

AN  
INAUGURAL DISSERTATION  
ON  
**ARSENIOUS ACID**

SUBMITTED TO THE  
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BY

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OF

*Tennessee*

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A. A. Hatcher M. D.

As a slight testimony of my regard for him as a Gentleman and Physician. This Thesis is respectfully inscribed by the Author.

# Prussic Acid

As custom and qualifications make it necessary, for the Candidate for the Degree of Doctor of Medicine, to write out a Dissertation on some medical Subject; I have chosen one that is all important to the Physicians that of Prussic Acid; One of the most eminent and energetic poisons known to the "Suicidal;" and a powerful remedial agent to the Skillful Practitioner. Therefore it is quite necessary for the Physician to understand its many and varied properties on the Animal economy. And all the Tests for detecting its Existence in a medical legal investigation.

The Earliest Chemists were embarrassed in determining the nature of the poisonous Substance known in Commerce by the name of Arsenic. Subsequent Experiments have gone to show -



That it is metallic Arsenic. Originated in the first degree. But possessing the Character of an acid.

It unites with alkalies to form salts and is properly called Arsenious acid.

It is sometimes found in nature in sublimed crystals in volcanoes. and among the ores of Arsenic in masses. Which are quite numerous such as Cobalt, Nickel, Bismuth Iron &c.

Arsenious Acid as found in the shops for medicinal use is in the form of a fine white powder in this state it is often adulterated with powdered chalk and other substances which is easily detected by heating the powder sufficiently to evaporate the Arsenic, and the impurities will be left behind.

Arsenious Acid dissolves readily in hot.

but, slightly so in cold Natn. And has scarcely any taste. And this accounts for the possibility of Confounding it with Calcined Magnesia. Which is often done. Dr. Mitchell in his Therapeutic mentions a fatal case of this kind.

The medicinal qualities of Arsenious Acid internally is Alterative and Febrifuge and externally violently irritant. It was formerly much used prior to the introduction of Sulph. of Quina in diseases of a periodical character.

The different preparations of Arsenious Acid are quite numerous. But the most useful and convenient form is in Solution. This usually called "Dowson's Solution" is the preparation most usually employed in this country. It consists of Arsenious Acid and Carbonate of Potash each sixty four grains added to one pint

of Water and heated by a Spirit Lamp.  
The dose of this preparation is from  
ten to thirty Drops three times per day.  
Thirty years ago the maximum dose  
was five Drop three times per day. But  
as Dr. Mitchell says; as Diseases of  
all kinds manifestly change their  
grade and force; so with the forms  
for which <sup>this</sup> medicine is employed. And  
he absolutely found it necessary in the  
Diseases of Pennsylvania in 1819 to use  
fifteen and twenty drop three times per  
day and oftener.

Arsenious Acid in some forms has  
long been extolled as a remedy in  
Cancerous affections such as Plummer's  
paste. And Icterus remedy for Cancer.  
But I think more advocates the  
good effects of these remedies in this  
disease "See the Character" portion of our  
Plethoric. For our Professors of Surgery  
at this day tell us that there is no  
remedy for genuine Cancer.



A case where this remedy was used  
came under my immediate observation.  
My father was afflicted with Cancer  
of the face and after employing  
the most skillful Physicians to  
no benefit. A celebrated Cancer  
Doctor (as he was called) was called  
in and an arsenical paste was  
used by him, which augmented the  
inflammation and irritation there in and  
I have no doubt hurried him  
to his grave. And again deaths  
have been reported from the absorption  
of this poison when used externally.

It has been <sup>questioned</sup> whether  
the different Arsenical preparations when  
administered internally act in the same  
manner some authors thinking that the  
selections need only be regulated by  
the convenience of administration. But  
the late Mr. Physic thought differently  
for the Arsenious acid and the solution  
of arsenate of Potash; was the result of

his experience that they act very differently, and cannot be substituted for each other.

Some authors have entirely proscribed the use of Arsenic, and think their introduction in the Pharmacopoeia a great evil, as legalizing the medicinal employment for self destruction and murder. This certainly would not decrease much the facilities for obtaining it; considering its extensive use in the Arts. Besides if we excluded all remedies from our list that had poisonous qualities we would give many of our most beneficent and energetic remedies in combating disease; and as the Latin phrase says of poisonous remedies ubi virus ibi virtus, which certainly is true. And I am sure there are few Physicians that would be willing to give up. *Corsiv. Sublimat.*, *Strichnia Digitalis* &c.



The diseases to which arsenic is applicable are numerous. In Schirous and annomalous ulcers Leprosy, prigo-<sup>sc</sup> authoritative authors think it peculiarly applicable. Dr. Pereira says: he has seen it used in many cases of Leprosy without a single failure to cure. And in obstinate intermittents it is highly extolled as a remedy; and as I have said before in most all periodical diseases.

The modus operandi of the arsenical preparations is diversified amongst ~~some~~ authors; <sup>some</sup> contending for its tonic effect. But this is not well accounted for. While <sup>others</sup> regard it an alterative; and especially does this appear in skin diseases. And its anti-periodical and febrifuge <sup>virtues</sup>, I believe are not denied.

By far the most important point as relative to Arsenious Acid is its

poisonous qualities, which I will now proceed to speak of. Opium acid in an over dose when taken internally or applied externally acts energetically as an irritant poison, and generally destroys life in a short time.

The effects of the poison on the animal economy are numerous and variable - which I don't think necessary to enumerate here. It may be well enough to remark that the different effects vary considerably, according to the different states of the stomach and habits of the patient. In some it requires a very ~~large~~ small quantity to prove fatal. And in others a very large quantity being taken with impunity. Less than two grains have been known to prove fatal in the adult; and again two drachms or more have been taken and yet the patient =

Survived. And it is stated that  
those having a Paralytic predisposition  
its fatality is greater by further devel-  
oping that predisposition. Although life  
may be prolonged for many months  
yet death will inevitably take place  
in general Palsy. Whether it  
entirely that this disease may be set  
up by arsenical poisoning in those hav-  
ing <sup>no</sup> apparent predisposition to the disease.

The remedies and  
antidotes for poisoning by Arsenious acid  
are numerous. I shall first give those  
that are considered as remedies.

First Emesis either by Emetics of the  
Stomach pump Milk, Soap, oils,  
and Charcoal And at the head of  
these, Magnesia and Tobacco  
have been used in many cases with  
success. Some regarding them as  
antidotes and others regarding  
them merely as remedies. Bussy  
considers for the Antidotal powers



of Magnesia and says it forms an insoluble arsenite of magnesia by chemical union with <sup>the</sup> acid. Several successful cases of its efficacy has been reported. Tobacco on the other hand is said to produce a compound by uniting with the arsenous acid and thereby destroying both of the original qualities of the drug. And Dr. Christison has demonstrated some of these facts; for instance the mixture of Soudann and Corsivo Sublimats: both separately will poison: while the compound apparently will do no harm.

The proper antidote for arsenical poisoning is the Hydrated Oxide of Iron. It is prepared by adding four ounces of Iron filings to eight ounces of Nitro-Muriatic Acid and heating to form a solution and then adding sixteen ounces of water; then by digesting three ounces of Aqua Ammonia to

Then down the oxide of Iron, the whole to be <sup>st</sup> filtered and the mass to be collected and dried for use. It may be given ad libitum both by the mouth and injection. It is to prepared freshly for use as it deteriorates by keeping.

The Subcarbonate of Iron - (Iron Rust) is said to have antiodotal powers, but inferior to the former article.

The Convalescence from Arsenical poisoning is generally long and tedious.

Treatment. If the patient live long enough for inflammatory symptoms to be set up, it consist in the Antiphlogistic. Such as venesection, leeches &c. Emetic, Emmeta, Antispasmodics and narcotics will often relieve pain and nervous irritation.

The diet should consist in mucilaginous drinks and bland articles generally such as milk, Tapioca, Rice, &c.

The modes of testing and detecting Arsenious acid. are numerous and some of

them complicated. But those that are most simple and easily obtained and performed. I think <sup>only</sup> necessary to mention. These consist in the liquid and reductive process. The first (Liquid) are the ammoniated nitrate of Silver and the ammoniated Sulphate of Copper. The former giving a bright yellow the latter an apple green color to a solution of the acid. And a peculiar odour of garlic is ascribable to it if a portion of the acid be thrown on fire Coals. But these are not satisfactory enough in a medico legal investigation unless combined with the reductive process. And the most simple forms of these I shall now proceed to give. Of these Rameau's and the one performed with Charcoal or (black flux). The suspected substance after being reduced to the dry state is rubbed up with the Charcoal and placed in a glass tube with one



End closed and the other slightly so by a plug of cotton so as to arrest the vapors which are condensed on the inside of the tube in the retortive state. Then by the application of heat to the substance of arsenic it may be collected and dissolved, and the liquid test applied. And if their characteristic colours are given the test is confirmed -

That of Rainach's is satisfactory and simple especially if corroborated by the liquid tests. This is done by cutting copper foil into pieces one inch in length and eighth of an inch in width, and putting them in the solution, then heating the mixture and adding a small quantity of muriatic acid to decompose it. And the thin steel like coating is deposited on the copper which may be ~~dissolved~~ separated by dissolving in nitric acid. And finally the liquid tests are applied.

Age 22 years

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