

Thesis for the M.D. degree.

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Subject.
Plomaine Poisoning.

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"Thesis."

Feb. 24th 1894.

Stomach Poisoning.

One hundred and three cases. Two deaths.

Symptoms, Postmortem signs, Treatment, and the Analyst's report.

During my period of four years assistantship to Dr. Owen Williams, of Bury Port, South Wales, I had the opportunity of witnessing the different symptoms and postmortem appearances of a remarkable outbreak of Stomach poisoning which occurred at Bury Port in April 1893.

I may here mention that the weather in April 1893, as well as during the whole summer, was intensely hot and moist, which considerably favoured the development of Stomach poisons in animal and vegetable matter.

On Tuesday the 25th April 1893, a local butcher, of the name of Alfred Deards, sold a quantity of brawn to several of the inhabitants of Bury Port. It appears that the brawn was made of cow's heads, sheep's heads, a calf's head and some tongues; and on Tuesday and Wednesday the 25th & 26th April 1893 Mr. Deards placed it in his cart and hawked it about in the streets.

It appeared according to the evidence of those who had partaken of it to be a very tasty preparation, and the butcher had no difficulty in disposing of most of it at the time.

All the persons who partook of the brawn were subsequently taken ill, some slightly and some severely, and two of those attacked died.

A period of incubation, usually from eight to thirty-six hours, preceded the illness. In many cases the first symptoms occurred suddenly and unexpectedly; but, in some cases, there were observed a feeling of languor, loss of appetite, nausea and colicky pains in the bowels. It was usually not long before pain in the belly, purging and vomiting came on, purging being of more certain occurrence than the vomiting. The pain was in some cases very severe, producing faintness and clammy sweats. In all the cases the stools were very offensive, of dark colour and watery.

Muscular debility was present in all the cases. Severe headache was a common and early symptom.

Pains in the back and limbs were prominent in the majority of the cases. The tongue was dry, thickly coated, red at the tip and edges. Thirst, often intense and distressing was a marked symptom. Severe chills occurred, and the temperature in some cases rising 101° , 102° and 103° .

The pulse in the height of the illness became quick, varying from 100 to 120. A sense of tingling in the lower extremities was present in a few cases. The urine was scanty and loaded with urates. Those who partook most of the brawn were the ones most severely affected, except one of the two fatal cases.

All the sufferers, manifesting symptoms in all respects identical, except in degree, had eaten portions of the same piece of brawn. In some families, six, eight, and ten were affected; and only those who had partaken of the brawn were subsequently taken ill, the others who had abstained were not affected. We were thus able to attribute the symptoms to a common cause - viz the brawn. Pork-brawn is, or should be the head or the head and feet well boiled down; and the cooking is generally so thorough as to destroy the genus of animal disease. When toxic effects follow the ingestion of brawn, it is therefore reasonable to infer that it is due to the meat having undergone incipient putrefaction. In two days one hundred and three cases were under treatment. Besides these there were several others slightly affected but did not seek medical assistance. In the two fatal cases, death was preceded by collapse, and the debility of convalescence in the most severe cases was protracted to several weeks.

We suspected poisoning from the following conditions - that the symptoms appeared suddenly, while the persons were in good health, - that the symptoms appeared after a meal, - and that several persons partook of the same brawn and all suffered from similar symptoms.

Case. I.
R.W. age. 50.

On Wednesday morning the 26th April 1893, the husband of R.W. came to the surgery for a bottle of medicine for his wife, whom he said was suffering from sickness and colic. The usual stomachic mixture was prescribed. Two hours later my principal Dr Williams was summoned to see her, he arrived there and found her suffering from sickness, pains in the stomach and bowels, accompanied with severe diarrhoea. She said that she was seized with severe shiverings about 11 p.m. the previous night - followed in about two hours by sickness, intense pain in the stomach and bowels with profuse diarrhoea. Dr Williams upon inquiring the cause ascertained that she had partaken for dinner and tea the previous day of some brawn which she bought at her door from Deards the butcher. She had also partaken of some shrimps. All the family including her husband and six children also partook of the brawn but none of them had partaken of shrimps except Mrs R.W. I may here state that none of the family showed any signs of poisoning at 11 a.m, when Dr Williams was first summoned although four of them admitted being out of sorts.

Dr Williams diagnosed the case as Gastroenteritis due to some poisonous irritant.

The symptoms were violent sickness, colicky pains in the stomach and bowels with

incessant purging, headache, thirst, tongue dry, thickly coated with a brownish fur, & glazed at the tip and edges. The vomited matter consisted of a bilious looking watery fluid. Temperature 102.5° , pulse 110, respiration quick, pupils dilated, extreme tenderness over the stomach and bowels, very anxious appearance and very prostrated. An effervescent mixture of Bismuth, Sod. bicarb, Acid. Hydroc. dil, Spt: Chloroform: &c was given with Morphia to ease the pain. A few doses of Mag. Sulph were also given to aid nature. Salol was given as an internal antiseptic every four hours. Counter-irritation to the stomach and bowels. Stimulants were freely given, Brandy and Soda water; Milk and Soda water, beef-tea, arrowroot and water were ordered in small quantities at short intervals.

April 26th. At 5 pm. I was summoned to see her and found her rather worse, there was no abatement of the symptoms, temperature 103° , pulse 115, vomiting and purging unrestrainable. She could retain nothing in the stomach. The pain continued very severe and morphia was injected subcutaneously, and ice given by the mouth.

April 26th. At 8 pm. I was sent for again with a message that the whole family had been poisoned. On my arrival I found the husband and and six children in their beds, five sons, their ages varying from 4 to 25 years, and one girl aged 7 years. I found them suffering from great pain, rolling about their beds,

with symptoms identical in all respects, except in degree, with Mrs R.W. One of the sons was very delirious and his pupils were widely dilated. As none of the children had partaken of the shrimps it was quite evident that the brawn contained the poison. Moreover, the general symptoms which are usually present in poisoning by shellfish were absent, viz - swelling of the eyelids and face, profuse secretion at the eyes and nose, heat and itching of the skin followed by an erythematous rash. Mrs R.W. had partaken twice of the brawn the same day while the rest of the family only partook of it once; the symptoms in her case developed sixteen hours before the rest of the family. A similar mixture was prescribed but modified according to the age of the children, no morphia was given to the younger children. Mrs R.W. Condition at 8 p.m. was very much the same as on the previous visit, the pain however had diminished a little, but, the vomiting and purging remained very obstinate. Temperature 103° pulse 120, tongue, very dry and coated.

Thursday, 27th April, 9 a.m. Patient showed very little improvement, she had had short snaps of sleep during the night, the vomiting and diarrhoea had not ceased, the colicky pains in the stomach and bowels were slightly less but continued to recur at short intervals. The stools were dark green, watery and exceedingly offensive. Temperature 102.5°

Pulse 110, tongue very dry with a brownish fur, severe headache and pains in the calves, she was able to retain a little arrowroot and water, but everything else remained but a very short time in the stomach.

Thursday 27. April. 8. pm. Condition of patient very much the same, Temperature 102°, pulse 105, Pupils dilated, tongue very dry, she had recurrent attacks of griping pain, great prostration. The urine was drawn off with the catheter and found slightly albuminous.

Friday 28. April. 7. am. No abatement of the symptoms, she was very restless and prostrate, great tenderness over the stomach and bowels, vomiting and purging continued, temperature 101°, pulse 100, slightly compressible and for the first time slightly irregular. Examination of the bases of the lungs showed a little passive congestion.

Friday 28. April. 6. pm. Condition rather worse, temperature 99°, pulse 85, compressible and irregular. Stimulants were freely given but failed to give any relief.

Sat^y 29. April. 9. am. She was evidently much worse, breathing very rapid and irregular, the surface of the body was cold, the skin cold and covered with clammy sweat, her eyes were sunken and the cheeks hollow, lips and nails were livid, Pupils dilated, tongue brown and dry like a chip, temperature 96°, pulse very small, irregular and hardly perceptible at times. The stimulants which were being regularly administered - brandy and ammonia - with subcutaneous injections

of ether, seemed to have little effect. At 11. am she was gradually sinking, temperature 95°, pulse imperceptible. She died in this state of collapse at 11.30. am. Sat. 27. Apl. She was perfectly sensible up to the morning of her death. Under treatment, she never showed any decided signs of improvement.

Case II. On Wednesday 26th April: 93 at 8.30. p.m. I was called W.E. age. 60 years. to see a carpenter W.E. whose complaint was similar to R.W. viz. symptoms of poisoning. He partook of the brawn was a small slice which the butcher gave him in the street to taste about 12 o'clock on Tuesday the 25th April. The first symptoms appeared about 6. p.m. on Wednesday, the 26th April, thirty hours after partaking of the brawn. He suffered from severe sickness and diarrhoea, the diarrhoeal discharges were exceedingly offensive and quite unrestrainable, accompanied by severe griping pains in the stomach and bowels quickly producing prostration and cold sweats, there was great tenderness over the abdomen, headache, thirst, tongue dry and coated, tingling in the legs, pulse 110, temperature 101.5°. The same mixture was prescribed in this case, with a few fair doses of Mag: Sulph. at the commencement, followed by Salol 5. grs. every four hours. He was placed upon the same diet as R.W.

Thursday. 27. Apl. 9.30. am. Patient's condition was rather worse, no abatement of the symptoms, temperature 103°, pulse 120, tongue drier and thickly coated, slight delirium during the night.

Thursday 27. Apl. 8.30. pm. No marked improvement in the symptoms, slight delirium and great prostration.

Friday 28. Apl. 9.30. am. Patient felt rather better, during the night the vomiting ceased, but the purging continued much as before. He now began to retain the nutrients which were given, and there were temporary signs of rallying. The griping pain was less frequent. He slept a little during the night; pulse 115, temperature 102°.

Friday 28. Apl. 8.30. pm. The sickness returned and the pain became more severe, temperature 103.4°, pulse 120. He was very restless and more delirious. A slight cough developed but no trace of pneumonia could be detected. No albumen in the urine. Sulphonal gr. XXV. was given to quiet the delirium.

Sat^y 29. Apl. 9.30. am. The vomiting and purging continued, and small streaks of blood were noticed in the vomited fluid. Temperature 102.6°, pulse 115. He was very restless and delirious all night, but slept from six to eight a.m. Very faint crepitation was detected at the base of the right lung, slight cough, but no rusty spit.

Sat. 29. Apl. 8. pm. Patient very prostrated and delirious. Temperature ¹⁰³ pulse 120. Sulphonal gr. XXX. was given.

Sun. 30. Apl. 9.30. am. He slept off and on after the Sulphonal but during the intervals he was very delirious. Temperature 101° pulse 104. The pain, sickness and diarrhoea continued much as before. No albumen could be detected in the urine.

Sun. 30. Apr. 8. pm. No improvement in the patient's condition, no further increase of crepitation, no rusty spit. Temperature 100° , pulse 95, the vomiting ceased, but the diarrhoea continued, the stools being passed unconsciously.

Mon: 1st May. 9.30. am. & 8. pm. Patient delirious, very prostrated, some streaks of blood in the stools, tongue brown and dry like a chip, evening temperature 99° pulse 85, pupils more dilated than they were before.

Tues. 2nd May. 9.30. am. Patient collapsed, surface of body and face pale and pinched, and covered with cold sweat; pulse irregular, respiration slow and shallow, heart's action slow and almost inaudible, temperature 97° . He died at 1.30. pm. on 2nd May. 93. D.E. had been very much addicted to drink of late which probably accounted for the delirium present in his case.

Post-mortem.

Case I.

On Sunday, 30th Apr. at 4. pm. a post-mortem examination was made on the body of R.W. The external surface of the body presented a pale and pinched appearance. The condition of the blood was very fluid. The right side of the heart was partly full of blood, the left side almost empty, the pulmonary arteries and lungs were engorged; systemic veins full of blood, systemic arteries empty. The bases of the lungs presented signs of passive congestion, also the kidneys. The most marked changes were discovered in the stomach and bowels. The stomach contained

about 3 or 4 Oz of yellowish gruelly fluid, the intestines contained dark coloured fluid which was extremely offensive. The mucous membrane of the stomach and intestines was softened and opaque, and in a highly inflamed condition with numerous petechiae which were more marked in the stomach, almost having the appearance of ulcers.

Case II. Postmortem examination on the body of D. E. The general appearance of the body externally and internally presented the same characters as in case R. W. The mucous membrane of the stomach and intestines was much more inflamed than in Case I, small extravasations of blood were visible all over the mucous surface of the stomach, and the greater portion of the bowels. Brain congested. There were signs of a small patch of pneumonia at the base of the right lung.

Samples of the brawn, as well as the stomach and intestines of the two fatal cases were forwarded in jars to the county analyst - Mr. William Morgan of Swansea. He failed to find any indication of any metallic irritant. He, however, discovered an enormous quantity of stomachines both in the viscera and in the brawn. They were of a crystalline character and he said they belonged to a class of chemical compounds known as amides.

Of the 103 cases which came under our notice two proved fatal. All the other cases recovered, some very quickly, some very slowly and a few were confined to their beds for four and six weeks. A great number suffered from dyspepsia for a considerable time, and diarrhoea alternating with constipation remained for months in a few.

The symptoms of ptomaine poisoning were those of Choleraic Diarrhoea or English Cholera. The sudden onset of the symptoms was consistent with English Cholera, but the sudden disappearance of the symptoms was not consistent with English Cholera, neither were there any cases of English Cholera before nor after the outbreak. Choleraic Diarrhoea most frequently attacks children, and is hardly ever fatal in adults. The greater number of those attacked in this outbreak were adults.

According to W^r H. G. Sutton, in his lectures on pathology, the mucous membrane of the stomach and intestines in cases of death from English Cholera in the stage of collapse presents an anæmic appearance. In these two cases death was preceded by collapse, but the mucous membrane of the stomach and intestines presented a highly inflamed appearance.

It will be seen from the account of the two fatal cases that the poison was a very virulent one, producing death in four days in one, and in seven days in the other. Neither case showed

any marked improvement under treatment. The same treatment was carried out in the most severe cases. Besides the two fatal ones, there were nine very serious cases, one family in particular - viz. the mother, son and daughter, the three were in a very critical condition for days. I believe they would have died but for the fact that they were able to retain some of the nutrients from the commencement. Being ignorant of the nature of the poison it was difficult to apply any special treatment. I could not detect any special symptoms which would lead one to suspect the presence of any of the metallic poisons. I was shown a piece of the brown on the second day, and it undoubtedly showed signs of putrefaction. Under the circumstances, the treatment was carried out on general principles. In those cases where there was no sickness an emetic was given. Mag. Sulp. was given at the commencement to aid nature in diluting and expelling the poisonous products from the alimentary canal. Salol in 5gr. doses was afterwards used to help to bring about an aseptic condition of the stomach and bowels.

Nutrients and brandy were administered in small quantities at short intervals to stimulate the patient over it.

Hot applications to the body and feet being also applied.

The question is, how did the brawn become poisonous. Alfred Seards had the reputation of being one of the cleanest-butchers in the town. His meat-shop was always well whitewashed and well ventilated. There was nothing to show that the beasts which he slaughtered were otherwise than apparently healthy; for no one who bought meat of him the previous week suffered any ill-effects after eating it. The heads and tongues which were used to make the brawn were kept in salt-water in the kitchen for four days. The nearest drain to the house was twenty yards away. The organisms may have been imported from some extraneous source.

The brawn was cooked on Sunday April. 23rd 93.

The weather in the previous week was very hot and moist which greatly favoured chemical decomposition in organic matter.

The most probable cause of this outbreak was—that the meat—viz—cow's heads, sheep's heads, calf's head and tongues, which were used to make the brawn had undergone incipient putrefaction before cooking, and that the cooking may have been sufficiently thorough to destroy the microbes but not the ferments which they produce. If the meat, which was used for making the brawn, was perfectly sound before cooking, it was almost impossible for it to undergo putrefaction and become poisonous in two days, that is, from Sunday to

Tuesday, granting of course that it was thoroughly boiled and cooked. The butcher said that the heads and tongues had not been in the house more than four days. Some parts of the brawn appeared to be more poisonous than others, as in the fatal case of D.E. who only partook of a piece about three inches square. It may be inferred from this that only one head or tongue or a small portion of either of them had undergone incipient putrefaction, and that in the process of cutting and mincing the heads and tongues into small particles, some portions of the decayed part may have settled more in one part of the brawn than another; consequently the greater the amount of putrefied portions in one part of the brawn the greater the amount of putrefaction in that particular spot. Also each particle of the decayed part acted as a kind of centre for putrefaction in the whole brawn.

Dr. Lauder Brunton says in his Croonian Lectures, June 1889, that the microbes themselves may be destroyed by a temperature which does not destroy the activity of the ferment which they have formed. Thus meat which has become tainted by the presence of putrefactive microbes may possibly be cooked sufficiently to destroy the microbes themselves, while the ferments they have formed continue to decompose the meat, and give rise to poisonous substances.

We can thus see how cold meat may become poisonous and produce serious symptoms, although the same food may have been eaten with impunity immediately after being cooked; for during the process of slowly cooling poisons may have been formed in the meat, although there may have been none in it immediately after it had been removed from the oven, and any microbes present were likely to have been killed by the cooking.

The county analyst said at the inquest - that an ordinary housewife ought to be able to detect the incipient stage of putrefaction. If this were true, the butcher ought to be more able than the housewife to detect the very early stage of putrefaction.

This is however contrary to the view held by some very eminent authorities - viz Dr Coats, of Glasgow, and Dr Stevenson of London; the former says in his book on Pathology in the Chapter on Bacteria: - "it appears as if the poisons might be evolved without the ordinary signs of putrefactive decomposition". Therefore it is impossible to detect the incipient stage of putrefaction by colour, taste or smell.

The fact that the persons who partook of the brawn were not all seriously affected was probably due to inequality in the putrefactive changes in different portions of the meat; or it may have been due to differences in temperature in various portions of the

brawn. The brawn appeared to be poisonous on Sunday evening, because the butcher, his wife and servant boy partook of it for supper and all of them were affected with symptoms of poisoning on Monday, although they did not seek medical advice ~~but~~ ^{except} some draughts prescribed by a chemist. This fact goes to prove that the meat had undergone incipient putrefaction before cooking, and that after it cooled the ferments continued to evolve poisonous products, consequently the brawn was much more poisonous on Tuesday and Wednesday. In several houses some of the brawn was given to cats and dogs with the result that they also showed signs of poisoning, and two cats were reported to have died.

The butcher was brought up for manslaughter at the Carmarthen Assizes, and was discharged. Dr. Stevenson gave evidence for the prosecution. The counsel for the defence stated that there was no case against the butcher, because Dr. Stevenson, one of the greatest authorities on poisoning, stated in his evidence that the incipient stage of putrefaction in animal matter could not be detected by colour, taste or smell. He also referred to Dr. A. M. Brown's book on the animal alkaloids, and he states that the generation of foetid effluvia is but a secondary factor in the process of bacterial putrefaction. If its presence is characteristic of putridity, putridity may still be active in its absence.

Stomaines, discovered and named by Selmi, are alkaloids generated during putrefaction, and closely resembling the vegetable alkaloids, not only in their physiological actions, but also in their chemical reactions. Some stomaines appear to be very poisonous, others do not appear to possess marked physiological activity.

Gautier is of opinion that, far from being substances exclusively of cadaveric origin, they are normal and necessary products of disassimilation of animal tissues, and that he has found very poisonous alkaloids in normal urine. The alkaloids which are elaborated by the living tissues, he names "Leucomaines".

Also there are elaborated in the living tissues uncrystallisable substances which are the extractive matters. He also states that the Stomaines and Leucomaines are toxic and that the extractive matters are more toxic than either.

According to Gautier, we resist auto-intoxication by two modes — by the elimination of the toxic products, and by their destruction by oxygenation. Elimination is accomplished by the kidneys and the liver. As to their destruction, this consists in a continuous combustion of the leucomaines by the oxygen of the blood; the leucomaines are there burnt, consumed in the circulatory current, and it may be, partially in the tissues.

Accumulation may take place under two

different conditions; as when there is excess of extractive matters and alkaloids, with normal but inadequate emmuction, or when the production of deleterious materials is normal, but emmuction insufficient.

Boucharad has disclosed the fact, that not only were alkaloids present in appreciable quantity in normal urines, but that they augmented notably in the course of certain diseases, in typhoid fever for instance.

Observations by Boucharad on the venous injections of urine would seem to show that the day urine affords a narcotic, sedative principle; the night urine, on the contrary, is marked by a stimulant, convulsivant principle.

Vegetable alkalies, stomaines and leucomaines have the same origin, the proteid materials, and are identical in their genesis; that is, proteid disintegration.

Gautier has discovered that intoxication by the extractive matters is accompanied by hyperthermia, whilst intoxication by the animal alkaloids is accompanied by hypothermia.

But should the two factors co-exist they neutralize each other, and the temperature remains stationary. Let one or other turn the scale, and immediately a thermometric variation may be noted.

The question may be asked, is there a possible method of distinguishing stomaines and alkaloids

that might have been criminally introduced during life. Many authorities are of opinion that there is no common method by which in every case any given vegetable alkaloid can be distinguished from any given ptomaine.

Marinozicco has shown by his researches that alkaloids of putrefaction were always minute in quantity, and that it was possible to distinguish those ptomaines from a great number of vegetable alkaloids when introduced in the system during life. M. Hugouneq also confirms the possibility of distinguishing, even in examinations the most difficult, a vegetable alkaloid introduced into the system during life from the ptomaine cadaveric alkaloids developed after death.

The process which enables the economy to resist auto-intoxication from the alkaloids, and which Gautier holds to be more powerful than elimination, is their incessant combustion in contact with the oxygen of the blood. For the most part, these deleterious compounds are very oxidizable, and it is under the influence of the incessantly maintained supply of oxygen that they consume themselves and disappear, at least in part, facts which sufficiently explain why, under normal conditions, only traces of the muscular leucomaines are already detected in the urines; in large proportion they having undergone combustion in the current of the circulation, if not in the tissues themselves.

Thus the healthy living organism may become poisoned by the accumulation within itself of deleterious substances normally elaborated but imperfectly or defectively eliminated.

Life is a contingent phenomenon, consisting of a series of partial births and partial deaths. It has been said that—"in the midst of life we are in death." If the organism is to survive, the organic and the inorganic must march hand-in-hand till death severs them.

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