CROONIAN LECTURES ON DISEASE AND ITS MEDICAL TREATMENT.

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LECTURE III.

MR. PRESIDENT AND GENTLEMEN,—In continuation of the subject of my last lecture, I proceed to consider the treatment of *Effusions* meaning by this word extravasations of blood, pourings out of serum, and accumulations of products of secretion. In the groups of diseases which I enumerated in my first lecture, I did not name effusions, for the reason that almost all of them, if not all, fall naturally within one or other of those groups: thus, effusions of blood are, for the most part, due to the rupture of vessels, and retained secretions to the obstruction of ducts, and are hence both the results of mechanical causes; effusions of serum are equally in a large number of cases due to mechanical obstacles to the flow of blood or lymphatic absorption, and in other cases either to inflammation, or to the retention of poisonous excretory matters in the blood, or to diseases affecting nutrition. But they are results of disease—or, if you prefer it, causes of disease—at any rate phenomena of disease, which we are constantly called upon to treat, and which it is very important that we should alleviate or remove; and hence it seems desirable to give their treatment some special consideration.

The chief difficulty in respect of the treatment of serous accumulations or dropsies resides in the fact, that the causes on which they depend are, for the most part, in permanent operation, and nearly always organic and incurable. Effusion of serum into the connective tissue—in other words, anasarca—depends, when it is general, mostly on disease of the heart, lung, or kidney, or on debility connected with anæmia, or with some other form of cachexia; when local, on obstructions to veins or lymphatics, or on inflammatory processes. Now anasarca, of course, immediately disappears when its cause subsides or is removed; thus when, as a result of ascites or of pregnancy, the lower extremities have become oedematous, the oedema is at once dissipated when the abdomen is made to resume its normal size; or when anasarca depends on scarlatinal inflammation of the kidneys, or on anæmia, the restoration of the kidneys to health, or of the condition of anæmia to that of full-bloodedness, is always followed by the subsidence of the dropsy.

It is obvious, therefore, that our first object in dealing with cases of anasarca, is to consider whether and by what means the condition on which it depends can be obviated or cured. But in most cases this condition is incurable; the patient has Bright's disease, and his anasarca is connected with, probably dependent on, the retention of urea in the blood; or he has valve-disease of the heart, or emphysema of the lungs, and his dropsy is due to consequent over-distension of the systemic veins; or a carcinomatous or aneurismal tumour has compressed or involved some trunk-vein, and caused local oedema. And, in fact, his disease is not only incurable but progressive, so that any permanent cure of its consequence—dropsy—would seem out of the question. Still it is certain that many inconveniences and many dangers may arise from the mere accumulation of dropsical fluid, and hence its removal, even though it be only temporary, is often desirable. This may be effected with more or less completeness in several ways; namely, by puncturing the dropsical tissues, or by acting powerfully on one or other of the emunctories—the bowels, the kidneys, or the skin—by which fluids are naturally removed from the system. I cannot doubt that both purgation, diuresis, and diaphoresis are all in their several ways efficacious. But, for myself, I must say that of the three I have least faith in diuresis, and most faith in diaphoresis. I am not quite sure that I have ever known a case of anasarca dependent on organic disease obviously relieved by the use of diuretics alone; and most certainly I have never known a case of phlegmasia dolens or of a case in which the face and arms have become dropsical from the pressure of a tumour within the thorax, or any other case of localised oedema, in which diuretics have appeared to have any influence whatever. And yet, if diuretics be competent to relieve general dropsies,

they ought to be equally competent to relieve local dropsies; if they be competent to relieve dropsy involving the whole body, they ought to be competent to relieve in an equal degree dropsy limited to the head and neck, or to both legs, or to one leg. That purgatives which produce watery evacuations are capable of removing a good deal of anasarcaous fluid is, I think, quite beyond doubt; at all events, we all know how marked and how speedy is the relief which often accrues to an anasarcaous patient upon the sharp action of a drastic purge. I recollect very well going round the wards of St. Thomas's Hospital one morning during the cholera epidemic of 1854, and being told with a certain amount of glee by one of the patients whom I had seen the day previous swollen with renal dropsy, that all his dropsy had left during the night. He had been violently purged without having taken purgative medicine; and before the night came he was dead of cholera. Diaphoresis I have used largely during the last four or five years, and, so far as I can judge, with great success. I confess I have as little confidence in medicinal diaphoretics as I have in medicinal diuretics; but I have great confidence in hot air, hot vapour, and hot water baths. During the period to which reference has just been made, and owing to the fact that special opportunities were afforded to us at the temporary St. Thomas's Hospital, I treated my anasarcaous patients largely by the Turkish bath; and I was soon surprised to find how well those even who were seriously ill bore it, and how much they were, for the most part, benefited by it. Indeed, I began by degrees to employ it in the treatment of such cases almost indiscriminately, and both for cases of heart-disease and cases of renal disease, whether acute or chronic. Under the influence of the Turkish bath, employed, as a rule, three times a week, and the copious perspirations which it produced, I have certainly seen over and over again general dropsy diminish rapidly, and in a very high degree, with a corresponding improvement in the general health of the patient. I hope I have spoken with becoming diffidence of my own power of removing general dropsical accumulations by attempting to promote their discharge from the kidneys, bowels, and skin. I have intended to speak thus, because it is comparatively rarely that I (and I think I am not alone in this respect) have had the opportunity of watching the uncomplicated effects of either of these procedures. We know how much the superintention of dropsy in heart-disease is hastened by whatever excites the heart to undue action, and by whatever deteriorates the general health; and how, under favourable hygienic conditions and appropriate medical treatment, the action of the heart becomes quieted, the health improves, and under the influence of these changes the dropsy disappears.

Similar observations are applicable in an equal degree to chronic renal disease and to the dropsy which follows upon it. Now, in almost all cases of anasarca that come under treatment, the patient is at once, in a greater or less degree, put under the influence of all those health-promoting conditions; and these co-operate with the special dropsy-removing remedies which we then or subsequently determine to employ, and give them often an appearance of efficacy which does not belong to them.

Dropsical accumulations within cavities depend, like anasarca, on various morbid conditions. Those which take place within the peritoneal cavity are the most common of them, and, on the whole, the most important; and I will therefore limit my remarks to them chiefly. Ascites may result, like anasarca, from causes acting generally, such as disease of the heart or kidney. But it depends, also, on any morbid condition which causes obstruction to the portal system of veins, especially cirrhosis, and other forms of liver-disease; and on various morbid processes affecting the peritoneal surface, such as chronic inflammation, tuberculosis, and carcinoma; and more especially such as are connected in the female with the uterus, ovaries, and other pelvic organs or tissues. Here, as in the former case, it will be admitted that, whenever we can cure or ameliorate the morbid process on which the effusion or fluid depends, the latter will speedily disappear. But I am by no means sure that in this, as in the former case, either diuretics, purges, or diaphoretics have, of themselves, any appreciable beneficial effect. I have never heard of, so far as I can recollect, and most certainly have never seen, a hydrocele or an ovarian cyst thus treated with advantage. Yet if dropsy of the belly, or of the pleura, or of the pericardium can be cured by such means, there is surely no reason why these other forms of dropsy should not be similarly cured. For myself, I can say most positively, that I have treated ascitic patients on all these plans with so little success that, practically, I have come to regard them as valueless. I do not mean that diaphoresis, diuresis, and action of the bowels are of no benefit to the patient; in fact, I am sure that he is benefited as regards his general health by maintaining a fairly free action of these excretions. But I have never had clear evidence that ascites has been removed by the promotion of either sweat, urine, or fæces. And indeed, as I have remarked elsewhere, uncontrollable diarrhoea is a not

uncommon attendant on ascites, and is a symptom for the most part of bad augury. But in the treatment of encysted dropsies, remedies which are supposed to promote the action of the absorbents are sometimes administered—mercury, iodide of potassium, chloride of ammonium, and others. I have never found them serviceable; and I do not see, on theoretical grounds, why I should find them serviceable. I showed, however, in a paper which I read before the Clinical Society three years ago, that I had treated a considerable number of cases of ascites depending on different causes (to the best of my belief, cirrhosis, chronic peritonitis, and peritoneal tuberculosis) with tonics, such as quinine and iron, or a combination of the two, with, as it seemed to me, unusually good results. In that paper I gave the details of ten cases of ascites, of which several were tapped once, and two or three more than once, nine of which, under a continuance of tonic treatment, lost their dropsical accumulation, and passed from my observation apparently restored to health. Since that paper was published, several similar cases have come under my treatment. One was a case of cirrhosis in a gentleman about thirty-eight years of age, who became jaundiced and ascitic, and had to be tapped, who refilled rapidly after the tapping, and who, while taking quinine and iron, gradually improved in health and lost his dropsical accumulation. Of course, the liver remains cirrhotic, and a recurrence of his dropsy is to be expected. But at all events, he is now, and has been for several months, free from it. Two other cases were those of young children, two or three years old, in whom, if a favourable result had not taken place, I should have diagnosed the presence of peritoneal tubercle. They recovered, however, completely; and the cause of ascites consequently remains doubtful.

The general results which I should venture to express in reference to the treatment of dropsies dependent on incurable organic disease are: that general dropsies may often be benefited by the use of diuretics, purgatives, or diaphoretics, but that those remedies exert no appreciable influence over encysted dropsies; that mercury, iodide of potassium, and the like have no special influence, and indeed act beneficially only in so far as they promote diuresis, or a corresponding action of the skin or bowels; that in most cases, if the patient's general health admit of improvement, that improvement is attended with more or less obvious diminution of dropsical accumulation; and that such improvement of health and dissipation of dropsy may often be effected, or at all events materially aided, by the employment of tonics.

I need scarcely add, in concluding this subject, that we have no medicinal means of promoting the absorption of accumulated urine, bile, or other kinds of retained secretions or excretions; nor of hastening the removal of extravasated blood.

Neoplasms or Tumours, in the more limited and scientific sense of the term, form a very large proportion of the diseases which we are called upon to treat; and their treatment is consequently a subject of great interest. Moreover, some tumours are apt to disappear spontaneously in various ways; others are distinctly influenced by medical treatment; and hence there are *à priori* grounds for thinking that others of them, concerning which our knowledge is less satisfactory, may also to some extent at least be open to successful remedial measures. It may be admitted, then, at all events as regards so-called "innocent" tumours, that we can cure or remove many of them by local measures. Can we get rid of any of them by remedies taken into the system? I suppose it will be readily allowed that nearly all of them are quite beyond the reach of remedies thus applied. No drugs, so far as I know, have the least influence in curing corns, or warts, or *nævi*; none, so far as I know, are efficacious in the slightest degree in arresting the development or promoting the absorption of fibromata, fatty tumours, enchondromata, or exostoses; none promote any curative change in muscular tumours of the uterus or prostate, or in tumours involving the nervous system; none, to the best of my knowledge, hasten the natural progress towards recovery even of such as tend to disappear spontaneously. I believe that liquor potassæ has been administered in the case of fatty tumours, in the hope that by decomposing their fat it would promote their removal, but certainly without benefit. The tumour, however, the removal of which under the influence of drugs has been chiefly celebrated, is goitre. It is well known that goitre was formerly reputed to be curable by burnt sponge; and that, when iodine was discovered, it was assumed that that was the active ingredient of burnt sponge, and it was soon found to be as efficacious in the treatment of goitre as burnt sponge itself. That reputation it has enjoyed, and enjoys, I believe, to the present day; and the discovery of its efficacy is everywhere quoted as one of the scientific triumphs of therapeutics. But when it was discovered first to cure goitre, it was found equally to cure the male of his testicle, and the female of her breasts. Long experience of the use of iodine has, however, proved conclusively that the belief that it was apt to cause the absorption of the testis or of the mamma was altogether illusory. And as regards goitre itself, I would

venture to ask, if there is not great reason to believe that goitrous necks are just as common now in Switzerland as they were before iodine was discovered to be a specific? For myself, I must say that, although I have given iodine and have seen it given over and over again in the treatment of goitre, I cannot call to mind a single case in which the disease was cured by the remedy, or even a single case in which there was perfectly satisfactory evidence of its amelioration. And I believe that I am not alone in this experience.

Tumours which are called malignant are so entirely beyond the influence of our remedies, that I need make no apology for omitting to discuss their treatment.

In some respects, *Tuberculosis* is a malignant disease. At all events, it tends to affect various organs, and to be disseminated through the agency of the lymphatics. It differs, however, from carcinoma and diseases allied to carcinoma in the remarkable proneness which its characteristic growths have to undergo degeneration and to become inert, and in the fact that the disease itself is actually sometimes arrested, and in a certain sense cured. I confess that, although perhaps a little inclined to be sceptical with regard to the curative influence of drugs, I see no sufficient reason to doubt the frequent efficacy of cod-liver oil and tonics, of good diet and careful attention to hygiene in the treatment, and still more in the warding off of this disease. But I doubt very much whether any one of the remedial agencies which I have enumerated can be regarded as curative, except in the sense that it improves the patient's general health, under which improvement the morbid process tends to subside or die out.

Syphilis, like tuberculosis, deserves a separate paragraph. It forms an important link between tumours, the treatment of which I have touched upon, and the exanthemata, the treatment of which I shall presently discuss; for it is related to tumours by the neoplastic character of its local manifestations, and to malignant tumours by the mode of its generalisation; and it is allied to infectious fevers by the fact of its origin and communicability by contagion, and (if surgeons be right) by the protective influence which one attack imparts. It differs, however, from both in the fact of its direct communicability from the father to his offspring at the moment of conception. I believe it is now generally admitted that no treatment of a chancre, no treatment adopted during the primary stage of the disease, will prevent the generalisation of the poison, and the liability to the occurrence of secondary and subsequently tertiary symptoms. And I believe it is also now generally admitted that we have in mercury and in iodine two medicines which have almost specific powers in causing the subsidence of symptoms. Of the treatment of primary syphilis, my own experience is very limited and remote; but syphilis in its secondary and tertiary forms has been constantly under my observation and treatment as physician to the skin-department at St. Thomas's Hospital. And I can assert, in reference to these latter, that I have over and over again seen the most marked and speedy beneficial effects take place under the influence of one or other or both of these remedial agents. But although they certainly do possess this influence in a degree which is altogether unmistakable, it is a fact of common observation, that often, when you seem to have cured the eruption, or the nodes, or the gummata from which the patient has been suffering, and have apparently restored him to sound health, all the symptoms recur as soon as the medicines have been discontinued, or it may be after a time under conditions productive of general ill-health. Sometimes, indeed, the disease resists all treatment, and may even break out afresh while the patient is still under the influence of the drugs which, in the first instance, had seemed to be curing it. We may assume that syphilis is one of those diseases which, according to the doctrine of Virchow, are general diseases, not because every part of the body is infected by their poison, but because the infective material carried by the blood becomes arrested at certain points in which it fructifies, producing the obvious phenomena of constitutional syphilis; and because each one of these secondarily affected points itself acts as a centre from which fresh infective material is thrown into the circulation. And on this assumption it is easy to understand how, even after the most thorough medical treatment, and after apparently the most thorough cure, germs of the malady may be left behind in some remote corner, as it were, of the system, beyond the reach of our drugs, and ready to form the starting point of a fresh outburst. But however that may be, the fact remains that mercury and iodine, the two most valuable antisyphilitic remedies which we possess, although they often relieve in a marvellous manner, constantly fail to effect a complete and permanent cure. And in this respect they seem to resemble some of the other medicines which we regard as specifics; namely, quinine, arsenic, and colchicum. The value of colchicum in the treatment of the gouty paroxysm is incontestable, and in a sense it may be regarded as curative of the paroxysm; but I am not aware that a long continued course of colchicum prevents the recurrence of those paroxysms, or

that it ever cures gout. Again, quinine and arsenic have an almost miraculous power in putting an end to an attack of ague; and very probably a continuance of either of these drugs would prevent during their continuance any fresh outbreak of the fever. But a course of quinine or of arsenic, although curative of the attack for which it is administered, rarely, if ever, so far succeeds in curing the disease, as to prevent its recurrence, under any of the usual non-specific conditions which are apt to determine its return. I recollect some years ago being consulted as to the treatment of a young lady living in London, who, having spent an autumn in the neighbourhood of the Romney marshes, had a severe attack of ague for the first time in her life the following spring. A few doses of quinine put an end to the attack. But it was determined to try to cure the disease thoroughly; and she was consequently kept under the influence of quinine (fifteen grains being given daily) for a period of about four months. During the whole of this period, no symptoms of the disease manifested themselves; but within two or three weeks of leaving the medicine off she had a very severe recurrence, which on this occasion was checked by arsenic. I may repeat that I do not in the least question the marvellous influence of any of the above specifics in cutting short, or curing, if you will, the symptoms of the diseases against which they are reputed to have a specific influence; I do not in the least question the extreme importance to the patient that he should be relieved of these symptoms when they arise; nor will I venture to deny that by thus curing symptoms and secondary morbid processes you do, in many cases, influence beneficially the progress of the disease out of which they arise. But I assert that, in at least a very large proportion of cases, the germs of disease remain in the system notwithstanding all your treatment; that the disease itself, though kept in abeyance, remains uncured.

It would be an endless task, and certainly incompatible with my design, to consider, or even to enumerate, all the various plans of treatment which have at different times been recommended for the *Specific Infectious Diseases*. At one time bleeding, at another time brandy; at one time calomel, at another quinine; at one time heat, at another cold, have been looked upon, if not as cures, at all events as most important adjuncts in the treatment of many of them. I believe, however, I am correct when I say that of late years the conviction has become more and more prevalent that we are unable by our remedies to cut any of them short, and that all we have it in our power to accomplish is to sustain the patient during the progress of his illness, and to prevent or relieve, as far as may be, all unfavourable contingencies; to steer his barque carefully between the rocks and shoals which threaten it with destruction, or rather to control the passions and support the courage of his capital while it is in the occupation of a foreign enemy, or dominated by an insurgent mob.

All the diseases of this class are obviously preventable; and it is in reference to these mainly that preventive measures are recommended and adopted. The fact that few, if any of them, originate *de novo*, and that all are directly communicable, and do in fact become generalised through a population by specific contagious particles or *contagia*, supplies the clue to the nature of the measures which are needed for their prevention.

I shall not presume to consider how far it might be possible, by adopting such measures as were found efficacious in the case of the cattle-plague, to stamp out effectually each one of the infectious diseases to which man is liable. It is sufficient to say that all of them can be effectually limited in their spread by isolating the sick, and by the destruction of all contagious secretions and of fomites; although it must at the same time be allowed that the difficulties in the way of such limitation are in a large number of cases, from circumstances entirely beyond our control as medical men, almost, if not quite, insuperable. But it will be admitted that our power of preventing the spread of such diseases is immensely increased by the possession of a correct knowledge of the natural history and of the sources and behaviour of the infectious materials which they evolve. Thus when, during the middle ages, the immediate cause of syphilis was not yet clearly recognised, and consequently cardinals and bishops felt it no disgrace to be its victims, the means of preventing the disease were unattainable; but now that it is recognised fully that it is imparted solely by inoculation effected, with few exceptions, by means of the genital organs during the act of impure coitus, the method by which alone its ravages can practically be arrested becomes obvious. And one cannot but lament the educated bigotry which is now opposing with so much earnestness and some success the enlightened efforts of sanitary authorities to check a disease which is not only a source of the direst misery to those who contract it through their own misdeeds, but which "visits the sins of the fathers upon the children unto the third and fourth generation." Again, when the causation of cholera was enshrouded in the mists of ignorance, and all that was known on this point was the fact that it

dogged the footsteps of man, no efficient means of preventing its spread through a population among whom it had been introduced could possibly be devised. But now that we know that the contagium of cholera resides almost exclusively in the evacuations, and that the disease itself is imparted mainly by contaminated water or food taken into the stomach, the measures which should be adopted to prevent its communication to others become apparent. And once again, before it was clearly recognised that measles, scarlet fever, and *rötheln* were distinct diseases, and that under the term continued fever were included at least three specifically distinct affections, it was impossible to recognise, in all its force, the law and the sanitary importance of the law, that at all events in most of these diseases an attack of one is protective against future attacks of the same. Nevertheless the law had been recognised and utilised in reference to one of them, namely, small-pox; and inoculation, which generally imparted a mild attack, proved a most valuable preventive of future and severe attacks of the disease, until by the discovery of vaccination the same end was equally secured by the inoculation of a different and much milder species of contagion.

But the subject of preventive medicine scarcely comes within the province of my lectures, at least if we employ the term preventive medicine in its ordinary acceptance. In the sense, however, of knowing beforehand the dangers which are to be apprehended in the course of the diseases which we have to treat, and of laying our plans to avert or to lessen these dangers, it forms a most important item in the remedial treatment of diseases, and especially perhaps of those now under consideration. Thus we know that inoculated small-pox, and inoculated cattle-plague, are on the whole markedly milder forms of disease than the same diseases acquired in the ordinary way; and that the probable reason of this is, that the patient is carefully watched and treated during the preliminary period of incubation. And I suppose that few will doubt that, if we have reason to believe that any one has contracted one of the infectious fevers, and then from the beginning up to the moment of invasion tend him with judicious care, we shall probably in some degree mitigate the severity of its subsequent progress. Again, we all know how prone the ulcers of enteric fever are to open into the peritoneal cavity, and how much the proneness to this fatal accident may be increased by a variety of circumstances; how liable inflammation of the ear is to supervene in measles, inflammation of the kidneys and albuminuria in scarlet fever, bronchitis in whooping-cough, and inflammation of the lungs in all of them; and how greatly supervention of these various complications may be influenced by the hygienic conditions in which the patient is placed; and we know certainly that, by taking the obvious precautions which the special dangers I have enumerated demand, we may often prevent their occurrence altogether, or secure a comparatively mild attack. I need scarcely add that I have merely selected striking examples in illustration of a general principle; and that all the exanthemata, and closely related diseases, are liable in a greater or less degree to the intercurrent of complications more or less special to each, which the well-informed physician foresees, and which it is his duty and his privilege to forestall.

But, besides being able to foresee dangers and to guard against them, there can be no doubt that in most cases, and in various ways, we may relieve functional and other disturbances as they arise, whether they be an essential part of the disease, or whether they be accidental complications of it; and that by such means we may not only relieve the patient from suffering, but assist him and fortify him against it in the moment of his extreme peril. I suppose most of us acknowledge that the diarrhoea of enteric fever is in itself a source of great danger to the patient, and that we benefit him materially by restraining it within certain limits. No one will deny that under other circumstances patients may be at least comforted by the evacuation of the contents of a costive bowel, or by the relief by means of the catheter of a distended bladder, or by the direct application to the parched tongue and throat of ice or other cooling or soothing fluids; and still more, I think, that immense benefit sometimes follows the use of a narcotic when the patient has been for some time restless and wandering and sleepless, or that of an alcoholic or other stimulant to give a fillip to the heart when the circulation is failing. Again we know that in most of these diseases there is a tumultuous development of protoplasm, attended with the production of much heat, a very rapid destruction of the albuminous tissues of the body, and a marked diminution in the beginning of perspiration and of urine. Now, temperature exceeding the normal is certainly injurious to the living tissues of the body; it is fair therefore to assume that this increase, though a consequence of disease, itself reacts injuriously on the system and adds to the severity and danger of the disease from which it springs. And I think it has been found, in accordance with what theory teaches, that the use of the tepid or cold bath, or cold sponging or other means of diminishing temperature, are frequently of great advantage. So also, the retention of effete matters in the blood

cannot but be detrimental to that fluid; and here it seems reasonable to believe that advantage should accrue from stimulating the sluggish excretory organs, the skin and kidneys to increased functional activity.

I believe however that, though we may certainly in a large number of these cases prevent danger by anticipating it, and relieve symptoms and complications when they arise, and thus benefit our patients most importantly and save life, we as certainly do not possess the power of cutting short or curing these diseases. Some of them, glanders and hydrophobia, never have been recovered from under any kind of treatment. Some of them, such as whooping-cough, always have a lengthened career; others, such as mumps, a very short one, whatever the remedial measures which may have been employed to combat them. And as regards the other affections belonging to this class, there is no doubt that in the large majority of cases they run their course, as to duration and stages, quite unembarrassed by the obstacles which our puny efforts endeavour to put in their way.

[To be concluded.]

ON

A NEW MODE OF HOSPITAL CONSTRUCTION.*

By HENRY GREENWAY, M.R.C.S., Plymouth.

MANY will remember the able address "On the Construction of Hospitals", delivered by Captain Galton at our annual meeting at Leeds, in 1869, and the interesting discussion thereon. Having myself been present on that occasion—and I am thankful I was, for more than one reason, as I had the good fortune to be introduced to distinguished men who have since passed away (I refer to Sir James Y. Simpson and Mr. Nunneley)—I was much impressed with the subject, and was led to devise a plan whereby I hoped to secure the advantages of a large hospital without its dangers, and the safety of the hut system without its inconveniences. In the *Medical Times and Gazette*, September 24th, 1870, I gave a short description of my design, which has since been variously criticised. Among those outside the profession who have favoured me with their comments, I have the honour to include Miss Nightingale, who has bestowed much time and thought on the subject of hospital construction, and to whom I would here beg to express my indebtedness. I have now the pleasure of bringing my plan before your notice in an improved form, and trust that it may meet with your approval.

The portion of the hospital allotted to patients consists of one or more substantial plain masonry buildings, not more than two stories high, and of any required length, according to the number of beds. The floor of each flat or story is to be waterproof. I first proposed glass and iron as suitable materials; and I would now also suggest glazed tiles, or wood covered with best Vieille Montagne zinc, or with sheet-lead, if there were no objections against the use of that metal, as it would also afford a very dead sound when walked on. Within each story, and extending nearly from end to end, is a block of compartments made of glass, fixed in iron framework. The block is divided longitudinally by a central glass partition, thus forming two rows of compartments, placed back to back, each compartment being 10 feet square, 12 feet high in front, and 17 feet at the back (the central partition), thus causing its ceiling to be on an incline. The space on each side of the flat, between the fronts of these compartments and the main wall, forms a corridor, 7 feet wide, its ceiling being likewise of glass. Into these corridors the compartments open. Each compartment receives its supply of air from a large tube which passes through the masonry wall, then across and underneath the corridor and the compartment; the air issuing from the floor of the latter through a long iron grating, which may run either transversely or from before backwards. This tube will be furnished with a valve to prevent excessive draught from high winds. The tops of the double row of compartments unite to form a flat ridge, two feet wide. From this ridge, over each transverse pair of compartments, rises a flue, made of metal or of glass, in iron framework, which leads from the interior of the compartments to the outside of the roof. To prevent the possibility of foul air passing from the top of one compartment into the other, the flue is divided longitudinally by a partition, so as to form two flues; the area of each (beneath the roof) being 4 feet by 9 inches, the partition being continuous with the back wall of the compartments. Through these flues the outlet of foul air takes place. In order to insure an upward draught from the floors of the compartments, the air within the flues will be heated by a hot-water appliance in one of two ways: 1. By

placing around the flue, a short distance above the ridge of the compartments, a "jacket" (part of a system which would extend underneath the roof over all the compartments); or 2. By passing a pipe, having an oval bore, through the flues, dividing the partition horizontally, the pipe itself thus forming a part of the partition, as seen in Fig. 1. The latter plan is more simple, and would prove more efficient. In the main wall there is a large sash-window opposite each compartment, which gives light to the corridor and compartment. Outside each window is a small balcony for conducting window-gardening. On each side of the door of the compartment is fixed a pleasing transparency, such as a landscape. The corridors can be subdivided by a series of self-closing glass doors, so as to form ante-rooms to the compartments. A proper temperature will be maintained by means of hot-water pipes; the water being heated by a gas-furnace, or by asbestos rendered incandescent in a gas-furnace, thus insuring a constant supply of heat, easily regulated. The compartments will be illuminated at night by transmitted light from the corridors. At each end of the flat are placed the usual "ward-offices", and they are separated from the patients' compartments by a transverse corridor, which unites the side corridors. Doors furnished with springs are placed in the passages leading to the bath-rooms, etc., to prevent effluvia entering the corridors. The nurses' rooms are so placed that the nurse may be able to see the patients through either row of transparent compartments; and if a patient on any emergency require the nurse's attendance, by pulling a string he would ring a bell and at the same time cause a signal to project from the front of the compartment, thus directing the nurse to the proper quarter. As the "ward-offices" extend not only across the ends of the flats, but project on each side of the building, the ground-plan of this portion of the hospital would somewhat resemble the letter I. The roof of the building to be of the ordinary kind, but furnished with skylights. The expense of such a building of one story for twenty beds has been estimated by an able Plymouth architect (Mr. James Hine, F.R.I.B.A.) at about £3,000, or £150 a bed.

In the opinion of our best authorities, one-story hospitals are the most desirable, and no hospital should be more than two stories high. I have made no allusion to administrative buildings, as they may be carried out according to taste. I have also abstained from entering into certain matters of detail.

The drawings here exhibited are from the office of Mr. Hine (the engravings are reduced copies). The first is that of a transverse section of a one-story building, or of the upper of two stories; the second is a plan of a story with twenty compartments (ten in each row), and offices at each end. The corridor on one side is shown subdivided into ante-rooms, the folding-doors being shut. If a building were constructed for a much longer block of compartments on one flat, then the block should be intersected by a cross passage, for the sake of convenience. The plan represents the building as isolated; but it would be connected with the administrative, and, if necessary, other detached portions of the hospital, by means of corridors or covered bridges.

The following are some of the advantages gained by the above plan, and they have been considered unattainable by any other at present in existence. Each patient has the enjoyment of his own special supply of atmospheric air, uncontaminated by exhalations from his neighbour; the supply is also being constantly renewed; the compartments being made of glass, no absorption of morbid product, or of emanations which may eventually become injurious (I refer to those particles which produce the well-known odour peculiar even to our best surgical wards)—no absorption, I say, can take place in their walls, and, by occasionally washing them with water, they will for ever retain their purity. There will be no danger on the score of fire. As the patient lies in his bed, he sees not only the transparencies, but can look through his glass door and across the corridor at the little garden outside the window. He has also the advantage of an apartment to himself, thus avoiding the unpleasantness often felt in associating with strangers, whose company may possibly be deemed undesirable; also, he would not be so shocked by deaths occurring around him. Although thus isolated, he would not feel lonely, as he would see those around him, and, with a moderate amount of voice, could, if he were inclined, converse with his neighbour. The patient, although plentifully supplied with air, is not exposed to a draught, as the under surface of the bed acts as a screen. Patients not confined to their beds, and having no infection, may be allowed to associate and take their meals in the corridors during the day. The medical attendant or nurse, before entering the compartment of an infected patient, would see that the doors in that portion of the corridor immediately adjoining were closed. Any escape of infected air would then pass out through the open sash-window, and not be distributed through the whole corridor. If occasion required, as in the event of a patient fainting, an extra supply of air could be gained by throwing open the compartment door and the sash-window, the corridor

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