life worth living, and that they will live longer than is commonly supposed.

Conclusions and Summary

By way of summary and to conclude: Angina pectoris is a serious disease of the heart which is manifested by pain across the chest or at the sternum, often extending into the arms, and which is due to deficient coronary circulation or imperfect blood supply. There are two main varieties, but their specific pain differs only in intensity, and their pathology has a common factor in myocardial ischaemia. When the pain is brief and depends on exertion, anginal pain is known as angina of effort, and arises from ischaemia due to localized arterial spasm. When an attack of anginal pain is unrelated to exertion and sufficiently prolonged, and complicated by the symptoms of infarction, it is known as coronary thrombosis, and arises from the resulting necrotic ischaemia. Between these two varieties all grades of angina pectoris are encountered, in the main depending on the severity and extent of the coronary disease and the effect on the myocardium—whether the ischaemia is transient (arterial spasm) or permanent (infarction). Cases of angina pectoris range from simple to severe, and present a similar pain

(anginal) of varying intensity, and reveal at their source a vascular identity.

Angina of effort may be initiated, complicated, or terminated by coronary thrombosis. By this a simple angina (of effort) can be converted into a sort of compound or complicated angina (with shock, etc.). The correlation between anginal pain and vascular lesion is not exact, for the worst cases of angina of effort approximate to coronary thrombosis. Angina of effort is fairly inclusive of all cases of angina pectoris excluding coronary thrombosis, cases with spontaneous attacks of pain at rest being almost invariably subject to angina on exertion.

Too much stress has been laid upon the gravity of angina pectoris. It is inseparable from a risk of sudden death, but this may be deferred for years. In attacks of coronary thrombosis and in the severer grades of angina of effort the pain is extreme and the danger is great, but milder forms are common and often run a tolerable course. There is every gradation between mild angina of effort and severe coronary thrombosis, as there is every grade of coronary disease. Too much attention has been centred on the anginal death, and too little on the anginal life and its management.

IMPORTANCE OF VOCATIONAL GUIDANCE FOR PRESERVATION OF THE HEALTH OF THE INDUSTRIAL WORKER *

BY

ANGUS MACRAE, M.A., M.B.

There are no statistics which afford any exact indication of the number of human beings engaged in work definitely unsuited to their capacities. In America it has been estimated that approximately 50 per cent. of the working population are vocationally maladjusted, but this calculation, based solely on questionnaire reports from satisfied and dissatisfied workers, is for various reasons unreliable. In any case, it is certain that the problem of the misfit is one of considerable magnitude, and that there is great need for improved methods of advising young people on the choice of occupation. It is a problem with important economic and sociological aspects, but the present paper is limited to a discussion of unsuitable employment as it affects the individual industrial worker, and, more especially, as it affects his health. In these days there is a growing realization of the importance of mental factors in the causation of sickness; it is clear that the whole man—body and mind—must be taken into account in any discussion on employment and health.

VOCATIONAL GUIDANCE AND THE PHYSICIAN

In this country the part played at present by the medical profession in vocational guidance falls short of the ideal. In school the child is examined at infrequent intervals by the school medical officer, who as a rule is concerned merely with the treatment of physical defects. In some areas the rule is that the child must be examined within two years of leaving school; hence, in certain cases, the medical information available to the child's vocational advisers is approximately two years out of date. Moreover, although there are exceptions to the rule, this information is commonly, for the purpose of vocational guidance, altogether too meagre.

So far as the writer knows, neither the certifying factory surgeon nor the doctor employed by the large

industrial firm can be said—with exceptions—to give guidance in any real sense of the word. These officials render a valuable service by rejecting candidates for work whose physical defects might make them a danger to themselves or to others. But to be rejected is not to be guided; and it is perhaps questionable whether all the rejections are necessary or desirable. It appears that in this country the industrial doctor often sets a uniform standard of physical efficiency for all entrants to the factory, no matter what variations exist in the physical requirements of the individual factory operations. Recent writers have protested against this practice, insisting that *adaptation* of the defective individual, not *elimination*, should be the aim.

"The object of the physical examination is not to make the plant a haven of physically perfect specimens . . . strict exclusion is a selfish policy, which deprives the doctor of his best field for improvement."¹

Further, the industrial doctor not only gives no positive guidance to those whom he rejects, but takes no part, as a rule, in the allocation of suitable work to those whom he accepts. This would seem to be a matter in which his services might be used to greater advantage.

PHYSICAL MISFITS

As to what proportion of the young people annually entering the ranks of industry succeed—despite the efforts of school and industrial medical services—in obtaining employment unsuited to their physical condition, one can only speculate. In an American investigation it was found that of 400 working boys and girls, not specially selected in any way, 49 per cent. had physical defects which were being generally aggravated by their occupation.² In this country a recent investigation of load-carrying among women in a number of different industries showed that there was a definite correspondence between the heaviness of the trade and the strength of the women employed, but the comment was made by the investigators that

"in view of the relatively casual method used in the selection of women, the only probable explanation is that it is a case of the survival of the fittest";

and

"no doubt the 'below par' young persons filter through to a level of work which is within their capacity, but at what cost to the individual one can only guess."³

* Paper read in opening a discussion in the Section of Public Health at the Centenary Meeting of the British Medical Association, London, 1932.

Of course the many researches recently undertaken in the fields of industrial medicine and industrial physiology and psychology have resulted in practical measures of great value in promoting the health of the workers. But in vocational guidance one is dealing, not with workers generally, but with individuals; and, outside the so-called "dangerous trades," the individual appears to have received comparatively little attention. May not every trade be dangerous, or at least unhealthy for certain types? Improvements in methods and conditions of work will not suffice to make a man a good worker or a healthy worker if, physiologically, he is a square peg in a round hole.

It is with much diffidence that the writer, whose experience has been mainly psychological, attempts a discussion of the ways in which vocational guidance might possibly be improved on its medical side. Some general principles may, however, be suggested as a basis.

THE OBJECT OF THE MEDICAL EXAMINATION

This should be the detection, not merely of physical deficiencies, but also of physical capacities. The doctor concerned with vocational guidance should strive, not only to prevent the aggravation, by unsuitable work, of existing defects, but also to promote, through suitable work, the full use and development of the individual's physical powers. In the words of Sir Henry Brackenbury,⁴ "perfection of faculty," and not mere prevention of ill, should be the aim of the physician. In the absence of notable physical defects, the head teacher in the London area is instructed to enter the letters "N.O." ("no observations") in the medical section of the child's school-leaving form: in the form used by the officer of the juvenile employment exchange the word "normal" is entered. But is it not important to study both physical and mental variations within the normal—not to mention the desirability of diagnosing the supernormal? It is certainly easier to contraindicate than to suggest fitting occupations, and it is true that psychological considerations must often render the ideal physical adjustment impracticable. The boy, for example, whose remarkable acuity of vision fits him for the trade of the watchmaker may on other grounds be much better equipped for the work of the salesman. But the fact remains that only when the doctor endeavours to provide positive as well as negative guidance will his contribution to the study of this problem be as useful as it should be.

ESTIMATION OF DEGREE OF PHYSICAL CAPACITY

Unfortunately, owing to the complexity of the matter, no great success has attended the many efforts that have been made to devise a simple method of assessing the general physical efficiency of the adolescent in a precise, objective way. But where tests and measurements fail clinical insight may achieve a reliable grading, both of general robustness and of particular physical conditions. To encourage the adoption of a standard practice the American Conference Board of Physicians in Industry has formulated a classification of defects, in which, for example, five degrees of hernia are defined, and three degrees of varicosity. As is pointed out in one of the publications of the National Industrial Conference Board, "a consideration of the findings based upon a common terminology furnishes the information necessary to determine the extent to which workers with particular defects can be employed, the occupations in which they can safely engage, and the effect of such occupations on their physical condition."⁵

In the present state of knowledge the doctor's judgement of occupational potentialities (especially at the difficult

age of puberty) must often be of a tentative nature. Therefore an exact medical record of the child at the time of leaving school will greatly facilitate the task of checking that judgement and of determining whether the occupation followed is physically harmful.

As the medical authors of a French book⁶ on vocational guidance have insisted, it is important to distinguish between absolute and merely relative contraindications. Valvular disease of the heart is an example of the one class, temporary albuminuria of the other. When curable conditions are discovered, the doctor must give advice on hygiene or treatment, and his occupational suggestions must be provisional. When physical defects are present, it may not be enough to warn the child against following occupations which may affect him adversely; it may be possible in some cases to suggest work which would be beneficial.

IMPORTANCE OF DIATHESIS

In the absence of actual signs of disease, it may perhaps be important to advise against particular occupations such as would favour the diseases to which the child is predisposed. The old doctrine of diathesis has recently been unpopular as a result of advances in bacteriology, which have directed attention to the seed rather than to the soil. There now appears, however, to be a revival of interest in this subject, evidenced, for example, by inquiries such as those of Draper⁷ into the constitutional and genetic aspects of disease. The study of the predisposition to particular diseases would appear to be an essential part of the vocational guidance doctor's work.

CONTACT WITH PARENTS AND LAY WORKERS

It is desirable that the doctor should interview the parents for the purpose of gaining information about the child's past history and family antecedents, and of impressing on the parents the importance of following medical advice. Owing to the prestige of the profession in the popular mind, parents are more likely to regard medical advice seriously when given by the doctor than when passed on by a "psychologist" or "vocational counsellor." It may be desirable, to preserve professional secrecy, for the doctor to keep the details of his examination private and to communicate only general recommendations to his lay collaborators. This practice is adopted in a number of vocational guidance offices on the Continent.

Finally, the doctor must express the results of his examination in intelligible language, and in as helpful a manner as possible, to the persons, usually non-medical, who are responsible for guiding the child. Ideally, the doctor assisting in such work should be acquainted with the nature and conditions of all the local occupations, but if it is impossible for him to name specific jobs which he considers suitable or unsuitable on medical grounds, he can at least supply positive and negative indications in terms of general occupational conditions. This plan has been followed in the experimental work recently conducted in this country by the National Institute of Industrial Psychology,⁸ and similar methods are employed in many Continental centres. There can be little doubt that the general use of such methods in vocational guidance would materially reduce the number of mistaken occupational choices due to lack of exact medical information or to misinterpretation of such medical information as is available.

When large numbers of children must be examined in a comparatively limited time, it is impossible to employ elaborate laboratory methods. It may be worth mentioning here, however, that the French authors quoted above have emphasized the great value of radiography as a means of confirming doubtful diagnoses.

PSYCHOLOGICAL INVESTIGATION

Sometimes one discovers, in record forms used in medical examinations, a minute space for the doctor's observations on the subject's "mental condition." Fortunately, the psychologist has now developed methods for obtaining a more comprehensive and exact estimate of mental factors than can be achieved in the course of a clinical examination. These are of two kinds: there is the method of standardized tests for the assessment of abilities, and that of the systematic interview for assessing temperament and character.

The mental testing movement, which had made considerable progress before the war, received a great impetus from the successful American experiment of applying psychological tests to nearly two million Army recruits during the war. In recent years these tests have been widely used in various fields of applied psychology and, in particular, in the vocational guidance of children leaving school. Much of the early testing was empirical and somewhat uncritical, but the best tests now in use, although certainly not infallible, are instruments of considerable scientific precision. It is impossible here to go fully into theoretical and practical details. A brief account of the matter must suffice.

INTELLIGENCE TESTS

The tests most widely used are those which measure intelligence, or "inborn general mental ability." These, although verbal in form, differ markedly from a scholastic examination. They call for natural ability rather than for acquired knowledge or skill. They are scored in an objective way, the personal bias of the examiner being eliminated. They usually involve little, if any, writing, so that the child who lacks facility of expression is not placed at a disadvantage. They are carefully standardized by application to large numbers of children of different ages. With the aid of modern statistical methods, norms are worked out in such a way as to make possible an exact estimation of the position of any particular individual among individuals of his own age and experience. Intelligence tests are often unfairly criticized. The psychologist understands their limitations, and knows that he must often interpret the results cautiously. But competent judges are agreed that general mental ability, subjective estimates of which are notoriously unreliable, can be much more accurately gauged by these tests than by any other method.

TESTS FOR SPECIAL ABILITY

Vocational maladjustment is often due simply to an excess or a defect of intelligence; the requirements of the job are far above or far below the individual's general capacity. In many other cases, however, the trouble is due to the lack of a special mental aptitude which the work demands, or to the possession of a specialized gift which the worker longs to use and for which his job provides no exercise. The testing of special abilities is still, for the most part, somewhat inexact, but the scientific procedures which have established the validity of the intelligence test can be, and are now being, applied in this field also. For a model investigation of a special ability the interested reader may be referred to the recent work of Cox on mechanical aptitude.⁹ Among such tests as have been used in recent experiments in this country may be mentioned those for "practical ability" (non-verbal problems, calling for practical planning with concrete materials), for mechanical aptitude, for form perception and visualization, and those for speed, steadiness, and precision in performing different manual movements. Standardized educational tests are also employed when a more exact estimate is required of proficiency in particular school subjects than may easily be obtained from the teacher.

ESTIMATION OF TEMPERAMENT AND CHARACTER

An interesting example of temperamental maladjustment is given by Dr. May Smith. Dr. Smith studied the "output" of three girls engaged in the sorting of soiled linen in the laundry trade, and observed that two of the

girls, who were sisters, worked much more quickly than did the third. Further investigation showed that the difference in speed was not due entirely to a difference in natural quickness. The facial contortions of the slow girl at the sight of an unusually dirty article, and the extreme care with which she handled it, made it clear that the emotion of disgust was an important contributory cause of her slowness.¹⁰

There have been many unsuccessful attempts to devise reliable tests for temperamental and moral characteristics. Recently Culpin and Smith¹¹ have found the McDougall-Schuster dotting test of considerable value in the diagnosis of a particular type of temperamental peculiarity; Pinard (whose work is as yet unpublished) has obtained promising results in an investigation of perseveration tests as indicative of general emotional stability; and Farmer and Chambers¹² have made a useful beginning with the testing of the personal qualities thought to be important in the causation of industrial accidents. For the most part, however, the psychologist engaged in vocational guidance bases his estimates of temperament on his observations during a systematic interview. Burt¹³ has shown that the trained psychologist, in a carefully planned and directed interview of quite short duration, can estimate with a surprising degree of accuracy the simpler temperamental tendencies, such as sociability, sympathy, cheerfulness, assertiveness, and timidity. The more complex qualities, such as industry, honesty, and reliability, are not so easily assessed, and here especially the psychologist seeks the assistance of the child's teachers and parents. From the parents he obtains also information about special family characteristics and occupational traditions. As in the medical, so in the temperamental, examination the family history often gives great assistance.

THE ENVIRONMENTAL FACTOR

The investigation of environmental conditions is especially important when temperamental deficiencies are present. In such cases the test results may sometimes shed light on the causation of the abnormality.

The vocational adviser must have some skill in detecting the minor discords in the emotional life of the adolescent. If not an expert psychiatrist, he must at least have the psychiatric outlook and must be prepared to offer advice on mental hygiene. In cases of marked temperamental abnormality the wise adviser will reserve judgement on the vocational question until it is seen what improvement can be effected by psychotherapy. Sometimes it may be possible, as in the case of physical defects, to suggest an occupation which will have a remedial influence—for example, by affording an outlet for natural impulses which have been unhealthily repressed, or which have tended to find expression in undesirable ways.

It is unnecessary to stress the dangers to mental health of work which is ill adapted to the worker's mental capacities or to his temperament. The mental strain resulting from uncongenial employment may in extreme cases—which are perhaps more numerous than is commonly realized—be a contributory cause of such grave conditions as alcoholism and insanity. Burt¹⁴ has found a definite relation between occupational maladjustment and juvenile delinquency, and Henderson and Gillespie¹⁵ have recently drawn attention to the importance of wise vocational guidance in the prevention of mental disorders, particularly the common disorders of the schizophrenic type. Moreover, the mental conflicts of the misfit, which are often aggravated by economic stress—for maladjustment may well affect earning capacity—cannot fail to react adversely on his physical condition; and in certain cases serious disablement may be produced. Nearly thirty years ago Janet,¹⁶ recognizing the psychological origin of some of the so-called "occupational neuroses," placed a writer with cramp in the same general category as a barber with a phobia for razors. Recent investigations of telegraphists' cramp have led to the conclusion that this condition is a symptom of a psychoneurotic disorder, and is designed to rescue the patient from uncongenial occupational conditions which have aggravated his temperamental peculiarities. Some at least of the sufferers, if they had

chosen a less exacting occupation, might have worked happily and efficiently.¹⁷

It is obvious that, to prevent such maladjustments, the vocational adviser must not only know the individual characteristics of the child but must investigate the special requirements of the occupations. Progress is being made in this latter direction, but much research remains to be done. It is work in which the doctor would seem to have an important part to play.

The method of formulating the vocational advice is not, and never will be, very exact. Vocational guidance will always remain an art rather than a science. The adviser soon discovers what has recently been called "the fallacy of the perfect niche." Usually there is no one occupation for which the individual is in all respects ideally fitted; and, when there is an ideal, the child is often unable for economic reasons to pursue it. Very often some sort of compromise is necessary. The aim is to survey carefully all the relevant data (the results of the special psychological inquiry being merely supplementary), and to assist the child towards a balanced judgement, so that his choice of work may be more rational and less hazardous than it might otherwise have been.

PSYCHOLOGICAL METHODS OF VOCATIONAL GUIDANCE

These, sometimes with and sometimes without medical collaboration, are now being practised in many countries, but there is an unfortunate dearth of published results such as might indicate the value of the procedures employed. In this country the National Institute of Industrial Psychology has made strenuous efforts to check the validity of its methods by "following up" the children examined and advised. There has recently been published an account of an extensive experiment which the Institute conducted some years ago among elementary school children in London.¹⁸ Six hundred children were advised and were followed up in their occupations, the follow-up survey including also a control group of six hundred who did not receive the psychologist's advice. The results, which have been confirmed by those of a more recent investigation conducted by the Birmingham Education Committee in collaboration with the Institute,¹⁹ clearly demonstrate the superiority of the psychological methods to those ordinarily used.

THE PERSONNEL IN TEAM WORK

There can be little doubt that the near future will see a widespread extension of these newer methods. How best to apply them on a national scale is a debatable question. It has been suggested that the psychological examination might be undertaken in the schools by specially trained teachers, supervised by an expert psychologist, who would be responsible for the direction of the work in a given area. Possibly the plan favoured on the Continent is the preferable one: here the work is commonly carried out by doctors and psychologists working together in a municipal vocational guidance office, close contact being maintained with the school staffs (and, in particular, the school medical officer) on the one hand, and with the local employers on the other. Certainly the doctor has an indispensable part to play, and the question of how he can most effectively contribute to the success of future plans of vocational guidance in this country would seem to be one which deserves the serious consideration of the medical profession.

The suggestion has been made that the general practitioner might undertake the work of vocational guidance.²⁰ That scarcely seems the ideal solution; the general practitioner usually lacks the time for such work, he lacks the training, and he may lack the temperament. Again, it is sometimes suggested that vocational guidance is essentially work for the psychiatrist, and there is much to be said in favour of that view.²¹ On the other hand, it is often objected that the psychiatrist, even more than most

specialists, tends to see things through distorted lenses; and it is certain that, to carry out the whole work of vocational guidance, he would require to be much more than a psychiatrist. Probably the team method is the ideal—doctor, psychologist, teacher, employer, parent, and child each playing his important part. Psychiatric assistance is most desirable, and, ideally, there should be a panel of medical and surgical consultants to whom children could be referred for special diagnoses. Certain special ear conditions, for example, may have an important vocational significance, particularly in relation to trades in which the worker is subjected to much noise.²²

CONCLUSION

Some general principles, which probably few persons would care to dispute, must be stated very briefly.

First, guidance for work should be supplemented by guidance for leisure, both because the psychological limitations of the job must often create a serious need for compensatory spare-time activities, and because the physical adjustment to the work must be affected by the manner in which the worker spends his energies outside the factory. The attendance of the parent at the vocational adviser's office would seem to afford an excellent opportunity for important measures of health education.

Secondly, it is of little use to give advice once. The child may not follow the advice (compulsion is, of course, out of the question), and the advice, when followed, will sometimes prove to have been ill founded. Some supervision of the juvenile worker is most desirable in order to facilitate the difficult process of adjustment to new conditions, to supply fresh advice when required, and to obtain, from the young worker's experiences, information which will be of service in testing and improving the methods of guidance employed. As Anderson²³ has shown, faulty work may not be due to any fundamental unsuitability on the part of the worker, and may call, not for a change of occupation, but for advice on personal troubles, the strain of which would render the worker inefficient in any occupation.

Thirdly, considerations of time prohibit the use in vocational guidance of tests other than those of a very general nature. In certain cases special tests should be applied at the place of work before the worker is engaged. This is commonly called "vocational selection," and it is an important supplement to vocational guidance. Two examples may be mentioned. A test of memory for numbers is desirable for prospective telephone operators, and tests of "idiosyncrasy," such as those used by Bloch²⁴ in the dermatological clinic in Zürich, might usefully be applied in factories where the work involves the handling of eczematogenous substances.

Fourthly, it may be important to advise older workers, especially those who have suffered serious accidents of injury and disease which cannot be foreseen at the adolescent stage. Indeed, vocational guidance should be a life-long service. A doctor recently reported to the writer the case of a man with myocarditis and bronchitis whose job consists in carrying heavy carpets about in a big store. As the doctor remarked: "The exertion doesn't help his heart and the carpet dust doesn't improve his lungs."

Finally, unhappiness and ill-health at work may be due to the fact that the employer or supervisor, not the worker himself, is a misfit. Vocational guidance must not be confined to the children of the labouring classes. In this country a limited amount of work has already been done in the guidance of public and secondary school pupils, with results which are distinctly promising.²⁵ An extension of this work is greatly to be desired.

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Memoranda

MEDICAL, SURGICAL, OBSTETRICAL

AURAL BACTERIAEMIA TREATED BY ORGANIC ARSENIC

As this case is recorded to show the therapeutic effect of organic arsenic in blood poisoning by *Streptococcus haemolyticus*, the reasons for the various operative procedures are not mentioned; they belong more to the field of the aural surgeon. For instance, the lateral sinus was opened on the fourteenth day after the Schwartze operation chiefly because the unsatisfactory temperature chart in the interval, culminating in a rigor, combined with the forward position of the sinus, inclined one to think that a subsequent thrombosis was possible.

The boy, aged 8, was a private patient of Dr. Helen Ewart. I was first asked to see him on January 9th, 1932. He had complained of severe pain in the right ear for two days. The tympanic membrane was bulging, and paracentesis was done the same day. The left ear was not affected. The boy had not been well since an attack of influenza early in December, 1931. All the rest of the family, six in number, had been similarly attacked at that time.

On January 21st Schwartze's operation was performed. The usual appearances of early mastoid disease were found. The lateral sinus was exceptionally well forward, and actually overlapped the posterior third of the antrum. The wall of the sinus, although healthy, must have been subjected to considerable pressure during the necessary process of opening up the antrum. On February 5th the lateral sinus was opened. It bled freely from both ends, torcular and bulb, and there was no visible thrombosis. On February 11th a specimen of blood was taken for culture. Dr. Smith of Preston reported a pure culture of *Streptococcus haemolyticus*.

Dating the commencement of his illness from the paracentesis, the position at the end of the fifth week and in the interval may be described as follows. During the whole time the temperature had ranged chiefly from 100° to 103° F. Only one rigor had occurred—namely, the day before the sinus operation. The pulse had not risen over 100. The boy did not look critically ill, and one hoped that things would settle down gradually. The treatment was chiefly symptomatic, with the addition of

scarlatinal anti-streptococcic serum at intervals. The serum treatment did not seem to do much good—in fact, on the whole, it seemed to weaken the patient. On February 17th he was much worse; the pulse rose to 140, and he looked as if he was going the wrong way. At this stage Dr. G. E. Loveday of Manchester was called in consultation, and the following is an extract from his notes, which he has kindly allowed me to publish:

"First seen on February 18th, 1932. Temperature swinging to 102° F., pulse 126. History of positive blood culture, *Streptococcus longus*; 0.05 gram novarsenobillon given intravenously, after blood had been withdrawn for culture, etc. Blood culture, February 18th: positive haemolytic *Streptococcus longus*; number of colonies per c.cm. uncountable—probably in the neighbourhood of 1,000 per c.cm. Phagocytic efficiency of whole blood, February 18th, 0.78. 0.1 gram of metarsenobillon was given intramuscularly on the morning of February 19th, the evening of February 19th, and the morning of February 20th. That afternoon (February 20th) the boy was seen by me and was distinctly better. Blood taken for culture was sterile. On February 23rd 0.1 gram metarsenobillon was given. The temperature rose rather higher after this, and the boy had some albumin in the urine. In consequence of this, and also to prevent the development of an anaphylactic state, scarlet fever antitoxin was given on February 24th, and also on February 25th. These doses of antitoxin appeared to have no beneficial effect, so on February 27th another dose of 0.1 gram metarsenobillon was given. Thereafter he made steady progress, and I believe no more metarsenobillon was given.

"The striking features in this case are the sterility of the blood forty-eight hours after an extremely heavy blood infection was found, the recovery from an infection of the blood with streptococcus which was so heavy that I should have considered recovery impossible from my previous experience, and the high phagocytic efficiency of the blood in the presence of a heavy infection."

After February 27th the temperature and pulse fell to normal, and remained so. Convalescence was uninterrupted. The mastoid wound and drum perforation healed in the usual way, with full hearing.

REMARKS

Most aural surgeons will, I think, agree that the majority of these cases of aural bacteriaemia tend to recover after several weeks of illness. During this period those in charge have a most anxious time. It is perhaps more difficult to avoid interfering too much with the natural resistive powers of the patient than it is to inject various drugs and serums. In fact, where active drug treatment has been pursued and the patient recovers, one cannot help feeling sometimes that the patient has recovered despite the active drug treatment. This boy, however, on February 17th was desperately ill, and was obviously going downhill. The marked improvement in the well-being of the patient within forty-eight hours of Dr. Loveday's treatment, combined with the absence of organisms in the blood at the end of that time, left no doubt in our minds as to what decided the issue.

Recent experimental work on this subject by Colebrook¹ is well worth perusal. He indicates the type of streptococcus which is most vulnerable to organic arsenic, the type of infection in which this treatment is likely to be successful, the variety of arsenical preparations which are most suitable, and whether the injections should be given intravenously or intramuscularly. Incidentally, this boy had had the tonsils and adenoids thoroughly removed three years previously. I am afraid one sees in recent years not a few similar cases—namely, serious ear infections in patients who have had tonsils and adenoids removed previously.

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