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THE PROGRESS AND PRESENT ASPECT OF MEDICAL SCIENCE *

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Whoever has the honour to deliver the Gilchrist Lecture is spared the difficulty of a choice of subject, for the text laid down for him is "The Progress and Present Aspect of Medical Science." That, it need hardly be said, is a very wide subject, and there is no one who has the knowledge to treat it adequately even if an hour's lecture gave him the time. I must therefore apologize in advance for inevitable superficiality.

Further, in depicting the present aspects of medical science, it is impossible to avoid considering medical practice also, for medicine is not a science which is studied for its own sake, but only in order that it may be applied in the prevention and treatment of disease. I should also premise that much of what I shall have to say applies especially to conditions in this country, or at all events in the more highly industrialized countries of the temperate zone.

Notwithstanding what has been said above, the purpose of the lecture is praiseworthy, for it is worth while to attempt from time to time, however imperfectly, to see where we stand. I sometimes wish, indeed, that there could be a sabbatical year in medicine during which all research and publication should cease, so that we might have leisure to sift the grain from the chaff and to consolidate the ground already won and plan out fresh advances; to get out of the trees, in short, and survey the wood as a whole. But that, I recognize, is merely a dream.

The Present Confusion

The first impression that any survey of the present aspect of medical science must produce is one of confusion. An immense amount of investigation into the causes and treatment of disease will be found going on, but too often it is ill conceived and ill directed, with the result that much so-called "research" is a mere beating of the air, a form of solemn trifling, wasteful alike of time and money. This confusion is reflected in medical publications, which have become excessive in number, and often so highly specialized that their very terminology is only to be understood by the initiated; full of facts and observations, but poor in ideas, in fertile hypotheses, and in helpful generalizations. We find the same disorder in the application of medical science to practice, for, in this country at least, our health services show a chaotic mixture of individualism and socialism, of commerce, charity, and State aid.

Now it may be admitted at once that much of this confusion is inevitable, for medical science is engaged in a constant fight with disease, and a battlefield is not the

place to look for order. None the less there might be more planning and direction of research; a reduction in the quantity and an improvement in the quality of medical literature, and some means of making it easier of access, as well as a better organization of the different services concerned with health. The recent report of the Committee on Scottish Health Services may perhaps pave the way to the last in Scotland.

Passing from these generalities it will be convenient to consider the present aspect of preventive and curative medicine separately, although, of course, there is no sharp line of distinction between them, curative medicine being often also really preventive.

Preventive Medical Science

Of the two divisions there can be no doubt that preventive medical science, although much the younger, has the greater achievements to its credit, for it has abolished some diseases entirely and greatly diminished the incidence of others; it has enormously reduced the death rate and has added materially to the expectation of life. These triumphs, of course, are not entirely due to medicine. To a very large extent they are the result of an improvement in the economic condition of the people, to the spread of education and of temperance, and to mechanical inventions of one sort and another; but even allowing for these factors medical science can still claim a large share of the credit. It would seem, indeed, as if, in this country at least, there was not much more to be done in "municipal hygiene"—that is to say, in the provision of pure water supplies, efficient sanitation, and so forth, and that the law of diminishing returns is beginning to assert itself, an increase of expenditure by public authorities being attended by a smaller dividend in improved health.

At present the efforts of the health authorities still further to reduce mortality and morbidity seem to be in four main directions: (1) improvement of housing conditions by the abolition of slums and overcrowding; (2) betterment of nutrition, especially of children; (3) the general introduction of physical education; (4) an attack on maternal mortality. Let us consider each of these for a moment.

Efforts to Reduce Mortality and Morbidity

1. That better housing should lead to better health needs no argument, for there is a definite correlation between density of population and morbidity, mainly because when people are more closely packed the dangers of infection are increased. On the other hand, it must be remembered that the advantage of more space at home is to some extent counteracted by the increased

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urbanization of modern life and by the tendency of people to crowd together in places of amusement, offices, and public vehicles. It is essential, too, that the advantages of greater air space should not be purchased at the expense of other even greater necessities such as food.

2. It is perhaps rash to speak of the relation of food to health in this city. That adequate nutrition is essential to health no one would deny, and that in some parts of the world malnutrition or under-nutrition is an active cause of morbidity is undeniable. To what extent these conditions prevail generally in this country except in certain impoverished areas is, however, another matter. I have written at some length on this subject elsewhere (Hutchison, 1936), but here I would only say that, speaking as a clinician, I cannot admit the existence of widespread under-nutrition, or even malnutrition, among our people, and I am of opinion that the improvement in the public health to be effected by improved nutrition, and particularly by an increased consumption of the so-called "protective foods," is not likely to be as great as is often anticipated. That, in short, the marriage of hygiene and agriculture, of which we hear so much, may easily prove a barren one. It is not, one may suspect, a love match, but one mainly of political convenience.

3. Physical education is designed to improve the physique, to strengthen muscle, and to correct deformities. It aims also at making the body a more efficient servant of the mind, and at the development of mental capacity and character. That, wisely directed, it is capable of doing these things there can be no doubt, but it must be remembered that there is no very definite correlation between a well-trained body and immunity to disease, and there is reason to expect that physical education will do more for happiness and character than for health.

4. Maternal mortality is, of course, not an important factor in the national death rate, for the number of women who die in childbirth each year in this country is less than half the number of persons who are killed on the roads. The poignant tragedy of maternal deaths must, however, stir the sympathy of everyone in a degree out of proportion to their mere frequency. That such deaths can be prevented altogether is too much to hope, although to reduce them in this country by at least a quarter is well within the power of preventive medicine. It is not, however, going to be a rapid process, for the first essential is an improved midwifery service, and that cannot be created in a day. We must also face the fact that prevention in this matter is up against certain adverse and partly unescapable circumstances. Among these are the increasing relative number of first-births and the desire, perfectly natural, that parturition should be as quick and painless as possible, which leads to the general and sometimes injudicious use of anaesthetics and to the frequent employment of forceps, or even Caesarean section, and other "labour-saving" devices designed to produce motherhood without tears.

These are the chief preoccupations of the public health authorities in this country to-day, and it will be observed that, with the exception of the attack on maternal mortality, they are not *ad hoc* measures, but are designed to raise the standard of health by fortifying two of the aspects of the "constitution"—the anatomical and the physiological—of which I shall speak later. They are based, therefore, on sound scientific principles, but what effect they will have on the death rate remains to be seen. The chief killing diseases among adults in this country are cardiovascular affections and their consequences, cancer, pneumonia and bronchitis, renal disease, and tuberculosis, and against none of these, except the

last, can the above or any other preventive measures at present do much; indeed, as the average age of the population rises, as it is bound to do, there will be a tendency for some of them to become commoner. As regards tuberculosis, however, the death rate has been falling for many years, and is still going down, though to a less degree in young adults than at other ages. To what extent the fall is due to the direct preventive efforts included in what is called the "anti-tuberculosis campaign" is doubtful, for it had been going on for years before that campaign was begun, but there are some authorities who believe that the wave of epidemic tuberculosis has spent itself, and that we are now getting down to the endemic level, where further reduction will be difficult. To this I shall refer again later.

Economic Burden of Invalidity

Morbidity, however, is as much the concern of preventive medicine as mortality, and is an even greater economic burden on a nation. It is a startling fact that in Scotland more than one out of every five insured persons is certified unfit for work at one time or another during the year, and that the days of sickness amount on an average to ten per insured person. The killing diseases, however, are not those which produce most invalidity, for the chief causes of certified incapacity are found to be "influenza" and upper respiratory infections, "rheumatism," "dyspepsia," and minor infections of the skin. These, along with accidents, account for about three-quarters of the sickness among the insured. Now it would be idle to suppose that preventive medicine can do much against these conditions at present, or that it is likely to be able to do much in the immediate future. We may, it is true, discover a means of immunization against "influenza" and the infections of the upper respiratory tract, and that would be a great gain; but the prevention of "rheumatism" in its various forms baffles us, and the conditions vaguely described as "dyspepsia" are not likely to diminish with the increasing strain and complexity of modern life.

Meanwhile it is pertinent to ask whether all this mass of invalidity is either genuine or necessary. By that I do not mean to suggest that any of it is due to deliberate malingering, but rather that much of it may be the result of mental causes: that it represents, in fact, psychoneurosis rather than physical disease. The investigations of Dr. J. L. Halliday (1935) in Glasgow and of Dr. T. M. Ling (1936), as well as those of Dr. Millais Culpin, are suggestive in this respect. Are the conditions of modern industrial life to blame or are we more lacking in grit than our forefathers? Or may it be that in these days of insurance and compensation we can have as much functional disorder as we are prepared to pay for? This, at least, may be said with certainty: that in future psychotherapy will have to take a place in the science of preventive medicine, for the psychological aspect of the constitution is just as important for health as the anatomical or the physiological.

Diseases of Childhood and Infancy

If a further reduction of disease and of premature death among adults is likely to become increasingly difficult the case as regards children is fortunately different. Among *them* the causes of death and of illness are much the same—pneumonia, bronchitis, infectious diseases, and tuberculosis taking the chief toll. The disappearance of rickets, which is rapidly taking place, should at least lessen the mortality from bronchitis and pneumonia in the earlier years, and as regards the infectious diseases we should soon be able almost to abolish diph-

theria by immunization, whilst the use of convalescent serum, when it becomes more generally obtainable, should greatly mitigate the dangers of measles as antiscarlatinal serum has already enabled us to control the really dangerous manifestations of scarlet fever. There is hope, too, that the preventive use of vaccines may lessen the prevalence of whooping-cough, which is so often fatal in early life. Much also can still be done to reduce the number of cases of tuberculosis in childhood by the universal pasteurization of milk and by protecting children more carefully from contact with tuberculous adults. There is one scourge of childhood, however—acute rheumatism—in the prevention of which no progress has been made, nor, considering our ignorance of the environmental conditions which favour its occurrence, does it seem likely to be made in the near future.

The mortality of infants, as distinct from that of children, has fallen by a half in the course of the present century, but it must be remembered that the fall was long overdue, for the death rate in children had declined much earlier. What share preventive medicine has had in the spectacular fall in infant mortality it would be difficult to say, but it is probable that economic factors, smaller families, the invention of dried milk, and the replacement of the horse by the motor have had as much to do with it as the work of welfare centres. The practical disappearance of epidemic diarrhoea, for instance, formerly a main cause of infant deaths, cannot to my mind be attributed to any strictly preventive measures. Be that as it may, it is not reasonable to suppose that prevention can do much more, for nearly half of the total infant mortality is now accounted for by neonatal deaths, the result of injury at birth, prematurity, and parenteral infections, and how difficult it is to prevent such deaths every obstetrician and paediatricist knows. It is arguable, indeed, that a diminution of neonatal deaths (those due to infections excepted) would be a doubtful blessing, for many of the surviving children would probably prove to be defective either physically or mentally, or both.

In later infancy, on the other hand, the science of nutrition now enables us to prevent diseases, such as rickets, formerly often so disabling and indirectly so fatal, whilst as regards the infectious fevers and tuberculosis the preventive measures, by which so much can be achieved in childhood, should yield relatively even greater fruits within the first year of life.

The General Practitioner's Part in Prevention

Before leaving our survey of the progress and present aspects of preventive medical science reference must be made to two contemporary currents of opinion which have a bearing on the subject. One is that the general practitioner should take a larger share in the prevention of disease, and that the medical student, even, should become—to use a *cliché* of the day—"prevention-minded"; the other is that the community at large should be encouraged in all possible ways to become (to use another catchword) "health-conscious." Let me say a few words about each of these opinions.

Most people, except the very bureaucratically minded, will agree that the practitioner should take his part in the ordinary preventive services, such as ante-natal work, welfare centres, and school clinics, and that his training as a student should enable him to do this efficiently. Those, however, who urge that the ordinary doctor should be more concerned with prevention are mostly not thinking of such activities as these, but would have the idea of "prevention" enter more into private practice. Yet

it is difficult to see how this can be done. The practitioner, of course, can and does advise individual patients as to the best means of preserving their health, but there is little beyond this that he can do. It is futile to expect him to preach to all and sundry general rules of health, for in the first place there *are* no such rules which are universally applicable, and in the second place the practitioner would be, thank Heaven, the last man to observe them in his own person. But, it is said, he might help in the prevention of disease by diagnosing it in its earliest stages. On this matter there is a good deal of loose thinking. The question of early diagnosis only arises in more or less chronic conditions, such as cancer, tuberculosis, and the cardiovascular degenerations, but the really early diagnosis of internal cancer is admittedly at present almost impossible, and as regards pulmonary tuberculosis the difficulty is that the disease is so insidious in its early stages that it is often well advanced before the patient comes under observation. Something might be done by the more general use of radiography, particularly in the case of young adults suffering from vague ill-health, but the practitioner has not always got the facilities for using this method, and its adoption on a large scale is going to be both difficult and costly. Or take the case of cardiovascular degeneration. Suppose a doctor discovers incipient hypertension in a patient, what is he to do about it? There is no specific treatment for hypertension, as we all know, and it is usually idle to advise the patient to lead a sheltered life, for he will reply that he has his living to earn. The same difficulty arises in many other chronic conditions, for it has to be remembered always in the matter of preventing and avoiding disease that only a certain price can be paid for health either by a community or by an individual. Beyond a certain point the game may not be worth the candle.

The objections to the attempt to produce what is called health-consciousness in the community are of another sort, and I have spoken of them on another occasion (Hutchison, 1934). Here it is sufficient to say that whilst the amount of benefit to health to be produced by such means is problematical, the danger of creating numbers of hypochondriacs is real. We must beware of preaching what Stevenson called the doctrine of "tin shoes and tepid milk"; nor need I remind a Scottish audience that we are not told in the Shorter Catechism that man's chief end is to glorify *Health* and enjoy it for ever.

Curative Side of Medicine

If we turn now to consider the present aspect of the curative side of medical science we shall be struck with the fact that of its three great divisions—diagnosis, prognosis, and treatment—the first is by far the most advanced. It may be said, in fact, without much exaggeration that there is little room for improvement in modern diagnosis (always excepting the early detection of cancer) when all its resources are brought adequately to bear on a case of disease. On the other hand, it might be argued with some plausibility that diagnosis is now overdone, for "investigations" not only add greatly to the cost of illness, but by detecting trivial deviations from the normal they confuse the boundaries between health and disease, and often cause needless anxiety. They are bad, too, for the art of medicine, by encouraging students and practitioners to rely on expert "reports" of one sort or another instead of using their own powers of observation.

The second division of curative medicine, prognosis, is in the least satisfactory condition of the three. There are many reasons for this which cannot be considered now, but it is to be hoped that in the future more attention

will be given to this important and difficult subject, for the facts from which a real science of prognosis might be built up are to a large extent already in existence, only they are buried in the literature of medicine.

In the science and art of treatment, on the other hand, we can claim great advances. Certainly at no previous epoch, thanks to the discovery of new anaesthetics, analgesics, and hypnotics, has illness as a whole been less disagreeable for the patient than it is now. In recent years, also, we have scored some great therapeutic successes, notably over diabetes and pernicious anaemia, whilst in a great many other minor directions the attack on disease has made progress. Even surgery, which was supposed by many to have reached the limit of its possibilities, has shown by its brilliant work in thoracic and intracranial disease and in affections of the sympathetic system that it is still capable of adding to our therapeutic resources.

There has, however, been no great strategic advance in the science of treatment in recent times comparable to that made by the discovery of anaesthetics and antiseptics, nor does there seem to be any on the horizon, unless psychotherapy should prove to be such.

Meanwhile, what can we really do in the cure of what I have spoken of as the great killing diseases? Very little. Take that "Captain of the Men of Death"—pneumonia. Can we really do much more here than support Nature in the hope that the patient will recover? Or cancer; in spite of minor advances in its treatment, such as the use of radium and deep x-ray therapy, more than 60,000 persons die of it in this island every year. Even in the case of pulmonary tuberculosis we are told on high authority that treatment has not advanced in the last thirty years except in that comparatively small group of cases in which artificial collapse of the lung is possible.

And how little can we do for the degenerative diseases, for nephritis, and for most organic affections of the nervous system! Even in the cure of the conditions which cause invalidity rather than death we have not much to boast about. Can we cure the common cold or influenza? Can we really do much in that large miscellaneous group of affections labelled "rheumatic," which account for so much time off work? As regards some of the other common causes of ill-health it seems certain that psychological methods will play a greater part in treatment—even of organic disease—in the immediate future than has been the case hitherto, but psychotherapy, though it can restore patients to happiness and usefulness, cannot claim to be able to save or even to prolong life.

So few, in fact, are the diseases we can really cure that one is tempted to believe that if all doctors went on strike for a year the effect on the death rate would be inappreciable. That is not to say, of course, that doctors are of no use, but only that they are of use in a different way from what the public imagines. In most cases of illness the doctor is really a mental poultice; he is a source of comfort, confidence, and consolation to the patient and his friends; but if he is honest with himself he will admit that the number of patients who would have died but for his attendance is lamentably small.

If this be the present aspect of the curative side of medical science where are we to look for better things in future? To bacteriology? But bacteriotherapy has not lived up to its early promise when it first gave us antidiaphtheric serum, although the intensive study of virus diseases now going on may yet bear fruit. To chemistry? We badly need a chemical agent which should kill infecting agents without damaging the tissues, but the *therapia magna sterilisans* of which Ehrlich dreamt still

remains a dream, although here again the recent discovery of prontosil encourages the hope that the dream may yet become a reality. To endocrinology, to which so many pin their faith? But the endocrines have hitherto been of more help to the pseudo-scientific quack than to scientific therapy, and, profoundly interesting and important though they are, it is difficult to believe that even a much more complete knowledge of their action than we are ever likely to reach would help us to do much against the diseases that really count.

Prophecy, however, is idle. That great advances will be made we may feel tolerably sure, although the popular opinion that for every disease there is a cure, if only we could find it, is certainly a delusion; but from whence new help will come it is impossible to say; it may quite well be from outside medicine and its ancillary sciences.

Reorientation of Medical Theory

No survey of the progress and present aspect of medical science would be complete which omitted to notice the change in the underlying doctrine of medicine, as distinct from the science of it, which has been gradually coming about since the beginning of the present century. Such a change although inconspicuous is important, for practice depends upon theory just as conduct depends upon one's philosophy of life. This reorientation of medical theory or perhaps, to speak more accurately, this reversion, with modifications, to an older doctrine, goes by the various names of Neo-Hippocratism, Individual Medicine, and Constitutional Medicine, of which the last is perhaps the best.

In Hippocratic times, as is well known, medicine was dominated by the theory of the humours, chief importance being attached to changes in the fluids of the body in the production of disease. It is not generally realized how long this doctrine held sway, but one finds traces of its influence well into the nineteenth century. Already, however, towards the end of the eighteenth century the counter-theory of solidism, of which Cullen was the chief exponent in this country, and which regarded changes in the solid tissues as lying at the root of all pathological processes, had been set up, and fifty years later the cellular theory of Virchow gave this way of looking at things a great impetus. As the result of it the pathological changes in organs attained major importance, and the effect on practical medicine was to lead to the classification of disease by organs and systems, and to make the localization of the disease the chief aim of the clinician. The art of diagnosis, in fact, came to consist in forecasting the changes which would be found after death—hence the satirical term "mortuary medicine" sometimes applied to it—and I remember that this way of looking at things was still prevalent when I was a student. Further, in the last quarter of the nineteenth century bacteriological theories attained great prominence, largely under the influence of Koch, and emphasis was laid upon infecting agents in the production of disease, the part played by the soil being to a great extent ignored.

Since the beginning of the present century there has been, as I have said, a gradual veering of opinion away from the rather narrow dogmas of the schools of morbid anatomy and bacteriology and towards a new outlook on the field of disease. This has been brought about by three factors, which in order of their appearance are: (1) the rise of biochemistry, (2) the discovery of the endocrines, (3) the striking advances in medical psychology, which we owe mainly to the genius of Freud. Hence has arisen what is now often called Constitutional Medicine.

Constitutional Medicine

The term "constitution" has, of course, long been familiar in medical literature, but the thing itself, being of the nature of an abstraction, is difficult to define. On no subject, indeed, has there been more loose thinking and writing, but we may perhaps best regard it as the total make-up of the individual, physical and mental, though that, of course, was not the meaning given to the term by the Greeks. Constitution in this sense is partly inborn, and so may be hereditary, although it must be remembered that every individual is really a new amalgam or experiment—and, in part, it is the effect of environmental influences. Nor is it to be regarded as a static condition; rather is it a state of flux, which varies to some extent from day to day and even from hour to hour.

Constitution as thus defined has three aspects or components: (1) The anatomical or morphological, the "order of architecture" as it has been called, to which the individual's body belongs. (2) The physiological or functional, the way in which his particular machine works. (3) The psychological, the intellectual and emotional peculiarities and reactions which he exhibits. These three components are closely interrelated and react upon one another so as to produce a trinity in unity, the chief integrating factors being the vegetative nervous system and the hormones acting through the blood.

That the constitutional doctrine is already influencing preventive medicine, although perhaps unconsciously, I have already indicated. Physical training is directed to building up the anatomical side or physique of the individual, and improved nutrition aims at a more vigorous and harmonious working of the machine as a whole, whilst industrial psychology is beginning to throw light upon the stresses and strains to which the psychological aspect of the constitution is subjected under modern conditions; but what bearing is the new doctrine likely to have on *curative* medicine in the future? Well, in the first place, it should at least save us from what has been described as the commonest fault of the prescriber—that of regarding all patients as alike. Man is not one, but "a diversity of creatures," and although all men may be born free they are certainly not all born equal. If this is so, it follows that there are few if any rules of health applicable to all individuals. We must remember the advice "Know thyself"; in other words, everyone must learn to manage his own machine so as to keep it in running order, and in helping him to do this there should be no one so useful as the family doctor, who in the old phrase "Knows the patient's constitution." It is the essence, too, of the constitutional doctrine that it recognizes that health is not a single static thing, but has many degrees, and varies even from hour to hour. In the majority of persons, it is true, the constitution is tolerably uniform and reasonably stable, but there are not a few in whom it departs so far from the mean in one or other of its aspects as to render the possessor of it liable to certain diseases. In other words, it produces a *diathesis*.

In the matter of diagnosis constitutional medicine teaches us to look for syndromes rather than for cut-and-dried diseases, the aim being to find out what is wrong with the working of the constitutional machine in any of its parts. It should therefore be specially helpful in those cases in which no precise diagnosis can be made.

As it is the essence of its doctrine to regard the body as one and indivisible, every part of which, through the integration of the blood, the vegetative nervous system, and the hormones, influences every other, constitutional medicine naturally looks for remote causes for localized effects. The fruits of this view are being seen in the

growing recognition given in recent years to focal sepsis as a cause of disease and in the introduction of thyroidectomy for auricular fibrillation—even when not primarily of toxic origin—as well as in the surgery of the sympathetic system. In the matter of early diagnosis, to which I have already referred, it points to chemical changes in the body fluids and to alterations in the functional efficiency of viscera as the most hopeful line of advance. In questions of treatment it has redirected attention to the importance of the blood, and this has led to a renewed interest in blood-letting, which had fallen too much into disuse, to a great development of transfusion, and to the use of new methods such as protein-shock.

Last, and most important of all, constitutional medicine bids us never forget that man has a mind as well as a body, and that every disease, whether organic or not, has a psychological aspect. It might even be said with some truth that the greatest service which the constitutional doctrine has rendered to medicine in recent times is the emphasis which it lays upon the functional element in all disease and upon the necessity for treating it.

Conclusion

Such is a very inadequate sketch of the doctrine which in all likelihood will chiefly influence the development of medicine in the immediate future. In conclusion, I am conscious that throughout this lecture I have taken what some may regard as too sober a view of the present aspect and prospects of medical science. I believe, however, that such an outlook is salutary, for we hear too much of the triumphs of medicine and too little of its failures; too much of the rosy prospects in store for it and too little of the difficulties to be overcome. It is surely better to face the facts without illusions, for "things are what they are and their consequences will be what they will be. Why, then, should we seek to be deceived?"

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Mont R. Reid (*New Engl. J. Med.*, October 22, 1936, p. 753) gives particulars of the fundamental principles of wound healing. The first essential is rest after the wound has been gently cleansed by means of sterile salt solution: compound fractures of the extremities to which plaster dressings are applied heal quickly. Another important factor in the healing of wounds is an adequate blood supply. The careful spacing of skin sutures is necessary so that a moist dressing will relieve tension by permitting the oozing of serum and blood during the period of swelling or oedema in the wound. Ideal haemostasis is also invaluable, as a haematoma delays healing and increases the danger of infection and suppuration. The prevention of infection should not be by means of germicides, since these injure the tissues. Granulation tissue is essential to the healing of every wound and it should be protected from trauma and bleeding. Tissue growth is obviously of great importance. Emphasis is laid on the necessity of treating infected wounds by conservative methods whenever possible, although if suppuration occurs some form of external drainage or excision may become necessary to avoid the damage of tension, accumulated toxins, and the spreading of infection. In cases of granulating wounds where secondary closure may be desired, intensive bactericidal therapy with Dakin's solution until the wound is macroscopically free of necrosis and all but a minor degree of bacterial contamination is the best course to follow.