Gleanings in toxicology / by Charles Meymott Tidy.

GLEANINGS

IN

TOXICOLOGY.

BY

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TO

DR. WILLIAM GRIMWOOD KING.

MY DEAR DR. KING,

I take the liberty of dedicating these few Gleanings to you. They are the record of Toxicological Cases that have been referred to me during the past year, and of such experiments as these cases suggested.

I dedicate them to you as an acknowledgment of innumerable kindnesses which, though I can never repay, I shall never forget. And, moreover, to whom could I more properly dedicate my first contributions to Medicine?

Very faithfully yours,

C. MEYMOTT TIDY.

The Laboratory,

September, 1869.

GLEANINGS IN TOXICOLOGY.

ON POISONING BY NITRATE OF BARYTA.

I WAS requested by Charles C. Lewis, Esq., coroner for Essex, to examine and make an analysis of the stomach of a man who had died under the following circumstances :—

W. H., æt. 46, single, a carman in the employ of the Messrs. Volckman, living at Stratford, had always enjoyed good health, with the exception of occasional, but slight, attacks of rheumatism, which, however, had never been sufficiently severe to keep him from his work. Having complained of a slight pain in the shoulder, one of his fellow-workmen recommended him to take some sulphur, and on the following day (Saturday), when his landlady was going into the village to make sundry purchases, he requested her to bring him in a quarter of a pound of sulphur. She did so, brought it back, and gave it to deceased. He then asked her to mix it for him in a little water. She thinks she mixed about a quarter of the powder with water in a mug. As he had complained during the day of a slight attack of diarrhœa, she recommended him to take the dose in the morning (Sunday), and not over-night, as at first he had intended. About half-past six in the morning his landlady heard him cry out, "I am poisoned." She at once ran up to him and replied, "Nonsense, you cannot be poisoned with flowers of sulphur;" whereupon he opened his mouth and showed her it was covered with blisters. Mr. Kennedy, of Strat-

ford, was sent for between nine and ten o'clock on the Sunday morning, and upon looking at the sulphur detected something of a crystalline nature in it. The man was then in a state of collapse, and died about twenty minutes past twelve, that is about six hours and a half after he had taken the mixture. There was a partial loss of voice, coldness in the extremities, intense pain in the bowels, a burning pain in the throat, partial convulsions, with violent vomiting and purging.

On Monday evening, Mr. Kennedy made a *post-mortem* examination, and reported as follows:—"Body well nourished, muscular rigidity well marked. The membranes of the brain were congested, the vessels being fully extended with dark-coloured blood. The left pleura was adherent, the left lung being very much congested, the right slightly so, especially at the edges. The heart was large and flabby, both sides full of black blood. The duodenum was highly congested; there were several dark congested spots about the rectum."

I received the stomach from the constable, and upon opening it noticed that in some parts there was merely a slightly increased vascularity, the redness in other parts being of a very much deeper character. Ramifying over its entire surface, I observed vessels filled with dark blood, which were more marked and in greater number near the pyloric end. This general florid appearance extended to that portion of the duodenum which I received attached to the stomach. The stomach contained about four and a half ounces of a reddish fluid, which had a neutral reaction. I also received the small intestines, which throughout their whole length presented a slightly, though very slightly congested appearance. The rectum was highly congested. The mug was also forwarded to me from which deceased had taken the mixture, containing some powder at the bottom; and likewise the packet from which the landlady had taken the powder she had mixed.

On examining the powder, I found it had very much the appearance of ordinary sulphur, save being somewhat lighter in appearance. On igniting a small quantity on a piece of charcoal before the blow-pipe, it deflagrated most brilliantly, giving a distinctly green light. I then made an analysis of it, and found in every 100 grains 51·52 of barytic nitrate. There was also potassic chlorate present with sulphur in the powder. Upon examining the

stomach for both mineral and organic poisons, I detected distinct traces of the barytic nitrate, and also the potassic chlorate. Of course there was no doubt left in my mind that the man had taken the powder, and that death had resulted from the action of the nitrate of baryta.

There was some reason for suspicion how this baryta became mixed with the sulphur, and I therefore requested that a sample should be sent me of the sulphur from the drawer of the chemist of whom it was said to have been purchased. Upon examining this, I found it to contain 6·76 per cent. of barytic nitrate. I then examined fifteen different samples of sublimed sulphur bought from fifteen different chemists' shops, all of which, however, I found to be perfectly pure. Indeed, it would scarcely be worth while adulterating flowers of sulphur. How, then, did the baryta get into the sulphur? It was plain that the mistake had originated in the chemist's shop, but at first it was not easy to account for the difference between the quantity of baryta found in the powder given deceased and that in the chemist's drawer. The chemist (who, by-the-bye, was a woman) asserted that she had never had any baryta in her shop, but the after evidence proved this to be a mistake on her part. The explanation was gathered from a late assistant, who knew of the presence of a packet of green fire in the shop, as he had sold some only a short time previously. There was no doubt, therefore, that this had been mistaken and sold by this lady chemist for sulphur, and that she threw the little remaining behind in the packet over and above the quarter of a pound that she was serving, into the sulphur drawer. And this fully explained the difference between the quantity of barytic nitrate in the two samples.

I was unable to find upon record a single case of poisoning by nitrate of baryta, nor yet of any experiments that had been made with it to determine the quantity that will destroy life. I made, therefore, the following experiments at the special request of the coroner. I must here acknowledge the assistance kindly rendered me by Dr. W. B. Woodman in watching the animals and assisting me in the *post-mortems*.

Experiment 1.—*August 10th.*—Gave a rabbit ten grains of nitrate of baryta as a powder, mixed with a little sugar. It was found dead in less than an hour.

Post-mortem, August 13th.—Rigor mortis persistent. Fur very rough. Pupils widely dilated. Brain and membranes congested. Lungs congested and very rotten. Heart.—Both sides full of black blood. Pharynx natural. Liver: very rotten; in some parts deeply congested. Kidneys: slightly congested. Stomach full of food. Broke down at once with the least touch; florid appearance over the whole inner surface. Duodenum slightly congested. Small intestines not congested, quite empty, and appeared transparent. Rectum deeply congested. Bladder empty. I found a trace of the poison in the liver, and in the stomach in considerable quantity.

EXPERIMENT 2.—*August 10th*, 7.30 *p.m.*—Gave a rabbit five grains of nitrate of baryta in the form of a bolus, with flour and sugar.

9.30 *p.m.*—Found it lying on its side slightly convulsed. Pupils widely dilated. Fur rough. Has been purged violently. Respiration 80, shallow and laboured. Aortic pulse 120, but hardly to be felt. Almost dead.

August 11th, 11.20 *a.m.*—Only just alive; insensible, and cannot be roused.

7 *p.m.*—Cardiac pulsations 160. Respiration 120. All but dead. Takes no notice, but apparently sees and hears. Is getting cold. Died at 10 p.m.

Post-mortem, August 13th.—Fur rough. Pupils widely dilated. Buttocks stained with fæces. A little frothy mucus about the mouth. Brain apparently normal. Heart.—Both sides contained black clots; the right side being most distended. A little staining of the endocardium. Lungs.—The lower lobes deeply congested, in fact, in the stage of red hepatization, almost passing into apoplexy. Stomach so softened as to tear with the least touch; distended with greenish food, consisting apparently of bran and corn. Second stomach nothing unusual. Duodenum somewhat reddened as to its mucous membrane. Rectum much congested. The remaining intestines apparently normal, containing a little milky fluid and a little fæcal matter. Urinary bladder full. Liver soft and congested. Kidneys apparently normal. I examined the urine and the liver for the poison, but was not able to detect any. Distinct traces, however, were to be found in the stomach.

Experiment 3.—Gave a small terrier (August 17th, 4.30 p.m.) thirty grains of nitrate of baryta on meat.

6.45 *p.m.*—Violent purging and vomiting. Insensible, and appears dying. Convulsive twitchings.

8.15 *p.m.*—Died, after severe convulsions.

10.15 *p.m.*—Rigor mortis strong. Some thin light brown fæcal matter about the anus.

Post-mortem, *August* 18*th*, 12.30 *p.m.*—Rigor mortis persists. Pupils widely dilated. Brain normal. Thorax.—Both sides of the heart contain black blood, the right side in greater quantity. Lungs considerably congested. Abdomen.—Stomach reddened, soft, and distended with food. Duodenum slightly congested, which congestion did not extend to the other parts of the small intestines. The rectum was considerably inflamed. The kidneys were slightly congested. The liver was considerably congested and softened. I found the nitrate of baryta both in the stomach and in the liver.

Experiment 4.—*August* 13*th*, 5.30 *p.m.*—Gave a small terrier ten grains of nitrate of baryta on a piece of meat.

9 *p.m.*—Very lively.

August 14*th*, 11.45 *a.m.*—Very quiet. Does not take much notice. Has been considerably purged.

9.30 *p.m.*—Heart beats 160. Has passed a formed colourless stool.

August 15*th*, 11.30 *a.m.*—Seems much worse, Cardiac beats 128. Slightly convulsed. There has been considerable vomiting and purging. Respiration unequal and irregular.

9.35 *p.m.*—All but dead. Getting stiff. Hardly seems to feel. Reflex actions almost gone. Has dragged itself a foot during the last hour.

August 16*th*, 11 *a.m.*—Considerably better, but very shaky on his legs.

8.30 *p.m.*—Very little power in hind legs, but seems gaining power in the front ones. Fell on attempting to jump down two feet.

August 17*th*, 1 *p.m.*—Hungry. Has been violently purged. Looks thin, shabby, and spiritless. Has passed a great deal of urine.

August 19*th*.—Has quite recovered.

Experiment 5.—*August* 13*th*, 5.30 *p.m.*—Gave a large skye terrier twenty grains of nitrate of baryta on meat.

6.30 *p.m.*—Looks dull, and is dribbling from the mouth.

9 *p.m.*—Slight vomiting and purging, but otherwise seems tolerably well.

11 *p.m.*—Very quiet. Has slight convulsions.

August 14*th*, 11.45 *a.m.*—Restless, but appears recovering.

August 15*th*.—Fast getting well.

Experiment 6.—*August* 17*th*, 11.45 *a.m.*—Gave a large dog thirty grains of nitrate of baryta on meat.

August 18*th*, 9.35 *a.m.*—Convulsions; cannot stand. Violent purging. Fur rough. Looks very stupid and shaky on the legs.

12.30 *p.m.*—Seems to have quite revived.

August 19*th*.—Has eaten a good meal, and is much better. Recovered in a few days.

Experiment 7.—*August* 17*th*, 4 30 *p.m.*—Gave a large dog sixty grains on meat and in powder.

6.45 *p.m.*—Able to stand, but seems tottering and very thirsty.

12 *p.m.*—Slightly convulsed. Looks dull and heavy.

August 18*th*, 10 *a.m.*—Better.

12.30 *p m.*—Has passed a great deal of water and been much purged.

3 *p.m.*—Still passing a great deal of water. Slight convulsions, and paralysis of back legs. Takes but very little notice of anything going on about him.

8 *p.m.*—No use in his hind legs. Heart beats 100.

August 19*th*.—Is considerably better; gradually recovering use of his legs. Seems hungry and drinks enormously. The dog was quite well and running about after two days.

Experiment 8.—*August* 24*th*, 2.40 *p.m.*—Gave a big dog 120 grains of the nitrate on meat. Within an hour there were violent convulsions, with excessive purging and vomiting. Apparently was in considerable pain. Drinks everything put in its way, and passes an enormous quantity of urine. Died at 5.20 p.m.

Post-mortem, *August* 25*th*, 1.30 *p.m.*—Rigor mortis persistent. Brain normal. Thorax.—Æsophagus natural. Lungs deeply congested. Clots in both sides of the heart. Abdomen.—Stomach the seat of acute inflammation, spreading over its entire surface. No ulceration or perforation, but there were black spots of extravasated blood distinctly visible on the mucous coat. The stomach contained some brown grumous matters. The inflammation extended to the duodenum, and affected more or less the whole length of the alimentary canal, but was most of all conspicuous in the rectum. The bladder was empty. The liver was deeply congested, and the kidneys slightly so. I was able to detect the poison in the stomach, liver, brain, and muscles.

I append the following tabular statement of the results of our experiments :—

Experiment.	Animal.	Dose.	
1.	Rabbit	10 grs.	Died in less than one hour.
2.	Do.	5 „	Died in 27 hours.
3.	Small terrier	30 „	Died in 3¾ hours.
4.	Do.	10 „	Recovered in five days.
5.	Large dog	20 „	Recovered in two days.
6.	Do.	30 „	Recovered in four days.
7.	Do.	60 „	Recovered in two days.
8.	Do.	120 „	Died in 2½ hours.

ON POISONING BY COLOCYNTH.

Mrs. P., a young married woman, had all her life enjoyed fair health. She had, however, suffered from a slight cold, and had passed nearly a fortnight over her usual monthly period. Talking with her landlady and another friend, she asked them what was a good thing to take, upon which her friend remarked she had heard "bitter apple" recommended. This was on the afternoon of the 5th of November. She took threepence out of her pocket, and asked her friend to purchase some for her, which she did at a neighbouring chemist's. She brought it home and gave it deceased. When she took the drug it is impossible to say, as there was no evidence on this

point. She was seized, however, early the following day with violent purging and vomiting, which never ceased until her death, which took place on the 7th of November.

Dr. Godfrey made an examination of the body, and reports that all the viscera were healthy. The uterus with its appendages, and the stomach and its contents, were forwarded to me for examination.

The uterus was unimpregnated, and seemed to me slightly congested. The stomach was preternaturally pale, and contained about 16 oz. of a light, yellow fluid, which smelt of digesting matter, and had a slightly acid reaction. I allowed the sediment to collect, and then examined it under the microscope, but was unable to detect any substance having the structure of colocynth. I then endeavoured to extract the bitter principle with alcohol, but was again unsuccessful.

Colocynth is imported in the form of a dried fruit, but is usually sold as a powder, having a yellowish white colour. Three pennyworth is a somewhat vague quantity, but I found that somewhere between two or three drachms is usually sold for that sum. The chemist of whom this sample was bought said at the inquest that he never gave more than a drachm for threepence.

Upon experiment I found that one grain of colocynth was the smallest possible quantity that could be detected in 10 oz. of a liquid made up of coffee, &c. Three drachms and a-half was, I found further, the smallest quantity that would prove fatal to a dog, in one case in eighteen hours, in a second in twenty-two, in a third in thirty-six hours; but its action is so uncertain, on account of the excessive vomiting that occurs, that frequently animals will recover after having taken a very much larger dose. Orfila relates the case of a man who recovered after having taken 3 oz. of the powdered colocynth for a gonorrhœa—and Christison the case of a woman who died in twenty-four hours after swallowing a teaspoonful and a half. Clearly then the action of colocynth is very uncertain, and so also is its detection after death; I found it in every case in the evacuations, but only in the stomach provided death occurred within twenty-four hours.

The symptoms in animals come on after a short time, somewhere between one and three hours. Vomiting generally occurs first, and diarrhœa follows rapidly upon

it, a considerable quantity of blood being invariably evacuated. There is evidently, in most cases, severe pain, and the pupils were in all cases contracted. I have occasionally noticed giddiness and extreme languor, but in no case convulsions.

The *post-mortem* appearances are variable in the extreme. As a rule, the stomach and duodenum are highly congested, and large ulcers are occasionally met with in the stomach. But in other cases, the appearances are precisely the reverse of this, the stomach and intestines being paler than usual, with this exception, that the rectum was in every instance considerably inflamed. Occasionally traces of inflammatory action are to be found in the bladder and kidneys. I have not noted anything abnormal in the other viscera.

I do not regard, therefore, failing to find the poison in this case as proof that death did not result from it, inasmuch as forty hours must at least have elapsed between the time she took the poison and death. Indeed, on the contrary, the vomiting and violent purging, the bloody stools, as noticed by Dr. Godfrey, the pale stomach which I have referred to as not unusual; the previous good health of the woman, the certain evidence the drug had been bought, and she herself ascribing her illness to having taken it, leave no question in my mind that the cause of death was from the colocynth. And from all I can gather, it is the smallest quantity on record that has produced a fatal result.

ON POISONING BY OPIUM.

In consequence of the facility with which opium in one form or another can be obtained, it is not surprising that more cases of poisoning occur with this drug than with any other. It seldom happens, however, that it is given in order to commit murder, as nearly all the cases are suicidal, except in some few instances where it has been administered to induce stupor, in order to facilitate the commission of other offences.

The two following cases that have occurred in my practice within the last few months present several points of very great interest to the medical jurist.

A young man, J. E. H., aged twenty-eight, living in the country, had led a somewhat irregular life, and suffered from time to time with fits of melancholy. One night he retired to rest somewhat earlier than usual, his relatives remarking that he seemed brighter and better than he had for some time past. In the morning, not appearing at breakfast at the usual hour he was accustomed, his friends went up-stairs to call him, and were alarmed at finding him in a perfectly comatose state. A medical man was sent for, and, (quoting his words in a letter he addressed to me,) "he seemed in a deep sleep, with a warm skin and frequent pulse, with contracted pupils, the reflex functions being active." He succeeded in rousing him slightly, when he said he had taken laudanum. Of this, however, there was not a doubt, for there was a recently emptied bottle on the table labelled "laudanum," and by its side a tumbler from which he had evidently drunk it. Every means to recover him was of course tried, but he died at 10 p.m. It is difficult to say precisely the interval of time that had elapsed between death and the taking the drug, but it must have been somewhere between fourteen and twenty-four hours.

The following day, by the coroner's orders, I had the stomach and its contents sent me. I was unable to detect any smell of opium: I examined the stomach and it seemed healthy. I then made an analysis of one half of the stomach for morphia and meconic acid, but could not detect the slightest trace of either. I then retraced my steps, and repeated the whole of the experiments on the remaining half, but again was entirely unsuccessful. I need scarcely add that I examined it systematically as I always do, for both mineral and organic poisons, but with negative results.

The second case I wish to refer to was one that excited a great amount of public interest from the mystery that seemed to surround it.

A policeman, whilst on his rounds early one morning in the neighbourhood of Hackney Wick, discovered the body of a man in the cupboard of an unfinished house. At the inquest it was proved to be a man who had escaped some four months previously from a lunatic asylum at no very great distance from the spot where he was found. At the request of Mr. Humphreys, Mr. Gant, of the Royal Free Hospital, made a *post-mortem* examination of

the body, and although it was in a somewhat advanced state of decomposition, he was unable to detect, in his opinion, sufficient cause for death. The stomach was then forwarded to me, by the coroner's orders, for chemical examination, as well as a bottle found by the side of the deceased, labelled "Laudanum, Poison." The bottle was perfectly dry, and merely had adhering to its side a small quantity of a brown deposit, an appearance not unfrequently seen on bottles in which laudanum has been kept. This deposit I tested, and found to be opium. The stomach was dried up, and it was impossible, owing to its semi-decomposed state, to make out any peculiar *post-mortem* appearances. It merely seemed covered internally with a brownish red matter. One half I submitted to analysis, and detected morphia in considerable quantity, as well as a trace of meconic acid. These results I afterwards showed Dr. Letheby with the other half, and he confirmed my analysis.

These two cases may be regarded as typical cases of opium-poisoning. In the one, although it is a moral certainty that death resulted from the action of opium, the man confesses he has taken it—by his side is the empty bottle, and the glass from which he drank the laudanum is on the table—and yet chemical analysis entirely fails to detect it. In the other, although a long period has elapsed since death, there is no difficulty in its detection.

And now the question naturally suggests itself, Why in one case is its discovery so easy and so certain, and in a second so difficult, indeed I may venture to add, impossible? There is but little doubt that the true explanation depends on the length of time that has elapsed between death and the exhibition of the poison. The action of the living stomach on opium, and as I shall point out in future papers, on organic poisons generally, is active and rapid. The poison may be taken, absorbed, and circulated, and yet if a sufficiently long time has passed, the medical jurist will probably fail to obtain any evidence whatever of its existence.

I will not attempt here to speculate on the causes of all this. It may be that the poison has been removed out of the reach of analysis, passing off by the secretions and excretions, if life be sufficiently prolonged—it may be that the quantity taken when distributed throughout the whole body is not in sufficient quantity in any one part,

such as is submitted to analysis, to be discoverable; whereas, if we could experiment on the whole body we might find it ; it may be that these poisons locate themselves in special parts of special viscera—or it may be (and such I deem most probable) that organic poisons when present in the living blood and the living stomach are really decomposed.

But on the other hand, I do not hesitate to state that the dead stomach has no action on opium, or upon organic poisons generally, which fact, as I believe it to be, I purpose dwelling upon at greater length afterwards. Here, at any rate, is an illustration that a man has been dead four months, and yet opium is detected without difficulty. I believe Dr. Letheby has had several other cases in which he has found it after a still longer period. And thus we were able to draw the following conclusion in this curious case :—"That the man died from the effects of opium poisoning, and that he died very shortly after having taken the drug, or otherwise it would not have been discoverable."

I should wish here briefly to allude to the detection of opium (or rather of morphia and meconic acid) in organic mixtures. My own experience is that the morphia is far more readily detected than meconic acid. The plan occasionally recommended of decomposing the plumbic meconate with dilute sulphuric acid, seems to me a very unsatisfactory and questionable mode of proceeding. Certainly it is far preferable to suspend the precipitate in a *small* quantity of water, and then decompose it by passing a stream of sulphuretted hydrogen through it. The length of time this method takes may be an objection to some. Meconic acid, I think, is broken up by the presence of a trace of free sulphuric acid. And further, if this mode of examination is adopted, the less water that is employed for suspending the impure meconate of lead the better, so that the application of heat to the meconic acid solution may be in this way rendered unnecessary.

Perhaps the best plan is to throw the precipitate, filter and all, into a mortar, and rub it up with either sulphate of soda, or what I am disposed to think is even preferable, namely, carbonate of soda, mixing it with a small quantity of water, until a liquid is produced, having the consistency of a thick cream ; allow this to remain about four or five hours, and then take up the meconic acid set free by shaking with alcohol. The filtered liquid may then be tested.

I may venture, however, once again to repeat what I have already stated, that I believe in opium poisoning it is quite possible to obtain very decided reactions of the alkaloid and yet fail to detect meconic acid.

ON POISONING BY LOBELIA.

There is no form of quackery more terrible and serious in its results than what is ordinarily termed "Coffinism." As a rule quacks are cautious enough whilst they give nothing that by any possibility can do their patients much good, that, at any rate, what they administer shall not do them any harm. Homœopathy is an illustration, and a very good one, of what I mean. Those pretty little round arsenical sugar plums that they call globules may possibly contain arsenic; but, considering that analysis has no difficulty in detecting less than a thousandth part of a grain, but that chemical analysis fails to detect any arsenic in these globules (at any rate, in all the cases I have examined, some five or six), we may very fairly conclude that if there is any arsenic present, it is in such a marvellously minute quantity that we are as certain it can do no harm, as we are perfectly sure it can do no good. So that homœopathy has one great thing to recommend it to inveterate physic takers—that they are dealing with a perfectly harmless and innocent system. And if people are satisfied with it, we have no right to complain. But not so, however, with Coffinism, a name (ominous indeed!) derived from the founder of the system, a "Dr. Coffin," whose patients are to be found in no small numbers amongst our poorer classes, and whose income must be almost entirely derived from their hard-won earnings. But Coffinism deals with no innocent or harmless drugs; nor is it satisfied with any innocent or harmless doses. Starting with their pet, though absurd theory, that "Heat is life; the want of sufficient heat, disease; and cold is death," they administer, with no cautious or measured hand, monstrous doses of cayenne pepper and lobelia to restore *healthy action*, or, what is the same thing to them, *warmth*, to a diseased and broken down system.

Within a very short time I have had two cases of death come before me from, I believe, the absurd practices of

these reckless practitioners. I may quote as an illustration the following, where, although I was unable to detect the poison in the stomach, doubtless partly on account of the length of time that had elapsed between death and its administration, as well as from the violent vomiting that occurred shortly after the drug had been taken, still the circumstances of the case leave no doubt in my own mind of the immediate cause of death.

I received from Mr. Rees Llewellyn, July 17th, 1868, by Mr. Humphreys' orders, a stomach and its contents from the body of a child, A. E. B., æt. one year, who died shortly after having taken some mixture obtained from "a Coffinite" residing in Whitechapel. I received at the same time some of the mixture he had prescribed for the child, the greater part of which had been given. The history of the case is briefly this:—The child was taken ill on the 10th of July with a slight diarrhœa. The parents tried some simple domestic remedies, but, the child not getting better, they thought it advisable to seek further advice. Consequently, on the 13th, they consulted the Coffinite. He gave them a bottle of medicine. The parents report that very shortly after the child had taken the "physic," it got rapidly worse, and the symptoms being somewhat alarming, they called in Mr. Llewellyn. They informed him that the sickness had been violent in the extreme, and that the Coffinite had told them to go on with the mixture. Again and again they repeated the dose, but the child never rallied. Mr. Llewellyn immediately suspected lobelia, and took possession of the bottle. He informs me the child was bathed in cold sweats, and was occasionally very convulsed. It died the day after Mr. Llewellyn was first called to see it. The stomach was considerably congested, and contained about half-an-ounce of fluid, which had a slightly acid reaction. I mixed the contents with water, and allowed it to stand for several hours, when I examined the sediment under the microscope, but was unable to detect any lobelia.

There was, however, no difficulty in at once recognizing under the microscope, in large quantities, lobelia seeds and portions of the leaves in the mixture supplied and administered to the child, according to the evidence of the parents. And, judging from this fact, and the symptoms noticed during life, though poison was not discovered in the stomach, for reasons I shall point out

directly, there is no doubt whatever that lobelia was the true and primary cause of the fatal result.

The Lobelia Inflata (Indian tobacco) is a native of North America. Its poisonous qualities were first noticed by its effect on cattle that had accidentally eaten it. Many eminent physicians in the United States have from time to time studied its action. It has a somewhat nauseous and irritating smell, and a burning acrid taste, somewhat resembling tobacco. The dried herb, as imported, is of a yellowish green colour, and is usually prepared by the shaking Quakers of New Lebanon (Pareira). It contains a volatile oil which, when distilled with water, imparts to the water the smell and acrid taste of the plant; also an acid which has been termed Lobelic Acid; and, lastly, the active principle of the plant that has received the name of Lobelina, but about which little is positively known.

Although it was not introduced into England prior to 1829, when Dr. Reece proposed it as a specific in asthma, it had become a favourite quack medicine in America as early as 1800. In the year 1809 a man of the name of Samuel Thompson was tried and convicted of poisoning a man with it. Now, lobelia is a poison, not in any way singular in this respect, that is frequently an antidote to itself. And very fortunate indeed is it for many patients that it proves so.

In giving it to animals I have found in many cases such violent vomiting produced that the poison must have been entirely got rid of, for they often recovered after most severe symptoms. In one case, however, in which I gave a small terrier a drachm of the powdered leaves and seeds which were retained, death resulted in about twenty-eight hours and a half. It is most remarkable that the followers of Dr. Coffin still maintain that it is incapable of destroying life. At an inquest, in which I had to give evidence, the Coffinite was most violent in his statements of its non-poisonous qualities, and abusive to those who ventured to disagree with him.

The following case from *Bigelow's American Botany*, vol. i., p. 181, well illustrates the reckless practice of these men in their administration of the drug:—

"A melancholy instance of death, occasioned by the use of lobelia in the hands of a quack, is detailed in the sixth volume of the Massachusetts Reports, in the trial of

Samuel Thompson, an empiric practising in Beverley, for the murder of Ezra Lovett. In this trial it appeared that the patient, being confined by a cold, sent for the pretended physician, who gave him three powders of lobelia in the course of half-an-hour, each of which vomited him violently, and left him in a great perspiration during the night. The next day two or more powders were administered, each of which operated by vomiting, and occasioned great distress. In like manner two other powders were given the subsequent day, leaving the patient in a state of great prostration. Several days after this the physician came again, and, finding his patient still worse, administered several more powders, which occasioned great distress, and at length ceased to operate. Finding that the stomach was not sensible to the emetic effects of lobelia, the physician repeated the dose, and when the patient complained of great distress at the breast, and said he was dying, the doctor assured him the medicine would soon get down, or operate as a cathartic. However, on the same evening the patient lost his reason, and became convulsed, so that two men were required to hold him, to relieve which the doctor forced down two more of his powders, and the patient, as was to be expected, grew worse, and continued so until he expired. The doctor, who had thus terminated the disease and the patient at once, was arrested and put upon trial for murder; but the homicide proving a legitimate one, from the want of sufficient evidence of malice prepense, he was acquitted and set at liberty."

So long, then, as vomiting is produced all goes well, but when this becomes impossible, by reason perhaps of prostration of the system by disease or old age, or, the reverse of this, its administration to infants and very young children, then it is that vomiting is not induced, and, failing this, there is nothing left for the wretched patient but death. And this conclusion is forced upon us, that lobelia, in the hands of such men--as careless as they are ignorant—is a most dangerous drug. If it were necessary I could give a long list of cases where death has been brought about by its administration. And I am led to fear, from facts that have lately been brought before me, that similar cases are happening daily, and, indeed, are becoming more frequent.

I may venture to remark in conclusion, that this

dangerous trade, this traffic in human lives, demands some immediate legislative interference. Unfortunately, at present, we have been unable to obtain a verdict, in England, even of manslaughter against any of these systematic poisoners, partly because the jury hitherto have taken a merciful, though, I fear, too merciful view, and returned a verdict to the effect that there was a want of malice, and partly because a dead man can tell no tales, and the secret of his death is buried in his grave with him.

STRYCHNIA.

Strychnia is the poisonous alkaloid of several plants. It was discovered as lately as 1818, by Pelletier and Caventou. The poisonous properties of the strychnos nux vomica, from which the alkaloid is usually prepared in this country, was probably known to the Arabians, although Dr. Pereira seems to think the remarks of Arabian authors had reference rather to the bean of S. Ignatius than to the nux vomica. Probably, moreover, the poisoned arrows of old-fashioned warfare, as well as of modern barbarians, owe their poisonous action to being steeped in a solution of one of the strychnos family. Fatal accidents have occurred by the bark of the strych. nux vomica having been substituted for Angustura bark (hence called false Angustura bark), but from which it may easily be distinguished by its twisted-like appearance, by its being peculiarly spotted, by the absence of smell and its bitter taste (from the strychnia it contains) ; and lastly, by the impossibility of separating it into layers.

The seeds of the strych. nux vomica are very peculiar. They are called by the Germans "crows' eyes," from some supposed similarity. Some short time back I was consulted respecting the composition and properties of a seed which had a most striking resemblance to the nux vomica ; but finding it had no poisonous action on animals, nor that I could discover a trace of either brucia or strychnia in it, I asked a well known botanist, who considered it was in all probability the seed of some foreign cucurbetaceous plant. I mention this because I have never seen any notice taken of the close resemblance between some seeds of this order and of the strychnia family.

Strychnia is invariably found associated with another alkaloid, brucia. It is also always present in the plant in combination with an acid.

Brucia has similar properties, and produces almost similar physiological effects to strychnia, but not in the same degree—that is to say, it is considerably less active. Endeavouring to fix the relationship between them, I find that 1-1000th of a grain of strychnia produced convulsions in a frog in seven minutes (given by mouth); whereas, to produce the same effect in the same time, it was necessary to administer about the 1-100th of a grain of brucia; or, in other words, strychnia is as nearly as possible ten times more powerful in its action than brucia. I do not think either that the convulsions were not quite so severe, nor did they last so long in the case of poisoning by brucia.

Respecting *the quantity* that will destroy life. Christison poisoned a dog by injecting one-sixth of a grain into the chest in two minutes, and (2) a wild boar by injecting one-third of a grain in the same way in ten minutes. Dr. Letheby had a case at Jersey, in 1856, where death resulted in five or six hours after a woman had taken half a grain by accident. I have had a case lately where a young woman committed suicide with some "Battle's vermin killer," and from the quantity she bought and the amount I found it contained, I judge she could not have taken more than a quarter of a grain. Death in this case took place in ten hours, the symptoms commencing, as nearly as we can judge, in about half an hour after she had taken it.

Respecting *the symptoms.* I may just quote from the account rendered me, by the medical man, of the above-mentioned case. The girl, when he first saw her, had severe muscular twitchings, her countenance wild and anxious, the face blue, and her skin covered with cold perspiration; the eyes were staring. She was, as a rule, muttering, but now and then called out hastily, "I am choking, I am choking;" at other times, "Give me some water, why do you not give me some water?" Very shortly afterwards regular tetanic convulsions came on, the pupils were dilated, the pulse was so quick that it could not be counted; it had also a peculiarly indistinct character. The position was what is called "opisthotonos." The spasms lasted about two to three minutes; the interval, if left

undisturbed, varying from five to ten minutes; but the spasms were brought on directly upon the slightest touch, as on bringing a glass of water to her lips, for which she was eagerly craving. In one spasm, a very severe one, the pupil was so much dilated that the iris was scarcely visible. The spasms continued to increase until death.

I do not know that I have anything very definite to say about the *post-mortem* appearances. In two cases I find noted that the hands were clenched, excepting the *index fingers*, which were extended. In most cases the heart is empty, and in all I find noted extreme congestion of the brain and spinal cord. The appearance of the stomach is by no means characteristic; I have seen it in two cases that have come under my notice intensely congested, in a third comparatively normal.

We may now examine some of the properties of this drug. It is when pure perfectly white, crystalline, and of an intensely bitter taste. Its solubility being a matter of great importance, I have made some fresh experiments, of which I give a summary, and the shape of the crystals formed on evaporating off the solvent.

1. *Chloroform*, 1 in 10.—Crystals not well formed; sometimes occurring, however, in rosettes or tufts.
2. *Dutch Liquid*, 1 in 30.—Residue reddish and not very crystalline, when only a small quantity is operated with; otherwise, when evaporated in bulk, the crystals are large, long, rectangular prisms.
3. *Alcohol*, 1 in 100.—Crystals brilliant and sparkling; modified rectangular and rhombic prisms; the opposite acute angles often replaced by planes; size of crystals dependent on quantity, but always well formed.
4. *Benzole*, 1 in 250.—Crystals very large; sometimes octahedra.
5. *Ether*, 1 in 340.—Crystals flat prisms, sometimes small and serrated.
6. *Bisulphide of Carbon*, 1 in 1,000.—Residue white and granular; forms indistinct.
7. *Water*, at 60° F., 1 in 7,000
   at 212° F., 1 in 2,500
   } Crystals small and very indistinct; in large quantities with the naked eye they appear in nodules.

The *acetate* is of all the salts that which is the most soluble in water and alcohol. It is not very soluble in ether. It forms long needle-shaped crystals, arranged in rosettes or plumuse tufts, or as large plates lying side by side.

The *sulphate* is not very soluble in water. It occurs under the microscope as small rectangular plates, or as large elongated needles.

I propose first of all examining some of the tests for strychnia, and their comparative values.

And the first I may mention is its intensely bitter taste, a test of extreme delicacy. A solution containing a grain in a gallon and a half of water is perceptibly bitter. The taste of residues is remarkably suggestive in medico-legal inquiries. The alkaloid itself I need scarcely say is very much more bitter than its salts.

The shape of the crystals vary. I do not think this is a matter of very much moment in toxicological researches, as we are almost certain to be able to prove its existence very satisfactorily by means of chemical tests, if we have enough of the material for microscopic examination. I may add, however, that the crystals sometimes assume the form of long rectangular prisms, at other times of octahedra, and occasionally of dodecahedra, the shape depending, as I have already mentioned, on the solvent employed.

But the colour tests are those upon which in medico-legal cases we principally rely. The best mode of carrying out the process is to place the strychnia or suspected matters on a clean white plate in a good light, take a drop of pure concentrated sulphuric acid upon the end of a glass rod, and thoroughly mix with the substance we are examining. Take care that the sulphuric acid is entirely free from nitric acid, as this would, as I shall point out directly, seriously interfere in some cases with the results. Then take on the point of a penknife a small quantity of either peroxide of manganese or lead, and place it by the side of the mixture on the plate; then with great caution, stir the acid so that it may come in contact with the smallest possible trace of the peroxide, and in this way the colour is certain to be developed. The great point to attend to is only to add in the first instance the smallest conceivable portion of the peroxide.

Now with respect to the reagents used, there are various substances recommended. The first of these is bichromate

of potash. I never employ it now, because I consider it so very uncertain. For, in the first place, not only do organic matters in the form of vegetable acids, or gum, or sugar, &c., hinder, or at any rate mask its action, but when even a trace of nitre, or common salt, or indeed any nitrate, or chloride, or a trace of tartar emetic is present, the reactions are seriously interfered with. I had occasion, a short time back, to examine a powder, which I found afterwards was a mixture of sugar and strychnia. I certainly should not like to have spoken positively as to the presence of the strychnia from my experiments with the bichromate and sulphuric acid, had I not made others with different reagents.

Then, again, the colour which is produced when you mix sulphuric acid and bichromate of potash is itself so intense that it is very likely to complicate results, and leave us in a state of some uncertainty. Now, of course it may be said, surely the black mixture of plumbic peroxide with sulphuric acid is far more likely to hide the colour than the red tint with the bichromate, but one finds in practice that this is not the case, and that it is far easier to see the play of colours even when mixed with a black powder than when we have to contend with dense shades of red. And, lastly, I am at a loss to understand why so many toxicologists recommend the bichromate of potash, when it is of all tests the least delicate. With both the plumbic and manganic peroxide I have been able, with care, to detect the 1-5,000th of a grain of strychnia, but the 1-3000th is the smallest quantity with which you can get an ordinarily safe result with potassic bichromate.

It is right, however, to say that nitrate of potash, to a certain extent, interferes with the action, when even peroxide of manganese is used, but neither common salt nor tartar emetic (which I have mentioned as interfering with the bichromate of potash) have any action, or are any hindrance to the employment of peroxide of manganese. I would even say that peroxide of lead is preferable to all, as nitrate of potash must be present in very great excess to interfere with its action. I have not a doubt that the reason why few toxicologists recommend these re-agents is the fear that the colour produced may, in a great measure, be hidden by the black powder, but after considerable experience I am convinced there is not the least fear of this being the case, unless (which is quite unnecessary) the oxide is added in large quantity.

And now what is the "modus operandi" of this test? It is a case without doubt of the action of *nascent oxygen*, that is of oxygen at the moment of being set free, upon the alkaloid. Dr. Letheby acting on this idea has proposed one of the most elegant modes with which we are acquainted of detecting the poison by submitting it to the oxygen evolved by means of the galvanic current. In this way the production of the colour is in our own hands. We can at once stop the action if we please by detaching the battery, and so stopping the evolution of the oxygen; secondly, it is free from every known source of fallacy; and, lastly, we have no extraneous tints of any kind to interfere with a perfect recognition of the colour. In a case of poisoning by strychnia referred to me some time back by Mr. Lewis, I used this test with highly satisfactory results.

There are still a few other chemical tests for strychnia to which I am desirous of directing attention, although I do not think they are in the first instance of much service in medico-legal enquiries, when we have so many important and delicate tests at our command, but it is certainly most desirable that they should be used, if possible, as confirmatory evidence, of which it is impossible to have too much when life and death are dependent on our evidence.

I will endeavour to give the reactions in what I consider the order of delicacy, an order the result of a very large number of experiments, and which in many respects differs from that given in most toxicological works.

1.—The most valuable of these tests is *Iodine*. The following is the best plan of carrying out the experiment:—

Place on a microscope glass a very small drop of an alcoholic solution of iodine, let it evaporate, *directly* it is dry add a drop of the strychnia solution, acidulated with acetic acid, to which is added a trace of sulphuric acid and a drop of spirits of wine. (I would say to see these reactions, a solution of a trace of strychnia in three drachms of acetic acid, one drachm of spirits of wine, and six drops of dilute sulphuric acid gives very good results.)

When it has dried spontaneously, examine under the microscope with a Nicol's prism and selenite, using no analyser, but merely a common eyepiece. The following characteristic figures will be seen.

(*a*) Small tufts, mostly circular, of acicular black crystals, as fine as needles.

(*b*) Myriads of minute dots of a somewhat triangular form, some being large and well defined. They are generally coloured, yellow, pink, and green.

(*c*) Large triangular crystals generally of a yellow or greenish colour, and composed of three parts radiating from a centre.

(*d*) A number of solid macled prisms, presenting here and there complementary tints of red and green.

(*e*) Solid rosette macles of four, five, and six sided prisms. These, however, were not so abundant unless the strychnia was added to the iodine solution when it had completely evaporated.

(*f*) Lastly, when the strychnia is in any quantity, large feathery and tubular plates of a colourless salt of strychnia not combined with iodine are apparent.

There are other ways in which the experiment may be made. The forms I have described are sometimes well displayed by dropping a mere fraction of a grain of strychnia on an alcoholic solution of iodine to which a trace of acetic acid has been added. There is another method by which I have obtained very good results ; namely, by touching a glass slide with a drop of acetic acid, then with a glass rod touch this with a solution of iodine so as to colour the liquid slightly yellow, and then add a mere trace of dry strychnia ; instantly a deep red brown colour appears, and this in a few minutes changes to orange yellow. Place over this a covering glass, and on examining it with a microscope, one or other or all of the several varieties of crystals I have described will be seen. If the acetic acid is added afterwards, myriads of minute acicular and somewhat macled crystals are generally developed. I consider the acetic acid should be added at the first as better results are in this way obtained. There is no difficulty by this means in detecting the 1-2500th of a grain.

2.—*Iodide of Potassium* produces an amber coloured precipitate, appearing under the microscope as minute triangular dots, or else as small prisms arranged in rosettes. Will detect 1-2000th of a grain.

3.—*Carbazotic acid* produces a pale yellow precipitate, appears under the microscope at first as minute needles serrated at the edges, or rosettes of minute serrated

crystals. After a time these form groups of acicular prisms branching off from each other like feathers, or arranged in radiated tufts. Will detect 1-2000th of a grain.

4.—*Chloride of gold.*—Pale yellow precipitate. Myriads of little rosettes, and nodules composed of small granules or of minute acicular crystals. After a time, and especially about the edges of the liquid, the nodules break up, and form needle-shaped and rectangular plates, or the nodules become covered with very minute spiculæ which radiate from them in all directions. Will detect the 1-1500th of a grain.

5.—*Chloride of Platinum.*—Nearly the same forms as described above, but the crystals composing the rosettes are not so well defined. The test I think is scarcely so delicate.

6.—*Bichloride of Mercury.*—White precipitate ; the crystals much the same as the two last, but larger and somewhat feathery, curving into each other, or else compact nodules of minute acicular prisms. Will detect 1-700th of a grain.

7.—*Perchloride of Iron.*—A yellow precipitate ; crystals are large octahedra. Will detect 1-100th of a grain.

8.—*Tannic Acid.*—White precipitate (which happens with nearly all alkaloids).

It is also precipitated by *bichromate of potash* (yellow) by *sulphocyanide of potassium* (white), by *perchloric acid* (white) ; by potash, soda, ammonia, and their carbonates ; but these precipitates I have not, as yet, fully examined, nor are the reactions of much importance.

I propose now examining the action of the poison on frogs, and its extreme delicacy, as a means of detecting its presence.

There is no test for strychnia so remarkably delicate, so absolutely certain, and so little liable to mistake, as its physiological effects on frogs. A solution where the colour tests may fail to give us satisfactory, or indeed any results, will produce, when injected under the skin of a frog, characteristic symptoms which are perfectly unmistakable. Dr. Marshall Hall, to whom we are indebted in the first instance for the test, recommends that the solution be merely applied to the skin ; but there can be no question, I think, that the injection of the solution under the skin

of the back, or into the abdominal cavity, will yield more marked effects in a far shorter time. Dr. Harley even asserts that on injecting 1-18,000th of a grain of the alkaloid into the lungs of a very small frog, tetanic convulsions occurred in nine and a half minutes, and death in two hours.

The following may be regarded as the ordinary course of symptoms. The frog, first of all after administration, remains for a short time perfectly quiet, and then succeeds a slight difficulty of breathing; which, after a varying time, dependent partly on the dose, considerably increases, the animal gasping as if for life; a slight tremor then becomes visible over the entire body, and this is particularly marked in the hinder legs. The animal will sometimes remain at perfect rest for a short interval, at other times it will give several energetic and convulsive leaps; and now follows the characteristic tetanic convulsions. Occasionally on their first appearance the animal will make a strange shriek, as if of pain, at the same time turning over and over from side to side. But this shriek, described by some as always occurring, may certainly be wanting; the spasms are not continuous, but may instantly be produced by touching the frog, or, indeed, by merely knocking the table with the finger. The pupils dilate during the spasms, but contract during the intervals. Very frequently the action assumes the form of "emprosthotonos," which, according to Dr. Harley, is more common in the frog than "opisthotonos," the reverse of this being the case in man.

The following are the details of some experiments on frogs, which I copy word for word from my note-book.

1. Injected 1-2,000th of a grain of strychnia under the skin of the back of a small frog. In thirty-six minutes it was slightly convulsed. In forty-eight minutes convulsions were very strong; could not walk. Recovered.

2. The same effects noted when injecting the same quantity into peritoneum; convulsions occurred in about twenty-five minutes. Recovered.

3. Injected 1-4,000th of a grain under the skin of the back; convulsed on touch in about forty-eight minutes.

4. The same effect and in about the same time, when injected into the peritoneum.

5. Put a frog and a toad into 500 grains of water, containing 1-2000th of a grain of strychnia. No effect.

6. Put into the mouth of the frog (a large one) a drop of a solution containing 1-2,000th of a grain. No effect.

7. After twenty-four minutes, put 1-500th of a grain into his mouth ; went off into a strong convulsion twenty-two and a half minutes afterwards, turned over on his back, and was convulsed for some hours. Recovered.

8. Gave toad by mouth 1-1,000th of a grain in two drops of water. It had a fit produced by touch in one hour and twenty-six minutes. Recovered.

9. Gave a toad 1-400th of a grain by mouth ; convulsions came on after 34 minutes. Recovered.

10. Gave a very large frog 1-300th of a grain by mouth ; was convulsed on touching him about four minutes after it had taken it ; danced on top of its toes, then laid on its side panting. Went off again and again upon repeating the touch. Recovered.

11. Gave 1-2,000th of a grain to a very small frog by mouth. Had convulsions on touch thirty-six minutes afterwards.

12. Gave a very large toad 1-2000th of a grain by peritoneal opening ; convulsions occurred in thirty minutes.

13. After three hours injected another 1-2000th of a grain into peritoneum. Died in forty-eight hours.

14. Gave 1-2,000th of a grain to a toad by mouth. Spasm in three hours.

15. Gave 1-1,000th to toad by injection under skin of back ; convulsions in two and a half minutes.

16. Gave 1-2,000th to frog by injection under skin of back ; convulsions in forty-five minutes.

17. Carefully injected 1-5,000th of a grain under skin of back of a very small frog. Convulsions in thirty-eight minutes.

18. Repeated experiment in another very small frog with 1-8,000th of a grain ; a decided convulsive tremor occurred in about forty minutes.

And now a few words upon the action of strychnia on the body. Although a poison which seemingly acts so energetically on nerves, its direct application to a nerve will produce no effect on that nerve, nor can a nerve con-

vey the poison into the system; for no poison can destroy life until it has, in some way or another, entered the blood, nor have the lymphatics even any power to carry the poison. And, moreover, it is not the nerves which are the actual seat of the disease. It is the spinal cord, and that only; the nerves merely acting as the telegraph wires to convey the effects of the disease from the spinal cord to the extreme limits of the body. All these facts are capable of direct proof by actual experiment. And thus, to sum it all up in Dr. Harley's words, to whom we are indebted for many valuable experiments on this subject, "the vessels convey the poison to the spinal cord, the spinal column becomes supercharged like a Leyden jar, and the nerves are the wires which distribute the shocks."

The exact mode in which strychnia destroys life may be regarded as yet as an unproved problem. It may be, as some have supposed, by *suffocation*, from the action of the respiratory muscles being interfered with from spasmodic action; or from a closure of the glottis from the same cause, inducing *asphyxia;* or, lastly, purely from *exhaustion*. To discuss these points, however, would lead me beyond the limit I have proposed to myself in these gleanings.

One other question suggests itself. How long after death is it possible to detect strychnia? A most important question, as those who follow the evidence given in toxicological cases will bear witness, and a question, moreover, which has received very different answers. My own firm conviction is that strychnia is not decomposed by contact with putrefying or decomposing animal or vegetable matter, or with substances in a state of active fermentation. Indeed, of so permanent a nature is it, that the blood, the secretion from the skin, and the urine, will all more or less yield traces of the poison in patients who are taking it in merely medicinal doses.

And now for an experiment which I believe will place beyond a doubt this point to which I am referring. At the time of the memorable trial of Palmer for poisoning Cook (1856), Dr. Letheby put half a grain of strychnia in a bottle with a dog's stomach and what appears to be pieces of human liver. This bottle had been entirely forgotten until one day when clearing out some old bottles I happened to come across it. With some diffi-

culty we made out the label. On that Dr. Letheby referred to his notes, and found a memorandum as follows :—

"May 4th, 1856, put 0·5 gr. of strychnia in wide-mouth bottle with dog's stomach, &c."

Clearly, then, this bottle had stood by above twelve years. I at once made an analysis, to see whether I could detect the strychnia ; and although I only operated on a quarter of the contents of the bottle, and which contained consequently not much more than 1-10th of a grain of strychnia, I had no difficulty, following the process proposed by Mr. Rodgers, in making out its presence by the characteristic colour tests. And this after it had stood for this long period in contact with decomposing animal tissues. Indeed, it seems (providentially, I think) that it is an organic compound that resists most means of decomposition ; and, to use Mr. Rodgers's own words, "Putrefaction, so far from interfering with the separation of the strychnine, greatly facilitates it." Mr. Rodgers has found it twelve months after interment. If, then, there is the slightest reliance to be placed in experiment, this truth is certain, that strychnine in contact with dead or living matters is left untouched—undecomposed ; and not merely so, but after having been mixed for months with strong mineral acids, it is left with all its properties as they originally existed. And if we fail in detecting it, if a considerable time has elapsed between death and its administration, it is not that it has been decomposed, but simply that it has been completely eliminated from the system. It is this absolute certainty that renders chemical science such a mighty aid to legal investigations, and so invaluable as a means not merely of convicting the guilty but of clearing the innocent ; for if strychnia causes death, only provided that sufficient time has not elapsed for it to be entirely eliminated, it is in the body, and the toxicologist should find it, no matter whether the examination is made immediately after death, or whether years have elapsed between the fatal result and the analysis.

And here these gleanings must close, to be resumed, if possible, at some future time.