red. Portions of the larynx and esophagus were almost black. The stomach contained a yellowish-red fluid; the small intestines a moderate quantity of a yellowish substance, and an *unnaturally profuse secretion* of yellowish intestinal mucus; in the cavity of the pleura at least eight ounces of reddish water, and there was a spot on the pleura three inches in diameter, covered with a gelatinous recent false membrane, into which vessels had already commenced to project, although it was so loosely attached to the pleura that it could easily be removed."

This case exhibits all the signs of a malignant form of gastroenteritis, with tendency to gangrenous disorganization.

Second form: Acute poisoning with collapse or narcotism: faintness or actual syncope, frequently convulsions or paralysis, and sometimes insensibility or delirium. The dose of Arsenic is half an ounce or more.

Pereira informs us that he has seen one case of this form of poisoning. The individual (a gentleman of about twenty years of age) coarsely pounded a lump

of arsenious acid and swallowed it. At a rough calculation it was supposed that he took about six or eight drachms of the Arsenic. The symptoms were pain, vomiting, great weakness, with extreme depression of the circulation, faintness, collapse, and death in about four hours. His intellect was clear until a very short time before death, when he sank into a doze. There were neither convulsions nor paralysis. Every attempt was made to remove the poison from the stomach; copious vomiting took place; large draughts of water were administered, and the stomach-pump applied. Notwithstanding these circumstances, more than four drachms of solid arsenious acid in the form of lumps were found in the stomach after death. Their weight had apparently prevented their removal during life.

In the following two cases the narcotic action of the poison is strikingly manifest. The first of these two cases is reported by Christison; the second is extracted from Rankin's Half-yearly Abstract:

"A young woman was caught in the act of swallowing little fragments of Arsenic, and it afterwards appeared that she had been employed most of the day in literally cracking and chewing lumps of it. When the physician first saw her, the countenance expressed chagrin and melancholy, but not suffering. After being forced to drink, she vomited a good deal, but without uneasiness. Two hours afterward, her countenance was anxious, but she did not make any complaint, and very soon resumed her tranquility. Five hours after the last portions of the poison were taken, she became drowsy, then remained perfectly quiet for four hours more, and at length, on trying to sit up in bed, complained of slight pain in the stomach, and expired without agony."

The second case is equally remarkable as far as the apparent absence of all signs of acute inflammation is concerned.

"A heavy, stupid-looking girl had taken a teaspoonful of white Arsenic. The physician found her sitting in her chair, more asleep than awake; on arousing her she reeled about the room in such a manner that poisoning by some narcotic was suspected. She acknowledged having swallowed *white mercury*, which was recognized by the aid of a pocket-lens to be arsenious acid. She vomited once after dinner, but there were no further symptoms until half an hour before she died, at noon the following day. She had no pain, no sickness, no acrid eructations, no burning taste in the mouth; her face was very pale, and she was faint and giddy. The sulphate of zinc, with mucilaginous drinks, was given her, and soon produced copious vomiting which was kept up for half an hour. The hydrated peroxide of iron was then administered in large doses. At nine o'clock at night she had experienced no pain, no unpleasant symptoms whatsoever. She was disposed to sleep quietly. At ten o'clock the next morning, her aunt came to say that she was quite well, and wanted permission to go *a-gleaning*, but at half

past eleven o'clock, while in a more than ordinarily cheerful mood, and engaged in preparing dinner, she suddenly complained of an excruciating pain in the body, with great prostration of strength. She went to her bed-room to lie down, and at twelve was found dead.

Upon examining the dead body, the stomach was found to contain half a pint of thin, dirty, green fluid; the mucous coat much corrugated, having a fungous appearance, very soft and so fragile that a touch of the finger tore it away. Three or four large reddish-brown patches were observed, extending into the intestines considerably beyond the duodenum. The peritoneal coat of the stomach and bowels was not inflamed. The lungs and the heart were healthy; the head was not inspected. Arsenic was contained in the stomach-fluids.

The *third form is an acute poisoning, with symptoms of gastro-enteritis, followed by an affection of the cerebrospinal system.* The symptoms of gastro-enteritis are first developed. If the patient recovers from these, the cerebro-spinal symptoms sometimes come on; the chief symptom is coma; and the most trifling: a peculiar imperfect palsy of the arms or legs: between these extremities have been observed epileptic fits, or tetanus, or an affection resembling hysteria or madness.

A number of interesting cases referable to this category are reported in Frank's Magazine; one of them will suffice for an illustration.

" Three servant-girls took Arsenic by mistake. The usual gastric symptoms were present: vomiting of blood and discharge of blood from the anus; they had a good deal of fever, which was followed by profuse sweats and pains in the teeth; their chests and necks were covered with purple spots. After a lull of the symptoms they all had returns of vomiting, purging, excessive pains in the stomach, inflammation and swelling about the root of the tongue; two of them were unable to speak or swallow, and in twenty-four hours were seized with *trismus and convulsions* of the whole body, in forty hours one of them was in an apoplectic state, breathing with difficulty, with general convulsions, lock-jaw, pale and repulsive face, pulse ninety and weak; when aroused she complained of violent headache with burning and pain in the throat; both the others became speechless, and were unable to swallow; with convulsive *cramps of the body, locked jaws, frequent spasmodic smiling*, bloating of the face, pulse one hundred and six, and strong. The next day two of them were attacked almost simultaneously with headache, followed by violent delirium and loss of consciousness; these symptoms were removed by cold affusions.

Having given a full description of the symptoms exhibited in cases of poisoning, we may as well subjoin in this place a description of the

POST-MORTEM APPEARANCES,

which Pereira sums up in the following concise and exceedingly impressive manner:

When arsenious acid kills by its narcotic operation, no morbid appearances are observable after death. The morbid appearances which are observed in cases of poisoning, may be arranged under the following heads:

a. *Morbid appearances of the alimentary canal:* Symptoms of inflammation, redness and sometimes extravasations of blood into the tissue of the canal; ulceration is frequently observed, sometimes softening of the mucous coat, effusion of lymph or blood, and occasionally even gangrenous spots.

b. *Morbid appearances of the vascular system:* The blood is sometimes, though not invariably, fluid after death, and dark-colored; heart flabby; it is asserted that on its inner surface (particularly the columnae carneae and the valves) is observed redness, sometimes diffused, sometimes in the form of spots, which penetrate a line in depth into the substance of the heart. The pericardium usually contains serum.

c. *Morbid appearances of the respiratory system:* Principally redness of the pleura, effusion of lymph or serum into the cavity of the pleura, red spots, and occasional congestion of the lungs, and redness of the membrane lining the air-tubes.

d. *Other morbid appearances:* In some cases inflammation and even gangrene of the genital organs; the conjunctiva is sometimes very vascular, and cutaneous alterations are often observed; redness, extravasation of blood and effusion of serum are said to have been seen in the brain. In conclusion, we have to advert to the

Antiseptic properties of Arsenic: Dr. Christison informs us that he has kept a bit of the stomach of an ox for four years in a solution of Arsenic, and, except a slight shrivelling and whitening, he could not observe any change produced in it.

Another remarkable property of Arsenic is to convert bodies into adipocere, a sort of mummy-like substance; these emit a garlic odor characteristic of Arsenic. Christison believes in this property; others deny it.

ANTIDOTAL TREATMENT.

In a case of poisoning, we use the stomach-pump, and give an emetic of sulphate of zinc, tickle the throat with a feather, and promote vomiting by demulcent and diluent liquids, such as milk, a solution of the white of eggs and water, flour and water, gruel, sugared water, oil and lime-water; the liquid serves to promote vomiting, the demulcents invest the poisonous particles, and the lime-water diminishes the solubility of the arsenious acid. To expel arsenious acid from the intestines, use castor-oil.

2. We use *mechanical and chemical antidotes:* The Cornish miners use olive-oil with confidence.

Charcoal, magnesia, and any inert powder may be used to envelope the Arsenic, and prevent its contact with the gastric surfaces.

The principal chemical antidotes are: the hydrated sesquioxide of iron, or brown iron-stone, magnesia and lime-water. If the hydrated oxyde be not at hand, give the common red oxide of iron rust with water. According to Pereira, these agents only act as mechanical antidotes. We give a tablespoonful to adults, and a dessertspoonful to children every five or ten minutes, until the poisonous symptoms are subdued. This acts well in cases where the poison was taken in solution; it then precipitates the Arsenic as a neutral arsenite of iron.

For the constitutional symptoms we may have to resort to dynamic remedies, such as Aconite, Cinchona, Ipecacuanha, etc. Stimulants may be required for the depression. Castor-oil and Opium may likewise be required, together with the continued use of antidotes.

In regard to the physiological action of Arsenic, we may safely assert that there is hardly an organ in the body which does not perceive the action of Arsenic, more or less. However, we may generalize this statement in a more specific manner by stating that the chief influence of this drug seems to bear upon the intestinal canal, the chylo-poietic organs, the heart and the nervous system; also upon the lungs, skin, salivary glands, urinary and sexual organs, upon the ears and eyes.