TABLE III.—*Showing the Relative Frequency of Each Error in all Cases of Normal and Subnormal Vision (Cases 398).*

	Boys and Girls	Per Cent.	Boys.	Per Cent.	Girls.	Per Cent.
Hypermetropia	165	41	66	33	99	50.0
Astigmatism	40	10	29	14.5	11	5.5
Myopia	16	4	9	4.5	7	3.5

I had not an opportunity of using atropine, and so I am unable to give a table to compare with Mr. Lawson's as to the number of cases of hypermetropia of 4 D and over. Thirteen of the hypermetropes, 7 boys and 6 girls, had convergent strabismus, which in 1 girl had been operated on.

With regard to myopia, there were only 3 cases over 3 D.

No.	Sex.	Age.	Myopia.
1	F.	8	4 D, R. and L.
2	F.	12	4 D, R. and L.
3	M.	13	13 D, R. and L.

Included in the above tables are 13 cases of nebula or other opacity of the cornea. This rendered the vision defective, but I ascertained the refraction by retinoscopy. Of these 13 cases, 7 were emmetropic (2 boys and 5 girls), and are included under the normal vision group, 3 were astigmatic (1 boy and 2 girls), 2 were myopic (both girls), and 1 girl had 1 D of manifest hypermetropia.

It is interesting to notice that the Rochdale Parish Church School, which is a new building and a model school as regards lighting, fittings and ventilation, yields almost identical results as regards refractive errors with the Stephen Street School examined by Mr. Lawson. In the Rochdale School 177 out of 398 pupils have normal vision, in the Stephen Street School 174 out of 392. The Rochdale School has, however, only 16 cases of myopia, as against 24 in Stephen Street. It is not easy to compare the figures as regards hypermetropia and astigmatism, for my work was done before Mr. Lawson's paper appeared, and I did not think it necessary at the time to separate accurately the cases of moderately high simple hypermetropia from those complicated with astigmatic errors.

Five of the children whom I examined were already provided with glasses. The parents of those not so provided, and whose sight was defective, were informed by letter of the advisability of having suitable spectacles prescribed by a medical man or at an ophthalmic hospital.

The results of my investigation may be interesting as supplementing Mr. Lawson's work with similar statistics from a Lancashire school. I have already referred to the fact that an annual examination of the eyesight of the children attending the elementary schools in some American cities is carried out under the supervision of an "oculist to the Board of Education." An excellent statement of the method followed in Minneapolis will be found in the *Educational Review* for September, 1897, in a paper by Allport, the Board of Education oculist for that city. It is to be hoped that the School Boards of this country will in time follow the enlightened example of those in America.

THE PASTEUR INSTITUTE OF MARSEILLES.—The following statistics relative to the work of the Pasteur Institute from the date of opening (December 9th, 1893) to January 1st, 1898, have recently been published by MM. Livon and Alezais:—1893 (22 days): Number of persons treated, 16; no deaths. 1894: Number treated, 268; 3 deaths (1.12 per cent.). 1895: Number treated, 355; no deaths. 1896: Number treated, 249; no death. 1897: Number treated, 318; 2 deaths (0.63 per cent.). This gives a total of 1,206 persons treated, with 5 deaths, a percentage of 0.41.

ON A CASE OF CYSTITIS OF THREE YEARS' DURATION DUE TO THE TYPHOID BACILLUS.

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A PATIENT suffering from symptoms of cystitis was admitted to the wards of the Belfast Royal Hospital, under the care of Professor Byers. A careful examination of the bladder, kidney, and the uterus having revealed nothing which could throw light on the origin of the cystitis, I was asked by Professor Byers to make a bacteriological examination of the urine.

The urine was of a turbid, opalescent appearance, strongly acid in reaction, and contained a small quantity of albumen. On centrifugalisation, the sediment was found to consist of numerous squamous cells such as are found on the mucous membrane of the bladder, numerous leucocytes with polymorphous nuclei and granular protoplasm (eosinophile and basophile); some bacteria were also recognised in the deposit.

I proceeded to isolate the micro-organism in question, and, suspecting the presence of the bacillus coli communis, I made agar plates with one, two, and three loopfuls of the urine. On the following day the plates showed colonies, all of the same appearance. Nine of these colonies were taken at random, and planted by the stab method on glucose agar, and incubated at 37° C. To my surprise all these colonies grew in an opaque, whitish line exactly resembling the growth of Eberth's bacillus, and without forming any gas. I then planted the bacillus on gelatine, broth, potato-gelatin, agar (stroke culture), potato, and milk. It resembled in every cultural respect the typical bacillus typhosus. Microscopically the bacillus proved to be actively motile, and when stained by both Pitfield's and Van Ermengem's methods showed numerous wavy flagella (12 to 16). A broth culture was kept for six days in the incubator at 37° C., and tested for indol, but gave no reaction. The original milk culture was kept more than two weeks in the incubator, and showed no sign of coagulation; while the gelatine stroke culture has now been kept for four weeks, and there is no liquefaction. Thus in all respects microscopically and culturally the bacillus isolated is the bacillus of Eberth.

The patient's blood was also examined. It was taken in the usual way, and with the bacillus isolated from the urine gave a well-marked agglutinating reaction at a dilution of 1 in 100. The other laboratory cultures of the typhoid bacillus also reacted with the blood of this patient, while several varieties of the bacillus coli, on which serum from a case of typhoid fever has often marked agglutinating power, failed to give the reaction clearly.¹

As this result was so unique, and in order to exclude any possibility of error, I a second time obtained a sample of the urine with the most aseptic precautions possible (that is, boiled glass catheter, sterilisation of orifice of urethra, etc.), and again succeeded in getting in the plate colonies of a pure cultivation. The colonies are proved to be those of the bacillus of Eberth. The blood was also tested a second time, and again reacted with the bacillus isolated from the urine and with the other laboratory typhoid bacilli. It showed on the second occasion a slightly increased tendency to clump the laboratory cultures of the bacillus coli communis. The power of agglutinating the coli communis cultures was, however, still much less than was commonly seen in typhoid fever.

The patient has been six weeks in hospital without abnormal temperature or other symptoms pointing to typhoid fever. Her history for the last three years, obtained with great care, is as follows:

M. R., aged 35, three years ago was living in a house where two children died, one of bronchitis and the other of diarrhoea (patient's diagnosis). She helped to nurse these children; shortly afterwards she suffered from frequent micturition. This trouble developed gradually, and was afterwards accompanied by pain. She consulted a doctor and was sent into hospital (medical wards) in December, 1895, where she was treated for three months for painful and frequent micturition. At this time there was an occasional passage of blood by the urethra. She left hospital considerably improved, but still suffering from frequent micturition. She returned to her work, but again in May, 1898, she had to consult a medical

man, who, after treating her for some months for cystitis, sent her into the Royal Hospital, where she is at present a patient. During the three years she has suffered from cystitis she has been troubled with headaches, which she states increase with the pain in the bladder region.

I have been unable to find a record of any case of uncomplicated cystitis from which the typhoid bacillus has been isolated in pure culture. In the exhaustive discussion of genito-urinary infections at the Edinburgh meeting of the British Medical Association this year no such case was mentioned.

This case seems of interest for the following reasons. 1. The history gives no evidence that the patient ever had typhoid fever, and the fact that she spent so much of her time in hospital and was under medical treatment at home may be held to exclude any possibility of mistake in this respect. In cases of typhoid fever the bacillus of Eberth is often found in the urine, even some weeks after the temperature is normal.² This case is one of typhoid infection without the usual symptoms of typhoid fever, and since there is no point in the history subsequent to the commencement of the cystitis three years ago, which suggests the occurrence of a new infection, the probability is that the typhoid bacillus has been present from the beginning. When we consider the fact that typhoid bacilli are so easily destroyed by more vigorous forms, such as Escherich's bacillus, it seems highly improbable that at any time during the course of the cystitis the typhoid bacillus has displaced the coli bacillus in the bladder. The acidity of the urine excludes the probability of other forms commonly found in cystitis ever having been present.

2. The blood serum gave a decided "reaction of infection." This shows that the case is not a simple bacteriuria, but that the bacillus has a nidus somewhere, as for example in the mucous membrane of the bladder, and thereby has such an effect on the blood and tissues as to cause the serum to acquire the agglutinating power.

3. It seems to follow that in this case the bacillus of Eberth was capable of producing a local lesion without the patient suffering from typhoid fever.

4. The fact that the bacillus can grow in the tissues without any symptoms of enteric fever resulting, and produce there a local lesion, is in favour of the view that this fever is a true general infection, and not merely of local origin, in the Peyer's patches of the intestine.

5. It also proves that the bacillus may occur in the tissues, and the blood serum give Widal's reaction, without the infection which we recognise as typhoid fever resulting.

6. To explain the anomalous fact that we have here a lesion, restricted apparently to the urinary organs, produced by the typhoid bacillus, which has persisted for a very considerable time without any symptoms of typhoid fever, three theories seem admissible:

(a) This patient for some reason or other was not very susceptible to infection with Eberth's bacillus, so that when the opportunity for infection occurred a local lesion alone resulted, and no general infection. This agrees with the result obtained when a non-susceptible animal is inoculated with a given bacillus.

(b) We have here a form of typhoid bacillus which differs in its infectious power from the recognised form of Eberth's bacillus.

(c) Typhoid fever is not solely due to the bacillus of Eberth, but other etiological factors must be brought to bear on the patient before the clinical features of typhoid septicæmia result. The researches of Sanarelli,³ which show how the virulence of the typhoid bacillus is increased by the injections of the toxin of the bacillus coli communis, and also those of Sidney Martin,⁴ which confirm his results, make it certain that the bacillus coli communis may be directly concerned in producing a virulent typhoid infection in animals. In the recent report on the Belfast water supply, Dr. Lorrain Smith has shown that the bacillus coli communis had a distinct relation to the etiology of the recent epidemic of typhoid fever in Belfast (1898), and that many of the cases gave evidence of the existence of a mixed infection of the bacillus of Eberth and that of Escherich.

The persistence of the typhoid bacillus in the bladder possibly for three years appears less remarkable when we recall the cases in which abscesses containing typhoid bacilli have been observed six or seven years after the occurrence of typhoid fever in the patient.⁵

I have to express my thanks to Professor Byers for permission to publish the clinical account of this case, and to Dr. Lorrain Smith, in whose laboratory the examination of the urine was conducted, and who not only suggested the line of investigation, but also verified my results.

REFERENCES.

- ¹ Lorrain Smith, *BRITISH MEDICAL JOURNAL*, 1898, vol. ii, p. 1782.
² Petruschky, *Cent. f. Bakt.*, 1892, No. 14; Klein's *Micro-organisms and Disease*, p. 245. ³ *Ann. de l'Inst. Pasteur*, vi, 721, viii, 193, 353. ⁴ Croonian Lectures, *BRITISH MEDICAL JOURNAL*, vol. ii, 1898. ⁵ Flexner, *Journal of Pathology and Bacteriology*, vol. iii, p. 202.

ON THE INFLUENCE OF PATHOLOGICAL STATES UPON THE ELIMINATION OF WATER AND CARBON DIOXIDE BY THE SKIN.*

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OBJECT OF THE INVESTIGATION.

THE object of this investigation has been to study the nature of the process of elimination of water and carbon dioxide as it occurs locally. To this end it has been necessary, in the first place, to ascertain the normal output of these substances at varying temperatures.¹ This done, attention has been turned to the modification of output induced by abnormal local conditions, it being conjectured that in this way further light would be thrown upon the mode in which these functions of the skin are affected. The surface of the upper limb has been submitted to experiment throughout. The pathological states studied have been those produced (1) by the application of a ligature to the limb,² and (2) by irritating the skin by the application of carbolic acid so as to excite a condition of inflammation.³

The average normal output of water from the skin of the upper limb (up to the level of the insertion of the deltoid) was found to be, at 35° C., about 4 grams per hour, and that of carbon dioxide about 20 mg. The actual output, however, varies from hour to hour, and still more from day to day. The temperature to which the skin is exposed has a marked influence on the discharge of carbon dioxide, and a relatively slighter effect on that of water. Further, the average output varies in different individuals, and also in the same individual at different seasons.

The influence of a ligature applied to the upper limb as close to the shoulder as possible is to cause a diminution of the output of water, amounting, it may be, to as much as 20 per cent., while a still larger variation of the output of carbon dioxide occurs in the opposite direction—namely, that of increased discharge. The extent of the alteration of output corresponds to the degree of tightness of the ligature, and is observed whether the temperature of the water bath surrounding the limb is 35° C. or 25° C.

METHOD OF EXPERIMENT.

In order to study the influence of inflammation, the surface of the limb was irritated by the application of carbolic acid, and it was found that the elimination of carbon dioxide was but little altered, such change as occurs being in the direction of a slight diminution of output at first and a small increase subsequently. On the other hand, there is a marked decrease in the output of water, amounting in the experiments made to more than 50 per cent.

The secretion of water by the skin can also be studied qualitatively, and in this way a valuable illustration is afforded of the mode in which inflammation produces its effect. Thus if an injection of 1/100th to 1/50th of a grain of pilocarpin nitrate is made into the skin of the palm, sensible perspiration is observed over a small circular area whose centre corresponds with the position of the front of the needle. When this area, which presents to the naked eye a finely glistening appearance, is examined with a lens, it is found to be covered with fine droplets of perspiration, situated at the

* Towards the expenses of this research a grant was made by the British Medical Association on the recommendation of the Scientific Grants Committee of the Association.