developing boys. With youth sensibly trained about the machine which is peculiarly his own, it may be anticipated that within a generation the attitude of the nation to health questions will be completely changed.

Meantime, existing ignorance and post-war restlessness must be faced. There is need of popular education in the wider sense, and the dissemination of sound knowledge regarding health and the factors which make for disease. It must be insistently urged that, *the causes of disease being withdrawn, health is restored.*

To avoid the difficulties and pitfalls attendant on sporadic propaganda by individual members of the profession there should be an ordered attempt to use legitimate means to achieve the purpose. Medicine must roll out "the song seraphically free of taint of personality." Why should not the British Medical Association, through its network of Branches, serve as chief voice? Within recent times the Council of the Association has been consulted by, and has been accorded entrée to, the Ministry of Health regarding debatable subjects. Why should not each Branch similarly form an accredited medium of communication with the corresponding local authority by means of reports on matters affecting the health of the area, and with the larger public by the press, through authoritative contributions on questions of living interest? The press is a great educator; *the university of the map in the street.* Medicine must court its alliance and contribute her best to abet its efforts.

I have long pleaded that, as part of the local machinery of health administration in each sufficiently large area, an advisory medical committee should be erected which would be available to the local health committee and to the medical officer of health for consultation and guidance. The arrangement would constitute a tactical procedure of much importance on the present strategic front. It would have permanent and growing value as compared with the occasional lecture which, like a brilliant firework, is apt to vanish in smoke.

Other natural channels suggest themselves as serviceable towards the common end. I would name especially the branches of the British Red Cross Society, which, in virtue of the Supplemental Charter granted by King George V on December 12th, 1919, includes among "its objects and purposes" the "improvement of health and the prevention of disease." Similarly the Scout and Guide movements are pregnant with promise for the future of the race.

Munus Apolline Dignum.

The quest of health for the world is a great adventure. It is up to Medicine to lead the way and sustain the brunt of front line combat. If Medicine step into the breach she will recover her place of direction in matters

affecting the human machine and national policy relative thereto, as these affect education, housing, industrial life, town planning, etc. Medicine is too apt to remain passive and silent in presence of issues which touch her vitally. She must free herself from the reproach implied in the poet's words: "*Mussabat tacito Medicina timore.*" If Medicine is to remain worthy of her divine origin she must flash the light from the car of Phoebus. Medicine must anticipate, inspire, and guide policy, and not rest content merely to carry out instructions imposed on her. Her chartered institutions, Colleges, Faculties, this powerful Association, and other collective groups, must not limit themselves as they commonly do to criticisms of proposals which reach them from without, and to grumbling at the terms of statute and regulation to which they are asked to conform. They must envisage and mould the developments of the future.

The aspirations of Medicine are not limited by geographical boundary or national policy. The study of health as a department of the science of life leads its devotees to observations and investigations in every clime. Nothing that influences human life is foreign to its purview. With mankind as its sphere, its aims and relations are world-wide. They are frankly international. Concerned with matters common to the race, Medicine will add to its triumphs in proportion as combination and collaboration of forces is secured throughout the globe. Towards this end much may be expected from fuller collation of the findings of individual workers and scattered groups in different countries—for example, by authoritative reports and conferences such as have been fostered by international associations, the League of Red Cross Societies, and the Health Bureau of the League of Nations. This widening evolution of medicine cannot fail to weave bonds making for solidarity among the nations. Already the tropics have been made habitable, and success in the completer adaptation of the planet for the life and health of man is only a matter of time.

Of all the attributes attaching to Medicine since the days of Hippocrates none has carried her further than her self-forgetting humanity. She is "humble because of knowledge, mighty by sacrifice." Pace the cynic, without the camp, and within it, that quality has inspired, and continues to inspire, her greatest adventures. With mind and eye fixed on perfection of form and function as the ultimate goal, the doctor's increasing purpose as the years roll on is the physical betterment of the race. We read that in the beginning man was created in the image of God, and that the Creator breathed into his nostrils the breath of life, and that he was placed in the Garden of Eden. Those biological attributes and relationships Medicine must recapture for mankind.

SOME REMARKS ON OUR PRESENT HOSPITAL SYSTEM.*

BY

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[AFTER a description of a motor tour through France and Spain to attend the meeting of the (British) Chirurgical Club in Madrid shortly after Easter, and a brief account of what the members saw, including some details of the working of the institution for the treatment and re-education of injured workmen, Professor Hey Groves continued as follows.]

It is the fashion now for all speakers and writers on our present hospital system to begin by assuming that there is something sacrosanct about the voluntary hospital system, and that it is our first duty to save this at all costs. Now I would begin by challenging the truth of this assumption. I should like to say boldly that the voluntary hospital system is dead. For there is something dignified and final about death—an honoured memory—a solemn requiem and a fitting monument and memorial. But unhappily there is neither dignity nor finality about the present condition.

* Being the presidential address delivered to the Bath and Bristol Branch of the British Medical Association at the Bristol University, June, 1927.

The system is not dead, but moribund, and its laboured life is kept going by stimulants and artificial respiration. Originally, and up to the beginning of the present generation, it may fairly be claimed that the voluntary hospital system did fully meet the needs of the time, and that it compared very favourably with the hospital system of any foreign country. In those days the situation was very much simpler than at present. It was only necessary to provide board, lodging, and nursing for the sick, with provision for emergencies such as surgical operations, which were then quite infrequent. The treatment of severe illness in those days was largely expectant, and the medical men who undertook hospital practice were the ordinary general practitioners of the town.

When I was a student there was only one general operating theatre at St. Bartholomew's Hospital, and at the General Hospital here in Bristol all the routine operations were performed on one afternoon in the week, the various members of the staff operating in turn with the others as spectators. Again, in those old days the voluntary hospitals were the only places where collective study and treatment of disease was undertaken. If a person had a comfortable home of his own then in times of sickness he stayed at home, and either medical or surgical treatment was carried out there. Treatment was so simple that everything needful could be done in a patient's own house. The hospital originally was

merely a home for the sick poor, where they could be lodged and fed at a time when their earnings had ceased, where the doctor visited them and prescribed for them, and the nurse washed them and made their beds. But what a change has come over things in the last thirty years! Anaesthetics and antiseptics have made surgical treatment available for considerably more than half of all cases of serious illness; x rays have rendered it possible to make diagnosis and prognosis certain in many cases where formerly these were only guesswork. The clinical laboratory has been evolved, and it is now no exaggeration to say that the examination and treatment of sick people is an exact scientific process, requiring the collaboration of many highly trained persons. This is true also of the new application of existing knowledge to cases of current disease or accident; but, in addition to such routine application of methods, there has come to be a realization of the need for more knowledge.

In former days the idea of new discoveries was left to the irrepressible genius of exceptional men such as Hunter, Pasteur, or Lister. But in the new spirit of our age almost every young man who has achieved a position on a hospital staff cherishes the conscious or unconscious ambition to find out and hand down to his successors some new thing, some better treatment, or to write some new page in the history of medical achievement; so that to the immense advance in methods of examination and treatment of the sick there has been added to the responsibilities of our institutions the glorious possibilities of research.

In a word, the hospital, which began as a mere hostel for the sick poor, has now to be a laboratory for scientific work, for prevention, diagnosis, cure, and discovery. The beneficent value of this work is now so generally recognized that the portals of the hospital have had to be opened to admit not only the indigent poor, but the middle class and the well-to-do. Still, however, there is not room, and there have had to be provided nursing homes for the wealthy and enormous municipal hospitals for the poor, so as to cope in a rather inadequate fashion with the problem which has become too vast for the voluntary hospitals.

It will be instructive if for a moment we compare the problem of education with that of hospital service. Until nearly sixty years ago education was also almost entirely voluntary. It was provided for by the charitable and religious bodies, who collected money for the building of schools and the payment of teachers; but growth of knowledge and the urgent need of imparting knowledge to all children soon made it impossible for the system to continue. In 1870 an Education Act was passed, by which the State undertook the responsibility of primary universal education, and since that time secondary and university education have to some extent become also a charge upon the State. This has not prevented religious bodies and private endowments from taking a great and honourable share in education; but the State, having set the standard and provided the means for education, this essential service is satisfactorily secured for all time and is no longer dependent upon philanthropy or mendicancy. Is there anyone who regrets this change from voluntary to State education? Should we like to think that the education which is essential for the community is to be dependent upon charity of the rich, upon the street corner collections, upon the results of pulpit appeals and well advertised lotteries? Would it content us if most of our schools were imperfect in size and structure and below the standard of Continental schools, simply because we could proudly boast that our education system was voluntary? Yet this is exactly the position of the equally essential hospital service in this country to-day.

Many of our voluntary hospitals are out-of-date old buildings, badly placed in unsuitable sites. It is true that most of such old buildings have been supplemented by newer wings of better design, which serve by contrast to show up the badness of the old part of the structure. The hospital sites and buildings are second or third rate as compared with the standard of modern buildings found in most foreign teaching hospitals. The buildings are not only below standard, but they are inadequate in regard

to size. In our big cities the voluntary hospitals have not kept pace with the growth of the population or the increasing demand for hospital treatment made by a larger proportion of the citizens. The lists of patients waiting for admission are becoming longer, and the municipal and Poor Law authorities are forced to build hospitals to meet the need.

In our own city the need for hospital beds has more than trebled in the last twenty years. This need has been met by the voluntary hospitals increasing from about 400 to 700 beds and by the municipal and Poor Law hospitals having been advanced from 100 to nearly 1,000.

From this it is evident that the voluntary hospitals now only take a second place in regard to the number of beds provided. But there is still a more serious aspect in this indictment of the voluntary system. Each voluntary hospital has its origin in the bequest of some benefactor or group of benefactors. The Royal Infirmary here was started by Churchmen and Tories, the General Hospital by Nonconformists and Radicals; Kingswood Hospital by the generosity of Mr. Handel Cossam and the fortunate circumstances which greatly increased the value of his gift after his death; the Children's Hospital, Eye Hospital, Orthopaedic Hospital, and Homoeopathic Hospital were each originated by philanthropists, whose names and memories are honoured in our midst.

Each hospital thus founded is an independent unit, governed by its own constitution, depending for its support partly on endowment, partly on an appeal for public assistance. This might be all very well if funds were adequate for the purpose and if the provision of a hospital service merely consisted in having bed, food, nursing, and a bottle of medicine for each sick person. It is, however, anything but well when funds are so inadequate that about half those requiring hospital treatment have to be handed over to the Poor Law or municipal authorities, and when the diagnosis and treatment of disease have become highly specialized sciences, requiring operating theatres, x-ray plant, laboratories, and, above all, highly trained specialists, who can only give first-rate service in a small part of the healing art. If it is true that under the present system there is not money enough to make any one hospital in this city perfect, it is still more obvious that each hospital cannot secure a perfect team of specialists, or provide such a team with a proper equipment or an adequate field for training, experience, and research. Take, for example, the subject of the prevention and correction of deformities, or orthopaedic surgery in the larger meaning of the term. No one will deny the importance of this subject from a scientific or industrial point of view; and yet among all the hospitals of this city there is not one which is large enough to provide an orthopaedic department.

Some years ago members of the staffs of the two larger hospitals in Bristol formulated a scheme for an orthopaedic institute which should be common to both, but this was not favoured by the managing bodies of either hospital, because, I suppose, it would have added to the individual lustre of neither.

Surely we know, and the general public will admit, that medical science is a highly complex affair, requiring special buildings and a highly trained staff. If this is so, ought there not to be an authoritative body which should regulate the standards of hospital site, hospital construction, and hospital staff? Such a central hospital board would be comparable in its composition and functions to the education committee, and would do the same for hospital service as the latter does for teaching.

As a matter of fact the need for expert direction of hospital affairs is very much greater than in education, for the science of healing has become so much more complex than that of primary or even secondary education. The grading of teachers and of schools is much simpler than that of hospitals, surgeons, physicians, and specialists.

The case for a co-ordinated hospital system depends, then, very largely upon the necessity for specialization in medical treatment and research. There is no need to argue as to this necessity, because it has been admitted and put into practice. Even "the man in the street" knows that he cannot get the best advice for his eyes, or ears,

or heart, or brain unless he goes to a doctor with special experience, and one who has that experience and practice in a modern hospital.

Granted, then, that specialization is a necessity, it would follow that special departments should be made as perfect as possible. To get this perfection unification is essential in order to obtain the best administrative control and to economize in the provision of costly apparatus and the still more priceless skill of experienced men. My meaning may be made clearer by examples.

Some years ago it was recognized that venereal disease should receive special study and treatment. This was partly because of social reasons, but also because new methods of treatment had been elaborated which required apparatus, administrative control, and specially trained men. The Government took the matter up and began by utilizing the staff and accommodation of existing large hospitals; but within a very few years this plan was replaced in large centres like Bristol by a single centre under one man, who has control of staff and assistants. This clearly shows that any authority that has responsibility in hospital matters would unify special departments to get maximum efficiency.

Next consider the problem of cancer research. This is a highly specialized subject and there are very few who are competent to undertake it. We are fortunate in Bristol in having Dr. Todd, who has already demonstrated his knowledge, enthusiasm, and a fair promise of success. For the purpose of his work he requires laboratories and assistants and ample financial support. Other institutions cannot afford to create similar departments, and even if they could, they cannot obtain another Dr. Todd by the simple expedient of advertising for him. Therefore I say that if such a department as that for cancer research can be founded in this city it should be placed in a unified hospital system so as to make it available for all.

Radiotherapy is perhaps the best example of a special department which requires a large initial outlay in material and apparatus.

The General Hospital has secured from a generous benefactor £5,000 worth of radium, and probably £20,000 worth will be required to do the work similar to that which is now carried on in London and Manchester. If and when this is obtained it ought to be available for the whole city and those districts which look to Bristol as their health centre; and not only ought this expensive plant to be common to the Bristol hospital system, but the one or two men who use it should have all the office work for record keeping and following up results under a single control. Be it noted, then, that the lead-selenium treatment of malignant growth which the infirmary is providing, and the radium with which the hospital is endowed, are both intended for the same object—namely, the cure of cancer. Under the present system these two potent agencies have been placed at different institutions—the only connexion between which is their rivalry, and whose most cherished tradition still is that no member of the staff shall serve both.

I have already spoken of orthopaedics, and mentioned that in the opinion of the surgeons of Bristol an orthopaedic department is very urgently needed; but none of the existing hospitals have a large enough surgical service to justify setting aside the necessary number of beds for the purpose. It is quite safe to predict that if the hospital system was unified, such an orthopaedic department would be founded at once.

Our present hospital system is radically wrong. It is wrong because it consists of isolated units without public control. No one hospital unit is perfect or self-contained, and there exists no co-ordination between the units by which the deficiencies of one may be made good by provision in another. No financial assistance of the voluntary hospitals can make good this radical defect, unless such assistance is accompanied by a condition for unification under a central control.

At present the hope for a better state of things seems to me to lie in the insolvent conditions of voluntary hospitals. The managing bodies of these institutions have now to choose between one of two policies: either they spend what

is necessary and accumulate a big debt, and when this becomes impressively large they make a heartrending appeal to the public to "Save our hospitals," or they practise rigid economy, and whilst they avoid a big debt they allow the institution to become inadequate for the work it has to do. At the same time patients are asked to pay towards the cost of their maintenance, collections are made in churches and in the streets, students are encouraged to practise buffoonery and mendicancy in public, lotteries, and even a mild form of blackmail are allowed to keep alive a system which in itself is essentially wrong. Instead of preaching in our church pulpits to ask for money for this system members of the British Medical Association would do well if they were boldly to declare that every penny given to the voluntary hospitals does something to prevent this city or country getting a proper hospital system.

Frankly, my first object in this address is iconoclastic. I would do all in my power to break the false gods which we have been taught to worship. So long as the voluntary system is kept alive we shall never have a co-ordinated hospital service. Every idol breaker is inspired by an ideal, and this is certainly so in my case. In Bristol we have every condition necessary for realizing such an ideal and of giving a lead to the whole country. A compact and wealthy city of nearly half a million people, surrounded by glorious country within easy access, a magnificent university, and the tradition of being the spot from which men stepped off for the discovery of a new world!

The ideal in my mind is to have, in the first place, a central board of hospital management concerned only in matters of general policy. It would determine what hospital provision was necessary; no philanthropist would be allowed to start a new hospital without due regard to the needs of the community. It would decide what special departments were needed, and where they should be placed. It would be ruthless in destruction of old or badly constructed and badly situated hospitals. Its main concern would be the provision of one large first-grade hospital, or hospital groups in which the study and the treatment of disease in all its special branches could be carried out with the maximum of efficiency and economy in regard to buildings, administration, equipment, and personnel. It would decide what ancillary hospitals were needed for special cases which require isolation.

The principal unit in the hospital system should be of such a size as to admit all cases of disease requiring institutional treatment (other than those needing isolation). This would involve a hospital of 1,000 beds. It would be built in the pavilion system, so as to contain, say, 800 beds at first, and be capable of extension to 1,000 or 1,200 as need arose. The hospital site would be in the country, within easy reach of the city. There would be main departments of medicine, surgery, and gynaecology with midwifery of 200 to 300 beds each. The medical department would contain such special departments—for example, those for cardiology, dermatology, pulmonary disease, or neurology; the surgical, those for orthopaedics, urology, cancer research, and radiology—as might be deemed necessary. There would be special departments for ophthalmology, oto-rhino-laryngology, of about 50 beds each. Every department would contain private wards for patients who could pay full fees for maintenance and professional attendance. All members of the staff engaged in teaching and research—and this would include all heads of departments—would be appointed and controlled by the university.

The question as to the payment of the staff, whether they should be paid at all, and, if so, how much, and by whom, is complex and perhaps of secondary importance. On one aspect of the case, however, I am quite clear: every department of the hospital should have as many junior assistants as it can find use for, their work being teaching and research and assisting in clinical work. These junior assistants should be paid a reasonable salary—that is, £400 to £700 a year, according to their time of service. Only in this way will it be possible to get the largest number of the best men from whom to choose the full staff of the hospital. Our present system makes no provision for the financial maintenance of prospective candidates for junior posts on the staff, nor indeed for the junior members of

the staff themselves. The result is that these posts are only open to men who have private means, or to those who have to make a living by private practice or coaching. We lose, therefore, many good men, and those we get become quickly absorbed in earning their living and cannot devote themselves to academic work.

The central hospital board would also have under its direction a group of ancillary hospitals—for example, those for infectious diseases, venereal disease and mental disease, and chronic or incurable disease for which only palliative treatment is possible; chronic crippling disease for which an open-air school hospital is needed. Such hospitals, of course, already exist, but they are controlled now by independent bodies without any definite relation to one another. Further, there would have to be a group of treatment stations for casualties and out-patients. These would be in close administrative association with the central hospital and would be staffed by the junior members of that institution.

Finally, no scheme would be complete which did not make some provision for the co-ordination of outlying country hospitals. I am quite aware that this opens up a very big subject and one which might well occupy the whole of an evening's address. But it is evident that if my main contention is correct—namely, that the treatment of disease should be organized on scientific lines—then there is no more justification for leaving the problem to be solved by haphazard philanthropy in the country than in the towns.

The need for, and the size, scope, and staff of a hospital in any country town or village should be much more a matter for Government control than the similar problems in relation to public-houses, music-halls, or schools. Every country hospital should be linked up with the university hospital in such a way that cases requiring special observation or treatment can be drafted from one to the other, and there should be an arrangement by which specialists from the university hospital could be available for consultation at the country hospitals. Further, the junior men, trained at the university hospital, all of whom cannot be absorbed by its staff, should have the opportunity of taking positions in the country hospitals, where they would work in amicable relations with their former chiefs.

This, in broad outline, is the ideal towards which we, in my opinion, ought to strive; the great obstacle in the way of the first step towards its attainment is the false notion as to the excellence and sanctity of the voluntary system.

It is generally assumed that lack of money is the main difficulty. I do not believe this for one moment. If the profession stood four-square and told the country that our hospital system of independent competing units was essentially bad and that there was urgent need for reform, then the money would be forthcoming just as readily as it was for education or the national insurance scheme.

As a striking comment upon the idea that a lack of money prevents adequate hospital provision and equipment, let me draw your attention to the fact that recently the city council has passed a scheme for spending one-quarter of a million pounds for the provision of accommodation for feeble-minded children!

During the last five years a voluntary committee has been trying to make provision for an open-air school-hospital for crippled children suffering from curable complaints, and has at last succeeded in getting the miserably inadequate sum of £20,000, with which, and with splendid optimism, it proposes to begin the work. The quarter of a million scheme for mental defectives was arranged by a gentleman who is also chairman of our largest voluntary hospital committee, a committee which is trying to pay its debts by selling half-crown lottery tickets for motor cars.

In this city there appears to be no financial difficulty in providing for the sick if these are criminals, lunatics, feeble-minded, or the subjects of venereal disease. But if the sick are intelligent, respectable people, suffering from cancer, appendicitis, or the results of street accidents, then they must be dependent upon a weary and flagging charity, supplemented by money-making methods which for any other purpose would be considered illegal.

In fact, State-aided insurance would seem to be the obvious solution of the financial difficulty.

Capital outlay on building new hospitals would not be as great as might be supposed. When unnecessary hospitals had been disposed of and sites sold there would be money enough to do a great deal of reconstruction, and this would have to be supplemented by a municipal rate and county rate, to which the State would contribute an equal amount.

THE VIRULENCE OF PNEUMOCOCCI IN PNEUMONIA.*

BY

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It is generally agreed that, though pneumococci are the commonest bacterial cause of pneumonia, these organisms also occur in the throats of a large proportion of healthy persons, who may never contract pneumonia. Why the pneumococcus should in the one case set up a highly dangerous condition, and in the other give rise to no ill effect, is unknown. The phenomenon is explained in such general terms as "variations in the resistance of different hosts" and "variations in pathogenic power of the micro-organism." Little is known of either of these factors, but investigations on the virulence of pneumococci obtained from all kinds of lesions, including many cases of pneumonia, offer certain clues for the solution of the problem. I have found that there are wide variations in pathogenic power among different strains of pneumococci, which I think explain some of the facts.

A measure of pathogenicity was first obtained, in terms of the minimal lethal dose for mice. The virulence measured thus was determined for each of sixty strains of pneumococci, collected at random, forty of which were isolated from pulmonary lesions, and the rest from lesions in other parts of the body chiefly secondary to pulmonary lesions. The series exhibits a very wide range of virulence, and the strains are conveniently classified into groups according to their grade of virulence.

These grades correspond quite constantly to different forms of disease in the lung. The highest grade is associated with the most acute, the most clearly defined, and the most fatal form of pneumococcal infection of the lung—namely, lobar pneumonia. The next grade, only slightly lower, is associated with bronchopneumonia, a less acute, less regular, and less fatal type. Empyema, which may arise from the extension of either a lobar or bronchopneumonic type of lesion to the pleura, corresponds to a range of virulence covered by both types. A sharp and unexpected fall in the virulence occurs before the next class is reached. This class is represented by terminal pneumonia, post-operative pneumonia, and such lung conditions as frequently arise in patients suffering from advanced disease or shock.

Pneumococci may therefore be divided into at least two groups by virtue of their pathogenic power; those of high virulence setting up well recognized clinical entities like lobar and bronchopneumonia; and those of low virulence which are associated with minor illnesses, or disease occurring in persons already debilitated.

The organisms of the first group are probably spread by contact, much as cerebro-spinal meningitis is spread, with only a small percentage of "contacts" contracting the disease. An outbreak of epidemic proportions at Cottenham, a village in Cambridgeshire, resulting in twenty-six cases of typical lobar pneumonia, affords convincing evidence of this method of spread. From every case examined a highly virulent Type I pneumococcus was isolated, and the spread of infection was traced from house to house and person to person. A similar outbreak on a smaller scale occurred at Cavendish in Suffolk, and no doubt other similar outbreaks could be traced if a search were made.

The second group, consisting of pneumococci of low

* Report to the Science Committee of the British Medical Association, June, 1927.