bean-shaped Gram-negative diplococci, intra- and extra-cellular, were present. It was considered that they were probably *Neisseria (Micrococcus) catarrhalis*.

X-ray screen examination showed full diaphragmatic movement, while a film showed increased basal linear striation but no evidence of a parenchymal lesion. The inference was that there was bronchial catarrh. The Wassermann reaction of the blood serum was negative. Examination of the blood gave the following results: red cells 4,200,000 per c.mm.; haemoglobin 72 per cent. (Haldane); there were 8,400 white cells per c.mm., and of these 56 per cent. were polymorphonuclear neutrophils, 11.5 per cent. lymphocytes, 30.5 per cent. large mononuclears, and 2 per cent. eosinophils. A Cooke-Arneth count of the polymorphs resulted thus:

Number of lobes ...	I	II	III	IV	V
Percentage of cells ...	16	42	37	5	0
Cooke's ² average figures ...	10	25	47	16	2

The Cooke-Arneth count shows a "shift to the left." This, if plurality of lobes be regarded as an index of the age of the cell, is indicative of some preponderance of younger cells, and suggests some active infective process.

Secretion was obtained from the two main bronchi by direct bronchoscopy, kindly done by Dr. Ion Simson Hall, who noted that the respiratory passages presented appearances typical of chronic bronchitis. The bronchial swabs were immediately transferred to the laboratory and put up in culture on Thomson's plasma-agar, laked blood-agar, and blood-smeared agar. Next day there was a pure growth of Gram-negative diplococci in smooth, circular, dull-greyish, raised colonies. These were subcultured (a) at 37° C., (b) at room temperature. The latter failed to grow despite repeated inoculations. The growth on a forty-eight-hour blood-smeared agar slope was easily emulsifiable in normal saline, forming a homogeneous suspension. Two cubic centimetres of this emulsion were injected intraperitoneally into each of two white mice, and a similar amount was injected into the marginal vein of a rabbit's ear. One mouse died two days after inoculation. Post-mortem examination showed marked dilatation of the veins of the anterior abdominal wall, while the spleen was large, dark, and congested. The peritoneal washings in normal saline were somewhat turbid, and contained only a few Gram-negative diplococci, which grew well on laked blood-agar (or on the same media as before) at 37° C., but repeatedly failed to grow at room temperature. The second mouse died eight days after inoculation, and post-mortem examination revealed a gelatinous form of peritonitis confined mainly to the right iliac fossa. Gram-negative coliform bacilli were obtained from the peritoneal fluid, but the heart blood was sterile. The rabbit appeared to suffer no ill effects, and was still alive eight weeks after the inoculation.

Using Hiss's serum-water medium, the biochemical reactions of the organism were found to be as follows:

Glucose	Lactose	Saccharose	Maltose	Dextrin
Acid	nil	acid	acid	acid

The organism was not agglutinated by the patient's own serum, which gave a negative reaction to the gonococcal complement-fixation test, nor was it agglutinated by meningococcal serums, Types I, II, III, and IV. (This latter, however, does not eliminate an atypical form of meningococcus.) It did not live long in culture, and subcultures had to be made every second day in order to keep the strain alive. Even so, the organism died out after two weeks. Vaccine therapy had been intended, but, in view of the improvement in the patient's condition with hygienic measures and an expectorant mixture, it was not considered to be necessary.

DISCUSSION

This case is interesting in view of the descriptions in recent literature of Gram-negative intracellular diplococci in the nasopharynx. It illustrates the care that must be taken before a definite name can be applied to such organisms. As the organism here described was grown in pure primary culture from both bronchial swabs we can be almost certain that it was responsible for the

chronic bronchitis found clinically and radiologically, and confirmed on bronchoscopy. It was obviously not one of the usual members of the *N. catarrhalis* group, as it fermented glucose, maltose, saccharose, and dextrin. Lactose was not fermented, but the colonial appearances were totally different from *N. pharyngis siccus*. The majority of *N. catarrhalis* are auto-agglutinable in saline, whereas this organism formed a homogeneous suspension. The inability to grow at room temperature made one think of *N. meningitidis* and *N. gonorrhoeae*, but the sugar reactions and the faculty of growing easily on blood-smeared agar ruled out the possibility of the organism being a gonococcus. Oliver³ states that there is a danger of cross-fixation in the gonococcal complement-fixation test with naturally occurring infection with *N. catarrhalis* and aberrant forms of the organism. The test was negative in the case of our patient, so this difficulty did not arise. The fact that there was no agglutination with meningococcal serums does not at once exclude *N. meningitidis*, as in sporadic cases of cerebro-spinal meningitis in non-epidemic periods the causal organism may not be agglutinated by any of the type serums.⁴

The organism described may most correctly be designated a *Neisseria* of a variety closely related to the meningococcal group.

SUMMARY

There is described a case of chronic bronchitis due to a *Neisseria* which presented some unusual features. Intracellular Gram-negative diplococci occurring extragenitally should not be labelled gonococci unless a full bacteriological examination has been carried out.

Our thanks are due to Dr. Goodall, physician to the Royal Infirmary, for permission to publish details of this case; and to Dr. W. R. Logan, bacteriologist to the Royal Infirmary, and Dr. Goodall for valuable help and criticism. The animal inoculation experiments were done at the laboratory of the Royal College of Physicians, Edinburgh.

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PREVENTIVE AND CLINICAL MEDICINE IN RELATION TO THE MEDICAL CARE AND TREATMENT OF CHILDREN*

BY

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"The new services of the doctor to the State call for a reconsideration of the whole business of education and equipment. A different kind of doctor is needed in these times. It is clear he must have no less of the learning and skill of former days, while he must also be furnished with an improved training in new subjects, in preventive medicine, and in the political science of communal responsibility."

I do not think I could well find a more suitable introduction to my paper than this quotation from the address given by Sir George Newman when opening the discussion on the future of the practice of medicine, at the Cambridge meeting of the British Medical Association in 1920. There is no question here of the training either for private practice, whether general or specialist practice, or for a public health service, but rather the recognition of the need for a different kind of doctor to meet the demands made by the community to-day and the correspondingly different requirements of medical practice. There will remain, rightly and necessarily, two aspects of medicine, the curative and the preventive, but the appropriate analogy will cease to be the time-honoured one

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of two streams running parallel for some distance after their junction, and will become rather that of a broad stream whose component waters are effectively blended to one common end.

It is to the implications of this new medicine as applied to children that I shall confine myself. Perhaps we hardly realize how far-reaching, carried to its apparently inevitable conclusion, are its implications in regard to medical organization, administration, and education. Every modern textbook on the diseases of children plunges straight into the description of well-recognized disease on the orthodox lines of aetiology, diagnosis, and treatment. A student would find it difficult to cull from such a textbook, whether written from the point of view of the clinician or of the public health service, any satisfactory indication of the modern, but now well-established, trends in the approach made by medicine to the diseases of children. During the first quarter of the present century we have been passing through the stage of clash between the practitioners of clinical and preventive medicine respectively. The task before us, the task primarily of our Association, is the welding of these activities into an organic whole on behalf of the health of the child and its maintenance.

THE INCIDENCE OF MORTALITY AND MORBIDITY

In order to provide the necessary data for my argument I will set out briefly some of the more important conditions with which, in children, we have to deal. These may be divided into two broad classes—those tending to lead to death and those tending to disability. There is no necessary correlation between the two classes of ailment. Little or no relation is found between the mortality table for children from birth to 15 years and a second table embodying the findings of medical inspection. The conditions found at medical inspection, if left to develop untreated, will not go to swell the tables of mortality. It is necessary to study both lists if conclusions as to medical organization and practice are to be deduced from the facts, since, though both may lead to similar conclusions, they have each an independent contribution to make to the argument.

The main facts as to mortality are these. Taking the figures for 1931, of every thousand deaths occurring under the age of 15, *respiratory disease* accounted for 241, *epidemic disease* 161, *disease of digestive organs* 90, *tuberculosis of all forms* 56, and *disease of the nervous system* 51. Respiratory disease holds first place easily under 1 year and during the first quinquennium; it is second only to all epidemic diseases between the ages of 5 and 10. Epidemic disease holds, due chiefly to diphtheria, first place in the second quinquennium; second place, due to measles and whooping-cough, in the first and also in the third quinquennium; and third place below the age of 1 year. Tuberculosis ranks first for ages 10 to 15 years and takes third place in the earlier quinquennia. Turning to the findings of medical inspection, the principal diseases in their order of frequency are dental disease, defective vision, enlarged tonsils and adenoids, disease of the skin, malnutrition, diseases of the ear and defective hearing, deformities, heart disease, and disease of the nervous system. These two lists do not, however, complete the tale. They take no direct cognizance, for example, either of such a general condition as debility or of rheumatism. Of the cause or causes of the former we are often largely ignorant, and what constitutes a diagnosis of rheumatism is not infrequently in dispute. Nevertheless, in regard to both of these conditions, accurate diagnosis and proper treatment may be of the first importance.

There is, of course, nothing fresh about these particulars. In regard to the fatal illnesses of childhood, it is common knowledge that our present organization of medical service is not meeting, sufficiently fully, the need for medical and nursing care, especially in the case of the very young child. We are not only behind in the measures adopted for prevention, but even in those available for actual treatment. This applies in particular to the heavy mortality associated with measles and whooping-cough,

and with respiratory disease, in the main broncho-pneumonia. In so far as the figures disclose disease or defect discovered at school medical inspection, appropriate machinery has been set up by the various local education authorities to secure treatment, and the returns sent in year by year by school medical officers testify, up to a point, to the efficacy of the arrangements made and to the value of the treatment given. But no one who has watched closely the development of the School Medical Service during the past thirty years can pretend to rest content with its achievements, great though the gain has been to the child. The need, in the early days of the service, for the treatment of gross disease and defect was necessarily clamant. This forced attention to prevention, to the treatment of disease in its early stages, in order to prevent its later development. The need is now recognized of going back further still, of obtaining a fuller understanding of health, of its different manifestations in different individuals, and of those early departures from physiological fitness which, uncorrected, lead on to physical signs and symptoms we recognize as pathological. A fresh biological approach to medicine in its theory and its practice is now required.

ILLUSTRATIVE EXAMPLES OF CLINICAL PREVENTIVE MEDICINE

The doctor of the past was in his practice relatively self-sufficient: he is becoming more and more the leader of a team. It is the requirement of team work that has tended increasingly to associate clinical medicine with the work of the public health officer. Team work comes naturally to him; not so to the general practitioner. If disease in children is to be treated in its early beginnings, the treatment to be effective must not be, in many cases, an incident in time with the doctor in the forefront of the picture—as may often be the case in acute disease, or when operative treatment is necessary, as, for example, in appendicitis—but a process in which various individuals and even organizations play a part under the doctor's direction, and into this the specialist or consultant should come equally with the general practitioner. Moreover, in this team work there must be no divorce between diagnosis and treatment, no artificial break at the expense of clinical medicine to suit the convenience of medical administration.

One or two concrete examples will help to show how complicated and difficult a business, compared with the treatment of well-established disease, may be the treatment both of disease in its early stages and of deviations from normal health. They will help to show, if clinical medicine is to function effectively, what indications there appear to be for modifications and developments in current methods of medical administration and practice. As my first example I will take *crippling* among school children. The work that has been done towards the abolition of the crippled child, as we have known him in the past, has been made possible only by the adoption of a concerted plan—an orthopaedic scheme, as it is called—which depends for effective functioning on the working together as one team of the child and the parent, the family practitioner, the school medical officer and the local authority, the specialist surgeon, the orthopaedic hospital and convalescent home, the orthopaedic clinic sister, the health visitor, the infant welfare centre, and the teacher and the school. No single individual is more important in team work of this kind than the general practitioner. Early and correct diagnosis is the first requirement of preventive medicine. At present, however, there are many considerations which may make it difficult for him to follow up his clinical advantage to its full fruition.

Then, secondly, the necessity for team work is being well demonstrated in the case of the *rheumatic* child. This work, however, is still in its infancy. It is based in part on assumption, and is hampered by our still imperfect knowledge as to the nature of rheumatism, as to the early manifestations of disease rightly attributable to it, and as to the treatment of those early conditions from the standpoint of the prevention of further develop-

ment. There are few tasks more difficult in clinical medicine than the right reading and interpretation of the natural history of heart disease. However carefully an individual may have been watched over a period of years, during which the condition may have progressed under our very eyes, we may have been at a loss to evaluate the factors determining the progress. An immense amount of careful recording of the results of physical examination, of the personal, family, and general environmental conditions of the child and adolescent, of the results of treatment—using this term in its broadest sense—will be required, and final data can be obtained only after a long period of time measured by years. Apart from team work, therefore, there is little or no prospect of a successful issue of a campaign to lessen effectively in the young adult the incidence of heart disease as we know it. The pivot in this enterprise should undoubtedly be the family practitioner; but again the present conditions of practice make it difficult often for him to function effectively. A comparatively long history of rheumatic infection may have preceded the first opportunity he has of seeing the child or adolescent, and the opportunity for watching developments, through the earlier stages of what may or may not prove to be rheumatic infection, may indeed fall more readily to the school doctor than to the family practitioner.

Further, this recently developed type of clinical medicine illustrates well the new place and function of the consultant or specialist. He has in the past been associated chiefly with well-established disease, and has been called in to diagnose some obscure condition or to advise as to treatment when life or death seemed at stake. We have not looked upon the consultant as a predominant partner in the great clinical enterprise of the prevention of disease in its early stages, but as an individual acting independently, who is concerned almost entirely with treatment and prognosis of disease which has reached a definite and usually advanced stage. Similarly with the hospital; it is reserved for the treatment of acute and well-established disease, and has rather prided itself on its isolation. There are many reasons for this which there is neither time nor need to discuss here, but a different and additional function awaits the hospital if it is to play its part in this development of team clinical medicine. It is common knowledge how urgent is the need for hospital reorganization and differentiation, even from the point of view of the effective fulfilment of its present functions in the treatment of disease. If the hospital is to become a partner in the team of preventive clinicians, accommodation will be required for the more accurate observation of disease in its earlier manifestations, and special facilities for the carrying out of investigations into the different branches of clinical pathology; there will need to be also the closest co-operation with other members of the team. Records made and kept will be on agreed lines, and those of each member made available to others. Work of this character over a long period may well be expected to bring the greatest benefit to the individual child, but this type of record is necessarily also of the nature of research work, towards which the often disjointed work of to-day can make but little contribution. Though reference has been made to these points in connexion with the steps taken for the prevention of heart disease they have also a much wider application. Rheumatism, however, forms a particularly appropriate illustration, since "rheumatic schemes," working on these principles, are actually operating, a notable instance being the scheme of Bristol and adjacent county areas.

Defective vision in children and the work of the oculist may be taken as a third illustration of how the idea of preventive clinical medicine may be extended to branches of specialist medicine. The oculist presents us with the last word in the treatment of disease and defect, but it is difficult to believe that defective eyesight in children has not more to gain than in the past from the application of these preventive principles in clinical medicine.

I take a final illustration from the very different sphere of mental health, and would instance the case of the *delinquent child*. He is in a less favourable position than the child suffering from some well-marked form of physical

disease. Our machinery for diagnosis and treatment in the case of physical disease is reasonably satisfactory, but this cannot be claimed in the case of the delinquent child. Although we occasionally recognize disease as among the direct causes of delinquency, notably in the case of encephalitis lethargica, nevertheless we associate with the delinquent child punishment rather than treatment. The study of delinquency as a symptom of mental ill-health has not yet progressed far. We have not up to the present made a concerted scientific effort towards prevention; we know comparatively little about the significance of early stages of departure from sound mental health. One thing, however, can be said—namely, that without well-planned team work there can be no hope of elucidating the problems of causation and treatment. The main problem is that of understanding and evaluating the significance of manifestations of behaviour in relation to the age of the child and to its family, school, and social environment. To this end the psychiatrist, the psychologist, the trained social worker, and the school teacher will each have their part to play.

SUGGESTED MEDICAL REORGANIZATION

Now this growing view of medicine, of clinical medicine, as an enterprise concerned primarily with the understanding of health and its maintenance, and the early detection and treatment of departure from the normal, cannot but have a profound influence upon the organization of our health services for children. At present the activities of clinical and preventive medicine run parallel, each fairly well defined. On the whole we may claim, as in the case of Elia and his cousin Bridget, that

"we house together . . . in a sort of double singleness" and "are generally in harmony, with occasional bickerings—as it should be among near relations."

We work on the theory that the school doctor is there to detect disease and defect, and, this done, to hand over the child to the family practitioner for treatment. This process may seem sufficiently reasonable in the case of disease or defect well developed, or of such a nature as to require little other than well-defined medical treatment at the hands of the practitioner.

Most conditions in childhood, however, either require following up and treatment in regard to which the doctor plays the part of supervisor rather than of actual agent, or are of a character requiring reference to a specialist rather than to a general practitioner. We can be said to have arrived at a sort of working compromise, as a result of which some conditions are treated under the aegis of the school medical service direct and some are referred to the family practitioner. I think it may be said generally that peace reigns between the practitioner and the school doctor. Nevertheless it is a peace which in some measure fails to bring satisfaction, and some of us may feel that it is a peace bought at the expense of clinical medicine. We can hardly rest satisfied with any system which divorces diagnosis and treatment if what we are primarily concerned with is the maintenance of health and the detection and treatment of early deviations from health. Clinical medicine is one and indivisible, and unity must be preserved. This is not the occasion to develop this principle and its application in detail, but it leaves no place for reference of a child out of one system and into another and perhaps back again into the first. We confine to one party the duty of medical inspection at school and to the other the task of domiciliary visits. It is impossible to build a sound clinical edifice on such an arbitrary division of labour. It is to cut the thread that should run through the medical life history of the child.

In thus formulating the claims of clinical preventive medicine I do not think I have overstated them, and I do not pretend that any satisfactory solution is at present in sight. The scheme of the British Medical Association, drawn up with so much insight into present-day needs, seems to me unsatisfactory at this point; it meets the difficulty and passes on. It assumes that medical inspection will go on as heretofore, and that the school doctor will play little part as a clinician other than that

of discovering disease and defect and then ejecting the child. This seems to misinterpret the place and function of clinical medicine. Is there no alternative? Is there no hope of substituting a single-doctor for a dual-doctor system? Such a unified system would involve considerable give and take on the part of the public health and the general practitioner service respectively. In practice, so deep are the furrows in which we now work, it might well be found that a change in the direction indicated might result in loss out of proportion to the gain, and we should on balance be left in no better position than at present. But I believe, nevertheless, that the possibilities of the change should be carefully explored. Bound up in the proposal are three main requirements, involving, first, the panel family instead of merely the panel industrial worker, thus eliminating the present method of payment by "medical act," as Sir Arthur Newsholme calls it; secondly, the willingness of the family practitioner, acting in this capacity as a member of the public health staff and in a manner similar to that of the present assistant school medical officer, to supply to the medical officer of the local authority reports in such form and at such intervals as may be prescribed; thirdly, a reconsideration of the medical education of the practitioner on the general lines indicated in the quotation at the head of this paper. Perhaps this latter may prove to be the most radical change of all, for there is involved the study of health as well as that of disease, and the assurance of a biological rather than a pathological approach to medicine for all who would practise the art in whatever direction or capacity.

The advantages of an organization on the lines indicated are obvious, but it will be agreed that organization alone will not produce the desired end. A high standard of skill and ideals must inform the whole service before there can be assured a real unity of medical supervision throughout the life of the child from infancy upwards. The framework would be that of the public health service, the general arrangements being in the charge of the medical organizer of the local public health service. There would be an important readjustment of the outlook and work of the general practitioner. He would no longer be consulted only when the child was considered by the parent sufficiently ill to seek his advice, and then, on the ground of expense, as sparingly as possible. He would so adjust the conduct of his practice that it grew in conformity with a health rather than a disease service. He would have at his command a health visiting and nursing service, equipped and maintained by the local authority, and specialist, hospital, and convalescent home service, arranged as part of the public health framework. Within the framework of such a Community Medical Service would be afforded to the practitioner the fullest freedom for medical practice; a practice in which the bond between doctor and family would form the strongest link in the chain.

Memoranda

MEDICAL, SURGICAL, OBSTETRICAL

EMBOLISM OF THE CENTRAL RETINAL ARTERY

In view of the rarity of success in these cases, I think this one is worth recording, especially as the patient has asked me to do so.

The widow, aged 70, of a former colleague and friend consulted me on New Year's Day, 1929, with advanced senile cataract in both eyes. The left one reached maturity in July, 1930, when I extracted the cataract with quite satisfactory results (corrected V = 6/9 ptl.). The patient enjoyed good vision till October 8th, when, after supper, a 'phone call summoned me, because she had gone totally blind. I found that at tea-time, while quietly seated at table, vision had suddenly been snuffed out. Examination revealed the picture of embolism of the central retinal

artery, with cherry-coloured spot at the macula. (The patient has an "organic heart.") I held out little hope for her left eye, and gave it as my opinion that we would probably, or almost certainly, have to resort to extraction of the right cataract, which is now mature, if we hoped to restore vision. In all cases, however, I always give treatment a fair trial.

I therefore ordered 2 per cent. pilocarpine to be instilled, and repeated in ten minutes, this to be followed forty minutes after the first drop by vigorous massage for five minutes. This was carried out at once by Dr. Ewing, and repeated three times the next day, without result. I advised that it be kept up for at least three days. After the morning massage on October 10th Dr. Ewing called me up on the 'phone to tell me that vision had returned. I advised perseverance with the treatment, for safety, till I saw the patient on October 12th. All the retinal arteries are now in full action again, and well filled, and her vision is as good as ever. A recurrence is, I think, most unlikely, and embolism in both eyes very rarely happens.

Here I can only quote one other case where I succeeded in dislodging an embolus which was visible in a branch of the retinal artery. It occurred in a soldier whom I was asked to see, who had septic endocarditis (Schottmüller's endocarditis lenta). His vision and partial loss of field were restored, and, I believe, remained up to his death, which was, of course, inevitable. Two further cases I have in mind, and hope to trace and report shortly.

There is therefore some chance in these cases, and it seems reasonable to assume that the sooner massage is begun the better.

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A CASE OF COMPLETE SECTION OF BOTH SCIATIC NERVES

The following case, in which attempts to suture the cut ends of both sciatic nerves failed entirely and were followed by recovery, with satisfactory restoration of function, seems of sufficient interest to be worthy of record.

CASE HISTORY

J. B., a schoolboy aged 8, fell twenty feet through a glass roof on June 23rd, 1927, and was admitted to my wards in the Royal Infirmary in an absolutely collapsed and pulseless condition, having lost much blood from two deep lacerated wounds, one at the back of each thigh. The muscles had been divided, and were protruding from the wounds, and both sciatic nerves had been completely severed.

Next morning, notwithstanding all treatment, the patient's condition was very critical, the pulse being just perceptible, and very rapid and weak. As the day advanced his condition became even worse, and a transfusion of blood was accordingly given, his mother being the donor. Thereafter he improved somewhat, and on the 29th an attempt was made to suture the left sciatic nerve and the muscles. Six days later the right nerve was sutured, and, as the left had sloughed, it was again sutured. The patient now became extremely ill once more. Both wounds became extremely dirty, both nerves sloughed, and it was recognized that attention must be directed entirely towards trying to save the boy's life, the legs being allowed to take their chance. No further effort was therefore made to unite the nerves, operations on which had failed. As the patient grew stronger, however, the wounds began to clean up and to granulate. The lower limbs, contrary to expectation, maintained a fairly normal appearance, and as the general condition improved sensation was found to be fair, although dulled, especially on the extensor aspects. Foot-drop was troublesome, particularly on the right side, and the knees tended constantly to become flexed. Gentle extension was applied to correct the flexion, and treatment by massage and electricity was commenced. About this time the patient began to be able to move the limbs, and he was encouraged to do this constantly and always more freely.

By October the wounds were greatly improved, but still required daily dressing. Light plaster casings were applied