Case of poisoning by arsenic from external application : transference of the poison from the skin to the stomach / by Alfred S. Taylor.

CASE OF POISONING BY ARSENIC

FROM

EXTERNAL APPLICATION;

TRANSFERENCE OF THE POISON FROM THE SKIN TO THE STOMACH.

By ALFRED S. TAYLOR, M.D., F.R.S.

In February, 1864, under the order of Secretary Sir George Grey, the following case was referred to me for investigation:

A girl æt. 9, the daughter of John Bootman, a farmer, at Wissett, near Halesworth, in Suffolk, died after a short illness, and without any medical attendance. The deceased was a daughter by a former wife, and resided with the father and stepmother. Charges of neglect and ill-treatment were made, and a strong suspicion arose among the neighbours that the child had been wilfully poisoned by the stepmother.

Mr. Haward, surgeon, of Halesworth, had been called in to see the child, but at too late a period to render assistance. The child was then dying. The evidence which he gave at the inquest comprises all that could be obtained of the medical history of the case. It was as follows:

"I know John Bootman and his wife, and have been their medical attendant. I never attended the deceased previously. On Saturday, February 14th, Bootman called at my surgery to consult me respecting his daughter, who had been unwell several days. I learned from him that the child

had suffered from lice in the head, and that to kill them he said he was afraid his wife had been employing an improper ointment: he thought she had used white precipitate. I said that 'If she had used only *that* it will do no harm, but if arsenic or any other poison had been applied the consequences might prove serious.' He did not state that the child was dangerously ill. I said 'If you think it necessary, I will go and see her at once.' He said he thought she was suffering from cold, and I prescribed some fever medicine, requesting him to send for me directly if the child became worse. He came again on Sunday, the 14th, and said the child was worse. I reached his house at three o'clock, and found the deceased child in a state of collapse. The extremities were cold; she was unconscious, and unable to swallow even liquids. My attention was directed to the state of the child's head; she appeared to have been suffering from porrigo, or scalled head. There was an ecchymosed spot on the forehead, and a discoloration also on the back of the neck. When I saw the deceased she was dying; it was impossible to do anything for her. From her symptoms she appeared to be sinking from the effects of some irritant poison. I made a post-mortem examination of the body on the Wednesday following, assisted by Mr. King. There was nothing remarkable in the external appearance of the body. The child was of average size, and well proportioned, and the body appeared to have had sufficient nourishment. The hair was matted by discharge, and there was a great accumulation of matter under the scalp. Heads of this character, if neglected, speedily get into a bad state. I have seen heads nearly as bad even in respectable families. There were no living lice on the head. There is no doubt that the head was in a neglected state, and showed great want of ordinary care and attention. The discoloration on the forehead and on the neck I was unable to account for. On examining the contents of the abdomen, the stomach and intestines were much inflamed, especially the duodenum, the mucous coat of which, as well as that of the stomach, was softer than usual. The mark on the forehead had nothing to do with the cause of death. The discoloration on the neck was probably caused by a mustard plaster which had been previously applied. My conclusion was that the child had died

from some irritant poison, probably arsenic, but whether taken by the mouth or by absorption through the skin, I could not say positively, but believe it to have been by the latter means. I should consider that some irritant poison had been absorbed or administered some days before death. I should imagine that when arsenic or other irritant poison had been absorbed through the skin, the pain would not be so severe and intense as if it had been taken into the stomach by the mouth. Arsenic in any form would be very improper treatment for such a state of scalp, or for any other external application."

The evidence of the father was to the following effect :— "Thursday, the 4th of February, was the first day that my attention was drawn to the head of the deceased. She was at that time pretty well excepting a slight cold. I found a great many lice upon the head. Nothing that I am aware of, by way of ointment or lotion, had then been put on the deceased's head. On Friday night, the 5th of February, I told my wife to do something to the child's head. I asked her if she had any precipitate powder, and she said 'Yes.' I afterwards ascertained that she had mixed arsenic and lard with it, and applied it to the head. I did not know there was any arsenic in the house. She said she took it from the top of the clock. I asked her how the arsenic came there, and she said it had been in the house before she came to my house. I did not see the arsenic, nor did I ask my wife for it; and I do not know of my own knowledge what was done with it. The deceased seemed pretty well on the Saturday and Sunday following,—the 6th and 7th of February. On Wednesday, the 10th, I found that she did not take her food as usual, and she looked very unwell. She was thirsty, and drank a good deal at times, and complained of a little pain in her body. I did not observe her particularly on Thursday, the 11th instant. I do not recollect noticing anything more as to the child's health until Friday evening, the 12th, when I asked her how she was, and she said 'Better.' On Saturday, the 13th, between eleven and twelve o'clock, I saw her lying on the bed. I then asked how she was, and she said she was very unwell. Her bowels had been moved, but she did not complain of any particular pain. My wife was

the only grown-up person that I know of with the deceased on Saturday. The eldest girl in the house was only eight years old. I remained with her about half an hour, and then I went to Mr. Haward, and got some medicine from him. I went home about five or six o'clock, and the deceased then appeared to be much in the same state as in the morning. I sat up with her all night. She was very restless, but quite sensible, and did not appear in pain. Her bowels were moved twice in the night. The motions were very loose. She dozed towards morning. She had gruel and a little brandy-and-water, and appeared to be warm and comfortable. When I awoke by her side, between seven and eight o'clock, she did not appear to speak so well. I asked her how she was, and she said 'I don't know.' I stayed with her for half an hour, and went off again to Mr. Haward about half-past eleven. I got home again about half-past two, and found the deceased unable to speak intelligibly. Mr. Haward came at three o'clock, and the deceased died about 5 p.m. (on Sunday, the 14th of February). She was dying when Mr. Haward came.

"On Wednesday night, the 10th, about 10 o'clock, I saw my wife put some ointment from a small box on the deceased's head. She rubbed it on with her finger on the back of the head. Then for the first time I observed that the skin of the deceased's head was broken. There was a good deal of matter oozing from it. The deceased complained that the ointment made it smart. My wife told me she had purchased the ointment from Mr. Reynolds, a druggist, of Halesworth, and that it was precipitate ointment. I never saw my wife beat the deceased. I heard the deceased complain of cramp in the legs on Friday night, the 12th, and also on the Saturday night following."

The stepmother, Sophia Bootman, was next examined; she described the circumstances under which the arsenic had been applied. Her evidence was as follows:—"I did not observe the state of the child's head until Thursday, February 4th. My husband pointed it out to me about ten days before the child died. On examination I found several sores, which were discharging. On Friday, the 5th, as I found she had a great many lice on the head, I took some precipitate powder,

which I had by me, and I took a little poison that lay on the top of the clock, and mixed the two together with pork lard, and made an ointment. They were both white powders. I put the ointment on the child's head, and rubbed it with my fingers all over the head. The quantity used was about the size of a walnut. I put all that I had of precipitate and arsenic into the pork lard. There was less than a teaspoonful of the powders, and about a teaspoonful of lard. The precipitate was bought at a druggist's. It had on it a printed label, with 'Precipitate: Poison,' printed on it. I got the other poison from the top of the clock. I found it there, in a piece of paper, when I first went to the house, four years ago. 'Poison' was written on the paper. It was a white powder; I did not feel it. (It was not labelled 'Arsenic.') I do not remember ever having used it for anything. At the time I mixed the two powders together, I did not know what the powder was which I took from the top of the clock. I read the word 'Poison' written upon it." In answer to the question, "If you did not know what the poison was composed of, for what reason did you put it on the child's head?" the witness said, "Because I thought they were both alike, and I thought it would have the same effect as the other—namely, to kill the lice. As soon as I took the powder out I threw the paper on the fire. This was about five o'clock in the evening. My husband asked me if I had done anything to the child's head. I told him I had used the precipitate powder and the poison off the clock. The deceased did not appear to be poorly till the Wednesday. That was the first day I observed signs of severe illness. I did not observe anything previously, except that she appeared to be suffering from a slight cold. I am quite sure I did not apply this ointment more than that once, and that was on Friday, February 5th. I afterwards used some other ointment, but none of my own making. (This was white precipitate ointment, obtained from a druggist's. It was applied to the head on Wednesday, the 10th.) The deceased showed no symptoms of illness until the Wednesday before her death. The deceased appeared to cough very much, her breath seemed bad, and she appeared very thirsty, which I thought proceeded from fever and cold. I observed no difficulty in swallowing. Up to that day she ate

her breakfast as usual. I mixed the powders in the wash-house, with an old knife, on a plate. I took the lard first, and put the powders on it, and mixed it up. I am quite sure I spilt none of it. I washed the plate directly, and I burnt the paper at once. I gave the child the medicine prescribed (some cough medicine from a druggist's) twice a day. She appeared on the Thursday much the same as she was on the Wednesday. She seemed better on the Friday, and got up and dressed herself. There was no looseness of the bowels. She did not complain of pain until the Saturday, when she seemed decidedly worse. She complained of belly-ache, and said she felt sick, but she did not vomit. She was purged twice. I had not given her any aperient medicine. I observed nothing more. There was no twitching or cramp. She said in the afternoon her feet were cramped. She sat up in the bed about an hour on the Saturday. She ate some gruel and drank a good deal of brandy-and-water. She seemed much the same in the afternoon, but about five o'clock she appeared worse. She could not take her tea. On Saturday we sat up with her; she seemed very restless, and got no sleep till the morning. I did not hear her complain of pain. She was taken with purging about midnight. It was constantly running from her. She was not at all convulsed. On the Sunday morning she was not so well, and faltered in her speech. She gradually sank from that time. I observed a place in the back of the neck; it was where I had laid a mustard plaster. I did so because she complained of a pain in the back of her neck. I put on the mustard plaster on the Thursday. I can't account for the mark on the forehead. I first observed that mark on the Sunday. She could move her head. I did not ask her how the mark came on her forehead. She got out of bed on the Saturday night, and she might have fallen down then. She was alone when she got out of bed on that occasion. It was about ten days before the child's death that I first observed the state of the head. My other children's heads have been in the same state, but they were not sore. When I put the ointment on the head I had no idea that it would do any harm. I put it on to kill the lice and do the child good."

Under the peculiar circumstances of this case, Mr. Haward, the medical attendant, declined to give a certificate of the cause of death until a chemical analysis of the viscera had been made. It was a serious question, whether, apart from the evidence elicited at the inquest, arsenic might not have been secretly given to this child by the mouth. The medico-legal problem for solution was, therefore—Could it be determined by a chemical analysis, with the other circumstances of the case, that arsenic had destroyed life by external or internal administration?

For the purpose of the inquiry the following articles and portions of the body were delivered to me, properly sealed and secured, at the Chemical laboratory, Guy's Hospital, on the 19th of February, 1864:—1. The stomach of deceased. 2. The intestines. 3. A portion of the liver. 4. A bottle containing four ounces of a brown liquid, said to be the contents of the stomach. 5. Two chip boxes, containing a white ointment. And 6. A portion of the scalp of the deceased.

Post-mortem appearances and Analysis.

The stomach and intestines.—The lining membrane of the stomach presented some inflammatory patches at the greater end. The coats were firm, not ulcerated or irritated in spots and streaks, as they commonly are where arsenic has been taken directly into this organ. This observation applies chiefly to the lining membrane of the stomach, on which arsenic usually spends its action. The surface of the lining membrane, examined by a magnifying glass, presented no appearance of arsenic or other mineral poison having been in contact with it. The upper part of the small intestines was most inflamed. No blood or undue effusion of mucus was found. This is most commonly met with when arsenic has been in direct contact with the stomach and bowels. The liver was soft and lighter in colour than usual, but its condition calls for no particular remark in reference to the cause of death. The contents of the stomach were slightly acid; they were of a brownish colour, from the presence of some bilious matter, and contained no blood (as in direct poisoning by arsenic), and only the usual amount of mucus. After four

days, by repeated washing, they deposited no mineral sediment, and no trace of solid arsenic could be discovered when they were examined by the microscope. The only substances found by a microscopic examination were portions of digested animal and vegetable food, oil-globules, and starch-granules. These different parts of the deceased's body were submitted to the usual tests and processes for the detection of arsenic, and the result was that slight traces of arsenic were found in four ounces of liver, as well as in the stomach and intestines. There were also similar slight traces of arsenic in the *contents of the stomach,* apparently in intimate combination with the mucus.

The scalp of the deceased was found to contain a large quantity of arsenic, combined with a quantity of mercury (white precipitate), which had been applied to it in the form of an ointment. The quantity of arsenic in the portion of scalp sent was estimated at about two or three grains. The two boxes of ointment consisted simply of white precipitate mixed with the usual ingredient (lard). There was no arsenic in either sample.

From the results of my analysis, and from a perusal of the depositions forwarded to me by the coroner, as well as from the information communicated by Mr. Haward, I am of opinion—

First. That this child died from the effects of arsenic, applied externally and absorbed into the system.

Secondly. The condition of the viscera in their appearances, the nature of their contents, and the minute imponderable quantity of arsenic present in them, is not consistent with the supposition that arsenic had been given in a solid form, or in a liquid form by the mouth, but is quite consistent with the absorption of the poison through the skin of the scalp and its diffusion by the blood, leading to its deposition in small quantities in the parts in which it was found.

In answer to some questions put by the coroner and jury at the adjourned inquest, it was stated that, when arsenic operated as a poison by external application, a long interval sometimes elapsed before the usual symptoms of poisoning appeared, and death did not take place until after several days. In this case there had been, according to the evidence, only one application

of arsenic, namely, on Friday, February 5th, and no sign of illness appeared until Wednesday, the 10th. There was then loss of appetite and thirst. The absence of vomiting in this case, and the slight purging the day before death, as well as slight pain throughout, were consistent with the view that arsenic had been applied externally and absorbed, and were not consistent with the ordinary mode of administration by the mouth. When swallowed, the poison produces speedily nausea, vomiting, purging and severe pain, these symptoms continuing so long as any of the poison remains in the stomach and bowels. Traces of arsenic might be found in the mucous fluids of the stomach, although the poison had not been administered by the mouth; but, whether administered internally or applied externally, traces of arsenic would be generally found in the liver and other organs, provided the person had not survived sufficiently long for the whole of the poison to be thrown off or eliminated from the body.

Upon this evidence the coroner, Mr. Gross, of Ipswich, directed the jury—That if they were convinced that the step-mother had used the ointment for an improper purpose, it would be their duty to bring in a verdict of manslaughter; but if they thought that she had prepared the ointment, as she said, to do the child good, not knowing what the effect of such treatment would be, however culpable and reprehensible the neglect she may have shown to the poor child, it would be their duty to return a verdict that the deceased had died from arsenical poison ignorantly applied. *Verdict:* That Eliza Bootman had died from arsenical poisoning, through absorption, from an ointment ignorantly applied.

This case, in the slow access of the symptoms, their comparatively mild character, the absence of some of the most prominent (vomiting and gastric pain), and in the long interval between the application of the poison and death (*ten days*), resembles other cases of poisoning by the external use of arsenic. It will be observed, too, that there was in this case, as in others, inflammation affecting the stomach and bowels, pointing to the specific action of this poison on the mucous membrane of the alimentary canal.

In reference to the chemical analysis, it may be observed

that only minute traces of arsenic could be obtained by Reinsch's process from the liver, stomach, and intestines. A sufficient deposit was, however, procured to yield in each case a sublimate of octahedral crystals. It is worthy of remark that no mercury was found in the tissues or in the mucous fluids. The great insolubility of white precipitate may probably account for this.

The portion of diseased scalp was treated by the following process to separate arsenic from mercury, both of these metals having been detected in it:—The scalp was cut up, and, after some hours' digestion in two drachms of pure and concentrated hydrochloric acid, was submitted to distillation in a sand bath. This was carried to dryness. The acid liquid in the retort yielded arsenic by the application of Reinsch's process, as well as by that of Marsh. Arsenic was procured from it in the state of metal, and also in the form of arsenious and arsenic acids. The distillate, when so diluted, readily gave a precipitate of sulphide of arsenic with a current of sulphuretted hydrogen, and from the weight of sulphide obtained, it was calculated that the small portion of scalp sent contained from two to three grains of arsenic. The residue in the retort was diluted with water, and treated with pure copper, whereby a considerable deposit of mercury was obtained. Sublimates of the metal in the usual globular form were readily procured by heating the copper in tubes. It was observed that the whole of the arsenic had been removed from the scalp by this process of distillation.

One of the results obtained by this chemical analysis requires a remark. It will be observed that traces of arsenic were detected in the mucous fluids of the stomach of the deceased. Some years ago this would probably have been regarded as a positive proof that, whether applied externally or not, arsenic must have been swallowed by this child. Such an inference, however, is not justified by recent experience. It has been incontestably proved by experiment that the mucous surface of the stomach and bowels is a medium for the elimination of poisons; and, unless this fact is borne in mind by medical witnesses, the greatest errors may be committed, and innocent persons condemned on erroneous charges. In the number of these 'Reports' for October, 1860 (3rd series,

vol. vi, p. 398,) will be found a record of the results of some experiments performed by Dr. Pavy and myself, in reference to the transference of poisons by absorption. The facts there stated clearly show that both arsenic and antimony may find their way into the mucous fluids of the stomach and intestines from the blood, and that the metals may be found in these organs although they have not been administered or taken by the mouth. In such cases the poison is found only in traces, without admixture of blood, flakes of mucus, or false membrane, such as are found in acute poisoning with arsenic. In reference to cases of chronic poisoning in small doses, the diagnosis is not so easy, and traces only of arsenic might be found under similar circumstances in the fluids of the stomach and bowels. Chemical evidence alone would not suffice to solve the question. A medical jurist must here look to symptoms and the general history of a case to enable him to come to a correct conclusion. In chronic poisoning by arsenic, gastric and alvine irritation, manifested by vomiting, purging and pain after each repetition of the dose of poison, will be present; and the occurrence of these symptoms with the detection of arsenic in the stomach and bowels would at once point to administration by the mouth. Such symptoms were absent in the case of the girl Bootman, and those which were really observed, were only in accordance with the effects of arsenic operating by absorption through the skin. The symptoms may be of a more severe character than those above described; still, unless arsenic, either in substance or in very large quantity, is found in the contents of the stomach and bowels, they may be considered as consistent with poisoning by external application. Among the early instances of life being destroyed by arsenic under these circumstances I may refer to the following, which occurred before it had been demonstrated that arsenic was absorbed into the blood, and deposited in the organs of the body. On the 15th November, 1827, M. Fristo was required to examine the bodies of two children who had died suddenly. Externally, some ecchymoses were apparent in the bodies, but the heads of both presented large ulcerated surfaces, covered with a greasy matter of a yellowish-red colour. The mother informed him that on the 12th November a person had undertaken to cure her three

children of tinea capitis, with which they were affected. She allowed him to apply an ointment, and some hours after the application the children suffered from convulsions and severe pain in the bowels. The youngest of the three died after violent vomiting and convulsions. The two others, a girl æt. 11, and a boy æt. 9, died with similar symptoms on the 14th, two days after the application. The principal post-mortem appearances in the girl were infiltration and thickening of the cellular tissue of the scalp; the membranes and substance of the brain were much injected, and serum was effused in the ventricles. The stomach was inflamed and presented ecchymosed patches, and a similar appearance was met with in the duodenum and other parts of the small intestines. In the boy the appearances were similar. M. Fristo examined a portion of the scalp, and separated from it a quantity of arsenious acid in powder. ('Annales d'Hygiène,' 1830, vol. ii, p. 441.) There was no doubt that the deaths of these children were caused by the application of arsenic in the ointment to an ulcerated surface of skin. No attempt was made to trace the poison to the tissues.

Dr. M'Cready, of New York, met with a case in which a child two years of age, affected with porrigo favosa, died from the effects of the external application of arsenic. A woman mixed half an ounce of arsenic with gin, and rubbed this mixture well into the heads of several of her children affected with this disease. It was followed by redness and swelling of the face. In the child above mentioned it produced diarrhœa and tenesmus, with paralysis of the lower extremities, but no signs of local inflammation. ('American Journal of Medical Sciences,' 1851, p. 259.)

A trial took place at the Chester Assizes in 1844, in which a man, pretending to cure cancer, was charged with the death of a female, by the application of an arsenical plaster, as it was alleged, to the breast. The woman died in a fortnight. No satisfactory evidence was obtained of the symptoms during life, except that there had been vomiting, and the accused had taken care to remove and destroy the plaster so soon as serious symptoms began to appear; hence there was no direct chemical evidence of the nature of the substance which he employed. Dr. Brett, of Liverpool, detected absorbed arsenic

in the substance of the stomach, liver, and spleen; the whole quantity detected was less than a quarter of a grain. The gullet, stomach, and intestines, were found extensively inflamed. In January, 1845, a man died apparently from the effects of arsenic absorbed through the skin of the arm. He was engaged in the manufacture of candles, to which arsenic was added in large proportion, and it was supposed that an abrasion of the skin had facilitated the absorption of the poison. The medical opinion given at the inquest was decidedly that the deceased had died from the effects of arsenic thus introduced into the system.

M. Flandin states that on one occasion he examined the viscera of a woman who had been killed by the application of an arsenical powder for the cure of a scirrhous breast. The arsenic (absorbed) was discovered in various parts of the body, but especially in the liver, which contained as much as is usually found when the poison has been swallowed. The quantity was greater than that separated from all the other organs together. This case presents many points of interest. The poison did not begin to produce its well-marked effects until after the lapse of about ten hours. Death took place in about six days, and the urine was suppressed throughout. The mucous membrane of the stomach and intestines was in its natural state; in the duodenum it was slightly swollen or thickened. (Flandin, i, 502.) In another case of a similar kind he found the arsenic only in the breast to which the ointment had been applied. The powder used by quacks as an application to scirrhous breasts is commonly a compound of arsenious acid, realgar (red arsenic), and oxide of iron. In this instance it was formed of seventy-five parts of the first-mentioned substance and twenty-five parts of a mixture of the last two. The quack stated that he did not apply more than four or five grains.

Cancer-quacks have furnished the greater proportion of the experience which we have regarding poisoning by arsenic applied to diseased surfaces. The following cases have fallen under the notice of MM. Bayard and Chevallier:—In November 1844, a lady consulted a physician respecting a tumour, about the size of a hen's egg, in her right breast. An operation for its removal was recommended, but she declined

this advice, and nothing more was heard of her until the 28th November, when it was found that she was labouring under symptoms of poisoning with arsenic. It seems that on the 22nd of November a man professing to cure cancer made several incisions in her right breast, and introduced into these a reddish-coloured powder, the parts being subsequently covered with an adhesive plaster.

In a few hours the patient had a shivering fit, and felt generally unwell. At night severe febrile symptoms set in, with copious and frequent vomiting of a greenish-coloured bilious liquid. On the 23rd the vomiting continued, bloody stools were passed, the febrile symptoms were unabated, and there was a tendency to drowsiness. These symptoms continued more or less until the 28th, when there was difficulty of breathing, great prostration of strength, pain in the chest, throat, and abdomen, with delirium. The eyes were strongly injected, and there was disturbed vision. The vomiting had ceased, there was no purging, and the abdomen was not painful on pressure. The intellect was not always clear. On the 29th she passed a restless night; there was no vomiting, but much purging of liquid stools. The pulse was 132, and small. Petechial spots appeared over the skin of the trunk and thighs. Very little urine was passed, and there was no perspiration. She died at 6 p.m., *seven days* after the application of the powder to the breast. The nature of this powder was not then known.

The urine passed on the 29th was analysed by M. Flandin, but he obtained only very doubtful traces of the presence of arsenic. On inspection there was no appearance of acute inflammation in the stomach and bowels. The mucous membrane of the large intestines alone presented an inflammatory redness. The liver, spleen, pancreas, and kidneys, were congested. The heart was soft and flabby. There was an ecchymosed appearance in the tissue of the right ventricle, and the lining membrane was very red and friable, an appearance which has been since observed by Dr. Wilks in a case of acute arsenical poisoning. The blood was liquid and black. On the whole, there were no appearances in the body sufficient to account for rapid death with the symptoms observed and described.

A *chemical analysis* was made by MM. Chevallier, Ollivier, and Flandin. Arsenic was detected by Marsh's process in three ounces of the diseased breast. Two separate analyses of the liver were made, the one of about three ounces and the other of about a pound, but no arsenic was detected in this organ. Six ounces of the fæcal matter in the intestines yielded no arsenic, and the same negative results were obtained from six ounces of urine, a pound of blood, four ounces of the kidney, two ounces of the lungs, and from eight ounces of the stomach and intestines. A portion of the red powder applied to the breast was examined and found to contain 75 per cent. of arsenious acid, and in the substance of the plaster which had been applied to the breast, arsenic was detected. ('Annales d'Hygiène,' 1846, vol. ii, p. 131.)

The remarkable feature of this analysis is the total absence of any evidence of the absorption and deposition of arsenic in the tissues. A quantity of the poison must have been used in order that any should have been found in the breast after the lapse of seven days; but this period of time would not account for its entire removal by elimination, even supposing that no arsenic had remained in the breast. The skill of the operators cannot be questioned, for they are well known as experienced experts; but it is probable that the process which they pursued—the method of carbonization by sulphuric acid—is not well adapted to the detection of minute traces of this poison in the organs. Even the urine examined on the day of her death by M. Flandin, gave no certain indications of the presence of arsenic, a fact which would lead to the conclusion that the poison was neither eliminated nor deposited; yet it is clear that it must have been absorbed, or the woman would not have died. In contrasting the results obtained by Dr. Brett, it will be perceived that, although in Dr. Brett's case the woman did not die until a fortnight after the application of the plaster, arsenic was found in the liver, spleen, and substance of the stomach.

MM. Bayard and Chevallier have reported another case which proved fatal in *five* days, in which an arsenical plaster had been applied to the breast of a woman. It seems that in this case no symptoms appeared until after the lapse of twelve hours. The patient then suffered from nausea, vomiting,

and bloody stools. These were followed on the next day by a burning heat in the throat, great thirst, and delirium. The symptoms continued more or less for five days, when the patient died. The affair was kept concealed, and the body was buried, but, from some rumour respecting the death, it was exhumed nineteen days after interment. No other history of symptoms could be obtained than that above given, as the deceased was not attended by a medical man. The inspection of the body was made under some disadvantages, but the principal appearances found were as follows:—The cavities of the heart contained dark-coloured blood; the heart itself was healthy, and the lining membrane natural. The liver, spleen, and kidneys, presented nothing unusual. On removing the intestines, there was a perforation of the jejunum, from which a lumbricus escaped. The stomach contained a bilious mucus. The mucous membrane was quite natural, and presented no appearance of inflammation. The lining membrane of the duodenum had a reddish tint, and the mucous fluid which covered it was slightly tinged with blood. The other portions of the intestinal canal had undergone no change. A part of the breast to which the plaster had been applied was removed.

The *analysis* was made by MM. Flandin, Bayard, and Chevallier, with the following results:—Two and a half ounces of the diseased breast, examined by Marsh's process, yielded arsenic. The linen rags which covered the breast contained arsenic. The liver was examined by the processes of Marsh and Reinsch, and arsenic was detected in each experiment. The heart, spleen, and kidneys, gave similar results. Other analyses were also made of the duodenum and a portion of the jejunum, of the stomach and its contents, of the liquid of the pericardium, the liquid of the abdomen, and the blood taken from the heart and large blood-vessels. These different liquids gave metallic deposits resembling those of arsenic, but too minute for a verification of their arsenical nature. A portion of the plaster which had been applied to the breast was tested, and arsenic was obtained from it. The powder which had been spread on the plaster, was found to be a mixture of arsenious acid, sulphide of arsenic, and red oxide of iron.

From these results, taken in connection with the symptoms under which deceased died, five days after the application of

the plaster to the breast, the reporters came to the conclusion that she had died from the effects of arsenic absorbed into the system. ('Annales d'Hygiène,' 1864, vol. ii, p. 152.)

These two cases present singular pathological and chemical differences. In the first the symptoms came on early, and were of a very severe character, the arsenic having been applied to wounds made in the breast. Death did not take place until the seventh day, and, although the poison was most favorably placed for absorption, no absorbed poison was detected in the dead body. In the second case the plaster was applied over a comparatively small surface, which had been previously scarified. There were no symptoms for twelve hours, they then continued unabated until the fifth day, when death took place. On analysis absorbed arsenic was found in all the organs, and even traces, as if from mucous elimination, in the stomach and intestines. The first case must be regarded as completely exceptional in its results. As a rule, we may always expect to find in a case in which arsenic has destroyed life by absorption through the diseased or wounded skin, some portion of the poison, however small, in one or more of the organs. The case of Bootman, which has been here reported and made the basis of these observations, will show that, even when arsenic is detected in the mucous fluids of the alimentary canal, due allowance must be made for its being a mere result of mucous elimination. Unless other circumstances are strongly adverse to this conclusion, a practitioner will not be justified in regarding the presence of *traces* of poison in the stomach, as a necessary proof of the introduction of the poison by the mouth.