without help, beyond the internal administration of strychnine and digitalis during the last weeks of pregnancy; the exception, not apparently a bad case, was found dead in her bed a few weeks before full time; she had been taking the drugs mentioned. This case illustrates the extreme difficulty of treatment and prognosis in cases of heart disease with pregnancy—a difficulty which should, however, be largely removed if a sufficient number of cases could, after careful examination, be watched at ante-natal centres through pregnancy and labour and afterwards.

The so-called physiological enlargement of the thyroid gland in pregnancy was not met with; not more than two or three of the patients showed any signs of thyroid hypertrophy, and in them it was of old standing.

A comparison of the maximum girth of the abdomen during the eighth or ninth month of pregnancy and the weight of the children immediately after birth was made in 148 cases; excluding 5 cases noted as fat, and one of hydranmios, the results seem to indicate that with a girth not exceeding 36 in. the child will not weigh more than 7 lb.; this confirms the rule laid down, I believe, by Ayres in America and quoted by Herman.

The blood pressure in normal pregnancy seems to be unaltered. An abnormal blood pressure may be due to an abnormal pregnancy or some disease complicating normal pregnancy.

Among the cases found with albumin in the urine, one, a primipara, came in 1916, late in her pregnancy, with a large amount of oedema and urine almost solid on boiling; she was immediately admitted and labour induced. She still (January, 1919) has a heavy trace of albumin in her urine and morning headaches. This failure of complete recovery after delivery, seen in some cases of albuminuria in pregnancy, should receive more attention. Is it due to the intensity of the initial attack, to the length of time the kidney complication exists, or to a renal lesion in existence previous to the pregnancy? If the last be the explanation, can treatment from the commencement of the pregnancy prevent or keep it in abeyance sufficiently for a living child to be delivered without undue danger to the mother? The records of some cases of chronic renal disease with pregnancy point somewhat to this last possibility.

Cases of excessive venous engorgement of the veins of the lower limbs were treated by bandaging to just below the knee, and in many cases the patients given aperients combined with strychnine and digitalis internally. The etiology of this complication of pregnancy is by no means clear; it cannot all be due to mechanical causes, for a woman in two successive pregnancies under equal conditions may in one pregnancy have distended veins and in the other no signs of them. I am at present inclined to consider it a question of circulatory power.

Multiparae who presented no detectable sign of disease or abnormality of the pregnancy, but came complaining of "feeling faint," "bad feelings," or a history of an early slight loss of blood in pregnancy, showed by an examination of their labour cards a great liability to give birth to stillborn or premature non-viable children, and the unknown cause of this fetal mortality leaves a valuable field for future research work. I am not here including cases whose history is typical of an old syphilitic infection with pregnancies terminating later and later in gestation, but rather cases giving the impression of a frail constitution, possibly the future victims of tubercle, heart failure, or renal disease.

In conclusion, one rare curiosity was observed—the patient had advanced disseminated sclerosis and pregnancy; her labour was normal, but she died some weeks later of her nervous disease.

REFERENCE.

¹ BRITISH MEDICAL JOURNAL, January 18th, 1919.

THE American Congress of Physicians and Surgeons will be held in Atlantic City this year on June 16th and the two following days. It was to have been held in Washington, but owing to the uncertainty of hotel accommodation there the place of meeting has been changed.

A CONGRESS on the history of medicine is to be held at Antwerp in 1920, on the occasion of the golden jubilee of Dr. Broeckx, the first medical historian of Belgium, and of the third centenary of the foundation of the Antwerp Medical Club in 1620.

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.

HAVING discussed small-pox as it was and is, and vaccination as it was and is, we now come to the important practical question of the control of small-pox in the present day. In considering this subject it is necessary to take account alike of the attack and of the defences. As to the former, small-pox in this country is, broadly speaking, a less fatal, a less infectious and a less prevalent disease, than it was fifty years ago. The diminution (which first appears definitely in the 1892-95 epidemic), while irregular, has been fairly continuous and has been very specially notable since about 1904.

Other factors in respect of attack are that the disease is not infectious in the incubation stage, that its infectivity is limited in the pre-eruptive stage and does not reach its maximum until vesiculation and pustulation, that it is not conveyed by water supply nor by drainage, that milk epidemics are unknown, and that there are no chronic carriers. Epidemics also often begin slowly, and when that is the case there is an appreciable period within which urgent measures may be carried out by a vigilant public health authority. The several weapons in the armoury of communal defence have now to be considered.

I. VACCINATION.

Vaccination and revaccination at once claim the first place. On the one hand, owing to increasing neglect of systematic infantile vaccination an increasing proportion of the population is not immune to small-pox, but on the other hand the calf lymph system of the Local Government Boards is of the first importance as a measure of defence. In the old days, as I have already pointed out, all that could be relied on in presence of the most extensive epidemic was the exiguous supply of humanized lymph which could be obtained once a week from the arms of infants under the routine of primary vaccination at the age of three months in England and six months in Scotland. Now a huge stock of half a million tubes of glycerinated calf lymph is kept in constant readiness, fresh material being regularly added to replace material which, through lapse of time, is regarded as of doubtful efficacy. Also the vaccinal process runs a shorter course than the incubation stage of small-pox, and if the protective operation be performed within two or three days after infection, vaccinia gets home first, and variola, when it comes along, usually finds the fortress barred against its entrance. The position, however, has its disadvantages. There is always the possibility that the operation of revaccination may not be successful, and this is a risk which has to be run by the individual who has previously neglected to protect himself. Other things being equal, the work of vaccination should be done leisurely and systematically. In revaccination the convenience of the youth or adult concerned should be considered, especially with regard to the opportunity for taking a few days' rest from any heavy manual labour, to prevent inflammation around the vesicles on the vaccinated arm. Even under a system of emergency or panic vaccination this rest should be obtainable if required, especially because experience indicates that there is more likelihood of an inflamed arm in the adult than in the child. But there should be little incapacity if the vaccination has been done in cleanly fashion and is covered up with cotton-wool and boracic acid whenever it is seen that a marked reaction is to follow.

Recent Vaccination.

Vaccination or revaccination in presence of an epidemic has the supreme advantage of recency. The immunity obtained is of the highest degree. The outstanding example of the effect of recent revaccination on a large

scale in this country is that of the city of Glasgow in 1901-2. Glasgow had prepared at enormous expense a great international exhibition, and fear arose that it would prove a municipal and financial failure owing to a threatened epidemic of small-pox which would prevent visitors flocking to the city. In these circumstances the Corporation, acting on medical advice, entered on a great vaccination crusade throughout its borders. It employed and paid the whole medical profession of the city to vaccinate all who could be induced to accept the protection, and the medical officer recorded the results fortnight by fortnight. They are set down here in tabular form.

TABLE V.

Not Recently Revaccinated and Recently Revaccinated Population of Glasgow, over Five Years of Age, in each Fortnight, with the Case of Small-pox occurring in each Class. (Dr. A. K. Chalmers.)

	Not Recently Revaccinated.		Recently Revaccinated.	
	Population.	Cases Registered.	Population.	Cases Registered.
1901.				
Jan. 12 ...	675,887	23	0	0
" 26 ...	674,816	350	1,071	0
Feb. 9 ...	671,025	202	4,862	0
" 23 ...	634,213	127	41,674	0
Mar. 9 ...	556,561	299	119,326	0
" 23 ...	518,426	161	157,461	0
April 6 ...	474,694	92	201,193	0
" 20 ...	429,056	67	246,831	0
May 4 ...	384,371	28	291,516	0
" 18 ...	366,125	18	309,762	0
June 1 ...	352,633	11	323,254	0
" 15 ...	347,777	2	328,110	0
" 29 ...	345,293	8	330,594	0
July 13 ...	281,867	1	394,020	0
Nov. 16 ...	279,452	1	396,435	0
" 30 ...	279,232	5	396,655	0
Dec. 14 ...	279,020	4	396,867	0
" 28 ...	278,796	0	397,091	0
1902.				
Jan. 11 ...	278,623	28	397,264	0
" 25 ...	278,152	23	397,735	0
Feb. 8 ...	277,653	23	398,234	0
" 22 ...	277,134	147	398,753	0
Mar. 8 ...	276,033	92	399,854	0
" 22 ...	274,611	85	401,276	0
April 5 ...	272,694	36	403,193	0
" 19 ...	271,619	15	404,268	0
May 3 ...	271,032	10	404,855	0

* The cases under five years have not been excluded from these figures, because their allocation through the various fortnights would have been difficult, and their inclusion is unimportant. In the 1900-1 part of the outbreak these numbered 60, 54 of whom (including 30 cases occurring under one year) were unvaccinated primarily.

It will be noted in the first column how the population not recently revaccinated was gradually diminished from 675,887 in January, 1901, to 271,032 in May, 1902, and how correspondingly the recently revaccinated population increased from *nil* in January, 1901, to 404,855 in May, 1902. During all that period the small-pox cases were also noted fortnight by fortnight. From beginning to end they were confined absolutely to the not recently revaccinated section of the population. Not a single case occurred among the recently revaccinated, and when another epidemic broke out after an interval of fully a year, only one of the 400,000 revaccinated was attacked.

Money Payments.—To enable a vaccinee to take a few days' rest after the operation many public health authorities in presence of threatened small-pox now offer a small money payment, especially to the inmates of common lodging-houses or persons of the like class. I have even known of a lodger presenting himself with bared arm for revaccination who when casually gripped by the other arm demonstrated expletively that he had been very recently revaccinated and that his second presentation of himself was due to the desire for another payment. Payment is not a high class of inducement towards protection against small-pox, but in the absence of other pressure or obligation resort has to be had to the method which suits the character of the individual.

Vagrants.—In connexion with vaccination the relation of vagrants and casual workers, navvies and the like, to spread of small-pox has often been discussed. Dr. Henry Armstrong, medical officer of Newcastle, published the result of a series of inquiries concerning it in 1893. The London County Council convened a conference of sanitary authorities on the subject in 1894, and the dangerous part

played by the vagrant is universally admitted. Dr. Kaye of the West Riding estimated that there were about 36,000 tramps and vagrants in England—a truly formidable number, with great possibilities as carriers of small-pox.

The Royal Commission in its final report in 1896 made a series of recommendations for better control of common lodging-houses in respect of small-pox prevention. Common shelters should be made subject to the law relating to common lodging-houses. Local authorities should have power to require medical examination of inmates of common lodging-houses and casual wards; to order the exclusion of fresh inmates for any required period; to close common lodging-houses temporarily; to offer free lodgings to inmates under suspicion of infectivity; should report to other sanitary authorities; and should offer vaccination to inmates.

II. COMPULSORY NOTIFICATION OF INFECTIOUS DISEASE.

Voluntary notification of infectious diseases was recommended in the Local Government Board's report for 1877, in which Poor Law medical officers were instructed to intimate every case, and it was advised that doctors be supplied with postcards for voluntary notification, the vaccination officers having similar instructions for intimation of cases. About this time various public health authorities were obtaining compulsory powers under local Acts. I think the first of these in England was Huddersfield in 1876. Others were Bolton, Nottingham, Jarrow, and Burton-on-Trent. Leicester followed in 1879.* In Scotland Greenock obtained powers in 1877, Edinburgh in 1879, and Aberdeen in 1881. Compulsory notification proposals were received with some hostility both by medical men and by opponents of vaccination. So late as November, 1894, the *Vaccination Inquirer* expresses its "hearty sympathy" with a medical objector to compulsory notification.

Notification of infectious disease was provided for in 1889 by an Act which local authorities could adopt if they so desired. It became compulsory in 1899, and is essential alike to the successful practice of emergency vaccination and to all supplementary measures for dealing with small-pox epidemics. Obviously to control a serious infection one must first be aware of its existence. Fifty years ago the knowledge which came to the public health officer was at the best casual and fragmentary—so casual and so fragmentary as to make impossible the stamping out of an epidemic otherwise than by general vaccination and revaccination, whilst these measures, as already indicated, were strictly limited by insufficiency of humanized lymph. Now the case is widely different. There is no disease of which the medical practitioner is more certain to give immediate notification than of small-pox, actual or suspected. Notification, of course, should be prompt, and the telephone or telegraph should be freely used in addition to written intimation to the medical officer of health.

Diagnosis.

As a preliminary to notification, diagnosis is obviously essential. But there is little opportunity in the present day for instruction of medical students, and the longer this remains at a minimum the better it is for all concerned, as it means that small-pox is absent. Such opportunity, however, as does exist should be fully taken advantage of, and wherever a case of small-pox can be seen students and practitioners within reach should be given, under due precautions, facilities for seeing it. Fortunately, as the result of action taken by the Royal College of Physicians in 1887, the institutions of the Metropolitan Asylums Board are now available for the education of students. The great hospitals for infectious diseases throughout the country are similarly at the service of the medical schools. To deal with actual outbreaks an excellent practice has been established by the Local Government Boards of England and Scotland of assisting any local health authority which has to deal with small-pox by giving them the aid of a medical inspector specially acquainted with the subject. Advantage should always be taken of this service not only for diagnosis but for the whole scheme of preventive measures.

* Dr. Millard, who ought to know, makes a puzzling statement as to Leicester. He says: "Compulsory notification came into force under a local Act as early as 1878." But the Act was not passed until August 11th, 1879, and the Royal Commission say (par. 481, Final Report) that it came into operation after that year.

III. PUBLIC HEALTH STAFF.

The next great difference between the past and the present consists in the vastly improved public health staff now employed by the very great majority of local authorities. In 1870 there was in Scotland only a single whole-time medical officer of health. For the rest, each so-called public health authority gave a more or less nominal appointment to some doctor in general practice, commonly without any special study or knowledge of hygiene or disease prevention. Diplomas in public health were not instituted for a good many years after 1870, and even yet the possession by a health officer of such a diploma is not invariable. They are mentioned in this connexion merely as indicating the education and training in the prevention of infectious diseases which are now obtainable. If one looks at the list of textbooks and publications of all sorts which have come into existence in relation to public health and compares it with the meagre literature of 1870, an indication of the changed conditions is obtained. In the early days of public health diplomas bacteriology was hardly even a rudimentary science, and the laboratory part of the practical examination was confined to chemistry and microscopy. Bacteriology, unfortunately, has, so far, been of little value in respect of small-pox, but the place it now occupies indicates the tremendous improvement that has taken place in the equipment of the public health staff of a local authority. Almost every day whole-time appointments are being substituted for part-time, and comparatively soon this advance will be complete. The medical officer, besides, has now a staff incomparably better than existed, or could have existed, in 1870. Just as education for the diploma in public health has advanced, so has education of the sanitary inspector, who displaces the old inspector of nuisances.

Let me say in a word on this point that the outstanding insanitary condition which can be regarded as of consequence in spreading small-pox is overcrowding. Proximity of individual to individual within dwellings undoubtedly favours extension of the disease, and the system of high tenement buildings giving accommodation to many households and approached by a common turnpike stair makes small-pox, once it has obtained a footing, very much more difficult to control in a city like Edinburgh or Glasgow than in any English working class town with houses only two stories high and each dwelling with its own door opening directly on the street.

IV. SURVEILLANCE OF CONTACTS.

Search for small-pox contacts was no doubt attempted to some rudimentary extent even in the pandemic of the Seventies. In 1878, referring to a report by Dr. Johnson, assistant medical officer of Leicester, in which he describes quarantining of contacts, the *BRITISH MEDICAL JOURNAL* says Dr. Johnson is in error in thinking his plan novel, as it had been practised in the metropolis and elsewhere, not only for small-pox but for cholera. The *JOURNAL* agrees that it is undoubtedly very useful at the commencement of what might otherwise have been an epidemic, and is worthy of being more extensively carried out. In cholera difficulty had been experienced in getting fathers into quarantine unless they were out of employment, "and then at least equal difficulty was experienced, at any rate in some places, in inducing them to leave the comfortable quarters provided." The practice thus seems not to have been confined to a single locality, but to have been more or less common. Obviously, however, observation of contacts could only be very imperfectly carried out in the absence of systematic notification of cases.

The epidemic of 1892-93, following as it did the passing of the (adoptive) Notification Act of 1889, furnished really the first opportunity for systematic surveillance of contacts on any extensive scale, and reports show that it was practised in many places: Warrington, Chadderton, Liverpool, Leeds, Oldham, Crewe, Stafford, Bradford, Gloucester, Leicester, Halifax, Sheffield, and Salford may be mentioned.

Under notification, surveillance is a routine duty of the most essential importance, and here the value of a trained and active public health staff becomes manifest. When the first case is discovered, and while it is being dealt with, the question of its origin is simultaneously investigated. The movements and doings of the individual before the development of the eruption; and for a day or two on either

side of it, have to be rigidly investigated, and if the source of his infection is discovered it becomes a new centre of similar inquiries. Next the patient has to be questioned as to his movements during the period of possible infectivity. The household claims the first place, and if he has been an inmate of a common lodging-house, the household is a large and difficult one. His place of employment, workshop or factory, has next to be thought of, also houses which he has visited—meetings, churches, reading-rooms, libraries, educational classes, public-houses, and so forth. All these have this in common, that they give opportunity for indoor infection. As already argued, I am satisfied that, especially in a mild type of disease, indoor infection is much more to be feared than outdoor. Yet if the medical officer of health has succeeded in fixing the patient's memory on his doings on the days in question, and if he can get him to tell the whole truth, note should be made of casual conversations on the street, or of contact in open-air workplaces, especially where the patient's eruption is abundant and where diagnosis has not been made until the stage of vesiculation and pustulation.

A list of contacts having been prepared in this way the necessary action—immediate offer of vaccination, and surveillance—is taken with regard to them. It is by no means necessary that all of them should be seen daily for a fortnight from the discovery of the case. The date of contact should in each case be noted and the surveillance should have relation to the date. Contacts should be dealt with as human beings whose liberties are not to be needlessly limited. Round about the day on which the disease may be expected to appear there should, of course, be special vigilance. A well vaccinated and revaccinated man, after disinfection of his clothing, etc., need have no restrictions whatever put on his movements because he was a contact. A doctor should not be the only privileged person in this respect. And even for others less well vaccinated it is unnecessary that daily work should be abstained from excepting on the critical days, but warning should be given of the necessity for at once giving intimation of the slightest symptoms of illness, usually backache and headache. There is at present no power to compel contacts to remain under conditions permitting of regular observation. They may roam the country as they please, and to deal with this difficulty special measures have to be thought of. In common lodging-houses the money factor comes in as in the case of vaccination of vagrants. It will profit the community to pay casuals to remain where they can be found at any time.

Reception Houses.—In large towns reception houses are very useful and they should have accommodation not only for individuals but for families. They have to be maintained, of course, by the public health authority. In the country reception houses are much less necessary and individuals can commonly be kept under observation at home.

School Closure.—The closure of schools in small-pox, as in the case of other infectious diseases, is a question of circumstances, and the practice may differ according to the facts. I have never myself had occasion to close a school for small-pox, and, as noted by Dr. Killick Millard, it is easier to keep under observation children in a school, especially from a central locality, than to visit them at their own homes. But, on the other hand, an unrecognized case in a school may have opportunity of spreading the disease into localities which would not otherwise be under risk of invasion. The question, as I have said, is one of circumstance, and vigilance is always necessary.

What small-pox may do when it finds entrance into a school is strikingly illustrated in the experience of the Borough of Ossett during the epidemic there.* An unvaccinated child attended school whilst suffering from small-pox. In her class were 27 children, of whom (a) 6 had been vaccinated and revaccinated, (b) 13 had been vaccinated only in infancy, and (c) 8 were unvaccinated. All those under (a) and (b) escaped attack. All those under (c) were attacked. In the same room were other 42 scholars, of whom (a) 8 had been vaccinated and revaccinated, (b) 20 had been vaccinated only in infancy, and (c) 14 were unvaccinated. All under (a) escaped attack, 5 of those under (b) were attacked, each of them

* Reported by Dr. Kaye of the West Riding County Council, and Dr. Greenwood, Medical Officer of Health, Ossett Borough, and quoted by Dr. Spencer Low in his report on the Dewsbury epidemic of 1904.

being over 11 years old, and 12 of the 14 under (c) were attacked. In other two rooms were 100 scholars, of whom (a) 45 had been vaccinated and (b) 55 were unvaccinated. All the 45 under (a) escaped attack, and 17 of the 55 under (b) were attacked. The type being mild, all recovered.

The difficulties of dealing with contacts are increased by the size and character of a community and by migratory habits of its population. In the east end of London one would expect control to be more difficult than in a residential part of the metropolis. Needless to say, every contact, whether intimate or remote—and contacts may be usefully so classified—should be advised to accept immediate vaccination unless he is already sufficiently protected. But pressure towards vaccination should never be excessive. The policy of Parliament to yield to strenuous objection should be borne in mind, and sometimes it turns out profitable not to have pressed too much. I have succeeded in vaccinating a whole village streetful of people as a result of development of small-pox by a contact who had ostentatiously refused protection.

V. ISOLATION OF SMALL-POX.

One of the earliest advocates of isolation as a supplement to vaccination was Sir James Y. Simpson in 1868, in a paper entitled "Proposal to Stamp Out Small-pox, etc."² Simpson stated that "in despite of the marvellous influence of vaccination the mortality produced by small-pox in Great Britain is still very great and startling," and that "Jenner's immortal discovery saves from death from small-pox in our present population probably about 80,000 lives annually," but that "there still die from its ravages about 5,000 annually." Concerning these he wrote that "doubtless a stricter enforcement of the new compulsory laws of vaccination, and a greater amount of attention to its proper performance with proper matter will betimes diminish the number of the susceptible class." "Yet, in the meantime," he goes on to say, "that disease still revels with fatal power," and he asks, "Can it be arrested in its progress?" He believed it could, and proposed four regulations, which were briefly: (1) "The earliest possible notification"; (2) "The seclusion at home or in hospital of those affected"; (3) "The surrounding of the sick with nurses and attendants" immune by cow-pox or small-pox; and (4) Disinfection. He attached chief importance and devoted the rest of his paper to "seclusion," or isolation, which, it will be observed, might be conducted either at home or in hospital. Concerning infectivity he writes: "As the disease does not mature into the stage of infection for some days after the eruption shows itself, a free period would thus be secured to arrange proper measures of isolation, either at home or in hospital, before the date and danger of infection was reached."

In his opinions as to infectivity Simpson was mistaken, almost as Haygarth of Chester had been in the eighteenth century, but excepting that he makes no mention of contacts, his whole scheme shows a characteristic grasp of essentials. I have stated his views here because of the grave risk which exists that the opinions of so great a man on so important a subject may be seriously misunderstood by readers who do not turn for the facts to Simpson's own writings but accept second or third hand references to them. Simpson's "Proposal" was brought before the Royal Commission on Vaccination by a witness who gave no hint either by quotation or reference that the paper contained any mention of vaccination. The dissentient Commissioners in their Statement say that Simpson's paper "will be found at page 40 of the fourth volume of our reports." They believed so, but in fact the paper is not there. What at a casual glance appears to be the paper is there, but it is not the paper as published by Simpson, all the above important references to vaccination being absent. In a review of the dissentients' Statement³ I pointed out with some fullness the misleading manner in which Simpson's "Proposal" was placed before the Royal Commission. In the next place, just as the dissentients relied on the evidence of the witness in question, so Dr. Millard, in a brief passage in *The Vaccination Question*, relies in turn on the dissentients' Statement, and, whilst quoting Simpson as to "stamping out," makes no mention of the fact that the proposal related to cases occurring amongst the fraction of the population left unprotected by vaccination. So the omission error is perpetuated.

Other authorities who have urged the value of isolation

hospitals are Dr. George Buchanan in 1874, and Dr. Thorne Thorne in evidence given before the Royal Commission which inquired into small-pox and fever hospitals in London in 1881-82, but the views of Buchanan and Thorne as to vaccination are so well known as to prevent any risk of misapprehension, at least for another generation.

Meantime, while isolation was being advocated by Simpson, Buchanan, and Thorne, it was being denounced by opponents of vaccination no less violently than was the Jennerian "rite" itself. In 1877 it was urged in one of a series of officially issued Vaccination Tracts that "small-pox hospitals are the culminating mistake in the social treatment of the disease. They are sewers of death to their inmates"; and so late as 1894 the *Vaccination Inquirer* declared itself strenuously opposed to compulsory removal to hospital. Now, however, isolation is advocated by antivaccinationists as if it were a discovery of their own and could be a substitute for vaccination. The Royal Commission tersely summed up the situation when they said regarding isolation, "what it can accomplish as an auxiliary to vaccination is one thing; whether it can be relied on in its stead is another thing."⁴

Hospitals.

As I have said elsewhere, small-pox hospitals are in a peculiar position in relation to prevention of the disease. If vaccination and revaccination were universal there would be no need for small-pox hospitals. On the other hand, if vaccination were absent, small-pox hospitals would be useless, unless, indeed, the whole staff connected with isolation measures—the medical officers, the sanitary inspectors, the ambulance drivers, the nurses, the hospital attendants, those who bring provisions to the hospital, and all connected with it—had already suffered from small-pox and had in that way achieved immunity. It is in the intermediate condition, with vaccination not universal, yet available, that small-pox hospitals find their place in the system of prevention.

Their Situation.—But when they began to be used on any appreciable scale in London and in Glasgow in the epidemic of the Seventies it is true to say that they did much more harm than good. The hospitals became centres of infection from which the disease spread throughout the community. Gradually this lesson was learned, sometimes with reluctance and often with disputation as to the nature of the hospital influence, whether aerial or by contact. Epidemiologists should read the report in the *Transactions of the Epidemiological Society* (vol. xxiv, 1904-5) of a two days' discussion on "The spread of small-pox occasioned by small-pox hospitals during the epidemic period 1900-1904, and its relation to atmospheric convection." There has been no opportunity of studying the question since 1904, and just possibly there may never again be a chance of having the hypothesis tested. But in fact the position now generally is that small-pox isolation hospitals are themselves isolated from the general community in addition to isolating the patients within them. With extension of rural housing and redevelopment of agriculture isolated sites may become more difficult to obtain, but a motor ambulance service enables a single well-situated hospital to serve a large area.

Their Accommodation.—Not only is the position of such hospitals of importance, but so also is the amount of their accommodation; and here it is practically impossible to state how many beds may be required for a given population in presence of an epidemic, so much depends on factors which cannot be measured. The infectivity of the disease, the promptitude and skill which are exercised in grappling with it, the circumstances of the locality in which it occurs, and so forth, are all important factors in the position. The course to adopt, therefore, is not to erect any very great amount of ward accommodation, but to have as the centre of the hospital scheme an administrative block which will serve for a large staff, and a large amount of ward accommodation. Also, there should be sufficient ground attached to the hospital to permit of quick extension. The situation of possible future ward blocks should be definitely laid out and the ground prepared so that so-called temporary buildings can be quickly erected. For small-pox I have always preferred that ward pavilions not expected to be often in use should be constructed of wood and iron. Such materials do not gather damp as sandstone does, and are more easily heated up and put into proper condition for occupation.

Their Management.—It is necessary to go into a little more detail here. Assuming the hospital to be in a safe situation, thoroughly competent management can go far to removing risk of danger. Vaccination again takes the first place. The staff, both resident and visiting, should be rendered immune; so should ambulance drivers, and all, such as carriers of provisions and stores, gardeners, etc., who have any reason to visit the hospital. Steps have to be taken also to prevent the conveyance of infection indirectly, as by clothing or person. The ambulance van in a city should not use busy streets liable to blocking of traffic when curiosity would gather passers by around the van. Quiet unobstructed side streets should be chosen for rapid transit. Theft from the hospital laundry should be carefully guarded against. Emergency nurses should not be employed, but only the trained and trusted staff who have been engaged in nursing other infectious diseases for the public health authority. It is an excellent arrangement, as under Dr. Claude Ker in Edinburgh, to get the nursing staff to forego their usual daily or weekly leave. They should be encouraged to remain within the grounds for a month or even more, and then there should be thorough disinfection prior to several days' continuous leave. The usual precautions as to overalls and caps should, of course, be observed. Goods for the hospital should be brought only within the gate and then taken in by the resident staff. There should be a separate gate for such traffic independently of the patients' gate. Letters regarding patients and official communications of any kind should be dictated by telephone to the local health office and then transmitted in writing. Visits to patients should be strictly limited, though in the case of a dying patient a visit cannot be refused, even if the visitor declines vaccination. He can at least be protected by overalls and subsequently dealt with as a contact.

Emergency Arrangements.—Small-pox should have a hospital to itself, but sometimes even yet local authorities are not so provided, and a safely situated hospital for ordinary infectious disease has to be utilized. In presence of small-pox in a county area I have repeatedly arranged for several local authorities to devote one of their institutions to small-pox, and for ordinary infectious diseases belonging to the district served by it to be treated at other hospitals in the county. This is made easier in practice by the fact that in the early stage of the disease at which a case is ordinarily diagnosed, the patient can safely be removed for quite a long distance in an ambulance wagon; and of course motor ambulances reduce the difficulty to a minimum. Where, however, circumstances make it necessary to treat small-pox in a hospital containing cases of other diseases, the position need not be despaired of. The vaccinal condition of all patients can be ascertained, and permission asked to vaccinate those who require it. If this is refused in any case the patient may probably be in a condition permitting discharge from the hospital, preferably to another hospital. Sometimes, however, a patient may be too ill for vaccination, and a certain amount of risk may be unavoidable. If so, it is part of the price that has to be paid for lack of vaccination or of a separate small-pox hospital. In Leicester, after its Method was departed from, in addition to having a small-pox hospital, the expedient was resorted to of commandeering, for small-pox, the whole of the ordinary infectious diseases hospital, by sending home all removable cases, whatever they might be suffering from. This was followed in 1892 by an extensive epidemic of scarlet fever. On another occasion in the same town such extension did not take place. Anyhow it will be agreed that small-pox is more to be feared than scarlet fever, and should have preference in isolation.

Ineffective Isolation.—Where a small-pox epidemic gets out of hand it quickly becomes futile to attempt to control it by hospital isolation, and efforts to do so are pitifully ineffective. Gloucester, Dewsbury, and Middlesbrough are cases in point.

Gloucester, taking Leicester for its guide, neglected vaccination, and surpassed even its mentor in the degree of its neglect. Also, its representatives told the Royal Commission about the cleanliness of their fine old city and called attention to its freedom from small-pox. Then when its trial came in 1895-96, though as a town of only 40,000 inhabitants it had not available the whole time of a medical officer, as Leicester had with its 200,000 population, yet with its 48 beds it had much more hospital accommodation

in proportion to its size, and it set out to follow the Leicester Method. But its type of infection, unlike Leicester's, was severe, and though this made diagnosis easier, the epidemic spread. After exhausting, and more than exhausting, its 48 beds it went on adding to its provision, so that in the end it had no less than 318 beds. But all was of no avail, and it had to fall back on vaccination and revaccination, ending its experiment by becoming the best vaccinated town in the British empire. Regardless of consistency, antivaccinationists have since then attributed the epidemic to insanitation.

Dewsbury, likewise defying vaccination and defying common sense in respect of every preventive measure, hopelessly failed by panic provision of hospitals to quell its epidemic.

Even Middlesbrough (population 90,000), with infantile vaccination extensively practised, but without systematic revaccination, and with a severe strain of infection in its epidemic of 1897-98, gradually increased its small-pox accommodation from 14 beds to the remarkable total of 822 beds; and in the end, as bewailed by the medical officer of health, they had "twenty-two blocks of temporary buildings which nobody knows what to do with, besides an enormous amount of bedding, beds, and other materials." Under such conditions house to house visitation for vaccination and revaccination is the only means to control an outbreak.

VI. DISINFECTION.

The object of disinfection is, of course, the destruction of the poison, and this ought always to be complete. It is a routine measure, and the modern methods available are well understood and thoroughly effective. Pawnshops and laundries may require attention where articles have been received from infected houses. In towns, shelters may conveniently be provided for poor persons whilst their houses are being disinfected. For security, articles which are difficult to disinfect, such as bedding, are not infrequently destroyed, and so the mind of the authorities is relieved of all anxiety on that score. A hospital superintendent of great experience has advised me that soaking of blankets, etc., in soap and water seemed to destroy all infection. Where a navy or a vagrant has occupied two or three different beds in a navvies' hut or common lodging-house with many inmates, disinfection is difficult and destruction expensive, but no necessary measure must be shirked on either ground. Not only may a lodger or navy have occupied in succession two or three different beds, but there may be in succession several introductions of the disease during an epidemic period, and the difficulty is manifest of carrying out thorough disinfection in the same lodging-house or hut time after time, perhaps at a few days' interval.

REFERENCES.

¹ *Public Health*, February, 1917; and similarly elsewhere. ² *Medical Times and Gazette*, vol. i, 1868, pp. 5 and 32. ³ *Trans. Epidem. Soc.*, 1896-97. ⁴ *Vaccination Tract No. 12.*

(To be continued.)

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

HERPES ZOSTER AND VARICELLA.

In view of the recent article by Dr. R. Cranston Low in your issue of January 25th, a case of similar concomitance may be worth recording.

On January 15th three brothers were admitted to hospital all suffering from scarlet fever. The eldest, who had no previous history of chicken-pox, had well marked right-sided herpes zoster, and, in addition to impetiginous spots on face and ears, there were one or two spots on the left side of the chest, which on healing have left a scar suggestive of a varicellar condition. On January 19th, four days after admission, one of the brothers developed a definite attack of varicella, and within fifteen days the youngest child also had chicken-pox.

Liverpool.

W. M. GRAY.

GONOCOCCAL PAPILLOMA OF THE UMBILICUS. The rarity of the following case may make it worthy of record:

S. M., a girl of 19 years, was admitted into St. Thomas's Hospital with the typical signs of a gonorrhoeal infection