Arsenic considered as a Poison.

There need be no apology for choosing Arsenic as the subject of this Thesis, the whole department of Forensic Medicine, especially the subject of Toxicology, is of great and growing importance. The numerous instances of Poisoning which are constantly occurring, the elaborate murders which have but recently been brought to light and the extreme responsibility which devolves on the Medical Man render it imperative that he should make himself fully acquainted with the subject. The necessity for this knowledge is the greater to those living in the country, for those in this, as in most other departments of Medicine, Medical Men are thrown more on their own resources, and are often required to give opinions in Coroner's Courts, founded on examinations, in which neither time nor situation have allowed of the assistance of Chemists or Skilled Toxicologists.

In town a Country House or one will deny the importance of a Knowledge of this Branch of the Medical Profession.

There are certain circumstances which give to Arsenic a position of predominance and importance among Poisons. The ease with which it is obtainable, its great cheapness, the easy and plausible excuses which can be made for its purchase, its slow and deadly effects, and the absence of any peculiarity colour, a taste likely to raise suspicions in its victim, render it a favourite agent of the murderer and the suicide. Furthermore, the numerous uses to which it is applied in the Arts, and for other legal purposes, occasion more than an accidental case of Poisoning by this substance.
The admixture of Arsenic with Sourdough is very apt to lead to fatal mistakes of this nature. The large quantity which occurs in Sulphuric Acid, and which is used for so many purposes in another instance, Arsenic formerly entered into the composition of a species of Candle, which produced the same very severe symptoms. Certain green French and German Tintments also have been found to contain the Arsenic of Copper as their Coloring matter, and all these have caused serious or fatal accidents. In the Provincial Medical and Surgical Journal for Dec. 26th 1837, an important notice is given by Dr. Darnley of the Occasional Presence of Arsenic in Unfermented Bread, which is made by the action of the Acetic Acid on the Bicarbonate of Soda. The Arsenic Acid which was made with Sulphuric Acid containing Arsenic having been thusly contaminated. Sulphuric Acid sometimes containing Arsenic—5½ grains of Arsenic in 1000 grs. In the same letter an account is given of a family who severely suffered from the effects of Arsenic administered in this way, and also gives an opinion the Sulphur Sublimation made from Iron Pyrites probably contains Arsenic. These examples will suffice to show, how occasionally an unexpccted case of Poisoning may be met with. To show the frequent cases of cases of Poisoning by this Poison, it may be stated, that Arsenious Acid alone destroyed in two years, 1837, & 1838, more than 185 lives. This number is greater than the deaths from all other Poisons. I have said enough to
show how important a poison Arsenic is, and how well it deserves the attention of the Profession. It was during my apprenticeship in the South of England that a well marked case of Poisoning by this mineral occurred, under my own observation, and in which case I performed various modes of testing the contents of the stomach for Arsenic under the superintendence of Mr.acey, the Gentleman to whom I was apprenticed. I shall therefore give a short account of this case imperfect though it may be, and afterwards to hand of the symptoms, Diagnosis, Treatment and Post mortem appearances of cases of Poisoning by Arsenic, and especially of the modes of analysing Arsenic Matter containing this substance and demonstrating its presence in these cases.

It was on the morning of Monday, August 3rd 1846. That a high numbered medical man was called in great haste to an Accident as it was called, which had happened on a farm, some three miles off. Naturally enough, his first inquiry was as to the nature of the Accident, so that he might take any thing with him which would be likely to be wanted. The answer given was that the patient was dead! But they wished him to come in order that he might give a certificate and that so there might not be any difficulty in burying her. Shortly afterwards he went and had the following story related to him. Eight Tucker 21. unmarried and an apprentice to the Farm. He bore a very good character and had enjoyed very good health was on the
The evening was suddenly ill with vomiting. She went to bed and at four in the morning got out of bed and went towards the window. Her stomach failed her and she fell. She woke another the inferences who put her some tea. The vomiting and purging now returned and she became in a very low and dejected state being scarcely able to speak. She did not appear to suffer much pain. But she was very thirsty drinking 5 cups of tea. She became rapidly lower more batching fell 7 o'clock in the morning 13th 10 hours after the commencement of the attack. When she died, she had shortly before her death been home to her sister or some fellow servant to approach her as if she wanted to communicate something, but she was too weak to speak. Such was all the history which he could obtain. He of course sent a servant for the committee andanged matter but found that they had been thrown away. For the whole of which she had been sick. But it had already been washed for the past 20 years or some had gotten he found it had been well scrubbed. The reason they gave for this cleaning was they were afraid the matter was infectious and that therefore the sooner they put off did not better at any rate it was evident there was nothing to be learnt from this instance. I may here mention that there had been a great mortality among the fowls very lately. So if not more than got dead. They wished to eat them but deceased has said she thought they had been poisoned and ought not
to the section. (I believe they were not rotten) they could not be
examined for analysis.

The corpse was sent for and on Wednesday ordered a full internal
examination. This was made the same afternoon.

The body externally appeared healthy & bloody; the froth was
spewing from the mouth & nostrils. The heart was flabby, the right
lung was filled with blood. The lungs were healthy. The liver
was not found much damaged. The stomach externally
appeared healthy. Ligatures were applied and it was removed.

The uterus was unimpregnated. The bladder healthy, empty.

The bowels healthy. The rectum & its contents were not examined.

There was no apparent cause of death. In Jan. The stomach
was brought home and with its contents handed over to the
Gentleman of Whom I was a Pupil. Under his directions I
made the following examination of the stomach, its
contents which I will briefly describe. It was made partly
the same evening but each once fully on the following and
succeeding days.

On opening the stomach, the mucous membrane was found thick,
and by Daylight there were a number of white spots on it. It
 contained about a Port of brownish fluid with some a trace
of solid matter. This fluid was slightly acid of p.H. 1.015
which we found spewed very strongly the the gastric juice of
sea with a large quantity of mule in it. A portion of the
contents of the stomach was filtered and tested with
A solution of the Ammonia Sulfate of Copper had with very little effect and with a solution of the Ammonia Sulfate of Silver occasioned a yellowish White Precipitate. Then a portion of the Stomach was cut into small pieces and boiled in distilled Water. This was filtered and again tested with St. Ann. Sulfuric Acid; the result was a Yellow Precipitate with a green tinge at first and with the Sulphuric Acid. It thick gave a yellowish Precipitate. Sulphuric Acid was added to a portion of the contents of the Stomach. After a short time a yellow film collected on the surface of the fluid.

I now proceeded to a careful examination of the contents of the Stomach by a dissection of its apparatus which I will first describe. The following is extracted from the London Medical Gazette for Feb. 1845:

"It is well known that fluids mixed with gelatinous matter are very liable to settle up when hydrogen is disengaged in them from the neutral action of lime and sulphuric acid and that this fact obstructs the experiments of Gretsch. It is equally well known that much of the arsenic contains in a poisonous liquid so tested escapes condensation and slender measurement. A Committee appointed by the Regius Government have continued an inveterate modification of this apparatus which may be simplified into the annexed form. A is a narrow glass cylinder open at the top about 10 inches deep and 1 1/4 or 1 1/4 Inch. diameter inside."
B is a glass tube about 1 inch diameter outside, drawn out to a
point at the bottom and closed at the top by a cork. The
centre of this cork a small glass tube C, divides down airtight
and is furnished with a stopcock into which a small bent tube
E is cemented. The bent tube E is joined
to the end of F by a cork or collar of caput-morte.
The manner of using it is as follows. Introduce
in B then insert its airtight cork, with the
attached tubes. Having opened the stopcock,
com into A as much of the suspected liquid
acculated with nitric or muriatic acid
acid as will rise to the top of the cork as far as B &c. will
immediately shut the stop cock, the generated hydrogen will
rise down the liquid out of the lower orifice of the tube B into
A and of course raise the level of it above the cork. The presence of
the tube E being dipped beneath the surface of a weak solution of the
nitrate of silver and a spirit flame being applied a little to the
end of the latter E, the stop cock in the slightly opened, so that the
gas which now fills B may escape slowly, as it jumps off in
separate small bubbles, thus the silver solution. By this means
the whole of the arsenic contained in the liquid will be separated
called in the metallic state, where the insides of the tube E &c. will
the silver in a black powder. The first charge of gas in B being
expelled from it, the stop cock is to be closed till the liquid is again

Fig I

Fig II
expelled from it by a fresh disengagement of Hydrogen. The ring of Metallic Arsenic deposited beyond E may be chased onward by placing another flame under it and thereby formed into an elongated steel-like mirror. It is evident that by a patient use of this Apparatus the whole Arsenic in any suspected liquid may be collected weighed and subjected to every kind of Chemical Investigation if I be joined to E by a perforated cork it may readily be turned up and its upper point raised so that as the Hydrogen issues it can be kindled. This flame is made to play on the surface of Glasp or Porcelain in order to preserve the Arsenic.

From this Description we made an Apparatus the only addition being a bulb in the tube just below the stop cock. The inflamed Jet was used not the solution of the Native of Silver.

To return to the Examination. The Apparatus was first made perfectly clean. New Corks German Glasp tubes & were fitted then Distilled Water and Chemically Pure Sulphuric acid and Zinc were put into the instrument, it was set to work and it was ascertained to be quite pure. No crust was obtained when Glasp or Porcelain were applied over the inflamed Jet. Then a portion of the suspected contents of the stomach was added. A considerably increased disengagement of Gas took place. The flame which before was scarcely visible became of a distinct perfectly visible blue color and on now placing Glasp or Porcelain into the flame a crust of a brownish color and billiant mirror like appearance rewarded our efforts. When the Glasp or Porcelain
did not quite touch the flame of course as brown crust was formed but a white mass of crystals. A number of these crusts were obtained, some were scratched off with a watchknife introduced into a benzoin tube heated and a ring of crystals were obtained these were chased up and down all they attained a size big enough to have their shape well seen. They were octahedra and bore all the appearance of White Crude of Arsenic. A garlic odor was perceptible when the metal was heated into the state of Arsenic. This tube was hermetically sealed. Another Ring of Crystals was obtained in the same manner in a common tube this was deplored by boiling distilled water and this now cloudy and olive solution was tested with the Ammonic Sulphate of Copper and Ammonic Sulphate of Silver and they gave no characteristic green and yellow Precipitates exactly similar to those thrown down by a solution known to contain Arsenic.

It is of course easy to explain chemically what had occurred as long as Organic matter and the salts it contains was present our satisfactory precipitates took place. But when the contents of the stomachs were added to Bunsen's apparatus that increased disengagement of gas which always occurs when two metals are present to be acted on by an Acid took place. Greenwater Hydrogen passed over, as it escaped was inflamed and the characteristic color of the flame manifested itself. The Hydrogen now combining with the Oxygen of the Air forms Water which condensed on the glass with the metal Arsenium.
As long as the flap was in the flame. Oxygen being excluded, metallic arsenic was thrown down. But when the flap was held just above the flame. The metal was enabled to combine with oxygen and the white arsenious acid was deposited. This being now dissolved the green dehydratation was obtained viz a colloidal solution containing nothing but the suspected substance which on being now tested with a solution of ammoniacal nitrate of silver and sulphate of copper gave the distinctive precipitate of arsenic of copper. Silver. From the previous precautions taken this arsenious acid could only have been obtained from the contents of the stomach. Similar and equally satisfactory results followed when a portion of the stomach itself and of some distiller water in which the stomach had rested 24 hours were employed instead of the fluid contents of the stomach. Nothing further was necessary uncontestable evidence was furnished that the flapper's stomachs contained considerable quantities of arsenious acid. This explains the inflammation of the viscera, last all the effusion of bloody serous around the afore mentioned white spots and thus rendered their removal difficult.proved that it had been introduced during life not after death and this combined with the absence of all other causes enabled one to declare that death had been caused by this poison. Other tests were now used as Berne's test Frencius test.
and they all contradicted the result of Beards Apparatus.
The white spots were themselves tested also the green and
yellow precipitates were mixed with Charcoal a Arsenioc acid
reproduced. One or circumstances must be mentioned.
It has been stated that during the day on which this examination
was going on the stomach was lying in a basin in water
on the table. Being hot summer weather there were numbers
of Wasps and Flies in the room and all had tasted of this fluid
(which Soon died) after a short time died so much so that the
table was became strewn with them some 50 to 60 and at
the least must have perished. It would have been interesting
to have tasted their Bodies but it was not done.

I am fully aware how very deficient this case is six many
important particulars, how very incomplete the History
of the case is, how many things were omitted in the First Report
How much better the Chemical Examination should have
been performed. I think however it must be clear to
all that the case was proved to be one of Poisoning by Arsenic
such as it is I have been induced to give it and shall
now proceed to speak of the various divisions into which
the subject of Poisoning by Arsenic divides itself, referring
from time to time to the case above narrated. But I
cannot conclude it without alluding to the Crown's Court
before which this case appeared. It was certainly a
real faire: The really acting hand of the Jury was the
relations of the Disturbances of the Poor Girl. And the Opinion generally expressed in court by one of the jurors and about the most influential of them, and in which many agreed was that it was plain the Devil had entered into the Maidens Heart to poison the Fowls and afterwards had tempted her to poison herself and she not being strong enough to withstand his temptation fell his victim.

The registered Verdict was "that she died from the effects of Arsenic" and whether she took it herself or whether it was administered to her there was no evidence to prove.

It is not my intention to enter into the consideration of Arsenic as a Chemical Substance. I shall merely state a few particulars bearing on Foetidial Questions.

The HEAT of Arsineum, as determined by HeCu 8.309 is of a green grey color. In the volatile state unchanged at a temperature of 350Fahr when excluded from the air and in contact with the White Oxide when heated in an open vessel the metal when volatile having has a very distinct Garlick Odor.

Arsenic Acid also called Arsenic White Arsenious, White Oxide of Arsenic As2O3, sp. gr. 3.720. Obtained by roasting Cobalt Ore in white Crystallines. In Mohs hardness of commerce in the form of a solid cake and also in Powder. The solid form in when used in a large quantity and at it quickly sets opaque and resembles white enamel. As often used with it presents a threat
layers of the Translucent and the Enamel Variety. The Powder is as fine as any flour, and in the form in which it is most usually obtained. These three Varieties all yield the same chemical Analyses.

The difference between the Opaque and Translucent Varieties seems due to a molecular change similar to that wrought in some other chemical substances; as most strikingly in the Sulphides of Mercury. Arsenious Acid has a slight acid reaction. It has been stated that the Translucent Variety is Acid and the Opaque Variety Alkaline, but the former contains both as decidedly, the slightly acid, and it combines well with Alkalies to form salts.

Disputes have taken place as to its taste and Solubility. First as to taste it was formerly considered to be Acid. Fodo states it to have a strong metallic taste, but Dr. Christison showed that this was an error; probably in many cases arising from the numbing sensation shortly afterwards experienced from the commencing inflammation. It really has little or no taste or is only a faint metallic taste quite perceptible in the form of effervescence. It may be of value to remember its taste, in cases of pretended poisoning when the Patient gives that he has taken Arsenic; or in these cases they will generally state that it was of a very strong taste. As regards its Solubility, Boiling Water dissolves very much more than Cold and Boiling Water retains on cooling very much more than cold water will take up. In the length of time of Boiling seems to make a very material difference. The Opaque variety seems also more soluble.
than the transparent. Pitcher gives it that Temperate water
depurates 24% per 1000. Boiling water 77% per 1000 and retains
on cooling 80% per 1000. Guitard says that Cold Water takes
up 9-6% of Transparent, and 12.5% of the Quartz Variety per 1000.
While Boiling water takes up 57% of the Transparent and 115% of
the Quartz per thousand. Taylor has made some very accurate
experiments and gives out that Cold water takes up from 100% to
500% that of Boiling water poured on Arsenic takes up 50% In half
boiled for one hour it takes up 74% and retains on cooling
to its weight. The presence of organic matter diminishes the
solubility of Arsenic. As few people are able to explain themselves
indefinitely, it may be some times useful to remember that an
ordinary sized pitcher is about 17 grains. A Teaspoon full is about
150 grains a tablespoon full about 530 grains.

We now come to the Symptoms occasioned by Arsenic.

These are some what different according to the dose of the
Poison administered. Now and often we read of a case when
small doses have been given repeatedly so as to make the death
appear to be attributable to some disease. This was the case
followed by Dr. Blandley who poisoned his father and also sister.

In many cases in ancient times. The symptoms in these
cases are those of inflammation of the Stomach, Bowels, vomiting
and passing pains of the belly and head. Vomiting
and prostrating. Gradual destruction of the health; the tooth
often rapidly decaying. Scientists very often use Arsenic typically,
to destroy the nerves of the teeth. Before stopping them at last when
the pulp is exposed) until finally as most commonly happens
a larger dose than usual is given and considerably aggravates
the symptoms and causes the death of the victim. Some have
considered the effects of bromain to diminish with the repetition
of the dose, that the medicine becomes tolerated by the system
in the same way that Antimony does but this is certainly
not the case. It has rather an accumulative effect as is
occasionally seen when administered medicinally. The drug
suddenly causing vomiting and epigastric and lung pain requiring
to be stopped.

Most commonly however the poison is administered in larger
doses and here the symptoms also vary to a most remarkable
extent being partly inflammatory partly those of a peculiar
affection of the nervous system. Commonly the symptoms begin
in from 10 to 30 minutes. In one class of cases they are those of
sudden collapse. The Patient lies covered with a cold clammy
perspiration with an almost imperceptible pulse. With
complete prostration of the strength, suffering little or no pain
with the mind unimpaired. Slight coma or coma like settling
on part before death. There may be little or no vomiting or
dying as these may be profuse accompanied by this collapsed
state. However these cases seldom last 24 hours. In this
latter class the case. I have seen must be referred. Here
the dose seems to have been so great as to cause death by
its action on the nervous system the collapse being so deep as to prevent all or almost all inflammation. It is very probable however that a comparatively small dose may cause these symptoms whilst a larger dose may cause symptoms of the real clap, for when the dose administered is large part of it may be vomited and even if retained it may be accumulated into one lump and be surrounded by mucous and thus after smaller quantity spread over a larger space or held in solution and thus applied to the whole surface of the stomach would have a much greater effect than the larger collected and isolated lump also probably when accumulated in considerable masses it acts as an antiseptic and prevents absorption taking place it is on this principle that it is applied sometimes by the surgeon to blisters and other raw surfaces the lungs of the wound being the safety of the patient.

But the second and more common clap of cases are those where the great feature is the intense inflammation. Here it may begin with slight collapse, there may be nausea fainting small and slow Pulse and so on, but soon or even without any perceptible stage of collapse the inflammatory symptoms begin. Here is Burning Pain in the throat and a sense of choking. The mouth and throat look very red there is intense pain in the belly at first confined to the stomach soon spreading over the whole abdomen. The Pain is greatly increased on pressure. There is incessant vomiting often of bloody mucus. Soon after vomiting
almost always sets in, blood being also pressed by stock. There is great enemias, with expansion of the limbs and often also relaxation. Then the skin may be found hot, and dry. The eyes bloodshot, the face flushed. The pulse full and quick, or the pulse may be small, feeble and irregular. The countenance may continue Zimmerman and on the part of the nurse, the patient is enduring and the skin may be covered by cold clammy perspirations. Then there is intense thirst severe headache. Then is also labored a quick catching Respiration occasionally oppression of the head. Giddiness, often leads to 2nd stage. Cramps of a very severe character, and death may be ushered in by convulsions or the patient have a short period of perfect absence of pain before death or after. The interval of pain, at the Pain may recommence with redoubled energy. These cases commonly last longer than the last and there is a 2nd. clasp of cases where life is still longer prolonged, or where even recovery may take place. These cases begin similarly to the 2nd clasp but after a time symptoms show themselves there may be those either of increased or of diminished action we may have convulsions or Status Epilepticus, in the reverse order and complete destruction of the brain, profound delirium or coma and insensibility or the loss of consciousness accompanied by muscular excitement exhibited in epilepsy. May occur. These nervous symptoms may occasionally accompany the symptoms of inflammation from the first. Another symptom often met with in cases which last a few.
days is the occurrence of various symptoms of the disease. In some cases they have been found to be attended with a mitigation of the symptoms as though the poison were eliminated through that organ. From the analysis of 25 cases given by Dr. Guy it would seem that Pain and vomiting particularly the former was the most constant symptom. Dizziness was also very common as also thirst. Of the Special Renous symptoms Dehiscence Soreness seems to have been the most common. It will be seen that the symptoms are partly due to the Tumefaction inflammation set up in the ciliary canal partly due to the action on the renal system and other remote organs. The variety of symptoms which may occur in different cases can well be imagined when their number and their opposite character is considered. The Symptoms of Poisoning by Poisones are much the same by whatever means the poison is introduced into the system as by the skin by raw surfaces as bites or by its being thrown up the vagina or rectum also when inhaled in the form of gas. In all it causes the General Symptoms of Poisoning by Poisones the vomiting, pains in the abdomen inflammation in the stomack the accompanying local inflammation of the part in immediate contact with the poison.

It has been stated that the symptoms vary in degree and also in character with the dose which has been given. due allowance being made for the fact that a large dose may by vomiting and concentration isolation be convecte
practically into a small one—It becomes an interesting point to ascertain what is the shortest period within which Arsenic has proved fatal and what is the smallest dose which has proved fatal. In the former, several cases are recorded of death in 5 hours. In the latter, 92 cases of poisoning by Arsenic of which 68 were fatal, of these 41 were so within the first day. The average being less than 9 hours. In 67 occurring within 12 hours. As regards the smallest dose which has proved fatal Dr. Lachèze mentions a case where 2 grains taken at 10 minutes intervals in two days proved fatal in 7 weeks in one case and in another in 10 weeks. Christian mentions another case of a child killed in 6 hours by taking 4 grains. Lachèze thinks 1 or 2 grains may prove fatal in a few days and states that 4 grains may cause death in 24 hours. Before leaving the Symptoms it will be well to consider what diseases could be mistaken for poisoning by Arsenic or the reverse. The Symptoms of Poisoning by Arsenic are those of acute inflammation of the alimentary canal followed by specific fevers and often accompanied by prostration. There is probably no disease which presents all the Symptoms of poisoning, the stage of collapse the violent inflammation, and the long train of nervous symptoms—these were well marked the inference would be almost
unquestionable that it was a case of Poisoning by Arsenic. But the majority of cases probably do not present this clear train of symptoms. Merely one or other of the stages may be present and these are diseases which nearly resemble it as Cholera, with English and Asiatic, Acute Paroxysmic Intermittic. Death from Distention of the Stomach, or Drinking cold Fluids, and Perforation of the Stomach or Intestines or some other Abdominal Viscera. The Post Mortem Appearances of Perforation of the Stomach or Intestine or other Abdominal Viscera would at once defeat the cause of death. English Cholera differs in that in it the evacuations are watery and do not contain Blood as is commonly the case in England poisoning. The swelling of the throat does not precede the vomiting, also it is commonly Epidemic at the time. The Stage of Collapse in Poisoning might be due to the Collapse of Cholera, in which a from drinking Cold Liquids other than boiled or from the perforation of the Abdominal Viscera. But in Cholera Cold English or Intermittic there is no swelling in the throat or if present it follows constant vomiting of Blood. The stage of shock as in poison is also the peculiarity. Look and feeled up appearance of Cholera could hardly be mistaken as due to Arsenic. The Collapse of drinking cold Fluids is perhaps more likely to be mistaken. This is knowledge of the patient having taken a drink whilst not well help to discover it commonly also in these cases death is far too sudden for it to be due to poisoning by.
Acronic. The case of the Collapse from the perforation of the abdominal viscera and the contents being poured out into the peritoneum will be at once evident on making a Post Mortem. The Stage of inflammation might be due to Acute Gastritis or Enteritis or to Cholera. The distinguishing marks of Cholera have been mentioned. Acute Gastritis probably merely arises from Poisons or from Boiling fluids swallowed. Even if it lasted after the burning of the throat would not precede the vomiting and there is no known Acute Enteritis is commonly attended with Constipation. The severe symptoms taken singly are symptoms of many different diseases but when they follow symptoms of sudden inflammation of the alimentary canal or accompany them they are pretty sure marks of Poisoning by Arsenic. With regard to all the diseases which have been enumerated if they last any time the Characteristic symptoms of Acrimonious or Acute symptoms or cutaneous symptoms ought to be but will not be present. Should these still be doubt as in many cases here will be, it must be decided by the Chemical investigation to be hereafter spoken of. Generally then will the certain collateral circumstances which will raise the suspicion of the Medical Attendant. The symptoms coming in after a Meal, perhaps many being attacked at once or the symptoms increasing after repeating the use of some special ingredient of a meal are cases in point.
He now came to the treatment to be adopted in these cases. It has been already remarked that arsenic when taken in large doses often excites vomiting. This is particularly apt to occur when the poison has been taken on a full stomach and occasionally this vomiting is so effectual as to remove all the poison. Should vomiting not be present when we are called to a case, our first object should be to curb it as soon as at the least to get as little of the poison as possible to act on the system. Gastric juices should be used for this purpose. They, in fact, fluids so as always to keep something in the stomach for it to contract upon. Gastric is perhaps one of the best things which can be given. They commonly, however, practice a vomiting will not remove all the poison. Before considering the value of antidotes it must be stated that arsenic seems to have a special tendency to accumulate in organs that become surrounded with tenacious arsenious gout. Which not only keeps constantly in contact with the biliary ducts, but also isolates it from the action of all substances poured into the stomach. All antidotes whatever their nature will therefore be powerless when this state of things has occurred. They can only act when the arsenic is held in solution or is not surrounded by this thick gout. Various substances have been extolled at different times as chemical antidotes and formed among these stands the hydrated mercury of iron. Prepared by boiling it down in arsenic from a solution of sulfuretted arsenic of iron. This forms with arsenious acid an
insoluble Arsenite of Iron - which the still poisonous, from being slightly soluble in the fluids of the stomach, is very much less than Arsenious Acid - and if enough of the Hydrated Oxide be added the fluids of the stomach will be themselves neutralized and thus an insoluble compound formed. The Japanese state that 1 part of the Hydrated Oxide are required to neutralize 10 parts of Arsenious Acid. This is probably the only true Chemical Antidote. Magnesia and Charcoal which have been partly solubilised are probably only by enveloping the Arsenic and thus are probably only useful when administered at the same time as the Poison. Many now think that the Sulphoxide of Iron also acts in this way. But at any rate it is the best remedy to administer. Lime of Sulphur is almost useless. The Sulphates of Arsenic being very soluble in the stomach and nearly as poisonous as Arsenic itself.

The use of strong substances as lime water, oil, butter, butter decoctions are now exploded as useless. Medicines and bland fluids to cause as much of the poison to be removed as possible and in one case recorded by Dr. Kerr soon as much as the pain comes. has been thus all safely removed and the patient not suffered any after ill effects, and afterwards the administration of Hydrated Sperm oxide of Iron in very large quantities are the great points of treatment. Many cases are on record where the Sperm oxide of Iron has apparently been followed by much benefit in a case told me by a Dr. I suggest living in the same town. I hear from Hand and Dog, swallowed a piece of Aschite Butter
containing at least 2 Drachms of Arsenic, which had been put
on a barn to poison Rats. About 15 minutes after from 2 to 3
ounces of the Common Lesions of Tox was given and the
Dog never experienced any ill effects after. The treatment
of the Inflammation set up by the Arsenic and of the Gastrointestinal
must be conducted on General Principles. If collapse be great
means must be taken to oppose the Patient. For the Inflammation
Blending is the means perhaps of greatest value. Leeches to the
Abdominal Tumefactions &c. But in all cases we must remember
that it is not true inflammation that we have to deal with,
and that there are nervous symptoms which must modify our
treatment and may render the very cautious exhibition of firm
useful.

As might be imagined from the Dying Picture of the Symptom,
the Post Mortem. Appearances are often of a most opposite
nature. In some cases there are positively no abnormal Appearance,
all as in a Case mentioned in the 12th Vol. of the Lancet 1862.

From occasionally however there is intense inflammation of the
Stomach. This may be merely equally diffused over the whole
surface or as is more common the Inflammation may as it were
radiate from 1 or more Gashes when the Arsenic has accumulated.
There may be specks of Arsenic scattered on the Gastrointestinal
membrane or it may be found between the Pajoe of the Stomach or it may
be collected in patches or none may be visible sometimes the
inflammation is confined to the Surface of the Pajoe not dropping down.
between them. The Stomach is commonly much congested. Excoriation of Blood under the mucous membrane, occasionally takes place and has been mistaken for Typhus. Alterations are not common. This in one case given by Gign. Diers was found when death had taken place only 4 hours after the administration of the poison. The symptoms of inflammation often extend into the Duodenum occasionally throughout the whole alimentary canal. The small sacs and papillae are occasionally inflamed and exudated. The Peritoneum is also occasionally affected within the whole or that part coming the Stomach. And other parts into which the arsenic has been introduced as the vicinity will be the seat of intense local inflammation, other occasional spotted appearances are not with as congestion of the lungs. The brain, with slight effusion into the ventricles. In the case of B. B. it noticed a peculiar alteration in the color of the heart, it being whitish with red spots. The blood is often found black and fluid. The genital organs are sometimes found inflamed. The bladder also is occasionally affected. Occasionally particularly if any considerable time has elapsed before the examination these will be found a yellow sulphur on the stomach instead of the arsenious acid if having been charged by the sulphurated hydrogen eliminated from the stomach arsenic seems to have an antipathetic power so that the bodies which have been poisoned by this mineral dry up and do not decay as ordinary bodies do. When the bodies decay
after the Stomach is wonderfully preserved from this cause Arsenic can often be detected for a very long time after death. In some cases where this Antiseptic effect has not taken place Dr. Christian supposes it to be close to that of the Arsenic having been vomited up before death.

Having thus briefly given the principal facts of the Symptoms Post Mortem appearances and Treatment it remains to notice The Evidences of Poisoning and especially the means by which the presence of Arsenic in the Body is detected and the various difficulties and fallacies which may be experienced and are to be overcome in the investigation of the case. It is in this that Radical Gentlemen in the country are often so deficient and show not unfrequently such marvellous failure in the Circumstantial Evidence of Poisoning by Arsenic. They are ignorant of the Symptoms: 1. The Post Mortem Appearance 2. Circumstantial Evidence & Experiments on Animals.

The Symptoms have been sufficiently shotted off and the diseases which somewhat simulate it mentioned. The Post Mortem Appearances have also been mentioned. It may be well to make a few remarks on their value as Evidences of Poisoning and 1st of the Patches of White Arsenic embedded and surrounded in lymph and muscles and the centre of intense inflammation. The second case is no doubt as to the Post Mortem Appearance being due to Arsenic. When Arsenic is found loose in
The stomach and dews not seem to be accompanied by inflammation. The objection might be raised that it had been introduced after death. Should the case be one of the extremely rapid variety characterised by collapse, these might be the Post Mortem Appearances and we should have to decide by other means. Post mortem appearances alone is of little value as a sign of poisoning by arsenic or any other of the constant poisons as it is so commonly met with when death has arisen from other causes, particularly in cases of death from sudden death. The peculiar extravasation of blood under the subcutaneous tissue is a better sign of constant poisoning. It gives no indication of what poison was given. Where ulcers are found in cases of poisoning by arsenic, they will be certainly accompanied by intense inflammation and very commonly some of the mineral will be found on their edges. The Post Mortem Appearances may then be most valuable evidence in some cases but in others the it may lead us to suspect that death has taken place from constant poisoning and may afford no clue as to what that poison is. In other cases again the Post Mortem Appearances may give us no clue whatever to the cause of death. As regards circumstantial evidence there are generally some circumstances in the case to excite suspicion. Symptoms of constant poisoning coming on slowly after a meal. Probably being increased on repetition of taking food, other symptoms being severe at the same time Arsenic being discovered in some article or in the remaining
faction of the lake meal. There and a number of other circumstances may lead to the inference that arsenic has been administered. This it must be by a reference to the other evidences of poisoning that we must try and ascertain the nature of the poison. Occasionally evidence of poisoning is obtained by experiments on animals, but this is always mere a desperate inquiry. To be of much value, the substance ought to produce characteristic effects on many animals. But the evidence of poisoning by far the most important is the chemical analysis by which indisputable evidence of the poison can be obtained may even the identical arsenic regained and exhibited in court. This is a most important subject and one about which a great deal has been said. Yet none the less the medical man to keep the following points steadily in mind, the difficulties would greatly disappear, they are

1st. That the actions of certain tests on arsenious acid are such that it is a very simple matter to recognise the pure acid on metal and prove that it could be nothing else.

2nd. That the difficulty attending the certain recognition of arsenious acid in medic no legal cases results from the intimate admixture of it with organic and coloring matter which proves the tests from acting characteristically.

3rd. That if the arsenious acid could be by any means again separated from everything else it would be as easy as before to undisputably prove its presence. The bearing
If these three points in mind would be of the greatest importance to the medical man in making his investigation and most especially would it help him in the worst of times.

These Points: They have to be treated as:

1. The Tests for Arsenic
2. The Means of freeing the poison from its admixture with Foreign Matter

1. The Tests for Arsenic

These are divisible into those applied to the Poison in the solid state and those applied to its solution.

When in the solid state we have a Powder of a White color very sparingly soluble in Water. This Powder sublimes with a moderate heat unchanged, and if this be repeated driving it up and down the tube it acquires the distinctive character of Octahedral Crystals. If a little of this Powder be touched by Leucorotaphe it remains unchanged. If another jelly be touched with the Hydrochloric Acid of Muriatic acid no change takes place but as soon as the Muriatic acid is evaporated a Bright Yellow Precipitate is formed. If an Acid as Sulphuric Acid be added this neutralizes the Alkali and the Precipitate takes place at once. Lastly if mixed with Phospho its Bulk of dense Chloreanal introduced into a tube and heated (and the access of the External Air being prevented) a ring of Metallic Arsenic is formed. This ring may be at first mixed with some undecomposed Arsenious Acid, which will be at the upper margin of the ring, but one or two short heatings will
convey the whole into a furnace-like ring the surface adhering to the glass being black of a metallic lustre and of a brown like vulcanancy. The internal surface is of a steel grey color and presents no mirror-like lustre. The oxide in fusing into the form of metal emits a small resembling garlic by beating this metal whilst free access of air is allowed it is again converted into the oxide. Should the oxide be very small in quantity it may be first pounded into the tube and the proper portion of charcoal or black flux poured over it. In all cases care must be taken to have the tube quite dry and if the quantity be small a Berzelius tube is to be preferred to a common one. Going in this as in all manipulations with Arseneous German Glass which does not contain lead the sparing solubility of this Wite Powder distinguishes it from Arseneous Sublimate as to its solubility subliming unchanged there are three Wite Powders which do so viz. Arseneus Carbonel and Arseneous Carbonate. This known to be Arseneus for it alone crystallizes in Octahedra also Chloride of Mercury or Carbonel is changed to a black oxide by bleach, the Bichlorides of Mercury or Carbonous Sublimate is changed yellow. Arseneus remains unchanged also when the Sulpide Sulfide of Hydro Design is added if it be Arseneus as soon as the Sulfuric chief holds the Terepait Sulfate and in solution it displays a bright yellow color. For further proof necessary we have it in the mode of reduction specified. Objections have been urged against this reduction test viz. that the black crust may be charcoal driven up
the labor, 2. That it may be Mercury, 3. That it may be Cadmium, 
4. That it may be a change in the transparency of the Gla
5. That even if it be Arsenie it may be obtained from the Gla.
Arsenie being used in its manufacture. The answers to these
objections are simple. To the 1st That a slight Care will prevent
it and that Charcoal cannot be changed into a White Crystaline
wine, that it has no garlick Odor and but a very imperfect vision
like Aspers, To the 2nd Mercury is in the form of globules also it has
no garlick Odor. To the 3rd That the Cud of Cadmium is condens
by known Prude has no garlick Odor does not crystallize in October,
but is changed into a Brown oxide of Cadmium Wantone it requires
a considerably greater heat for its consolidation. To the fourth. If
German Glafs be used the Glafs will not dissolve moreover the
description of the Common Glafs is at the Point healed not at
a little distance from the Flame. To the 5th Arsenie is consolidated
and wholly dephosphated during the process of making the Glafs. Thus the
Arsenie can be easily recognized and distinguished from all other
substances. Let us now consider it in a Fluid State
as a Solution of Arsenious Acid in Water, This is slightly Alkaline
by adding a few drops of properly prepared Ammoniakulphate of Copper
a Scecal Glaub Green Precipitate is thrown down a Nonsib of Copper.
2 By adding to another portion a few drops of properly prepa
d a Solution of Ammoniakulphate of Silver a Lemon Yellow Precipitate
is thrown down this test being extremely delicate 3 by adding
to another portion a few drops of the Solution of the Hydroxylphate
If Ammonia in free acid ising also added a bright yellow precipitate takes place. If on passing diluted hydrochloric gas then the fluid a similar precipitate takes place. In these also certain objections have been raised. But first I must state how properly prepared the Ammonium Sulphate of Copper or Sulphate of Silver are to be obtained. A common solution of the Sulphate of Silver and Sulphate of Copper is to be prepared and then Ligno Ammonium is to be added drop by drop as just a black oxide is thrown down. But the Ammonia is to be added till it is again nearly redispersed. It must not be tested with a solution of Ammonia to see if it acts characterising and for the Ammonium Nitrate of Silver an alkaline solution of the H. Iron Basic Sulphate should be prepared and so much Ammonia added that whilst it ceases to throw down the Sulphate yet it may throw down the Arsenite. When thus prepared no objection can be raised against it especially if the Sulphate of Copper be used in conjunction. Having said thus much I may say that the objections to the Copper test are that Carbazot acid or any other strong yellow fluid also decoction of onions would strike a green color with the blue solution but if a colorless solution were used this would be obviated also if it is checked by the silver test. Further only Ammonia will yield a metallic crust if the precipitate be mixed with charcoal and reduced as before stated. To the silver test it is objected that the phosphoric Acid of the Triple Phosphate will throw down a yellow precipitate. But we have seen that if the test be properly prepared the Alkaline Phosphate
will not give a yellow Precipitate and with regard to both of them they will not give a green precipitate with the Copper test as will they act with the Sulphureted Hydrogen test. It must be remembered however with both these tests that if either Acetic Chloric Tartaric or Butyric Acids be in excess no precipitate will be obtained. The solution ought as we supposed not to contain these acids but if they were present they would have to be neutralized by an Alkali. With regard to the Sulphureted Hydrogen tests we should be careful to expel all the sweep of gas by heating it gently and letting it stand. That precipitate like the other may be reduced with the Black flour. The following objections have been raised against the Sulphureted Hydrogen test:

1. That Cadmium will give a similar precipitate.
2. That a parcel of Tin will also give one.
3. Lastly that Antimony will also give a red precipitate and that red and yellow shade so the one into the other that in this as in other cases differences of depth are not to be allowed as distinguishing marks. The answers to these objections are simple. The yellow precipitate should be dried then on touching it with Ammonia if sesquioxide of arsenic it will be soluble if sesquioxide of Cadmium. Tin first Antimony it is insoluble. If touched with Hydrochloric Acid the sesquioxide of arsenic is insoluble, the other three are soluble. On heating the Precipitate with Black flour the arsenic is reduced to a Metallic Poison, the Cadmium is reduced to a brown Brine and which on volatileization will change into a white Crystalline King of Petrolea. Whilst the
Perchlorate of Tin and Perchlorate of Arsenic are not reduced. These three moreover give an immediate precipitate with the Hyposulphite of Ammonia and do not yield the characteristic precipitate with the other liquid tests. Thus they may objection which might be urged against either of the tests singly is dispelled by using the two together. The one then checks the other, and further reduction makes security secure. By the tests given a simple solution of the Acid is most easily tested and all objections most readily refuted. It remains to show how a stable and simple solution of Arsenic is to be procured in Andro Legal cases.

The means of obtaining this Reduction are divisible into two Leads A where it is obtained by the destruction of the Arsenic Matter B where it is obtained without the special process for destroying the Arsenic Matter. Under the 1st Lead are to be mentioned the Reduction by Inhotum of Soln. 2 by Inhotum Acid 3 by balsam Acid. The Principle of the first is as follows: The Substance to be tested is to be mixed with Inhotum of Soln. About two Parts of Soln. to 1 Part of the substance to be tested chopped up small if Solid if Liquid two Parts of Soln. to one Part of the whole of the Liquid. This is to be subjected to dryness. This mixture is then to be known by little by little into a crucible heated to a dull red heat. If the ash left be dark colored some water must be added by this means the Inhotum of Soln. is expelled. It yields Oxygen to this
Animal Matter and also the Ascorous Acid, were the Ascorous Acid to remain as such, the heat would quickly volatilize it, but it is converted into Ascorous Acid which combines with the
black to form compounds of which it withdraws the lead to which it is exposed. The Animal Matter peels off in the form of Bitter Salts with Bitter Salts and the Ascorous
acid is still mixed with Bitter Salts. It has therefore still to be purified from these by a method to be afterwards described viz. Brocks or Bierich tests as they are called.
The reduction by the Bitter Acid is performed either by digesting the solid matter in cold concentrated Bitter Acid till it has all been oxygenated by the action of the Bitter Acid or by adding it in small pieces to warm Bitter Acid and partly evaporating till it gives off a thick smoke. The action being the same only more complete; in either case the Ash is to be boiled in Bitter
Water and filtered. But this also fails like the last in most sufficient and
cells to have to be removed. By familiar means to those used in the form


The reduction by sulphuric Acid is performed by mixing the
Animal Matter with Sulphuric Acid about a half pound being the
accompanying amount. By this means the Animal Matter is
changed to water being abstracted. The Ash which is obtained
by evaporation over the fire. Sulphuric Acid being added to it is mixed in water and moistened with Sulphuric Acid
to convert the Arsenous acid into Arsenic acid, this is to be dissolved
shaken and so on as in the other cases. But here also the process
is not final; it has to be further purified. Furthermore it may
be objected that the sulphuric acid itself may contain Arsenic
which may thus be present in the substances used in the reduction
of the Animal Matter. The common fault of these processes is
that to one not much practiced in chemical manipulations they
are attended with considerable difficulty, also that some of them
at least are objectionable as introducing sources of fallacy till
one is wanting in that they are but steps to the accomplishment of the true
solution. We come then to consider the means of obtaining
Arsenic in an isolated form not by the destruction of the Organic
Matter but by removing the arsenic from it. These means are
found in what are called Pernochs and Glauchy tests.
They both agree in that the poison is removed by the superior
attraction for it on the case of copper in the other. The sulphate of Arsenic
a viscous test is as follows: the suspected liquid is to be
acidulated with Hydrochloric acid, into this a strip of bright
Copper is to be introduced. The liquid is to be boiled and if Arsenic
be present a metallic film coats the copper, this is then to be taken
out washed in destilled water dried and introduced into a flask tube
that being now applied the metal is volatilized and by blowing
at once in burned up and down the tube, it is changed into
crystals of Arsenious acid. This can now be dissolved and the
tests for Arsenic in solution applied. This test however
Simple as it appears—is not without objections. The Permatec Acid shown as has been before said, contains Arsenic. This must be
guarded against by first using distilled water and extracting
of the Permatec Acid then color the Copper. If this does not happen
the Arsenic lees in fine. But there are other objections. The Metallic
plane which the Arsenic forms on the Copper generally forms with
any other matter will off, and on washing, must may
be lost, also unless the washing is carefully performed. Organic matter
may, if thick, adhere to the copper and on heating the Metal in
the tube, Charcoal will be deposited on the sides of the glass well
the Arsenic also it is supposed that sufficient Permatec Acid in Clioic
may be retained to cause a white precipitate with the bath of
silver. This test was used several times in the case investigated and
certainly the Presence of Arsenic was clearly made out. The oblelous
crystals were formed. But the objections noticed were present on
some of the occasions, doubtless, because the experiment was not
performed with sufficient care. Still difficulties which might
again embarrass the unskilled hands of the Country Medical
Doctor. Dr. Frezenius also states that all Indicolite crystals calling
Frezenius and other Metals under the Separation of Arsenic by Copper
difficult or even impossible. This if true is a real serious
objection. This objection which are raised against it say that the
Indicolite crystals may be due to the Metals will be noticed after heating
of the rust and last fuscous of greying this paper from all foreign admixture.
Marsh's test. This test has undergone many modifications.
The Principle in all is the same viz the production of Hydrogen by
the Action of Dilute Sulphuric Acid on Zinc and the introduction
of the suspected Liquid into the same vessel. When if氨酸 be passed
it will combine with the Dissolved Hydrogen on fire inflaming
the Gas as it escapes from a Jet. The Hydrogen combines with the
Oxygen of the Air to form Water and the Metal becomes deposited on
any substance which is placed in the flame. The first Apparatus used
was of the form fig. III. It was found however that this method which
took place when Organic Matter was thus treated was so great as quickly
to get into the Jet and put out the flame and otherwise spoil the
Experiment. Various modifications have therefore been proposed to
overcome this difficulty. Such as in fig. IV where a stopcock being used
when that the fluid was pushed out of the third leg and then being
separated from the zinc which was conjoined to the short leg by the stopcock and
and practically this was not found to be sufficient. So we made
some Bulbs being joined to favour the breakout of the Bubbles. Still it did not
answer. Then after were then made use of to produce a comparatively clear solution
there we have before examined and spoken of. The Apparatus which has
been described at the beginning of this Thesis will I believe be
found to obviate all the evils of the gotting and thus by enabling
us to attain our object by one process greatly simplify the Investigate.
It will be seen that the separation is far more complete than
are any of the other processes considerably more so even than in
an apparatus of a more what common make which is given in
Christison and drawn fig in the last edition of Ravina. The light
If tubes also, and the final bulb, before the stopcock begins the chance
of fluid getting into the tube. I have used this instrument
frequently and have never been had any trouble with it. It was
in constant action for nearly two days, on the occasion mentioned
towards evening and at various other parts of the day, when not
wanted, the cock was turned, the gas filled the opeck and there,
it was ready, the next morning it was still in perfect working order
once or twice the fighting was getting troublesome, but on letting
it aside for a short time, it regained its cleanliness sufficiently
to be used again. If course the same portions were not constantly
in the apparatus, as soon as satisfactory evidence and several
experiments were obtained in a separate in perhaps on some occasion
after one or two hours, it was changed to try something else-
so has been said on one occasion it stood all night. Besides
in this case of poisoning it was used with equal success to
economize the cause of death of some few to which a farmer
suspected to have been poisoned. Arsenic was found in
abundance in the corn with which their crops were filled
and afterwards it was found that it was very probable they might
have eaten of some corn mixed with arsenic in seed. It was
also used to detect Arsenic mixed purposely with various
substances as with a compound made to resemble an ordinary
dinner, also with cider, also with the contents of another
human stomach obtained at a post mortem. In every case
the arsenic was easily detected and the fighting caused little or no.
annoyance. Supposing therefore that this instrument can be used for testing organic matter such as the ordinary contents of the stomach or a portion of water in which the coat of the stomach has been boiled let us consider what objections can be urged against it and what advantages it presents.

The objections urged against it are first that both the Lime and Sulphuric Acid are known commonly to contain arsenic often in large quantities and thus that any evidence of arsenic obtained by using this instrument may be due to the materials used not to the presence of it in the suspected substance. This objection is readily refuted by setting chemical hydrochloric Pure Lime and Sulphuric Acid and by igniting the Hydrogen or heating the tubes in the manner before described we prove that up to the moment of adding the suspected substance the apparatus is free from Arsenic and this is one of the great advantages of such apparatus that you can thus by the same process demonstrate the purity of your test and the immediate elimination of some arsenic substance on adding the suspected matter. Its delicacy being such that in all cases with very few exceptions we can use plain distilled water and pure the concentrated fluid undergoing examination. Another objection is that other substances may cause a crust on the glass. This is the point to often said of to weaken the medical means evidence that any is the great substance which pins crusts resembling somewhat Arsenic. There is a certain difference which will generally
Enable us to tell to which of the two metals it belongs but they are merely differences of degree and therefore not to be much trusted. This objection ought to be met by the statement that we do not use Marsh's apparatus as a test, we do not allow it to be called Marsh's test but we simply use it as an apparatus to separate a metal in present and afterwards by special tests we prove that that metal is or is not Arsenical. Marsh's apparatus is used to obtain the metal free from foreign admixture to show that the suspected matter contains Arsenic, but by present to obtain a substance the afterwards identified as Arsenic. The crust given by Antimony is a far more smoky one than that afforded by Arsenic. It is more rarely and more imperfectly gives the metallic lustre also the Antimony crust is surrounded by a cloudy white powder to a much greater extent than the Arsenical crust. We found also that the Antimony crust was far more easily wiped off than the Arsenic. This seems almost to depend on the size of the jet. If large say 3′ of an inch long both the Arsenic and Antimony were equally easily rubbed off. But if the jet be only from the 18 to 20 an inch long (quite big enough for any purpose) the Arsenic crust was found to require a good brush out once or twice repeated to slide off. The Antimony disappeared on the slightest touch. When a Compound crust was formed both of Arsenic and Antimony the crust presented characters intermediate between the two but on giving it a slight brush the whole of the Antimony was
removed leaving a characteristic Arsenic stain. Some pieces were preserved both of Pure Arsenic and Pure Antimony. Mixed Arsenic and Antimony and the crusts obtained from Elypt Lachers stomach by placing a slpaf slip over them Canada Balsam uniting the two. These I still have by me and they are as good as the day they were made. The Arsenic even the mixed metals and the crusts from P. Tucker's case were easily and satisfactorily made. The Antimony so easily came off that it was most difficult to preserve a specimen; indeed I found it impossible to make a good one with the white powder nicely seen. But there are other differences of which the best is touching them with a solution of Chloride of Calcium. The Antimony crust is insoluble. The Arsenic in soluble with water; also with Hydrochloric acid of Ammonia.

The Antimony gives an orange stain. The Arsenic


during gradually changing into a yellow color. This yellow stain can again be tested as has been before spoken of by Ammonia or by Hydrochloric acid also the metallic crust can be tested by the heat at which it is volatile. The best way being to take melting time kept melting by bits of the metal being added on placing the crust on this the Arsenical crust is volatile and just above the melting point, Antimony not till it is raised considerably above the melting point. Another mark is given by taking the antimony and which Turing says is not to be trusted to mix with the ammosical crust with a sulphuric acid by passing sulphuric acid over the crust in a volatilizing state and then passing dry Hydrochloric acid gas over the sulphuric acid.
If Arsenic is found to be the active ingredient in a sample, it should be identified by the
process of dissolving the sample in water and then analyzing the solution for arsenic. This
process involves the use of certain chemicals and testing procedures, which are best
described in detail in the text. The main points to consider when identifying Arsenic are:

1. The formation of an arsenic compound is one of the main characteristics that
   indicate the presence of arsenic. This compound can be identified by its specific
   properties and behavior in a variety of tests.

2. The use of special apparatus or equipment, such as the Schmell and Gehrke Apparatus,
   is recommended for the identification of arsenic. These apparatuses are designed to
   facilitate the process and ensure accurate results.

3. Special reagents are used to confirm the identity of a substance as arsenic. These
   reagents are used to test the sample and confirm the presence of arsenic.

4. The reduction test is another important test for identifying arsenic. This test involves
   reducing the arsenic compound to a form that can be detected and measured.

5. The identification of arsenic is a complex process that requires careful attention to
   detail and the use of appropriate equipment and reagents. It is important to follow
   the procedures carefully to ensure accurate results.
much more difficult to accomplish satisfactorily and cannot
be compared to the other two processes.

We have now seen how the Arsenic is present in the separated
from foreign admixture, also how it is to be identified as that
mineral. One or two other points have to be considered. It is possible
that the poison may have been introduced after death. It
has been before stated what post-mortem appearances would dis-
prove this statement. But still further to prove it and to demon-
strate that it had been absorbed into the system, it is of great
value to test the liver, gall urine, blood itself; to ascertain
if Arsenic can be detected in them. This is to be done by
using Grasshier's test and then if crystals are obtained
to test them by the various means specified. Should Arsenic be
found in them; it is clear that the Arsenic has been absorbed
during life and if it is to be found any where it will be in
the parts specified. The statement made at one time that the Human
Body contains only the Bones contains Arsenic is now known
to be unfounded. In cases where the Body has been dug up
out of the grave, after the lapse of some period, it has been stated
that the Body may have been impregnated with the Poison by the soil
containing Arsenic. This must be disproved by the testing of the soil.
also in cases where Hydrated Disoquinidine has been given it
has been stated that it may have contained Arsenic. This must also
be disproved by testing the Antidote and even if it should contain
Arsenic in small quantities it may be possible to prove that the Stomach
contains more than the whole of the antidote administered before. The Quantitative Analysis is performed by converting the Mental into Terega Sulphur and washing it in Ether: every 100 grains of Terega Sulphur will correspond to 80 grains of Amebium Acid, and can be performed by employing Macfarl's Apparatus with the tube dipping into the set of the Rebit a of Silver, as before spoken of.

I now propose to conclude this Thesis with a few remarks on the Principal points to be attended to by the Practitioner. On being then summoned to a case where the symptoms are those of Poisoning by Amebium, he will have to treat the case according to the Principles before laid down, producing vomiting if not present, and carefully avoiding Antimony as an Medicament, indeed, would be contra-indicated both by the disease and by the difficulties it would throw in the way of any future Analysis. Afterwards giving Terega Prude of Iron, giving stimulants, if the patient is in a state of collapse, if not, using anti-laxative Measures, also carefully searching for any thing likely to form a clue to the case, e.g. such as Powders, Bottling Medicine, also the food contained of. To carefully note down the symptoms exhibited, whether they came on after any particular meal? and other questions which the circumstances of the case may dictate. The Vomited and Passed Matters will have to be reserved for Analysis. Supposing the case to be fatal, a careful post mortem will have to be made, examining every part of the body, particularly the stomach and the outlets of the body, especially the Mouth and Throat.
carefully, noting down the appearances presented and reserving the stomach and its contents, also the liver, spleen, blood, urine, for analysis. Then he will have to conduct his search for arsenic after the manner described and ascertaining that his search in Ransom's apparatus is itself free then adding the suspected substance, which can be concentrated by evaporation and then if crystals are obtainable, converting them into the oxide, crystallizing it, observing the shape of the crystals and then dissolving them and applying the ammoniacal fulminate of silver, ammoniacal sulphate of copper, the hydrosulphite of ammonium and freshly prepared, also the sulphured hydrogen test. In this manner testing both the stomach, its contents, and the other organs of the body, all the possible precautions being taken to guard against fallacy of any description and care being carefully taken at the time of all the circumstances. By these means the various duties of the medical man will be performed in a systematic manner. He will leave clearly before him the object he wishes to attain to and being thus clear himself will be far less likely to become confused when subject to any cross-examination or when any attempt is made to shake the value of his evidence.

Fires.

March 1850. George Anthony Croppa Lake.