THE
COMPLICATIONS
OCCURRING IN 600 CONSECUTIVE CASES
OF
SCARLATINA.

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ON THE COMPLICATIONS OCCURRING IN 600 CONSECUTIVE CASES OF SCARLATINA.

Of all diseases, with few if any exceptions, Scarlet Fever presents the greatest number and variety of complications. Nostage of the disease is exempt from these occurrences, nor does the mildness or severity of the primary attack seem to exert much influence in preventing or determining their onset.

Almost all the organs of the body may be involved, and in many cases are left with their function permanently impaired.

Of 600 consecutive cases of Scarlatina treated in Ruchill Hospital, Glasgow, from Sept. 1900 to June 1901, 195 showed symptoms of one, or more, of the recognised complications of the disease. In this number are included 20 cases in which more than one complication was observed; so that, no case having been affected with more than two, deducting 20 from 195, we arrive at the number of patients showing such symptoms, or 175, a percentage of 29.16.

Thus it is evident that practically one out of every three persons, suffering from Scarlatina, will ultimately develop symptoms of one or other of the numerous intercurrent affections, to which the disease is liable.

In discussing this subject, I have not included those cases in which symptoms occur pointing to involvement of the central nervous system, such as the delirium commonly manifest in acute cases in the early stages of the disease. Nor have I touched upon those in which the condition of the throat is extremely grave, or those where toxic symptoms are especially prominent, as I consider that such cases may be placed in one or other variety of the typical disease. Only those are here mentioned, in which some affection develops, outwith the range of a typical attack of Scarlatina, some departure from the normal.

TABLE OF COMPLICATIONS.

Albuminuria (Simple)	35.	5.83 per cent.
Acute Nephritis	31.	5.16
Rhumatism	25.	4.16
Bronchitis	24.	4.
Otitis	20.	3.33
Endocarditis	15.	2.5
Eczema	12.	2.
Adenitis	9	1.5

Urticaria	8	1.33
Secondary Throat	6	1.
Broncho-pneumonia	4	0.66
Lobar Pneumonia	3	0.5
Paralysis	2	0.33
Jaundice	1	0.16
Ophthalmia	1	0.16
Purpura Haemorrhagica	1.	0.16

Albuminuria. In treating of Simple Albuminuria, I have excluded all cases in which albumen accompanies, and may be accounted for by a high temperature at the beginning of the illness, and also those in which the condition did not last at least three days. Further those cases, of somewhat frequent occurrence, in which a faint haze is visible on boiling, with the subsequent addition of a drop of acetic acid, but which do not show any confirmatory evidence with nitric acid in the cold, or with Pieric Acid in saturated solution, have also been excluded.

It is extremely difficult in many cases to draw a hard and fast line between Simple Albuminuria and Nephritis, and some must of necessity be included in the former category

which more properly belong to the latter.

Taking all the preceding into consideration I shall shortly describe in what manner the distinction has been made. Only cases showing no diminution of urine and no anasarca, in which blood has been absent from the urine when examined microscopically and by means of the Guaiacum Test, and where the microscope has failed to reveal any tube casts, have been placed in the class of Albuminuria. To recapitulate, Simple Albuminuria includes all cases in which the presence of the albumen cannot be accounted for by a high initial, or subsequent, temperature; where the condition has lasted at least three days; in which the presence of the albumen is shown by the use of nitric acid in the cold and by Picric Acid; where there is no diminution of urine, no anasarca, nor any appearance of blood, and finally where no tube-casts can be discovered.

Taking the average date of the appearance of Albumen in the urine it seems that the middle of the second week is its most frequent period of onset; its incidence varied from the end of the first week to the sixth, but no cases have been observed in which the onset was longer delayed. While a small quantity of albumen in the urine need cause little anxiety of itself, yet cases occur in which the

condition assumes, it may be with startling rapidity, the aspects of acute Nephritis.

The cause of the presence of albumen in the urine is somewhat difficult to decide. Dietitic peculiarities may apparently give rise to it, as in the case of a girl five years old, in whom an attack was always excited by partaking of fish, while in another case, a boy of six, potatoes seemed to be the exciting cause. When these respective articles of diet were with-held no sign of albuminuria appeared. This tendency lasted for four weeks and then passed off.

Assuming the erect posture was the signal for the appearance of albumen in the urine of a girl of nine, though when this patient was confined to bed no trace of it could be found; this condition disappeared after a fortnight.

In all other cases no cause could be assigned, and its frequency seemed to be as great in summer as in winter, in proportion to the prevalence of the disease. Females seemed to be somewhat more liable than males, in the proportion of 20:15.

The most probable cause would seem to be the involvement of the renal epithelium in the general scarlatinal process, and the consequent weakening of these structures, thus rendering them less resistant to the passage of

albuminous substances from the blood stream.
To this subject I shall return in treating of nephritis.
One condition which seems to predispose to albuminuria seems to be overcrowding of wards with consequent reduction of air space and defective ventilation, and this applies not only to albuménuria but to almost all the complications of Scarlet Fever.

The average duration of Simple Albuminuria is about a week, but relapses are not uncommon, and some cases continue for four weeks with only slight intermissions.
The age at which albuminuria was most commonly manifest in this series, was on an average 13 years.
As regards treatment, the great majority of cases require none, though watchfulness is necessary in all in case symptoms of acute Nephritis supervene. Usually the condition arises before the patient has been allowed up, so that the enforcement of the recumbent posture is in most cases unnecessary.
No restriction of diet is as a rule necessary, but if the quantity of albumen tends to increase, a low diet becomes imperative.
Of drugs the best results seem to be obtained with urinary antiseptics such as urotropin in doses of 10-15 grains combined with an equal quantity of Sodii Bicarb. and with

astringents of which the best are Perchloride of Iron, in doses of 10 minines of the Tincture, & Ferro-Alumen, 1 drachm to 1 pint of water, half a pint of this solution to be taken during the day.

Acute Nephritis. Of all the complications of Scarlatina the most immediately serious, and most frequently fatal, is acute Nephritis. This condition occurred 31 times in the foregoing list, giving a percentage of 5.16, and of this number 5 died, a mortality of 16.13 per cent of those attacked, or over all of .83. The total number of deaths amounted to 12 and, deducting from these two in which toxic symptoms, amounting to malignancy, were evident, and the fatal result ensued within 36 hours from the onset of the disease in the one case and 40 hours in the other, it will be seen that acute Nephritis was responsible for 50 per cent of the total mortality.

The severity of the original attack seems to have little influence in determining the onset of Nephritis. Of the above 31 cases, 8 were of special severity, 8 were moderate, and in the remaining 15 the attack was slight. Of the cases which terminated fatally, the primary condition in 2 was slight, in 2 severe, and in 1 moderate, which would lead us to suppose that, should a severe case of Scarlatina

subsequently develop Nephritic symptoms, the chances of such an attack terminating fatally are considerably enhanced.

The ages of the patients attacked ranged from 2 to 16, being on an average 7, so that, comparing this result with that arrived at in treating of Simple Albuminuria in which the average age was 13, it is evident that the younger the patient, the greater is the danger of Nephritis supervening; and what is originally a simple albuminuria, and continues so to be in the older subject, has a greater tendency to develop graver symptoms in the younger.

Sex seems to have little influence on the etiology of Nephritis, there being 16 males and 15 females attacked, but considering that over all females considerably outnumbered males, (342 females to 258 males), there may be a greater tendency for males to be attacked.

As regards seasonal influences, more cases were developed in the Autumn than at any time during the rest of the year. This is to a certain extent coincident with the greater prevalence of Scarlatina at that period, but as the admissions continued with only slight diminution in number from the opening of the Hospital, on Sept. 15th 1900, until the middle of January 1901, something else must be taken into consideration.

During the first four months from its opening, the Hospital was extremely overcrowded, as many as 40 being crammed into

a ward the air space of which was only sufficient for 18, though even with that the recognised minimum of 2000 cubic feet per patient could not be obtained.
In December and January the number in the wards was gradually reduced to the proper proportions and this was followed by a reduction in the frequency of complications as a whole.
I shall again discuss this subject of overcrowding more fully at a later stage of this article.

Of course there are many things to be considered in determining the causation of Nephrtis in Scarlatina, and doubtless the wards being new and consequently damp, combined with the difficulty of satisfactorily working the ventilating arrangements of a new hospital, must have contributed to the general causation in the first instance.
The early part of the year 1901 was much more severe as regards cold than the latter part of 1900, but was not so damp generally, so that cold alone does not seem to be the greatest exciting cause.
As regards the immediate cause of Scarlatinal Nephritis conjecture alone is possible. Doubtless the epithelium of the glomeruli and of the uriniferous tubules is involved in the general scarlatiniform process, and, as some have suggested, may take part in the desquamative process in a similar manner to the skin. This theory is borne out by the frequency with which renal epithelium, as distinct from

tube casts, in all stages of degeneration is discovered in the urine. Doubtless also a kidney so weakened must be much more liable to inflammatory conditions, on any extra strain being inflicted upon it, as for instance, on getting out of bed for the first time. In 9 cases out of 31 assuming the erect posture was the signal for the onset of Nephritis. Again if we suppose that the affection is of Bacterial origin, the kidney must, in such a condition as above described, readily fall a victim to the inroads of the micro-organisms or their toxius.

In 2 cases of acute Nephritis, all possible aseptic precautions being taken, the parts having been first rendered as sterile as their nature permitted, and the urine being drawn off through sterilised catheters into sterilised vessels, I succeeded in isolating a coccus closely resembling, if it were not identical with, the Staphylococcus albus. From the urine of another case also, at a very early stage of the disease, namely the second day, and which did not subsequently develop Nephritis, a similar organism was isolated.

This coccus grew, readily on nutrient gelatine at room temperature, without liquefying the medium, forming small elevated opaque colonies of a glistening white colour and showing a granular appearance under a low power of the microscope. On nutrient Agar-Agar, Glycerine Agar, &

solidified blood serum, it also grew readily, forming slightly elevated white streaks, having minute rounded projections from the sides, as in cultures of the Staphylococcus albus. The organism was readily stained by the common basic Auiline dyes, & also stained by Gram's method. Under a high power of the microscope it was found to form irregular masses, with a tendency to run into double chains of from 4 to 9 elements, one end of the chain, however being usually more irregular & tending towards the Staphyllous arrangement.

The number of cases in which such an organism was found is too few for the purpose of drawing any conclusion. Specimens of urine from 17 cases were examined each 3 times, and the organism was only discovered in three. The coccus may quite possibly be identical with the Staphylococcus Pyogenes Albus and yet it would be sufficient to account for many of the symptoms of Nephritis.

In an organ of such extreme vascularity as the kidney, pus formation will seldom occur, though in one of the cases included in the list, such a condition arose, and yet all other symptoms of acute inflammation may be present. The kidney then being in a susceptible condition from the ordinary effects of the disease, must be, as previously observed, peculiarly susceptible to the invasion of an organism, whether the specific microbe of the disease or not.

The average duration of the disease is from 3 to 4 weeks, but some cases persist for as many months and may even then be dismissed with a certain amount of albuminuria remaining.

Taking a typical case of Scarlatinal Nephritis the symptoms will as a rule take a course somewhat as follows-:

The case may or may not have been severe originally but, in any case, has followed the ordinary course, and convalescence is proceding satisfactorily when, at the end of the third week the urine suddenly diminishes and oedema develops. This diminution may be preceded by the appearance of albumen in small quantity in the urine, and there may be some prodromal rise of temperature; in a number of cases, however, neither was observed. A symptom which is almost invariable in its appearance at an early stage and which is often most distressing in its effects and most difficult to allay, is vomiting. Diarrhoea also is sometimes observed at the commencement, and may persist throughout the attack. The oedema is well marked in the face and in the extremities but in severe cases it involves the whole body and may even cause considerable ascites. When it persists for a few days it gives the skin a waxy, semi-transparent appearance which is very characteristic. In severe cases there is usually restlessness with a tendency towards delirium in the early

stages, and if the affection continues with undiminished severity, drowsiness gradually supercedes the restlessness, and is a grave symptom. Pain in the back is occasionally and headache frequently complained of.

The urine is scanty high coloured and of high specific gravity (1020-1030), usually containing blood in considerable amount as well as much albumen, in some cases however, there may be little or none of either in the earliest stages. These symptoms as a rule persist for two or three days, when the urine gradually increases in amount and the specific gravity falls but the blood and albumen still continue abundant and the excretion of urea is below the normal. At the end of a week the oedema has almost entirely disappeared. The blood & the albumen coincidently diminish, the former disappearing, however, before the latter, and on an average in three weeks from the onset of the symptoms the patient has recovered, though still very anaemic.

The pulse is as a rule very characteristic in the kidney disease of Scarlet Fever. In the majority of the cases it was rapid and incompressible but in some while still rapid it was markedly soft. The most characteristic feature, however, was its irregularity. This was, in a few of the cases, present from the beginning of the attack but in most it became manifest within the first 24 hours.

About the second or third day this acceleration of the pulse gives way to a very marked retardation, the irregularity being still evident, and the rate may fall as low as from 50 to 60 per minute. Im one of the cases this retardation was present from the first. The irregularity as a rule persists until recovery begins to take place, when, first of the cardiac symptoms, it disappears. There is as a rule an appreciable amount of Cardiac dilatation. Microscopically large numbers of red blood-corpuscles are visible in the urine from an early date as well as blood casts. As the condition begins to improve these casts are replaced by others of a granular nature, which in their turn diminish and finally disappear, asconvalescence proceeds to recovery. A trace of albumen may persist for some days after all casts have disappeared from the urine.

Oedema was entirely absent in 16 out of the 31 cases though the disease otherwise followed a similar course to the above. It occurred in all cases that ended fatally. The onset of the symptoms may be more gradual andwithout any rise of temperature. A haze of albumen, gradually increasing in quantity, may appear in the urine, and may be followed by the appearance of blood in greater or less quantity. There may be no diminution in the quantity of urine but, on the contrary, as in two of the above cases, there may be an

increase from the beginning, the urine being of very low specific gravity (1004-1010)

Again cases occur in which, though there may be marked diminution of urine, amounting almost to suppression, there may be neither blood nor albumen therein, or the latter only in very small quantity. In 3 cases, two of which proved fatal, such a condition was noted, and all were of very sudden onset. In both of the fatal cases above mentioned, death took place soon, in one case 30 hours and in the other 36 hours after the onset of the symptoms.

In 7 of the 31 cases, or 22.57 per cent. albumen was present in large quantity, with granular casts, in the urine, but no blood could be detected, nor was there any rise of temperature. oedema, or diminution of urine.

Relapses, or more properly recrudescences, are common in Scarlatinal Nephritis. In six cases a recrudescence took place, while in two there was a distinct relapse. Nothing that would account for these occurrences could be discovered, except in one case in which the relapse occurred on the morning after the child had been allowed up, the urine having been free from albumen for 10 days, and from blood for 18. In one case the recrudescence proved much more severe than the original attack, but as a rule they followed a much milder course, & were of shorter duration.

It is unfortunate that in none of the fatal cases of Scarlatinal Nephritis would post mortem examination be allowed, as the appearance of the kidneys cannot be described in consequence.

The treatment of Nephritis involves two primary considerations; the increase of the urinary flow and the reduction of blood, and coincidently of albumen, therein contained. To give relief to the overcharged kidneys the usual recommendation is to stimulate the sweat-glands to active secretion by means of hot wet, or steam packs, but the danger of this practice is seldom touched upon. In my experience of such cases hot packs of any kind should be avoided as far as possible, and should only be employed when the strength is well maintained, and when the skin is already acting be it ever so slightly.

Of the fatal cases enumerated I am of opinion that this result was directly caused, or at least materially hastened in two cases by hot wet packing in one case, and by steam packing in the other. With a hot dry skin and a rapid incompressible pulse, with marked irregularity, so often noted in this disease, hot packing frequently does irreparable mischief unless it be reinforced by some method calculated to lower arterial pressure and dilate the capillaries of the skin. Liquour Trinitrini answers this last requirement admirably, and ought to be given in doses

of 1/100th of a grain every 3 hours. By this means blood pressure is lowered, by the dilatation of the minute arterioles of the skin, and doubtless also of the kidneys, and consequently there must be greater radiation of heat from the integument than when the vessels are firmly contracted under the influence of the disease.

Poultices over the lumbar region, and dry cupping in same locality, are of doubtful benefit but may be of some.

Wet cupping may be beneficial judging from the admirable result that attended venesection in one of my cases.

The patient a boy of 7 years, was admitted on December 28th 1900, suffering from Scarlatina of 3 days duration. The rash was fairly well marked but fading, the throat was deeply congested but clean, and the tongue typically scarlatiniform. Temperature was 102.2°, pulse 120 soft but regular, and respiration 25.

Temp. fell to normal on the 3rd day after admission and convalescence was established by the beginning of the second week.

On the morning of January 26th 1901 his temperature was found to be 103.2F, pulse was 130. hard and irregular; respiration 30. Face was flushed and somewhat cyanotic; skin was very dry; urine was suppressed. This seemed to me to be a case in which hot packing would be distinctly dangerous and as the child seemed full-blooded, having

regard also to the somewhat cyanosed condition, I determined to try the effect of venesection. The consent of the child's parents having been obtained, three fluid ounces of blood were withdrawn from the left median basilic vein. There was no faintness throughout and even before the operation was completed the respiration, which had before been laboured, became much calmer. After the operation the pulse, though still hard, had lost much of its irregularity. At the end of an hour the child fell asleep, the temperature having dropped to 102.4°, and while asleep his skin broke into a profuse sweat. Sleep lasted for 3 hours at the end of which three ounces of urine were passed, highly albuminous and very bloody. The temperature by this time had fallen to 100.2° F. That evening 6 ounces of urine were passed and the skin was still acting freely. On the morning of January 27th, the temperature was normal, the urine was much increased, and the child thereafter made an uninterrupted recovery.

The administration of Digitatis to combat the irregularity of the heart, and to strengthen that overtaxed organ ought to be avoided. It is well known that Digitatis has a powerful effect in contracting the peripheral vessels and this contraction, added to that which already exists, merely increases the work that the heart is called upon to perform. Strophanthus, with perhaps the addition of

Srychnine, better fulfils the required conditions as it exerts no influence on the arterioles and is besides more suitable in all respects for young children; further, its effects are not nullified by a high temperature as is the case with Digitalis. Large doses of the saline aperients, such as Magnesium Sulphate, are of value at the commencement of treatment to draw off as much fluid from the system as possible. By this means the kidneys are relieved and a certain amount of urea is eliminated. To check the vomiting so frequently a symptom in such cases, very little can be done, and its treatment resolves itself into the removal of the cause. A combination of acetate & citrate of Potassium in large doses seems to be of value in assisting diuresis, but cannot be given when vomiting is present, these salts ought to be administered frequently when the condition of the stomach permits.

Perhaps, the treatment which of all others gives the greatest promise, is the introduction into the cellular tissue of large quantities of normal salt solution.

Two cases of special acuteness were so treated with the best results.

The mode of procedure was the same in both so I shall describe one case as an example.

The patient, a girl of 9, was admitted on November 14th 1900 suffering from a moderately severe attack of Scarlatina of

2 days duration. Convalescence was established by the 7th day, and proceeded satisfactorily until the evening of the 15th from the date of admission, or the 17th from the onset, when the temperature rose to 103°, and the urine was suppressed. There was some oedema of the face and of the lower extremities, but not very marked. The pulse was 140 per minute, soft and running, skin hot & dry and the respiration 32.

Next morning the temperature was still 103° but the pulse had risen to 150 and the respiration was 35; there was marked irregularity of the pulse and the area of cardiac dulness had increased half an inch to the left, there was still absolute suppression of urine. During the night drachm doses of Magnes. Sulph. were administered every hour for 3 hours but had to be discontinued on account of sickness.

Minim doses of Liq. Trinitrin were also given every 3 hours and were retained.

As this seemed to be a very suitable case on account of the extreme weakness of the pulse, it was decided to try the effect of intracellular injection of saline solution.

The abdominal wall having been thoroughly cleansed,

10 ounces of sterilised normal salt solution were gradually introduced into the cellular tissue in that region by means of a medium sized aspirating needle connected by a rubber tube, with a glass funnel, the whole apparatus having been previously sterilised.

A clip was attached to the tube to regulate the flow of the fluid. Two hours later a similar quantity of the solution was introduced and in about an hour and a half the flow of urine had commenced.

About 2 oz. of very bloody and highly albuminous urine were passed but towards evening the blood and albumen were distinctly diminished. Next day the amount passed came up to the normal standard, blood and albumen being still less. The pulse within an hour after the first injection had very distinctly hardened and had lost much of its irregularity, but its rapidity was maintained. The temperature also remained at the same level until the flow of urine was reinstated, when it steadily declined and was 100.2 at 10p.m. During the night it fell still further and was normal at 10 a.m. on the following day. The respiration was much easier after the administration of the solution and declined coincidently with the pulse. Half an hour after the second operation the pulse had fallen to 140, being firm and regular, and its rate gradually diminished during the day being 120 at 10 p.m.. Next morning it ran at 96 and was

still good. Recovery was complete in 8 days.

The second case was not so rapidly successful as that above mentioned, and required a repit ition of the solution in the same quantity, on the following day. The result however, was highly gratifying in both.

To control the loss of albumen and to counteract the resulting anaemia, which is frequently intense, the Tincture of the Perchloride of Iron, or Ferro-Alumen gave the best results.

Diet should in the early stages be bland and unirritating. Skim milk, demulcent drinks such as Barley water and Imperial Drink, consisting of Cream of Tartar & Lemon Juice, are useful.

As the flow of urine increases farinaceous foods may be added and a lightly boiled egg, or one beaten up with milk, once or twice daily is advisable.

Stimulants are of doubtful benefit unless the state of the heart urgently calls for them when champagne is undoubtedly of the greatest value.

Rheumatism Rheumatism as a complication of Scarlet Fever was observed 25 times, a percentage of 4.16. It appeared as early as the 2nd day and as late as the 56th, but on an average of all cases, 14.8 days after the onset of the original disease. If we deduct two cases in which its

appearance was unduly delayed, namely, 44 days in one case and 56 in the other, the average date of onset is reduced to 7.8 days. Its appearance was heralded in all the cases by some rise of temperature, amounting to one or two degrees, unless in those cases where the original attack was still in its acute stage with the temperature high, when no farther increase was observed. Where Rheumatism occurred in a case approaching convalescence, but where the temperature had not quite fallen to normal, a farther rise was noted, and either coincidently or at latest on the following day pain was complained of and swelling of the joints became evident.

The joints most frequently affected are undoubtedly the wrists. One wrist alone was affected in 3 cases and both wrists in 9; other Joints also may be involved but not with the same frequency. In the list below I have shown in the form of a table, the joints involved, and the number of times each was affected:-

One wrist	3 times
Both wrists	9 "
Wrists & finger joints	4 "
Wrists and Ankles	3 "
Ankles	3 "
Knee	2 "
Elbow	1 "
	25.

From the above it will be seen that the larger joints are seldom affected, no case being observed in which the shoulder or the Hip joint was attacked. The wrists, as is evident from the above table, were attacked in 19 out of 25 cases, either alone or in combination with other joints. Scarlatinal Rheumatism seems to be almost as common during the Summer as in the Winter months, considering the greater prevalence of the disease in the latter season, but damp weather seems to have some tendency to determine its onset; sex seems to have no influence as a predisposing factor. The disease as exemplified in the above cases seems to have little tendency to migrate from one joint to another. In the great majority of cases the affection persisted to the end in the joints first involved, only 3 cases being observed in which several joints were attacked in succession, the joint first affected improving as the second developed the Rheumatic symptoms. In no case did the synovitis become purulent but yielded readily to treatment. In all respects except the last Scarlatinal Rheumatism closely resembles the gonorrhoeal variety and doubtless the causation is similar in both.

The duration of an attack varies from 3 to 15 days but on an average is about a week.

During the attack the heart must be carefully watched,

as affections of that organ are often most insidious in their onset, and even with extreme care the date of their appearance is frequently most difficult to determine.
In 4 of the above cases Cardiac symptoms ensued in from 3 to 5 weeks after the attack of Rheumatism, and that although the heart was examined daily for a fortnight after its disappearance without anything abnormal being detected.
Two of these cases had suffered from severe attacks of Rheumatism, while in the other two the attack was exceptionally mild. From this it might be inferred that 16% of rheumatic cases subsequently develop cardiac symptoms.
In all cases of Scarlatinal Rheumatism it is advisable to administer Sodium Salicylate, either alone or combined with Potassium Bicarbonate, in doses of 5 to 20 grains according to age, and to continue the treatment for ten days after all joint symptoms have disappeared. By this means the implication of the heart is to a certain extent obviated. No bad effects arise from this continued treatment with salicylate unless the kidneys are diseased, in which case its administration must be discontinued, and simple alkalis substituted. Two cases which resisted the salicylates were speedily subdued by Benzoate of Soda.
It is best to keep the affected joints well wrapped in cotton wool but anodyne applications are seldom required.

In the great majority of cases no alteration of diet is necessary though in some cases some restriction may be advisable.

Bronchitis. Bronchitis is a somewhat frequent complication of Scarlet Fever, the percentage of cases so affected being 4 in this series.

In the majority of cases the condition is simple and tends to disappear with the approach of convalescence, but occasionally, and particularly in young children, it assumes a grave aspect. and was the cause of the death of two infants, one 15 months, and another 2 years of age, as was proved by post mortem examination. It is possible of course that recovery might have ensued had it not been for the precedent attack of Scarlet Fever, which in both cases was severe.

As a general rule in all cases in which Bronchitis was present, its severity was directly proportional to that of the original disease.

As regards treatment, a simple expectorant mixture is all that is required in most cases, though sometimes poulticing is necessary when respiration is much impeded. In very young children it is advisable to make use of the steam tent, since in all such there is a tendency for the disease

to proceed to Broncho-pneumonia.

Otitis. Otitis was observed in 20 out of 600 cases, a percentage of 3.33. This might be considered an unusually low rate, but doubtless the frequency of the various complications of Scarlatina never remains constant, in the different epidemics of that disease.

Otitis may appear at any date in an attack of Scarlet Fever, though the majority of cases occur during the early stages; its earliest appearance was on the 3rd day of illness and its latest on the 98th. Taking the average of the total cases the time of incidence seems to be about the 21st day, but if we omit that in which the onset was so unusually delayed, 98 days, we find that the figures become 12.65, and this I imagine is much nearer the mark than the former. Otitis depends directly as to its causation, on the severity of the throat affection, and especially on the degree of involvement of the naso-pharynx. In all the cases noted the throat condition was severe, with one exception, and in 15 there was coexisting nasal discharges. As regards the exception, above mentioned, though the condition of the throat was not severe, still the affection was prolonged, existing as it did for three weeks from the onset, and there was some involvement of the posterior nasal cavity, as evidenced by a slight but distinct muco-purulent discharge

from the nostrils.

This points to the eustachian tube as the path of infection. The inflammatory process spreads along that canal causing hyperaemia and swelling of the mucous membrane lining the same, whereby it becomes blocked; and in consequence the inflammatory products, resulting from an acute affection of the tympanic cavity, are dammed up in that chamber, and ultimately as the path of least resistance, burst the tympanic membrane, and escaping from the external auditory meatus, relieve the tension.

The duration of ear mischief, as evidenced by a purulent discharge from the external meatus, varies from 14 days to 3 or 4 months, and in some there seems to remain a tendency to recurrence of the trouble, on the subsequent development of any other acute disease.

The great majority of cases occurred among young children, the average age being 3.6. With regard to sex, 11 were females and 9 males.

In an ordinary attack of otitis there is usually a preliminary rise of temperature, unless it be already high when any addition may not be noted, and this rise is accompanied by pain often very severe, in the ear. The auricle is as a rule red and somewhat swollen and this redness and swelling may involve the posterior auricular region also. The pain

continues, and may increase in severity for 2 or 3 days when the tympanum gives way and a purulent discharge exudes from the ear, the temperature at the same time falling and the pain being relieved.

If the drum be examined during the early stage it will be found red and swollen, in severe cases presenting an appearance very similar to that of a ripe raspberry; the external auditory canal is also swollen and extremely tender. Examination of the ear during the acute stage causes severe pain, and though doubtless the proper treatment, when the membrane appears as above described, is to immediately incise it, yet the attendant suffering is so great, and the membrane so frequently gives way of itself, under soothing and expectant treatment, healing as a rule perfectly after the discharge has ceased, that it is doubtful whether the benefits to be expected from surgical interference are to be preferred to its undoubted disadvantages.

In a fair proportion of the cases, ten per cent, swelling occurred behind the ear, over the mastoid process, forcing the auricle out from the scalp forward and downwards. This is caused by subperiosteal inflammation over the mastoid process and may be due either to a filtration of the inflammatory products through the interstices of the bone, from the mastoid cells, or to the escape of purulent fluid,

from the middle ear between the bony and the cartilaginous portions of the external canal, and its lodgment over the mastoid process. The tough nature of the temporal fascia, and its firm attachment to the temporal ridge, prevents the upward extension of the inflammatory swelling.

Immediately on the appearance of this swelling it is advisable to make an incision, close behind the auricle, right down to the bone, and though very little actual pus may be discovered, a small quantity of sero-purulent fluid is usually evacuated.

These measures are usually sufficient to prevent any extension of the mischief, but delay of a few hours may result in extensive necrosis of the mastoid bone.

Extension also to the mastoid cells is not infrequent, though not observed in any of the above cases, and this condition calls for immediate operation of a radical kind to obviate the spread of the diseased process to the cranial sinuses, or to the membranes of the brain.

In the treatment of the early stage the indications point to the relief of pain, by the application of heat reinforced if necessary by the use of drugs.

Hot fomentations frequently renewed answer the former purpose admirably, while the latter condition is fulfilled by the introduction of a few drops of glycerine of Carbolic Acid

with $\frac{1}{8}$th to $\frac{1}{4}$th grain of Cocaine Hydrochlorate added, into the external meatus, opium also in the form of the official tincture is of value, and these drugs can be conveniently inserted when contained in small, pyriform, gelatine capsules.

After the rupture of the membrane our endeavour should be to facilitate the removal of the purulent material from the tympanic cavity. To accomplish this, the ear ought frequently to be syringed out with a warm solution of Glycerine of Carbolic Acid, in the strength of 1 drachm of the Glycerine to 1 ounce of water, with the addition of Boracic Acid to saturation. A hot saturated solution of the latter drug alone is also valuable, while a very weak solution of Formic Aldebyde, (1-2000 to 1-5000) sometimes proves of service, though its advantages are counter-balanced by the pain to which its use gives rise.

The insufflation of powder into the ear, either Iodoform or Boracic Acid, ought in my opinion to be avoided, on account of the danger of blocking up the perforation in the tympanum, which in many cases is extremely small, and by preventing the free outflow of the discharge, give rise to intracranial mischief.

In the majority of cases the tympanum heals rapidly as soon as the discharge ceases, and only a small number are left

with any permanent defect in hearing.

Endocarditis. The most serious of all the complications to which the victim of Scarlatina is liable, not perhaps immediately but from the evils which later may follow it, is Endocarditis with involvement of the valvular structures. In 15 cases of this series, a percentage of 2.5, the heart was affected, and this number might in all probability be increased, as no case has been included where doubt existed. The ages of the patients attacked varied from 1 to 23 years, being on an average 9.13; from this it would seem that adults are comparatively exempt.

The severity of the original attack seems to have little predisposing influence, since if we divide the cases affected into three classes namely:- slight, moderate and severe, we find five cases in the first class, six in the second, and four in the third. In the class of slight cases, I have included all those in which the rash was not deep in colour, where the throat symptoms were of little moment, and where the temperature was below 101° F. In the second class are those with a well-developed rash, a deeply congested, but clean throat, and a temperature not above 103° F. The third class includes all those with a dark and profuse eruption, a throat covered with purulent exudation, and a temperature of 103° F and over.

Taking into consideration the comparative mildness of the type of Scarlatina as a whole, which prevailed during the season 1900-1901, and the relative scarcity of severe cases it would seem that if anything, the severity of the attack has some influence, if slight, in predisposing to endocarditis.

As regards seasonal influences, it is difficult to draw any conclusion, particularly as a full year's observation could not be obtained, the Summer months being wanting. The greatest number of cases appeared during the coldest months of the year, 3 being observed in October, 1 in November, 4 in December, 3 in February, 3 in March and 1 in May.

Four of these cases were preceded by Rheumatism, but in the remaining eleven no connection with anything of the kind could be traced, in only two of these four cases was the rheumatic attack severe.

In each case the joint pains, as well as the swelling had subsided for a considerable time, before any symptoms pointing to involvement of the heart were observed.

The average date of onset is 33 days from the commencement of the primary attack.

In the great majority of cases the cardiac symptoms appear most insidiously, and unless daily examinations be made, the condition may only be discovered, when the state of the

heart is noted, previous to allowing the patient up for the first time. In only three was there any initial rise of temperature to put one on one's guard, and even with them, some days had elapsed before the true cause of the disturbance was placed beyond doubt. A very good rule to follow, when a rise of temperature occurs in a scarlatinal convalescent, is to fix the attention on the heart. When examination of the urine, lungs, throat and ears gives negative results.

Pain in the praecordial region is seldom complained of in the initial stages of Scarlatinal Endocarditis.

The valvular aperture most frequently attacked, and permanently damaged, is without doubt the mitral, obstruction being the rule. In thirteen out of fifteen cases the mitral valve suffered, the Aortic being affected in the remaining two; in the latter valve the conditions, in both cases, were obstruction with insufficiency.

Considerable dilatation of the left ventricle was invariably noted, the area of cardiac dulness extending to the left from half an inch to an inch and a half over the normal. The pulse was usually increased in frequency and in eight cases was markedly irregular. Its tension was low and in those cases suffering from affection of the aortic valve, it exhibited all the characteristics of the so-called

watter-hammer.

Anaemia was well marked in most of the patients affected with, or recovering from endocarditis, the anaemia being in direct proportion to the severity of the cardiac affection. This anaemia differed from that observed in many convalescents from Scarlet Fever, in that the waxy, yellowish appearance was absent in the former, and was replaced by a somewhat livid paleness, there being on close inspection a bluish under-tint in the skin. The lips also, instead of the pale pink appearance of chlorosis, were of a bluish colour, while the finger nails were similarly affected in varying degrees. No trace of cyanosis could be detected in four cases.

In only one case did the dilatation persist undiminished on dismissal and this patient was removed by her parents to her own home against my advice. There was a gradual disappearance of the dilatation in all the others, but in four cases there remained a greater or less amount of compensatory hypertrophy on dismissal.

The cardiac murmur remained audible on the day of leaving hospital in all the cases noted.

I shall now give a brief description of one or two cases to illustrate the various points to which I have called attention.

Case 1. A girl aged 10, was admitted on March 18th 1901 suffering from Scarlatina of two days duration. On admission, the child presented a typical, bright scarlatiniform eruption, the throat was deeply congested but clean, temperature 101.6 F, pulse 120, respiration 30.

Convalescence was established on the 22nd March, and matters progressed favourably until the evening of the 25th when the temperature rose to 100.2 F. No pain was complained of, and nothing abnormal could be found in the urine or the lungs, but a faint murmur could be detected at the apex on systole of the ventricle. Pulse numbered 100, of low tension but regular in its beat.

Temperature became normal on the morning of the 27th March but the murmur gradually increased in intensity until the 31st and could be plainly traced into the axilla and round to the angle of the left Scapula.

The apex beat was now in the nipple line, in the 5th interspace.

Pulse numbered 120 and was very irregular.

The dilatation gradually increased until the 15th April, when the apex beat was situated in the 6th interspace, ¾ inch outside of the nipple line;

pulse still remained low, as to tension, rapid in beat and markedly irregular.

Child was pale with cyanosed lips and finger tips and the breathing was rapid and shallow.

From April 15th till April 30th the dilatation gradually disappeared and the intensity of the murmur became somewhat lessened.

Pulse was now stronger and was free from the irregularity so apparent before. The cyanotic tint, had disappeared although the child still remained pale and respiration was decreased in frequency at the same time having become free and no longer attended with discomfort.

At her dismissal on May 18th the limit of cardiac dulness to the left was at the nipple line. A murmur, ventricular-systolic in rythym and blowing in character, was audible at the apex, and was tracable into the left axilla and round the left side. Pulse was 80, of good tension, and regular.

Case 11. Girl, aged 10, admitted 29th October 1900, suffering from Scarlatina of three days duration.

On admission, body and limbs were covered with a deep scarlet rash; throat was deeply congested, with purulent exudation covering the tonsils which

were much enlarged; Temp. 103.6° F. Pulse 140. Respiration 40. Sibilant rales were audible all over chest.

Disease pursued a normal course, temperature falling to normal on 9th November, and she was allowed out of bed on the 27th of the same month.

The same evening she complained of pain in the ankles. These joints being also somewhat swollen. Hot fomentations were applied and 10 grain doses of Sodium Salicylate were administered every 3 hours. No pain, or swelling was present in the joints on the 29th.

On the morning of 1st December temp. was 98.6°. but on the evening of the same day it reached 101°. The tongue was thickly coated with yellowish fur, pulse was 98 of good tension and regular.

Dec. 2nd Temp. 100.8° pulse 100 respiration 20. Face somewhat flushed, perspiring freely; pupils dilated. Evening temp. 102° pulse 100, respiration 20. Thereafter the temp. continued at the level of 102° with morning remissions of from a half to one degree, until the morning of the 8th Dec. when a faint cloud of albumen appeared in the urine; by the evening the albumen had disappeared. The same evening a faint murmur was audible over the

Aortic Area, systolic in rythym, and not, so far as could be discovered, communicated to the vessels of the neck; it was also audible over the lower end of the Sternum.

The apex beat was situated in the 5th interspace on the nipple line.

From the 8th to the 12th Dec. the temp. continued high, and during the interval the murmur became much clearer, and had added to it a hint of the V.D. character; the murmur could now be clearly detected in the vessels of the neck.

There was also a considerable increase in the dilatation, the apex beat being situated ¼ inch to the left of the nipple line.

The patient had at this time every appearance of an attack of enteric Fever, there being a well marked malar flush with circum oral pallor, and dilatation of the Pupils, perspiration also was profuse.

Pulse was very rapid, running at 120-130, of low tension with sudden impulse, and very irregular.

Widal's reaction was tried on the 10th and again on the 20th with negative results in each case.

The temp. gradually fell from the 13th to the 18th when it reached normal.

Dilatation now reached its maximum, the apex beat being $\frac{5}{4}$ inch outside of the nipple line, in the 6th interspace.

The murmur was typically one of aortic obstruction and regurgitation, pulse was somewhat less rapid, being from 100 to 110, and had lost much of its irregularity, the capillary pulse could be well demonstrated on forehead and lips.

She was moved, against advice on Jan. 12th 1901 with the dilatation unaltered. The pulse, however, was decidedly fuller & stronger and the irregularity had disappeared.

In five of the fifteen cases no symptom was observed, while the patients were confined to bed, which would lead one to suspect the presence of cardiac trouble, and it was only on their being examined previous to being allowed up, that the involvement of the valves was discovered. In four of these the mitral valve was attacked and in the fifth the aortic. In all there was an appreciable amount of dilatation of the left ventricle.

As regards treatment, nothing is of so much importance as absolute rest. This, combined with light but nourishing diet, is all that is indicated in most cases. Should there

be much cardiac excitement, aconite or Veratrum Viride, in minute doses, is useful in allaying the same, while any irregularity, after the acute stage has subsided, may be combalted with digitalis, or Strophanthus which seems to be more beneficial in young children. Nothing has any effect in the way of checking an attack of acute endocarditis when once it has made its appearance and all that can be done is to place the heart in a position relieved from all avoidable strain, and so to obviate, as far as possible, extensive valvular damage. In the later stages ferruginous tonics may be necessary to remove the attendant anaemia.

Eczema. Eczema is somewhat frequently noted during convalescence from Scarlet Fever, as well as occasionally in the acute stage of an attack, twelve cases of this skin affection were observed, making a percentage of two. Young children only as a rule were affected, only one case over 6 years of age being attacked with the disease and that an adult; with the latter the attack was acute and general. Previous to its appearance, there existed in eight of the above cases, for varying periods, a sero-purulent discharge from the nose or ear, and as a rule the characteristic skin lesion followed somewhat rapidly the onset of such discharge.

On the skin beneath the nostrils, or beneath and around the ear, these surfaces in fact which were kept in a continual state of irritation from the passage of the septic discharge, there appeared small subcuticular vesicles rapidly coalescing to form on their rupture extensive crusts, from beneath which an equally irritating discharge flowed, infecting adjacent areas of healthy skin. Sometimes minute papules, having vesicular arices, were noted, and these rapidly becoming purulent and undergoing rupture, either spontaneously or from scratching, speedily gave rise to a crusting similar to that mentioned above. Itching was severe from the earliest stages and unless the hands were confined the scabs were picked off and other parts of the skin being scratched by the infected fingers, particularly the chin, the disease was forthwith communicated thereto.

Eczema usually appeared about the middle or towards the end of the second week, and when once established was most difficult to remove. Even the removal of the cause, in those cases which were directly due to irritating discharges, failed except in two cases to lead to the speedy disappearance of the skin eruption. Further there was a marked tendency to recurrence of the affection, since nine of the cases suffered from one or more relapses.

The parts most frequently affected were the face and

the head, the chin, upper lip, and the ears suffering most. In only one case as before mentioned was there an acute affection of the body generally. Here the disease was distributed over the face, back, flexon surfaces of the arms, dorsal surface of the hands and fingers, the lower abdomen, inner aspects of the thighs and behind the knees, the palms of the hands and the soles of the feet were not attacked.

In those cases where no antecedent discharge from nose or ears was observed, the disease first became manifest behind and above the auricle, at its junction with the scalp. Beginning thus its nature was usually vesicular, as before described, and spreading in the same manner, it travelled round the ear and to a variable extent invaded the scalp. As in the case of Impetigo contagiosa, it was virulently infective, being speedily innoculated on other parts of the face and trunk, but it differed from the former in the minutely vesicular nature of its commencement.

The duration of an attack varied within wide limits. In four cases cure was affected in ten days, while with the majority from twenty one days to two months elapsed before the skin was free from the affection.

The treatment consisted in the removal of the crusts, by means of Carbolic oil, or more generally, a moist compress of boracic lint covered with gutta-percha tissue. After the

condition of the parts beneath had been exposed by this means, if much serons oozing existed, they were thickly dusted with a powder composed of 2 parts finely powdered starch and 1 part boracic acid. As soon as the inflammatory condition had subsided under this treatment, and primarily in those cases in which the discharge was not great, the affected parts were thoroughly bathed with a 5 per cent solution of Carbolic acid, dried by means of sterilised gauze, and finally covered over with Unna's Zinc Gelatine, with the addition of Ichthyol in the proportion of one drachm to the ounce. The gelatine was washed off every morning, and reapplied after washing with the carbolic solution. Simple zinc ointment, oleate of mercury and Resinæ were tried, but, with the exception of the latter in one or two more chronic cases, were of doubtful benefit.

The application of the zinc-ichthyol gelatine did not succeed at first, but after the addition to the treatment of the preliminary bathing with carbolic solution, the results became very satisfactory. This I think admits of very simple explanation, when one considers the undoubted contagiousness of the affection, and its consequent, probable, bacterial origin. When the sores are enclosed with a layer of gelatine, without previously having rendered the surface in any degree sterile, what practically amounts to an

incubator is formed. All the requisites for bacterial growth are present, there being a nutrient medium in the sore itself as well as in the discharge from the same, while there is an equable temperature of the required degree, and an absence of light. That the improvement in procedure specified is undoubtedly beneficial was proved by the great abatement of the itching which immediately took place on its adoption, while with the first method the itching habitual to the affection was at least not diminished, and in some cases was certainly aggravated.

With regard to general treatment the question resolves itself into one of general support rather than of drug therapeutics. Arsenic, so highly praised by many as almost a specific in the treatment of skin disease, was found lamentably wanting. No drug indeed seemed to exercise any beneficial influence. Cod liver oil either alone or combined with malt, and regulation of the diet, all salted meats being avoided and fresh butcher meat itself reduced to the minimum, seemed to give the best results.

The treatment carried out in the case of general eczema already referred to, differed somewhat from that just mentioned so far as the local applications are concerned; no change in the general treatment was made. The entire body was thoroughly sponged thrice daily with a solution of Liq. Carbonis Detergens, in the strength of 2 ounces to 1

pint of hot water. Thereafter the affected parts were thickly dusted with the starch and boracic acid powder previously mentioned. Rather less than a week was necessary to subdue the acuteness of the disease, and thereafter the parts still affected were treated with an ointment composed of lanoline, containing ichthyol in the proportion of 1 drachm to the ounce. The eruption had entirely disappeared in 15 days from the onset.

Adenitis. In nine of this series of cases or 1.5 per cent, an acute swelling of the glands situated on the anterior border of the sterno-mastoid muscle, close beneath the ear, appeared during the third or fourth week of the disease; in two of these cases both sides of the neck were affected. Overcrowding seems to have a decided influence in determining the onset of this affection as the wards in which seven of the cases occurred were much overcrowded.

I have not included in this number those cases in which adenitis arises at the onset of the primary attack, nor those complicating a secondary infection of the throat, since such may be easily accounted for by septic absorbtion from the acutely inflamed and ulcerated faucial structures. In any inflammatory condition of the tonsils, apart altogether from Scarlatina, a certain amount of swelling and tenderness of the lymphatic glands in the neighbourhood is invariably

present, but those to which I now refer showed no sign of any fresh involvement of the throat, and convalescence from the original disease had been established for at least a fortnight, in some cases four and five weeks, before the condition was observed.

The direct cause of this late adenitis doubtless is the deposition of bacteria, absorbed from the inflamed throat, in the glands as in a filter. There they remain quiescent until some accidental circumstance lowers the vitality of the body generally to that degree sufficient to allow of their active growth within the glands, or some injury, however slight, may be received locally, and thus form within the glands a suitable nidus for their development. That the latter may be the exciting cause was demonstrated in one case, where a boy 5 years of age, received an accidental blow on the left side of the neck, from a toy, a small wooden brick, thrown by another child. No discomfort from the injury was experienced at the time, the skin being neither abraded nor discoloured, but next morning some swelling was manifest in the same region, accompanied by a slight rise of temperature and tenderness on pressure. The swelling rapidly increased and became fluctuant, so that three days afterwards, an incision had to be made, and the abscess cavity drained, after which healing was rapid, under the influence of hot compresses of cotton wool soaked in 2½ per

cent carbolic solution. The wound was quite closed in five days from the date of incision.

As regards overcrowding, especially when a large number of serious cases are in the same ward, the effect may be two-fold. First the deficiency of air space, and the consequent concentration of the Scarlatinal poison, in the inspired air, may as above stated, so lower the vitality of the organism as to allow of the development of the bacteria within the tissues, and in the second place, the micro-organisms, given off in the breath of those acute cases, and passing over the moist, faucial mucous membrane of convalescents, in the air they breathe, must be deposited on these surfaces, and may thence be absorbed through the lymph channels, and so carried to the glands.

Of the nine cases given above, two occurred at the beginning of the third week, three at the end of the same, three in the middle of the fourth week, and one at the beginning of the fifth. From this it would seem that the average date of incidence of this form of adenitis is the end of the third week, or 21.5 days from the onset of Scarlatina.

Young children were alone affected in this manner the average age being 4.5 years.

To illustrate the foregoing I will now describe in detail one of the cases of this affection:-

Boy aged 5, was admitted on January 24th, 1901. suffering from Scarlatina of 2 days duration. On admission, the body was covered with a brilliant, scarlatinal eruption, the throat was deeply congested and tonsils enlarged, but clean. Temp: 102.6°, Pulse 130, Respiration 26.

Glands at the angle of the jaw were enlarged and tender. Tongue was peeling at tip and edges, as well as over the dorsum, on both sides.

Illness followed a normal course, rash disappearing on 6th day and temp. falling to normal on the 8th. The throat was to all appearance normal by the 13th day from the onset of symptoms. Desquamation was abundant and typical.

On the morning of the 25rd day from the commencement of the primary attack the temp. was found to have risen to 100.2°, the pulse was 100, full, bounding and regular, the respiration 30. Urine was normal, chest clear, no implication of joints, no involvement of throat, ear or heart.

On the left side of the neck, at the auterior border of the sterno-mastoid muscle, opposite the angle of the jaw, a hard painful swelling, very tender on pressure, was discovered. Hot fomentations were ordered to be applied every two hours.

The same evening the temp. had risen to 101°, and there was an appreciable enlargement of the swelling. The temp. kept at much the same level for 3 days, ranging from 99.6 in the morning to 101.2° in the evening, and the glandular enlargement gradually increased.

On the morning of the 4th day fluctuation was apparent in the swelling, now almost the size of a hen's egg, and it was accordingly incised and lightly scraped, about 3 drachms of pus were evacuated. Dressings of cotton wool, soaked in hot carbolic solution (1-40) were applied and changed every 3 hours.

Temp. the same evening fell to normal as also did the pulse and respiration. Wound continued to discharge for 5 days and was healed on the 8th day after incision.

Urticaria. Urticaria was observed in 1.33 per cent. of the cases quoted, and occurred as a rule during the second or third week, when desquamation had become well established. It was never accompanied by any general disturbance and in the majority of cases its duration did not exceed three days. In two however, recurring attacks took place over a somewhat extended period, one case lasting for thirteen, and the other for sixteen days.

They were all noted during the months of October, November,

and December, or at the time when the wards were most overcrowded, though possibly the season may have had some influence in its causation.

No connection could be traced with any particular article of diet, nor did abstinence from flesh meats or from fish seem to exercise any controlling influence on an attack.

The cases were equally divided among males and females.

The severity of the primary attack appears to have some determining influence, as in seven of the cases the original disease was particularly acute, while the remaining one was moderately severe.

In all desquamation was well marked and prolonged.

The part most frequently attacked with the urticarial eruption was the trunk, the abdominal wall as a rule being most involved. In three cases the eruption appeared over the body generally with the exception of the face, which escaped in all, but even when the arms and legs showed the characteristic rash, it was still most thickly planted on the chest and abdomen, particularly the latter.

The affection was usually first observed in the morning over the chest and abdomen, reaching its height in a few hours. Large, white, crescentic patches somewhat elevated and surrounded by a red border, were thickly scattered over those parts, and to a less extent over the back. When the limbs became involved, their proximal extremities showed most of

the rash, while below the knee and the elbow little could be seen; on these parts also, the marks were less crescentic in character, but more in the nature of rounded, elevated spots, varying greatly in size. The knee and the elbow were as a rule thickly covered.

Itching was intense while the eruption remained out, but disappeared on the subsidence of the latter.

Usually all the spots had disappeared before night, only to reappear on the following morning.

As before stated, the general duration was three or four days, but sometimes the attack was more prolonged. The eruption appeared in the morning and persisted for some days, fresh spots appearing as those first noted disappeared, then after a day's interval the process was repeated.

In every case dermatography was a well marked symptom.

The treatment consisted of warm alkaline baths morning and evening, with the internal administration of arsenic, though the latter was of doubtful benefit. Antipyrin in doses of five to ten grains, gave better results and apparently relieved the well nigh intolerable itching. No other drug seemed to give any better results.

Pneumonia. Acute inflammatory conditions of the lung parenchyma were observed seven times, of which four were of a lobular, and three of a lobar nature. They all occurred in young children, the average age being four years.

Here also the severity of the primary attack has a tendency to lead to the onset of lung troubles, and the complication usually appears during the early stage of the disease.
The date on which the lungs became involved was from three to nine days from the commencement of the illness, and in every case the attack was severe.
Of the seven cases, six occurred in males.
As regards lobular Pneumonia, this in all four cases was preceded by an acute bronchitis, which gradually invading the more minute ramifications of the bronchi, finally attacked the air-vesicles, and led to a consolidation of the lobules connected with the former.
As previously noted, Bronchitis occurs with some frequency in the early stages of Scarlatina, and it may be due either to an infection of the bronchial mucous membrane with the micro-organisms circulating in the general blood stream, or perhaps the inspired air passing over the inflamed and possibly ulcerated, but in any case highly septic, throat may carry thence the infective material. With the larger bronchi in such a condition of hyperaemia, and in cases where the throat is acutely inflamed, the continued passage of septic material into the lungs, there must be a great danger of the inflammatory process, gradually, or rapidly extending to the terminal branches of the air tubes.

In all the cases of Broncho-pneumonia referred to, the temperature ran high. The pulse was very rapid and compressible, while the respiration was shallow and increased in frequency, much more in comparison, than the pulse; the ratio fell as low as one to three, or even one to two in some cases.

About six days after the onset of scarlatinal symptoms, or in fact, at the time when the temperature should have shewn some signs of approaching the normal, the rate of respiration became much increased, as well as shallow and panting. The temperature also, instead of following the usual downward course, was maintained at the same level or might even be raised by one or two degrees. The face was as a rule pale with a somewhat livid tint; sweating in most cases was profuse, and there was marked restlessness, amounting in one case to delirium.

The pulse was rapid and running at the onset, but became more thready as the disease progressed and frequently very difficult to count.

Percussion over the lungs in all cases except one revealed a flatter note, compared with the surrounding surface, over one or more circumscribed areas of the chest wall on both sides, and over these areas also some increase of vocal resonance could be made out; little could be elicited by means of vocal fremitus. I have already mentioned that bronchitis was always an antecedent symptom, and consequently

the chest was usually filled with the sibilant rales characteristic of that affection. But over the areas mentioned above these rales had given place to others of a somewhat coarsely crepitant variety, and the respiratory murmur had acquired a more tubular character. The finely crepitant rales of Lobar Pneumonia were ~~more~~ never audible in the Lobular form.

At the end of three or four days the rales became moister, though the tubularity of breathing continued unchanged, while other areas occasionally showed signs of involvement the first mentioned rales being audible in them also.

At the same time the temperature assumed a more hectic character, dropping a degree and a half or two degrees in the morning only to resume its wonted level in the evening. Improvement was as a rule very gradual, and no date could be pointed out definitely as the turning point of the illness. Usually about the eleventh or twelfth day the temperature began to fall and falling gradually reached the normal on the seventeenth or eighteenth day; an even more rapid return to normal of pulse and respiration especially the former accompanied the descent of the temperature. Recovery by crisis was not observed.

Below I append a clinical report on one of these cases.

A child male, aged 5, was admitted on December 18th 1900 suffering from Scarlatina of two days duration. The Rash was olivid, the throat deeply congested, with

a thick greenish-yellow exudation covering the tonsils; a sero-purulent somewhat sanguineous discharge flowed from the nostrils. The glands under the jaw were much enlarged, painful and tender to the touch, temperature 104.2°, pulse 144, respiration 38.

Loud sibilant rales were audible all over the chest, but no dulness could be detected, nor was ther any change in the vocal resonance. Jacket poultices to be renewed every 3 hours, and a stimulating expectorant mixture were ordered.

Dec. 19th morning temp. 103°, pulse 130, respiration 36 no change in the condition of the chest.

Evening temp. 104° pulse 140 respiration 38.

Dec. 20th. morning temp. 103.4°, pulse 144, respiration 40. Condition of the throat little changed. Bronchitic rales persist, but at right base close to the spine extending from the lower border of the 6th rib to the upper border of the 9th and from the vertetral column outwards, a distance of 2 inches, the respiratory murmur is somewhat tubular and rales of a coarsely erepitant variety are audible. The percussion note is flatter in the same region and the vocal resonance louder.

" evening Temp. 104.6°, pulse 148, respiration 52.

Similar signs to those above described are now present in left side, over an area irregularly circular and about 1½ inch in diameter, situated about one inch to

the left of, and in a line with, the inferior angle of the left scapula.

The child was enclosed in a tent and subjected to the steam from a bronchitis kettle from the morning.

Dec. 21st. Morning Temp: 103.2°, pulse 140. resp. 56, pulse thin and decidedly weaker, champagne ordered, half an ounce every 3 hours.

21st. Evening. Temp: 104°, pulse 150, resp. 60. Rales moister, otherwise no change in lungs. Pulse increased in strength. Sweating freely, face pallid, somewhat cyanosed.

" 22nd. Morning Temp: 102.8°, Pulse 144, resp. 54. no change in lungs, throat cleaner.

" 22nd. Evening Temp: 104°, pulse 154, resp. 58. Rales much coarser and bubbling. Vocal resonance increased over affected areas. Dulness extended farther round right side. Tubularity of breathing unaltered.

From Dec. 23rd to Dec. 29th temp. ranged from 100.8°, in the morning, lowest reading, to 103.4° in the evening. Pulse continued rapid as also did the respiration, though hardly so markedly as regards the latter.

Dec. 30th Morning temp: 100.2°, pulse 142, resp. 46. Sibilant rales almost disappeared, some ronchus present, loud bubbling rales audible over affected areas. Dulness and tubularity of breathing undiminished

Dec. 30th. evening: temp. 102°, pulse 140, resp. 46.

" 31st. morning: " 100°, " 128, " 44.

Tubularity of breathing lessened.

Dulness diminished: rales somewhat decreased.

" 31st. evening: temp 101.4°, pulse 116, resp. 40.

Morning temperature reached normal on Jan. 3rd, and the evening temperature on the 5th: chest clear on Jan. 10.

Acute Lobar Pneumonia does not seem to occur with quite the same frequency as Broncho-pneumonia, a state of things which may be explained by the youth of patients attacked with lung complications, and the greater tendency in children for the affection to assume the latter form.

In the Lobar variety of the disease there seems to be a grave danger of a septic condition supervening, as in one of the three cases noted death was due to septic Pneumonia, and in another abscess of the Lung developed.

As in the case of Lobular Pneumonia, so with the Lobar variety, the severity of the original attack, and more particularly of the faucial condition seems to have a strong predisposing influence. In all three children who subsequently developed pneumonia, the throat symptoms were very severe, though with one the rash was not well marked nor was the temperature high (100.2°.)

The end of the first week seems to be the usual time for

the appearance of pneumonic symptoms. This is probably due to the commencing separation of the purulent exudation from the tonsils about that date, and as each of these cases suffered from bronchitis, more or less severe, on admission, the consequent coughing doubtless loosened this exudation still further, allowing minute fragments of the infective material to be carried into the lung when deep inspiration followed the paroxysm.

A child of four, to whose case I have alluded above, with an anginous throat, simultaneously developed pneumonic consolidation of both bases, on the day after admission, and died within 36 hours on the 9th day of his illness.

The third case was one of typical pneumonia and recovery took place by crisis on the 7th day of the attack, and the 14th from the onset of scarlatinal symptoms.

Another case which illustrates the septic nature of pneumonia occurring with scarlet fever was as follows:-

A boy aged 8, was admitted on Feby. 19th 1901, suffering from Scarlatina of 3 days duration. Rash bright, Temp: 104.6, Pulse 136, Resp. 40. Throat severe, Bronchitic rales audible all over chest. Feb. 22nd temp: still remains high. Fine crepitation audible right lower lobe. Dulness on percussion in same region. Breathing tending towards tubularity. Feb. 23rd Temp. 104.6°, pulse 154, resp. 62.

Typical pneumonia right lower lobe.

Mar 2nd. Dulness absolute over right side from spine of scapula downwards. Respiratory murmur absent. Vocal resonance and vocal fremitus also lost. Since Feb 26th temperature has ranged from 100.2° in the morning to 103.6° in the evening.

Mar 9th. Respiratory murmur audible over right side except at the extreme base. Moist rales audible at lower part. Dulness still marked but not so board like in its sound as at last note. Temperature has pursued a markedly hectic course ranging from 99°, or even normal, to 103°.

Mar 15th. Dulness confined now to right base aspirating needle inserted between 8th & 9th, 7th & 8th, and 6th & 7th ribs. without any fluid being discovered. Temperature runs a similar course to above. Pulse 100 to 112 remains good. Respiration 34.

Mar 23rd. Expectorated a large quantity (unmeasured) of foetid pus during the night and also to-day. Temp. 100° this evening.

Mar 31st. Temp. still rises to 100° at night but is normal in the morning. Dulness still present but diminishing: rules absent. No pus expectorated since 25th.

April 14th. Temperature normal since the 10th. No cough Weight increasing - Dulness slight right base.

Respiratory murmur weak in same region. No rales.

April 30th. Dismissed well. Slight dulness and some weakness of respiratory murmur persist no dyspnoca.

Secondary Throat Symptoms. Occasionally after convalescence has been established for some time a fresh series of throat symptoms develop, frequently accompanied by a discharge from the nose, this occurred six times, or in one per cent of all the cases.

Here, as in the subject just treated of, all the cases occurred during the late autumn and winter months, when the wards were particularly heavy and contained a large number of serious cases. The female wards were always more overcrowded than those devoted solely to males, since all males of five years and under were admitted into the former, hence it may be, all the cases in the present category were observed in female wards. Four females and two males were attacked, the ages of the boys being three and five years respectively; the average age was six years.

Doubtless this condition is one practically confined to hospitals, the "Hospital sore throat" being well known even in institutions where no fever cases are received, since patients nursed in their own homes are seldom compelled to breathe an atmosphere not only vitiated, but laden with the Scarlatinal virus.

The difficulty of properly ventilating a ward containing double, and occasionally more than double, the number of patients for which it was primarily intended, must be experienced to be understood, and in cold winter weather one has a choice of two evils - either to have the temperature of the ward at a depth incompatible with comfort or safety, or else, to subject the patients to the risk of more or less rapid intoxication, with the concentrated emanations from a large number of acute cases.

There is no doubt, that if any disease requires in its treatment a free supply of pure air, it is Scarlet fever, but this is what in Glasgow Hospitals, at least during the season of the disease's greatest prevalence, is usually impossible of attainment.

To obviate such a state of affairs, special convalescent homes should be attached to all fever hospitals, so that scarlet fever patients who have passed the acute stage of their illness, might be drafted thereto, and so be freed from much of the risk to which the presence of acute cases among them causes them to be subjected.

It is by the accumulation of convalescent cases in the wards that these become overcrowded, and were the above precautions taken, there can be no doubt that the frequency of complications would be materially lessened, as well as the

number of so-called return cases. Under the present conditions, the prevention of the latter is impossible, in spite of every care taken in the disinfection of dismissals. Secondary throat symptoms which may develop at any time after the primary condition has subsided up to the end of the third week, are ushered in by a rise of temperature, reaching in some cases five degrees above the normal, by pain on swallowing, a feeling of tightness in the throat, and stiffness of the jaw. The face is flushed and seems swollen while the glands under the jaw are enlarged, painful and tender. The tongue is usually dry covered over with a brownish coating, and may be fissured, the breath is foetid, the pillars of the fauces, the uvula and the adjacent soft palate are congested and swollen, the tonsils are enlarged and deeply inflamed, the pulse is rapid and in the early stages full and bounding, becoming after the first few days softer and more compressible.

On the following day there is usually a considerable amount of purulent exudation on the surface of both tonsils. At the same time there is frequently much obstruction to nasal breathing.

In from two to three days a muco-purulent discharge from the nostrils usually makes its appearance, this discharge being of such an irritating nature that a few hours may be

sufficient to set up an acute eczema of the upper lip.
The throat affection continues acute for six to eight days, gradually disappearing thereafter, but the nasal discharge may persist for over three weeks.
The tonsils first become clean and the temperature gradually in some cases rather suddenly, falls to normal, this fall being accompanied by a decline in the pulse rate. The tongue becomes clean and the appetite returns, while the cervical glands gradually subside, although abscesses may have formed and required incision.
The treatment found to be most efficacious consisted in the insufflation of a fine powder consisting of equal parts of Potass Chlorat. and Pulv. Acid. Boric, with ten grains of menthol added to every ounce of powder.
In very young children, gargling the throat is impossible, while swabbing the same with antiseptic solution is usually an acutely painful and invariably a disagreeable method.
The nose ought to be thoroughly douched every two or three hours. Most benefit in this connection was derived from the use of a hot saturated solution of Boric Acid with the addition of Glycerine of Carbolic Acid in the proportion of two drachms to the ounce.
Ophthalmia. While in many cases of scarlatina there is considerable injection of the conjunctival vessels, the deeper

and more profuse the rash the greater being this hyperaemia, it occasionally happens that this simple affection rapidly assumes an acutely purulent aspect, leading to extensive damage or even destruction of the eyeballs.

The latter was observed in one child of eighteen months, who was admitted on October 6th 1900, with a history of having contracted scarlet fever three weeks before; desquamation was well marked but no other special symptom could be discovered.

The child was in an extremely filthy condition, with a copious, purulent discharge from both eyes, the corneae being muddy. In the centre of the left cornea there was a large ulcer.

Both eyes were frequently douched out with a saturated solution of Boric Acid and twice daily a few drops of a strong solution (20 grs. to the ounce) of Silver nitrate were introduced, a piece of Pagenstecher's ointment was also placed beneath the lower lid, morning and evening, No improvement occurred and on the 13th the left cornea ruptured.

Slight ulceration was now apparent in the right cornea and the presence of pus in the anterior chamber of the same eye was determined. Paracentesis was accordingly performed, and

the pus evacuated. The left eye continued to discharge until Dec. 30th. but the right eye improved rapidly after the operation, recovery being complete by Nov. 10th.
The left eye was totally destroyed, no perception of light remaining therein, but the sight of the right eye was fairly good, though somewhat obscured by corneal opacities resulting from the previous ulceration.
All the foregoing may be classed as examples of well recognised scarlatinal complications. Those to which I shall now shortly allude might be considered as of accidental occurrence.

Acute Anterior Poliomyelitis.

In two cases infantile paralysis developed simultaneously with the scarlatinal symptoms. In the first case, a girl of ten years, there was complete loss of power in both legs, with absence of all reflexes, diminution of sensibility and paralysis of the bladder and rectum. Power and sensation gradually returned to the left leg, the latter much more speedily, and the bladder and rectum recovered their contractility, but in the right leg, though sensation was restored, movement remained very limited and no return of the reflexes occurred. When dismissed on April 10th, atrophy of the right leg was marked especially below the knee, where paralysis was complete.

The other case occurred in a child of two, whose right arm and both legs were paralysed without implication of bladder or rectum. Sensibility was little if at all impaired but knee jerks ~~was~~ were absent, the other reflexes in the lower limbs remained normal. The legs rapidly improved but the paralysis of the arm remained complete, and some atrophy of the same had occurred, on dismissal ten weeks later.

Jaundice. Jaundice, probably due to catarrh of the bile duets, was observed in one case. It made its appearance on the sixth day of illness, reached its height on the tenth, and then, gradually fading, disappeared finally twenty days from the date of its being first noted.

Purpura Haemorrhagica. One case of Purpura Haemorrhagica was also noted. The attack was ushered in by a slight rise of temperature (99.8°) on the morning of the 18th day of illness. During the course of the day a number of the characteristic petechiae, and irregular haemorrhagic patches appeared beneath the skin of the abdomen and thighs, and on the following day similar spots were apparent on the chest, back and arms. The gums became spongy and continually oozed blood, while the lips became ulcerated and also bled to some extent. Small haemorrhagic spots could be seen beneath the buccal mucous membrane. Haemorrhage from nose,

bowel, and kidney occurred but, though some altered blood was occasionally vomited, there was no definite evidence of haematemesis. as the blood mentioned might,and probably did,reach the stomach from the throat and posterior nares. The temperature remained above normal, running between 100° and 102° for 18 days when it gradually fell, until the 21st day of the attack. The spots gradually disappeared thereafter and the general condition improved, recovery being complete 39 days from the onset of purpuric symptoms.

Such then are the numbers of the Scarlatinal complications, in their various proportions, as they occurred in this series of cases. No doubt the results here given differ materially from those arrived at by the different authorities on the subject. The newness of the hospital must have had some influence on these results, as it stands to reason that the buildings could not be saturated with the organism of the disease, as is undoubtedly the case with the older institutions. As evidence of this I would call attention to the comparative infrequency of the strictly septic complications to which the sufferer from Scarlet Fever is liable, such as Otitis, Secondary Throat Symptoms &c. Something must also be laid to the account of the type of disease prevailing during this season.

It was of particular mildness and severely affected throats were comparatively scarce. Certainly the proportion of renal cases is unusually high, but this might also be accounted for by the wards being recently finished, and consequently somewhat damp and difficult to ventilate. I am of opinion that, low as the proportion of septic affections undoubtedly is, it might have been kept much lower, had the wards been maintained at their recognised limit as regards patients.

So far as cardiac involvement is concerned, little material exists with which to make comparison. The heart in Scarlatina has evidently been neglected by most writers, who either do not refer to it at all, or else dismiss the subject in a few lines. It is thus impossible to state whether the proportion of such cases is above or below the average.

Jas. McHaffie.