With regard to the relation of rheumatism to scarlatina I have some evidence that rheumatism occurs in patients living in houses with defective sanitary arrangements. The last case of scarlatinal rheumatism which I saw was in a house in which a defective soil pipe had been the cause of severe tonsillitis in two other adult members of the family. The patient had been specially exposed to drain emanations just before the scarlatina commenced. Two other cases of rheumatism with scarlatina occurred in houses in which defects in the drains were subsequently found. As sewer gas often penetrates bedrooms from the free communication that exists under floors and between the layers of lath and plaster partitions the poison may enter the system at any date after the scarlatina has developed itself.

Of the association of rheumatism with erysipelas I have met with no instance. Trousseau mentions it as sometimes occurring, and two such cases are reported by Dr. Downes in the JOURNAL of June 25th, 1887. As erysipelas occurs in connection with insanitary surroundings its association with rheumatism is quite intelligible.

How far the explanation of a mixture of poisons will hold with regard to the joint affections occurring in puerperal fever, pyæmia, gonorrhœal and other forms of urethritis, must be left for further inquiry, but I think it probable that in some of these the specific rheumatic poison may be at work. Defective drains may certainly cause puerperal fever, and the worst case of joint affection after urethritis which I have ever seen occurred in a house with gross defects in the drains.

The opinion held by some that there is a combination of rheumatism with gout—a true “rheumatic gout” is not incompatible with the views expressed as to the nature of rheumatism. The gouty constitution may modify the action of the poison and render the disease less acute. With regard to the possibility of various forms of chronic rheumatism being due to the same poison as rheumatic fever, we have good grounds for recognising it, seeing the great differences which occur in tuberculosis, which may manifest itself as an acute or very chronic disease. The changes in the body due to age no doubt play a very important part in modifying the action of the poison, but it is also likely that many individuals have acquired an immunity from the acute effects of the rheumatic poison by a similar process to that by which those constantly making *post-mortem* examinations acquired an immunity, the frequent absorption of poison in small doses rendering the body less vulnerable but not completely invulnerable.

Lastly, I wish to call attention to the explanation which a recognition of the specific nature of the disease and of its common mode of propagation affords of the otherwise unexplained facts given by the British Medical Collective Investigation Committee in their report.¹ The subjects of hereditary predisposition, age, time of year, have been already alluded to, and there remain for special consideration the influence of occupation, of exposure to wet and cold, and of special states of the weather. A table in the report gives out of 655 cases—of which details were sent to the Committee—71 domestic servants, 63 school children, and 46 married women. These together make up more than one-fourth of the whole number. These persons would be much indoors, more constantly in a polluted air due to defective drains; and the domestic servants, specially exposed to effluvia from broken drains under the house, untrapped sink pipes, and from defective soil pipes, from which air is forced when slops are thrown down a closet. Married women, amongst the lower classes, fulfil the duties and are thereby exposed to the same extra risks as servants. Children are by their age rendered specially susceptible. The Committee noted the remarkable number of cases occurring amongst servants, but only suggested that inordinate consumption of meat and beer, and want of exercise, probably rendered them more liable than other classes. Exposure to wet, cold, or fatigue, or a combination of these, is stated in the report to have been a previously existing condition in 430 of the cases. As predisposing causes there can be no doubt that they play an important part. Such causes, by depressing the vital powers, render the body more vulnerable and capable of being acted on by what at another time would have no effect. This is so well known with regard to other diseases that one readily recognises it as a powerful predisposing influence in the case of rheumatism. Fowls, frogs, and fish are under ordinary conditions insusceptible of inoculation with anthrax. Pasteur succeeded in inoculating a hen by administering to her a prolonged cold footbath.² Others have successfully in-

oculated frogs and fish by raising the temperature of their surrounding medium.³ In both these cases, although alteration in the temperature of the blood may have had some influence, the vital processes must have been modified by the abnormal conditions.

The lowering of the vital resistance by the occurrence of another disease may also render an individual more easily affected by the rheumatic poison.

Conditions of weather may act indirectly in causing rheumatism. In cold and wet weather a house is shut up more closely, and the air in it being rendered warmer and less dense than the outside air there is greater suction at any existing leak in soil pipe or drain; hence in such weather there is greater chance of “catching” rheumatic fever. Atmospheric influences come into play in other ways. A certain range of temperature must be specially favourable to the micro-organisms concerned, and a moist still atmosphere would render their stay in and around a dwelling more prolonged than in windy weather. Dr. Haig-Brown states that he has observed outbreaks of tonsillitis and rheumatism after close, still, damp weather.

If the views expressed in this paper be correct, there will be the satisfaction of knowing that rheumatism, the treatment of which even now is more or less unsatisfactory, is to a great extent a preventable disease, the prevalence of which will be to a great extent lessened in the future by the progress of sanitary science. Meanwhile the occurrence of rheumatism, whether well-marked as “rheumatic fever” or manifesting itself only by the so-called “growing pains” of children, or even as a continued fever without joint affection, as is sometimes the case, calls for as thorough and careful an examination of the drainage of the patient’s residence as does the occurrence of typhoid, diphtheria, or any other pythogenic disease.

REPORT ON AN OUTBREAK OF DIPHTHERITIC TONSILLITIS AT ETON COLLEGE IN SEPTEMBER, 1889.

By JAMES W. GOOCH, M.R.C.S.E.,

Honorary Surgeon Windsor Royal Infirmary and Eton College Rifle Volunteers.

Soon after the commencement of the Michaelmas term there occurred at Eton College an outbreak of tonsillitis, which could apparently be accounted for by the exceptionally damp, muggy weather which then prevailed, and which was causing the disease in so many parts of the country. Although, however, after a time the weather improved, cases still occurred in the school in increasing numbers, and assumed a more serious and diphtheritic type.

As the drainage of the town and the water supply are known to be as perfect as it is possible to be, it became necessary to endeavour to discover some other cause for the epidemic. Accordingly I turned my attention to the milk supply of the College, and learned that there were no less than fourteen distinct sources from which it was delivered. I found that one farmer supplied entirely six of the houses in which cases of tonsillitis had occurred, and one in which there had been no case; he also supplied half the milk to two other houses, in one of which there had been no case. None of these houses had anything in common excepting the milk supply. There was only one other case in the whole school, in a house not supplied with milk from the above mentioned farm; this was a case of simple tonsillitis, and had probably an independent origin. The above facts seemed strongly to indicate, therefore, that milk taken from a certain farm was the cause of mischief. It was suggested that I should visit this farm, which I did on October 19th, being assisted in every way by the owner. All the cows (eighteen in number) as far as I could discover were perfectly healthy, and no sores could be detected on any parts of their bodies. The sheds were clean, large, and well ventilated. One new cow only had been recently purchased, and she came from a neighbouring parish in which no disease was known to exist. She had a calf three days old when bought, but I was assured that her milk had not been used until the proper time had elapsed. The dairy itself and all pails and cans were clean and in good order, and there was no illness amongst the dairymen employed on the farm or in their families. Water for all purposes was taken from a surface well in the yard, but some distance from

¹ JOURNAL, February 25th, 1888.

² Louis Pasteur: his Life and Works, pp. 209, 210.

Crookshank's Bacteriology, p. 288.

any drains. The well was about 15 feet deep, and the water in it always stood at the level of the Thames. On analysis it was pronounced to be free from sewage contamination, but to contain a certain amount of vegetable matter. I was also assured that all tins, pails, etc., were always scalded and washed in boiling water. There seemed, therefore, nothing about the homestead to account for the contamination of the milk.

On further inquiry, however, it appeared that the cows had been turned out, early in July, into a meadow half a mile away, and that this meadow was adjacent to the sewage farm of a neighbouring town, the smell from which was often very offensive. Moreover, crude sewage had been seen to pour from this farm into a ditch to which the cows had access, and from which they drank. In the middle of July there were a few cases of tonsillitis in two or three of the college houses supplied with milk from the above-mentioned farm, but at the time the milk was not suspected, and the term soon afterwards came to an end. On September 25th, however, three days after the commencement of the next term, the disease broke out again, and cases continually occurred. On October 18th the cows were all taken from the meadow to the homestead for the winter, and it is an interesting fact that since October 20th, two days after their removal, not a single case of diphtheritic tonsillitis has occurred in the school. It appears almost to a certainty, therefore, that the contaminated water taken by the cows was the actual cause of the epidemic in question. Through the courtesy of Mr. W. H. Power, of the Local Government Board, I have been enabled to see his reports on the outbreaks of diphtheria at Hendon, and Camberley and York Town. In the former report it appears pretty conclusively proved that the disease was caused by the milk pails having been washed in sewage-polluted water, and that this latter had also been taken by the cows, or that the cows themselves suffered from disease. In his report, however, on the outbreak of diphtheria at Camberley and York Town, near Aldershot, Mr. Power states that "nothing could be discovered about the farm, dairy, and cowsheds that could be regarded as affording a definite and completely satisfactory explanation of the infection of the milk." In conclusion, he states that "there is not on record any authentic instance of water, however impure, having been the means of conveyance of diphtheria to the human subject."

Further on, he says: "Finally, it had to be suggested that diphtheria material thus annexed by the cow could either have been swept in" during the milking, "or else, being excreted from her system (as matters unassimilable by cows are excreted), could have been delivered there unaltered along with the milk secretion, the animal herself meanwhile suffering no inconvenience whatever. Perhaps the chief recommendation of this theory is its novelty." Thus it has never been actually proved that germs in sewage-polluted water can pass through the cow, and be excreted in an active condition in her milk.

In the outbreak at Eton College, however, there can be no doubt of the possibility and probability of such an occurrence. In this case the milk pails and cans were washed in boiling non-contaminated water at the homestead, were taken to a meadow half a mile away, filled with milk direct from the cows, and brought back for distribution to the customers.

There were several arguments brought forward against the theory that the milk was the cause of the epidemic at Eton, nearly all of which, however, on investigation, could be explained away.

First, Why did a large house (I), containing forty boys, partly supplied with milk from the suspected source, have no cases of sore throat? On inquiry, the cook stated that the above-mentioned "milk taken in the evening is always boiled for coffee used in the early morning, and that the morning's milk is mixed with milk from another dairy, and drunk for breakfast, and tea in the evening."

Secondly, Why did the children in another house (F), also only partly supplied with milk from the suspected dairy, escape, whilst others in the house fell ill?

It was found that this milk was never taken to the nursery, but always from that another source.

Thirdly, Why did one master living by himself in a small house escape, whilst another master similarly situated did not, both drinking the infected milk?

The landlady of the former states that she "always boils the milk directly it comes."

Fourthly, Why did twelve boys in one house (B) who had a tumbler of milk given them each morning, and also three little children in another house (A), escape?

These last questions are not easy of explanation, for in both houses there were cases of tonsillitis, and the entire milk supply was from the infected source, and was not boiled.

Table, showing Dates of Infection, etc. Instead of giving the Names of those occupying the Houses, Letters are affixed.

Date.	New Households.	Number of Cases.	House.	Abstract.		
				Date.	Number attacked.	Total Persons in House.
1889.						
Sept. 25	1	1: A	A	Sept. 25, 26, 29, 30th; Oct. 6, 8, 9	7	58
" 26		1: A	B	Sept. 27, 28 (2); Oct. 7, 9, 10, 15,	11	76
" 27	1	1: B		18, 17, 19, 20		
" 28		2: B	C	Sept. 29; Oct. 6, 7	3	46
" 29	1	2: A, C	D	Oct. 3, 5, 8, 9 (2), 11, 16	7	44
" 30		2: A	E	Oct. 5, 8, 9	3	5
Oct. 3	2	2: D, H	F	Oct. 6, 7, 9, 13	4	54
" 5	1	3: D, E, H	G	Oct. 15	1	3
" 6	1	3: A, C, F	H	Oct. 2, 5, 7 (2)	4	16
" 7		5: B, C, F, H (2)	I	No cases, milk boiled	—	53
" 8		2: A, D	J	"	—	3
" 9		6: A, B, D (2), E, F				
" 10		1: B				
" 11		1: D				
" 13		1: F				
" 15	1	2: B, G				
" 16		2: B, D				
" 17		1: B				
" 19		1: B				
" 20		1: B			40	358

In the accompanying table will be found the dates of the invasion of the various houses, and also of the cases as they occurred. It will be seen that there were 40 cases amongst about 360 persons who drank the suspected milk, in a space of time extending over twenty-five days. As the first cases occurred three days after the term began, and the last two days after the removal of the cows from the meadow to the sheds, it would appear that the period of incubation of the disease is short. Most of the cases ran the same course, and none were ever in the least serious. They began with tenderness and swelling of the cervical glands, coated tongue, and more or less fever, which lasted for about twenty-four hours. In the more severe cases the temperature rose to 101° or 102°, there was headache and sometimes vomiting, and a general feeling of discomfort. Many of the patients, however, expressed themselves as feeling quite well, having only slight pain on swallowing. The tonsils were inflamed and scarlet, and were covered more or less with patches of a purely white exudation. This latter gradually appeared to melt away, leaving the mucous membrane almost free from any trace of abrasion. In only one case did I see any patches on the pharynx. All the graver symptoms of diphtheria were absent, and yet the disease differed entirely from ordinary follicular tonsillitis. The colour of the throat was that of scarlatina, but there was no rash. Several of the patients had relapses in convalescence, as if a fresh quantity of the poison had been taken from the milk. The average duration of the disease was eight days. From the facts above mentioned it would appear:—

1. That infected milk was the cause of the disease.
2. That the water in which pails, etc., were washed was not in fault, as it continued to be used after the cessation of the outbreak.
3. That disease germs can pass through the system of a cow and be excreted in her milk in an active condition.
4. That boiling the milk destroyed the vitality of the germs.
5. That the disease was perfectly distinct from diphtheria, scarlatina, or follicular tonsillitis.
6. That the disease was non-infectious from the fact that no person took it who had not drank the milk, although in close communication in school, etc., before isolation.

It is a fact that cases of scarlet fever have recently occurred in the town from the sewage farm of which sewage had escaped into the ditch to which the above-mentioned cows had access. Is it possible that in their passage through the systems of the cows the germs of scarlatina may be so altered in their character that they can set up in human beings a milder and non-infectious disease, just as when a cow is inoculated with the virus of small-

pox, as formerly supposed, that vesicles containing vaccine result? This latter sets up in human beings a non-infectious disease of a mild type; and in the same manner it might be supposed that the germs of scarlatina, modified as above, might possibly, when applied to the mucous membrane of the throat, also set up a milder non-infectious disease, running a regular and definite course.

It was a curious fact that in the outbreaks of diphtheria at Camberley and Hendon poor people who drank infected milk so often escaped the disease. Mr. Power, in his report, explains this from the fact that the poor buy a small supply just sufficient for a meal and use it at once, but that richer persons take a larger quantity, and probably keep it some hours before using it, during which time the germs appear to multiply, and thus render the milk more poisonous. In corroboration of this theory it is remarkable that, in the house at Eton in which the largest percentage and the most severe cases occurred, evening's milk was never used until the following morning, and morning's milk in the evening of the same day. Moreover, diluting the milk seems to have had the effect of diminishing the intensity of the poison, for in the house above-mentioned, in which no cases occurred, and where the evening's milk was boiled for early coffee, the morning's milk was always mixed with that from another dairy. Again, in another house, in which, as mentioned above, the children escaped, after the nursery milk was taken, the milk from the two sources was mixed, and although four cases did occur in the house, they were so slight that it was not thought necessary to keep the patients in bed.

A CASE OF FÆCAL EXTRAVASATION INTO THE PERITONEAL CAVITY: THOROUGH WASHING OF THE PERITONEUM: RECOVERY.

By HARRISON CRIPPS, F.R.C.S.,
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UNTIL recent times, the extravasation of fæcal matter into the peritoneal cavity was regarded as an almost inevitably fatal accident, the patient either rapidly succumbing from the symptoms of shock, or in a few days from acute peritonitis.

From a superstitious dread of opening the peritoneal cavity, no attempt was ever made to save such cases by surgical procedure. Owing, however, to the enterprise of the earlier ovariologists, it soon became apparent that not only did the peritoneum safely admit of free exposure and handling, but that it possessed a power of repair probably in excess of that of any other tissue in the body. A further great advance in peritoneal surgery was the method of thoroughly flushing the cavity to remove obnoxious material contaminating it after ovarian operations, a method first suggested and successfully practised by Mr. Lawson Tait. The principle thus introduced has, through the practice of Mr. Treves and others, been found to be of as much value in the general surgery of the peritoneum as it has proved to have been in the hands of ovariologists.

I venture to record the following case as an instance in which a life was undoubtedly saved by the employment of this principle.

Miss —, aged 52, sent to me by my friend Dr. Hudson, of Barbadoes, gave the following history: She had always lived in the West Indies, and had been in every respect a healthy woman until about a year ago. At that time she commenced to be troubled by slight constipation, followed by attacks of diarrhoea. The symptoms continuously increased, and for the last two months she has required to go to the closet several times a day, especially in the morning. At these times she passes only a small quantity, and has the sensation of the bowel never being completely relieved. She does not like to pass urine, for if she does so a teaspoonful or two of mucoid discharge escapes from the rectum.

She does not have much pain in the lower parts of the bowel, but has great pain occasionally in the small of the back. She is a stout woman, and has lost flesh lately. Upon making an examination the anus was found to be normal, but at a height of 4 inches was a tight anular stricture, which would only admit the tip of the finger. The stricture was fringed with hard malignant

nodules, and the diseased portion of the bowel appeared to extend to a considerable height.

Owing to straining, the strictured portion of the bowel had become considerably invaginated, so that a *cul-de-sac* nearly an inch in height completely surrounded the diseased bowel, which felt to the finger not unlike a projecting cervix uteri. The height of the disease rendered its removal impracticable, and on account of the distressing symptoms produced by the stricture a colotomy was advised. The operation, however, was postponed for ten days, on account of a troublesome cough.

On June 20th, the patient being placed under an anæsthetic by Mr. Mills, I performed inguinal colotomy after the method I have recently described in the JOURNAL.¹ The bowel was opened on the second day. All went well till the fifth day. At that date she had a violent fit of coughing at 8 A.M. This was soon followed by abdominal pain. The pain increased, and by the middle of the day became very intense, and she commenced to retch. At 1.30 I saw the patient. She was suffering intense abdominal pain referred to the umbilicus, and was rolling about the bed. Her hands were cold, her face looked pinched and shrunken; the pulse, which was extremely rapid, could scarcely be felt at the wrist. Indeed, she showed all the symptoms of severe shock.

On examining the wound, I found that the stitches had given way, and that the bowel, except at one corner, had dropped back into the abdomen, and that the peritoneal cavity in the neighbourhood was full of fæces of pea soup consistency. From the severity of the symptoms I feared the case was hopeless. However, with the aid of my colleague, Mr. Bruce Clarke, I picked out the bowel, and passed five strong silk sutures through the skin, and then through the edge of the bowel on each side. These were not tied, but held in such a way as to prevent any more fæces being poured into the cavity. We then proceeded to thoroughly wash out the matter already extravasated. This was done by at first simply syringing with a Higginson syringe all the parts in the immediate neighbourhood of the wound. An india-rubber tube about the size of the finger was then passed 6 inches downwards towards the pelvis. Water was pumped through this, and allowed to regurgitate from the wound. It at first returned deeply stained with fæces. It gradually came back clearer, and after several quarts had been used returned perfectly clear. The position of the tube was varied from time to time during the washing.

A glass drainage tube was now passed in at the lower angle of the wound, and the stitches on each side drawn tight and fastened. To save time, no anæsthetic was given. It was a point of marked interest to observe that the abdominal pain which, had been intense, ceased entirely in a few minutes after the washing had begun.

5 P.M. Since the washing the patient has been entirely free from pain. She is still suffering much from shock, and the pulse at the wrist cannot be counted, and the glass tube is full of slightly turbid fluid which was drawn off.

10 P.M. Pulse very feeble, 152, no pain, tube again full of fluid, but nearly clear. Temperature, subnormal.

June 26th. Restless night, was twice sick. Pulse stronger, 130.

June 27th. Better night. Pulse 110. No more vomiting. Fluid in tube smaller in quantity and quite clear. A large quantity of fluid motion is constantly running from the colotomy wound.

June 29th. Improvement continues. Pulse 100. Has almost constant diarrhoea, but which by careful nursing has been prevented coming into contact with the tube. Glass tube taken out.

During the next fortnight she had constant diarrhoea, the temperature ranging from 100° to 103°. The diarrhoea then gradually ceased, the temperature became normal, and the appetite increased. In the course of a month the colotomy wound had completely healed and the new anus was acting well, without pain or trouble. The following month she returned home to the West Indies, and I have heard since that she has been able to get out and about, and that the colotomy opening acts satisfactorily.

There are two particular points of interest in this case, the first is the rapid and complete relief from intense pain which followed immediately on the washing out of the fæcal matter from the abdominal cavity. The pain must have been due to the contact of the acrid fæcal matter with the peritoneum. It could not have been due to inflammation, for it came on too rapidly for such to have taken place.

The second point of interest lies in the fact that notwithstanding the extensive extravasation of fæcal matter it gave rise to no