after the attack; but it was distinctly better. A week later, however, the eczema relapsed, and was worse than ever before.

IMMUNITY OF INFANTS.

The immunity to measles of infants under 6 months old is well known, and the following case shows this immunity in a striking way.

A family of ten, consisting of father, mother, and eight children, were living in two rooms. The three youngest children had not had measles. One of these contracted measles, and the day afterwards the mother was delivered of a sickly male child. In a few days the two other children had measles; but the baby never contracted the disease, although the three children ill with measles were sleeping in the same bed as the mother and baby, and the mother alternately nursed the suckling baby and the fretful children.

This immunity of sucklings has been explained by some experiments of Ehrlich on mice. A female mouse immunized to the castor-oil poison bore mice that were immune also to the poison, but whose immunity passed off in about forty days. The immunity passed off more quickly if the mother did not suckle the young mice; and if the mother suckled the young of other mice not rendered immune, instead of her own young, some immunity was transferred to those, showing conclusively that the immunity of the mother is partially transmitted by the milk as well as through the placenta. Some such explanation is necessary in the case cited above, as the exposure to infection could not have been more complete.

TREATMENT.

Most writers seem to regard the treatment of measles as of little importance apart from the treatment of complications. This view is not correct, for I have known of epidemics in which one practitioner who takes an interest in treatment has a very low mortality, while others practising in the same district have a high mortality. This cannot be altogether a matter of chance.

Every practitioner knows the drugs which are usually given in measles, but it is sometimes forgotten that there are three lines of treatment for every disease.

First, there is *physical treatment*; and it is after this that hospital training generally stops; the treatment I mean by rest in bed, warmth, local applications, and by drugs.

Secondly, there is *mental treatment*, at present largely in the hands of the Christian Scientists. Means are taken to give the patient a suitable confidence in himself and in his medical adviser, and to give him a suitable hopefulness.

Thirdly, *social treatment*. It is necessary to create a suitable social atmosphere around the patient. The relatives must have confidence in the doctor; they must believe that he thoroughly understands the case, and that he is doing all that can possibly be done for the patient.

With children there is comparatively little mental treatment required, but social treatment is very necessary; and it is only by recognizing this, and by strict attention to this line of treatment, that it is possible to get instructions carried out properly.

Poor mothers are often very careless with children suffering from measles, for they regard the complaint as trivial; and it requires much eloquence to persuade them to take more care and keep the children warm. The equanimity that Osler preaches is an excellent general attitude for the practitioner; but every one must be prepared to lay this aside and use such means of persuasion that may occur to him. One practitioner had such a difficulty in persuading the mothers in a certain colliery village to take reasonable care of their children during a measles epidemic, that he told them he would sign no death certificate if any child died, as it would be the mother's fault. The threat of an inquest was the most effective means of persuasion he could find, and for the children's sake he was certainly justified in using this means.

THE International Association for Cancer Research, which has had to encounter not a few difficulties in its birth, has at last come into being. The objects are the promotion of the investigation of cancer, methods of treatment, the collection of statistics, and the establishment in Berlin of a central bureau of information on everything relating to cancer. The directors of our own Cancer Research Fund have not seen their way to join the Association.

THE USE OF SERUM IN SCARLET FEVER.

By H. CUMPSTON, M.D., D.P.H., B.S.,

LATE ASSISTANT MEDICAL OFFICER, WESTERN HOSPITAL (METROPOLITAN ASYLUMS BOARD, LONDON); MEDICAL OFFICER TO CENTRAL BOARD OF HEALTH, WESTERN AUSTRALIA.

THE most commonly accepted nomenclature as regards the severer cases of scarlet fever is that which classifies them into toxic and septic. In the present state of ignorance as to the nature of the organism that is the cause of scarlet fever, the pathology of the toxic state must remain obscure; the septic condition, however, is known to be due to streptococci. Although this arbitrary classification may on bacteriological grounds be open to criticism, yet it furnishes a satisfactory clinical nomenclature. The clinical manifestations of the two conditions are briefly these:

Toxic.

The onset is sudden, and is characterized by rigors, convulsions, rapid rise of temperature, sore throat, and generally the appearance of a brilliant scarlet rash. The temperature rises, perhaps, to 104° to 105° F. in the first twenty-four hours. The child becomes delirious, the tongue is heavily coated, and vomiting and diarrhoea with loose green stools set in. The condition becomes progressive, convulsions perhaps continue, the rash becomes more pronounced and deeper in colour, till finally, in spite of treatment, the delirium passes into coma, and the child dies. Death ensues often within forty-eight hours after onset, and rarely occurs later than the fourth day. There is in this condition generally no ulceration and little swelling of the fauces, no purulent discharge in nose or pharynx, and little swelling of the cervical glands.

Septic.

In this condition the onset is slower, the illness frequently, indeed, beginning as an attack of simple scarlet fever with generally some swelling of fauces and some deposit on tonsils. As a rule, about the third, fourth, and fifth day of illness the temperature, previously between 101° and 102° F., makes a fresh rise, and the average temperature level becomes higher. At the same time there is seen an exacerbation of the faucial inflammation—the fauces often swelling so much as almost to meet in the mid line, the pharynx becomes full of mucopurulent discharge, and the cervical lymphatic glands swell often to a large size, and become tender. During the next few hours the faucial mucous membrane becomes ulcerated, and a profuse purulent nasal discharge begins. This nasal discharge is often fetid, and is always irritant, causing excoriation of nares and upper lip. At one or other stage the punctate scarlet rash takes on a petechial or haemorrhagic character, due probably to extravasations of blood at the bases of the papillae. This is mostly seen on the extensor aspects of the elbows and knees, less often the wrists, and sometimes is seen on the lower part of the abdomen. This rash will be referred to as the "septic rash." The onset of this complication in the course of the disease is often marked by diarrhoea, but the almost invariable symptoms which should arrest the attention of the attendant are the fresh rise of temperature, the enlargement of the cervical glands, which is generally rapid, and the onset of the profuse acrid rhinorrhoea.

The subsequent course of scarlet fever which has assumed this type is generally protracted. The fauces remain ulcerated, becoming frequently necrosed until large sections of the soft palate and fauces slough away; the glands remain large and tender, the infection spreading through the periglandular tissues until a general cervical cellulitis is set up, producing—when bilateral—the "bull-neck" condition, and frequently the cellulitic condition becomes suppurative, requiring incision and drainage—occasionally it sloughs extensively. This cellulitic condition has even been recorded to have extended and involved the mediastinal tissues. If death does not supervene, the ulcerative condition of the fauces is always troublesome; the mucous membrane sometimes takes weeks to heal, and may involve so much of the muscular structures as to produce a paralysis of the soft palate and consequent difficulty of swallowing, with nasal regurgitation of food. The recovery may be prolonged over three, four, or five weeks, and be, perhaps, accompanied by such

pyaemic manifestations as suppurative arthritis, subcutaneous abscesses, bronchopneumonia, or even suppurative mesenteric glands, for these were discovered *post mortem* in one case.

The pathology of this "septic scarlet" condition is fairly well defined. The occurrence of scarlet fever is accompanied by a large increase in the number of streptococci in the mouth and pharynx, and itself probably produces a condition of lowered resistance on the part of the faucial mucous membrane to the invasion of those streptococci. These organisms settle on and produce ulceration of the faucial mucous membrane and find their way along the lymphatics to the glands, where they produce the conditions of adenitis, periadenitis, and cellulitis, often even abscess. They also, as has been shown, find their way into the general circulation and set up pyaemic manifestations.

Whether the several constitutional disturbances which accompany this septic condition are the result of the absorption of toxins manufactured by the streptococci resident in the fauces or the result of bacterial poisons produced by the general systemic streptococcal infection cannot at present be stated. Clinically, however, it cannot fail to be recognized that this "septic scarlet" condition is accompanied by profound constitutional disturbances, and is, as a general rule, protracted over a long period. The slow healing of the faucial mucous membrane, the persistence of the rhinorrhoea, and the long-continued discharge from the cervical suppurative area are its most troublesome features.

Some time ago the first attempt was made at a scientific treatment of this septic condition, when it was proposed to inject a weak solution of phenol into the peritonsillar tissues on the onset of this condition, the object being the absorption of the phenol along the same lymphatic route as the streptococci themselves and the consequent destruction of such of the streptococci as came under the influences of the phenol.

Polyvalent Serums.

Since then various attempts have been made with different types of antistreptococcal serum and combined polyvalent serums to obtain the same object by a physiological rather than a therapeutic method. Recently Messrs. Burroughs and Wellcome have used for the purpose of making an antiscarlatinal serum only streptococci which had been obtained from the scarlatinal cases, and I am indebted to the courtesy of that firm for the following account of the method of its preparation:

The antistreptococcus serum (scarlatina) is obtained from horses immunized against cultures of streptococci which have been isolated from various cases of scarlet fever. These streptococci have been found in some cases in the blood, in other cases in the suppurative lesions which complicate pure scarlet fever, such as ulcerated throat and middle-ear disease. No particular type of streptococcus is therefore exclusively employed, the object having been to obtain as many organisms from as many cases as possible, so as to include a variety of strains.

It is thus seen that the serum is a polyvalent one, and during about a year Burroughs and Wellcome's serum was used on many of the worst cases of "septic scarlet" that came into the wards of the Western Hospital. Forty-two cases were treated, and as these were the worst cases among over 2,000 consecutive admissions the test of the efficiency of the treatment was as severe as it could be under the circumstances. The results are best shown in the form of a table (see Table I).

The table accounts for 37 cases; the remaining 5 were typical "toxic" cases, in all of which a fatal result ensued; these were of ages 2, 4, 5, 7, 5 years, and died on the third, fifth, fourth, third, and sixth days respectively. It was thought, however, by experienced observers that in two of these some distinct modification of the usual course of a toxic attack was obtained. These were the cases that died on the fourth and sixth day. In the latter venesection was first performed, about 10 oz. of blood being removed and the serum (50 c.cm.) then injected.

These 37 cases, then, show 26 recoveries and 11 deaths. Two of the deaths may fairly be excluded, as one had a chronic post-rheumatic endocarditis and the other a congenital cardiac condition with chronic cyanosis of skin. As the cases were all very severe "septic cases," the proportion of recoveries, though not startling, is yet sufficiently encouraging.

TABLE I.

Age.	Recovery.	Deaths.
1 to 2	0	1
2 to 3	3	1
3 to 4	2	3
4 to 5	3	3
5	5	0
6	4	2
7	1	1
8	0	0
9	2	0
10	1	0
11	0	0
12	1	0
13	2	0
14	1	0
15	1	0
	26	11

The efficiency of the treatment is, however, to be judged in another way—by the marked improvement in symptoms seen in those that do recover. This improvement has been manifested in the cessation of delirium, the fall in the temperature, the disappearance of the muco-purulent pharyngeal secretion with subsidence of faucal swelling, the cessation of rhinorrhoea, or, in those cases in which the rhinorrhoea persisted, the disappearance of the purulent character of the discharge, and the comparatively rapid cleaning and healing of the fauces. Another less obvious result is the prevention of suppuration in cervical glands. In only three of the series was there any suppuration, while experience teaches that a much larger proportion of these cases would under ordinary conditions have shown cervical suppuration. The rapid recovery of the patients from deglutition paralysis is part of the recovery of the fauces, for this phenomenon is not in scarlet fever of nerve origin, as in diphtheria, but is a mechanical condition due to infiltration of the muscles of deglutition by inflammatory exudates.

Time of Administration.

The streptococcal invasion gives abundant evidence of its own onset in the superadded rise in temperature, the rapid enlargement of the glands, the exacerbation of faucal inflammation, and the onset of rhinorrhoea. The occurrence of one or more of these conditions during the first week of a case of scarlet fever should be taken as the indication for the use of serum. Appended is a table showing the results according to the day of disease on which serum was administered.

TABLE II.

Day of Disease.	Recovery.	Death.
2	1	0
3	3	1
4	7	1
5	4	1
6	2	2
7	5	2
8	1	1
9	1	1
10	1	1
11	1	0
13	0	1
14	0	1
	26	11

It will be seen that the proportion of recoveries to deaths increases according to the earliness of administration. On or before the fourth day the ratio is 11 to 2; fifth day, 15 to 3; sixth day, 17 to 5; fourteenth day, 26 to 11.

Method of Administration.

In 4 cases 50 c.cm. were administered intravenously and the impression formed from the few cases observed is that the intravenous injection produces more rapid and satisfactory results than the subcutaneous. It is not, however, always feasible and in one case (*vide infra*) was followed by undesirable results. In this series of cases the dose used was at first 25 c.cm., but it was found that 50 c.cm. gave much better results. In 5 cases every sample of urine passed was collected for four days after injection and examined. In no case was there any abnormality. The serum was not eliminated as such, nor did it produce any renal irritation.

Undesirable Results.

The most serious was that seen in one case in which within an hour after the injection of serum intravenously a rigor and a temperature of 105.6° occurred. The attack soon passed off, and recovery was normal. Three cases were followed by an abscess at the site of injection. Two other cases showed an erythematous rash on the trunk twelve and fourteen days after injection respectively; this rash may or may not have been produced by the serum. Six cases showed an urticarial rash one, one, two, three, eleven, and twelve days after injection respectively; one of these was followed by a brilliant erythema circinata. Three cases of suppuration occurred, while experience teaches that a much larger proportion of these cases would have under ordinary conditions shown cervical suppuration.

CONCLUSION.

It is difficult with such a small series of cases to give anything more than the impressions of the observer, and it is impossible to detail each of the cases. The recovery-rate is certainly better than usual, and the fact that the earlier the administration of the serum the better are the results is also favourable evidence.

But I could not help being struck with the clinical course of many of the cases that recovered. Within forty-eight hours of the injection the temperature began to fall, became normal in another forty-eight hours, and remained normal, the cervical glands began to subside, the necrosis of the throat began to clear up, and the rhinorrhoea either ceased or lost its purulent character. Not all of the cases showed so satisfactory a course, but most did very much better than would have been expected in the ordinary way without serum injection.

In one case the temperature reaction to the first dose of serum was marked, but the improvement was not sustained. It may be that there was a case of invasion by several types of streptococci, some of which the particular serum used did not affect.

Observation of these 42 cases leaves the distinct impression that the injection of the "antiscarlatinal" serum in large enough doses (not less than 50 c.cm.) and early enough in the disease—that is, as soon as the onset of rhinorrhoea, swelling of cervical glands, and superadded rise of temperature, the signs of septic invasion, occurred—will produce a marked improvement in "septic" cases.

In "toxic" cases little can be said in favour of the use of serum, but here some slight improvement was noticed in 2 cases.

HORSE-POX DIRECTLY TRANSMITTED TO MAN.

By A. F. CAMERON, M.A., M.D., D.P.H.,

SENIOR ASSISTANT MEDICAL OFFICER, SOUTH-EASTERN FEVER HOSPITAL; LATE SENIOR ASSISTANT MEDICAL OFFICER, SMALL-POX RECEIVING STATION, METROPOLITAN ASYLUMS BOARD.

DURING the small-pox epidemic in London in 1901-2 about 10,000 patients were re-examined at the receiving stations, and about 1,000 of these were found not to be suffering from small-pox. The cases included many of great interest and variety. The following is an account of one of the non-small-pox cases which deserves to be placed on record.

F. K., 32 years of age, a stableman, was admitted to the receiving station, South Wharf, Rotherhithe, on March 31st, 1902, certified to be suffering from small-pox.

Condition on Admission.

He complained chiefly of pain in the left arm and arm pit. His temperature was 100.4° F., his pulse 100. He was at work up to March 25th, but first felt out of sorts on March 23rd, when he noticed two red spots on his left arm in the position indicated by 1 and 2 on the diagram. These "spots" became painful and

enlarged, and others appeared in the positions indicated. At the time of admission the rash on which the diagnosis of small-pox had been based was confined to the arms and left hand. It consisted of only eight lesions, of which seven were on the left forearm and hand, and one was on the right arm just above the level of the bend of the elbow. There was severe lymphangitis of both arms, and the axillary glands on both sides, but particularly on the left, were much enlarged and very tender.

The lesions varied in size, but not in type. They resembled the lesion of a primary vaccination about the eighth or ninth day of its development, but they were more severe. The vesicular ring with turbid contents was well raised above the level of the surrounding skin on an indurated and tender base. Within the ring was a brownish-black, slightly depressed crust. In the larger lesions on the arms the diameter of the vesicular ring varied from 12 mm. to 9 mm. In two, situated one on the left forefinger, the other near the base of the left thumb, the vesicle was much smaller. In two to three days after admission the severe pain in the arms abated. The local indurations and lymphangitis gradually disappeared as the lesions crusted and the gland swelling subsided without suppuration. A point to be noted is that for several days the patient had severe constitutional disturbance.

The fact that the lesions were confined to the left arm and hand (there was only one on the right arm), their uniform type and synchronous development, and above all their resemblance to the lesions of a primary vaccination, suggested that they were due to inoculation.

History.

He stated that for some time before the onset of his illness he had been engaged in treating a horse suffering from "ulcers of the mouth and throat." The treatment consisted partly in washing out the mouth, and for the purpose he used an ordinary syringe. The horse's head was raised and held in the usual way. The man held the charged syringe in his left hand, while he pressed home the piston with the right. His left forearm and hand were fully exposed to the stream of fluid returning from the horse's mouth. His right hand and arm were out of the way of the return stream, and were exposed only to the fluid which might splash or trickle along the outside of the syringe. This appears to explain the severe affection of the left arm and the comparative immunity of the right. The attitude of the arms in using the syringe, and the man's habit of keeping his shirt-sleeves rolled above the elbow when at work, probably accounts for the grouping of the lesions below the elbow, and the complete immunity of the left upper arm.

The patient had been successfully vaccinated in infancy and not since. He was vaccinated at the receiving station on three occasions with lymph of two strains known to be potent, but on no occasion did any reaction follow.

Consideration of all the circumstances of the case led to the diagnosis of horse-pox.

From time to time, since Jenner's and Loy's work, other cases have been reported of the direct transmission of the disease to man from a horse suffering from "sore heels." Eighteen months after the occurrence of the case F. K., my attention was called to a similar case which had been reported to the Clinical Society of London by Mr. John Langton in 1877, a case indeed so similar, that the coloured plate which accompanies the report in volume x of the *Clinical Society's Transactions*, might serve, with but slight alteration, for the case now recorded. In Mr. Langton's case, however, the horse from which the disease was contracted was "suffering from inflammation of the legs and cracked heels," and no eruption or ulceration in the mouth was noted. In the case here described the patient did not say that the horse was suffering from any other local condition of the nature of "sore heels" or "grease," but