THE CONTROL OF SCARLET FEVER.

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By

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INTRODUCTION.

The present methods of controlling scarlet fever, although good as far as they go, leave much undone or neglected.

Defects are many, such as:

(1) Inefficient isolation.
(2) Careless or ignorance on the part of nurses, parents, and others in dealing with such articles (food included) as convey infection.
(3) Inefficient treatment of the patient, especially with regard to destroying the infection at its source.
(4) Inefficient disinfection of house and of sickroom with its contents during the illness and afterwards.
(5) Widespread ignorance among the public as to what constitutes scarlet fever.

Scientifically the defect consists in a want of exact knowledge as to the infective agent and its life history. The control of diphtheria presents a less formidable task because the public take altogether a much more serious view of the disease and are consequently much more careful in its isolation and treatment. Then we have an exact scientific knowledge of the infective agent in diphtheria - the Klebs-Loeffler
Bacillus, its life history and toxin, which enables the profession to handle the disease from the very beginning. It is thus possible to notify and treat diphtheria with its antitoxin from the earliest possible moment, but at present with scarlet fever this is impossible.

A typical case of scarlet fever is easily recognised by any trained eye, but a slight attack or an atypical case will baffle even the most expert.

Dr. S. G. H. Moore of Huddersfield believes that the source of infection lies in the throat and accessory cavities, and not at all in the skin. The evidence in favour of Klein's Streptococcus Scarlatinae (probably identical with conglomeratus of Kurth) being the specific micro-organism is very strong, yet, while these organisms could both be isolated from many tissues, repeated examinations of the skin give negative results. Both these organisms tend to persist in the throat and accessory cavities.

With regard to the skin, there is neither blood nor lymph in the epidermis, consequently, if the micro-organism circulates in the blood or lymph, one would scarcely be expected to find it in the epidermis. It is more reasonable to assume, in the absence of direct proof, that the organism finds a suitable habitat in the warm moist throat, at least to begin with, and that the dermatitis is the outward manifestation of the ir-
ritrant toxin produced by it. An overgrowth is produced as the result of the hyperaemia and the epidermis is exfoliated. Dr. Killick Millard of Leicester in an investigation elicited the opinions of many fever-hospital superintendents and the view expressed was that they could produce no evidence that desquamation per se is a source of infection, but on the other hand patients may continue to desquamate freely after the cessation of infection.

The accumulated evidence would tend to show that the period of quarantine should correspond with the condition of the throat, nose, etc., and that desquamation unless contaminated, may be disregarded.

In this thesis it is intended to discuss the various methods of control now in practice, their limitations, etc., and to show the necessity of more comprehensive methods. Cases for illustration will be given as occasion requires.
HISTORICAL.

Recognition of early and anomalous cases.

The origin and native habitat are unknown. We are indebted to Sydenham for the recognition of scarlet fever, and its differentiation from cases of measles, diphtheria, and erysipelas. His observations were made in London on cases which occurred during his time there, 1661-1675. Previous to this, probably scarlet fever had caused several epidemics, but there is no proof.

Scarlet fever is a widespread affection on European soil, especially the north-western and northern countries. It is seldom seen in Africa or Asia, rare in India, and unknown in Japan. In North America, it was first seen in Kingston, Massachusetts, in 1725 and from there it spread through the New England States within a few years, Canada being invaded at the beginning of 19th century. South America fell a victim in 1830. In 1848 it developed in Australasia, where it generally occurs as a mild type.

The cases in Sydenham's time were apparently of a mild type, as the throat symptoms he does not describe. Since that time, however, outbreaks of more or less severity have occurred, and in urban areas it is now constantly present.

Anomalous cases of scarlet fever frequently occur,
cases being recorded as far back as 1829. Buttera in his review (1857) of older literature gives reports of such cases between the years 1829-1857. He describes a case of well marked scarlatininform angina with copious rash which followed a typical course. Four days from the commencement of that case, a little girl in the same house developed croup with marked angina but with no eruption throughout the illness. Five days later a little brother in the same house also developed intense characteristic angina with no eruption at any time.4

In 1825, Renass, during an epidemic at Loches in that year, observed three cases of scarlet fever in one family. Two children had the typical rash, but one child had all the symptoms but no rash.5

In 1838, Eoselt published an account of a severe case of scarlet fever in a girl of 20, in which there was no eruption although the girl had marked desquamation and anasarca.6

In 1839, Taeppin described an attack of five cases of Scarlet fever, in two of which there was no eruption.7

In 1848, Coley described similar cases without eruption.8

In 1854, Anderson report similar cases.9

In 1858, Banks report similar cases.10
In 1869, Batter reported an epidemic of 20 cases. Among them was a boy who had a very severe attack with no eruption, recovery being protracted owing to post-scarlatinal arthritis.\(^\text{11}\)

In 1862, Hillier\(^\text{12}\) give similar cases

In 1863, Heckford\(^\text{13}\)

In 1870, Robinson writes of an employee infecting his master with scarlet fever, taking the form of angina followed by virulent otitis. Three of this gentleman's household were within a few days attacked by angina. There was no rash in any of the four cases, but the infection from the father was undoubted. An interesting and instructive observation on these cases was that they had previously had scarlet fever.\(^\text{14}\)

In 1882, Whelan reported an epidemic at Accrington where he observed undoubted cases without eruption but showing angina, nephritis and glandular enlargements with metastatic ovaritis simulating mumps. He also observes that cases without eruption frequently give a history of a previous attack.\(^\text{15}\)

In 1892, Baiss reported three cases in one family. The first child had a slight sore throat, feverishness, and some glandular enlargement - a mild case. There was no desquamation later. A second child fell ill a few days later with similar but more severe symptoms and with a rash resembling measles. Then a third
child developed a typical scarlatinal eruption, which cleared up the diagnosis.  

In the same year (1892) Warry reported an epidemic of 150 cases of scarlet fever with sore throat, but many with absence of rash. Those without rash were found to be due to milk infection. He based his diagnosis on the following facts: (1) many desquamated, (2) others developed nephritis, arthritis or otitis.  

There are many other observers who have reported similar cases without eruption amongst whom may be mentioned Harrison, Kennedy and Lynn. Other observers have reported cases of afebrile scarlatina and McClanahan observed several such cases in a series of 150.

Occasionally the throat affection may be very slight or even absent. 

In addition to the difficulties in diagnosis in the cases above mentioned, further trouble is frequently met with in cases of Rubella, which sometimes resemble scarlet fever very closely.  

In 1894, Clement Dukes describes an affection closely resembling scarlet fever to which he gives the name of 'Fourth Disease', but other investigators have failed to discover such cases.
Sanitary Measures Adopted.

Little or no action was taken till about 50 years ago to control the prevalence or diminish the mortality of scarlet fever.

Glasgow was the first city to erect an Hospital for infectious diseases. This was opened in 1865. A second one was opened later and a third was opened in 1900.

London opened its first hospital for infectious diseases in 1871, under the charge of the Metropolitan Asylums Board, now there are nine of these hospitals and a convalescent home.

Boston (U.S.A.) in 1868 erected a pavilion to their City Hospital, but this was soon found to be inadequate. In 1895 a large hospital for infectious diseases was opened.

The Public Health Act, 1875 (England and Wales), made some provision for the prevention of the spread of infectious diseases, power being given to the Sanitary Authorities to cleanse and disinfect under certificate from the M.O.H. or other medical practitioner, any house or part of a house or articles within so filthy as to endanger health, or to prevent infectious disease, to provide hospital accommodation, a disinfecting apparatus, to disinfect clothing, bedding, etc.

The Contagious Diseases (Animals) Acts, 1878-1886,
and the Infectious Diseases (Prevention) Act, 1890, give increased powers in the prevention of infectious disease. The Infectious Diseases Notification Act, 1889, which was adoptive, is now compulsory by the Infectious Diseases (Notification) Extension Act, 1899.

The Public Health (Scotland) Act, 1897, and the Public Health (Ireland) Act, 1878 are similar to the English Act of 1875. In each of these acts power is given to the Local Government Board to make regulations for (1) the speedy interment of the dead; (2) house to house visitation; (3) provision of medical aid, accommodation, disinfection, and for guarding against the spread of disease; and (4) for any such matters or things as may appear to them advisable for preventing or mitigating infectious disease. The Local Authority shall superintend and see to the execution of these regulations and shall have the power of entry on the premises for this purpose.

The Public Health (London) Act, 1891, which embodies in its enactments the Infectious Diseases Notification and Prevention Acts, gives to the metropolis similar powers in dealing with infectious diseases.

The antagonistic feeling towards notification and removal to hospital has now almost died away, so much so that in some districts, urban especially, as many as 90% of notified cases of scarlet fever are sent to hospital.24
Symptomatology.

The diagnosis of a straightforward case of scarlet fever with all the classical signs and symptoms is a perfectly simple matter to the experienced. It is the atypical cases which give rise to more or less difficulty. In a general survey of the whole question it is necessary to keep in mind the following influences.

(1) Season. The seasonal curve of notified attacks in Britain is at its minimum in March and April, rising to a maximum in October. Cases occurring in cold weather are apt to be more severe.

(2) Age and Sex. In the 49th Annual Report, 1886 of the Registrar-General are the following:

(a) the liability of the unprotected to infection is small in the first year of life, increases to a maximum about the fifth year, after which it rapidly and steadily diminishes.

(b) the female sex throughout life, the first year possibly excepted, is more liable to scarlatina than is the male sex.

Johannessen reports that of 185 children under 15 years who were exposed to the infection, 28% contracted the disease, while of 314 adults, only 5%.

There are three classical types into which scarlet
fever is usually divided.

I. Scarlatina Simplex, or mild form, running its course without complications or sequelae.

II. Scarlatina Anginosa, in which the throat and cervical glands are much affected.

III. Scarlatina Maligna, a rare condition, in which the system seems overpowered by the intensity of the poison, causing extreme nervous prostration with its attendant 'ataxic' or 'typhoid' symptoms. Amongst these cases must be included the 'haemorrhagic'.

The incubation period is rarely over a week. It may be as short as 24 hours, but the average varies from 3-5 days.

A short incubation period is more frequently seen in a severe case than in a mild one.

Invasion. This pre-eruptive or prodromal stage is characteristic in that it is shorter in scarlatina than in any of the other fevers. The onset is abrupt. The duration of invasion is commonly about 24 hours. Children are attacked with repeated vomiting (without nausea), diarrhoea, rigors or a convulsion. Adults complain first of chilliness or rigors, sore throat, headache, malaise and prostration. Pulse and temperature rise quickly, the pulse more so than the temperature. This pulse-temperature ratio is almost pathognomic of scarlatina. The skin is dry and to the touch gives a sensation of very pungent heat. The
throat condition varies with the severity of the attack. The child may complain of soreness of the throat or the throat symptoms may be entirely objective. In more severe cases there is a uniform hyperaemia of the pharynx, tonsils, and fauces, with minute red points on the hard palate. Associated with this there is painful enlargement of the cervical and submaxillary glands.

In contrast to these mild throat cases, there is the severe variety of scarlatina anginosa. In such cases by the third or fourth day the tonsils are swollen and coated with exudation. There is intense congestion of the mucous membrane of the mouth and pharynx, hoarseness and painful deglutition. Offensive sanious discharge from the nostrils, foetid breath and foul mouth occur. Then the voice may become nasal, and deafness may occur. The cervical glands swell enormously till the condition of diffuse cellulitis or 'tippet neck' may bring about a fatal result. In this form diphtheria may complicate, or the tonsils and soft palate may necrose.

Between the mild form and anginuous cases there are many grades.

The eruption appears usually from 12-36 hours after the first symptoms of invasion, and the duration of the rash varies from 2-10 days. The full development of the rash is generally seen in from 12-24 hours
from its first appearance. It invariably appears first on the root of the neck and over the chest, and near the larger joints. It then spreads over the entire body except the centre of the chin, the tip of the nose, the circumoral zone, the scalp, palms of the hands and soles of the feet. The eruption consists of minute red dots (due to congestion of the follicles) with surrounding paler halos, which run together causing a general suffusion of the skin of a bright scarlet colour, often compared to the appearance of a boiled lobster. On pressure, as on stroking with the finger, a whitish streak develops but quickly disappears. This is the so-called 'Tache Scarlatinale.'

When the rash is fully out it is important to note that the backs of the hands and sides of the fingers are generally affected. When not absolutely universal, the edge of the eruption gradually fades off into the normal skin. During the height of the eruption, there is intense itching or burning of the skin, with some swelling of the eyelids, cheeks, hands and feet. In uncomplicated cases the highest temperature is coincident with the full eruption. This applies also to the constitutional symptoms.

Variations in the eruption are frequent and puzzling. In mild cases the rash may be faint or doubtful or perhaps escape notice. When faint or doubtful it should be looked for on the chest or loins. It may
be absent in some very mild cases, in cases with severe throat symptoms, and in malignant cases. In very severe cases many irregularities are seen in the character of the rash and also in the time of its appearance. It may appear as large irregular patches, it may be macular resembling the rash of measles, occasionally it is purplish in colour, and very rarely it is haemorrhagic. Frequently a millet-seed rash of tiny vesicles develops, which in a day or two become filled with a milky fluid. When the eruption fades, it leaves persistent brownish stains in the folds in front of the elbows, in the armpits, groins and in the popliteal spaces. These stains may help in diagnosis.

The tongue is a point of diagnostic importance. It is at first coated with a thick creamy white fur through which the enlarged papillae project as little scarlet protuberances.

The fur is shed quickly leaving the tongue red and raw resembling a ripe strawberry. Hence the expressions of strawberry or raspberry tongue, or cat's tongue.

The fever in uncomplicated cases defervesces by lysis in from 2-8 days, the temperature being somewhat higher in the evenings than in the mornings.

Desquamation, or peeling, is even more characteristic than the rash. The overgrown epidermis becomes exfoliated. It commences, as the rash does, upon the
neck and chest, and this is usually seen from the 6th to the 10th day. The duration of desquamation is indefinite. In some cases it is completed in a fortnight, in others it takes several weeks.

Occasionally in mild cases no desquamation is seen, but that is of rarer occurrence than absence of eruption. Previous reference has been made to cases recorded by Baiss and Warry. About a month ago, I was called to a house where there were only two children - twins, aged 11 years, boy and girl. The girl had well marked scarlatina and on enquiry it was found that some days previously, the boy had what was looked upon at the time as a cold. He had complained of sore throat and had been vomiting. There had been no rash seen and no evident desquamation followed. Scarlet fever was prevalent in the locality, the girl had an undoubted attack and the boy got off with a few days indisposition.

Many irregular or aberrant forms of scarlet fever occur, the commonest form being abortive and showing nothing but sore throat. Trousseau gave the name of 'Scarlatine fruste' to a disguised or latent scarlet fever.

The malignant type (ataxic, or haemorrhagic) can scarcely be diagnosed from the signs or symptoms alone. The prevalence of the disease or the occurrence of milder cases in the same house gives the clue.
Relapses, recurrences and second attacks may occur, although infrequently.

Kinnicutt\(^{30}\) (New York) observed two attacks within 8 months in a boy of 5 years.

Pritchard\(^{21}\) (Glasgow) reported the case of a patient who had three attacks within 2 years. Relapses or recurrences are occasionally seen during the 2nd or 3rd week, and are usually milder than the initial attack, although Körner\(^{32}\) mentions eight cases where the recurrence proved fatal.

Dr. Newsholme\(^{40}\) has also drawn special attention to such cases.

In diagnosing a second attack, it is necessary to have typical symptoms in order to eliminate error.

33 Leucocytosis is present in this disease.
DIFFERENTIAL DIAGNOSIS.

Difficulties occur:
I. Due to the condition of the throat:
   (a) Before the rash appears.
   (b) Where rash is absent.
II. Due to the rash.
III. Due to the desquamation.
I. (a) and (b). It is impossible to be sure of a case until the rash or other typical symptoms appear. The pulse-temperature ratio already mentioned is met with in the other diseases when the temperature is high, as, for instance, in diphtheria, measles, acute pneumonia, or even acute tonsillitis. A clear history of recent exposure to infection helps considerably. From diphtheria - cases of scarlatina anginosa may give rise to doubt especially where the rash is late or absent. Clinically the following points should be noted.

   In diphtheria the temperature is raised at the onset but quickly falls, only rising again with extension of the membrane or the occurrence of some complication. Delirium is unusual. The membrane on the fauces is sharply defined and often limited, bleeding on removal. Ulceration is rare. Glands are moderately enlarged and not matted together nor the skin inflamed. Antitoxin is beneficial. Bacteriologically the Klebs-Loeffler bacillus. From tonsillitis and oth-
er kinds of faucial inflammation and certain acute diseases such as pneumonia the clinical signs and symptoms, with a little delay decide.

The following case which occurred recently in my own sanitary district, illustrates the difficulty frequently experienced with throat cases. During the first week of October 1910, George D. (aged 8), returned (apparently well) from Hospital after an attack of scarlatina. At the beginning of December this boy developed what the parents treated as a cold. Not having seen the boy during this attack, it could not positively be asserted that the following cases in the same family arose from infection from the boy, but the suspicion that the boy still harboured the germ is justifiable. James D. (aged 18), about December 8, developed tonsillitis with general faucial injection, no vomiting nor rash at any time. E. D. (aged 15) and A. D. (aged 12) on December 11 were down with typical scarlatina, being removed to Hospital next day. James D. was kept at home until desquamation rendered the diagnosis of scarlatina conclusive.

Another case, which occurred a year or two ago in my private practice, is instructive.

The wife of an actor had an attack of tonsillitis with rash which was of doubtful distribution and nature. A fortnight after this, the couple having mi-
grated to this city, I saw the lady and found her freely desquamating. She was accordingly isolated in Hospital, much against her will.

Several weeks ago, I was called to a boy P.J. (aged 5) whom I found ill with a throat condition simulating diphtheria; no rash appeared during the few days I saw him. He was removed to isolation hospital. A week after his removal a brother, W.J. (aged 13) in same house was down with similar illness, but the throat did not appear clinically so like diphtheria. This case showed slight albuminuria, and arthritis, also a slight red papular eruption on backs of hands and lower part of forearms. Ten days afterwards he was desquamating freely and there was distinct browning of the flexures. On enquiry at the hospital I found that P.J. was also in a similar state and was now being regarded as scarlet fever without eruption. Although there are two other unprotected children in the house, no other case has yet arisen.

II. Due to rash:-
A. Eruptions occurring in the well-known eruptive infectious fevers.
B. Eruptions occurring in other infectious diseases.
C. Eruptions of sepsis and other infective processes.
D. Eruptions from use of drugs.
E. Eruptions of intestinal or other cause.
A. From the well-known eruptive fevers:

**Measles** - an initial rash frequently occurs usually confined to the trunk, closely simulating that of scarlatina. Koplik's spots, the initial catarrh, and leucocopenia are diagnostic.

**Chicken-pox** - an initial rash occasionally occurs usually confined to the trunk, similar to that of scarlatina, simultaneously or quickly followed by the vesicular eruption.

**Small-pox** may have an initial rash of two kinds, erythematous or petechial, which may simulate that of scarlatina. The erythema appears on first or second day and may be limited to the joint regions and small areas on the trunk, or it may be quite universal. It is not so markedly punctate as that of scarlatina, and is unusual in young children. The petechial rash which is diagnostic of small-pox especially affects the abdomen below the umbilicus and the upper and inner aspects of the thighs. These two initial rashes may be combined. Initial symptoms of small-pox such as intense frontal headache, lumbar pain, aching of the limbs etc., are diagnostic.

**Rubella** gives rise to most trouble. In epidemic years it occurs especially from March to June thus differing from scarlet fever. The rash in rubella commences on the face as small discrete pink spots, quickly spreading to the trunk and upper limbs and lastly to the lower
limbs. On the second day the rash will have faded from the face and have lost its spotty character on the trunk where it has now assumed the form of a diffuse erythema, frequently punctate. Discrete spots will still be seen on the lower limbs which will help at this stage to distinguish from scarlatina. Other signs of diagnostic importance are, conjunctivae frequently injected, enlargement of glands particularly the posterior cervical, sore throat only slight, constitutional symptoms very mild, vomiting rare, and no circumoral pallor.

A year or two ago, in spring, I witnessed an outbreak of several cases in one house. The first cases were regarded as ordinary measles until the last child developed a rash which simulated scarlet fever very closely. The constitutional signs and symptoms were so slight as to exclude scarlatina. The presence of the other cases also helped in diagnosis.

B. From other infectious diseases:

Erythema of diphtheria. This is occasionally seen from the second to the sixth day of illness and is accompanied by no further rise of temperature. The rash occurs as a perfectly even bright red flush, non-punctate, and followed by no desquamation. It is important to remember that antitoxin frequently produces an eruption.
Erythema of influenza. In this connection it is necessary to exclude the possibility of a drug eruption. Whitfield in the epidemic of 1891-92 saw several cases, the rash occurring during the first few days with desquamation following in some of them. Hamilton published in 1905 a series of such cases but the rash though scarlatiniform was not followed by desquamation.

Erythema Infectiosum - Scarlatinoid - Fourth Disease.

These appear to be the same disease, but authorities are not agreed as to its existence. Reference has already been made in this connection. The rash, which is scarlatiniform, begins on the cheeks and does not affect the circumoral region. There is nasal catarrh. The temperature falls in 24 hours, and the rash fades rapidly. The state of the mouth, pharynx, tonsils, tongue, face, etc., are similar to scarlatina. Desquamation occurs, but no complications. Children are especially affected.

C. From Sepsis and other infective processes:

It is necessary to exclude erythematous eruptions due to the use of various antiseptics in surgical dressings. Erythema may develop after operations (minor or major) confinement or trauma. This condition has been called 'Surgical Scarlatina', but is now recognised as a septic poisoning. The rash, which is punctate, usually begins around the wound and spreads centrifugally for a time, and then breaks out symmetric-
ally with a special tendency to affect the extensor surfaces. There is no brown staining left in the flexures and sore throat is unusual. General symptoms are severe. Patients with recent wounds, unless protected by a previous attack, if exposed to contagion, are peculiarly susceptible to the scarlatinal poison. Walton Browne (Belfast) has placed on record several such cases. A healthy child, 16 hours after operation for hare-lip developed a dark scarlatinal rash, dying quickly. Another patient, who, it was afterwards learned, had been recently exposed directly to scarlatina, was circumcised. In 30 hours he was covered with a scarlatinal rash and had a temperature of 104° F. In 40 hours the wound became gangrenous, coma set in, and death in 70 hours. A child with lacerated wound, was accidentally placed in a bed next to one in which was a patient who had just developed scarlatina. The exposure lasted less than an hour, but in six hours the child was taken with vomiting, high fever, and headache, became comatose and died in 15 hours, no rash having appeared. After death, however, a purpuric rash was seen upon the skin.

Beggs reports similar cases.

To differentiate between erythematous septicaemia and scarlet fever in such cases, it is essential to have something definite to help in the diagnosis, viz. history of exposure to infection, throat symptoms, ne-
phritis, desquamation or contagion.

**Erythema with Tonsillitis.** This combination is likely to be mistaken, at least, to begin with. Whitfield reports two cases, (1) attack commenced with tonsillitis and high temperature. Twenty-four hours later a punctate rash was observed first on throat and neck and later on the limbs. This rash was not uniform but left off with very sharp margins. No brownish staining was left. The tongue cleaned but did not desquamate. There was no subsequent desquamation and no spread of contagion. (2) Patient felt suddenly ill, developed tonsillitis, feverishness, and a scarlatinal rash on neck and arms within 24 hours. On the fourth day of illness the rash was seen also on the chest and the temperature was still raised. There was marked yellowish staining on pressure, and browning of the flexures. The face was desquamating freely especially round the mouth and chin. Tongue furred but not strawberry in type. The evidence of peeling before the fading of the rash decided against scarlatina. Desquamation of the body followed, and there was no spread of contagion.

**Erythema with Gonorrhoea.** Many rashes are seen in cases of gonorrhoea and some are scarlatinal in character. In these cases it is especially necessary to exclude drug rashes, Copaiba in particular. The diagnosis from scarlatina is a simple matter from the his-
tory and general signs and symptoms.

D. From Drug rashes:

Enemata. Ordinary hard (sodium) soap occasionally produces a scarlatiniform eruption within 24 hours of the administration of the enema. Usually it appears first on the buttocks and then on the extensor surfaces of the limbs. There are no other signs or symptoms to suggest scarlatina.

Antitoxic serum. A scarlatiniform eruption is the rarest form, and when it does occur, it begins around the site of injection, and there is no accompanying rise of temperature.

Belladonna, Quinine, Mercury, Opium, Veronal, Salicylic Compounds, Potassium Iodide, Antipyrine, etc.

Rashes from drugs are unlikely to behave exactly as in scarlatina. To be diagnosed from the cardinal signs and symptoms of scarlatina being absent in such cases.

E. From other eruptions:

Erythema in young children, fugitive in character, usually patchy and frequently non-punctate. Caused by wearing flannel or by vigorous screaming. There is no temperature, sore throat, etc.

Erythema scarlatiniforme and Erythema scarlatiniforme recidivans. Causation unknown, possibly intestinal in origin. There are sore throat, vomiting, pyrexia and scarlatinial rash, which however is patchy and confined more or less to the trunk. The rash usually
persists for some time. Desquamation begins before the rash has faded. The circumoral pallor is not a marked feature. In the relapsing or recurrent form the history of repeated attacks is of assistance.

III. Due to Desquamation:

It is necessary to bear in mind that every case of scarlatina does not desquamate, and that desquamation by itself may mean one of many conditions. Examples are - measles, rubella, dermatitis, antitoxin, and other erythematous rashes.

Desquamation of the pin-hole variety is more common to scarlatina that to any other disease, and if accompanied by shreds of skin about the finger and toenails, ears, etc., is very suggestive of scarlatina. Any other history, such as sore throat, nephritis, otitis, nasal discharge, etc., clears up the diagnosis.
CONTROL.

Prophylaxis is the keynote of modern medicine. Scarlet fever is so treacherous in its remote consequences and so uncertain of its ultimate outcome that it becomes a matter of great importance to prevent its spread. Every means of prevention must therefore be sought out and adopted towards this end. It is necessary in the first place, to consider in detail the mode of infection. The chief source of infection is the patient himself. The infection is regarded as residing in the throat, nose and accessory cavities, and probably in the skin. Through the acts of inspiration or swallowing the scarlet fever germ is conveyed to the pharynx and tonsils and there develops in the presence of warmth and moisture in a susceptible individual. The poison may be conveyed by the breath, by discharges from the affected mucous membranes, by the scales during desquamation and probably from all the excretions, urine, faeces and perspiration.

Infection may be conveyed directly from the patient or indirectly from the nurse, doctor, clothing, bedding, letters, toys, domesticated animals, carpets, food (especially milk) and feeding utensils, etc. Articles such as these retain the infection for an indefinite period and may convey the infection to any part of the country. Where houses are close together,
bedclothing, while airing in the window, has been known to convey the disease to an adjoining household. Washing of infected with other clothing is also a means of spread. A bouquet of flowers sent from a sick-room to an institution proved a vehicle of infection. Milk is a well-known carrier, and instances of milk epidemics such as at Wimbledon, in Surrey, and in Marylebone, are common. The epidemic investigated by Power and Klein in Marylebone in 1885, was traced by them to milk obtained from a dairy at Hendon, in which the cows were found to be suffering from a vesicular affection of the udder and teats with mild constitutional disturbance, and Klein has shown that the micrococci found in such milk are probably identical with those found in scarlatina, and that they may be capable of exciting the disease in animals. Similar outbreaks have occurred in other parts of England, Stirlingshire, and Glasgow.

The usual source of milk infection, however, is derived from a human source either in the dairyman's household or anyone having the handling of the milk vessels. Dr. H. B. Wood writing on scarlatina epidemics has shown the importance of private individuals returning uncontaminated milk-vessels to the milk vendor. Corfield has traced infection to a tin of milk. There is no evidence of the infection being spread by water or by air-currents. Nothing is definitely known as to any relation between soil and scarlet fever, although
Boobbyer has recorded a series of cases the incidence of which appeared to be determined by disturbance of the soil. 52

In order that infection should occur there must be (1) a suitable condition of the soil, (2) a diminished resistance of the individual, and (3) germ of necessary virulence.

There is considerable reason to believe that outbreaks of scarlet fever come to an end from a diminution or attenuation in the infective potency of the specific virus, after several removes, and that the occurrence of outbreaks is due to renewed virulence.

It would appear that there is a cyclical variation, and that the usual sequence of cases does not extend beyond four to six removes, the earlier and later cases being milder and less marked, the middle members of the series the more severe and pronounced.

Duration of Infection - The contagion of scarlet fever is present from the onset of invasion, is greatest at the height of the fever and from then gradually declines. At what time a case is free from contagion is, in the absence of definite bacteriological knowledge, a very difficult point. Everything depends upon the case. There cannot be any hard and fast rule. The end of the period of desquamation has long been erroneously regarded as the end of infectiveness, but the knowledge that the contagion is really derived from
the throat, nose, ear, etc., and that desquamation at least, in the later stages, may be disregarded, has changed the old opinions. Six or seven weeks may be regarded as sufficient in a mild and uncomplicated case, but other cases must be regarded as infectious as long as any discharge remains. A chronic pharyngeal catarrh, especially in winter, may long contain the germs of infection. Late infection arises from purulent otitis, rhinitis, chronic pharyngitis, suppurating glands, eczema, empyema and possibly also from the urine in nephritis. These cases may retain the infection for several months. One case is recorded in which scarlatina was communicated through a purulent nasal discharge after eleven weeks; another in which the opening of a post-scarlatinal empyema was followed by an outbreak of scarlet fever in a surgical ward. Authentic cases are on record in which more than a year had elapsed between the first and second cases, where the source of infection seemed certain.

"Return" Cases and "Secondary" Cases.

Return cases occur in the proportion of 2-4% and in the absence of bacteriological investigation little progress can be expected in this direction. On careful clinical examination a case may be certified as cured and relieved from isolation, but any case may turn out to be a 'carrier', giving infection to others in contact. A cold in the head, producing nasal dis-
charge is, in all probability, the cause of renewed infection.

Secondary cases frequently occur after the isolation of the original case, the specific poison not having been properly eradicated from the house.

Return cases and secondary cases are most common during the early weeks, but, as already indicated, may occur after the lapse of as much as a year. The case of George D. previously mentioned (page 18) would appear to be a case in point. Nash reports a case where a person, twelve months after an attack, developed a cold with nasal discharge, and, although himself without symptoms infected two others in the house. Nash is of opinion that a person may be a 'carrier' in a double sense. (a) he may be a carrier of a virulent germ; (b) he may be a carrier of a non-virulent germ, which may acquire virulence when his own health is impaired. This subject is dealt with fully by Professor W. T. Simpson and Dr. Cameron.

'Missed' cases are also a very frequent cause of spread. The failure to recognise these cases may be due to mildness of the attack deceiving the parents and even the medical attendant. Many cases are missed owing to ignorance, teething and stomach troubles getting the blame of producing a mild rash, and desquamation being overlooked or passed over without a thought.
In this connection illustrative cases are not required as every doctor in practice comes across them from time to time. Cases are brought to the surgery with complaints of rheumatism, debility etc., and are often found to be desquamating or suffering from post-scarlatinal nephritis. Missed or mild cases are present more frequently at the beginning and at the end of an epidemic, but are more likely to be recognised as the epidemic wanes.

The epidemiology of scarlet fever is of great importance and is dealt with fully by Drs. Whitelegge and Hamer.

Dr. Fremantle lays stress upon the rhythmical prevalence of scarlet fever, which rises and falls, not only with the seasons of a year, but also over a series of years. He describes a seasonal ripple, a five year wave and a thirty year tide. Thus, much prevalence (and malignancy) was seen in the years 1601-4, 1834, 1861-70, and 1900-2. The explanation is possibly due to the fact that persons of susceptible age are entirely a new generation about every thirty years. The five years wave is due to the replenishing of susceptible children. The seasonal ripple would appear to be due to compulsory attendance at school, and possibly through the agency of flies which are most prevalent in the autumn.

To what is the continued prevalence of scarlet
fever due? Many reasons are given but the chief are:

(1) imperfect isolation due to ignorance of the public as to the means of spread;
(2) increased travelling facilities;
(3) compulsory education and especially the herding together of children of susceptible age;
(4) the absence of a protective vaccine, such as has prevented small-pox.

The control of scarlet fever is accomplished by (a) General Sanitary Measures, and (b) Preventive Measures.

(a) General sanitary measures are of universal application and there is no doubt of their efficacy in raising the standard of health amongst the people, and incidentally lowering the susceptibility of the individual. How far such measures limit a disease such as scarlet fever is very difficult to determine, but it seems to be generally accepted that scarlet fever in its causation and dissemination is little influenced thereby. Public health measures have been in general directed towards the improvement of the environment of communities. Thus we must have pure water supply, effective drainage, and prevention of nuisances. The one insanitary condition, which certainly does play an important part, is overcrowding either of the people themselves or of the housing, or both combined. This is due to the relative chances of contact being so much
greater. In the Supplement of the L.G.B. (Scotland) Report for 1908, the case-rate for the principal towns is given as 43.13 per 10,000 of the estimated population, whereas for countries (landward) the case-rate is only 33.14, showing the adverse influence of aggregation. Filth and damp in relation to dwellings have no effect on the spread of scarlatina except in so far as they tend to lower the individual resistance.

Much depends upon the administration of the public health department, which has become more or less re-organised since the passing of the Infectious Diseases Notification Act. Systematic methods of investigation and control are employed in most areas. The following enquiries are essential:

1. Patient: - name, sex, age, date of onset, date of rash, present and past isolation, probable source of infection, recent contact with infected persons or things.

2. Household (including patient): - name, sex, age of each inmate, susceptibility (as shown by history as to previous attack), date of last attack (if any), occupation, place of work or school, and date of last attendance thereat.

3. Home-work.

4. Milk supply.

5. Sanitary conditions of house and surroundings.

6. Previous cases of the disease in the home or
in its vicinity, or at the school or work-place.

When a case occurs it is the duty of the medical officer of health to make full investigation as to the possible sources of the disease, and to advise as to the measures which appear to him necessary in preventing its tendency to spread. Besides a knowledge of general medicine, it is necessary that he should have special training in preventive medicine. A knowledge of epidemiology, bacteriology, aetiology, symptoms, course, and sequelae is necessary, and besides these he should have access to a well-equipped laboratory in order to aid his researches.

(b) Preventive Measures.

1. Education of the public as to their responsibilities.

2. Control of school attendance.

3. Regulation of milk supplies, industries, etc.


5. Isolation.

6. Disinfection.

1. The public require at all times to be kept informed as to their duty towards their neighbours in all things. The old proverb, "Do unto others as ye would have them do unto you", must be enforced. Parents and guardians must be taught how to recognise mild cases and, if in doubt, to seek advice. Carelessness and ignorance must be put an end to. The public
should be made aware of the fact that a mild case is quite as infectious as a severe one. As soon as diagnosis is made, notification is compulsory by law and should be done at the earliest possible moment. A suspicious case should be isolated until such time as a diagnosis is made, and thus valuable time may not be lost.

Instruction in all duties and responsibilities may be given by health visitors, sanitary inspectors, and the medical officer of health by means of personal visits, lectures, and by distributing printed matter.

Attention through such agencies should specially be drawn to

(a) Infectious Diseases Notification Act.
(b) Public Health Act (Secs. 50-59, Scotland.)
(c) Isolation.
(d) Ventilation, sunlight and warmth.
(e) Disinfection.
(f) Food.
(g) Recognition of mild cases.
(h) Cleanliness.
(i) Desquamation.
(j) Discharges from ear, nose, throat, etc.

2. Control of School Attendance.

Holt\textsuperscript{46} says that schools are the hot-beds for the spread of scarlet fever. Shirley Murphy\textsuperscript{60} has shown
that at school ages cases are lessened by holidays.

In Nottingham it was found that far fewer attacks began on Wednesday than on any other day of the week, owing presumably to lessened opportunity of infection on Saturday and Sunday.

Dr. Lennane (M.O.H. Metropolitan Borough of Battersea) in his annual report of 1908 discusses this question. He says "the influence of schools as a means of spread is considerable. The fact that, during the year 1908, out of 1099 cases notified, 714 were children of school age (5 to 15 years), points to the school as a channel for the dissemination of the disease. The effect of environment in this respect affords additional evidence that schools do play a most inconsiderable part."47 "This is mainly due to the presence of mild, unrecognised cases in the schools or occurring in the houses of children attending the schools."48

Much may be hoped from the systematic medical inspection of school children with its provisions for searching out all absent children by nurses, school inspectors, etc. Hogarth49 recommends the following routine with the object of discovering mild or missed cases in school. "When two or more cases of sore throat have occurred in one classroom, the teacher should be instructed to keep a list of all children absent for a whole day or more, especially if it be a Friday or a Monday. On their return, if indisposition
be admitted, they should be cross-questioned as to the presence of sore throat. If sore throat has occurred, no child should be readmitted except on medical authority." Again he adds, "All children, on their return to school after an attack should be brought to the notice of the school doctor, and should be examined again from time to time.

Nash says "I am convinced that, but for school influences there would be a very marked and immediate diminution in the number of cases, and it is to be hoped that medical inspection of school children will not only result in the early detection of those actually affected, and those most likely to be infected (such as children with adenoids, enlarged tonsils, etc.) but will secure ample cubic space for each child, and the maintenance of efficient ventilation in school."

Chalmers (Glasgow) in his annual reports gives a table arranged to show the influence of school holidays on case incidence. Appended is the table for the year 1909.
<table>
<thead>
<tr>
<th>Periods</th>
<th>Cases notified</th>
<th>Increase or Decrease</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-5</td>
<td>5-14</td>
<td>14 &amp; over.</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>M</td>
</tr>
<tr>
<td>May 19 to June 30</td>
<td>76</td>
<td>68</td>
<td>119</td>
</tr>
<tr>
<td>July 1 to Aug. 17</td>
<td>58</td>
<td>59</td>
<td>102</td>
</tr>
<tr>
<td>Aug. 18 to Sept. 29</td>
<td>84</td>
<td>87</td>
<td>204</td>
</tr>
<tr>
<td></td>
<td>216</td>
<td>214</td>
<td>425</td>
</tr>
</tbody>
</table>

Each period represents six weeks, the middle period being the holiday season.
Chalmers adds "while there was a reduction in the number of cases during the six weeks the schools were closed, there was a very marked increase during the following six weeks. This may not be wholly due to school influence, but may be associated with the autumnal prevalence which is characteristic of this disease."

It must be remembered also that during the holiday season the weather is mild, the children are much in the open, and the windows of their homes are open all the time, in contrast to the colder months when the children are more confined and the windows kept shut.

Referring to the above table it shows that the largest number of notified cases is in children of school age (5-14), and also that the increase after the holiday season is most marked in the same group.

In times of prevalence it is necessary that schools or parts of schools be closed for a season, where it is found that spread is arising therefrom.

The influence of ordinary day schools upon the spread of infection was discovered exhaustively in a Memorandum issued by the Local Government Board in 1884, and in a revised form it exists in Article 88 of the Day School Code of 1900. This Article gives sanitary authorities powers (a) to cause particular scholars to be for a specified time excluded from attendance,
(b) to require the school to be closed for a specified time.

Residential schools, such as under the Poor-Law, Industrial, or Reformatory system, have a greater influence upon spread of infection than ordinary day schools. Such schools should be conducted on the best sanitary principles, especially with regard to cubic space in the living and sleeping rooms, separate lavatory basin, brush, towel, etc., spray system of washing, etc. etc.

The respective Public Health Acts lay down rules in regard to children attending school. See Section 57 Public Health (Scotland) Act.

Just as school aggregation is justly blamed for spreading infection, it must be borne in mind that all other gatherings or meetings of children must share the responsibility.
3. Regulations of Milk Supplies, Industries, etc.

As already indicated, milk is a fruitful source of infection, the contamination usually being derived from the cuticle or discharges from another case. Milk epidemics are recognised by certain peculiarities.

(a) Sudden onset and abrupt cessation.
(b) Most of the cases arise simultaneously.
(c) Several cases in one house arising simultaneously and limited to milk drinkers.
(d) Common milk supply to infected households.
(e) Cases are most commonly in better-class people as they consume more milk.
(f) Unlikely to occur in those who boil milk before use.
(g) Attacks mild and with low mortality.

In order to prevent contamination of milk the relative Acts (Contagious Diseases (Animals Acts, 1878-1886), the Public Health Acts, and Local Government Board Orders (Dairies, Cowsheds, and Milkshops Orders 1885-1889) must be enforced, but, in addition to these, sanitary authorities may frame bye-laws. In spite of all this legislation, the country's milk-supply remains very impure, and in urgent need of attention. My individual experience has led me to the conclusion that the impurity is due to a great extent to ignorance, carelessness, and indifference, both amongst the pub-
lic and cowkeepers, retailers, etc. The cowkeeper and milker do not realise the importance of having healthy cows in healthy surroundings, and of exercising all the rules of cleanliness in order to prevent initial impurity. The storekeeper does not consider it necessary to keep his supply cool and free from dust and other impurities. The general public do not demand their supply to be bottled in clean bottles, thereby safeguarding it on transmit or until required in the home. The necessity of such care is being gradually recognised by the public, and it is to be hoped that legislation will soon produce the desired result.

Industries, (especially home-work) such as milk traffic, nursing, washing, tailoring, and all work involving the handling of food or clothes, must be forbidden as long as a case remains in the house, but only for a quarantine period if the case is removed to hospital.


This is imperative by law both by the householder and by the medical attendant. In practice it is usually left to the medical attendant, who is, as a rule,
only too glad of the co-operation of the sanitary authorities. If no doctor in attendance, the duty devolves on the householder.

Failure to notify incurs a penalty.

5. Isolation, (a) at home, (b) in hospital.

The first essential in treating an infectious disease such as scarlet fever is to place the patient in the conditions most favourable for combating the disease and so as to prevent spread of infection. The question now arises as to the relative merits of home or hospital isolation. Personally, with our present orthodox methods of treatment of this disease, I am inclined to regard home isolation as more or less a sham from the very imperfect way in which it is understood or carried out. As long as there is infection, isolation is imperative, and if so, it ought to be done thoroughly, and I believe that can only be carried out properly by removal to hospital. The duration of isolation whether practised at home or in hospital, corresponds to the duration of infection which has been already discussed.

A. The essentials of home isolation consist of

(a) the complete separation of the sick from the healthy. This is provided for by placing the patient and the nurse in a room or rooms as far from the other members of the household as possible, preferably on
the top floor. The room or rooms selected should be devoid of unnecessary articles such as curtains, carpets, upholstery, etc., should be freely ventilated, provided with plenty of sunlight, with a fire in colder weather partly for warmth and partly for ventilation, and kept as clean as possible. A sheet (kept wet with disinfectant) should be hung over and covering the doorway in order to prevent infected air from the sick-room entering the house. (b) Children in the house who have not been exposed to the disease should preferably be sent away at once, and those who have been exposed, separately quarantined for at least a week. (c) The nurse should not be allowed to mingle with the other members of the household until a complete change of clothing has been made, and hands and face thoroughly disinfected. A douche for the mouth, nose, and throat may be usefully employed by the nurse once or twice daily. (d) The medical attendant should wear an overall while in the sick-room, and disinfect his hands before leaving. If his ordinary clothes are exposed to infection, they should be changed before coming in contact with other children. (e) No visitors, especially children, should be allowed within the infected house, but there is no power to enforce this by law, or to inflict punishment in case of default. Exposure of infected persons or articles, however, carries a penalty.
(f) All milk should be boiled, so as to prevent infection reaching other members of the household. (g) Bedclothing, towels, dishes, spoons, and all other utensils, etc., used in the sick-room to be kept apart, and made use of by no one but the patient. This applies also to any food which has entered the sick-room. No food should remain in the sick-room. (h) After recovery, patients should not be allowed to mingle with other children for some time (2-4 weeks) and should sleep alone for at least three months. (i) Cats, dogs and other domesticated animals should be prevented from carrying the infection. They should preferably be boarded out (after a disinfectant bath if exposure has taken place) during the isolation period. Pets of this description often come in very close contact with the patient frequently lying on the bed, and no thought is given to the risk. In my own experience, I was much surprised a few months ago on visiting a medical friend lying in hospital with scarlet fever, to find a pet dog curled up at his feet.

B. Hospital Isolation as at present practised is not truly correct. Certainly the case is isolated from the community at large, but when placed in a ward along with other cases it becomes a question of aggregation rather than of isolation. If an isolation hospital is to fulfil its real purpose, it must not only isolate its cases from the community, but each case
must be isolated from the others. Whether this can be done efficiently in a general ward or by providing separate cubicles, as at Walthamstow, becomes a matter of administration. Each case must be regarded as possibly harbouring some form of infection communicable to its neighbours.

Crookshank (M.O.H. Barnes) rightly advocates that all isolation hospitals, both in material and administration, should be brought up to surgical pitch (if not already so) and thus enable complete asepsis to be practised both by doctors and nurses. This is a matter of primary importance in preventing cross infections and in obtaining the best results. As an aid to this practice, there must be sufficient cubic space provided (the minimum requirement of the Local Government Board being 2000 cubic feet, and floor space, 144 square feet, for each patient), and the beds in a general ward arranged so that the head of each may be as far apart as possible. This is best accomplished by increasing the length of a ward at the expense of the breadth. Wards should be built, if possible, as one-storied pavilions with windows at each side, and placed in such a direction as to obtain at all times the maximum of sunlight. Ventilation should be provided for by artificial means, and also by cross ventilation between opposite windows. The necessary warmth may be maintained by a combination of open fireplaces and hot pipes.
One of the advantages of removal to hospital is that time may be spent in the open air almost from the first, provided the weather is suitable. This open-air treatment also lessens the susceptibility to 'cold in the head' after dismissed.

Cases admitted to hospital should always be arranged so that the septic cases may be kept apart from the others.

After the acute stage is over, it is advisable to remove cases to a convalescent ward. This allows of dilution, so to speak, of the infection and prepares the way for dismissal in a pure state.

When a patient has no longer any clinical signs of infection he should be prepared for departure.

Detention in hospital should be for as short a period as is consistent with safety, as this has been found to lessen the number of 'return cases'.

The method of discharge should consist in undressing in a special apartment, a thorough bathing in an adjoining bathroom, and a complete change of clothing put on in a third room kept only for this purpose, and after a night's rest allowed to depart.

On discharge, parents and guardians should be given certain instructions as:

(1) avoidance of cold on the journey and afterwards;

(2) keeping apart from other children for a time;
(3) kissing and fondling prohibited;
(4) sleeping apart;
(5) sending child away to a relative in the country for a holiday, if possible.
(6) daily bath;
(7) on occurrence of indisposition, nasal or ear discharge, consult the family doctor.

The question of the value of isolation hospitals in preventing scarlet fever was raised by Dr. Wilson and afterwards investigated by Dr. C. K. Millard. The result of Dr. Millard's research would indicate that hospital isolation has no effect in reducing its prevalence. This is rather surprising, but due, I believe, to administration. In order that an isolation hospital should fulfil its function, cases in the homes not only require to be notified earlier but removed in a more expeditious manner than has been the custom. Also, as has already been said, hospital administration or management must be brought up to surgical pitch.

Dr. Niven (Manchester) in his Annual Report for 1901 gives an exhaustive analysis, in which it appeared that hospital is really instrumental in diminishing the incidence of scarlet fever.

Two interesting papers on this subject are written by Newsholme and Aldwinckle. That Isolation Hospitals have been, at least, instrumental in reduc-
ing the mortality, is summed up in the final report of the Royal Commission on Vaccination, where the Commissioners say:— "We think that the steps which have been taken, in various ways, to isolate persons suffering from scarlet fever have largely contributed to this decline," while dissenters tell us, without hesitation that regarding scarlet fever in London, the recent development of proper hospital isolation has been most strikingly effectual in reducing, almost to insignificance, the mortality.

It is reasonable to assume that the longer a case is left at home without isolation, the more chance there is of spread. A case in point occurred recently in my own district. A boy, the son of a baker, took ill and the doctor who visited stated to the parents that the disease was scarlet fever and would necessitate the patient's removal as the house was unsuitable for isolation. This occurred on a Thursday evening, but the notification form was not posted until Saturday night nor delivered till Monday. Certainly the boy was removed at once, but secondary infection took place in due course, and, as the father continued his work during this interval, it is impossible to estimate how much harm was done. I do not mean that this negligence occurs often, but with the advent of telephones and telegraph communication, the public health department should demand more expedition.
As another means towards efficiency, isolation hospitals should be provided with small side rooms where doubtful cases or cases of mixed infection may be isolated separately. If such rooms are not provided where you can place a doubtful case or a case of diphtheria plus scarlet fever or a case, such as Dr. Foord Caiger records, in which four diseases, scarlet fever, diphtheria, measles and whooping-cough, were co-existent? That hospital isolation is appreciated both by the profession and by the public, is shown by the increase in numbers admitted year by year. Thus in Glasgow, in the year 1891, 62.8% of all notified scarlet fever cases were isolated in hospital. This figure has increased to 84.3% in 1901 and 91.8% in 1909. Edinburgh at the present day isolates in hospital 90-95% of all cases. In the Supplement of the Local Government Board (Scotland) Report for 1908, the percentages are given as 67 for counties and 80 for burghs, the principal towns averaging 84.

In larger hospitals, all difficulties would be more easily overcome by the adoption of the cubicle system for cases on admission, and after recovery removing the cases to a general ward.

Removal to hospital should only be done in a vehicle kept for the purpose and which can be easily disinfected. A case happened in my district lately where a man was informed by his doctor that he had an attack
of scarlet fever and would require to go to hospital. The patient on leaving the doctor's house, went by train to hospital without any further thought.

6. Disinfection; A. Of the home, B. Of the patient, (a) during sickness, (b) after recovery or death.

   A. Disinfection of the house should always be carried out under the direction of the sanitary authorities. Disinfectants are usually supplied gratis for use during the illness, and should be used freely. Floors, and woodwork generally, should be kept clean by washing with dilute disinfectant. Bedclothing, towels, dishes, spoons, etc., should be steeped in disinfectant and afterwards boiled. The infected room or rooms should be kept well lighted and ventilated.

   All dust and rubbish should be burnt in the sickroom fire and not removed to the ashpit. A washhouse common to other neighbours must not be used. Closets to be well rinsed with disinfectant daily. All milk should be boiled, especially for children.

   After recovery, all movable textile materials, which cannot be boiled, including blankets, pillows, mattresses, curtains, carpets, etc., must be removed and disinfected by steam or hot air. The bed, chairs, table, and other washable articles, should be washed with dilute disinfectant. Upholstered chairs and other articles should be taken outside and well brushed, washed or beaten. The walls, ceiling, floor and
other surfaces should be washed, especial attention being given to corners. Preferably the walls should be stripped of the paper and the ceiling and walls white-washed and the wood-work repainted. Fumigation of the room or rooms, with contents, is most conveniently done with formalin vapour spray after all openings have been closed up, and the formalin allowed to act for 2-4 hours, afterwards being thoroughly aired.

Books, toys, and other valueless articles are best destroyed by fire.

If the patient be removed to hospital at the very beginning of the illness, the sanitary inspector must use his discretion as to how much of the house and household goods will require disinfection. If removal has been delayed and the child allowed about the house, the whole of the house may require fumigation. The bed and bedroom will, in every case, require the most thorough attention.

B. (a) The patient should receive special attention during the whole of the isolation period. The excreta and other secretions should be received into a bedpan or other vessel containing disinfectant and after a short interval emptied into the closet. Slops should never be emptied into a sink. Old linen, gauze, or absorbent cotton or rags should be used in preference to handkerchiefs and burnt immediately.
Soiled body clothing should be steeped in disinfectant previous to washing.

The mouth, throat, and skin of the patient must receive special attention. The teeth should be kept clean, by brushing if possible, using some mild antiseptic for the purpose. The mouth should be rinsed out frequently with a similar antiseptic. The throat should be swabbed out, painted or sprayed, according to the severity of the case, with a disinfectant such as izal in liquid paraffin or carbolic oil 10%. The nose may be sprayed at the same time.

The practice in the Metropolitan Asylums Board’s hospitals is for the throats to be forcibly syringed out every few hours. If this is done, care must be taken that septic material is not injected into the eustachian tubes.

The skin from the very commencement should be washed daily and afterwards anointed with disinfectant such as eucalyptus oil, once or twice daily, in the hope of destroying the infection which may reach the skin. Dr. Robert Milne (Medical Officer to Dr. Barnardo’s Hospital and Homes) believes that by this method, e.g. eucalyptus oil for the skin and carbolic oil for the throat, infection no longer exists and isolation need not be practised. Personally I have for several years, in working-class homes where isolation
is out of the question, treated all my home cases by this method without experiencing secondary infection amongst the other children in the house. In adopting this line of treatment it is necessary to make an early start, if success is to be attained. This method is at present being tested by many hospital superintendents, general practitioners, and medical officers of health and their united experience has been too limited to express an opinion, but I have no hesitation in adopting it in all home cases at least.

(b) After recovery, a final bath should be given, the hair (preferably cut short) and scalp should be cleansed with a mixture of acetic acid, glycerine, and spirit, and a complete change of clothing put on by the patient.

In case of death no 'wake' may be held. The body should be interred as soon as possible. If the death has occurred in hospital, the corpse should be taken direct to the cemetery.
SUMMARY.

Remedies suggested for a more thorough control.

1. Missed cases should be systematically searched out by Public Health and School agencies.

2. Hospitals must truly isolate by being brought up to aseptic standard.

3. Treatment at home should be by some means calculated to prevent the infection spreading from the patient.

4. Milk-supply must be dealt with as water supply, that is, by municipalisation. Thus only can be expected a pure milk supply at reasonable cost.

5. Domesticated animals should be treated as other contacts.

6. Visitors must be prohibited from entering an infected house.

7. Suspicious cases should be isolated until diagnosis is certain.

8. Notification in more expeditious manner.

9. Children specially susceptible, e.g. with enlarged tonsils, adenoids, naso-pharyngitis, and carious teeth, should receive the requisite attention.


11. Ignorance abolished. This is the greatest bugbear to progress, and could be dispelled by pub-
lic lectures, mothers' meetings, magazine and newspaper articles.

(12) Diagnosis, (exact clinical and bacteriological) would prove of incalculable value.
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