THE CROONIAN LECTURES ON THE HYGIENIC AND CLIMATIC TREAT- MENT OF CHRONIC PULMONARY PHTHISIS.

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LECTURE I.

Definition of Phthisis.—Infectiousness.—The Bacillus.—Differences in the Liability to Phthisis: Acquired and Hereditary.—Circumstances influencing the Prognosis.—Deplorable Condition of the Consumptive Poor in the Ordinary Hospitals.—Preventive Treatment.

MR. PRESIDENT, FELLOWS, and GENTLEMEN,—Drs. William Ewart J. E. Pollock and Andrew have delivered before you, in the course of the last few years, lectures on important points in the ætiology, pathology, and treatment of phthisis. I intend to confine myself as much as possible to the hygienic treatment in the widest sense, which includes the dietetic and climatic management. Graves said: "It is of great importance to know how to make a man phthisical, as, by pursuing an opposite line of conduct, we will be able to prevent it." In these words lies my excuse, if I do not altogether avoid questions of ætiology and pathology.

While the lectures of my predecessors to whom I have just alluded were full of scientific research, mine claim only a humbler place; but if I were only able to put the matter as I see it, before you and the profession in general, with sufficient clearness and force, I should hope to be fortunate enough to contribute a small share towards the development of a more energetic and somewhat more successful prophylaxis and treatment of phthisis, especially in the poorer, but also in the richer classes.

As the word phthisis has had different meanings at different times, and at the same time in the minds of different men, I must state what I mean by pulmonary phthisis, namely, a chronic disease of the lungs, with consolidation beginning almost always at the apex, having a tendency to caseation, softening, and the formation of cavities, or of fibrous changes; all these changes may occur in the same individual at the same time in different parts of the lungs, or may follow one another at different periods of the disease. These changes are endowed with infective qualities, and have a disposition to spread to the adjacent parts, and to become also disseminated over distant parts. They are mostly found associated with the tubercle-bacillus discovered by R. Koch, and they are intimately connected with, we might say, engrafted on, a state of malnutrition of the whole organism, and especially the cells and tissues of the lungs. I claim no originality for this definition, which is not exhaustive, and which I have given only for the purposes of these lectures. It is derived principally from the remarks made by Drs. Green, Wilson Fox, and others, during the discussion at the Royal Medical and Chirurgical Society on Dr. Percy Kidd's paper on the Distribution of Tubercle-bacilli in the Lesions of Phthisis. I exclude the lung-diseases often called phthisis, which are caused by mechanical irritation through inhalation of inorganic or simple organic dust, the different forms of bronchiectasis, chronic bronchitis, or emphysema, and heart-disease, chronic changes resulting from pressure on the bronchus, the diseases of hydatid origin, cirrhosis, empyema, and syphilitic changes of the lungs.

With regard to the infective power of the changes in the lung of phthisical subjects, they have been surmised long ago, even before the history of inoculation, which dates back at least as far as 1843, when Klencke made some experiments, which were almost forgotten when Villemin began his famous researches. The late William Budd, you remember, was perfectly convinced of the infectiousness of phthisis. On more than one occasion, when discussing the subject, he expressed his astonishment that the view of the infectiousness was not universally credited. Mr. W. Thompson, amongst others, has constantly insisted on the communicability of the disease. Possibly this view would not have been so generally accepted, even now, if the ideas of the profession with regard to zymotic diseases had not been gradually transformed by the researches of Pasteur, to whom the greatest praise is due, although

he was preceded in some points by Schwann, that type of the modesty of genius, and had not the marvellous results obtained by Lister's disinfecting processes acted as a stimulus to the germ-theory in general. Pasteur's intelligent and never resting industry paved the way to a number of other scientific observers and experimenters, as Davaine, Obermeier, Cohn, H. V. Carter, Cohnheim, Klebs, Wilson Fox, Burdon Sanderson, Baumgarten, Lister, Tindall, Tommasi-Crudeli, Klein, and others, so that Koch's discovery of the tubercle bacillus came to us like a long expected message.

Dr. Andrew especially dwelt on the importance of this discovery in his lectures on the Ætiology of Phthisis, where he justly said that "not many discoveries of equal importance have received such speedy and strong confirmation as that of the tubercle-bacillus."

Mr. Watson Cheyne has given a full, clear, and confirming account, based on visits to the Continent, and many experiments performed by himself. The literature on the subject in this country, as also in France, Germany, Italy, and America, is already very large, and has received an important addition by the paper already mentioned by Dr. Percy Kidd, and the discussion which followed it. In spite of the large array of authors and papers, however, we cannot say that we know all about the bacillus; by which term I understand not only the developed little rod, but also its spores, and the chemical poison which probably is originated by its development in the tissues in an analogous manner to that in which, according to the researches of Gaspard, Panum, Billoth, Burdon Sanderson, and others, a powerful chemical poison, sepsin, is developed in the process of septicæmia.

We have no doubt that the bacillus is intimately associated with phthisis, but the exact relations appear to require still further elucidation. It is, for instance, not quite clear why the tubercle-bacillus thrives in some persons and not in others; or why in the same persons it thrives at one time and not at another. It seems to be an acknowledged fact, that some micro-organisms do not grow in the living tissues of a living animal. Dr. Klein states this with regard to the "septic and zymogenic organisms properly so-called;" and explains their occurrence in diseased tissues during the life of the subject, by assuming that these tissues had become changed, by inflammation or otherwise, so as to become practically dead before the organisms could grow in them. By analogy, the question arises whether the tubercle-bacillus settles and grows in healthy living tissues of the body, or only in pathologically altered tissues. We know that it thrives in the bodies of most warm-blooded animals when inoculated; but this does not prove that it will find a *nidus* in a healthy tissue when merely brought into contact with it by the surrounding air. The first point which we have to consider is, that the air which we inhale perhaps does not so often contain the fully developed bacillus as is supposed by many people, for this microbe does not thrive in the air at the usual temperature, but requires, according to Koch, a temperature approaching that of the human body. Its growth entirely ceases below about 82° Fahr., and above 107°, and it thrives best at about 98° to 100° Fahr.; while other pathogenic microbes have a much wider field; for instance, the anthrax-bacillus, which grows luxuriantly between 67° and 74°, and up to 110° Fahr. A further point against the spread of the tubercle-bacillus out of the animal body, is that it does not form spores in the air, while the anthrax-bacillus does. Another peculiarity in the life of the former is that it grows slowly, that it requires as many days for its development as the anthrax-bacillus requires hours. This circumstance seems to diminish our danger considerably, for we may presume that a bronchial mucous membrane, when healthy, materially assists the expelling act of expiration by its ciliary functions. We are, however, less secure when, by catarrhal or inflammatory conditions, the mucous membrane of the bronchi, and especially of the smallest divisions, is deprived of its protecting surface, and when the respiratory acts are imperfectly performed, especially the expiration, thus allowing the stagnation of impure air in the alveolar spaces, and permitting the bacilli and their spores to develop themselves under circumstances most favourable to them.

This leads me to another subject in the relation of bacilli to phthisis, which appears not finally settled, namely, the chronic affections of the apex, which are usually regarded as incipient phthisis. Every one of us has seen numerous cases of this kind, characterised by some degree of dulness, mucous rhonchus, and more or less pyrexia, at one time or other. Many of these cases are followed, after a shorter or longer time, by an extension of the disease to other portions of the lung, and by a fatal termination. Not a few cases, however, become arrested and retrogressive, and ultimately, to all appearances, cured. These apparent cures are not always permanent; but, after intervals of four or six months, or some years, a similar affection is started again, either in the same or in the other apex, or in both, and may rise into fully developed phthisis, or be again arrested. In looking over my

notes, I have found eleven cases in which the arrest or cure has now lasted from five to twenty years, without a relapse, so that the cure may be regarded, with some degree of assurance, as permanent. What was the nature of these cases? Were they bacillary or non-bacillary? I cannot answer the question with any degree of certainty, as the bacillus was not known at that time, and only its constant absence in the sputa could have pointed with probability to the non-bacillary character of the affections.

I am inclined to believe, first, that some of the apical affections which I have seen were non-bacillary, or, in other words, the result of chronic catarrh and inflammation, without the presence and influence of bacilli, while the greater number were complicated by the presence of the parasite, and partly caused by the latter; second, that non-bacillary cases are apt to become bacillary, by the settling of the bacillus in the diseased cells and tissues; third, that bacillary cases may, under favourable circumstances, become non-bacillary. The recent discussion, already referred to, at the Royal Medical and Chirurgical Society, has not cleared up the question. Dr. Wilson Fox, in his philosophical remarks, told us that we ought not to be too quick in accepting all which the new views of the bacillary origin of phthisis required, considering that the pathology of tuberculosis had biennially, triennially, or quinquennially, been swayed by histological dogmata. Dr. Green, on the other hand, seemed more thoroughly to accept Koch's discovery, as being in perfect harmony with our older views, and his (Dr. Green's) definition of phthisis. He questioned the existence of pretubercular consolidation of the apex, which term may perhaps be understood as equivalent to non-bacillary consolidation, which I have used above. He appeared, however, not quite certain on this point. In some cases of disease of one apex, he said, where there was no evidence of softening and disintegration, it was difficult to say whether they were tubercular or not.

I have been told that it is imprudent to discuss, in our present state of transition, the question of the treatment of phthisis; but I do not quite share this opinion. If we could hope that, by further acquaintance with the nature and life of the bacillus, we could, at an early date, ascertain a method of attenuation of the tubercle-virus for inoculation, or find means of destroying the bacillus and its spores, either in the air we breathe, or in our tissues, or discover substances by which, without injury to ourselves, some slight alteration in the chemical constitution of our cells and tissues could be effected, which would render the thriving of the bacillus impossible, I should certainly wait; but I do not think that we are justified in entertaining such hopes for the near future, although the discovery of some such means does not appear to me at all impossible. We are not so well off as surgeons with regard to keeping off the entrance of spores into wounds and sores. The ingenious respirators invented by Tyndall and Frankland are certainly not without practical value, but their use will, I fear, never be general; and when once the system is infected, we do not yet know of parasite-killing remedies, which in effective doses would not injure the host together with the parasite. Even the surgeon, when once pyæmia or septicæmia is established, has hitherto found himself powerless to arrest the progress of the disease by means of antiseptic remedies administered internally. He even has great difficulty in disinfecting an external sore when complicated with sinuses. I well remember a conversation with Sir Joseph Lister on this subject, when he held out no hope that we might, at an early date, succeed in disinfecting an infected lung. The conversation to which I refer, occurred some years ago, but I have no reason to believe that Sir Joseph has altered his views since then. Although, however, we possess no direct means of destroying the parasite, we need not despair of doing good, by placing persons under circumstances in which they are less liable to become infected, and when infected, more able to limit the progress, and to effect a more or less perfect and more or less permanent cure. We know that the reputed cause of danger, the tubercle-bacilli or their spores, exist in many localities; and that yet, fortunately, the majority of people remain free from tubercles, and some become infected only after some accident, some lowering influence, mental or physical, or some catarrhal inflammatory affection of the respiratory organs, or some febrile disease, as measles or whooping-cough, or typhoid fever. There is some reason for the inference that, under such depressing influences, the resisting power of the body, and especially of the lungs, becomes impaired, and that thus the pathogenic germs are more likely to find a nidus for their development. This diminished resistance thus produced constitutes the complex class of *acquired predisposition*, which may be transitory or permanent. Our duty is, to prevent the occurrence of this predisposition, and, when it is formed, to remove it by improving the state of nutrition. And a further duty is to prevent, during the existence of this acquired predisposition, the risk of infection.

There is, besides, an equally large, if not larger, class of persons who have *hereditary predisposition* to phthisis. We must avoid entering on the exact nature of this heredity, whether it consists, as Professor Sée, in his very interesting work, *Phthisie Bacillaire des Poumons*, argues, in direct transmission of the virus from parents to offspring, or whether only in the transmission of certain predisposing defects. But we shall, under the head of "prophylactic treatment," return to the consideration of the duties which the existence of heredity imposes on us.

Before I enter on these duties, I must say a few words about prognosis, and endeavour to meet the gloomy views which many medical men still entertain. That anyone can hold the opinion that phthisis is incurable, is almost incredible; as not only older medical authors, but many of the most experienced living men, have pronounced distinctly hopeful views. The words of Carswell should be sufficient. "Pathological anatomy," he says, "has perhaps never afforded more conclusive evidence in proof of the curability of a disease, than it has in that of tubercular phthisis." Instead of saying that the prognosis of phthisis is almost always bad, I would, on the contrary, say that it is frequently hopeful. Every one of us has, I doubt not, often met with this proof in making *post mortem* examinations of persons who had died of other diseases. The instructiveness of most of such cases, however, is greatly diminished by the fact that the conditions of the person at the time when the attack had occurred are unknown, as also the circumstances under which the cure had taken place. As a great interest is attached to cases whose history is known, I venture to give you a short sketch of a case in which I had the opportunity of witnessing two separate attacks of phthisis, terminating in recovery, and finding the remains of the lesions, by *post mortem* examination, seven years after the second recovery, when death had occurred from typhoid fever with perforation.

C. M., aged 21, with a history of phthisis on the part of his father, came under observation in July 1867, on account of hæmoptysis. He had previously had attacks of "bronchial catarrh," as he called it. There was dulness, with crepitant rhonchus, over the left apex down to the fourth rib, and also on the supraspinal region. The right side was free; he had moderate pyrexia, and loss of flesh. With rest in bed and on sofa, with open windows, light cold food, and ergot of rye, the bleeding soon ceased. There was subsequent general improvement after removal to Weybridge, where he was ordered to be, during the greater part of the day, in the pine-forest of St. George's Hill; he was obedient to take frequent meals and cod-liver oil, with small doses of arsenic. He was then advised to spend ten or twelve months at Davos or St. Moritz; but, as this advice was described by an authority, who was separately consulted, as due to my "cold-loving idiosyncrasy," C. M., having found an engagement at Cape Town, went thither. At that place, he was disagreeably affected by the wind and dust, and was, therefore, sent to the high ground amongst the Boers, where he spent six months of the cool season on several farms at elevations of between 4,000 and 6,000 feet. Being constantly in the open air, with abundant exercise on horseback and walking, he entirely recovered, and was afterwards for some years at Cape Town and in the neighbourhood, in perfect health. In January 1873, after a year's residence in Paris and London, he was again seized with hæmoptysis. The apex of the left lung had remained free, showing only slight dulness and flattening, and occasionally a dry crackle, but no moist rhonchi; while the right apex was in an analogous condition as the left had been in 1867. Under a similar treatment, he again improved; and, being a good sailor, he went on board a sailing vessel to Valparaiso. On the voyage, the cough almost subsided; but at Valparaiso, where he began office-work, it became worse, and he was advised to carry out my previous suggestion to spend a year at Jauja, in the Peruvian Andes, whence he returned to Valparaiso in perfect health. In 1878, I had the opportunity of examining C. M., when on a visit to Europe. The former flattening and dulness over the left apex had disappeared; the breathing was only somewhat harsh, with prolonged expiration; but over the right apex there were slight dulness on percussion, some flattening, and harsh long expiration. He was able to bear any amount of fatigue, but no confinement to close room and office-work. I did not see him again till he came, in August 1881, from Italy and France, with well-developed typhoid fever of a moderate type, without any lung-complication. He had almost recovered, when, at the end of the fourth week of the disease, he committed, against strict advice, the imprudence of eating a rather large quantity of grapes. Perforation of the lower part of the ileum took place within twenty-four hours, from a sore which had been in fair progress of healing, almost all the other patches being already healed. There were cretaceous patches in the apices of both lungs, and also in the lower lobe of the

right lung, with the often described changes in the surrounding tissues.

Whether these two attacks of phthisis were bacillary, and if so, whether the encapsuled cretaceous and semicretaceous masses still contained bacilli and spores, are questions which naturally offer themselves. If the bacilli and their spores can retain their life for years in such encapsuled masses, then it is very possible, as has been suggested by others, that the fresh attacks of phthisis which occasionally occur, after years of apparently perfect cure, are in some cases due to self-infection from the escape of imperfectly shut up parasites. A case lately published by Dr. Neuwerk, of Tübingen, tends to show that bacilli may really exist in such old encapsuled masses. The main points of the case are these. A ranger in a healthy district of Prussian Silesia, who served in the Franco-German war of 1870-71, in perfect health, and passed in 1875 a medical examination as a good life, suffered in 1877, during six months, from cough, anæmia, emaciation, and a general feeling of illness; he recovered, however, while continuing his open-air duties, and then remained well for several years, till cancer of the stomach developed itself, from which he died. The post mortem examination disclosed in both apices, which were contracted and puckered, cretaceous masses of different consistency, and also caseous nodules, in one of the latter of which Dr. Neuwerk found well-developed bacilli, after having searched in vain for a long time. He ascribed the phthisical changes in the lungs to the illness in 1877.

Dr. Neuwerk's case and the one related by myself have this in common, that indubitable attacks of phthisis were cured by what may be called "open-air treatment," and that death occurred not from phthisis, but from other diseases.

These cases, if we had no other proof, would in themselves be sufficient to show that phthisis is sometimes cured, and I do not hesitate to repeat that it is often cured.

There is nothing more baneful than the idea that phthisis is incurable. It shuts out all honest attempt to do everything possible, and to make every sacrifice to promote arrest and cure. I well remember in my student's time, when phthisis was considered as mostly incurable, how the name of the disease was withheld from the patient's knowledge; how depressed he became when he found it out; how he regarded himself doomed, and sometimes killed himself by poison or debauchery. I remember also the joy amongst the younger medical generation, and the public, when a more hopeful view developed itself, and the readiness to submit to every sacrifice and to long expatriation, with a fair chance of recovery. I will not mention the names of the living men who have worked in this direction, but I cannot help paying a tribute to the memory of Graves, Carswell, Archibald Smith, Addison, and Felix Niemeyer.

The portions of lung which are already destroyed before the treatment has commenced cannot be restored; but experience has shown to us that life, with a fair capacity for work and for enjoyment, can be maintained after a loss of a good part of the lungs, and that the remaining part, if sound, can be rendered capable of doing the ordinary life-work of both entire lungs; though it must always remain unfit to perform the extraordinary duties which can be occasionally demanded from the combined power of both lungs in perfect health.

That even the presence of a cavity does not preclude a cure, more or less complete, all the best observers of England, and many of the Continent, have proved. The phenomena of cavities have been carefully studied by Dr. C. T. Williams, Dr. Douglas Powell, and especially by Dr. William Ewart, whose Gulstonian Lectures of 1882 contained the fullest account of the pathology of cavities with which I am acquainted. In some cases, the formation of a cavity, as Professor Jaccoud and others have pointed out, is even favourable, provided the infectious contents can be thoroughly evacuated, and a fibrous zone of demarcation be established between the cavity and the surrounding healthy tissue. The tendency to fibrous change in this, as in all other processes of phthisis, is one of the most powerful agencies towards prolongation of life, and, in many cases, towards arrest and cure of the disease.

There is a species of constitution, which does not fight well when attacked by any serious disease, and especially by phthisis. I cannot satisfactorily define this complication of anatomical and physiological peculiarities of cells and tissues, and nerve-functions, which our old physicians, especially in Germany, used to call "erethic constitution." A slight injury, or a slight course of irritation, produces constitutional effects, especially pyrexia, quite out of proportion, and the effects do not readily disappear. The equilibrium of health is not easily regained. The pulse is generally rapid, the appetite varying, the mucous membrane irritable, sleep imperfect. This constitution is always associated with a certain degree of asthenia, sometimes patent, sometimes masked. For the sake of brevity, we might use,

I think this term when referring to the constitutional peculiarities just mentioned. The general treatment, and especially the climates most useful to other consumptive patients, are not easily adapted to this constitution. The prognosis of the developed disease is bad. Prophylactic treatment is imperative.

A most important point in the prognosis is the degree of intelligence and judiciousness of the patient, and, in many instances, of the patient's friends. The delicate or sick persons, who have an insight into their own condition in the wider sense of the word, and into those influences which act beneficially on them, and those which act injuriously, have a better chance of recovery than those who are less intelligent, who do not see the bearing on health of all the numerous items of daily life, most trivial in appearance, but all-powerful in their accumulated action.

A circumstance of equal importance is the possession of means, to carry out the most suitable treatment. No other disease demands so many, and as long continued, sacrifices, as phthisis; and those who are able to make them have, as a rule, a greater chance of recovery than those who cannot. The poor deserve our greatest sympathy. While, in the majority of other diseases, the ordinary hospitals place the poor almost under the same favourable conditions as the rich at their homes, this is by no means the case with phthisis. On the contrary, the majority of general hospitals are very ill adapted, and the well arranged special hospitals for the treatment of consumption have accommodation only for one sufferer in thousands. I wish, gentlemen, I could induce you not only to see this in the same light that I do, but also to use your influence with the public gradually to fill up this great gap in our philanthropic institutions.

Preventive Treatment.—In discussing the treatment of phthisis, it is impossible to restrict ourselves to that of the developed disease, and to pass over the prophylactic or preventive treatment. The latter is, indeed, in many cases, all that gives us any chance; for in some constitutions the disease, once established, runs a rapid course to the end, or, at best, cripples the patient for life; and many of those endowed with better constitutions do not possess the means to submit to treatment which often must be extended over many years.

The question of preventive treatment has been ably discussed by many authors, Drs. Mc Cormac, Pollock, Jaccoud, and Rühle, amongst others, and quite lately, in a comprehensive way, by Ewald, in his address to the International Medical Congress at Copenhagen.

Some of the questions relating to the prevention of phthisis ought to belong to public hygiene and state medicine; for instance, whether to destroy cows affected with tuberculosis; whether to permit the flesh and the milk of such animals to be consumed; the hygienic arrangements in school-board schools, the playgrounds connected with them, and the superintendence of the games; the number of school-hours; the condition of factories, and the work at factories; the buildings for the accommodation of working people and their families, the barracks, etc.

The questions of infectiousness and communicability of phthisis are not yet sufficiently settled to lay down prophylactic rules with regard to them, but they ought to be carefully and calmly investigated in all their bearings. I have only to deal with them in the preventive sense, not as ætiological questions; but both cannot be quite separated. Dr. Andrew has fully discussed them in his Lumleian Lectures, and, though we may not in all points agree with him, his reasoning, based on historical data and personal experience, deserves thoughtful examination. There is in Dr. Andrew's discussion no sign of a feeling which is so apt to intrude itself unconsciously on the inquirer, and sometimes to influence his judgment. I have, for instance, heard from intelligent men the view that it would be cruel to shun the consumptive, who is already much afflicted; to check the intimate intercourse between him and his nearest and dearest friends, or to render his condition intolerable, and promote the fatal termination of his disease, by not allowing him to marry. If we could be sure that, by allowing intimate intercourse and marriage, the disease could not be spread, it would certainly be cruel to give pain; but, if experience and investigation should teach the opposite, then judgment ought to have precedence before feeling.

We are, I suppose, all convinced that infection can take place by inoculation; and this may possibly occur more frequently than is thought. Several instances are recorded. I remember, just now, two occurrences. The first is related in a communication by Dr. Lindmann in the *Deutsche Medicinische Wochenschrift*, 1883; two children, who were circumcised by a man who was in the last stage of consumption, and who, after the circumcision, sucked the prepucce according to the Jewish rites, became both infected with ulcers at the prepucce, and swelling of the inguinal glands; and the ulcers had the appearance of

tuberculous ulcers. One of the children recovered after some months; in the other, the glands became ulcerated, and caseated masses were removed from them. The child then apparently recovered, but, in the third year, it perished from Pott's disease and rapid phthisis. The second occurrence is recorded in the *Berlin Medicinische Wochenschrift* of 1878. The midwifery practice in the small village of Neuenburg was pretty closely divided between two midwives. One of the two became consumptive in 1874, and died in July 1876. Ten children, without hereditary predisposition, attended by this midwife between April 1875 and May 1876, died within the first seventeen months of their lives; while none of those died who were attended by the other midwife; and tubercular meningitis is a rare disease at Neuenburg. The consumptive midwife was in the habit of sucking the mucus from the mouths of the new-born children, and of blowing air into the mouth when there was the slightest sign of asphyxia.

It is not impossible that more cases of inoculation will be observed when once general attention is directed to this point. I remember two cases, which I am now inclined to explain in this way, though, at the time of their occurrence, I had not done so.

The first was in a wet-nurse, who nursed a consumptive child. She first had an ulcer at the side of the tongue, which was regarded as due to a rough tooth, which, however, did not heal after the tooth had been filed, and was not cured by borax and other local applications. Several months later she lost her voice, and ultimately died from phthisis. I am inclined to think that a slight sore on the tongue had been inoculated, and formed the starting-point of phthisis in this woman, who was free from hereditary disposition.

The second recollection relates to a mother who nursed a consumptive daughter, fifteen years old, with whom she shared the same bed, and whom she constantly kissed. She likewise had, first, a sore on the tongue, and afterwards on one of the tonsils, before she manifested any signs of pulmonary consumption. But in this case, the mother belonged to a somewhat tainted family, and her husband had died from phthisis. Although she had been apparently quite well before she nursed her daughter, yet she may have had latent phthisis before the sores on the tongue and tonsil made their appearance.

On the question of the contagiousness of phthisis, the views of medical men will probably remain divided for a long time to come. The facts brought forward by Drs. Theodore Williams, Pollock, and Andrew, are very encouraging, and we may be sure that phthisis is not in the same way communicable as scarlet fever and small-pox are. But we must bear in mind that there is more intimate intercourse between husband and wife, and near relatives sleeping in the same room, and even the same bed, with consumptive persons, than between nurses, or medical men and patients; and that, besides, the hygienic arrangements at the Brompton Hospital, and at some of the best general hospitals, are much better than those of many of the small houses. Since I read a paper "On the Communicability of Phthisis between Husband and Wife" at the Clinical Society more than ten years ago, I have not met, in my own practice, with any such striking cases as those which I then related, so that I am happy to think that they are rarer than it seemed to me at that time. But I remain convinced, from clinical facts, of the communicability of phthisis under certain circumstances; and the experimental researches of Tappeiner, Veraguth, and Schäffer ought not to be forgotten.

In preventive medicine, therefore, the infectious character of phthisis ought to lead to certain precautions, of which I can mention only the most salient. Persons afflicted with consumption, for instance, especially the subacute forms, ought not to be allowed to perform offices by which breath, or saliva, or sputa are brought into close contact with healthy, and still less with very young or weak diseased people, or persons with an acquired or inherited predisposition. Not without reason, physicians have forbidden kissing between consumptive patients and other persons; but this prohibition recalls to my mind a beautiful German poem by Scheffel, in which a famous tomat, a prince of cats, watches from his throne high up on the roof the doings of mankind, and soliloquises on that trait of human nature, to kiss one another, especially in the time of youth. From this poetical cat's cogitation, I infer that kissing is a part of man's nature, and nature, I fear, cannot be stopped. "Naturam expellas furca, tamen usque recurret."

The secretions and excretions of consumptive persons, and the wearing apparel, bedding, etc., soiled by them, especially the expectoration, should be disinfected and carefully removed. Woollen articles of furniture ought also to be avoided or frequently changed for disinfection. No dust ought to be made in sick-rooms or wards, as the microbes are likely to be moved about in this way. The cleaning of rooms and furniture by a dry process of sweeping and dusting ought,

therefore, to be forbidden. Ventilation of the sick-room ought to be most abundant, not only for the sake of the sick persons themselves, but for those in contact with them; and the latter ought to be much in the open air, and attend to their health by all other means, in order to keep up their power of resistance.

It is our duty to prevent, as far as lies in our power, the marriage of consumptive persons, and even of persons who, though not actually consumptive themselves, belong to families with a strong consumptive taint. We must, at all events, endeavour to convince those with whom we come into professional contact of the importance of this duty; but, notwithstanding all this, our advice will often be disregarded; and those who know the meaning of the wonderful word love, and its equivalents in other languages, cannot be astonished at it.

Failing in the prevention of marriages, we must direct our attention to the management of those affected with hereditary tendency. The infants of consumptive mothers ought never to be suckled by the latter, but ought to have perfectly healthy wet-nurses, or, if this be impossible, they ought to live on milk from sound cows, or donkeys, or goats, during the first year—boiled, if there be the slightest cause for suspicion as to purity; and milk ought to form, during the first six years, the principal article of food, and ought only gradually to be in part substituted by other animal food, with an admixture of farinaceous and green vegetables. I quite agree with Dr. Duckworth's remarks in the *Practitioner*, on the insufficient use of milk as an article of diet in England, with regard to children as well as adults; and these remarks would be still more applicable to other countries. Those who have been in the country districts of Italy know how difficult it is to obtain milk. The child ought never to sleep in the same room, and still less in the same bed, with the consumptive parent or any other consumptive person. The child's room ought to be large, with plenty of light, in a southern or south-western aspect, with abundant ventilation by day and by night. Whatever we may think of Dr. Henry Mac Cormac's explanation of the origin of consumption by the "breath rebreathed," it must be acknowledged that pure air is the best means to prevent consumption; that he has pleaded in favour of it in a more eloquent way than any other author; and that his teachings ought to be accepted much more universally than has hitherto been the case. The temperature of the room ought not to be too high, 65° Fahr. being quite sufficient for the very young, and 62° for somewhat older children, and less in the sleeping-room. The skin ought always to be covered with flannel, the clothing warm and loose; there should be daily sponging, with gentle friction. The temperature of the water used is to be gradually lowered, 60° Fahr. being sufficient after the second year. The child ought to be taken out into the open air for several hours every day; and, later on, it should spend the greater part of the day in the open air. If it can be arranged, the house ought to be in the country, on a dry slope with sunny aspect. Active exercises ought to be encouraged at an early period, and to be gradually increased as to duration and activity of movement; games, gymnastics, rowing, riding on horseback, climbing, and all kinds of exercises by which the muscles and the organs of circulation and respiration are brought into play, and, as a consequence, the nutrition of the body is improved. Mental education need not be neglected, but ought to go on, and can go, hand in hand with sound physical education; but confined rooms and sedentary habits ought to be vigorously avoided. No trade or profession ought to be permitted which insists on or induces such habits, or which exposes the delicate person to dust or tainted air; but farming, sea-faring, and other open-air occupations ought to be selected. The period of cessation of growth, and the first year succeeding it, require special attention. But how can this be applied to the children of the poor? I am afraid that I must say that this is one of the problems not yet solved, and perhaps not to be solved in the very near future. Let us, at all events, lay down these principles for the guidance of those who have influence on the nursing and education of the children of the poor, and some improvement, we may hope, will gradually be achieved, and is often achieved already now, in individual cases and in well arranged orphan asylums. With regard to schools, too, we can demand the best hygienic arrangements and playgrounds attached to them, and gymnasia and drilling masters.

Every one of us has, I suppose, met with instances which prove how much can be done by judicious physical education, even under apparently hopeless circumstances; yet you will pardon me, I hope, gentlemen, if I relate to you the outlines of a very instructive family-history. About thirty years ago, I saw a lady affected with rapid consumption, living in a small street near Bloomsbury Square; the husband, a teacher of languages, had just died under my care at the German Hospital, of chronic consumption, at the age of 38. He was

a member of a consumptive family. The wife's family, too, was by no means free from consumption; indeed, out of three brothers and two sisters, two brothers and one sister had already died of the disease. She herself had had seven children, between the ages of 12 and 1. The second of these had died from tubercular meningitis. The others, namely, four boys of 12, 9, 7, and 2 years, and two girls of 5 and 1, were fairly healthy, excepting the youngest boy, who was pale and rachitic. After the death of the mother, some relatives, intelligent and wealthy at the same time, took entire charge of the children. They took them to their home in a mountainous district of Silesia, one of the healthiest parts of Germany, and brought them up on the plan which I have just sketched. The oldest son remained well so long as he took much out-door exercise; but, at the age of 23, he became wrapped up in the study of the origin and affinities of languages, worked day and night, gave up exercise, took most of his meals in his study surrounded by books, and perished from rapid consumption in less than eighteen months. The second son took to farming, and was in excellent health up to the age of 29, when he found his occupation not remunerative enough, and began to work in a commercial house, being confined to an ill ventilated office during the greater part of the day, and working besides this at home, with the hope of gaining a better position. After scarcely two years of this intensified city-work, he had several attacks of hemoptysis, and died in less than two years from the outset. The third son has become a cavalry soldier, leading a judicious life, and is a strong and healthy looking man. The fourth child, then a girl of five years old, is now a country parson's wife in a healthy part of Silesia, has no children, and is perfectly healthy. The youngest son, rachitic as a child, has become a powerful man, and is a farmer near Manitoba in Canada; and the youngest daughter, staying with him, is likewise strong and healthy. The history of this family is very instructive; it shows that, by favourable circumstances, even a strongly marked family tendency may be neutralised; and this becomes still more manifest when I add that by far the majority, namely, nine out of eleven, of the cousins of these children have died from consumption before the age of 28. It further teaches the serious lesson that, if the stringent rules of health be neglected, even after the constitution has become satisfactorily developed, the disease may suddenly show itself, and run a rapid course. My experience, indeed, forces me to say that a strong hereditary tendency, especially from the mother's family, requires the strictest attention, not only during the first thirty years, but from infancy to old age, for old age does not shelter from phthisis. I have notes of several cases where, with a healthy mode of living, the health had been perfect up to fifty, and phthisis was developed afterwards, and under unhygienic influences. Thus, for instance, C. M., with a consumptive history on the mother's side, was perfectly well as a sailor up to the age of 52, when, on account of a chronic and fatal disease of his wife, he retired from the service, and, while nursing her, was much confined to the house for many months. Dyspepsia and phthisis developed themselves, and he died at the age of 56. A. D., likewise with consumptive tendency from the mother, enjoyed good health as a traveller for a commercial house, till, at the age of 54, he exchanged this occupation for office-work as a partner in the house, and lived altogether in town. His health began to fail after a year, and he died before he was 59.

I could mention other similar instances, and have also had the opportunity of seeing repeatedly "consumption" as the certified cause of death in life-insurance cases after 60, where insurance had been effected late in life, in spite of hereditary disposition, because it had been thought that, at so advanced an age, the office might be secure with regard to the development of consumption; but I am convinced that where the hereditary predisposition is much marked, there is only that "security" of which the great poet says:—

"And you all know security
Is mortals' chiefest enemy."

Altogether, there seems to be no good foundation for the general impression that consumption is rare in the later part of life. Dr. Sommerbrodt found, in twenty-five *post mortem* examinations of military pensioners, eleven times tubercular lesions as the cause of death, the average age at the time of death being 82. Dr. Würzburg found, on comparing the number of deaths at certain ages from consumption with the number of persons of the same age living, that, in the Prussian monarchy, phthisis is decidedly a more frequent cause of death among the old than among the young; thus he gives, amongst 10,000 persons living:—

93 deaths from phthisis in the period of age from 60 to 70			
nearly 68	"	"	50
only 41	"	"	30
" 30	"	"	20

At Copenhagen, likewise, according to Lehmann, the death-rate from phthisis to the number of persons living at the same age, increases with advancing years up to the age of 75. There is, however, in this respect, a difference between different countries, and in England and France, for instance, the death-rate is greatest between 15 to 35. It is not easy to say what is the cause of this difference. It may be partly due to a difference in the names given to the diseases in the different countries; thus, in England the number of deaths from "lung-disease" in old age is proportionately greater than in Prussia, while that of "phthisis" in old age is smaller. It is possible that some cases, which in England are certified as "chronic bronchitis," or other "lung-disease," would receive in Prussia the name of phthisis. But part of the difference may be accounted for by the fact that, during the much colder winters in Prussia, old people are more confined to narrow, ill-ventilated, stove-heated rooms, than is the case in England, where the cold is never great, and where open fire-places do not allow the air to be vitiated to the same degree.

The preventive treatment of the acquired predisposition to phthisis is similar in principle to that of the hereditary predisposition; but it generally is not required for the whole of life, but only for a shorter or longer period. The preventive treatment must be varied according to the constitution and the circumstances of the individual, the causes which have produced the predisposition, and the system or part of the body principally weakened. You will not wish me to enter into details, but allow me briefly to discuss a few points only.

A fruitful source of phthisis is the tendency to catarrh of the respiratory mucous membrane. It is not to be treated by confinement to hot rooms, and by avoiding the open air, but, on the contrary, by hardening and by accustoming the delicate person, clothed in flannel, but not loaded with clothes, to constant exposure to the air in almost all weathers, by walking, driving, riding in open carriages; by abundant, though judicious, ventilation of the rooms; by regular sponging of the skin, at first tepid, perhaps with vinegar, afterwards cold, and by friction; and by strengthening the whole system by nutritious food, and by frequent prolonged changes to the sea-side, or the mountains, according to the nature of the constitution. These frequently recurring catarrhal affections may form predisposing causes in different ways, especially by producing sore places in the mucous membrane, and thus allowing the bacillus to settle; or by weakening the epithelial cells of the mucous membrane, and their ciliary action; or by causing imperfect breathing from unconsciously avoiding deep inspirations, in order to avoid coughing, or by weakening the nutrition and energy of the whole system. The latter element is powerful, and by no means rare. Many persons remain excessively weak for a long time after a so-called "severe cold," and lose entirely their appetite, and their inclination to exercise and to work. I have repeatedly observed this, to a limited degree, in myself. A fortnight, or even a month, after the beginning of a general cold, a short run, or a walk of five or six miles, causes a sense of fatigue, perspiration, and great acceleration of the pulse; and a walk of twelve or fourteen miles a marked rise of temperature, of which there is no trace at other times; and the pulse is sometimes for weeks, in the evening, unnaturally rapid, without rise of temperature. It is possible that this general weakness is connected with imperfect energy and imperfect resisting power of the epithelial cells of the alveoli, or would lead to it, if it were not checked by judicious management. The tendency to imperfect breathing which often accompanies protracted colds, is best remedied by judicious exercise, even if it cause, at first, fatigue. Persons presenting the imperfect development of the thorax, often described as the "paralytic form," and the general appearance known by the term "phthisical habitus," whether hereditary or acquired, demand similar management to those subject to constant catarrhs. The imperfect development of the thorax specially requires pulmonary gymnastics, deep inspirations, alternating with complete expirations; breathing with raised arms, in order to allow free entrance of air into the apex; and judicious climbing of hills and mountains.

It is not only our duty to remove the acquired disposition, but also to prevent the acquirement of it by physical education, general hygiene, and by the management of acute diseases, especially those which affect the respiratory organs, as measles, whooping-cough, diphtheria, bronchitis, pneumonia. The broad rules laid down by Dr. Wilson Fox in his article, "Pneumonia," in Dr. Russell Reynolds' *System of Medicine*, relieve me of the duty of further entering on this subject. But, with regard to measles, diphtheria, and whooping-cough, I cannot help pointing out the injurious influence of hot rooms and fear of ventilation, to which I have been repeatedly obliged to ascribe a share in the cause of phthisis. Change of air to mild sea-

side, or fairly braeing inland, places, is often important during the convalescence from these diseases, but the fatigue of long journeys is to be avoided.

Preventive medicine has a very large field in the subject of phthisis. I need only remind you of the change in the mortality from phthisis of soldiers and prisoners by improved ventilation in barracks and prisons; and we must always have before our minds the important discovery of Bowditch and Buchanan, that drying of the soil by drainage diminishes the mortality from phthisis. The practical application requires no words.

THE GULSTONIAN LECTURES, ON MALIGNANT ENDOCARDITIS.

Delivered at the Royal College of Physicians of London, March, 1885.

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LECTURE II.

Symptoms.—In considering the symptoms of endocarditis, it is important to bear in mind the manifold conditions under which the disease may develop. A limited number of cases may be grouped together as forming a primary substantive disease; but in the great majority the affection is either an associated pathological state, or is of the nature of a secondary malady arising in the course of some other disease.

In the primary cases, individuals in perfect health may be attacked, or, more frequently, the disease affects those with chronic valvular endocarditis, with perfect or failing compensation. Where the affection occurs after an injury, or in the puerperal state, the cardiac condition must be regarded as part of the general sepsis, and is of the same nature as the pyæmic foci and the inflammation of serous membranes. The existence of the endocarditis in these cases has no special influence, and the phenomena may be just as marked without it.

When the endocarditis supervenes in the course of some particular disease, as rheumatism or pneumonia, it is usually a secondary process, though indeed it may be regarded as directly produced by the causes which have excited the original diseases.

The different modes of onset, and the extraordinary diversity of symptoms which may arise, render it very difficult to present a satisfactory clinical picture. The general symptoms are those of a febrile affection of variable intensity, which may be ushered in, like any acute fever, with rigors, pain in the back, vomiting, headache, etc. Arising in the course of some other disease, there may be simply an intensification of the fever, or a change in its features. The pyrexia is constant, but variable in type and intensity, and more likely than any other symptom to lead to misinterpretation. Prostration of strength, delirium, sweating, and other signs of severe constitutional disturbance, are usually present.

Cardiac symptoms may be marked from the outset; pain, palpitation, sense of distress, and murmur; in many instances, there has been old valvular disease, but in a considerable number of cases the heart-symptoms remain in the background, hidden by the general condition, and giving no indication; or they may be so slight, that they are not even detected on special examination.

The embolic processes give a special prominence to local symptoms, which may divert attention from the general malady. Thus delirium, coma, or paralysis may arise from implication of the brain or its membranes; pain in the side and local peritonitis from involvement of the spleen; bloody urine and pain in the back from affection of the kidneys; loss of vision from retinal hæmorrhages; and suppuration in various organs, or gangrene, from the distribution of emboli.

So diverse are the features of malignant endocarditis, that a consideration of the symptoms is greatly facilitated by arranging the cases in groups, according as they display special characters. Dr. Kirkes, in 1852, called the attention of the profession to the occurrence of a typhoid-like condition in acute endocarditis, and he subsequently pointed out the fact that inflammation of the valves might

lead to pyæmia. The investigations of Charcot and Vulpian (*Gazette Médicale de Paris*, 1862), of Virchow (*Gesammelte Abhandlungen*), of Jaccoud (*Nouveau Dictionnaire de Médecine*, etc.; art. Endocarditis), and others, gradually led to the recognition of these two great types of the disease. Of late, still further separation has been made of the cases with features closely resembling ague or intermittent, and also of cases in which the cardiac symptoms are most prominent; and I shall call attention to certain cases in which the symptoms are those of an acute affection of the cerebro-spinal system.

And first let me direct your attention for a few moments to those cases in which the endocarditis is merely a part of a septic or pyæmic state, the result of an external wound, a puerperal process, or an acute necrosis. Somewhat over 18 per cent. of the cases I have analysed were of this nature, the majority of them occurring in connection with puerperal fever, 11 per cent.; the others in association with various wounds and injuries, or acute necrosis of bone. The puerperal cases appear most frequent after abortion, and the first symptoms usually develop within a week or ten days of delivery, beginning with rigors and fever, and running a course not essentially different from ordinary puerperal septicæmia or pyæmia without endocardial complication. Sometimes, the onset of the symptoms may be much delayed, and the patient up and about her duties when the attack comes on. Usually, there is local inflammation of the uterus or ligaments; membranous-diphtheritic-endometritis, and phlebitis, are common. Occasionally, there may be no special affection of the generative organs, as in a very severe case reported by Dr. Moxon (*Pathological Society's Transactions*, xxi), in which there was extensive endocarditis of the right heart, and sloughing patches in the lungs. The woman had been delivered within the month, and the uterus appeared in a state normal for the period. The endocardial lesions are not necessarily ulcerative, but may be vegetative, and occasionally suppurative. It is very evident, from the records, that valves with sclerotic changes are most often affected. The visceral lesions are always suppurative, but do not appear to be more numerous than in cases of puerperal sepsis without endocarditis. The heart-symptoms may be completely masked by the general condition, and the attention may be directed to them only by the occurrence of embolism. In this connection, it may be remarked that malignant endocarditis may attack pregnant women, and run a rapid course leading to abortion. In two cases of this kind, Litten (*Charité Annalen*, Band iii, Berlin) found no differences in the clinical features or anatomical condition, as regards valves and metastases. In other instances, there may be the rigors, sweats, and irregular fever, leading to abortion, without the occurrence of any suppurative foci, as in a case reported by Guyot (*Bulletin de Soc. d'Anatomie*, 1879). Dr. Trueman, of Macan, New Brunswick, has also sent me notes of a case which developed during pregnancy.

The cases of ulcerative endocarditis in traumatic and operative septicæmia are of a similar nature, but do not appear to occur so frequently as in the puerperal condition. Many of the cases occur after very slight injuries, as paring a hangnail, or a corn, a sloughing pile, or the passage of a sound through a stricture. There are usually suppurative infarcts in the lungs; and, even with extensive ulcerative changes in the left heart, the pyæmic foci may be all in connection with venous system and right heart. This was well illustrated in the case of a man, aged 25, who was admitted to the Montreal General Hospital, May 31st, with a wound of the radial artery. Phlebitis followed, and cellulitis of the arm, rigors, septic pneumonia, thrombosis of the femoral vein, and symptoms of pyæmia. At the necropsy, there were numerous foci in the lungs, and a suppurating thrombus in the femoral vein. The mitral valve presented, on the ventricular face of the anterior segment, a patch, of the size of a sixpence, swollen and greyish white in colour, and opposite to it, on the auricular face, was an ulcer big enough to contain a small pea. There was another also on the wall of the left auricle. There were no infarcts in the arterial system. In these cases of puerperal and traumatic septicæmia, the right heart is more frequently affected than in any other group of cases. Thus, of the thirty-seven cases of this kind, there were thirteen in which the tricuspid or pulmonary valves were involved.

In the acute necrosis of bone or acute osteo-myelitis, a secondary endocarditis may develop; and in some instances the clinical features may strongly resemble malignant endocarditis, as was well illustrated in the case of a lad, aged 10, who died after an illness of less than a week's duration, characterised by high fever, rigors, sweats, etc. No local trouble was complained of, and at the *post mortem* examination there was ulcerative endocarditis of the right side, and a purulent focus in the septum; and it was only after the most careful search that the primary trouble was found in a small spot of acute necrosis of the tibia.