Meningococcic Septicaemia.

Sir Humphry Rolleston concluded his lecture by discussing meningococcic septicaemia, which, he said, might present several variations from the short initial invasion of the blood by meningococci, which probably preceded infection of the meninges in most, if not all, of the cases of meningococcic meningitis. He continued as follows:

Possibly cases of true meningococcic septicaemia are only more commonly recognized now than formerly, but Netter has suggested that Dopter's observation that whereas before the war 96 per cent. of the cases of meningococcic meningitis were infected with the meningococcic Type A (Gordon's I and III types), a change has taken place, so that now the parameningococcus, or Type B (Gordon's II and III), is responsible for an equal, if not a larger, number of the cases, may be correlated with an increased incidence of meningococcaemia and meningococcic manifestations in the skin, joints, and eyes. Brulé also considers that parameningococcaemia (due to Type B) is more frequent and more severe than meningococcaemia (due to Type A).

Meningococcaemia appears to have been first established by Gwyn in 1899 in a case of meningitis with arthritis. Salomon in 1902 detected meningococci in the blood eight weeks before meningitis supervened; in the following year Warfield and Walker described the first case of meningococcic endocarditis with septicaemia; a fulminating case of meningococcaemia also without meningitis was recorded by Andrewes in 1906, and in reviewing the cases two years later Duval summed up in favour of the septicaemia being secondary to the meningitis, the reverse of the present opinion. Lüdke described a case of meningococcic septicaemia in which in addition streptococci were obtained by blood culture.

Portret distinguished four kinds of meningococcaemia: (i) Without meningitis, (ii) preceding meningitis, (iii) with metastases, (iv) without metastases. The following forms of meningococcic septicaemia may be described:

1. In a certain number of cases a fulminating meningococcaemia proves fatal before meningitis has had time to occur, and lumbar puncture, if performed, gives exit to clear fluid without any meningococci or increased cell content. At the necropsy meningococci can perhaps be obtained from the fluid in the ventricles of the brain, but there is no exudation. The clinical features of these cases are severe toxæmia, often at the onset, with a low temperature, followed by fever and perhaps hyperpyrexia, rapid pulse and respirations, and extensive haemorrhages into the skin, mucous and serous membranes, and adrenals. The clinical picture may suggest the "acute abdomen," such as internal strangulation, intussusception (Pybus), or Henoch's fulminating purpura, haemorrhagic fevers.

2. Abortive cases in which a blood infection is overcome after a short time by natural immunity, though commonly assumed to be frequent, are difficult to prove. Cases of febrile meningococcic purpura without meningeal symptoms, or presenting meningeal irritation which, as shown by lumbar puncture, is not due to meningitis, and may therefore be explained as meningism, come under this heading. Sainton and Maille's case with a measly eruption, synovitis of two joints containing meningococci, and a positive blood culture but no meningitic symptoms, the whole illness lasting about a week, belongs to this group of abortive cases. In order to determine the incidence of these abortive cases during an epidemic Maxcy selected 27 cases with fever, headache, and malaise, but without petechiae, and made blood cultures which were uniformly negative. Doubt is thus thrown on the assumption of their frequency, but further investigations of this character are desirable.

3. Intermittent meningococcic fever due to septicaemia may (a) last for weeks without any meningitic symptoms ever developing. In Liebermeister's case the disease lasted four months and in Bray's case, complicated by chronic pulmonary tuberculosis, there was fever for five months and recognized meningococcaemia for three months. Though striking, they have not been very often recognized. Netter had five examples among his 368 cases, and Brette collected 22 cases in 1918. The attacks of fever may be quotidian or tertian and in the intervals the patient may feel well. The disease may resemble malaria, quotidian or tertian, or enteric fever—Netter's pseudo-malarial and pseudo-typhoid forms. The attacks of fever may begin with a rigor and

end with sweating, be accompanied by splenic enlargement; joint pains and orchitis may occur, and rashes, such as polymorphic erythema or erythema nodosum, herpes or papules, especially on the lower extremities or around the joints, or petechiae may be present. But the disease may run its course without any cutaneous manifestations (Zeissler and Reidel, Worster-Drought and Kennedy). In exceptional instances malignant endocarditis is due to infection with the meningococcus (Warfield and Walker, Cecil and Soper, Worster-Drought and Kennedy).

(b) In another group septicaemia follows the subsidence of meningococcic meningitis. Brulé records a case with septicaemia of two months' duration with purpura and positive blood cultures on five occasions. Lancelin's patient had meningococcic meningitis, and after an afebrile period of four days had fever imitating malaria for seven days and then yielded to serum; meningococci were not obtained from the blood, but the presence of purpura rendered septicaemia highly probable. Among 126 cases Landry and Hamley detected two cases of post-meningitic septicaemia.

(c) During the course of intermittent meningococcic fever there may be transient meningitic symptoms; thus, Maxcy describes a case with transient rigidity of the neck, which appeared a week after the onset and rapidly passed off.

(d) In an allied group of cases the septicaemia is prolonged, but is eventually followed by meningeal infection; in Ainé and Chéné's case the pseudo-malarial stage with splenic enlargement lasted for four weeks before the onset of meningitis; and in Serr and Brette's two cases lumbar puncture was first performed after four and two months' fever, and cures rapidly followed the intravenous injection of serum.

A correct diagnosis is seldom made in the absence of meningitic symptoms. Blood cultures should be taken during the febrile paroxysm.

The Milroy Lectures

ON

**HALF A CENTURY OF SMALL-POX
AND VACCINATION.**

DELIVERED BEFORE THE ROYAL COLLEGE OF
PHYSICIANS OF LONDON.

BY

JOHN C. McVAIL, M.D., LL.D.

**CONTROL OF SMALL-POX IN THE PRESENT
DAY (continued).****VII. LOCAL CO-OPERATION AND CENTRAL CO-ORDINATION.**

A duty that should not be neglected is to notify local authorities in the neighbourhood, especially if any contacts are supposed to have travelled into their area. The date of exposure to infection of such contacts should always be stated to the medical officer so as to guide his action. If in any case there has been an exodus of navvies from constructional works or of vagrants from a lodging-house, the police of surrounding areas, as well as the medical officers of health, should be informed and a search instituted for contacts. Often the name of the navy in such circumstances is of no avail. Some of them for various reasons seem to use a new name for every new job.

Dr. Boobyer of Nottingham adopted a very systematic scheme of notification to various parties within his own area who might utilize information sent to them. The name and address of every fresh patient was furnished daily to general and special hospitals, to the post-office surgeon, the Charity Organization Society, the guardians, the Education Committee, the city librarian, the health visitor, the owners or rent collectors of infected houses, the vaccination officer and public vaccinator, and various municipal officers.

Under orders by the Local Government Boards of England and Scotland every small-pox case individually is to be reported as it occurs. The army, navy, and air force authorities are notified at once if concerned, an inspector is usually sent, and necessary inquiries are carried back to other districts or other countries. Small-pox abroad is followed to the extent that information

allows, and port medical officers are told of any known special risk. Last year at Newcastle a shipload of refugees from Murmansk in Russia was medically examined, and four or five cases of ambulant small-pox were found which would otherwise have got to destinations within the country. The resumed traffic with the North Sea and Baltic ports is being closely watched.

These, then, are the essentials of the modern method of small-pox control: (1) A large supply of glycerinated calf lymph constantly available, capable of immediate increase, and freely used for all who will take advantage of it; (2) compulsory notification; (3) a sufficient public health staff; (4) search for, vaccination of, and surveillance of contacts; (5) isolation; (6) disinfection; and (7) local and central administrative co-operation and co-ordination.

Excepting for two features, these preventive measures, as such, are not new. They are not even modern. In a review of the public health administration of Glasgow⁵ the late Dr. Hugh A. McLean showed that so early as 1648 the precautions set forth for the prevention of plague were, when translated into modern speech, briefly as follows:

- "1. Compulsory notification.
- "2. House-to-house visitation; districts mapped out and certain quartermasters or sanitary inspectors appointed to each.
- "3. Compulsory removal, rich and poor alike, to the isolation camp on the Town's Moor, with corollary of treatment and upkeep at the town's expense.
- "4. Appointment of a superintendent to manage the camp with visitation by a councillor twice or thrice weekly.
- "5. Cleaning of infected houses and clothes and removal in special closed carts of infected filth."

The two new items in the modern scheme of prevention as applied to small-pox are (1) vaccination, or immunizing of the individual, and (2) observation of contacts, based on present day knowledge of incubation periods during which infectious disease can be dealt with before the stage of infection is reached. These embrace the essential advances in principle which have been made within the past three hundred years. The rest is improvement in practice.

A Navvies' Small-pox Outbreak.—In illustration of the experiences and problems—difficult, but stimulating and interesting—which small-pox may bring to the health administration of a rural area unprovided with the preventive equipment of a town, I may give a brief account of an outbreak amongst navvies in the winter of 1892-93. A new railway—the West Highland—was being constructed in Dunbartonshire, along the shores of the Gareloch, Loch Long, and Loch Lomond, and hundreds of navvies were employed at a time when small-pox prevailed extensively in the industrial parts of Scotland. On December 26th, 1892, a message came to me from the Glasgow Health Office that a tramp suffering from small-pox had been found in a lodging-house, and that he had just come from Ardlui, a small scattered hamlet at the head of Loch Lomond, where he had been staying for several days. I wired to the nearest doctor on Loch Lomondside—at Tarbet, about ten miles away—to visit immediately, and set about collecting vaccine lymph preparatory to visiting on the following morning. There was a steamer service on the Loch only three days a week.

The tramp had stayed for several days in a navvies' hut used as a lodging-house. There were 19 inmates and the incubation period had not quite elapsed. Note was taken of the vaccinal condition of the 19, and I arranged that the Tarbet doctor, who was also doctor to the railway constructional works, would visit daily and watch for appearance of the disease. The railway contractors were asked, and agreed, to refrain from dismissing any of the navvies in the hut, and to employ them in a gang by themselves. Two, however, had already gone away, and were searched for by means of the police in half a dozen adjoining counties and burghs. Both were found. One had previously had small-pox, and neither developed the disease.

Meantime the hut was disinfected and the infected bedding burned, but the problem which troubled me most was what to do with any small-pox which might develop. The nearest available hospital was at Knightswood, close

to Glasgow, and forty miles by road from Ardlui. Conveyance of small-pox cases by the steamer service was not to be thought of, and the onset of a heavy snowstorm answered in the negative the question whether Knightswood Hospital could be approached by road. I resolved therefore—and there was no time for deliberation—to start a hospital and observation house on Loch Lomondside. The navvies' lodging-house was secured for the former purpose, and another hut not far away was obtained as a reception house, the ordinary navvy inmates being sent elsewhere. Staffing and equipment were the next problem, though all questions were really being tackled at the same time, with the help of Mr. Dunbar, the county sanitary inspector, who gave invaluable assistance. The observation hut was put in charge of a navvy who had been in the army, and maintained discipline. No nurses could be obtained in Glasgow, but the ex-matron of a small local hospital was found in the Vale of Leven, at the south end of Loch Lomond, and undertook the job with such help as was obtainable. A retired sanitary inspector, not in his first youth, was also enlisted in the service, and, under the name of "Sanitas," which somehow was at once given to him in the locality, he did excellent work, though on one occasion his supervision of the funeral of a patient who had succumbed to small-pox had results which would have required some explanation had an intelligent press got hold of the facts. It required the aid of three men and three bottles of whisky to accomplish the obsequies of that navvy. One of the mourners was so overcome that he fell into the grave on the top of the coffin, and subsequently conveyed small-pox to a neighbour who had no other kind of contact with the outbreak. Such a funeral introduced what is now called "a certain liveliness" into the proceedings, and some restraint had to be put on local enthusiasm. The thrice-a-week steamer service was quite insufficient for communication purposes, and a night drive in an open trap along the frozen roads from Glen Falloch to Balloch was the coldest experience I ever had. A motor launch with its engineer was hired for the period of the outbreak, and served for conveyance of bedding, furniture, food, and other supplies, and also of the staff.

These arrangements were not wholly made in advance, but matured contemporaneously with the occurrence of cases of small-pox. On January 2nd and 3rd three of the navvies developed the eruption. A man who had been twice vaccinated and had had a day or two's feverishness without eruption was retained as attendant, and the wife of the hut-keeper was also pressed into the service.

The Tarbet doctor took medical charge of both huts. A son of the keeper of the original (by that time the hospital) hut was one of the inmates of the observation hut, but refused revaccination and disobeyed strict injunctions not to visit the hospital hut. He duly developed small-pox and was transferred to the hospital hut. Two or three persons had been indirectly exposed to infection from the case of the tramp and two developed the disease.

Another centre of infection was meanwhile discovered at a navvies' hut at Ardencaple on the Gareloch. On January 10th the hut-keeper developed the disease and was removed to Knightswood Hospital, the distance being about twenty miles. Infection had been by a tramp on his way north to Crianlarich in Perthshire. I wrote to the Perthshire medical officer warning him to be on the outlook for small-pox at Crianlarich, but received the same day a letter from him warning me about Ardencaple. On the side of Loch Long, midway between Ardencaple and Ardlui, was another navvies' hut which also became involved by tramp infection, and as it was only nine or ten miles from Ardlui, the hospital hut there served for a case which occurred. Whilst visiting the Loch Long hut I found an inmate engrossed in reading the *Fortnightly Review*. Many a navvy, like this man, has a life story which he will not reveal.

The public health authority sanctioned the use of revaccination to the utmost in control of the disease, and, employing the doctor at Tarbet, the operation was, I believe, performed on every one of 600 navvies working on the railway track in Dunbartonshire, with the exception of such as were already immune through small-pox or revaccination.

The total cases in the outbreak amounted only to 12, with 2 deaths.

Regarding vaccination, I reported as follows :

Of the nineteen inmates of the hut at Ardlui, three had already had small-pox and none of these were attacked; four had been either revaccinated or their primary vaccination had been performed subsequently to the age of 12 years, thus making it equivalent to a revaccination, and none of these were attacked by small-pox, though they included the man referred to who had a slight febrile illness. Of the remaining twelve, one had four marks of vaccination, two had two marks, six had one mark, and two had no traces of ever having been vaccinated. None of those who had more than one mark were attacked. Of the six who had one mark two were attacked, and of the two who had no marks, both were attacked and one died.

The facts as to the vaccination or non-vaccination of these nineteen persons were taken down by Mr. Dunbar to my dictation on my first visit on 27th December, previous to any of them having developed small-pox.

Such an outbreak involves much hard work to those responsible for its control, and calls out all the initiative a man possesses, but the results far more than repay the labour. The scene was set in the wilds, beside lochs and frozen streams and snow-clad mountains. The whole experience made an unforgettable impression, and was an unequivocal demonstration of the value of vaccination, supplemented by emergency measures of isolation and observation of contacts.

Leicester and Small-pox.

It is impossible to complete a survey of the present-day control of small-pox without reference in some detail to what has come to be known as the Leicester Method of dealing with the disease.

The usual antivaccination history of Leicester is that prior to 1872 it was a well vaccinated town, and that after having suffered from the epidemic it abandoned vaccination. The facts, however, are very different. Before 1872 Leicester had been notorious for its neglect of vaccination, as appears, indeed, from statements made by exponents of Leicester's methods. In 1842 the guardians decided not to carry out the Vaccination Act of 1840, and in 1851 not half of the inhabitants were vaccinated. Lord Lytton, in introducing the Vaccination Act of 1853, cited Leicester as an example of neglected vaccination. A table of statistics of vaccination submitted to the Royal Commission by Mr. J. T. Biggs on behalf of Leicester showed a large average default excepting for the years 1868-71, and as regards the period subsequent to 1872, at a census of the vaccinal condition of a typical population of over a thousand people, taken in 1903, it was found that about 62 per cent. had been vaccinated, though no doubt many of the vaccinations would be of old date.

It happens that from time to time in recent years* Dr. Killick Millard, the medical officer of health, has quoted as follows from my book, *Vaccination Vindicated*, published so long ago, alas! as 1887:

In Leicester, when its time arrives, we shall not fail to see a repetition of last century experiences, and certainly there will afterwards be fewer children left to die of diarrhoea. It is to be hoped that when the catastrophe does come the Government will see that its teachings are duly studied and recorded.

As I am by way of summing up my views on the whole subject, the opportunity may be taken of commenting on the prophecy, and generally on the doings of Leicester in respect of small-pox and vaccination.

I have learned, I hope, many things in thirty years, and feel no need to maintain now all I believed then, but the prophecy above quoted was conditional. In the same paragraph I wrote:

Throughout the country there has been nothing approaching an epidemic since 1870-73, and Leicester has had little chance of getting its "immunity" tested. When another great outbreak occurs among the susceptible population of England it will be time enough then to see how Leicester comports itself under the ordeal.

In 1893 (in Stevenson and Murphy's *Hygiene*) I repeated the reservation that "since the Leicester experiment was begun it has not been subject to the test of any general epidemic like that of 1870-73." That reservation remains. Nothing comparable to the great epidemic of 1870-73 has since occurred, and Leicester's immunity has not been subjected to the stipulated test. But Dr. Millard does not give the full quotation, and in *The Vaccination Question* he definitely excises my reference to the 1870-73 epidemic. Yet in proportion to the prevalence of small-pox in Britain, or in London, Leicester stood worse in 1892-93 and in 1903-4 than it did in 1870-73. But I attach little importance

to these comparisons. The essential facts are (1) that small-pox is not now, in respect of fatality or infectivity or prevalence, the same virulent disease as it had been when I wrote *Vaccination Vindicated*; (2) that glycerinated calf lymph was not then available as it is now for emergency vaccination to any required extent in Leicester or anywhere else, and (3) that the Leicester Method as expounded by its protagonists a quarter of a century ago differs in important respects from the method now followed in that town. Taking as its expositor Mr. J. T. Biggs, to whom Dr. Millard specially refers, the method as it existed, or rather as it professed to exist then, is very different from that followed now.

Several points may be noted:

- The Method was "without recourse to vaccination." (The italics are by Mr. Biggs.)
- The Method was entirely voluntary; there was no compulsion.
- The same hospital was used for small-pox and all other infectious diseases at the same time.*
- The same hospital was also used for the (voluntary) quarantining of contacts.
- Compensation for loss of time (of contacts) was not offered.

The best feature has been that from the beginning contacts seem to have been searched for carefully and kept under surveillance. That is an important fact, creditable to the medical officers concerned. Houses and their contents were, of course, disinfected.

Every one of the items (a) to (e) has been given up.

(a) "Without recourse to vaccination." In saying that this item has been given up a reservation is necessary. I do not believe, and never have believed, that the Method ever was without recourse to vaccination, and that which never existed cannot be given up. But Mr. Biggs says so with the emphasis of italics. He repeats the statement, and before the Royal Commission he says, "We have dealt with small-pox without vaccination" (Q. 15374), and he speaks of "the abandonment of vaccination." Dr. Millard uses the same phrase, "abandonment of vaccination." He writes that "Leicester, indeed, by abandoning vaccination, has performed a 'control' experiment of some value," and refers to the epidemics which have occurred "since vaccination was abandoned" (*Public Health*, 1904, p. 627). But there is an important difference. As he observes, "It is well to define our terms." When he says "vaccination was abandoned," he means "infantile vaccination as established by law in this country." It is in this way, by this special meaning for the word vaccination in this special connexion, that Dr. Millard is able to say that Leicester has abandoned vaccination. He states the position rather differently again when he says that the method "professes to suffice for the control of small-pox without resort to universal vaccination." In his report for 1902 he wrote that "all three medical officers of health who have carried out the 'system' have been firm believers in vaccination and have not hesitated to make as full use of it as possible, short of compulsion, when the occasion for it has occurred." Therefore, when Dr. Millard speaks of abandonment of vaccination he does not really mean abandonment of vaccination. But if the chairman of the Sanitary Committee of Leicester (Alderman Windley, who has filled that office for forty years) was within even measurable distance of being correct in saying in 1887* that "only in a very rare instance was it (vaccination) done with consent of individuals by the ex-officer of health, Dr. Johnson, and that is so long since that he does not remember it," then there has been a vastly increased resort to vaccination, and the Leicester Method is not now in respect of vaccination what it was thirty years ago. In 1903 there were 1,084 contacts, and Dr. Millard induced nearly 800 of them living in infected houses to submit to vaccination.

The Leicester Method, in short, is not "without recourse to vaccination."

(b) Mr. Biggs declared before the epidemic of 1892-93:

We find small-pox very easy to deal with, and the same hospital and staff of officials deal with small-pox as with other infectious diseases. There is no compulsion. If people choose, they may go into quarantine, or they may stay out. No one's liberty is infringed.⁹

* Also, Mr. Biggs wrote, "We have one horse and one ambulance van which is kept for other diseases, whether there is any small-pox or not" (*Vaccination Inquirer*, July 1st, 1891).

There is nothing to show that removal to hospital is now any more optional in Leicester than in any other large town which possesses sufficient accommodation. That "no one's liberty is infringed" is only true if every case that is removed goes willingly—and it is unbelievable that Dr. Millard lets any patient fit for removal remain at home if the public is thereby endangered.

(c) The use of the same hospital for small-pox and all other infectious diseases was abandoned so early as before the end of 1892—that is, whenever small-pox became epidemic in the town, and less than two years after such use had been described as part of the Leicester Method. Not only was a separate small-pox hospital of sixty beds subsequently provided, but the whole of the ordinary hospital for infectious diseases was most prudently emptied of all other diseases and set apart for small-pox in the epidemic of 1903-4—the second since 1871-2—and Dr. Millard being now medical officer of health. It was a wise precaution, but it was not the Leicester Method.

(d) The quarantining of contacts at the hospital was abandoned in 1893, again when the town had to deal, not with a theory, but with a reality.¹⁰ Dr. Sidney Coupland says, in reporting to the Royal Commission (Appendix VI, p. 3): "It is not, therefore, to be wondered at that the sanitary authority was led to abandon this essential feature of the plan known as the 'Leicester System' and to substitute for it the generally adopted practice of maintaining infected families under supervision in their houses during the 'quarantine period' of sixteen days."

(e) With regard to compensation for loss of time not being offered to contacts, when such compensation was recommended by the Royal Commission on Vaccination, Dr. Millard declared that "it marks the approval of the Royal Commission of one of the special features of the 'Leicester Method.'" I would not myself have regarded (e) as of first-class importance, but as Dr. Millard holds it to be a "special feature" it is only fair to include it in the list. Mr. Biggs said to the Royal Commission:

I think there is sufficient evidence to prove that no compensation has been made in the shape of wages, and that all that has been done in carrying out our system has been to reimburse those whose articles of furniture have been destroyed.

The Leicester Method has in this respect, therefore, been reversed, and the reversed practice is now boldly claimed by Dr. Millard as distinctive of the Method.

Indeed, it is not vaccination but the Leicester Method in most of its features which has been abandoned in Leicester. At the same time, small-pox has in the present day become in this country a less fatal, a less infectious, and a less prevalent disease than when the Method was propounded. Under these circumstances Leicester had only 355 cases of small-pox in the epidemic of 1892-93 and 715 in 1903-4, and thus furnishes useful illustrations of the fact that, with the mild type of small-pox which prevailed in the provinces in these two epidemics, the modern method, which had taken the place of the Leicester Method, can achieve some measure of success even in a town where there is a large unvaccinated population, and where pressure towards recent vaccination is applied only to contacts.

Leicester's "Luck."—In 1904¹¹ Dr. Millard appreciated how much Leicester owed to the attenuated strain of virus with which it had been infected. "I fully realize," he says, "that the results of the experiment in the future may be very different from those achieved in the past. Moreover, it may have been merely a lucky coincidence that the two epidemics which have occurred since vaccination has been abandoned¹² have been of such an exceptionally mild type. The epidemic at Gloucester was far more fatal." But Leicester has shared in the unparalleled freedom from small-pox which this country has enjoyed since 1904, and now Dr. Millard derides the "luck" theory on which he would have been able to fall back had a severe type of small-pox with high infectivity been experienced in Leicester. In 1914 he writes:¹³ "Many people appear to think that, owing to some extraordinary good luck, small-pox has never come to Leicester in a fatal or epidemic form since vaccination was abandoned." Again: "Hitherto it had often been alleged that the 'Leicester Method' had never been adequately tested, and that Leicester had been lucky."¹³ Thus in 1914 Dr. Millard

ignores the reservation which he had made ten years earlier as to luck. He did not know, and none of us knew, otherwise we would have been prophesying smooth things, that the mild small-pox which first unequivocally showed itself in the epidemic of 1892-95 was the beginning of an experience which was to last and develop up till the present time. But he need not now jeer at himself, under the pseudonym of "Many people," for having prudently provided, lest the position should prove untenable, the bridge of retreat which he had builded under the name of Luck.

In one important respect, however, Leicester has been lucky. It is impossible to read the reports of Dr. Priestley on the epidemic of 1892-93 and Dr. Millard on that of 1903-4, without being impressed by the admirable skill and activity and vigilance which distinguished their management and control of the outbreaks. A public official has no easy task in carrying out measures which are contrary to the prejudices or opinions of the authority which he serves, and it requires both tact and courage to deal successfully with so difficult a position. There is abundant evidence that in Leicester the officers have been well endowed in both respects. This has constituted Leicester's Luck.

WHAT OF THE FUTURE?

More than a quarter of a century ago I wrote that "it will not do to assume that throughout the world, from now till the end of time, small-pox will continue to rage epidemically unless prevented by universal vaccination. Just as leprosy has died out from this country and is even now dying out from Norway and Sweden and Iceland, so may small-pox or scarlatina, or measles, or any and every zymotic disease, die out in the future from this and every other land. And, quite conceivably, small-pox, rather than either scarlatina or measles, might be the next in order of the maladies to disappear from the civilized world."¹⁴ But, I went on to argue, epidemics had been too recent and too severe to justify any assumption of such disappearance. During the quarter of a century since these words were penned, the position has vastly improved, but even yet one dare not assume that danger has disappeared or become negligible.

The European war has passed and the armies are returning to their own countries. It was under these circumstances that the small-pox pandemic of the early Seventies developed. Up till now no such sequel has arisen. But in considering the after-war possibilities of reintroducing small-pox into this country, there is a substantial risk of importation by persons arriving during the incubation period, especially from countries like Russia or Poland when communication with them is again opened up. As before noted, ordinary traffic carrying passengers and cargo from the North Sea and the Baltic has already begun.

It has, however, to be borne in mind that the belligerent armies have very extensively received the protection of revaccination. What the details are for each army we do not know, and we have not yet the particulars even for the British Forces, but I would venture to hope that the amount of vaccination against small-pox in the British army must have greatly increased the total anti-variolous protection of the United Kingdom as a whole and especially of the adult male part of the population. Always in the past since the vaccination laws were enacted the child population has most benefited by legislation, and the transference of small-pox prevalence and mortality from earlier to later periods of life has been one of the phenomena most characteristic of the Jennerian prophylaxis. Now, however, infantile vaccination is largely fallen into disuse, whilst the male adult population is probably better protected than ever before. For though revaccination was always obligatory in the army, yet until this war began the army was so small as to count for comparatively little in the country as a whole. As years pass it will be interesting to watch the course of small-pox prevalence under these conditions, that is, if small-pox does resume its prevalence. Still better will it be if the disease in its old form finally succumbs to the mild strain which is now so common.

Wars have been followed by various pestilences amongst the civil population. As recorded by Dr. Prinzing,¹⁵ bubonic plague, typhus fever, dysentery, typhoid fever, and small-pox have been concomitants of great world

¹² Dr. Millard does not mean that vaccination was abandoned. His special definition of the term vaccination has to be borne in mind.

struggles. The virulent pandemic of influenza has so far been the only outstanding accompaniment of the greatest of all wars, though in Germany, as already noted, the enormous number of Russian prisoners introduced the infection of small-pox, which obtained more hold than that country has ever experienced since it adopted its great system of vaccinal protection. It is too soon yet to prophesy that we have seen the last consequences of the European war in respect of epidemic disease. If, however, small-pox were to invade this country, the measures at our disposal and our preventive equipment generally should enable us to deal with it, despite the fact that, on the whole, we are going back on, rather than developing, our position in regard to general protection obtained beforehand. If the disease is of the mild or American type with low infectivity, it is all the less to be feared. If, on the other hand, the old European type of the Seventies should begin to develop, the means for meeting it are at hand. If vaccination of contacts, supplemented by isolation, disinfection, and the other measures for controlling epidemics were to prove insufficient, then I have no doubt that the spread of infection would result in the general adoption of the one solitary measure capable of controlling an extensive epidemic. That measure is vaccination, but it will be all the greater triumph of vaccination if even a limited resort to it under the modern method suffices to prevent any outbreak from assuming epidemic or pandemic proportions. Just as Lister's antiseptic system finds its greatest triumph in the aseptic system which evolved from it, in the same way success of the modern method of small-pox control will be the greatest triumph of the Jennerian prophylaxis.

In concluding these lectures, let me express my thanks to medical officers of health in various parts of the country who have kindly replied to many inquiries; to Dr. John Brownlee, of the Medical Research Committee, I am greatly indebted for aid in abstracting particulars from published reports; and I have again to thank the Royal College of Physicians for honouring me with the Milroy Lectureship for 1919.

REFERENCES.

- ⁵Glasgow Medical Journal, July, 1911. ⁶Public Health, July, 1904, p. 609; The Vaccination Question, 1914, p. 101; Public Health, March, 1917, p. 115. ⁷Public Health, July, 1904; The Vaccination Question, 1914, p. 44. ⁸Vaccination Inquirer, November, 1892, p. 128. ⁹Vaccination Inquirer, May, 1891. ¹⁰Dr. Priestley's Report, p. 97, and Royal Commission's Final Report, par. 483. ¹¹Public Health, p. 627. ¹²The Vaccination Question, p. 102. ¹³Ibid., p. 137. ¹⁴Stevenson and Murphy's Hygiene, vol. ii, 1893. ¹⁵Epidemics Resulting from Wars, Clarendon Press, 1916.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

INFANT FEEDING.

IN Dr. Laing's article in the BRITISH MEDICAL JOURNAL of February 8th he refers to the system of long intervals and limited feeds advocated at many infant welfare centres, and expresses the fear that it will bring discredit on them, "for the mothers will find that babies fed in this manner do not do so well as others." As an infant welfare medical officer having some 1,000 babies under my supervision, I should like to express my entire agreement with Dr. Hickling in her reply to Dr. Laing. Fourteen years ago I saw such splendid results from the "three-hourly day and no night feeding method" adopted as the routine at some of the largest maternity hospitals on the Continent that I have recommended it ever since, with excellent results.

At present I have a dozen pairs of twins attending my clinics some of whom weighed only from 4½ to 6 lb. at birth, and all of whom have made good progress with three-hourly feeds during the early months. I found several of these poor mothers fed their infants only three-hourly from the first week because the process of feeding two, in addition to the necessary toilet, took so long that more frequent feeds were impracticable. I had a set of triplets attending one of my clinics brought up on what Dr. Laing calls "this system of starvation." At the age of 10 months none of the three weighed less than 20 lb., and they are still "going strong." To-day I examined a perfectly healthy baby weighing 19 lb. 10 oz. at 8 months old who, the mother assures me, has only been fed three times in the twenty-four hours—that is, at 7 a.m., 1 p.m., and 7 p.m.—ever since the age of 3 months, though I usually advise five or six feeds in the twenty-four hours at 3 months.

I have never been able to detect symptoms of starvation apparently due to three-hourly feeding. The infants suffering from the worst malnutrition I have seen recently were being fed two-hourly, some of them quite regularly, the mother said, and one of them every hour and a half. Scores of infants have been brought to me at hospital or clinic suffering from dyspepsia and loss of weight on two-hourly feeds, who have begun to gain weight the first week after the interval between feeds was changed to three or four hours.

While not wishing to be dogmatic, I am firmly convinced by experience (including residence at a hospital where my bedroom was next the mothers' and infants' wards) that nearly all normal babies make the best progress when kept eight hours at night without a feed from the first, though one or two teaspoonfuls of boiled water may be given if the infant wakes during the first few nights. The habit of sleeping for eight consecutive hours at night is invaluable to mother and baby, and leads to an improvement in the quality of the milk.

I fully agree with Dr. Laing that in infant feeding no hard and fast rule as to quantity is practicable. When consulted as to the quantity to be first given to a baby previously on the breast, I always take the size, weight, and appetite into account. I tell the mother she may need to increase the quantity, if possible keeping to the proportions suggested, till the baby is seen again in a few days.

Space prevents me from giving statistics, but from 100 unselected cards, taking all cases seen by me under a month old, when the interval between feeds was lengthened from two to three hours, I find the average gain in weight for the following months is from 1 lb. to 2 lb. 6 oz. in a month.

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PROFLAVINE OLEATE IN THE TREATMENT OF OPEN WOUNDS.

I HAVE read with interest the paper by Drs. Berkeley and Bonney in your issue of February 8th on the subject of proflavine oleate in the treatment of open wounds. During my work in France for the past two years I have treated all cases of open wounds with modified bipp. The formula for this is: Iodoform 2 parts, bismuth subnitrate 1 part, vaseline 12 parts, and enough hard paraffin to give the preparation the consistency of butter. This is spread thickly on a double layer of gauze and placed over the whole raw surface of the wound, whether flat as a guillotine amputation stump or irregular as a deep ragged wound of the trunk or limbs. This dressing need only be changed every second to fifth day, according to the amount of discharge from the wound. Like the proflavine oleate, it peels off the wound without causing any pain. Occasionally it may cause the granulations to become flabby if used for very prolonged periods, and then it should be replaced by some stimulating preparation, such as Mercière's fluid, which consists of iodoform, guaiacol, eucalyptol, balsam of Peru, of each 10 grams, alcohol 100 grams, ether 1,000 grams.

But at the present time surely no large open wound should be left to close by a gradual and lengthy process of granulation without an attempt being made to close it or at least diminish its size by secondary suture. As a preliminary to this operation, I have found this ointment excellent. It also has the advantages of being moderately cheap, easily made, and non-poisonous, even when used in large quantities and over lengthened periods. The painlessness of the dressings under this method of application is truly remarkable and is enormously appreciated by the worn-out patient.

Dublin.

R. ATKINSON STONEY.

As a result of the ordinance recently issued by the Civil Government of Madrid making vaccination compulsory more than 400,000 persons in the city and province have been vaccinated.

SURGEON-GENERAL MERRITTE IRELAND, Chief of the Medical Corps of the United States Army, and Colonel Walter E. Bradley have been presented by General Pershing with the Distinguished Service Cross in recognition of their services during the war.