

The Schorstein Lecture

ON

SYPHILIS AND ANEURYSM.

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COULD he have been asked, I am sure the good clinical physician to whom this hour is dedicated would have chosen to keep alive in this hospital which he loved so dearly the tradition of his name by an annual lecture; and he would have felt it peculiarly fitting that the official representative in medicine in his old university, of which he was so devoted a son, and which he remembered so generously in his will, should have been selected as the first lecturer.

Amid the tragedies of professional life two seem darkest—the young man full of hope cut off in the springtime of promise, stricken in the very forefront of the battle as it began, by sepsis, typhoid, tuberculosis or diphtheria. Scarcely less poignant is our grief at the loss of a man who has spent the strong years in gaining for himself a distinguished position, and just when everything has prospered in his hand, and he is entering after the long struggle upon well deserved honours and rewards, the "blind fury" snatches him away. Such was the fate of our friend Gustav Schorstein, the memory of whose service to the profession and to this great charity is to be commemorated in this most appropriate way.

There are those who see only dark clouds lowering on the horizon of the newly opened twentieth century; but already within its first decade we may boast of three achievements of the very first rank, each illustrating in its special way the spirit with which humanity is tackling its eternal problems. The dream—no, the carefully thought-out plan—of Leonardo da Vinci has been realized in the conquest of the air; the final tribute to the enterprise and endurance of man has been paid at the North Pole; and a Sphinx has been forced to break the silence of four centuries.

Syphilis has been one of the great riddles of the race. For generations it shared with malaria the peculiarity that we knew the cure without knowing the exact cause. As prevalent to-day as a century ago, problems of its origin and prevention have remained insoluble. In one direction our knowledge has widened greatly: it added terror to an already terrible disorder to know that such implacable and cruel foes as locomotor ataxia and general paralysis of the insane, to say nothing of a host of less important affections of the nervous system, were of syphilitic origin. And now, after long years of patient research, the riddle of its origin has been read, and the brilliant work of the much-lamented Schaudinn has opened a new and hopeful chapter in the history of one of the greatest of human scourges. Already the discovery has placed in our hands a means of diagnosis, early and late, which cannot fail to add efficiency to our treatment.

The fact that the germ belongs to the spirochaetes has deepened the wide interest in a group of parasites the enormous importance of which we are just beginning to realize. Already attention has been called to the remarkable similarity in certain clinical features of one of the most representative of protozoan diseases—namely, sleeping sickness—with syphilis, the spirochaetes of which are believed to be very closely related to trypanosomes.

I said that a new and hopeful chapter in the history of the disease had been opened by the discovery of the cause, and a full warrant for such a statement is to be found in the experience of the past twenty-five years with tuberculosis and malaria. Let us ask ourselves, Where do we stand to-day in respect to syphilis? Where is its place in the hierarchy of the infections? The cold figures of the last Registrar-General's report for the year 1907 tell the tale. The great preventable diseases which head the mortality bills are tuberculosis, pneumonia, whooping-cough, influenza, measles, and diphtheria. Syphilis appears low down, credited with only 1,658

deaths. But this is not even a half-told tale. Syphilis kills in three ways and at three periods. Almost without exception the acute infections spare the child *in utero*, but this one takes a heavy toll of the unborn, and we may estimate that of the unnumbered, and as yet unregistered, stillbirths, more than one-half are due to it. The 1,658 deaths in 1907 form a second group; a majority were in children under 5 years of age, but practically all succumbed to the direct lesions of the disease, and this group alone appears in the register under the heading of syphilis. But it is not with syphilis as with other infections, most of which come in sharp assaults, and once defeated the enemy retires; though it sometimes happens, as in typhoid fever, hostile soldiers settle down in a harmless symbiosis, and in tuberculosis it is more often a protracted truce than a final victory.

But the worm that never dieth and the fire that is never quenched express in simile the only too frequent story of the syphilitic infection. And this chronicity and intractability appear to be a special feature of all protozoal disorders. Who can say when a case of amoebic dysentery is cured? Ask an old Mississippi doctor how long it takes to rid the body of the malarial parasite, and he will shrug his shoulders.

The full extent of the ravages of the pox has only been realized of late years, and to appreciate its dignity and rank among the killing maladies we must add from the Blue Book for 1907 a third great group—the 2,332 dead of general paralysis, the 584 dead of locomotor ataxia, half at least of the 1,983 dead of paraplegia, half at least of the 2,279 deaths recorded as softening of the brain, and perhaps a fourth of the motley group recorded as "other diseases of the nervous system." This brings the deaths in England and Wales to above 6,000, and gives syphilis the sixth place in the hierarchy of diseases due to specific germs. And yet we sometimes hear the remark, "syphilis is not a killing disease"!

There remains to be considered another affection, the association of which with syphilis has been long under discussion. There died of aneurysm in Great Britain and Wales in 1907 1,140 persons—199 females and 941 males, the largest proportion coming in the middle period of life. How many of these had syphilis? Is there no way to prevent this large mortality? These questions may now be asked pertinently, since, as I have already remarked, the new researches have led to new methods of diagnosis, and they should enable us to settle once for all the vexed problem of the rôle played by syphilis in producing arterial disease, and more particularly that of the aorta.

Historical Summary.

The story of the association of aneurysm with syphilis takes us very far back and into very good company. There are three periods in the growth of our knowledge. The older begins with a very shrewd observation of the father of modern surgery, Ambroise Paré—I quote from the second English edition (London, 1634, page 287), which is practically the same in the original edition published in 1561: "The aneurismaes which happen in the internall parts are incurable. Such as frequently happen to those who have often had the unction and sweat for the cure of the French disease, because the blood being so attenuated and heated therewith that it cannot be containd in the receptacles of the Artery, it distends it to that largeness as to hold a man's fist; Which I have observed in the dead body of a certain Taylor, who by an Aneurisma of the Arterious veine suddenly whilst hee was playing at Tennis fell downe dead, the vessell being broken; his body being opened I found a great quantity of blood powred forth into the capacity of the chest, but the body of the Artery was dilated to that largeness I formerly mentioned, and the inner Coate thereof was bony. For which cause within a while after I shewed it to the great admiration of the beholders in the Physitions Schole whilst I publicly dissected a body there; the whilst he lived said he felt a beating and a great heate over all his body by the force of the pulsation of all the Arteryes, by occasion whereof he often swooned."

Vesalius, to whom we are indebted for the first recognition of internal aneurysm, does not mention syphilis as a possible cause; but his contemporary, Fernelius, mentions the coexistence: "Venus vénérien forme des aneurismes dans les arteries."

The Italian physicians at the end of the seventeenth and beginning of the eighteenth centuries were really the first to lay great emphasis on the syphilitic origin of aneurysm. Morgagni, *facile princeps* of clinical pathologists, in Letter LXIV of the *De sedibus et causis morborum*, speaking of sudden death, refers to syphilis as the cause of a great number of disorders of the heart and arteries leading to it; and in the letters descriptive of the diseases of the heart and arteries one is impressed with the frequency with which syphilis is mentioned; and in one place he specifically states that the disease predisposes to aneurysm.

Lancisi, the distinguished Roman physician, whose celebrated work on aneurysm was published after his death, in 1728, went even so far, in his thirty-second proposition, to discuss the signs, etc., by which we may recognize *Aneurysma gallicum*, or the aneurysm due to the French disease, the popular name for syphilis. It is evident from his description that he recognized quite clearly the relation of the two diseases, though neither he nor Paré felt quite certain how much was due to syphilis and how much to the mercurial cure. The writers of the early part of this century gave very little attention to the subject. Neither Scarpa nor Hodgson laid any special stress upon syphilis as a cause; and how completely it had become a negligible quantity is best attested by the scant reference in Broca's large work on aneurysm, 1856, by far the ablest contribution of the period.

The second period embraces the latter half of the last century, during which the subject of visceral syphilis was thoroughly studied. Dittrich, Steenberg, Wilks, Lancereaux, Laveran, and others called attention to the frequency of arterial lesions in syphilis; but it was the medical officers of the British army who forced the recognition of the part played by it in aneurysm upon the attention of the profession. Unfortunately, many of the communications were buried in Annual Reports, which never had the proper recognition, such as the work now receives in the *Journal of the Royal Army Medical Corps*. In 1862 Assistant Surgeon Lewer¹ reported a case of aneurysm of the thoracic aorta in a soldier, aged 25, suffering at the time with secondary syphilis. There were four cup-shaped aneurysms of the arch with cicatricial changes in the vessel. Professor Aiken, of the Army Medical School, in the third edition of his textbook (1866), states that in 26 syphilitic soldiers who had died during four years, 17 presented changes in the aorta, "cicatricial-like loss of substance of the inner coats, small local dilatations of the artery, and in several cases aneurysmal expansions, one as large as an orange, which proved fatal."

A very important communication was that by Inspector-General Lawson,² in which he pointed out the great frequency of aneurysm in the army, and its increase at Aldershot from the millesimal ratio of 0.25 in 1860 to 1.68 in 1868. So far as I can see, he was one of the first to recognize clearly the independence of aneurysm of the ordinary atheromatous changes in the arteries. His conclusion is worth quoting:

It would be going too far to discard the influence of this degeneration altogether, but certainly aneurysm, as I have met with it among soldiers, seems frequently to exist quite independent of that form of disease of the arteries, and destruction of large portions of even the whole three coats may take place by an acute process, and without a trace of atheroma in the neighbourhood.

Myers,³ while recognizing the influence of syphilis, was not inclined to regard it as a very important cause of aortic disease. But so far as the army was concerned the question was definitely settled by Francis H. Welch, at the time Assistant Professor of Pathology at Netley. Read before the Medico-Chirurgical Society, November 23rd, 1875, his paper⁴ remains the most important communication on the subject in English. He dwelt upon the recognition by military medical men of the influence of syphilis in causing vascular lesions, and supported this belief by a study of 34 fatal cases of aortic aneurysm at Netley. The average age at death was 32, the youngest 26. In 5 cases the aneurysms were multiple. In 64 per cent. the arch was involved. In at least 50 per cent. there was a definite history of syphilis. He combated the view that the disease bore any relation to chest constriction, or arterial obstruction, but he emphasized that the ground-

work of aneurysm was laid in the aortic disease, and remarked that:

While no dilatation need ensue under ordinary arterial pressure or such as might be present under civil exertion, yet under the forced exertions, with chest constriction, of army exercises, it would be difficult to understand how such a crippled tube as a degenerate and weakened aorta could resist the extra-internal pressure.

Welch recognized macroscopically the form of aortitis now regarded as pathognomonic of syphilis. It differs, he says, from the nodular form, as the lining of the aorta is thrown into wrinkles with the cicatricial-like puckering and internal roughness. The two fundamental propositions deserve to be quoted, as his study has scarcely received the consideration it deserves:

1. That the aneurysmal tumours are associated with, and preceded by, a diseased condition of the contiguous layers of the internal and middle coats of the vessel—as a tissue growth, terminating in degeneration—which, by impairing the elasticity and contractility of the walls, allows of their expansion and dilatation under the tension of normal arterial blood pressure, or this abnormally increased by any cause.

2. That these two forms of textural derangement of the aorta are dissimilar in origin and causation; that the limited passive opacity is connected with long-standing diseases of various kinds, inducing a diminished vitality of the system at large; that the structural growth is in the major number of instances associated with syphilis, and in a minor degree with rheumatism and alcoholism, as causations; hence it follows that, or the latter phase is the commencement of that pathological sequence of events under one aspect terminating as aneurysm, the means for the prevention of the aneurysmal tumour must be essentially directed towards the elimination of the special exciting agencies.

These quotations serve to show how completely the army surgeons were convinced of the immense importance of syphilis as the prime factor in the causation of aneurysm. These views did not have a very warm reception. I may be permitted to quote part of a recent letter from Colonel Welch, an old student of this school, who regrets very much that he cannot be with us to-day:

The only individual who gave me the slightest support in 1876 was Sir James Paget, and since then one or two others have written giving me their experience, but for long after, as could be seen in the narration of annual cases in the professional journals, there was a dead set against my deductions.

Still there were a good many exceptions, and the view has gradually gained acceptance; and in 1894 Goodhart made the strong statement that "It is sufficiently near the truth to say that women never have aneurysm except they have had syphilis." Virchow and others in Germany, Jaccoud, Lancereaux, Verdie, Vallin, Laveran, and Huchard in France, were strong supporters of the syphilitic view. The Dublin physicians, whose contributions to the subject of aneurysm have been so important, described many cases associated with syphilis. Tufnell⁵ reported a case of a man aged 19, in the early secondary stage of syphilis, who after a sudden strain felt faint, and had a pain in the abdomen, and shortly after presented signs of an abdominal aneurysm.

Sir Samuel Wilks⁶ was the first in this country to recognize the importance of syphilis in arterial disease, and in his well-known paper he described the characteristic syphilitic arteritis of the cerebral vessels, and he mentions that above an aneurysm of the abdominal aorta in a young prostitute were structures resembling gummata. In 1868 Sir Clifford Allbutt studied the histological changes in the arteries in a case of cerebral syphilis, and in 1874 Heubner published his well-known researches.

Naturally the remarkable benefit which followed the use of potassium iodide suggested the syphilitic character of the aneurysmal lesion, a view which was strongly supported by Fournier, Vallin, Verdie, and Bramwell.

The past thirty years have been very fruitful in researches on the lesions of the aorta and their relation to syphilis. I cannot do more than touch upon one or two landmarks in the literature which is given with great fullness by Benda in the *Verhandlungen der Deutschen pathologischen Gesellschaft* (1904), and in Lubarch and Oster-tag's *Ergebnisse* (1904). The sum total may be said to be the recognition of a type of aortitis if not peculiar to, at least most commonly found in connexion with, syphilis, and which forms the anatomical basis of a large proportion of cases of aneurysm. Quite recently the definitely syphilitic nature of certain of these lesions has been

demonstrated by the discovery of spirochaetes. Helmstedter,⁷ a pupil of von Recklinghausen's, appears to have been the first to recognize that loss of the elastic fibres by rupture and necrosis was the essential histological change at the basis of aneurysm. You will see by these figures in his original paper, which I pass round, the characteristic fracture of the elastic laminae, and the infiltration in places with embryonic cells. In the plate which he gives of the first part of an aorta is figured very well the depressions and grooves which follow rupture and atrophy of the elastic fibres of the media. While he does not appear to have recognized these lesions as due to syphilis, we must give him the credit of the earliest description of the changes which are regarded now as most commonly due to this disease.

In 1875 Köster, discussing the relation of aneurysm and arterio-sclerosis, maintained that a special inflammation of the media, mesarteritis, should be regarded as the primary cause of aneurysm.

In 1877 Heiberg described the miliary gummata in the media, and Laveran shortly after spoke of the islands of embryonic cells as minute syphilitic gummata. The most fruitful contributions were from Heller, of Kiel, who with his students, particularly Döhle, described the sclerotic, cicatricial type of aortitis, with its characteristic macroscopic appearance, as peculiar to syphilis. The microscopic changes were very much those reported by Helmstedter and Köster. The great work of Eppinger, 1887, one of the most exhaustive ever written, and a series of papers by Thoma in *Virchow's Archiv*, emphasized still further the great importance of lesions of the media. Coats and Auld, of Glasgow, made valuable contributions to the histological changes in aortitis. The Scandinavian physicians appear to have long held the belief in the intimate association of syphilis and aneurysm, and the monograph of Malmstens⁸ is largely devoted to the sclero-gummatous aortitis which he believed to be specific, and which he found in 80 per cent. of 101 cases of aneurysm.

The most important recent discussion on the subject was at the German Pathological Society in 1903, introduced by Chiari, whose very able study supports strongly the view that syphilis stands in close causal connexion with a *mesaortitis productiva*. Following a very thorough critical summary of the literature, Benda supported this view; and in the general discussion that followed, participated in by a large number of the most distinguished of the German pathologists, the same view was maintained. Only Marchand held that the majority of aortic aneurysms depended upon the common form of arterio-sclerosis, though he did not deny that the sclerotic variety, which he believed was caused by syphilis, also favoured aneurysm formation.

Of more recent papers, that of Aitchison, which appeared in vol. ii of the *Archives of the Pathological Institute* of this hospital, strongly supports the view that there are two distinct pathological processes in the aorta—the one degenerative, characterized by proliferation and subsequent necrosis in the intima, and by degeneration in the media (the ordinary atheroma); the other inflammatory, characterized by round-cell infiltration of the adventitia and media with destruction of the muscular and elastic elements, a mesaortitis which in a majority of cases is of syphilitic origin.

Brockbank, in a study of 182 cases of aneurysm *post mortem*, found 16 in which syphilitic lesions were present in other organs; in 19 additional cases the lesions were suggestive of syphilis. In 87 syphilitic subjects aneurysm was found *post mortem* in 18 cases.⁹

The surgeons of the British navy have from time to time contributed individual reports of cases of aneurysm associated with syphilis, and Fleet Surgeon Bassett-Smith has recently reported¹⁰ the figures from the *post-mortem* room at Haslar—25 aneurysms in 300 bodies.

The subject has entered a third phase in which, with the new methods of diagnosis, the specific nature of the arterial lesions has been demonstrated, and the characteristic serum reaction detected. Several observers—Schmorl, Reuter, Benda, and Klotz—have described the spirochaetes in the lesions in the aorta. J. H. Wright,¹¹ of the Clinical Laboratory of the Massachusetts General Hospital, has found the parasites in five cases of aortitis, one of which was associated with aneurysm. In a personal communication, he states that he has found the organisms

in two other cases. He has very kindly given me a microscopic section, in which I think you will be surprised to see the large number of parasites, though as a rule they were present only in small numbers. Dr. Wright's well-known reputation in this field of research gives to his work a very special value.

With an improved technique the results with the Wassermann reaction have become more and more trustworthy, and its enormous importance in the whole group of late syphilitic affections is now generally recognized. Syphilitics sometimes present two or more of the late lesions in combination; thus the association of aneurysm, and still more frequently of aortic insufficiency, with locomotor ataxia is well known; or a man may have tabes, aortic insufficiency, and aneurysm. The Wassermann reaction has been found in many of these cases. Citron¹² has tested it in 19 cases of aortic insufficiency, 11 of which gave a positive reaction. Of the 55 cases of this lesion examined during four years, there was a definite history of syphilis in 10.9, a probable history in 25.4 per cent. If all those were included with inequality of pupil, or absence of pupil or patellar reflexes, the percentage reached 36.3.

Collins and Sachs¹³ have tested the Wassermann reaction in a number of cases of cardiac and vascular disease, which was positive in 5 cases of aneurysm, and in 10 of 13 cases of aortic valve disease. In 6 of 9 recent cases of aneurysm at the Johns Hopkins medical clinic, the reaction was present (L. F. Barker).

Syphilitic Aortitis.

The basic change which makes aneurysm possible is a mesaortitis, which may as a rule be readily distinguished from the ordinary atheromatous process. Macroscopically it presents two important characters: First, it is often localized, involving an area of an inch or more of the tube—very commonly the first part of the arch, with which the valves are often implicated. The coloured frontispiece of the aorta of a young man, in the third edition of Balfour's well-known book on diseases of the heart, which I here show, is a typical illustration. Or there may be a localized patch about the origin of the great vessels or in the descending aorta, just above the diaphragm. With extensive disease of the thoracic part the abdominal aorta may be spared. Penrose has reported from my clinic¹⁴ two typical instances: In a man aged 36, who had syphilis at 19, two circumscribed areas were present, one involving a part of the arch and the valves from which an aneurysm extended towards the right; the other was just above the diaphragm; the intervening portion of the aorta was healthy. Microscopically it showed the typical changes in the media and a nodule of epithelioid cells, which Dr. Flexner thought very suggestive of gumma. The second case, a man aged 35, with a well-marked scar on the penis, was admitted with aortic insufficiency. The lesion was limited to the first portion of the aorta and involved the valves. The rest of the tube was free.

Secondly, the appearance of the vessel differs strikingly from that seen in the ordinary degenerative atheroma. In typical cases the appearance is that now known as cicatricial or fibrous aortitis. The lining membrane is scarred and puckered with narrow linear furrows, sometimes little pits from which stellate lines radiate; very characteristic, too, is the translucency in places due to areas of localized atrophy, so that the bottom of the little shallow depressions presents a bluish tint. There may be an entire absence of the ordinary yellowish raised nodules of atheroma and of the calcified flakes so common in the similar degeneration. As one might expect, in some cases the two processes are combined. But there appears to be a consensus of opinion among pathologists that this type of sclerotic aortitis is characteristic of syphilis. Dr. Turnbull has very kindly placed a series of characteristic specimens on the table.

Microscopically, the changes are very striking. First, alterations are met with in the media, consisting of necrosis, with fragmentation of the elastic fibres, many of which are seen as though cut off sharply. Secondly, a cell infiltration in the media separating the elastic and muscular fibres, and extending between the lamellae in lines, sometimes forming large foci of round-celled infiltration containing giant cells and areas of necrosis. So

dominant are the changes in the media that the process is called *mesaortitis*. Definite miliary gummata may be present. Thirdly, the adventitia shows areas of cell infiltration, particularly about the vasa vasorum, and spreading into the media along their course. Many of the smaller vessels show the obliterative endarteritis. Fourthly, the intima is in places atrophic along the lineal depression, but more frequently shows compensatory thickening, but there is rarely calcification. And, lastly, the spirochaetes of syphilis have been demonstrated in the sections, and through the kindness of Dr. Wright, of the Massachusetts General Hospital, I am able to show you one of his remarkable specimens. This represents the briefest possible summary of the general features of the syphilitic aortitis. And we may say that the first essential factor in the causation of aneurysm, the groundwork, so to speak, is the weakening of the arterial wall by destruction in places of the media.

It would, I think, be taking altogether too narrow a view of the question to suppose that syphilis is the only infection capable of causing *mesaortitis*, and so responsible for aneurysm. The researches of scores of observers have shown how common it is to have foci of arterial degeneration in the acute infections. Thus in 52 necropsies in typhoid fever in which the state of the aorta was described, in 30 there were areas of arterial necrosis, 21 of which looked recent (W. S. Thayer).¹⁵ What I think may reasonably be claimed is that the *mesaortitis* of the type I have mentioned is much more commonly caused by syphilis than by any other infection; and as it is so much more widespread, it naturally is much more liable to be followed by aneurysm.

One of the first lessons of the *post-mortem* room is that the common arterial degeneration, atheroma, does not necessarily lead to aneurysm. On the contrary, any one who has frequented the dead-house of a "sedimentarium," to coin a word, such as "Bloccley," in Philadelphia, where the aged poor congregate, comes rather to the conclusion that extensive atheroma protects against it. And we know now that it is not the ordinary senile and pre-senile degenerations, but a special process at the middle period of life, due to the infections, that leads to aneurysm.

How Does an Aneurysm Begin?

Once *mesaortitis* is present, either in a small patch or in an area of 2 or 3 in. in extent, the aneurysm may arise in one of three ways: First, by acute necrosis and erosion. There exist in the literature a considerable number of cases in which in an aorta otherwise healthy an acute erosion of the coats has occurred, with the formation of an aneurysm. In some of the cases the appearance may well be called the round or acute perforating ulcer of the aorta. I show here three photographs of such cases. It is quite possible that some of these may be syphilitic in origin, as they have occurred in young persons. The edges are irregular, not covered with vegetations. The orifice, measuring from 1 to 2 cm., leads directly into a small aneurysmal sac or perforates directly in the periaortic tissues. Of the cases of which I show photographs one was in a young man of 21, one a woman of 35, and the third a man of 42. In one the perforation took place with the formation of an aneurysm which ruptured into the oesophagus. The other penetrated directly into the pleura, while the third perforated from the abdominal aorta into the retroperitoneal tissues. In the case of the man aged 21 the microscopic appearance is very suggestive of syphilitic *mesaortitis*. Dr. Klotz has kindly examined for me the edges of the specimen from the woman aged 35, and he thinks the aneurysm and the perforation was probably exogenous, and he takes the same view of the specimen from the man aged 42. In the multiple small cup-shaped aneurysms of the arch rupture may take place through a very small punched-out erosion, usually opening into the pericardium. It may be difficult to determine in a given case whether the perforation has taken place from without or from within. Some of the cases may be mycotic or septic in origin. As sudden death is the rule the condition is uncommon in routine hospital work, and more frequently comes before the medico-legal physician.

Secondly, given the presence of an area of *mesaortitis* with loss of the elastic resistance of the wall, spontaneously or as the result of strain or effort, the intima over the

weak spot may split with the formation of an aneurysm. This view of internal rupture is a very old one, but one had a somewhat hazy idea of what was meant until we found how it could be produced experimentally over an area of degeneration of the media caused by adrenalin. A clean-cut fissure of the intima may lead directly into a small aneurysmal pouch, as in this drawing of the aorta of a rabbit from Fisher's paper,¹⁶ which shows this method of formation of aneurysm very clearly. The acute *mesaortitis* met with in ulcerative endocarditis and septic conditions may show these splits and fissures in a most remarkable manner. I show photographs of an aorta, the specimen of which is in St. Bartholomew's Hospital, taken from a boy aged 6½, a patient of Dr. Jordan. Following an attack of otorrhoea, headache, and synovitis of one knee, lasting for about three weeks, with a temperature of 103°, while convalescent and up and about, laughing and playing, the boy suddenly turned pale and died. The small aneurysm of the aorta had ruptured into the pericardium. Corresponding to it, the intima showed a triangular tear with sharp edges. There may be on the arch three or four of these small sacs, each one showing a clean-cut split of the intima. In what was perhaps the first case (according to Eppinger) in which the mycotic character of an aneurysm was recognized I found four in the arch in connexion with ulcerative endocarditis. There are a good many cases now in the literature, and I pass round a photograph of one which I have examined at the museum at McGill College, and which has been reported by Dr. John MacCrae.¹⁷

There are cases with more extensive tears of the intima and inner layer of the media, which may lead to rupture of the aorta, or to dissecting aneurysm, or which may heal completely. It is in connexion with this special mode of production of aneurysm that strain plays so important a rôle. What we mean by strain is a sudden muscular effort by which the blood pressure in the aorta is suddenly heightened. One cannot but be impressed with the extraordinary frequency of the history of a sudden muscular effort, followed often directly by pain in the chest, which passes away gradually, and then a few weeks or a month later the signs of aneurysm appear. Take such a case, for example—a case already referred to by Tufnell. A young man aged 19, in the early secondary stages of syphilis, was shoving up a side of beef, but it came back on him so that he had to let it down. He tried again and again, and at last succeeded. He was faint and tired, and soon felt a severe pain in the abdomen. Shortly after he developed a large aneurysm of the abdominal aorta. In this, as in most of these cases in young persons, the sequence of events is: a specific aortitis with weakening of the media, a sudden exertion, a split of the intima over the weakened spot, and the gradual formation of an aneurysm. Whether a perfectly normal intima and media ever split has been questioned, except as the result of direct trauma. Dr. Turnbull has shown me a recent specimen in the museum which he has placed here for your inspection, in which there was an extensive tear of the intima in a middle-aged woman, with formation of a dissecting aneurysm, and death after about a week. The edges of the clean-cut tear certainly do not show any very serious change in structure. In going over this specimen, I put the new system in vogue in the pathological department to a test. I asked for a slide of the edge of the tear, and the histological description, both of which were immediately forthcoming. A very interesting point is that these splits may occur in a perfectly normal-looking vessel, as was the case in the abdominal aorta of George II, in whom this type of lesion was recognized for the first time by the well-known anatomist Nicholls.

And the third and very common mode of production of aneurysm is weakening of the aortic wall, localized or diffused, followed by a gradual dilatation, either involving a large area of the tube, sometimes the whole tube, but more frequently a localized area. This dilatation form of aneurysm is readily produced experimentally, and the aorta of a rabbit treated with adrenalin may show a dozen or more saccular pouches. It is a not uncommon form in the syphilitic aortitis, in which one may see three or four small cup-shaped pouches, often at the root of the aorta, the intima extending into a little sac. In the star-shaped scars the linear fissures and depressions are covered by intima, and the bluish

translucent appearance is due to the loss in great part of the elastic and muscular elements of the media. But this type of aneurysm is most characteristic of the ordinary degeneration, the senile or presenile atheroma, in which the entire arch, or even the whole aorta, may be diffusely dilated, or in local areas there are flat, saucer-like dilations of the coats, associated with advanced degeneration, fatty and calcareous, of both media and intima.

Statistics.

There are many interesting problems concerning the incidence of aneurysm in different countries under different social conditions and among known syphilitics. I do not propose to inflict many figures upon you, but there are a few worthy of attention. The general mortality I have already given. About 1 in 459 deaths are returned in England and Wales from aneurysm, and the proportion of cases has not varied much from year to year. Until recently we have had little or no information upon the question of how many of the deaths among syphilitics are from aneurysm. In a recent study by Alexandre¹⁸ the figures are collected particularly from the reports of the insurance companies. Among 3,658 deaths in connexion with the Widows' Fund Insurance Company, there were only 24 from aneurysm, and only 2.2 per cent. could be attributed to syphilis. Blaschko, quoted by Alexandre, in 5,574 deaths found that 5.2 per cent. could be attributed to syphilis. These figures probably represent two extremes among the better class of people who take out life insurance. As to the relative number of known syphilitics who die of aneurysm, there are a few statistics available. In Blaschko's series of 150 deaths, only 4 died of aneurysm. Of 487 cases in Goolmer's statistics, quoted by Alexandre (of Gothaer Insurance Company), known to be syphilitic at the time of insurance, 13 died of aneurysm of the aorta; 28 per cent. in all cases died of definite syphilitic disease. In 87 persons with positive syphilitic lesions at the Royal Infirmary, Manchester, aneurysm was found in 18—that is, 20.6 per cent. (Brockbank).

It has long been known that the incidence of aneurysm varies very greatly in different countries. The *post-mortem* returns are the most accurate. Among 19,300 necropsies at Vienna, von Schroetter¹⁹ gives 230 cases of aneurysm (1 in 83), and E. Müller,²⁰ among 10,360 necropsies, gives 183 aneurysms. The Leipzig figures for three years are given by Briesemester,²¹ 3,037 necropsies, 50 aneurysms of the different arteries. These three give a fair average for Germany. At Guy's Hospital,²² among 18,678 necropsies, there were 325 aneurysms (1 in 57), a very much higher percentage than the German figures. At this hospital, in 3,467 necropsies—January, 1907, to October 1st, 1909—there were only 31 cases of aneurysm. One reason for the small number is the large proportion of children. At the Johns Hopkins Hospital, among 3,100 necropsies, 99 aneurysms were found (1 in 31), an extraordinarily high percentage in comparison with the German figures, and nearly double the percentage of those in Guy's Hospital.

Professor Allen has sent me the figures from the Melbourne Hospital. Of 46,878 patients admitted for the ten years ending June 30th, 1905, there were 298 cases of aneurysm.

Leonard Rogers, of Calcutta, has very kindly had analysed for me the *post-mortem* records of the Calcutta Medical College for the last thirty-five years. There were only 30 aneurysms in 5,900 bodies (1 in 196), 0.05 per cent.

We now come to the interesting question as to the percentage of cases of aneurysm with a syphilitic history. Haphazard figures, collected without special reference to the condition under survey, are fallacious. The profession has had a sharp and useful lesson in locomotor ataxia and general paralysis. How far have we travelled since Erb's paper at the International Congress in 1881 forced us to consider the connexion of these two diseases with syphilis? The studies of Fournier, Gowers, and others show that the more carefully the past histories of tabetics and paretics are inquired into the larger the percentage of those found affected with syphilis.

It is the same with our study of aneurysm. I shall not quote the old figures, which may be found in any textbook, and in which the ratio ranges from 40 to 85 per cent. I propose to give you my own personal experience. Of 31 cases of aneurysm of the aorta seen in private, in 3 no

mention was made of syphilis, in 10 syphilis was denied, while in 18—that is, in 58 per cent.—there was a positive history. At the Johns Hopkins Hospital aneurysm is a very common affection; during the twenty years ending May 16th, 1909, there were 386 admissions for aneurysm among 24,363 admissions to the medical wards. A very large number of these were readmissions, which reduces the total number of cases to 248, which have been picked out and analysed for me by Dr. W. T. Parsons.

There were 204 cases of aneurysm of the thoracic aorta, 23 cases of aneurysm of the abdominal aorta, 3 cases of aneurysm of both thoracic and abdominal aorta, 4 cases of the mesenteric artery, 1 of the thoracic and innominate artery, 6 of the innominate artery, the balance of the axillary, carotid and femoral arteries. It may be mentioned that in these same series there were 3 cases of aneurysm of the heart.

Of the total number of cases of aneurysm, 101 had a well-marked syphilitic history—40.9 per cent. Taking the thoracic aneurysm alone, of the 204 cases, 83—that is, 40.6 per cent.—had had syphilis. Compared with some other figures, this represents a low percentage of syphilis cases, but we know how difficult it often is to get a satisfactory account from the patient, and the histories are very often defective, and only those with very clear accounts of the disease were included. Among 9 recent cases in which the Wassermann reaction was tested, it was positive in 6.

The comparatively large proportion of cases of aneurysm at the medical clinic of the Johns Hopkins Hospital does not necessarily mean that syphilis is more prevalent in Baltimore than elsewhere. Two causes may be mentioned: the hospital is a consulting centre for a very wide extent of country in the southern and western portions of the United States, and the proportion of negroes is large. The ratio of coloured to white in the aneurysm series is about 1 to 2.6, while the proportion of white to coloured in the wards in about 5 to 1. The incidence of syphilis in the coloured population is high, and many of the men have very hard work, necessitating sudden effort and strain.

Clinical Features.

In a great majority of all the cases the clinical features are those which we recognize as in ordinary aneurysm, but there are a few peculiarities deserving of special consideration. As pointed out by Morgagni, arterial syphilis is a common cause of sudden death. It is, *par excellence*, the unsuspected aneurysm, the aneurysm without either symptoms or physical signs. The most frequent site of perforation is in the first portion of the aorta, usually in one of the small cup-shaped sacs. The literature is full of cases of this type. The perforation may take place in any part of the aorta, and from a very small orifice. I have already alluded to the possibility of certain of the cases of acute perforation of the aorta being the result of a rapid necrosis and softening of a large focus of mesoarteritis.

It is a common type of aneurysm of cerebral arteries, and a frequent cause of sudden death with symptoms of apoplexy. In Beadles's²³ study of the 555 cases of cerebral aneurysm recorded in the literature no special mention is made of age or of the relation to syphilis, but it is very suggestive that in 46.3 per cent. the patients were in apparently good health. One half of the 12 cases of cerebral aneurysm which I reported were probably syphilitic. One of the cases, a man aged 36, who was in perfect health at the time of the rupture, had had a hard chancre eighteen months previously; extensive disease of the basilar artery was present.

In Bradford's²⁴ case, in which a very similar fusiform aneurysm existed in the basilar artery, in a man aged 29, who died suddenly, numerous gummata were found in the liver.

A second peculiarity is that it is the aneurysm of the third and fourth decades. Welch referred to this in his series of 34 Netley cases; the average age was 32. Of course the army is made up largely of men under 40, but in looking over the specimens in the museum of the Royal Army Medical College, Millbank, one is impressed with the youth of the subjects from which they have been derived. Of 44 cases of aortic aneurysm in which the ages were given, 15 of the soldiers were under 30, and 36 under 40 years of age. In the Johns Hopkins Hospital series there were 89 patients under 40 years, and 159 above that age.

Moreover, in young and middle-aged men the syphilitic form often presents a triad of symptoms—angina pectoris, aortic insufficiency, and aneurysm. This special type of syphilitic mesoarteritis is very prone to affect the root of the aorta, and I have had a very interesting group of cases, some of which I have reported,²⁵ in which the very first symptoms were severe attacks of angina pectoris. Gradually under observation aortic insufficiency has supervened, with the signs of aneurysmal dilatation. In some of the cases the insufficiency has been induced rapidly enough to cause great cardiac dilatation, and months have elapsed before the cardiac equilibrium was restored. This is just the group of cases of aortic insufficiency in which it is not always easy to say whether aneurysm co-exists.

And the last and most suggestive feature is the prompt relief which may follow the use of potassium iodide. Since its introduction by Bouillaud, few remedies have stood the test of time more satisfactorily, particularly in the cases of young men with a well-marked syphilitic history. The prompt disappearance of the anginal pains, the improvement in the local symptoms, the diminution under observation of the aneurysm itself, and in rare instances a complete cure, are within the experience of all of us. Particularly is this the case in the group with the triad of symptoms just mentioned. I see at intervals two patients, both old syphilitics, one of whom has had a large sac growing to the left of the sternum for eight years; the other, after very severe symptoms of chiefly dyspnoea and venous obstructions, has been very comfortable for more than five years. The type of sac is very apt to be just the form in which obliteration is most likely to occur, the one with the narrow neck, and, once consolidated, no further trouble occurs. More than once I have referred to the case of a soldier discharged for aneurysm after the Crimean war. Twenty years later we found a completely healed aneurysm of the terminal portion of the arch, and a perfect double aorta, the result of complete healing of a dissecting aneurysm.

CONCLUSION.

The practical question remains, What can we do to restrain the ravages of syphilis, and so reduce the proportion of deaths from aneurysm and other diseases directly due to it? At a low estimate, we may place the mortality at between 6,000 and 7,000 annually, about 1 in 80 of the deaths, not taking into account the unestimated and very large number of stillbirths. In about one-seventh of the cases the deaths are due to what we regard as the more direct effects of the disease; aneurysm and the enormous group of affections of the nervous system represent later, but none the less definite, effects of the poison. The Wassermann reaction and the detection of the spirochaetes gives an entirely new aspect to the disease, and obliterates in great measure old distinctions and divisions. There is only one syphilis, one and indivisible, with many manifestations.

The discovery of the cause is the first step towards successful measures for the prevention of an infectious disease. So far as venereal disease is concerned our attitude has been one of hopeless inactivity, partly owing to inherent difficulties, partly to a lack of courage. The innate difficulty relates to the problem of controlling one of the two great primal appetites. No measures yet devised have successfully restricted illicit intercourse between the sexes. Prostitution, the blackest blot in our civilization, exacts a ghastly toll of suffering, and a sacrifice annually of thousands of lives. Add to the 6,000 or 7,000 slain by the spirochaete the thousands maimed and killed by the gonococcus—a David among cocci—and the sum total debited the venereal infections reaches figures only behind those of tuberculosis, pneumonia, and cancer. Too deeply entrenched in the very citadel of our social fabric for a frontal attack, the lessons of other successful campaigns must be conned, and long years of training must be undergone before we can hope for a truce, to say nothing of victory. There are four lines of attack possible. The first is a wholesome and healthy education of our youth in matters sexual, pointing out plainly the necessity of continence, though a hard condition; the really terrible risks, and the sad train of events likely to follow an infection. Secondly, steps should be taken to lessen "the sight of means," as the proverb puts it, the open, flagrant whoredom which makes the streets

of this city, for example, a byword among the nations. In other capitals vice has deliberately to be sought, here it jostles our youth in most seductive form at every turn, to the great peril of even "a fugitive and cloistered virtue." It is no wonder that so many yield, "Knowing not" (or for the moment forgetting) "that the dead are there," and that he "goeth down to the chamber of death." A special police force of men and women could in a year clear the streets and places of public amusements. Such a measure *alone* might only "skin and film the ulcerous spot," as no doubt it does in Paris, where Bizard²⁶ estimates that one million men visit annually "les Maisons de tolérance" and "les Maisons de rendez-vous"!

Thirdly, venereal diseases should be put in the same category as other acute infections of public danger, and every case should be known, registered, and supervised. Chimerical, futile, visionary, impossible! Yes, so it seems, and so it is to-day; but twenty years ago how wild and fanciful we thought the notification of tuberculosis!

And, lastly, much may be done to lessen the ravages of the disease by increasing everywhere the facilities for early and prolonged treatment. The new methods of investigation have raised a hope that—perhaps at the very outset, at the portal of entry—the disease may be jugulated. Time will tell. Like other protozoal affections, syphilis displays an obstinacy and chronicity that has made some authorities doubtful of the possibility of a final cure. On this question I have always pinned my faith to the greatest of British syphilographers—that special ornament of your school, Jonathan Hutchinson—sharing his belief in the permanent curability of the disease. I have been long enough in the profession to see the children's children of syphilitics hale and hearty, with no taint left in stem or branch; but unhappily this is not always the case, and unless the treatment is thorough and prolonged recurrences are only too common, and the Registrar-General's report indicates in how many thousands it is still inefficient.

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- ⁹ *Medical Chronicle*, 1909. ¹⁰ *BRITISH MEDICAL JOURNAL*, August 14th, 1909. ¹¹ *Boston Medical and Surgical Journal*, 1909. ¹² *Berl. Klin. Woch.*, November 3rd, 1908. ¹³ *American Journal of Medical Sciences*, September, 1909. ¹⁴ *Johns Hopkins Hospital Bulletin*, vol. ix. ¹⁵ *Ibid.*, vol. xv. ¹⁶ *Deut. med. Woch.*, 1905. ¹⁷ *Journal of Pathology and Bacteriology*, 1905, vol. x. ¹⁸ *Etude statistique de la mortalité dans la syphilis*, Paris, 1908. ¹⁹ *Nothnagel's Handbuch*. ²⁰ *Zur Statistik der Aneurysmen*, Jena, 1903. ²¹ *De Arterio Sclerosa Syphilis*, Leipzig, 1903. ²² *Bryant, Clinical Journal*. ²³ *Brain*, October, 1907. ²⁴ *Clinical Society's Transactions*, 1904. ²⁵ *Medical Chronicle*. ²⁶ *Annales des maladies vénériennes*, juillet, 1908.

AN exhibition of working models of sewage distributors and sprinklers shown in action has been opened in the Parkes Museum of the Royal Sanitary Institute, 90, Buckingham Palace Road, S.W., and will be continued until the end of next January. The museum is open daily from 9.30 a.m. till 5.30 p.m., and on Mondays till 8 p.m.

THE annual dinner of the staff and past and present students of the Royal Dental Hospital of London was held at the Whitehall Rooms, Hôtel Métropole, on November 20th, under the chairmanship of Mr. C. F. Rilot. The toast to "The Hospital and its School" was proposed from the chair, Mr. Rilot in the course of his remarks alluding to the resignation by Mr. Colyer of the post of Dean, who during his tenure of office had done the school most excellent service, his compelling personality giving a healthy and invigorating impulse to the whole of its work. In order that the hospital Gazette should attain a full measure of success it should, Mr. Rilot said, be supported by old students. The toast was acknowledged on behalf of old students by Mr. E. A. Mansell, and on behalf of present students by Mr. W. L. Jackson, who stated that some twenty-five of his fellow students had joined the Territorials, and that the formation of a rifle club was under consideration. Mr. Dolamore, the new Dean, speaking to the same toast, gave an account of the existing conditions of the school. The present was the fiftieth anniversary of the foundation, and all those who had preceded him in the office of Dean were still alive. There were now 160 students on his books. The evening was brought to a close by the singing of "Auld Lang Syne."