Present condition.—A well-developed, well-nourished girl, looking more than her age. Temperature 98.3°.

Alimentary system.—Lips pale; teeth, some molars decayed; tongue pale and moist; disagreeable taste in mouth; no appetite; marked thirst; complained of pain after taking two ounces of milk and lime water; the pain was increased by pressure and lasted a quarter of an hour. The pain was localised to a spot the size of a crown-piece, and the tenderness was manifested on very slight pressure. Bowels confined. Liver dullness, three inches and a half.

Circulatory system.—Apex beat in fifth left interspace, sounds normal. Pulse regular, rather weak, compressible (78).

Respiratory system.—Respiration 16; percussion and auscultatory signs normal.

Urinary system.—Urine 1012, acid, no albumen, sugar, or bile.

Generative system.—Has never menstruated.

Treatment.—Two ounces of milk and lime water, reduced next day to half an ounce every hour; the following mixture was ordered, to be taken three times a day,—five grains of sulphate of iron, one drachm of sulphate of magnesia, ten minims of dilute sulphuric acid, one ounce of peppermint water.

Progress of case.—This treatment was continued except that the dose of sulphate of magnesia was increased or diminished as found necessary, according to the state of her bowels.—Nov. 21st: No vomiting after the half-ounce doses of milk and lime water were instituted, but she complained of pain. One ounce of bread-and-milk every hour.—24th: Sick this morning; still in pain. A piece of lint soaked in liquor epispasticus applied to epigastrium.—27th: No more sickness; pain better. Ordered house diet.—Dec. 7th: Discharged cured.

The points in this case worth noting are—1. The history of other nervous affections. 2. The age of the patient, which is less than that at which gastric ulcer usually occurs. 3. The persistence and frequency of the vomiting, which followed everything, even water. As already pointed out, vomiting in ulcer of the stomach rarely occurs after every meal, and it is very exceptional to find the stomach so irritable as to reject all food. So much has this impressed itself upon me that I would ask you to pay special attention to this point. 4. The localisation of the pain, which is usually given as a sign of some value in ulcer of the stomach, but which evidently must not be too strongly relied upon. 5. The absence of hæmatemesis. 6. The beneficial effect of a small blister, so often observed in nervous pain. 7. The very rapid recovery of the patient under appropriate treatment.

If you will bear in mind the teaching of this lecture I have no doubt you will recognise the majority of cases of gastric ulcer that come before you, while you will also avoid the mistake of treating stomach neuroses too seriously; but I should not be doing my duty if I did not warn you that ulcer of the stomach may occur under quite different circumstances from those which I have told you are typical. About this time last year I saw with Mr. Pearse of Brierley Hill a gentleman who complained of pain in the right hypochondrium relieved by food. He was about fifty-three years of age, very careful in his habits, but a great worker and sometimes irregular in taking food. The pain was described as burning and as radiating down towards the anterior superior spine of the ilium. Physical examination revealed nothing. The case was regarded as one of gastrodynia, the diagnosis being based on the relief to pain by taking food and the absence of other indications. He improved greatly on a mixture containing hydrochloric acid and strychnine. During the winter he got very constipated, his pain returned and increased. Mr. Pearse saw him, and with some difficulty removed a lot of scybalous fæces from his bowel, but the pain continued, and he was said to have passed a gall-stone and to have been slightly jaundiced. When I saw him I heard this history, but I heard too that he had on two occasions vomited some coffee-grounds matter. I confess that I did not attach proper importance to this symptom. Relying on the history, I agreed in the diagnosis of biliary colic, and was greatly astonished to hear next day that he had died in the night, evidently from internal hæmorrhage. So far was I from recognising the true nature of the case, that I then believed that death was due to the rupture of an aneurysm which had previously leaked into the stomach. Yet a post-mortem examination showed that the hæmorrhage

had come from a simple round ulcer on the posterior wall of the stomach, near the greater curvature and midway between the cardiac and pyloric openings. This case does not show the consultant in a very favourable light; but our failures are often the most instructive as well as the most impressive cases. The points of interest are: (1) the seat of the pain, which was not explained by the position of the ulcer; (2) the relief to the pain after taking food, so directly opposed to what we should expect from an ulcer, though I have already told you that we had the same statement in another case (No. 1 in list); and (3) the absence of hæmatemesis until within a few weeks of the termination of the case. I need hardly remark upon the difficulty created by the statement that there had been slight jaundice, followed by the finding of a gall-stone in the fæces. Altogether it was a very puzzling case, and I hope you may not have many such to deal with.

Finally, I must say a few words about treatment, though you have already heard the details in the accounts of the cases submitted to you. As a general rule, I order at first half an ounce of milk and lime water every hour as the only food, with the sulphate of iron and magnesia mixture in purgative doses three times a day. Ziemssen and Leube use sulphate of soda or Carlsbad salt in purgative doses, with the object of removing all remains of food from the stomach; but I use this mixture simply to remedy the anæmia and constipation so generally present. If hæmatemesis actually occurs, or the patient is admitted with a very recent history of it, I order ice to suck, and feed per rectum for a day or two, and then proceed as before. When, as usually is the case, vomiting and pain cease under this treatment I double the allowance of milk and lime water, then change the diet to soft bread-and-milk, getting on through pounded chicken and custard and eggs to ordinary diet as rapidly as possible. The good results are attested by the table. It may be objected that these cases are not cured, but that there is only a temporary remission of the symptoms. I do not think this is true, although one case did undoubtedly relapse three times, as all these patients were made out-patients under me, and attended for a longer or shorter time, continuing to take the medicine. Had they relapsed it is most probable they would have reapplied for admission to this hospital, where, according to the rules, they would have been placed under my care. It may be thought that there is danger by this plan of exciting hæmorrhage or causing perforation, but I think this fear is sufficiently answered by the record.

Lecture

ON

KOCH'S TREATMENT OF TUBERCULOSIS.¹

By THOS. WHITESIDE HIME, A.B., M.D., &c.

DR. HIME stated that he had felt great reluctance in accepting the complimentary invitation of the secretary to deliver an address to the Society on the above subject—first, because he hardly felt competent to deal with so important a matter in the brief time available; and secondly because, so far as he could ascertain, everyone he met seemed to have his mind definitely made up with regard to the whole question. He had heard many medical men in Berlin, who had been treating cases of tuberculosis by Koch's method ever since the liquid was in use, say that they must postpone giving a definite opinion as to its merits until sufficient time had elapsed to make it possible to speak with certainty. But he had met only very few persons who had never seen a case at all who had not made up their minds, and who were not generous in imparting their conclusions on the subject. Professor von Bergmann said in his last lecture at Berlin that it might be January, 1892, before he

¹ Delivered before the Bradford Medico-Chirurgical Society. The lecture was illustrated by photographs thrown on the screen by a magic lantern, showing patients at different stages of treatment; and two patients suffering from lupus were also shown, which were under treatment.

would be able to pronounce his judgment, although he had treated a great number and variety of tubercular cases by Koch's method. But the writer in the *Eatonswill Gazette* was less timid. He did not hesitate to denounce the whole proceeding as a dangerous imposture, and to declare that where a person died under Koch's treatment the doctor who had employed it should be indicted for manslaughter! And such trash was read with avidity by the million, and unfortunately also by medical men sometimes. Was it any wonder that research in such departments of science was at the lowest conceivable level in this country when the press provided such instruction for the public? Even some medical men, after a day or two in Berlin, thought it becoming to write authoritatively to the lay press on the subject—some against it, others (equally incompetent) in its favour. However, as he had enjoyed special advantages for studying the whole subject while acting as Special Commissioner for THE LANCET, sent to Berlin to report, and had also had some personal experience in the employment of the method of Koch in his own practice, he would endeavour to lay before them such points as seemed to him likely to be of interest and value. His knowledge of the subject was mainly due to the opportunities afforded to him by the physicians and surgeons in charge of cases in Berlin, and he wished to say how greatly he and thousands of other medical men were indebted to their German colleagues for their never-failing courtesy and kindness. There was, indeed, no limit to the cordiality shown and the opportunities afforded for studying this most interesting and novel subject; and although it might seem invidious to name anyone as more distinguished than his colleague for this good fellowship, still he thought it right to give utterance to the common feeling of gratitude felt to Professor von Bergmann for his lavish expenditure of time and attention on importunate, and often inconsiderate, foreign medical visitors. The importance of the problem which Koch had undertaken to solve none would deny. It is nothing less than that of victoriously assailing the microbe of the most deadly of all diseases, and rescuing its victims already enfeebled by its deadly assault. Undoubtedly tuberculosis is the most terrible of all the diseases in the nosology, not only from the great number of its victims, but also from attendant circumstances. It was estimated that one-seventh of the human race perished annually from this cause alone.² The death-rate in England (1888) per million persons from phthisis alone was 1540; from tabes, 236; and from "other tubercular diseases," 406; the actual deaths from phthisis being 44,248, and from "other tubercular diseases" 18,434, or altogether 62,682. Against this may be set the whole class of zymotic diseases, which only caused 40,000 deaths, in order to see the relative magnitude of the fatality from tuberculosis, which attracts very little attention, and from zymotic diseases, which seem to absorb the whole energy and attention of sanitarians and of the public. If a death occurs from diphtheria or typhus fever in a street, what an excitement! The inspectors even of the Local Government Board are immediately set in action, and a report is soon presented to the authorities. Yet the total deaths in England in 1888 from typhus fever were only 160, and from diphtheria 4815, as against 62,682 from tuberculosis. The columns of the leading papers are frequently filled with alarming letters as to the prevalence of diphtheria, as evidenced by perhaps a dozen cases within a few weeks, and a score of deaths in a year in some locality; yet during the same period thousands have suffered and died from tuberculosis without even a passing comment from anyone.

The magnitude of the evils arising from the prevalence of tuberculosis was greatly increased by the terribly long duration of the disease, which caused its economic importance to be so much greater than that of almost any other disease, and by the fact that adults, the most effective portion of the population, suffered so largely. It was cruel

enough to see young children swept off rapidly by measles, whooping-cough, and other diseases, but it was far worse to see their parents and adult brothers and sisters slowly gnawed away by the relentless bacillus of tuberculosis. The modern discovery that the tuberculous patient is a source of infection to those around him during the long, weary years of his wasting disease, certainly has not robbed it of any of its terrors, although the discovery, no doubt, will ultimately lead to precautionary measures and protection for those exposed to the risk. Up to the present time it must be admitted that practically we had been helpless against tuberculosis. Medical science had devised little more than uncertain methods of giving general tone and vigour to the tissues of the patient by good food, air, tonics, exercise, &c., so as to assist it in resisting the inroads of the organism of the disease. It is unnecessary to particularise the extent of the success attained. But certainly no scientific method of contending against the disease had been even plausibly suggested until the present. Indeed, only a few years ago a distinguished authority gave a reason for the theoretical impossibility of devising a "protective" against tuberculosis—viz., the fact that one outbreak of tubercular disease does not protect against a second or further one.³ Suddenly, it may be said, all theories and opinions on this subject have been subjected to a rude shock, and in a most unexpected manner. The excitement and enthusiasm aroused by the announcement that Koch had discovered a successful method of dealing with tuberculosis have surpassed all similar occurrences. Within a few days of the announcement of the discovery thousands of medical men, including many of the most distinguished in every land, had abandoned their professorial and private work, and in the depth of winter were pilgrimaging to Berlin to see with their own eyes the new method in operation, and with a vague hope of bringing back some of the liquid for use at home. The goal set before himself by Koch was one very different from the other "protective" methods hitherto in use. Jenner had introduced to the world a method of preventing small-pox, which consisted in giving to a person an attack of a mild disease, analogous to, and probably identical with, small-pox.⁴ This artificially imparted disease protected against small-pox more or less completely, small-pox being a disease which rarely recurs in the same individual, and the preventive disease (vaccinia) having the same characteristic. The remarkable discoveries which were made by that great genius Pasteur in this realm of science depended for their success in protecting animals against certain diseases on the power to attenuate the virus of those diseases, to effect which he employed various means. The attenuated virus was sufficient, when inoculated on an animal, to give it a mild attack of the disease; and as it was one which did not usually recur, this one mild attack was found sufficient to protect the animal against a subsequent attack. The reality of the protection which Pasteur had been able to secure was indubitable, but it was not permanent in the case of all diseases. He had succeeded in attenuating the virus of fowl cholera by simply keeping it exposed to the air, while protected from other organisms. Inoculation with this attenuated virus was protective against the strongest virus. On March 21st, 1881, Pasteur, Chamberland, and Roux presented a memoir to the Academy of Sciences in Paris, showing how, by cultivating anthrax bacilli at 42° to 43° C. for a certain time, the culture might be inoculated on animals without serious danger, and afford them protection against the strongest virus. The animals became feverish and ill, but not seriously so except in a small proportion of cases. These great discoveries of Pasteur had been further worked out by others on the same lines, and "vaccines" had been obtained capable of protecting against several diseases. The duration of the protection obtained against rabies had been experimentally proved to be at least five or six years, as some of Pasteur's

² The commonly received opinion that generally phthisis kills most victims between the ages of five and thirty-five has been shown by Würzburg to be true only of the total number of deaths, but not true of the proportion of deaths to those living at various ages. He shows from large material that the highest mortality is of persons aged from sixty to seventy years (per 100 living of that age), and the lowest of persons from five to ten years (Mitt. aus d. Kais. Gesundheitsamt., B. ii.). In England (mean for 1871-80) the highest rate (3745 per million) occurred among persons of thirty-five to forty-five years of age; and the lowest rate (358 per million) among children aged five to ten years. Klebs (Allgem. Pathologie) considers this greater prevalence of phthisis in advanced age to be due to the generally diminished vitality of the cells, which yield to the attack of the tubercle bacilli more easily than at more vigorous ages.

³ Zum derzeitigen Standpunkt d. Lehre von den Schutzimpfungen. Von Prof. Naunyn. Leipsic. 1886.

⁴ There are the strongest grounds for believing that vaccinia may be imparted to the calf by inoculation of human small-pox. Hence vaccinia is to be regarded as variola modified by passage through a bovine; just as Pasteur and Thuillier attenuated the virus of swine Rothlauf by passing it through rabbits, whereby it was rendered harmless (and protective) to swine, though still continuing fatal to the rabbit. Similarly, Pasteur found that the virus of canine rabies passed through apes in series becomes gradually so attenuated as to lose the power of infecting dogs; while passage through rabbits in series greatly intensifies its activity.

protected dogs have resisted repeated efforts to infect them either by subcutaneous, intravenous, or subdural inoculation within that period. The anti-rabic method differed from all the others in that there was no evidence whatever of a morbid condition being produced in either men or animals during the production of the refractory state.

Koch's anti-tubercular method was something different from all these. He did not endeavour to protect against tuberculosis by giving a mild attack of that disease; nor did he seek to cure the disease by injecting a different form of bacillus, as had been done successfully by Emmerich, who injected the streptococcus of erysipelas as a protective against anthrax; and by Pawlowski, who successfully injected the pneumococcus of Friedländer with the same object. Koch injected a liquid, the nature of which had not been made known by him,⁵ subcutaneously, and produced an intense reaction thereby, but he certainly did not give the patient a mild attack of tuberculosis. The liquid contained no specific organism, certainly no living tubercle bacilli or their spores, attenuated or other. It undoubtedly did find out and produce a most remarkable series of changes in living tubercular tissue wherever it was visible, and there was every reason to believe that in other situations withdrawn from view the changes produced were similar to those seen in lupus, tubercular joints, and other more or less external forms of tuberculosis.

It seemed to be the general idea that Koch's discoveries on this subject were limited to having found out a substance for which he claims the power of destroying living tubercular tissue. But he has done far more than this. In the first place, in his address to the International Medical Congress⁶ he claimed *not* to have discovered such "a substance," but "substances" which are capable of checking the growth of the tubercle bacillus not only in the test-tube, but also in the animal body, without injury to the latter. The importance of this fact, that Koch has discovered more than one substance endowed with this property, should not be overlooked. For we have thus the possibility of utilising other substances than that which is known as "Koch's lymph," and possibly with as good or better effects. But another great fact has been so overshadowed by the curative aspect of the discovery as to have also been lost sight of—namely, the fact that Koch has been able to render animals refractory to inoculation with virulent tubercle. This discovery would have immortalised any other man; but seeing that Koch has also discovered how to stamp out tuberculosis in animals suffering from that disease, and that his method was being employed with a view to save human beings suffering from the same disease, people have quite lost sight of this other great discovery. We may happily congratulate ourselves that Koch has declared that his "work is not yet finished," and hope that other great discoveries will result from his continued activity. The power of successfully "vaccinating" animals so as to render them refractory to subsequent inoculation with tubercle has also been claimed by Richet of Paris. He had obtained immunity by means of injections of culture media of tubercle bacilli which had been sterilised by heating above 100° C. From two observers, working manifestly in different ways, we had thus obtained the same great result, the possibility of rendering animals refractory to inoculated tubercle. As an illustration of one practical application of this discovery, he would mention that he had been consulted by a gentleman as to the desirability of employing Koch's method as a prophylactic in the case of two children. They were orphans, not obviously tubercular, children of parents both recently dead from phthisis, the mother having been in an advanced state of that disease during her pregnancy, shortly after the termination of which she died. The proposal was one of great importance and interest, but he had hardly satisfied himself as to the answer to be given, though at present he thought that he ought to yield to the request which had been put to him, as these poor orphans, according to all experience, are most probably highly susceptible to tuberculosis.

Koch's liquid had been so frequently described, correctly

and incorrectly, that Dr. Hime would merely show it and let them judge of its appearance &c. The mode of its application was the same as that of any other subcutaneous injection. It was certainly desirable to use for this, as for all operations, sterilised instruments, and ones which were accurately graduated. Koch's syringe having no piston, was freed from one source of danger. The pistons provided with plugs of leather or other absorbent material were liable not only to retain dirt of various kinds, but also considerable quantities of potent drugs, such as morphia, which had been used. Further, everyone had found such pistons frequently dry and unusable when wanted. Koch's syringe was free from these disadvantages. It was important that the indiarubber ball should not be too thin and weak, and in using it one should be careful not to force air into the tissues; even if aseptic it might cause trouble. The accurate graduation of the syringe, when so powerful a substance as Koch's liquid was being injected, was a matter of the first importance. It was a tremendously powerful substance. An ordinary injection represented 0·001 mgr. of the liquid. He had it on the best authority that this probably contained only about one-thousandth part of active material, or about the fifteen-millionth part of a grain! Yet this infinitesimal fraction could set the whole body of a man weighing 15 st. in such a state of change that the whole was raised to a temperature of 104° to 105° F. The weight of the mass thus affected was infinitely greater than that of the active agent, the exact proportion being about 1 to 98,000,000,000! That extreme accuracy was needed in dealing with such a substance was evident, but the syringes in the market were certainly not all as accurately graduated as they should be. The lecturer could strongly recommend the syringe of Strohsehein, which had no piston or indiarubber ball, and was a marvel of ingenuity and cheapness. It was a pity that two different ways of describing the quantity injected had slipped into use, some persons giving the volume, or portion of a cubic centimetre used; others the weight in milligrammes. The latter seemed the preferable standard. The place selected for the injection was a mere matter of convenience. Koch had suggested the loose skin between the shoulder-blades and the lumbar region as being almost painless and otherwise suitable.

The noticeable results following the injection have been grouped together under the term "reaction." The reaction is a highly complex combination of phenomena, some local, and affecting only parts which are infected with tubercle, others indicating more a general affection. It was quite erroneous to regard the temperature as constituting the reaction, or even as being its main feature. There is usually no reaction whatever at the site of the injection. Frequently, even in cases of strictly limited lupus, where the lungs are perfectly sound, the earliest indication of the system being affected is a short, dry cough, which may come on as early as half an hour after an injection, even in persons absolutely free from pulmonary disease. It is more like the attempts of a person to cough who has no cough than anything else. It may be pretty constant and annoying, but generally is not sufficiently accentuated to be so. It rarely lasts longer than two hours or thereabouts, and it gradually subsides before disappearing. On the other hand, the local reaction affecting the parts where there is living tubercular matter may come on before there are any decided indications elsewhere showing that the injection is taking effect. This observation of Dr. Hime's harmonised with that of Dr. Lindner of Berlin, who says⁷ that general constitutional reaction is not always observed where there is local reaction. Dr. Hime had noticed very trivial general effects occurring long after the local reaction had come on, and when, in fact, it was passing off. Dr. Lindner is also of opinion that a general reaction never is observed in cases where there is no local reaction, but Dr. Hime could not confirm this. On the contrary he had seen general, without local, reaction occur. It may happen, indeed, that no reaction, either local or general, will follow the first small injection. Again, there may be none until several and increasing injections have been given, and then rather suddenly and unexpectedly there may be a considerable general and local reaction. This non-occurrence of a reaction after one or two, or even more, injections must not be regarded as indicating either indifference to Koch's liquid or the absence of tubercle. It is possibly due to the fact that for some reason the tubercular deposits are so situated and circumstanced

⁵ An account of its mode of production has been published by Koch since this lecture was delivered.

⁶ Aug. 4th, 1890; translated by T. W. Hime, M.D., and published by Baillière, Tindall, and Cox. Koch's own words are: "Ich habe schliesslich Substanzen getroffen, welche nicht allein im Reagenzglas, sondern auch im Thierkörper das Wachsthum der Tuberkelbacillen aufzuhalten im Stande sind." He adds, further on: "Wenn man sie [meerschweinchen] der Wirkung einer solchen Substanz aussetzt."—U. S. W.

⁷ Lecture delivered Dec. 8th, 1890, before the Gesellschaft. f. ü. Gesundheitspflege, Berlin.

that the injected material does not readily act on them, and that the products of that action, when established, do not readily enter the circulation. For it seems probable that the fever and many other elements of the state known as the "reaction" are due to the absorption of tissue disintegrated at the seats of disease by the influence of the injected "lymph" and taken up into the circulation. That similar general symptoms are induced by such an occurrence is familiar under other circumstances, notably high bodily temperature being thus induced. Depage of Brussels assumes that the injected material contains an agent, ptomaine or other, which combines with the ptomaine of the tubercle in

ever, showed no specific characteristic whatever. All these parts reacted markedly to the first and several subsequent injections. The small scar under the right eye, however, only reacted at one point, which shot up red and swollen from the surrounding white tissue. This would suggest the almost complete success of Mr. M'Gill's attempt to eradicate the disease at this point. Several small spots on the right upper eyelid reacted, and have since sloughed out and apparently healed perfectly. The same has occurred at the spot above the left side of the mouth. The place between the eyebrows swelled and became red, and this was repeated after several injections; but there has never been any formation

FIG. 1.

J. C.: Lupus of the face of seventeen years' standing. Before injection with Koch's liquid. (Under the care of Dr. Hime, Bradford.)

FIG. 2.

J. C. at the height of reaction, seventeen hours after the first injection of Koch's liquid (0.001 mgr.). (Under the care of Dr. Hime, Bradford.)

the blood of the injected person. The general phenomena of reaction he regards as being due to the introduction of this substance in the blood, and partially to its combination with the small quantity of tubercular ptomaine circulating in the blood. But only very exceptionally did the injected "lymph" produce reaction, except in tubercular atients.

The appearance of the reacting part is very peculiar and characteristic. In order to give those colleagues present who have not seen such as vivid an idea as possible of what great changes may occur, Dr. Hime produced on the screen two likenesses of a patient he was treating for lupus—one showing him before treatment, the other taken seventeen hours later, when he was in the height of local and general reaction, with a temperature of 103°. The features are greatly distorted, owing to the extensive swelling of the nose, upper lip, and part of the left side of the cheek, the eyelids, and the skin between the eyebrows, the parts affected with tuberculosis. The patient had been surgically treated for the disease at the Leeds Infirmary by the late Mr. M'Gill more than once. Under the right eye was a whitish scar, where he was last "gouged"; above the left side of the mouth was another cicatrix (neither very distinctly marked in the drawing). The two upper lids were red and puffed before treatment, and made him at first fear some kidney mischief might coexist, which was found to be the case. There was a roughened, reddish condition of the skin between the eyebrows, which, how-

of scab, and Dr. Hime thought that the disease, though undoubtedly present, was very limited and superficial. There was no local reaction whatever in any part of the patient's body, except those connected with the face.

(To be continued.)

REMARKS ON THE OPERATION OF ILEO-COLOSTOMY FOR ORGANIC DISEASE OF THE CÆCUM, CAUSING OBSTRUCTION.

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I WAS much interested in Mr. Bryant's able and instructive paper on "ileostomy" for organic disease of the cæcum, which appeared in the columns of THE LANCET of Jan. 15th. That such an operation as he describes may be the means of relieving some of the urgent and distressing symptoms of obstruction, as well as of prolonging life, cannot be disputed, but the question arises, by adopting such an operation, does the surgeon place his patient in the best obtainable position during the remainder of his life? It is on this point I wish to make a few remarks, and I