Postscript.—I have lately learned that one of the cases I have successfully operated on has the prospect of becoming a mother, viz., Mrs Y., whose case is related in the *Glasgow Medical Journal* for November, 1867. This is the second out of my twenty operations in which pregnancy has followed ovariotomy, a previous case, Mrs M., reported in this *Journal* for 1866, having given birth to a healthy child.—G. B.

II.—NOTES OF A SCARLET FEVER EPIDEMIC.

By DAVID PRIDE, M.D., *Neilston.*

THE ravages which scarlet fever, from time to time, makes amongst children, and the great difficulty experienced in grappling with its causation, is, I think, a reason why notes of individual epidemics should be put on record, so as to furnish data upon which it might be possible afterwards, as evidence accumulates, to safely generalize, and from which, ultimately, it might be possible to deduce something like the law by which it is governed in its visitations. In the epidemic, the history of which I am about to narrate, the total number of cases which came under my observation was 169. Of these 140 recovered, and 29 proved fatal. They may be classified as follows:—Of scarlatina simplex there were 115 cases, all of which recovered. Of scarlatina maligna, *i.e.*, where the patient was, so to speak, struck down by the very intensity of the poison, and killed outright before there was time to rally from the primary shock of the disease—5, all of which proved fatal. Most of those cases died comatose, and within from 24 to 36 hours of the first seizure. Of scarlatina anginosa, *i.e.*, of purely putrid sore throat supervening on a typhoid type of the disease, with dusky red rash and, in some instances, petechiæ, 14; of which number 5 recovered and 9 died. Of cases variously complicated, and all more or less severe at the outset, 35. Those cases may be subdivided according to their complication as under:—Of pneumonia supervening on the fever there were 2; one of them an infant of 13 months, and the other a child of 3 years, both fatal. There were 20 cases with dropsy as a sequel of the fever, of

which number 16 recovered and 4 died. There were 2 cases with convulsions consequent upon uraemic poisoning during convalescence, both of which recovered. One case died, having paralysis of the left side, another from acute cerebritis—this patient, a girl, 4 years of age, screeched incessantly up till her death; and a third, an infant, died of an undefined head affection. Another case proved fatal from severe abscess of the ear; another from suppuration and complete destruction of posterior nares and nasal bones; and another from suppuration of posterior nares, left ear, and mastoid bone of same side. There were 3 cases where simple diphtheria accompanied the fever, one of which recovered and two died. Two had what might be called diphtheria complicated; in one instance, which recovered, by large abscess of the glands after sub-maxillary bubo; in another, by cephalalgia, uræmic poisoning, followed by coma and death.

Regarding *the mode of attack* in this epidemic, it may be stated that, as a rule, at the outbreak of the epidemic, the disease manifested itself *all at once*, *i.e.*, there was no premonitory ailing. It set in with a suddenness both surprising and alarming to the child's parents. The general statement was to this effect in the greater number of instances:—"The children were quite well, so far as was observed, and playing with the other members of the family up till bed-time; they had taken their food as usual during the day, and had taken nothing unusual before going to bed, and did not complain of anything being the matter with them." Then during the night they would awake, in some instances in the very act of vomiting, and in others almost so, beginning to vomit immediately on waking up; and this vomiting continued, to the intense alarm of the child's parents. The vomited matter was generally bile, of oily consistence. Frequently, though not always, purging supervened on vomiting, and then very generally, though not nearly always, the vomiting ceased. This vomiting and purging, either separately or conjoined, generally continued for about four hours, at intervals more or less frequent; during, or at the cessation of which, the patient was generally very much exhausted. The little sufferer then

rallied, and then for the first time, in almost every instance, sore throat was complained of, and also headache.

The Rash.—In about three-fourths of the cases, the rash made its appearance within *about twenty-four hours* from the first attack of vomiting. More particularly was this the case when the epidemic was, so to speak, at the zenith of its virulence. In other instances the rash began to appear with the reaction that set in after the prostration caused by purging and vomiting. In saying the rash made its appearance in about 24 hours, when the epidemic was at the height of its virulence, I wish to distinguish between the promptness of its appearance in those instances and the tardiness with which it frequently declared itself towards the decline of the epidemic. Of the crisis it may be remarked, that by far the greater number of uncomplicated cases reached the crisis between the fifth and sixth day of the illness.

About midway between the first and final appearance of the disease, and when by far the largest number of patients were ill, the fauces, tonsils, and soft palate were intensely livid red in colour, and yet, notwithstanding, this inflammatory or congestive action did not, as a rule, or even in a large number of instances, prove troublesome or serious.

Those cases were observed to be by far the most fatal where the patients were full in habit, and had naturally a florid skin; and that, too, even where the efflorescence was copious. Also, a large amount of efflorescence was not in itself a criterion of the mildness of the attack, *i.e.*, when the rash came out extra well, it did not, as is the popular belief, show the cases to be less fatal; on the contrary, while it was desirable to have the rash well out, and being out to prevent retrocession, yet in most instances, even where the rash came out thoroughly, but was of a darkish red, in some instances almost livid, colour, in a person of previous full habit, even though at first the throat or brain were not seriously or at all implicated, such cases were to be looked upon as of a grave character. It was observed in such cases that about the third day the heart lost all propulsive power over the cutaneous circulation. On pressing the blood out of the skin with the finger point,

instead of returning at once, or almost at once, as in more favourable cases, it stole back very languidly. In those cases, there could be no doubt, the very intensity of the poison had prostrated the vigour of the heart, and in part paralysed its action; the brain also was usually inactive, and the patient generally dull, and had a strongly comatose tendency.

Of individual susceptibility.—Nothing was more remarkable than the immunity some families enjoyed from the attacks of the disease, and different members of the same family even, where the disease had made its appearance. For instance, to take two cases out of many: The fever broke out in a family of three children, none of whom had it before. It destroyed one child with great rapidity, and the other two were not seized. Again, Mrs J. and three children came from Glasgow on a visit to her sister, who had nine children, seven of whom never had scarlet fever. Mrs J.'s children were all seized, and all died in little more than a week—one of acute cerebritis, another of putrid sore throat, and a third of coma; and notwithstanding the impossibility of keeping up a strict quarantine where so many children had to be attended to by the mothers, every one of her sister's seven unprotected children escaped the contagion. Now this, I think, has a bearing on the question of isolation. I confess it was with considerable alarm that I thought of so many children, unprotected by any previous attack, being exposed to the contagion of evidently a very bad type of the disease. The difficulties in the way of removal were such that I did not see how it could be accomplished, and they were accordingly allowed to remain. But suppose they had been separated, that those unseized had been removed to a distance, I would naturally have inferred that the isolation in this case had been instrumental in saving the children from being attacked. It would have borne *à priori* evidence on its front in favour of such a view, as, it might have been argued, the probability of seven unprotected children so thoroughly exposed escaping the attack of such a contagious disease, and of such a bad type, was very slight indeed. I do not by any means wish to say isolation should not be attended to where it can be conveniently accomplished.

My object is rather to guard against error in inference, for such a case might have been cited, as I have seen similar cases have been cited by others, "to prove that the disease on breaking out in a family could, by means of isolating the first attacked, be prevented from spreading further," whilst in reality it proved no such thing.

A very noticeable feature, and one generally attended by grave sequelæ, was the persistently rapid pulse. If after the lapse of five or six days, a period corresponding in by far the largest number of cases to the crisis, the pulse did not begin to fall, in cases primarily uncomplicated,—the rash meanwhile possibly declining or having disappeared,—it was almost invariably a sure sign that some secondary complication was about to declare itself. Sometimes a diphtheritic affection of the throat or nostrils would supervene, although the throat had previously been very little affected; or suppuration of the ear; or intense cephalalgia; or insomnia; or suppression of the renal secretion and convulsions; the pulse all the while jerking, sharp and small, and from 120 to 180, or more. In this way many cases, which had left what might be called the normal rut of the disease, ran on week after week, one complication cropping up after another had just been so far mastered as to lead to the hope that the patient was, after all, going to struggle through the terrible ordeal, until perhaps six weeks or two months elapsed, when death came to the rescue, relieving the little sufferer from great distress and the attendant from great anxiety. This character of the pulse I had over and over again to observe, viz., that if its frequency did not begin to diminish at a time corresponding to that at which the patient should have reached the crisis, notwithstanding the fever might have abated, the appetite slightly rallied, and the patient got more refreshing sleep, there was almost to a certainty some secondary complication, as I have before expressed, working behind the scenes, and about to make itself manifest. Many cases might be cited bearing out this statement, but the case of this little girl will illustrate the point at issue, and suffice. Catherine K., aged six years, a stout girl of good constitution, and who had always enjoyed

good health, was seized with scarlet fever of a very mild type. The disease was ushered in by no very severe symptoms, in particular, there was neither vomiting nor purging to any extent. The rash was slight, throat affection also slight, temperature moderate, and pulse 95 on an average. She was kept in bed, was lightly nourished, and slept, considering her disease, calmly and well. Bowels were regular, the urine was passed in good quantity and regularly, and at the outset was free from albumen. About the fifth day the child felt so well as to be inclined to sit up in bed; but still, with all this improvement, the pulse was high, indeed, had not at all gone down as might have been expected from the apparent improvement in her general condition. A few days after this the pulse began gradually to creep up, and rose to 120. Severe continued headache was now complained of, was constantly referred to left parietal region, and accompanied with complete sleeplessness. The slightest movement, as in lifting her or turning her in bed, very much aggravated the pain, and caused her to cry out piteously. As the case went on other complications began to appear; the throat took on a diphtheritic appearance, the fauces and tonsils got covered by a muco-membraneous exudation, which evidently extended into the nostrils, and from which there was a nasty ichorous discharge. The headache gradually yielded, but never quite left. She afterwards improved so that she could swallow well, and breathe quite freely; the diphtheritic exudation had disappeared from the throat, but still the pulse kept rising, and I dreaded yet farther complications. The urine, which up to this had been passed in good quantity, now became scanty and intensely albuminous, but not bloody; and the face became, for the first time, slightly puffy. There was no pain over the lumbar region. The pulse now rose to 180, became small and jerking, and continued persistently high. The child lingered on, got gradually worse, and died.

Now regarding the epidemic itself. During the months of April, May, June, July, August, and September, the fever raged with unabated fury. But with October came a lull, and for two weeks in the middle of the month there were not

more than one or two cases in the village or its westward neighbourhood, and we were hoping the pest had gone. But towards the end of the month it again appeared with increased force, few children escaping who had not previously been attacked. In the second outbreak, however, a change was observable in the nature and mode of attack. The cases were not now so regularly ushered in with severe vomiting and purging. The vomiting was now comparatively slight, and not nearly so sudden in its accession, and the throat affection was much sooner complained of and much more severe. Coma was less frequently met with, and the fever never rose so high. The throat affection now more frequently assumed a diphtheritic aspect. Especially was this the case about the crisis of the fever; more sloughy and gangrenous, and less purely membraneous than true diphtheria, and always accompanied with great difficulty in swallowing, and with nasty sanious discharge from the nostrils. The simple submaxillary bubo was now less frequently seen, and the congested throat had now assumed a more serious character. With the advance of the season the temperature of the atmosphere was very much lowered, and concurrent with this there was a decided difference observable in the after comportment of the disease. The average temperature of the summer months of 1868 had been more than usually high, and cases of renal congestion were very rare: indeed, there are no cases taken notice of as such in my notes during the warmer months, *i.e.*, during the first part of the epidemic. But in the second outbreak, renal congestion and consequent dropsy became very prevalent, owing, I doubt not, to the arrest of the cutaneous elimination of the toxic agent. Another feature peculiar to the second outbreak was, what I have already to a certain extent referred to, that, as a rule, the cases were much less severe and sudden at the outset and up till the third or fourth day, than they had been before. The consequence of this was, that patients felt so well as to insist upon being allowed to rise or sit up in bed—a request not unfrequently complied with,—and it generally ended in puffiness of the face, and more or less suppression and albu-

minous urine, with possibly general anasarca of a most intractable nature. This not unfrequently proved fatal by destroying the secreting part of the renal organ, or producing pulmonary œdema. Parotid enlargements were also very frequently met with—were, indeed, quite epidemic during the second outbreak, whereas during the hot weather they had been very rare.

As it is always of importance, if possible, to understand something of the source of the disease, and also to understand the general sanitary condition of a town during the prevalence of an epidemic, I will now state what light could be obtained bearing upon the source of the fever, and how our town and immediate neighbourhood stood in regard to sanitary arrangements.

In the spring of 1868, W. N., his wife, and family, came from Glasgow to reside in the vicinity of Neilston. They were in good health at the time of coming here. Scarlet fever was in their neighbourhood in the city, but to the best of their knowledge they had been no way in contact with it. The house they now occupied was small and ill-ventilated, and had in it two recess beds and one window, and the door entered from the side of a passage. They were only a very short time here when two of the children took ill, next the mother was laid up, and lastly the father himself; and when I saw them there was no doubt of the scarlatinal nature of the disease from which they suffered. Several cases of scarlet fever made their appearance very soon after this in the village, but I am not aware that there had been any before it for some years. Whether or not this was the source of our epidemic might possibly admit of doubt; but certainly they associated themselves very strongly in my mind as such, from being the first cases in the district.

State of drainage.—The relation of drainage to the origin and spread of epidemic disease being still, to a certain extent, *sub judice*, I am induced to say a word on the state of drainage in the village. Previous to 1867 there were several very large open drains in and around the village, into which the refuse and sewage of the whole town by various ways found exit. In one large drain in particular, the sewage remained,

to a great extent, stagnant for months together in hot weather. But in 1867 and 1868 these drains were "laid" with vitrified drainage pipes, and "covered in," so that the village during the middle and end of 1868 had never been in a better state as regards drainage.

Water supply of the village.—The villages eastward of Neilston, *i.e.*, between Neilston and Glasgow, are all supplied by water from the Gorbals Gravitation Water Company, whilst the water used here is solely derived from spring wells. In 1867, when a threatened visitation of cholera was impending in Glasgow, a committee was appointed here to inquire into the sanitary condition of the place, and take such steps as might be deemed expedient to put the town in the best condition to ward off epidemic disease. With this view, samples of water from all the "wells" in the place were sent to Professor Penny, of Glasgow, for analysis; and I am, through the kindness of our Sanitary Inspector, enabled to incorporate extracts from his reports in these notes:—

"'BIG WELL' WATER.

"An imperial gallon of this water was found to contain 34.40 grains of dissolved ingredients, consisting of:—

Organic matter, ...	4.00 grains.
Saline matter, ...	30.40 "
	34.40 grains.
Hardness, ...	16°5

"*Remarks.*—In colour, taste, and other physical qualities, this water is unexceptionable. The analysis shows, however, that it is strongly charged with saline substances, and contains a larger proportion of organic matter than is usually found in good and wholesome waters.

"In the course of its examination, distinct evidence was obtained of the presence of a small quantity of surface drainage, and of matter analogous to sewage. The organic matter, also, was partly of an animal nature; and the presence of nitrates, and the quality and proportion of saline ingredients, point strongly to the pollution of this water, with a minute trace of drainage products.

"I am not prepared to say that it is actually prejudicial to health; but I am quite clear that its habitual use for drinking is not desirable, and that in times of an epidemic—such as cholera,—its domestic and dietetic use would be attended with considerable risk. It is, moreover, one of those waters which are liable to vary at different seasons, so that it may, at times, be more strongly and seriously polluted than the sample here reported on."

I may here remark that the inhabitants who had their water supply chiefly or solely from this well suffered very severely from scarlet fever. The largest number of fatal and intractable cases took place within what might be designated *the radius proper of its water supply;* almost all the cases were of a low typhoid type; many of them proved fatal in the earliest stages; and many, indeed a large proportion of such as did drag through the crisis, were seized with sequelæ of the very gravest nature.

"'CROSS WELL.'

"An imperial gallon of this water was found to contain 72 grains of dissolved ingredients, consisting of:—

Organic matter, ...	4.00 grains.
Saline matter, ...	68.00 "
	72.00 grains.
Hardness, ...	30°

"*Remarks.*—The very large proportion of sulphate of lime, and of nitrates and chlorides in this water, is conclusive in showing that it is polluted with the products of surface drainage of the nature of sewage, from an inhabited locality. The organic matter is also in notable quantity, and partly of an animal and noxious character.

"I am clearly of opinion that this water is not only impure, but decidedly unwholesome for habitual use as a beverage, as well as extremely unsuitable for the preparation of food, and for other domestic purposes. It will vary in the quantities of its ingredients according to the season; but I am satisfied that it will at times be more seriously polluted, and more objectionable than the present sample indicates."

I would remark of this "well," that it is closely situated to "Gallocher's Well;" and as the water from the latter is popularly believed to be better than that from the former, its water is, on this account, not so largely used. There were few cases of scarlet fever within what we shall call the *radius proper of its water supply;* but this may in part be explained upon the ground of its being surrounded chiefly by shops.

"'GALLOCHER'S WELL.'

"An imperial gallon of this water was found to contain 39.00 of dissolved ingredients, consisting of:—

Organic matter, ...	6.04 grains.
Saline matter, ...	32.96 "
	39.00 grains.
Hardness, ...	28°5

"*Remarks.*—This is an impure and polluted water. It evidently contains products derived from objectionable surface drainage, and it will, I have no doubt, be at times more contaminated with hurtful matters than the sample analysed.

"The organic matter is in large proportion, and of a noxious character. The presence of nitrates, and so marked a quantity of sulphate of lime, is peculiarly indicative of its being polluted with matter from objectionable sources.

"I consider it a decidedly unwholesome water; and, although clear to the eye and pleasant to the taste, I have no hesitation in recommending that its use for dietetic and domestic purposes should be discontinued."

The water from this well is much liked, and largely used throughout the town for dietetic purposes. The fever was not specially severe in its more immediate neighbourhood.

"'HIGH BROADLY WELL.'

"An imperial gallon of this water was found to contain 19 grains of dissolved ingredients, consisting of:—

Organic matter, ...	1.60 grains.
Saline matter, ...	17.40 "
	19.00 grains.
Hardness, ...	10°

"*Remarks.*—Judging from the result by the analysis of this sample, the water of 'High Broadly Well' is of fair quality for domestic use. It is perfectly colourless, and quite free from all sedimentary matter, and devoid of odour. The total amount of dissolved ingredients is not in excess of the quantity contained in many waters used for town supply, and none of the ingredients can, in the proportions in which they are present, be regarded as hurtful or objectionable.

"The amount of organic matter is small, and not objectionable; but the presence of nitrates in so notable a quantity, is an indication that a little surface drainage is finding access to the well, and leads to the suspicion that at times the water may be polluted to an objectionable extent; but, in order to decide this point, it would be necessary to examine it at different seasons, especially after heavy rains, and after long-continued dry weather."

It may be observed that the inhabitants of the locality most likely largely to use this water enjoyed a comparative immunity from the fever. The fever did break out in its vicinity, but was by no means of the low typhoid type witnessed amongst the people whose water was chiefly derived from the "Big Well." The disease was here much less fatal, and more easily manageable; indeed, so much was this the case, that not a single case had a fatal issue. I may also remark that the water from this well is held in high repute by a large section of the inhabitants, and is very generally carried even to some distance for certain domestic purposes.

"'TOLL WELL.'

"An imperial gallon of this water was found to contain 11.5 grains of dissolved ingredients, consisting of:—

Organic matter, ...	1.40 grains.
Saline matter, ...	10.10 "
	11.50 grains.
Hardness, ...	7°5

"*Remarks.*—The physical character and chemical analysis of this water clearly shows that it is good and wholesome. In colour, taste, and appearance it is all that could be desired,

and none of its ingredients are hurtful or objectionable. The organic matter, which is wholly of a vegetable nature, is in very small proportion, and quite harmless. It is free from iron and nitrates, and from all injurious metallic impregnation."

It may be stated that there are very few inhabitants in the vicinity of this "well," that scarlet fever did make its appearance amongst them, but there were only a very few cases.

After receipt of the above reports, measures were taken to put into practice such improvements as they naturally suggested. Certain of the wells were thoroughly cleaned; others, where leakage from without was suspected, were "cemented round;" and when drains came near the wells, "vitrified sewage pipes" were "laid," for the double purpose of facilitating the passage of sewage on the one hand, and preventing its soaking into the ground and possibly contaminating the waters, on the other. Moreover, dungsteads were cleaned; those that were too deep were made shallower, in order to prevent stagnant water from collecting. Where pigs were kept so near to dwelling-houses as to be considered prejudicial to health, they were ordered to be removed farther from dwelling-houses. And yet with all this sanitary improvement, the epidemic, which had made its appearance amongst us, spread from house to house with a degree of virulence truly alarming.

It may, of course, be argued, and to a certain extent correctly so, that the town could not have had time to reap the benefits of the improvements adopted, consequent upon the reports of the analysis of the water, before the fever made its appearance amongst us. The reports were made in 1866; the improvements were commenced in 1867, were finished in 1868; and in the spring of the same year the epidemic broke out. So that the water supply of the village, and the atmospheric condition as regards malaria from the large open drains, must have been the same, or very nearly the same, as it had been at the time of the reports, and, moreover, must have continued so till a date sometime later than the first appearance of the scarlet fever epidemic amongst us.

Inferences made from an inquiry into the circumstances

connected with an epidemic of such limited extent, as the one we are now considering, would require to be drawn with great caution, and possibly much reservation. But certainly it would not be too much to suggest the question for consideration—viz., How did scarlet fever, where present, comport itself in villages supplied by water solely or chiefly derived from the Gravitation Company, as compared with villages whose water supply was from spring wells? And, where the water supply is mixed, partly derived from the Gravitation Company and partly from spring wells, had scarlet fever any apparent special relations to the radius of the water supply of the spring wells and Gravitation water pipes; and if so, what were those relations respectively?

III.—TWO CASES OF DIPHTHERIC PARALYSIS, WITH REMARKS.

By DAVID EASTON, B.A., M.D., *Stranraer.*

THE following cases may be taken as good examples of the secondary nervous affection known as diphtheric paralysis. They exhibit in a marked degree many of the chief symptoms observed in that disease; they show, also, that the severity of the secondary affection must not be taken as an indication of the gravity of the primary (the secondary disease merely shows the greater amount of the blood poisoning), for, as in the second case, you may have paralysis due to diphtheric influence, although this may not have been accompanied by its usual local manifestations; and I have attended several cases of diphtheria much more severe than the first, and who recovered perfectly, without in the slightest degree showing a single symptom of the secondary nerve affection. In the first of these cases, I unfortunately did not examine the patient's urine, so that I am unable to say whether or not it contained albumen; but the fact of an interval of convalescence of nearly a month, goes far to confirm the supposition that at that late period it did not contain that substance. At no time during the progress of the second case could the smallest trace of it be detected in the urine. My first patient had completely recovered his former colour, vigour, and strength, before the accession of the first nerve symptoms; and my second, although not robust,