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William Osler: Original Papers 1907-1919

William Osler Sir

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Jessie East

1922.

The Royal Medical Society of Edinburgh.

BY

WILLIAM OSLER, M.D., F.R.S.,

Regius Professor of Medicine, Oxford.

THE ROYAL MEDICAL SOCIETY OF EDINBURGH:

PARTICULARLY ITS RELATIONS WITH THE PROFESSION OF THE UNITED STATES AND CANADA. REMARKS AT THE DINNER OF THE ROYAL MEDICAL SOCIETY, FEBRUARY 2, 1907.

By WILLIAM OSLER, M.D., F.R.S.,
Regius Professor of Medicine, Oxford.

I DO not know, Mr. President and Gentlemen, that I ever rose to propose a toast with greater pleasure. I had known, of course, in a vague way, about this ancient Society with its widespread affiliations, and I remember with what satisfaction I received its honorary membership a few years ago; but it was not until I got a few days ago a list of the members that I appreciated the pride which you must all feel in belonging to it. For what is it that should make, and that so justly does make, you Edinburgh men proud? Not the beauty of your city, beautiful beyond all others; not the grandeur of its buildings, nor their historic associations; not the rich legends, nor the bewitching poetry with which you have captivated the race; but the *men* who in the past generations have made you what you are to-day. And it is this feature which makes your Society of such interest, ante-dating as it does all other medical societies of the English-speaking world. Looking over the list of members since 1737 I was prepared, of course, to find the names of many of the great men of the profession, but I did not expect to find a list of such extraordinary distinction. I doubt if there is any other Society in the world, except, perhaps, the Royal Society of London, with such a roll of honour. Let me just refer to some of the eighteenth century members. I skip the famous Monros, whom we all know, to express the hope that the John Monro of the second session (1738) was the father of Monro primus, and the fine old army surgeon who did so much to establish the Medical School and the Infirmary. And among the names in 1740 I find a Robert Willan, afterwards a practitioner at Hull, and the father of the father of Dermatology (the Robert Willan whose spirit I know both Allan Jamieson and Norman Walker invoke), and who was himself a member of the Society in 1777.

You have two of the great medical poets on your list—Mark Akenside, whose “Pleasures of the Imagination,” once so popular,

is now almost as neglected as his scanty professional writings; but what would I not have given to have been a member of this Society in 1753, when Oliver Goldsmith sang Irish songs and told his stories! That must have been a memorable session—for hilarity, if not for work! In almost every year some memorable name occurs:—Fordyce (1756), of fever fame; Thomas Percival (1762), whose medical ethics formed the basis of the Code of Ethics of the American Medical Association; William Withering, of the same year, whose little book on the *Fox-Glove* is still worth studying, and whose name should be ever remembered in connection with one of the great drugs of the pharmacopœia; Joseph Black (1776), whose fine portrait graces this hall, one of the greatest of your members, and perhaps the most distinguished chemist who has ever been a professor of medicine; Andrew Duncan, whose portrait is one of your treasures; Gilbert Blane; both the Hopes, great friends of the American students; Currie—cold-water Currie—of Liverpool, the biographer of Burns; Parry, who described the symptoms of ex-ophthalmic goitre long before Basedow or Graves; John Aiken, the biographer; Saunders of Guy's Hospital, who took Edinburgh methods of teaching to London; Fothergill—the great Fothergill—the Quaker, and the friend of the American colonists, whose memory is still precious in the profession of Philadelphia; Lettsom, remembered now by a rhyme! Beddoes, the discoverer of Sir Humphrey Davy; Mathew Baillie, the founder of British pathology, nephew of the great Hunters, who were, I believe, only extraordinary members of the Society; and Gregory of *the powder*. It is a wonderful list, which could be greatly extended; but I must take time to speak a word of Cullen, to whom this Society owes so much, and who had such a good influence with generations of the young men who came under his spell. The famous controversy which convulsed this Society in the seventies, started by that remarkable genius Brown, is remembered and discussed, while the theories over which the members quarrelled so hotly are now as dead as their originators. Perhaps to-night this hall may tell another story, and after we are gone Cullen may step out of his frame and wage a ghostly war of words with his old adversary!

And what a list in the nineteenth century!—Richard Bright, Marshall Hall, W. B. Carpenter, C. J. B. Williams, William Sharpey, John Hughes Bennett, Goodsir, Thomas B. Peacock, John

Burdon Sanderson, Murchison, and greatest among them all, Charles Darwin, whose father, uncle and grandfather were Edinburgh men, and his father a member of the Royal Medical.

But I found on your roll names that touch one more closely than any of these. As you know, I have been for more than thirty years associated with the profession of Canada and the United States. To few men has it been given to see the work of his colleagues over a wider area—from the banks of the St. Lawrence to the ever-glades of Florida, and from the Mississippi to Nova Scotia—and interested always in the history of the profession, and in the ideals which have gradually moulded it, imagine my surprise and delight to find that many of the men held in highest honour in those two countries had been members of this Society. Let me refer to some of them. The founders of the first medical school in the United States—the University of Pennsylvania—were all Edinburgh men. John Morgan, whose celebrated *Discourse* led to the foundation of the Philadelphia School; Adam Kuhn; William Shippen, the father of Anatomy in America; and Caspar Wistar, still a famous name in Philadelphia. During the winter the distinguished visitor to that city is sure to hear his name in connection with the well-known Wistar Parties which he inaugurated, and which still hand on the traditions of the jovial character of a man whose motto was, “Go, seek the cheerful haunts of men.” But, greatest of all, greatest name perhaps in American Medicine, is Benjamin Rush, the favourite pupil of Cullen; indeed, he has been well named the American Cullen. But you can claim a still greater American—Benjamin Franklin—whom you elected to honorary membership in 1786. During the nineteenth century I find the names of two very distinguished Philadelphians—Nathaniel Chapman (1801), the fragrance of whose memory still lingers in that city, and though dead and gone these sixty odd years, patients still write to him from different parts of the country—at least they did a few years ago; and Samuel G. Morton whose *Crania Americana* is one of the most important contributions to anthropology by an American anatomist.

In New York, too, the men who founded the old King's College, now Columbia, were your colleagues. Samuel Bard, a favourite pupil of Cullen and of Hope, was a devoted member of the Society, of whose proceedings, in 1762, he gives a most interesting account

in a letter to his father.¹ He wrote an early and accurate account of malignant sore throat (1771), and his *Treatise on Obstetrics* was the first work on the subject issued in America. An even more interesting New Yorker, whose memory is perpetuated in the beautiful hall of the Academy of Medicine of New York, is David Hosack, of the session of 1792-93. And a third was Samuel Latham Mitchell (1784), a physician-naturalist of the best type. These three men laid the foundation of the medical institutions of New York.

From the Southern States a large number of young men came here for their education. A few years ago I bought from Johnston's, of George Street, a collection of 120 theses of American students who had graduated between the years 1750 and 1820, and more than one-half of them were from Virginia and the Carolinas. I find on your roll the Moultries of Charleston, S.C., David Ramsay, and many others not so well known. One of your Presidents (1784) I must mention, as his grandson's name is a household word in the profession to-day, the brilliant Thomas Addis Emmet, of Dublin, who was in the 1798 Rebellion, and afterwards went to America.

One of the seven medical societies organised in the United States in the eighteenth century is the Medical and Chirurgical Faculty of the State of Maryland, the headquarters of which are in Baltimore, a Society with which I have been closely connected for the past sixteen years. I knew that a number of the founders were Edinburgh men, but I was not prepared to find that at least eight of them were graduates of this university, and four of them were members of this Society. Upton Scott, the first President of the Faculty, became a member in 1751. His descendants are prominent members of the profession in Maryland to-day, and one of his great-great-grandsons is a Rhodes scholar with me in Oxford.

¹ It may be worth while to quote a sentence or two. After stating that it was organised by Cullen and Akenside in 1737, he says: "It now consists of between twenty and thirty members, who meet every Saturday evening, in a room in the Infirmary, where they dispute upon medical subjects in the following manner: Each member has about six months beforehand a set of papers given him to write a comment upon, consisting of a practical case, a question on some medical point, and an aphorism of Hippocrates. Every Saturday a set of these papers is produced and read before the Society by the author, having circulated a week before among the members, who come prepared with objections, and the author with argument to defend them,"—Gross, *Am. Med. Biography*, p. 175.

Not all of the American students belonged to this Society, and I find that George Buchanan and David Moores, both founders of the Maryland Faculty, were Presidents of the Royal Physical Society. To two other members I must refer—John Shaw, who went to Canada with that great coloniser, whose memory we Canadians all cherish, Earl Selkirk, and who afterwards settled at Annapolis, Ind.; and John Birnie (1772), a nephew of Upton Scott's, whom I mention for the sake of his grandson, Clotworthy Birnie, a country practitioner of Maryland, whom to know makes one proud of his profession, and who could sit among you here to-night looking more of a Scot than many I see.

And all my Philadelphia friends will be glad to know that in 1838 Samuel Lewis was of your company. A Barbadian who had migrated to the United States, a learned bibliophile, he devoted many years and much money to the Library of the College of Physicians of Philadelphia, in which a handsome room and a special collection of books bear his name.

But I have not finished, and, at the risk of wearying you, I must speak of your Canadian members, as they did a great service in that country, particularly in Montreal. The founder of McGill College was of course a Scot, and the men who organised the Medical Faculty were all Edinburgh men—Stephenson, Holmes, Robertson and Caldwell (I am not quite certain about the last named), and they brought with them the best traditions of this school, which have been so well maintained by their successors that McGill has been called the Edinburgh of Canada. Stephenson and Robertson were members of the Royal Medical. I am sorry I cannot find Holmes' name, as he was *facile princeps* among them. Then I find many names well known in the profession of Lower and Upper Canada—the Sewells (four of them), Badgeley, Arnoldi, Crawford, Peltier, Belin, Hallowell, M'Nider and others. Altogether you may feel proud of the over-sea record of your members, which brings the Society into such close affiliation with the profession of the United States and of Canada.

I had intended, Mr. President, to speak on the value of the Medical Society in the education of the medical student, but I can only spare time to refer to one point. We do not lay to heart the remark of Bishop Butler, that instruction is often the least part of education, and there is much more in a medical student's life than giving him a professional training. In a

society such as this he may be taught that all-important acquirement—to think and talk while he stands on his feet. The whole question of professional economics should be taught in the schools, and men should not be allowed to go into practice without a thorough knowledge of the business, social, and professional relations of their calling; but this is too large a question to touch upon here.

And let me, in conclusion, call to remembrance the memory of a man to whom we all owe a great debt. I hold in my hand a volume of the MSS. Notes of the Lectures of John Rutherford, who introduced clinical teaching into Edinburgh in 1747-48. It was my intention to leave this precious volume here, but to my joy I found this afternoon, in the Library of the Royal College of Physicians, the lectures of 1749-50, and in the same handwriting, curiously enough. This set is of the session 1748-49, and as the introduction is the same, and there is the same description of his method, I decided very promptly not to leave the two sets in the same city. Possibly the first set may turn up. They are of great value as a record of the initiation of clinical teaching in the English-speaking schools; and what has been called the Edinburgh method dates from the introduction by Rutherford of practical classes in the Royal Infirmary. But we owe the method to the Dutch, who are our masters in this as in nearly all the advances in modern civilisation. Rutherford and his colleagues, Plimmer, Sinclair and Innes, were pupils of Boerhaave, the Dutch Hippocrates, under whom the objective method of Sydenham reached its highest development, and out of which, when united to the “anatomical thinking” of Morgagni, and the new methods of physical diagnosis, modern clinical medicine has evolved.

It has been a special privilege to be with you this evening, and to have been assigned the toast of the Royal Medical Society, from the members of which the English-speaking profession on both sides of the Atlantic has derived its most enduring inspiration, and I ask you to drink to its continued prosperity.

ON THE LIBRARY OF A MEDICAL SCHOOL.

By WILLIAM OSLER, M. D.

ON THE LIBRARY OF A MEDICAL SCHOOL.¹

By WILLIAM OSLER, M. D.

One day last spring a London bookseller called and said ^[109] he had a library of seventeenth and eighteenth century medical books for sale, which had been gathered by the physicians connected with the Warrington Dispensary. Looking over the catalogue I saw at once that it was a collection of value, and knowing that it would supplement very nicely the special libraries which have gradually grown up in connection with the Johns Hopkins Medical School, I wrote to Mr. W. A. Marburg and he authorized me to purchase it and to have it put in good order, and this has been done, and to complete his generous gift, Mr. Marburg has furnished bookcases as well. Dr. Welch will speak of some of the special works. I may mention in passing that the library is very rich in English medical pamphlets of the seventeenth and eighteenth centuries, and contains a large number of the works of classical medical authors which we had not in the library.

A word or two on Warrington and the men who collected these books: This old town on the banks of the Mersey, partly in Chester, partly in Lancashire, had in the middle and latter part of the eighteenth century a notable group of scientific and professional men. The Aiken family made the place celebrated as a literary center, as it was largely through the Rev. John Aiken that the Warrington Academy became so famous. His son John became well known through his "Biographical Memoirs of Medicine in Great Britain," and the large work on "General Biography." A sister of

¹ Remarks made on the occasion of the presentation of the Marburg collection of books to the Johns Hopkins Medical School, January 2, 1907.

[109] the elder Aiken was the distinguished authoress, Mrs. Barbauld, and Lucy Aiken, a daughter of Dr. John, became a well-known figure in English literature. But by far the most important of the scientific men who lived here in the eighteenth century was Joseph Priestley, who was tutored in "classics and polite literature" at the academy for six years, from 1761. He must have had a very stimulating effect on his colleagues. A very notable character who also has a strong interest for us on this side of the water is Thomas Percival, who was born at Warrington and practiced there before going to Manchester. Upon his work, "Medical Ethics, 1803," was founded the code of ethics of the American Medical Association. I see it stated that a brother of this Percival was also a well-known physician at Warrington, and at his death left a very large library; some of the books may possibly be those before us this evening. James Kendrick was a physician and naturalist of the same type. It was by the exertions of these men and their colleagues that this library was formed. The influence of the Warrington Academy, the educational college of the Unitarians of England, made the town a literary and scientific center, and the medi-

[110] cal profession must have benefited largely from the intellectual environment of the place. So prominent indeed did it become that a Press was organized, and in looking over Miss Nutting's interesting collection of books on "Nursing," to which I shall refer later, I noticed that from it the works of the celebrated philanthropist, John Howard, were issued. Altogether, the collection has an affiliation with a remarkable group of men, and its value is not a little enhanced to know that it has been used by such men as Priestley, and John Aiken, and Thomas Percival.

The occasion offers an opportunity to make a few remarks upon the future of the libraries connected with this school.

Books are the tools of the mind, and in a community of progressive scholars the literature of the world in the different departments of knowledge must be represented. With the existing arrangements we have gradually built up two libraries, one connected with the hospital and the other with the university. In the former are to be found the modern

works and journals relating to medicine, surgery, obstetrics, [110] and the various specialties. Under Dr. Hurd's fostering care this side of the library has grown rapidly, and we have had several valuable donations from the libraries of the late Dr. Donaldson and the late Dr. Chatard. Files of all the more important medical journals are there to be found, and we can all testify to the very stimulating influence which this library had had upon the hospital staff and upon the senior medical students.

After the medical school had opened and the laboratories of anatomy, physiology and pharmacology been erected, the University began the collection which is in this building and which represents the modern works and journals in those scientific subjects upon which medicine is based. There are now very complete files of the scientific journals of anatomy, embryology, physiology, pharmacology, and physiological chemistry. While, in some ways, the ideal plan is to have a special library of each subject in each laboratory, the buildings here are so close together that it was thought best to concentrate all of the collections in this building.

Now it is along these two lines that a library of a medical school should progress, but there are one or two other sides of the question which may be considered. In a large city with another active medical library supported by the profession, the two should work in harmony, as great economies could be effected, particularly in the purchase of the more expensive works and journals. I am glad to know that the library of the Medical and Chirurgical Society is prepared to co-operate with the other medical libraries in this city in some such plan. It is not worth while for the library of the medical school to deal extensively with local literature or with the transactions of the State societies, or to attempt to keep files of all the smaller American journals. There are two other directions in which the library of a medical school should grow, and they are well represented by the collections presented to-night. When a man devotes his life to some particular branch of study and accumulates, year by year, a more or less complete literature, it is very sad after his death to have such a library come under the ham-

[110] mer—almost the inevitable fate. Fortunately, such libraries are very often offered for sale *en bloc*, and this was the case with the large collection of works on teratology and embryology formed by the late Professor Ahlfeld, of Germany. Through the liberality of Mr. W. F. Jencks this very valuable library has been secured for us and will be presented to-night by Dr. Williams. These special groups of books are of the greatest value to the student. It is interesting to know that in connection with the training school of the hospital Miss Nutting has gradually formed a library of all the works relating to nursing and to the care of the sick in peace and war, and I may remind you that we are already the fortunate possessors of another remarkable collection, that of the late Dr. Fisher, who gathered together the set of portraits which was presented to the hospital a few years ago by Dr. Kelly.

This Warrington collection represents a fourth side of the library work. I think you will all agree with me that the interest which has been taken here in the history of medicine and in the biography of the great men of our profession has had a very stimulating influence on the younger men, in giving to them that historical outlook so important in scientific research. The library of a great medical school should contain the original works of all the great masters of medicine. No book should be added to a library simply on account of its age. As in modern literature so in that of the sixteenth, seventeenth, and eighteenth centuries, there is an enormous quantity of trash which is hardly worth shelf room. I would have *all* of the original works of *all* of the great men; and one special value of this Marburg gift is that it is so rich in original editions of many of our masters. For example, I would have in such a library a carefully selected group of the works of Hippocrates, not everything, of course, but the standard editions, such as the Aldine folio, and the editions Frobenius and the more important translations; the *editio princeps* of Celsus, 1479; the more important of the works of Galen, including the fine Aldine edition, 1525; good editions of Dioscorides, Aretaeus, and of Pliny, and of the other great medical writers of the Greco-Roman school. On the same

principle should be collected the chief works of the Arabian ^[110] physicians, and a shelf or two should be devoted to the school of Salernum. The great medical Humanists should be well represented—Linacre, Caius, and others. Every scrap of the writing of such a man as Vesalius should be collected. A good beginning has been made with the 1543 edition of the “*Fabrica*,” but of such a man all the editions of all his works should be here. The same may be said of such great anatomists as Fabricius, Malpighi, Eustachius, Sylvius, and many others of the sixteenth century. The original works of the great physiologists should be sought for. Every scrap of the writings of Harvey (and they are not numerous) and every edition should be here. In practical illustration of my remarks I beg to present to the Marburg collection an original edition of the “*De Motu Cordis*,” 1628, perhaps the ^[111] greatest single contribution to medicine ever made, and which did as much for physiology as the “*Fabrica*” of Vesalius did for anatomy. The “*De Motu Cordis*” has become an excessively rare book. I had been on the outlook for a copy for nearly ten years. It had not appeared in an auction catalogue since 1895. Then in August of last year a very much cut, stained and unbound copy was offered to me at a very high figure. It had come from the library of Dr. Pettigrew, the author of a work on “*Medical Biography*.” I had been waiting a long time for a copy, but this looked so shabby and dirty that I decided not to take it. Some months later the booksellers sent the copy back nicely cleansed and beautifully bound, and this time I succumbed. Within forty-eight hours the same dealers sent me another copy from the library of the late Professor Milne Edwards, of Paris, uncut and very nicely bound, which they offered at the same price. Naturally, I took the larger copy and the other one went to a friend in this country. The copy I here present to the library has been a little too energetically cleansed, so that the leaves are very tender and in places have had to be repaired. It came from the library of a physician in London and the bibliographical data are found attached.

I would have the complete works of the Hunters, every fragment available of John Hunter's; everything of Haller—

[111] and that means a great deal—of Majendie, and a complete collection of the monographs of great modern physiologists, such as Claude Bernard. The original works of the great clinicians, of Boerhaave, Morgagni, Bichat, Laennec, Louis, Corvisart, Bright, and Addison should be on our shelves; and lastly the great works relating to the history of medicine and to medical bibliography should be collected. Books in the special historical and bibliographical department of the library could very well be added to this Warrington collection, in which way the university could express its appreciation and gratitude for the very generous gift received from Mr. Marburg.

And one word in conclusion—when the plans for the medical school were under discussion, I drew in outline what I should have liked to see on this plot of land. Very much idealized it would have taken many millions for its realization. Surrounding the entire square ran beautiful stone cloisters (ornamented with busts and statues of the great men of the profession), and uniting the four chief buildings which stood in the middle of the sides of the square. On the Monument Street front was a beautiful structure in stone devoted to the library and museum. This part of my plan could yet be realized. As the museum collections grow, and as year by year the books increase in number such a building will become a necessity, and in it these special libraries will find their appropriate home.

ON TELANGIECTASIS CIRCUMSCRIPTA UNIVER-
SALIS.

By WILLIAM OSLER, M. D.

ON TELANGIECTASIS CIRCUMSCRIPTA UNIVER- SALIS.

By WILLIAM OSLER, M. D.

For many years I have been interested in the *nævi* and [401] small telangiectic spots which one sees so frequently in the routine examination of patients. Their increase as age advances, their peculiar distribution, their temporary character in young persons, the association with cirrhosis of the liver, the possible association with internal carcinoma, the occasional eruptive-like outbreak in jaundice, the remarkable hereditary form associated with epistaxis (of which I have reported three cases)¹ the presence of the spider-*nævi* in scleroderma, and their occurrence in the scar of X-ray burns—these are points upon which I have dwelt over and over again in the routine work of the wards. On January 21, 1906, while I was taking one of Dr. Barker's ward classes, I found a patient whose case is here described, and I saw immediately that it was a form of generalized telangiectasis which I had never met with before. The case belongs to an excessively rare form of the disease of which only some fifteen or twenty cases are on record, and Dr. Barker has very kindly allowed me to report it. The history may be given in full:

W. J. H., age 39.—Patient complains of pain in the right side of abdomen.

F. H.—Family history is negative. The parents are living and well. He has no brothers nor sisters. His parents deny emphatically any joint or skin trouble in the family, but the mother had urticaria when young.

P. H.—Patient has not had any infectious disease. He has not had tonsillitis. He had attacks of "grippe" for several con-

¹ Johns Hopkins Hospital Bulletin, 1901, Vol. XII, 333.

[401] secutive winters. The first, during an epidemic in Paris in 1889, was severe. In 1893-94 he had "pleurisy" though from his description one would suspect it to be lumbago. The pain was in the lumbar region, chiefly in the right side, very severe, relieved by hot packs and turpentine, in many ways resembling his present pain except that the former attack has been entirely in the back. He has believed his back to be weak and has taken gymnastic exercises. He has always been of neurotic temperament, and after 3½ years of hard work with much privation as an artist in Paris he broke down in 1893 with "nervous prostration," and for six years could work only intermittently. He thinks he has never entirely recovered.

Head.—He has had attacks of giddiness about once a week for past three years. He has considerable astigmatism which causes severe headaches relieved by glasses. Has never had any flashes of light; has never fallen; never has vertigo; no ear trouble.

Respiratory system.—No chronic cough, bronchitis, or hæmoptysis.

Cardio-vascular.—During the past three months he has been rather short of breath after meals and on running up stairs. No pain around the heart.

Renal.—Not any oedema of ankles or of face. No blood in urine before present illness. The urine has been examined several times in the past few years and always found normal. No increase in frequency.

Gastro-intestinal.—No symptoms on the part of these organs; bowels always regular.

Habits.—Until six years ago he was an excessive smoker; since then moderate. Formerly a moderate drinker; now abstemious. Denies all venereal trouble.

Skin.—The skin condition has evidently not attracted much attention. The patient states he had noticed the purplish mottling only for the past ten years. His mother is sure that his [402] skin was normal when a baby and during youth and she has noticed the present condition only during the past two years. The patient says the mottling has become more intense during this time. At no time has it entirely disappeared, although more intensely colored during cold weather than in summer. During the summer of 1889 he had an attack of hives, and he gives an indefinite history of several attacks since. In November, 1905, he began to have epistaxis which has recently recurred without apparent cause and lasting about five minutes. During his attack of "nervous prostration" he was troubled with hæmorrhoids and was operated on. He has never noticed any tendency to prolonged bleeding from slight cuts. Has never had

hæmoptysis. He denies absolutely any attacks of joint pains, [402] colic, vomiting, or diarrhœa.

During the past month the patient's feet have bothered him by intense itching, so severe as to cause him to rise at night and apply a lotion. During the past two weeks patient has undergone a great deal of mental and physical exhaustion in connection with an art exhibition.

P. I. —Came on suddenly at six o'clock in the morning of January 20 (yesterday), with the passage of about a pint of bloody urine (dark red), followed by pains in the right abdomen "just below the last rib on the right side." Gradually the pain became extreme, and in ten minutes was at its height, causing the patient to double up and roll about in agony. The pain remained localized and did not radiate to the thighs or shoulder, nor was it paroxysmal. The pain lasted about twenty minutes and then gradually ceased, the patient breaking into a free perspiration. In half an hour after the onset of the pain he felt all right again, arose from bed and went about his day's work (mounting and selling pictures). Last night he retired at 11.30. During the day patient passed his water three times and while it appeared dark, he did not notice that it contained blood. Last night the patient slept fairly well and did not get up to urinate. About six o'clock this morning (January 21), patient had a peculiar sensation in right abdomen, and a "presentiment of another attack." He arose from bed and passed another pint of brick-red urine, during which passage there was no pain, but immediately afterward pain came on gradually and in five minutes was extreme. A doctor was summoned who diagnosed the case appendicitis. The pain was agonizing and this time lasted five hours (until morphine was given sufficient to relieve it), and was accompanied by fever. The patient does not remember that he was short of breath during the attacks. In the first attack he had considerable nausea but was unable to vomit. In the second attack he vomited freely, especially after taking morphia. He has had no diarrhœa with the attacks. His appetite is good and he says it always has been.

Since the onset of his trouble the patient has noticed a prickly sensation in the end of his penis on urination.

Patient's mother says that the urine passed in the first attack contained blood definitely, but she is quite sure there was no blood in the urine passed before the attack on the second morning.

Fairly well nourished man. Face rather flushed: keeps eyes closed: pupils rather wide. Pulse 68, with occasional slight irregularity. Vessels well felt but not sclerotic.

Thorax.—Is symmetrical, except that right side is slightly fuller than left, and sternum deviates slightly to left. There is

[402] a well-marked lateral curve to right in mid-dorsal region. Movements of chest are equal. Lungs clear in front.

Heart.—Apex impulse visible and palpable in fifth interspace about in mammillary line, 9.3 cm. from median line and dulness extends 3.7 cm. to right. Impulse is of moderate intensity. First sound at apex slightly prolonged, suggesting a systolic murmur. Second sound clear. Sounds are clear elsewhere. Second left or pulmonic, a little louder than second right. During examination a number of patches of urticaria have appeared. There is fairly well-marked dermatographia and where he has been blue-penciled there is urticaria, which is appearing also as wheals bordered by a wide blush over places marked for dermatographia. *Abdomen* is natural. *Liver* is not palpable or enlarged. *Spleen* is readily palpable, falling, with patient on right side, 3-4 cm. below costal margin. The tenderness previously present has now disappeared.

R. B. C.....5,320,000

W. B. C.....11,900

Hb.106 (corrected).

Coagulation time = 4 mins. (slide method).

Fresh blood cells.—Appear of good color and uniform in size and shape. Not much tendency to rouleaux formation nor crenation. Leucocytes rather numerous but no marked leucocytosis.

On January 24 I made the following note: The skin presents a very remarkable appearance. On the face there are a few spots like acne rosacea. The skin of the neck is clear. Over the trunk and the extremities are numerous dark red spots looking exactly like a fresh purpura. Their distribution is very well shown in the accompanying photographs. They are very thickly set over the chest and back and on the flexor surfaces of the forearms and inner aspects of the arms (Figs. 2 and 3). The spots vary in size from two to six millimeters in diameter, and often coalesce to form large blotches. While of a dark purplish tint, as a rule, they can be changed by rubbing to a vivid red. Everywhere on palpation the spots disappear completely, leaving a slight brownish stain. They are not raised and the color is uniform. There are no individual blood vessels seen. It is evidently a capillary dilatation. It is remarkable the difference in appearance after friction of the spots on the arm. They become of a bright red color, return instantly after pressure, while the other spots are of a dark livid hue and the blood returns very slowly. The condition of the hands

and feet is very remarkable. As seen in Fig. 1, the fingers [402] are cyanotic and look like the picture of Reynaud's disease. The soles and margins of the feet and the toes have the same deep purple color. Factitious urticaria is readily produced, as is well shown in Fig. 4. The patient remained in hospital until March 9. He was on a modified Weir Mitchell treatment and did remarkably well. Dr. Bordley reported that he had a slight choroiditis in the right eye. During his stay in the hospital the patient had several severe attacks of abdominal pain, which was relieved by acupuncture. I saw the patient again on January 2, 1907. The skin was in practically the same condition. Though still somewhat nervous, he had kept pretty well and was able to attend to his work. The best account I have found of this condition is in *La Pratique Dermatologique*, T. IV, by Brocq, under the title of Primitive Generalized Telangiectasis. Very few of the reported cases have had anything like the same extensive distribution as in the one here described. In one reported by Vidal² he calls it *Télangiectasie accidentale symétrique et généralisée*—a female, aged 31, nervous and hysterical; at the age of fourteen noticed the red spots appearing under aspects of the forearms. They extended gradually and appeared symmetrically on the arms, chest, neck, fingers, [403] the backs of the hands, and the lumbar and dorsal regions. Before they came out she was very much troubled with a chronic urticaria, and she had a very marked hyperæsthesia of the skin. Levi³ has reported two cases, the second one, a woman, aged 33, had only 35 spots in all, which had appeared in different parts of the body between 1897 and 1900. In his first case, a woman aged 70, the spots were much more extensive, and with a distribution very much as shown in the photographs here given, but there was not the extreme involvement of the feet and hands.⁴

One or two points about this case require comment. From the statement of the mother there can be little question that

² Bull. d. la Soc. Méd. des Hôpitaux, 1880-81, page 186.

³ Gaz. Hebdom., 1901, p. 13.

⁴ Presse Médicale, 1896.

[403] this is an acquired, not congenital form. Everywhere it is the capillaries, not the small venules that are involved. The appearance of the back and of the arms is not unlike that seen in the most extreme grade of vasomotor mottling. The patient, Juliet D., medical number, 16254, who was in the ward G in October, 1903, had an appearance of the back and feet very similar to this patient. She was also extremely neurotic, but under treatment the mottling entirely disappeared. This is a permanent dilatation of the capillaries of localized areas. The condition of the hands and feet suggests the local asphyxia of Reynaud's disease. The skin of the soles of the feet and the toes was quite purple. The color could be changed to a vivid red by friction. In the interval of a year, which elapsed after I first saw him, no change had occurred, so that it is evidently a state of permanent ectasia of the blood vessels of the skin. Dermographia, common enough in conditions of vasomotor instability, is seen in a marked degree in many cases of neurasthenia. Two other symptoms are of special interest in the case. The recurring attacks of colic, for which no cause could be found, may have been associated with a gastro-intestinal urticaria, that is a localized area of infiltration of the gastro-intestinal wall, such as has been shown to be responsible for the colic in the so-called Hennoch's purpura. The hæmaturia may be a form of so-called renal epistaxis, such as is met with sometimes in Reynaud's disease. Bleeding is a common event in the remarkable generalized telangiectasis of the hereditary form, and some of the cases have been described as hæmophilia. Since the report of the cases in the *Bulletin*, already referred to, I have found another family. The bleeding is usually from the nose, but it may be from the lips or mouth, only rarely from the spots on the skin.



FIG. 1.

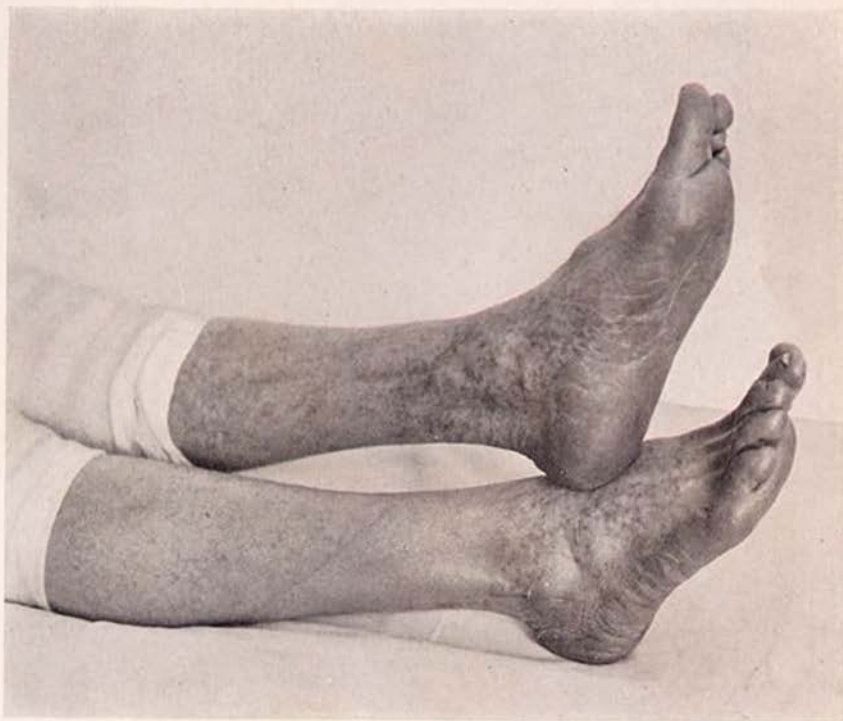


FIG. 3.

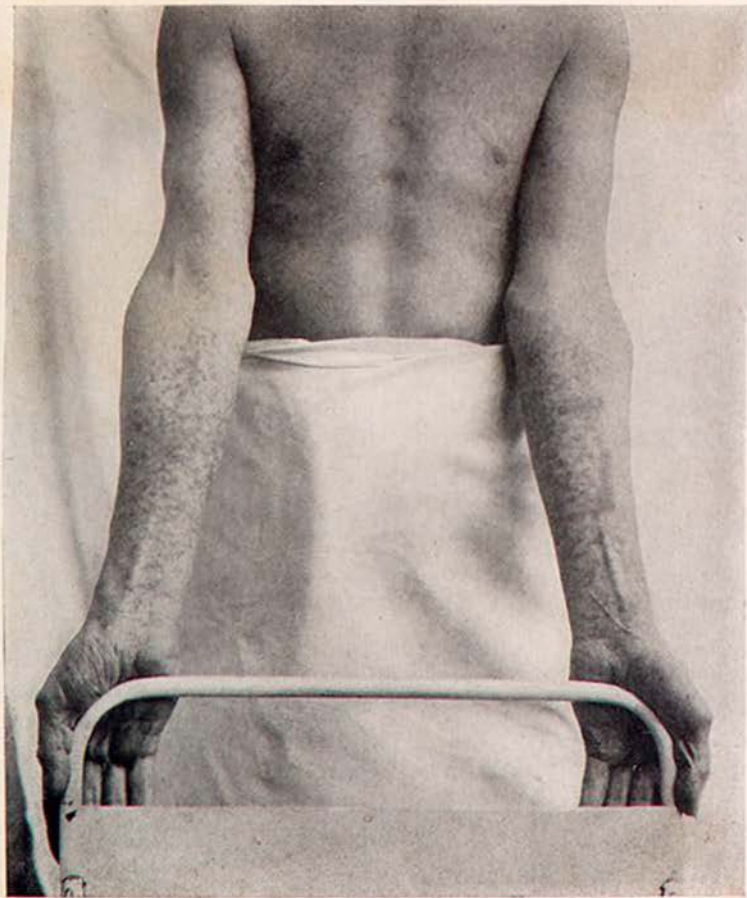


FIG. 2.

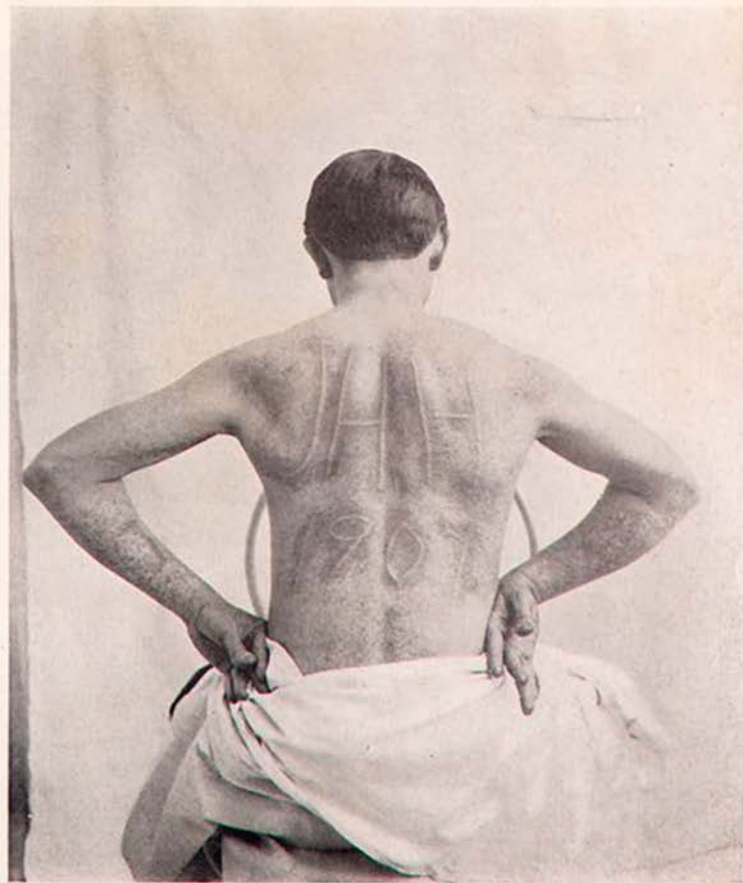


FIG. 4.

A Clinical Lecture

ON

ABDOMINAL TUMOURS ASSOCIATED WITH DISEASE OF THE TESTICLE

Delivered at the Radcliffe Infirmary, Oxford, on March 20th 1907

BY

WILLIAM OSLER, M.D. OXON., F.R.S.

REGIUS PROFESSOR OF MEDICINE AT THE UNIVERSITY OF OXFORD

Reprinted from THE LANCET May 25, 1907

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ON

ABDOMINAL TUMOURS ASSOCIATED WITH DISEASE OF THE TESTICLE.

GENTLEMEN,—Not infrequently the diagnosis of an obscure affection of the abdomen is determined by an examination of the testicles. More than once in my experience the nature of a peritonitis or of an abdominal tumour has been cleared up by finding a tuberculus orchitis; or in syphilis gummata may occur at the same time in the liver and in the testicles. But it is more particularly in malignant disease of these organs that abdominal features are met with, and the case before you illustrates in a singularly complete manner many of the peculiarities of this association.

This well-built fellow, aged 22 years, with a suspicious pallor of the face, was sent by Mr. R. R. Hatherell from Kingston Bagpuze and Mr. Parker has kindly sent him for my clinique. When seven years of age he fell from a tree and injured the left testis which was transfixed by a small spike. Ever since it has been a little enlarged, but it gave him no trouble until about six months ago, when it began to grow and to be a little painful. A few weeks ago he noticed a swelling of the abdomen. He has lost about 8 pounds in weight. The left testicle is of about the size of a small orange, round, and firm; the epididymis is enlarged and there is a gland of the size of a filbert just above it, which I thought at first was the cord. There is no sign of the old injury. In

both inguinal grooves the lymph glands are enlarged and hard, forming visible tumours. The abdomen presents a very remarkable appearance (as illustrated in the accompanying illustrations,¹ Figs. 1 and 2). A prominent mass occupies the left upper quadrant, lifting the costal border, and causes bulging of the eighth, ninth, and tenth ribs. Below it reaches to the level of the navel and to the right a little beyond the linea alba. It appears to descend slightly on

FIG. 1.



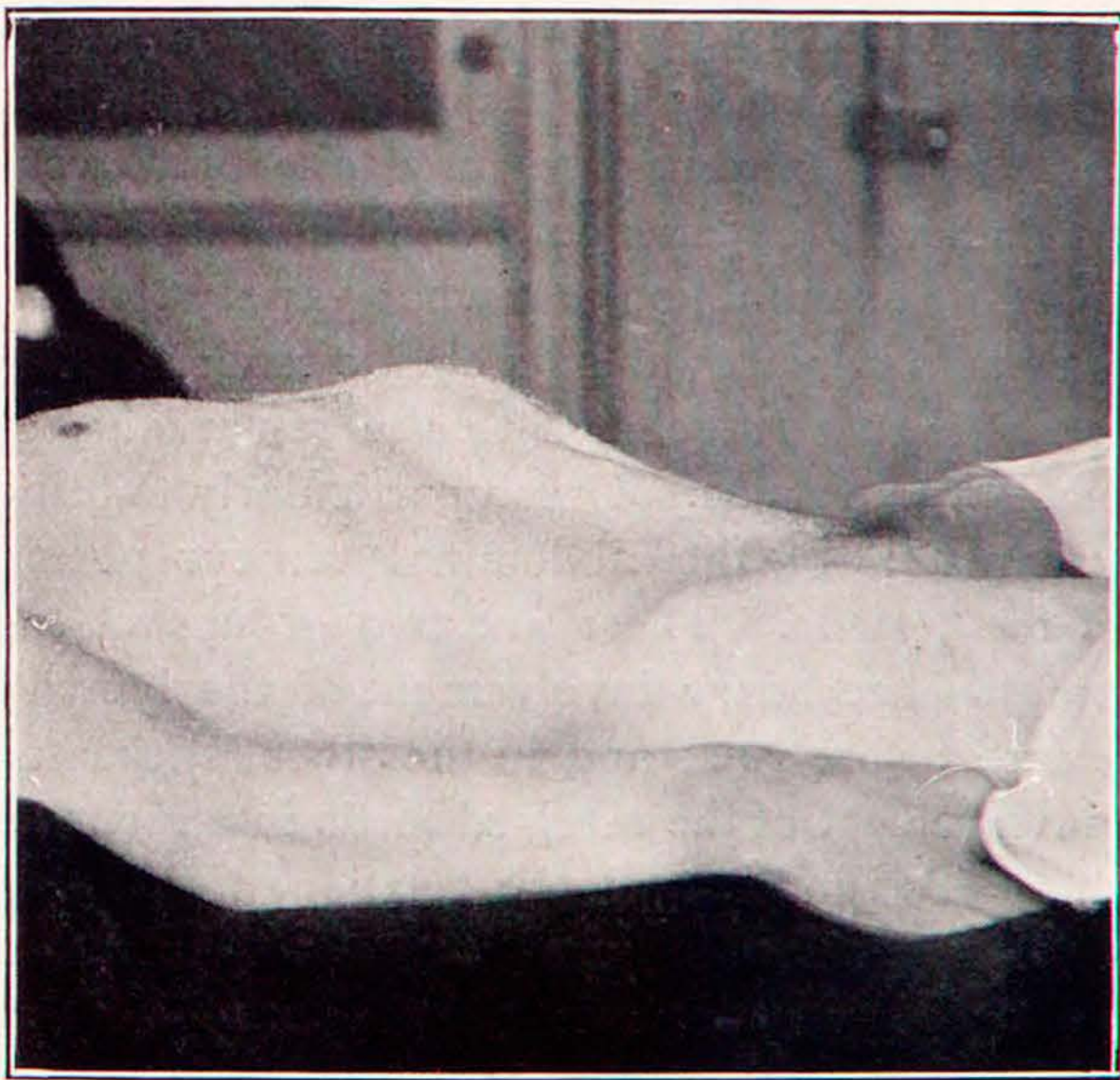
View of abdominal tumour from the front showing the high position.

deep inspiration, and on close inspection there is a shock-like pulsation in the whole mass and in the splenic region. On palpation the mass is very solid and immovable, emerges directly beneath the costal border, and extends to the level of the navel, but below the limits cannot be accurately made

¹ These photographs were taken by Dr. R. H. Sankey on April 9th. The tumour has grown very much.

out. To the right it reaches to the middle line but the epigastrium itself is not occupied nor does the liver appear to be enlarged. Passing deeply in the flank it cannot be grasped between the hands and moved up and down like a renal or splenic tumour. It has rounded outlines without nodules and is painless on pressure, firm, and has a feeble pulsation, not expansile, but just such as one feels in deep-seated abdominal growths. The throbbing of the abdominal

FIG. 2.



View of abdominal tumour from the side.

aorta is felt just above the navel. There are enlarged glands both above and below Poupart's ligament on both sides. There is an enlarged gland just above the left clavicle.

Two very common events in connexion with malignant disease of the testicle are illustrated by this case—the influence of trauma (which in some statistics has been as high as 50 per cent. of the cases) and the very rapid generalisation. Following an injury the tumour may appear in a few months, or, as

in this patient, 15 or more years may elapse. It is well to bear in mind that the course may resemble an acute orchitis. Some years ago I saw with Dr. McGill of Catonsville, a young man, aged 19 years, who had bruised one testis on his bicycle. This was followed by swelling, gradual enlargement, and the tumour persisting the organ was removed. It contained blood and much grumous matter thought to be pus. About a year later he began to fail in health and when I saw him he presented two large tumours in the upper abdominal region, evidently connected with the liver. There was fluctuation and the masses felt like sacs of pus. An exploratory operation showed the condition to be a rapidly growing soft sarcoma of the liver.

The generalisation is, in the majority of cases, through the lymphatics, and, as in this case, may take place very early. I have not sufficient experience with tumours of the testicle to say on simple examination just what variety this is, though from its firmness in places and its elastic tendency in others it is quite possible that it belongs to the remarkable group of embryomata or teratomas. I wish particularly to bring before you the characters of the abdominal tumour in malignant disease of the testicle. There are two groups of cases: (1) the tumour is a secondary involvement of the lymph glands, as in the case before you; and in the other (2) the tumour is primary involvement of the retained testis in a monorchid or a cryptorchid. To understand the relation of the secondary tumours you must bear in mind that the lymphatics of the testicles discharge very high up into the aortic lumbar glands—on the left side into three glands to the left of the aorta just below the renal artery, on the right side into from three to five glands to the right of the vena cava and between it and the aorta. The secondary tumour is, therefore, above the level of the navel, and usually begins in the upper quadrant of the abdomen on the side of the affected organ. This explains the position of the tumour in the present case. It has all the characters of a deep-seated mass which has sprung from the retro-peritoneal lymphatic glands. The solidity of the growth, its depth, the immobility, the absence of an outline conforming to the well-known shape of a renal or a splenic tumour, and

the impossibility of grasping it bimanually, which can be done in the majority of all new growths of the kidney, and the character of the throbbing impulse which is so marked in these deep-seated lymphatic tumours in the neighbourhood of the aorta—all these points favour the view that we have to deal with a large secondary mass involving the lymph glands connected with the left testicle. Here, too, the first glandular barrier has been broken through and the germs have reached the cervical lymphatic gland on the left side. An unusual point in this patient is the involvement of the inguinal glands, which, as a rule, escape, unless the scrotum itself is attacked. Later in the disease the lungs may be involved, the heart, the liver, and other organs. I have already mentioned a case in which there was extensive secondary disease of the liver. It is not always easy to determine the precise nature of an abdominal growth which has developed many years after removal of a testicle. The patient may have gummous orchitis and syphilis of the liver or there may be tuberculosis of one testicle, and years later tuberculois of the liver. This rare association happened in the following case:—

On Oct. 14th, 1903, Mr. L. was sent by Dr. Schofield of Charlestown, West Virginia. Ten years previously he had had the right testicle removed by Hunter McGuire for tuberculosis, but the patient himself said that the nature was doubtful, and a subsequent letter from Stuart McGuire states that the tumour was a sarcoma. The patient had had stomach trouble for a couple of months and a week before consulting me had noticed a lump in the abdomen. He was positive that he had never had any syphilis. He had had good health and had not lost in weight. I dictated the following note: “Healthy-looking fellow; fairly good colour. Tongue is a little furred. Hands are a little pale. Pulse is regular. He weighs 120 pounds. Abdomen is prominent in epigastric region and a mass descends with inspiration, having the unusually great vertical excursion of at least five inches, reaching to a little above the navel. Transverse extent of the prominence is fully three inches. Marked communicated

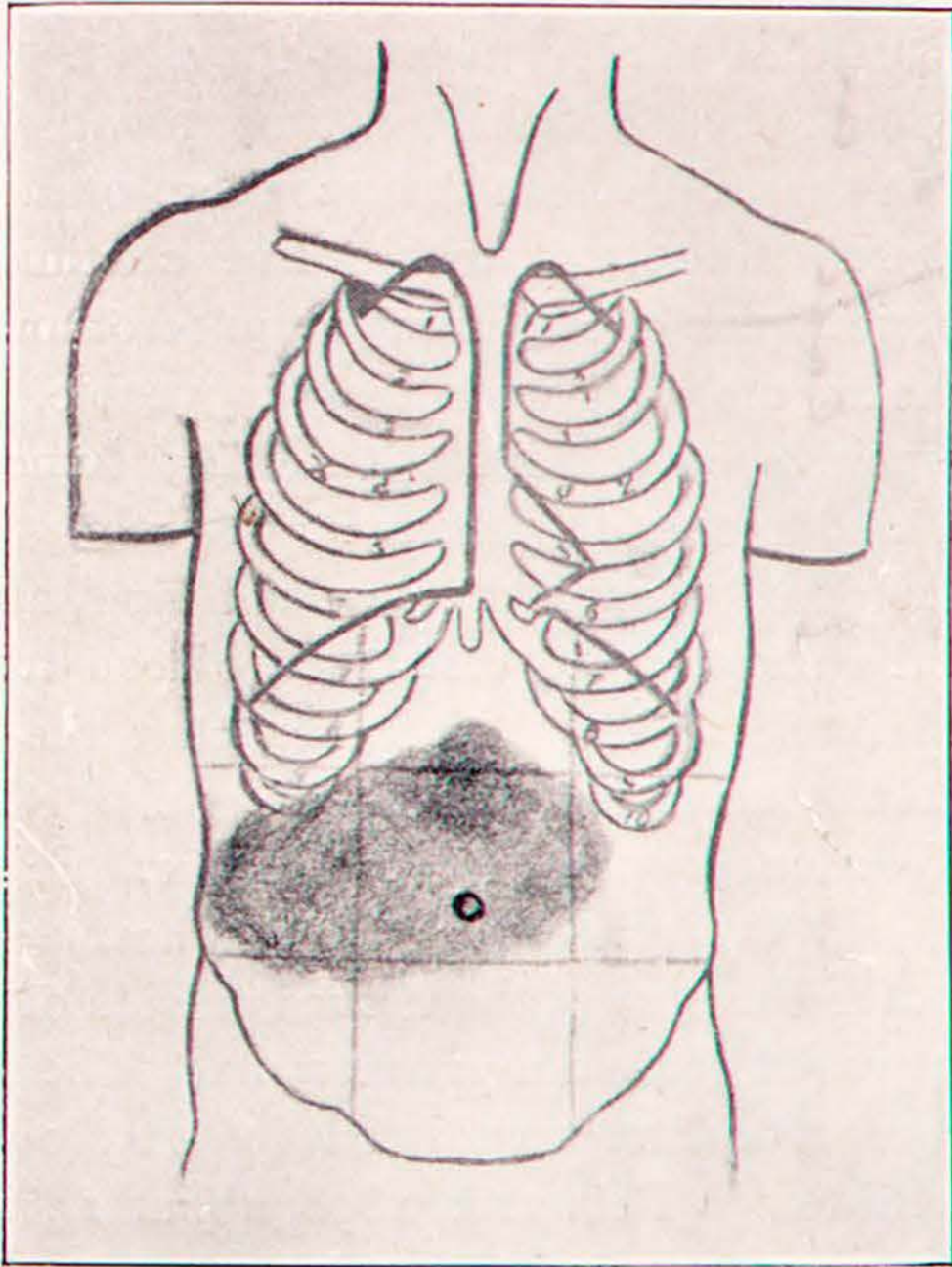
pulsation over whole epigastric region. Right infracostal groove obliterated. Navel is normal. Superficial glands are not enlarged. On palpation the mass corresponds to a firm, hard, ridge-like tumour, very freely moveable, rounded, without a definite edge, but fingers can be got above and below. It is difficult to say whether it is attached to the liver or not. At the outer edge of the right rectus it feels as though it were, and here the edge of the liver is distinctly palpable, fully two fingers-breadth below the costal border. Edge of spleen is easily and distinctly palpable. The mass is singularly painless on palpation. There is resonance over it. Percussion gives upper border of liver at the seventh rib in nipple line. Glands are a little shotty. After inflation of stomach the mass is not nearly so prominent. It does not change specially in position, remains the same, rather less than more resonant. The shadow of its descent is not so definite. The edge is a little more definite and prominent just by the rectus border." My opinion was that he had a sarcoma of the liver following the tumour of the testicle. I urged him to have an exploratory operation. This was done by Ransohoff of Cincinnati, who has reported the case in the *Medical News* of April 16th, 1904. A tumour was found embedded in the left lobe of the liver. The omentum was adherent to the free border. "What was felt as the tumour mass was now found to be the left lobe of the liver hardened and nodular." The tumour was removed with the thermocautery. The patient died on the sixth day after operation from severe vomiting of blood. Dr. Hiller reports that the tumours had the histological features of tuberculosis, though tubercle bacilli could not be demonstrated.

As is well known the testicle retained in the inguinal canal is very often the seat of new growth. In the following case a large abdominal tumour followed removal of a sarcomatous right testicle :—

The patient was a man, aged 36 years (surgical numbers 5936 and 7448). He was admitted to Dr. Halsted's clinique on Oct. 19th, 1896, complaining of a swelling in the right

groin. His family and personal history was unimportant. The right testicle had been undescended but it had been palpable in the right groin. It never gave him any trouble until 18 months ago, when he first noticed that it was enlarged and extended higher up than before. It continued gradually to increase in size but with only an occasional attack of pain on

FIG. 3.



Tumour of retro-peritoneal lymph glands secondary to sarcoma of right testis.

standing or exertion until three weeks ago, when pain was more severe and extended down the leg. The pain was stabbing in character and accompanied by a sensation of itching and tingling. The bowels were constipated; for three weeks he had had frequency of micturition but the urine was scanty. There was no loss in weight and the appetite was good. Examination showed a somewhat sallow complexion; the

mucous membranes were of fair colour, the pulse was normal, and the heart and lungs were normal. With regard to the abdomen, the spleen was not palpable. In the right hypochondrium there was some resistance which was too superficial for the liver. The scrotum contained only the left testical, which seemed normal; the right testicle was absent. Rectal examination revealed a firm prostate. As to the lymphatic glands, in the left axilla was a small nodule of the size of a marble. The submaxillary glands on the left side were somewhat harder than on the right. In the right inguinal region above Poupart's ligament was felt a tumour mass, ovoid in shape, of about the size of an orange, 13 by 11 centimetres, extending from within five centimetres of the anterior superior spine of the ilium to the scrotum. The mass lay just beneath the skin, was freely moveable, and was not tender or sensitive on manipulation. The tumour was very hard, tense, and seemed to fluctuate slightly. The tumour seemed to be just beneath the external ring, and when one invaginated the scrotum the resistance of the tumour above could be readily felt. The patient said that the sensation in the mass was the same as in the other testicle. On Oct. 23rd, 1896, Dr. Bloodgood removed the tumour. It lay beneath the skin and had the usual coverings of a hernia. There was no evidence of infiltration of the tissues outside of the capsule. The tumour proved to be a myxosarcoma. The patient made a uneventful recovery and was discharged on Nov. 15th, 1896. He was readmitted on Feb. 21st, 1898, about 14 months after operation, with recurrence in the retroperitoneal glands. For about six weeks he had been having pains in the back, with swelling of the abdomen, on which account he drank to excess. The bowels had been very constipated. Two days before readmission he had some burning pain and hæmaturia. On Nov. 22nd I made the following note: "Skin decidedly icteroid; scar on right side extending parallel to Poupart's ligament; little fulness of abdomen in right half, chiefly in the upper portion. The left infracostal groove more distinct than right; walls soft, no resistance on palpation. Occupying the central upper portion of the abdomen is a solid, irregular

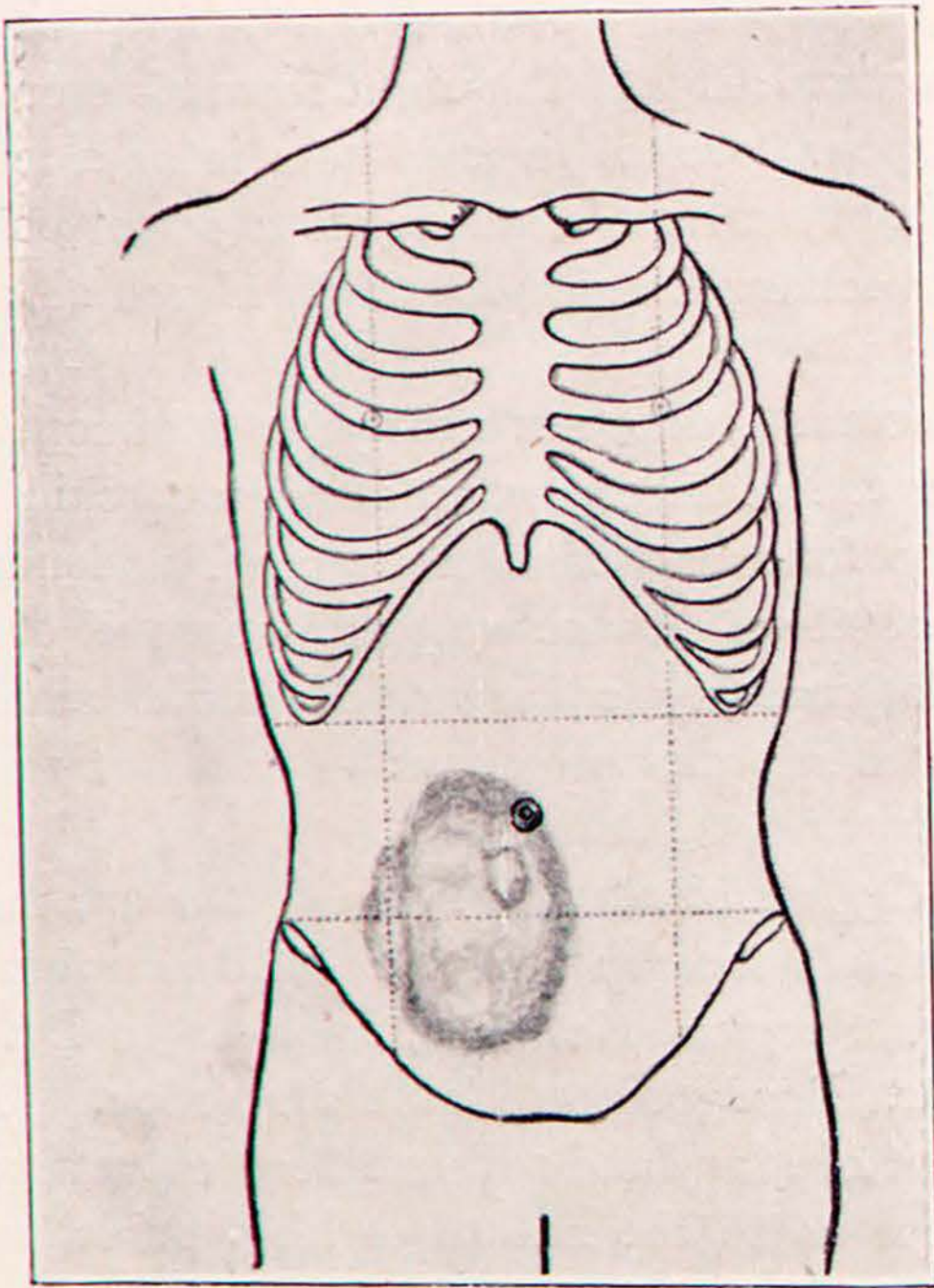
mass; to the right it extends far over into the flank, below to the level of the spine of the ilium. To the left it does not extend so far, but in the epigastric and upper umbilical regions it extends as far as nipple line. There is bulging above the navel. It can be felt most pronouncedly midway between the navel and ensiform cartilage. Outline between mass and liver not clearly defined. It is very resistant and immobile and does not descend with inspiration or posture. On bimanual, the mass seems an unusually deeply placed tumour. Everywhere gurgling in the intestines can be felt, but the edge of the liver is not palpable. The right rectus is more rigid than left. The upper level of liver dulness is on a level with the upper margin of sixth rib and extends to costal border." The patient was discharged unimproved on March 28, 1898.

In the second group, not nearly so common, the tumour originates in the retained testes of a monorchid or a cryptorchid. The following cases have come under my observation; two of them in the surgical clinique of the Johns Hopkins Hospital my colleague Halstead allowed me to demonstrate to my clinical class:—

CASE I. *Cryptorchismus; abdominal tumour; diagnosis of sarcoma of retained testicle; removal; rapid recurrence.*—A man, aged 29 years, Surgical No. 2900, was seen in Dr. Halstead's ward with Dr. Bloodgood on March 21st, 1894. The patient was a resident of Maryland and had been at several clinics seeking advice as to the nature of his trouble. He was a medium-sized, slightly-built man, somewhat effeminate looking in the face, with a fair-sized moustache but with very little hair on the cheeks. He had been pretty well up to six or eight weeks ago, when he noticed for the first time a lump in his abdomen, since which time there had been gradual enlargement and he had lost in strength and weight. He looked pale; there was no fever; the pulse was good. The abdomen was uniformly distended, having the appearance of an ordinary ascites; the superficial veins were not enlarged. On palpation it was moderately tense and fluctuation was

readily obtained. In the middle line on deep palpation a firm, hard body was touched which was felt to occupy the right lower quadrant of the umbilical region and the greater portion of the hypogastric, extending, however, much more to the right than to the left side. The surface was irregular and there was a very marked prominence to the right. It could be moved a little from side to side, but there was too much

FIG. 4.



Abdominal tumour formed by retained testicle.

fluid in the abdomen to make any satisfactory bimanual palpation. It was hard and resistant and in the process of dipping for it with the tips of the fingers it evidently yielded and could be depressed from one side to the other. The scrotum³ was empty but somewhat distended; the inguinal canals² were open and the ascitic fluid passed directly into the sac of the scrotum. Examination by the rectum revealed the

presence of a hard indurated mass on the right side. Considering that the patient was a cryptorchid and the known proneness of the retained testicle to new growth, the diagnosis of sarcoma of one of the intra-abdominal testicles was made. On the 24th Dr. Halsted operated; he removed the ascitic fluid and found a tumour formed by the enormously enlarged and sarcomatous right testicle. The organ had retained its shape; a groove separated the body from the greatly enlarged epididymis. The tumour was greyish-white in colour, firm and hard in some places, soft and partially cystic in others. A portion of growth on the pelvic floor could not be removed. The patient left the hospital on April 14th very much improved in his general health, but returned on May 12th with signs of recurrence.

CASE 2. *Monorchid ; tumour in the right side of abdomen ; ascites.*—The patient was a married man, aged 46 years. Surgical number 2992. He was admitted on April 17th, 1894. His family history was negative. His personal history was negative, except for alcohol to excess until 41 years of age. The present illness began about eight months ago with a sharp sudden pain in the left side of the abdomen of very excruciating character, which lasted about five minutes. This was followed by a soreness for several days in the left ilio-costal space. About three weeks after this attack he noticed a hard tumour in the left side of the abdomen which was painful on pressure. For some months prior to September, 1893, the patient had noticed increasing difficulty in moving his bowels, and this had progressively increased, and now only strong purges or enemata were successful. About December, 1893, he had pain around the neck of the bladder on micturition; now it occurred only occasionally. The tumour had not increased perceptibly in size. He said he had become paler and had probably lost weight. There had never been any blood in the urine or stools. The patient was an emaciated, cachectic man, with pale mucous membranes; the radial pulse was small and weak, with the vessel wall decidedly sclerosed. There was no

general lymphatic enlargement. The abdomen was distended and prominent, particularly in its lower half, where two tumour masses were seen, one in the right inguinal region and the other more to the left of the navel. The abdomen was soft in its upper half, but below and to the right of the navel was felt a large, hard tumour with irregular margins, painful on deep pressure. The small nodule in the diagram corresponds to the epididymis and was more painful than the rest of the mass. The growth was not moveable nor was it adherent to the skin. There was much fluid in the abdomen, which had been increasing since admission. The difficulty in moving the bowels had also increased. The inguinal glands were slightly enlarged and tender. The left testicle was absent and could not be felt, while the right was normal. The inguinal canal on the left side was open, though the internal ring was barely felt. Blood: 4,200,000 red cells, 6500 white. Since admission the fluid had increased in the abdomen and the patient had become weaker. The urine was clear on examination. The patient was discharged unimproved on May 7th as Dr. Halsted refused to operate.

CASE 3. *Monorchid: tumour in the right lower quadrant of the abdomen; operation.*—On April 25th, 1900, I saw with Dr. Henry Jackson and Dr. Cabot in Boston a robust healthy man, aged 45 years. He had had for years an undescended testis on the right side, which had once been just at the inner ring but subsequently had receded. For three or four months he had had irregular pains in the abdomen, thought to be due to gas, chiefly in the right iliac fossa. About six weeks previously Dr. Jackson noticed the presence of a lump in this locality and three weeks previously Dr. Cabot operated and found a large, solid tumour corresponding to the testis but passing deeply and surrounding the vessels in such a way as to make it inoperable. The patient was a healthy-looking man, though he had lost a good deal in weight. He did not look at all cachectic. The hypogastric region was a little prominent and there was a bulging just below and to the right of the navel. On palpation the right inferior quadrant of the abdomen was filled with a

solid mass. Above it extended beyond the level of the navel and to the left about the middle line. It was fixed, slightly irregular on the surface, not painful. The prominence noticed was evidently the colon pushed up to the top of the mass. The fingers placed above Poupart's ligament came directly upon the tumour. There was very little pain. He had begun to have a little uneasiness down the course of the anterior crural nerve. He gradually became cachectic as the tumour increased and died about six months after I saw him.

In this group the tumour is in the lower abdomen, usually on one side, and, as in Cases 1 and 2, it may have the outlines of an enlarged testis with the epididymis attached. It is interesting to note that in two of the cases there was ascites, a not uncommon event in connexion with the solid abdominal tumours, particularly of the ovary.² The general contour of the abdomen in Case 1 suggested simple ascites and the tumour was only discovered on deep palpation. The cases are not very common. Chevassu in his recent study³ has collected 128 cases of tumour of the testicle from recent literature, and of these ten were inguinal and five abdominal. There is not much difficulty in the diagnosis, as very often the tumour has the shape of the testicle with its epididymis. In the cases of Abel⁴ and of Marion⁵ the tumour occurred in hermaphrodites with the external genitalia of women. The nature of the growth was of course not suspected until operation when the uterus and ovaries were absent and sarcomatous change was found in one of the abdominal testicles. The question of prompt surgical treatment is important, as involvement of the glands may occur very early as in this case. The abdominal tumour has been removed in many instances, but

² I have reported two cases of solid tumours of the ovary in which the ascites recurred for many months, requiring repeated tapping, and in both patients the diagnosis of the solid tumour was only made on examination after tapping. Both patients recovered after the removal of the affected ovary and both are alive to-day, one 20 and the other seven years after the operation,

³ *Tumeurs du Testicule*, Paris, Steinheil, 1906.

⁴ Virchow's *Archiv*, Band cxxvi., p. 420.

⁵ *Annales des Maladies des Organes Génito-urinaires*, tome xxiii.

great difficulty has been met with in complete extirpation, as in Case 1. The retained testis lies so close to the posterior abdominal wall that the adjacent tissues are soon involved. Considering the liability to rapid involvement of the lymph glands of the affected testicle it would seem reasonable in all cases to remove them as well as the primary tumour. It adds greatly to the seriousness of the operation, but in young persons the risk is worth taking. It was done by Roberts⁶ of Philadelphia, but his patient was old and fat and the operation was secondary to a recurrence.

⁶ *Annals of Surgery*, 1902

A Clinical Lecture
ON
ERYTHRÆMIA

(POLYCYTHÆMIA WITH CYANOSIS, MALADIE
DE VAQUEZ)

Delivered in the Radcliffe Infirmary, Oxford, on November 28, 1907

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GENTLEMEN,—It is interesting to follow the stages in the recognition of a new disease. Very rarely does it happen that at all points the description is so complete as at once to gain universal acceptance. Albuminous urine and its association with dropsy had been noted before Bright studied the changes in the kidneys and drew with a master hand the picture of the disease which we now know so well. Complete as was Addison's monograph it took a good many years before we recognised fully the relation of the suprarenal bodies to the disease that now bears his name. The original description of simultaneous disease of lymph glands and spleen by the distinguished old Quaker physician, Hodgkin, had not attracted any more attention than had his equally remarkable contribution on insufficiency of the aortic valves (which antedated by several years Corrigan's account), until Wilks, the "grand old man" to-day of British medicine, drew attention to the condition. And so it was with myxœdema, which was well known for years in England before our continental brethren recognised its existence. First a case here and there is reported as something unusual; in a year or two someone collects them and emphasises the clinical features and perhaps names the disease. Then in rapid succession new cases are reported and we are surprised to find that it is by no means uncommon. This has been the history of a very remarkable malady of which the patient before you is the subject.

In 1892 Vaquez, a Paris physician, well known for his researches on the pathology of the blood, described a condition of hyperglobulism with cyanosis, which he believed to be due to an over-activity of the blood-forming organs. Then in 1899 Cabot of Boston reported a case and a second in the following year, and McKeen another Boston case. In reporting a fifth case Saundby and Russell seem to have been the

first to realise that the condition was a "definite clinical entity and one which was new to medical science." In 1901 I had become greatly interested in the question, having under observation a case of chronic cyanosis with a very high blood count. Then in quick succession I saw two other cases and these formed the basis of a paper¹ in which I brought forward the available evidence in favour of the view that we had to deal here with a new disease. In the following year I returned to the question and was able to summarise 17 cases.² Within the past three years the literature on the subject has grown apace. From almost every country cases have been reported. The Index Medicus for 1906 has 12 references to papers, while in the numbers for this year to date there are 17. Papers of great value have been published by Türk of Vienna, Weintraud of Wiesbaden, Bence of Budapest, Senator of Berlin, Parkes Weber, Robert Hutchison, Watson and Saundby in this country, and by Engelback and Brown and by Howard Anders in the United States. There are now at least 70 cases on record, which indicates that we are dealing with a fairly common affection and one which, like myxœdema, only requires to be known to be recognised.

The patient before you illustrates in a typical way the features of the disease. We are much indebted to Dr. E. Morton, of Woodstock, who brought her in and to Dr. W. P. Richardson of Blisworth, Northampton, who has arranged for her to return for a more careful study. A married woman, aged 54 years, with five children, she has had all her life exceedingly good health. For the past three years she has not been so well, suffering with pains in the hands and feet, which a medical man whom she consulted called neuritis. She has been able to attend to her work, but of late years has lost somewhat in strength. She has not been short of breath and she has not had headaches. About a year ago she noticed that the abdomen was swollen. For some time she has known that her face has changed in colour. It is darker and in the cold becomes intensely blue. The hands and feet, too, have become blue, particularly the feet and legs after she has been walking about, and they are at times painful. Altogether, the history presents very few points of moment and the condition has come on insidiously in a very healthy woman. When admitted the cyanosis was extremely marked and the house physician, Dr. J. W. S. Macfie, an old pupil of Dr. G. A. Gibson of Edinburgh, and who naturally knows all about cyanosis, immediately made a blood count and had the diagnosis of the new disease ready for us.

The patient's appearance at once attracts attention. The face has a dusky hue and the lips a purple tint; she rests quietly without dyspnœa and with the head low. Over the cheeks and nose there are numerous small distended venules.

¹ American Journal of the Medical Sciences, 1903.

² Brit. Med. Jour., Jan. 16th, 1904.

The conjunctivæ are not suffused ; the tongue is of a deep, purplish-red colour. The hands and feet are very much cyanosed, though not so deeply as they were on admission. She tells us that after very slight exposure to cold they become livid. One remarkable circumstance is the degree of vaso-motor instability. If the hand of a healthy person is held down for a little while there is a slight and perceptible change in colour, but it does not become actually cyanosed unless, perhaps, in cold weather. Usually, however, a marked difference in colour is noticed and when held up above the head the skin gradually becomes pale again. You can see the change, for instance, in a normal hand in a very few seconds. When this patient holds the hand down within 30 seconds the veins become turgid and full and the skin of a deep-blue colour ; held up the blood rapidly leaves the hand and it becomes pale. The effect of posture is still more striking in the feet. If she sits on the edge of the bed for a few minutes the legs, as high as the knees, become purple. One can almost see the blood drop into them. When she returns to bed and the leg is held up the blood very quickly runs out and the skin becomes pale. Over the general surface of the body there is a dusky tint which is best seen by pressing the hand firmly upon the skin of the abdomen or the back. The anæmic impression remains for some seconds and is very slowly obliterated. Another feature of interest about the skin—when a series of lines are drawn with a sharp edge the usual reaction is hyperæmic (which from its intensity in some conditions of the nervous system has been called the *tache cérébrale*), the result of a vasodilator action. But here just the opposite takes place. Along the line of irritation there is a vaso-constrictor action in the small arterioles and the lines stand out as bands of anæmia, in this instance of unusual width, fully four millimetres on each side of the line.³

The second feature of importance relates to the abdomen, the skin of which is relaxed and scarred, and to the left of the umbilicus there is a marked prominence. On palpation this is easily made out to be a greatly enlarged spleen ; the edge is just at the navel but to the left it extends fully four fingers' breadth below this level. Into the left flank the edge may be readily traced, where it is two fingers' breadth above the anterior superior spine of the ilium. A notch is readily palpable and when grasped in the two hands the whole organ is freely moveable. The flatness on percussion extends as high as the eighth rib. The liver is not enlarged and there is nothing else of any moment

³ This "white line," one of the most interesting manifestations of what S. Solis-Cohen calls vaso-motor ataxia, is met with: (1) in many normal persons; (2) in hysteria and neurasthenia; and (3) in conditions of cutaneous irritations when dermatographia may be produced. It may come out and persist as a white line; transient hyperæmia may precede it, active hyperæmia may follow it, or occasionally factitious urticaria. Recent French writers have suggested its association with adrenal insufficiency.

in the abdomen. Except for the cyanosis and the dilatation of the superficial veins there is nothing of special moment in the circulatory system. The apex of the heart is tilted into the fourth interspace, but the organ is not enlarged. The sounds are clear at the apex and base and there is no special accentuation of the aortic second sound. The pulse is 96 and the blood pressure is 118. The superficial arteries are just palpable. There are numerous petechiæ scattered over the skin of the legs. The examination of the lungs is negative. There is no emphysema. The third point of special interest is in the examination of the blood, which flows in a large drop from finger or ear when pricked, and is sensibly richer in colour than normal and the drop is unusually viscid. A number of counts have been made which show the red blood corpuscles to range from 9,200,000 to 9,710,000 per cubic millimetre; the leucocytes are about 24,000 per cubic millimetre and the hæmoglobin from 130 to 160. The red blood corpuscles look normal; the average diameter is 7·5 microns. There are a few poikilocytes. The most striking feature is the presence of a number of nucleated red blood corpuscles of all forms. A differential count of the leucocytes show polymorphs 73·6 per cent., lymphocytes 18 per cent., large mononuclear forms 3·6, and coarsely granular eosinophiles 4·8 per cent.

Dr. G. Mann has estimated for me the specific gravity of the blood which is 1·0755; the normal average is 1·0777. He has also very kindly made a comparative estimate with the hematocrit of the ratio of plasma and corpuscles, which was the following:—

Patient.					Normal person for control.				
Red cells	...	...	...	76·5	Red cells	...	...	...	48·5
White cells	...	...	...	4·85	White cells	...	...	...	3·0
Plasma	...	...	...	18·67	Plasma	...	...	...	48·5

Dr. G. Mann estimated that the patient had fully 58 per cent. more red blood corpuscles than the normal individual. Miss Mabel Fitzgerald has estimated on several occasions the alveolar CO₂ by Haldane's method and it was found to range from 4·13 to 4·61, just at the lower limit of normal. The urine looks normal. Dr. W. Ramsden of the physiological laboratory has made a careful study of it with the view of determining the presence of an excess or abnormality of the pigments. The specific gravity is 1016. A small quantity of albumin is present. There is no sugar, the pigments normal and not in excess; urea was 18 grammes for the 1000 cubic centimetres; the chlorides 5·8 grammes.

You must not expect to see in every case the triad of symptoms so well marked as in this patient. I think you will agree with me that we have here a condition which does not conform to any known disease and I am in full accord with those who regard it as a hitherto unrecognised affection of the blood-making organs. We may now discuss the features in greater detail.

The cyanosis, the signal symptom, which at once calls attention to the condition, has been present in a great majority of the cases. And yet it is accidental and at any time can be made to disappear.⁴ Keep this patient for an hour or even less at a temperature above 80° and the cyanosis will change to a vivid red. The first case I saw presented remarkable alterations in this respect. In the hot summer days he was "red as a rose" and looked bursting with blood and in the winter he became as blue as indigo. The colour of the skin in health depends on two circumstances—the degree of fulness of the peripheral vessels and rate of the circulation in them. There may be general pallor and apparent anæmia with a normal blood count. These pseudo-anæmias are most interesting and deceptive. Only the other day I saw a young girl who at once attracted attention by her colour, or rather by an entire absence of colour, but when I remarked upon it she answered, "Oh, I never worry about that, I was born pale." The symptoms did not suggest anæmia, but I was not prepared to have a report from Dr. A. G. Gibson that she had more than 5,000,000 of red blood corpuscles to the cubic millimetre. It is a matter of local distribution. Just the opposite condition may be present—the colour may be good with pronounced anæmia. The old writers recognised a *chlorosis rubra*. A few years ago there was admitted to Ward E of the Johns Hopkins Hospital a well-built, healthy looking man, complaining of shortness of breath and palpitation of the heart. His colour was high and due, as could be seen with a lens, to fulness of the small venules of the skin. Even the skin of the body looked reddish. To our astonishment the count was 2,000,000 of red blood corpuscles per cubic millimetre. We called the case anæmia rubra. It was not until the count sank below 1,200,000 per cubic millimetre that the features of anæmia became evident.

In individuals, and indeed in nations, there are remarkable differences in the degree of fulness of the cutaneous vessels. The out-of-door life and the damp cold, plus sometimes the plethora-producing beer and the vaso-dilator influence of spirits, tend to make the exposed skin of the Englishman much more vascular than in his American or colonial relatives. Chillblain, so common in this country, is one expression of this extreme local congestion under the influence of cold. A state of permanent turgescence of the capillaries and small veins of the hands and face may be entirely local—the feet may not be involved—and is usually of no moment, save in women who worry over the appearance and appeal to us—in vain, I fear—for help. I saw one rare sequel of this chronic engorgement of the vessels of the hands—viz, clubbing of the fingers. The man had had for 20 years or more a red face and red beefy-looking hands—in

⁴ When this patient was shown at the Clinical Section of the Royal Society of Medicine as the room got hot and doubtless in part due to the excitement her colour changed and the skin lost the cyanotic hue.

the winter always blue and cold. There was no heart lesion. He had noticed the change in the shape of the terminal joints for five or six years.

The other circumstance upon which the colour of the skin depends is the rate of blood flow. If now I rub vigorously this patient's left hand, or place it in warm water, the activity of the circulation in the skin is increased, as can be seen at once by the rapidity with which an area of pressure anæmia is filled up. And with the increased rapidity of blood flow the colour changes from a reddish-purple to a bright red. In the one the blood is arterial, in the other venous; the change in colour is due to a rapidly produced change in the rate with which the blood passes through the capillaries of the skin. Normally the current is so rapid that the tint of the skin is arterial. Cyanosis results whenever the capillaries are full and the current is slow. The factors must be combined. Conditions in which the stream in force and volume sinks to a minimum may be associated with pallor, not with cyanosis. I had once a unique experience. I remember it well, as the patient was one of the first to apply after the opening of the Johns Hopkins Hospital. She had Raynaud's disease and held up her right hand, the fingers of which presented a remarkable appearance. The little one was normal, the ring finger was as white and as cold as marble, the middle finger was deeply cyanosed (local asphyxia), while the index finger was as "red as a rose." There was probably just as much blood in the index as in the middle finger, but in the one the arterial sluices were wide open, the capillaries distended, and the stress rapid, while in the other the arteries were contracted, the capillaries full, and the stream slow. In the dead-white ring finger there was probably more than contraction of the arteries and slowness of the stream—an angio-spasm involving all the smaller vessels, arterioles, capillaries, and venules. In the patient before us there may be two accessory factors favouring slowness of flow in the terminal vessels. The observations of Parkes Weber, Haldane, and others have shown that the whole volume of blood is greatly increased. In one case Haldane estimated the total amount to be more than double the normal. With this the specific gravity is higher than normal. But another element, the viscosity, is still more important and this has been shown by many observers to be greatly increased. It may be readily seen with the drop as it flows, for example; it takes an unusually long time to spread under a covered glass. It would, of course, be in the capillaries that this increased viscosity would be effective.

There is one other factor in inducing cyanosis upon which Saundby, very rightly, lays great stress—namely, the dilatation of the venules and the loss of tonicity in the peripheral veins. In this patient the cyanosis in the legs is a question altogether of gravity. Dependent they are blue, held up they become pale. As she is recumbent in bed they are of a dusky purplish red. We must not forget, however,

that cyanosis is not altogether a question of stasis and capillary engorgement. The peculiar colour is a corpuscular affair depending upon the hæmoglobin whether oxidised or reduced. There are remarkable forms of cyanosis in which the colour of the skin is altogether due to changes in the hæmoglobin: the methæmoglobinaemia due to the taking of the coal-tar products, the enterogenous cyanosis which has been studied and reported by the Dutch physicians (Stokvis and Talma) and by Samuel West and Wood Clarke in this country, and the form reported by Gibson and Douglas in which colon bacilli were isolated from the blood. West and Clarke give an analysis of all the recorded cases of this idiopathic cyanosis, both met- and sulph-hæmoglobinaemia. It has been called enterogenous on the view that the change is due to the action of substances absorbed from the bowels. The tint of skin and mucous membranes of both toxic and enterogenous forms differs from that of ordinary cyanosis and may be recognised at a glance, as it is rather an ashen-grey lividity, suggesting a light type of argyria. A popular American headache remedy introduced of late years into this country is responsible for many cases, and on several occasions I have put the question point-blank, "Have you been taking ——?" There is a certain characteristic colour of the polycythæmic cyanosis which is referred to by Cabot and one or two other observers—a sort of red Indian hue which is most marked in circumstances when the arterial is just beginning to obscure the venous tint. And one more point may be mentioned; as with all conditions in which there is persistent hyperæmia of the skin pigmentation may occur; this was very marked in a case of Stockton and Lyon. There have been cases reported in which the pains in the hands and legs with the extreme congestion have suggested the erythromelalgia of Weir Mitchell—the red, painful neuralgia. In Joseph Collins's case this was a very marked feature and the patient complained a good deal of pains in the hands and feet, but in the few cases of erythromelalgia I have seen only one extremity was attacked, and it was, as its name indicates, a red erythema, not influenced by gravity to any extent. The extreme grade of local asphyxia may suggest Raynaud's disease, and this has been the diagnosis in a case which Dr. W. S. Thayer very kindly showed me.

For the recognition of the disease a blood count is necessary, not simply a blood examination, as in the cases of leukæmia. The essential feature, the *polycythæmia*, the *erythræmia*, can be determined only by counting the number of red blood corpuscles in a cubic millimetre. A true polyæmia, a plethora vera, is present. Haldane estimated that a patient of Parkes Weber had nearly double the normal amount of blood and post mortem the cases have shown a state of great fulness and engorgement of the internal vessels. This is another point of analogy with leukæmia, in which also there may be an extraordinary increase in the total volume of blood. The counts have been very remark-

able—this patient has nearly double the normal. Cabot has reported 12,000,000 per cubic millimetre, and in a case of Köster the count was 13,600,000 per cubic millimetre. The question has been raised whether it is possible to pack this number of red blood corpuscles into a cubic millimetre. Dr. G. Mann, who has interested himself in this point, tells me that it would be possible to put 13·9 millions of red corpuscles into this space, so that the maximum recorded count is within this limit. You might suppose that in every condition of local engorgement with cyanosis the blood count would be high, but this is not the case. In a case of alcoholic neuritis with legs just as purple as those of this woman, in Raynaud's disease, in the skin of a "Bardolphian" facies bursting with blood, the number of red blood corpuscles per cubic millimetre may be normal.

The *enlargement of the spleen* is variable. It rarely reaches the size seen in this patient. Cases have been reported in which the edge of the organ has reached the crest of the ilium. It may precede the occurrence of the cyanosis and it may not have been noticed during life but have been found post mortem. It has been present in a large proportion of all the cases.

Many additional features have been noticed. This patient presents very few symptoms, only pains in the hands and feet and a slight loss of vigour. Headache has been a common complaint and a distressing sense of fulness with occasional attacks of vertigo. One of my cases had recurring attacks of nausea and vomiting. Constipation is a very common symptom. High blood pressure is the rule and it is remarkable considering the great increase in the volume of blood that it is not increased in the present case. Sclerosis of the superficial arteries and a trace of albumin in the urine have been frequently noted. In the first case I studied this combination of albuminuria, high blood pressure, and arteriosclerosis had suggested a diagnosis of Bright's disease. Attacks of bronchitis and of asthma have been described. In Case 1 of my series during the winter season piping râles were constantly present in the bronchial tubes. Hæmorrhages have occurred in a number of instances, sometimes petechial, as on the skin of this patient, sometimes from the mucous membranes—hæmoptysis, hæmatemesis, or hæmaturia. Death from cerebral hæmorrhage has occurred in several instances.

We scarcely know enough to discuss intelligently the pathology of this interesting affection but there have been five or six post-mortem examinations within the past 18 months which throw some light upon the condition. Theoretically, polyglobulism may be due to a diminished destruction of the red blood corpuscles, to an excessive loss of plasma, and to an increased production of red cells. A relative polycythæmia is by no means rare and occurs in many clinical conditions associated with loss of fluids. It rarely reaches the high grade seen in these cases. Weintraud suggests that the polyglobulism of this disease is due to retarded destruction but there are no clinical or anatomical facts in support of this

view; nor, on the other hand, is there any evidence of increased hæmolysis in the deposition of pigment in organs, such as occurs in hæmachromatosis, or in changes in the proportion of the urinary pigments. A true erythræmia follows a residence at high altitudes and is present in congenital heart cases, in both probably an adaptive process, more corpuscles being required to carry on the O_2 metabolism. The studies on the bone marrow by Miller and others have shown it to be in a state of active hyperplasia in congenital heart cases. Recently Ambard and Fiessinger⁵ have reported a case of congenital cyanosis with polycythæmia in which there was the most intense proliferation of the bone marrow.

In this splenic polycythæmia there have been at least six post-mortem examinations—all with practically the same anatomical changes—a plethora vera; intense hyperplasia of the bone marrow, a myelomatosis rubra; and enlargement of the spleen, with histological changes indicative of chronic passive congestion, a uniform hyperplasia of all its elements. It may be that the spleen participates actively in the process, as the histological studies do not indicate that it is an enlargement due to the accumulation of the products of hæmolysis. Neither spleen nor lymph glands ever lose their power of making red blood corpuscles, though in normal states in the adult they hand the function over to the bone marrow. But even with an undoubted evidence of myelomatosis we are not nearer the essence of the disease—the *why*—the cause of the mysterious flooding of the body markets with the products of its red-blood factories. From a score of causes the output may at any time be doubled, either by working overtime or by setting in motion all the blood-making machinery. After a hæmorrhage the little discs are turned out in countless billions and if from any cause, as in high altitudes, or in congenital heart disease, there is trouble in the lung-exchange to barter the CO_2 for the O_2 , an extra supply of corpuscles is soon forthcoming to make up the defect. Nothing is more certain—in the microcosm as in the macrocosm, given a demand and there is soon a supply. But here is a condition in which, so far as we know, there is an over-supply without any corresponding demand and the same riddle confronts us as in leukæmia and several other diseases of which over-production of a normal tissue or element is the essence. The interesting suggestion has been made by Korányi and Bence that the disease is due to a lessened power of the red blood corpuscles to absorb oxygen. Given a hæmoglobin of poor quality, incapable of combining normally with O_2 , a greater number of erythrocytes would have to be manufactured to meet the usual demands of the system. With this, too, they regard the increased viscosity of the blood as an important element in producing the

⁵ Arch. de Med. Experiment. Mars., 1907.

cyanosis. Saundby has brought forward the view that there is such a state of capillary dilatation with slowing of the blood current that each little boatlet of blood cannot discharge its proper cargo, and to make up for this failure more are put into circulation, the antithesis of the condition existing at high altitudes when as each little boatlet cannot get a sufficient cargo of O_2 in the space of time it remains in the lung capillaries, three are sent out to do the work for which two usually suffice. The remarkable combination of symptoms is one which lends itself to theoretical considerations. We have not yet got to the heart of the mystery of leukæmia, and in this remarkable disease is added another to the many interesting problems relating to the physiology and pathology of the red blood corpuscles.

A word about the name, always a difficulty in connexion with a new disease. The choice lies between an eponymic, an anatomical, or a symptomatic name. The one suggested by Parkes Weber—splenomegalic polycythæmia—has been adopted in this country. In France it has been called *maladie de Vaquez*, or *Vaquez-Osler*, and in the United States some of my friends have been kind enough to associate my name with it. But the priority of description rests with Vaquez and if a name is to be associated with the disease it should be that of our distinguished French colleague. Among other names which have been suggested are *polycythæmia rubra* and *erythrocythæmia megalosplenica*. In many ways the name *erythræmia*, suggested by Türk of Vienna, seems to be the most appropriate. It is short and it designates the most striking and the most constant peculiarity; it has the great advantage of an analogy with leukæmia, and both affections are associated with states of morbid activity in the bone marrow.

We know as yet very little about the treatment of the disease. As a long experience with leukæmia has demonstrated, we have nothing at our disposal which controls the morbid processes in the bone marrow. Two or three measures have been carried out which have given relief. When there are fulness of the head and vertigo repeated bleedings have been tried with great relief. Inhalations of oxygen have been used and cases have been reported in which the cyanosis has been relieved and the number of red blood corpuscles greatly diminished. We shall ask to have this given a thorough trial and Dr. Sankey has agreed to apply the x rays over the spleen, which seems to have been helpful in some instances of enlargement of the organ.⁶

⁶ For a month this patient has had the oxygen inhalations daily and the x-ray treatment. She has gained several pounds in weight and is feeling very much stronger. The oxygen inhalations have had no influence on the cyanosis, nor is there any change in the polycythæmia. The spleen is somewhat reduced but the cyanosis this morning (Jan. 1st) is very marked.

VIENNA AFTER THIRTY-FOUR YEARS.

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I spent the first four months of 1874 here. I came from Berlin with Hutchinson, an Edinburgh man (Sir Charles F., who has recently died), and we lived together near the *Allgemeines Krankenhaus*. As illustrating the total blotting out of certain memories, particularly for places, I may mention that strolling to-day up the *Alserstrasse* I could not recall the street, much less the house, where we had lived for the four months. I found my way readily enough to the *Riedhoff*, where we were in the habit of dining, and where I first met my old friends, Fred Shattuck, E. H. Bradford, E. G. Cutler and Sabine of Boston. An extraordinary development has taken place in the city within thirty years, and I scarcely recognized the *Ringstrasse*. Then, only the foundations of the new university buildings and of the *Rathaus* had been begun. Now these, with the parliament house, the courts of justice, the twin museums of art and natural history and the new Bourg Theater, form a group of buildings unrivaled in any city.

THE GERMAN CONGRESS FOR INTERNAL MEDICINE.

The primary object of my visit was to attend the *Congress für Innere Medizin*, and I had the pleasure of having with me my old student and friend, Dr. Joseph H. Pratt of Boston. We reached Vienna in time for the preliminary Sunday evening social gathering in the *Kursalon* of the City Park. Here we found a greeting in true German fashion and a hearty welcome from the president, Professor Müller of Munich. The work of the congress began at sharp 9:30 on Monday morning with a discussion on the "Relation of the Diseases of the Female Generative Organs to Internal Maladies." Unfortunately, the large University Hall, in which the meeting was held, was most unsuitable. Though seated not very far away, Professor Rosthorn's remarks were almost inaudible. It is a miserable mistake in introducing a discussion on any subject to speak for more than half an hour, but to continue for an hour and a quarter is too much for human endurance, and a great many did not wait for Professor Lenhartz's discussion of the problem from the standpoint of internal medicine.

Nothing new was brought out, and so far as I could gather, Professor Rosthorn took much the same ground as Clifford Allbutt in his well-known Goulstonian lectures dealing with the intimate relationship through the sympathetic nervous system of the generative functions with those of the other organs.

Quite an animated discussion followed, in which Stintzing, Turban, Klemperer and others took part. Dr. Singer read a most interesting paper on "Intestinal Diseases in the Climacteric," calling attention particularly to frequent hemorrhages which he had known to arouse suspicion of malignant disease.

In the evening the city fathers gave a magnificent banquet to the congress in the superb hall of the *Rathaus*. At three long tables were seated some 600 guests.

On Tuesday morning Professor Neisser of Breslau opened the discussion on the "Present Position of the Pathology and Therapy of Syphilis." This was a splendid address, delivered without notes, in a good clear voice, and the subject matter arranged in a most orderly manner. He dealt particularly with the three points brought out by recent investigations—Schaudinn's discovery of the spirochete, the discovery of Metchnikoff that apes could be infected, and the discovery of Schaudinn that the fluids of infected persons reacted specifically. He dealt very fully with his own experimental work in Java, much of which has appeared, but it was particularly interesting to hear the relation of the extraordinary influence of atoxyl on the infected animals. It acts as a specific and prevents the development of the spirochetes, so that if given soon the disease could be completely stopped, and later the animal reinfected. Neisser was followed by Professor Wassermann, who described with great clearness his studies on the specific reaction. We have now apparently a diagnostic means by which the presence of the disease may be definitely determined at a very early stage. As the reaction may be present before secondary symptoms appear, it will have a very important influence in early treatment. The general expression of opinion is very favorable to the method. Professor Finger spoke of it to me in the warmest terms. It persists after all clinical symptoms have disappeared, and a positive response in locomotor ataxia and in general paralysis clinches the question of the true syphilitic nature of these maladies. Both Neisser's and Wassermann's addresses were models.

One of the most important communications of the congress was from von Noorden's clinic. Two of his assistants have been carrying on researches on the "Mutual Relations of the Pancreas and Thyroid." For many years von Noorden has had the idea that there was some important mutual influence between these two organs. The remarkable fact comes out that in animals from which the thyroid gland has been removed it is impossible to produce diabetes by any of the

known methods, not even by the Claude Bernard puncture of the medulla.

Of the third day of the congress I saw but little. Professor Schmidt of Halle introduced a discussion on "New Clinical Methods of Investigating the Functions of the Intestine," in which he went over his recent work very fully, most of which has already been referred to in THE JOURNAL.

DINNER TO THE CONGRESS.

At the dinner of the congress His threw out the interesting suggestion (apropos of the presence of Grünbaum and Trevelyan from Leeds, Pratt from Boston, Barr from Portland, Ore., and myself), that the time had come to have an International Congress for Internal Medicine. The physiologists, the laryngologists, the alienists and others have such gatherings, and there now exist in France, Germany and Italy, England and the United States special societies devoted to internal medicine. A congress once in four or five years would be most helpful. We should get to know each other and be able to appreciate better the work done in different countries. Professor Schultze of Bonn gave his usual humorous sketch of the proceedings of the congress, which was greatly appreciated. A ripple of excitement spread around the tables when it was noticed that the places in the orchestra of the pianist and the first violin had been taken by von Neusser and His. The members gathered around the elevated gallery and the distinguished artists were greeted with loud applause and had a vigorous encore.

THE VIENNA LIBRARIES.

Prof. Max Neuburger, whose name is so well known in association with Pagel as editor of the "*Handbuch der Geschichte der Medizin*," very kindly arranged to show me the points of interest in the Vienna libraries. I may mention, by the way, that Professor Neuburger's new work on the "History of Medicine," of which one volume has appeared, is being translated and will be published from the Oxford University Press. He expects to have Volume II completed this year, and we hope to issue the English edition complete in one volume within the next fifteen months. I was greatly interested to see the new home of the *Wiener medizinische Gesellschaft*, built under the presidency of Billroth, which combines features of a library, a club and meeting place. The auditorium is exceptionally well arranged with seats for 300, and there is a large gallery. The library now numbers more than 40,000 volumes and is very rich in current periodicals. The university library is one of the largest in the city, and the arrangement in it for the accommodation of the medical students seems to be excellent. At the time of our visit the section of the reading room assigned to them was nearly full. A room has been set aside in connection with the medical

faculty for the collection of all the literature relating to the history of the school, for the collection of the works of all the famous old men connected with it, and a repository for pictures and instruments, etc., the whole to form a collection illustrating the evolution of the history of the medical department of the university. This example could very well be followed in all of our medical schools. It has been done to some extent at the University of Pennsylvania, as William Pepper III. has already made large collections for this purpose.

The *Hofbibliothek* is unusually rich in manuscripts and early printed books. I was anxious to see the copy of "Christianismi Restitutio" of Michael^s Servetus, 1553, in which for the first time the lesser circulation is described. This is one of the only two known copies in existence. The entire edition was confiscated, and the author, at the time a practitioner in the little town of Vienne, near Lyons, fled for his life to Geneva. Here his heterodoxy was quite as obnoxious to Calvin, into whose hands he fell, and he was burnt at the stake in the same year. The "Restitutio" is one of the rare books of the world. Only two of the 1,000 copies known to have been printed have survived. The one in the *Bibliothèque Nationale* originally belonged to Dr. Mead, and the history is fully given in an appendix in Willis' work, "Servetus and Calvin." The Vienna copy is in excellent preservation, beautifully bound, and states on the title page that it came from the library of a Transylvanian gentleman living in London. It fell into the hands of Count de Izek, who presented it to the emperor of Austria. It is a thick, small octavo of about 700 pages. The first one to give credit to Servetus for his discovery of the lesser circulation was Wotton, whose "Reflections Upon Learning, Ancient and Modern," 1694, is a most interesting book, for an introduction to which I have long been grateful to my friend, Dr. Norman Moore. The other work that I was most anxious to see was the famous manuscript of Dioscorides, prepared at the end of the fifth century for Julia, daughter of the Emperor Flavius. It is one of the great treasures of the library. Now to us in the West only a name, Dioscorides, an army surgeon of the time of Nero, fills a great place in the history of medicine, and is still an oracle in the Orient. He was not only a great botanist, but he was one of the first scientific students of pharmacology. Scores of fine editions of his work, with commentaries, were issued in the fifteenth and sixteenth centuries. Two years ago this Vienna manuscript was reproduced in *fac simile* at Leyden. Though very expensive, the two volumes costing \$150, it is a work which all the larger libraries should get, and it is just the sort of present librarians should make our wealthy consultants feel it a privilege to give.

THE HOSPITALS.

I was surprised to hear Professor Müller say that he thought in hospital architecture Vienna led the world, and that there was here a group of architects who were adepts in all matters relating to hospital construction. I have come to his conclusion, on what may appear to be very hastily acquired data. It is not often that in the same day and in the same institution one passes from eighteenth to twentieth century conditions. Dr. Koessler took us to the old medical clinic, now in charge of von Neusser, where I found the old wards very much the same as I remember them in 1874. Except in minor details, not only Oppolzer and Skoda, but probably also Peter Frank and de Haen could return to the *Allgemeines Krankenhaus* and not be surprised by any very unfamiliar sights. There is the same extraordinary wealth of clinical material. I must say it was a surprise to see the old type of nurse; not, of course, that she is necessarily either unintelligent or inattentive. Indeed, as we passed a bed in which there was a new patient whom the junior assistant had not seen, he turned to one of the nurses, who in reply to his question said, "Yes, Herr ——— says she has mitral stenosis and insufficiency!" I was interested to see in the ward a case of Pick's disease, the pericardial pseudocirrhosis of the liver. The old question comes up here as to priority of description. In the special number of the *Wiener klinische Wochenschrift*, issued for the congress, Professor von Neusser describes it as "Morbus Bamberger." He states that in 1872 Bamberger described the condition as a special malady which he had already known for a long time and which up to that time had not been recognized in the literature. Certainly Pick deserves credit for having brought together all the known facts relating to a clinical condition to which very little attention had been given before his paper. I had a most interesting talk with Pick and Brauer and Wenkebach on the whole question, which is not one simply of pericardial adhesion. Wenkebach has helped to solve the problem in a recent number of Volkman's *Vorträge* in an article on the "Relation Between Respiration and Circulation." Brauer of Marburg, who is coming over to the session of the American Medical Association, will discuss the subject in connection with his operation of cardiolysis.

If anyone interested in hospitals—in every possible detail, construction, situation, general arrangements for the comfort of the patients, for the convenience of the students, for the advancement of science—if such an one wishes to have a Queen-of-Sheba sensation, let him visit the first group of the new buildings of the *Allgemeines Krankenhaus*. They have begun the rebuilding with the departments for women, and two of the three clinics, for midwifery and gynecology, are completed, one for Professor Schauta and the other for Professor Rosthorn, recently called from Heidelberg. About

10,000 deliveries a year take place in the three clinics, one of which is for midwives. The new clinics are exact duplicates of each other, and each has accommodation for about 200 patients. The buildings are of four stories, a central building with wings, built of brick and stucco, with spacious corridors, large windows, tiled floors and white oil-finished walls. Inside and out they form the most attractive hospital buildings that I have ever seen. But it is not so much this aspect that gives one that sinking of the heart of which the Queen of Sheba complained when Solomon showed his treasures—it is the organization and the completeness of the arrangements for teaching and for the scientific study of disease. One large floor is assigned to students, who all live in the building while attending the midwifery cases. Each clinic has its own laboratory, a special museum for teaching purposes, a library and a fully equipped small laboratory adjoining the gynecologic operating room, so that an opinion may be given immediately as to the nature of a growth. Down to the smallest detail every care has been taken to make these two clinics the most perfect of their kind, and if the hospital is completed on this elaborate plan it will, indeed, be worthy of the fame of the Vienna school and there will be nothing like it in Europe or America. The government foots the bills, and the total cost of the two buildings has been 9,000,000 kronen (\$1,800,000).

Professor Schlesinger very kindly took us to the Franz Josef Hospital, also a new building, on a less elaborate scale but very complete in all its appointments. It is particularly well arranged for the acute infectious diseases, and the most elaborate precautions are taken to isolate and disinfect the patients. Professor Schlesinger is very popular with American students, and we found working in his wards Dr. George Cheyne Shattuck III. of Boston, and young Dr. Fischel of St. Louis, both of whom have for some months been acting as voluntary assistants. It was interesting to see two wards devoted entirely to erysipelas; as far as possible all the cases in the city are sent here. Connected with this hospital is a beautiful new children's department, built by Professor Schlesinger's father-in-law. It looked to be an admirable model for the new Harriet Lane Johnston's children's department at the Johns Hopkins Hospital. In the arrangement for isolating cases, in the simple and easily worked character of the wards, in the laboratory arrangements and in the special incubators for feeble babies the hospital seemed much in advance of anything I had ever seen.

The scientific laboratories of the medical school have been completely transformed. Dr. Fröhlich took us through Professor Meyer's Pharmacologic Institute and through the new physiologic laboratory and the anatomic department—such a contrast to the old days!

CRITICISM OF WORK OF CONGRESS.

The general impression one gets of the work of the congress is very favorable. Too much, perhaps, is attempted. There are too many papers, but the keenness of the men and the scientific interest are most stimulating. As I remarked about the congress two years ago in Munich, there is a strong tendency in internal medicine to-day toward physiologic and chemical problems. On the long list of papers, eighty-eight in number, there were only about five dealing with bacteriologic questions. An extraordinary number dealt with questions in physiologic pathology and presented the results of experimental work.

INFLUENCE OF VIENNA ON AMERICAN MEDICINE.

As a medical center Vienna has had a remarkable career and her influence, particularly on American medicine, has been very great. What was known as the first Vienna school in the eighteenth century was really a transference by van Swieten of the school of Boerhaave from Leyden. The new Vienna school, which we know, dates from Rokitansky and Skoda, who really made Vienna the successor of the great Paris school of the early days of the nineteenth century. But Vienna's influence on American medicine has not been so much through Skoda and Rokitansky as through the group of brilliant specialists—Hebra, Sigmund and Neumann in dermatology; Arlt and Jaeger in ophthalmology; Schnitzler and von Schrötter in laryngology; Gruber and Politzer in otology. These are the men who have been more than others responsible for the successful development of these specialties in the United States. Austria may well be proud of what Vienna's school has done for the world, and she still maintains a great reputation, though it can not be denied, I think, that the Æsculapian center has moved from the Danube to the Spree. But this is what has happened in all ages. Minerva Medica has never had her chief temples in any one country for more than a generation or two. For a long period at the Renaissance she dwelt in northern Italy, and from all parts of the world men flocked to Padua and to Bologna. Then for some reason of her own she went to Holland, where she set up her chief temple at Leyden with Boerhaave as her high priest. Uncertain for a time, she flitted here with Boerhaave's pupils, van Swieten and de Haen, and could she have come to terms about a temple, she doubtless would have stayed permanently in London, where she found in John Hunter a great high priest. In the first four decades of the nineteenth century she lived in France, where she built a glorious temple to which all flocked. Why she left Paris, who can say? but suddenly she appeared here, and Rokitansky and Skoda rebuilt for her the temple of the new Vienna school, but she did not stay long. She had never settled in northern Germany, for though

she loves art and science she hates with a deadly hatred philosophy and all philosophical systems applied to her favorite study. Her stately Grecian shrines, her beautiful Alexandrian home, her noble Roman temples, were destroyed by philosophy. Not until she saw in Johannes Müller and in Rudolph Virchow true and loyal disciples did she move to Germany, where she stays in spite of the tempting offers from France, from Italy, from England and from Austria.

In an interview most graciously granted to me, as a votary of long standing, she expressed herself very well satisfied with her present home, where she has much honor and is everywhere appreciated. I boldly suggested that it was perhaps time to think of crossing the Atlantic and setting up her temple in the new world for a generation or two. I spoke of the many advantages, of the absence of tradition—here she visibly weakened, as she has suffered so much from this poison—the greater freedom, the enthusiasm, and then I spoke of missionary work. At these words she turned on me sharply and said: "That is not for me. We gods have but one motto—those that honor us we honor. Give me the temples, give me the priests, give me the true worship, the old Hippocratic service of the art and of the science of ministering to man, and I will come. By the eternal law under which we gods live I would have to come. I did not wish to leave Paris, where I was so happy and where I was served so faithfully by Bichat, by Laennec and by Louis"—and tears filled her eyes and her voice trembled with emotion—"but where the worshipers are the most devoted, not, mark you, where they are the most numerous; where the clouds of incense rise highest, there must my chief temple be, and to it from all quarters will the faithful flock. As it was in Greece, in Alexandria, in Rome, in northern Italy, in France, so it is now in Germany, and so it *may be* in the new world I long to see." Doubtless she will come, but not till the present crude organization of our medical clinics is changed, not until there is a fuller realization of internal medicine as a science as well as an art.

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ENDOCARDITES INFECTIEUSES CHRONIQUES,

par M. le Professeur WILLIAM OSLER (d'Oxford)

On peut observer, dans d'assez diverses circonstances, une endocardite dont la fièvre est le symptôme dominant, et qui peut se prolonger durant des semaines et même des mois. Chez l'enfant, à la suite d'une fièvre rhumatismale, une endocardite peut maintenir la température élevée pendant plusieurs semaines sans autres symptômes, alors que l'état général reste bon. Dans les affections valvulaires chroniques, lorsque la lésion cesse d'être compensée, une fièvre légère, irrégulière, due à une récurrence d'endocardite, peut se prolonger plusieurs mois; mais il est de règle que la durée des formes graves d'endocardite infectieuse soit moindre que trois mois. Néanmoins, certains cas ont une évolution bien plus longue, comme l'avaient vu Wilks, Bristowe, Lance-reaux et d'autres. Bristowe rapporte un cas d'une durée de cinq mois. Souvent les frissons répétés que l'on observe ont été pris pour du paludisme, d'où l'opinion que l'endocardite maligne pourrait être consécutive à la malaria. Dix cas de ce type chronique d'endocardite infectieuse sont résumés dans le tableau ci-dessous.

Le tableau clinique, dans mes dix cas, était celui d'une septicémie chronique présentant les caractères suivants :

1). Dans tous les cas, il existait une lésion valvulaire latente, qui six fois était une séquelle du rhumatisme articulaire aigu.

2). La fièvre était le symptôme prédominant. Son invasion est parfois inaugurée par des frissons; d'ordinaire elle n'est pas élevée et son allure est du type rémittent. Des transpirations profuses s'observent souvent. Pendant plusieurs mois le malade peut n'éprouver aucun autre symptôme et se sentir assez bien pour se lever.

3). La lésion valvulaire antérieure n'est cliniquement guère ou point modifiée, et jusque vers la fin il peut n'y avoir point de symptômes du côté du cœur, les signes physiques ne présentant que fort peu de changements.

N ^{os}	Noms.	Age.	Date.	Rhumatisme antérieur.	Lésion valvulaire ancienne.	Symptômes initiaux.	Type fébrile.	Lésions cutanées.	Em- bolies.	Lésions cardiaques à l'autopsie.	Durée de la maladie.
1	J. M.	28 ans	Juillet 1888	A l'âge de 12 ans.	Mitrale.	Fièvre.	Rémittente.	Nodosités érythémateuses douloureuses.	0	Endocardite mitrale.	13 mois.
2	T. B.	43 —	Mars 1902	0	Mitrale.	Frissons, fièvre.	Rémittente.	Purpura.	0	Endocardite mitrale.	10 —
3	F. D.	21 —	Mars 1895	Atteinte légère en octobre 1908.	Mitrale.	Frissons, fièvre.	Rémittente.	Nodosités érythémateuses douloureuses.	Cerveau	Pas d'autopsie.	7 —
4	M. B.	19 —	Juin 1890	Dans l'enfance.	Mitrale.	Frissons, fièvre.	Rémittente.	Nodosités érythémateuses douloureuses.	Cerveau	Pas d'autopsie.	5 —
5	R. B.	33 —	Mai 1902	0	Aortique.	Frissons, fièvre.	Rémittente avec frissons.	—	—	Pas d'autopsie.	4 —
6	D ^r T.	33 —	Septem. 1902	0	Aortique.	Arthrite, frissons, fièvre.	Intermittente et rémittente.	Nodosités érythémateuses douloureuses.	—	Pas d'autopsie.	9 —
7	D ^r R. T.	53 —	Février 1903	Dans l'enfance.	Mitrale.	Fièvre et sueurs profuses.	Rémittente.	Nodosités érythémateuses douloureuses.	Rétine, rate, reins.	Endocardite mi- trale, aortique et tricuspide.	8 —
8	R. W.	36 —	Novem. 1906	Dans la jeunesse.	Mitrale.	Frissons et fièvre.	Rémittente.	Purpura.	—	Pas d'autopsie.	6 —
9	D ^r C.	52 —	Mai 1907	0	Mitrale.	Fièvre.	Rémittente.	Nodosités érythémateuses douloureuses.	Cerveau	Pas d'autopsie.	7 —
10	A. A.	20 —	Janvier 1908	Il y a cinq ans.	Mitrale.	Fièvre.	Rémittente.	Nodosités érythémateuses douloureuses.	—	Pas d'autopsie.	7 —

4). Les phénomènes emboliques ne sont pas fréquents et s'observent seulement vers la fin.

5). On voit se produire, au niveau de la peau des doigts et des orteils, des taches érythémateuses douloureuses éphémères; elles sont rares sur le reste du tégument. Leur diamètre varie d'un centimètre à un centimètre et demi; elles sont rouges, papuleuses, souvent pâles en leur centre. Elles disparaissent généralement au bout de quelques heures, mais elles peuvent subsister pendant une journée entière. Elles font efflorescence par poussées, sans être jamais très abondantes. Je les ai rencontrées dans sept cas de ma série. Elles ressemblent à de petits éléments d'érythème noueux et n'ont aucune analogie ni avec les nodules rhumatismaux sous-cutanés ni avec les nodosités éphémères de Ferréol.

6). La lésion anatomique est une endocardite proliférative chronique, souvent très étendue, siégeant sur la mitrale ou la tricuspide et sur les cordages tendineux, mais possédant peu de tendances destructives. Les lésions emboliques ne sont pas suppurées.

7). Dans mes cas, comme dans ceux de Harbitz et de Lenhartz, l'hémoculture a montré que le streptocoque est le microorganisme le plus souvent en cause. Mais le staphylocoque, le pneumocoque et le gonocoque ont aussi été trouvés. L'évolution lente et chronique de la maladie est probablement en rapport avec une atténuation de virulence du germe.

8). Dans un petit nombre de cas des vaccinations antimicrobiennes ont été faites avec succès.

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CHRONIC INFECTIOUS ENDOCARDITIS

By WILLIAM OSLER¹

AN endocarditis with fever as its only symptom may be prolonged for weeks or months under many different circumstances. Following rheumatic fever in a child an endocardial complication may keep up a temperature of from 100° to 101° for several months, during which time there may be no other symptoms and the general condition may remain fairly good. In chronic valvular disease in the stage of broken compensation slight irregular fever may persist for months, associated with the presence of fresh endocarditis. As a rule, the form of endocarditis to which we give the term infective, septic, or ulcerative runs its course under three months. That occasional instances were characterized by a very protracted course was noted by Wilks, Bristowe, Coupland, and Lancereaux. In my Goulstonian Lectures 1885, I stated that this type had the following characteristics: the fever was irregular and intermittent, resembling ague; the cold, hot, and sweating stages might succeed each other with great regularity; in the intervals fever might be absent; two or three paroxysms could occur in the course of a day. In many of the instances the disease was prolonged to three or four months, and I give the notes of a case of Bristowe's, in which the condition persisted for five months. The recurring chills usually led to the diagnosis of malaria and also gave rise to the opinion widely held, particularly by French writers, that ulcerative endocarditis could be caused by this disease. The cases to which I wish to call attention in this communication are of this chronic character, not marked specially by chills, but by a protracted fever, often not very high but from four to twelve months' duration. At the time of the delivery of the Goulstonian Lectures I had not seen a case of this type. In the past twenty years I have seen ten cases of this form, two of which I have already reported (*Practitioner*, 1893). I have put them together in tabular form to indicate their main features.

¹ Read at the Association of Physicians of Great Britain and Ireland, Edinburgh, June 12, 1908.

SUMMARY OF TEN CASES OF CHRONIC INFECTIOUS ENDOCARDITIS.

No.	NAME.	AGE.	DATE.	FORMER RHEUMATIC FEVER.	OLD VALVE LESION.	EARLY SYMPTOMS.	TYPE OF FEVER.	SKIN SYMPTOMS.	EMBOLISM.	HEART LESIONS.	DURATION.
1	J. M.	28	July, 1888	Yes	Mitral	Fever	Remittent and intermittent	Painful nodular erythema	None	Mitral endo- carditis	13 months
2	T. B.	43	March, 1892	No	Mitral	Chills and fever	Remittent	Purpura	None	Mitral endo- carditis	10 months
3	Florence D.	21	March, 1899	Yes	Mitral	Chills and fever	Remittent	Painful nodular erythema	Brain	No p.m.	7 months +
4	Mary B.	19	June, 1890	Yes	Mitral	Chills and fever	Remittent	Painful nodular erythema	Brain	No p.m.	5 months +
5	R. B.	53	May, 1902	No	Aortic	Chills and fever	Remittent with chills	—	None	No p.m.	4 months +
6	Dr. B. T.	33	Sept., 1902	No	Aortic	Arthritis, chills, fever	Intermittent and remittent	Painful nodular erythema	None	No p.m.	8 months
7	Dr. R. T.	53	Feb., 1903	Yes	Mitral	Fever and sweats	Remittent	Painful nodular erythema	Retina, spleen, kidney	Mitral, aortic, and tricuspid endocarditis	8 months +
8	R. W.	36	Nov., 1906	Yes	Mitral	Chills and anaemia	Remittent	Purpura	None	No p.m.	6 months
9	Dr. C.	52	May, 1907	No	Mitral	Fever	Remittent	Painful nodular erythema	Brain	No p.m.	7 months
10	Alice A.	20	Jan., 1908	Yes	Mitral	Fever	Remittent	Painful nodular erythema	None	No p.m.	7 months

It has long been recognized that malignant endocarditis is really an acute septicaemia with localization on the endocardium, but the symptoms are not necessarily due to the local lesion. The clinical picture is a septicaemia sometimes of a typhoid type, sometimes like a pyaemia—then again with predominant meningeal symptoms, occasionally with pronounced cardiac features. The pneumococcic, the gonorrheal, and the streptococcic forms present, as a rule, a picture in which the heart-symptoms are in the background. Cases of infection with these organisms may run an identical course without any endocarditis. On the other hand, there is a large group of cases in which the endocarditis plays a more important rôle and the vegetations and ulcerations appear to be directly responsible for the fever and the associated symptoms. As a rule, the valves involved are already the seat of a sclerotic change. The source of the infection is rarely to be determined. Thus, in only one of the series here reported was there an external lesion. The patients in this series were all adults, five women and five men. In six there was a past history of rheumatic fever; eight had old mitral lesions, two aortic, well compensated, and not giving any trouble at the time of the onset of the symptoms. It was not always possible to get a definite history of how the attacks began. In five of the cases there were chills and fever, mistaken for malaria. Cough and loss of weight in some cases suggested tuberculosis. The slight fever without any localizing symptoms may raise the suspicion of typhoid fever. In my series these have been the three diseases the diagnosis of which has been suggested. Once established the fever becomes the dominant, and for months may be the only, symptom. This is the most striking peculiarity of the cases. Week after week, month after month, the daily rise of one and a half or two degrees may be the only indication there is of an existing mischief. In Case I, in which the fever lasted for thirteen months, the patient's sister, a trained nurse, had decorated the room with yards of the temperature charts; fever with an occasional sweat were the only symptoms. The appetite remained good and she lost very little in weight. There were no embolic features and from month to month there were few, if any, changes in the cardiac condition. In this very protracted form chills are not nearly so common as in the more acute cases, nor is the fever so high, not often reaching above 102.5° or 103° . It is of a remittent type, not falling to normal at any period of the day. With the occurrence of a chill the temperature may rise to 104° or 105° , but in none of the cases was there the type of fever in which the paroxysms recur with great regularity—quotidian or tertian, as we see so often in the acute forms of ulcerative endocarditis. Another peculiarity is the occurrence of periods of apyrexia, usually towards the end, but in one or two of the cases there were afebrile interludes which gave deceptive promise of recovery. It is well recognized now that fever is not an invariable accompaniment of endocarditis. Following pneumonia there may be for months a slight toxæmia with little or no fever in connexion with a patch of endocarditis.

The cardiac features in this group are usually well marked, but as a rule

there are no symptoms. The patients complain neither of palpitation nor of pain. There is no dyspnoea except towards the close, and in no case did dropsy occur. In eight of the ten cases there were the well-marked physical signs of a mitral lesion and the associated slight enlargement of the heart. In only six cases was there marked hypertrophy and dilatation. In two of the cases there was aortic insufficiency. One of the most striking circumstances is the very slight change in the character of the heart murmur in spite of the fact of most extensive vegetations and alterations in the valves. Thus in the case of Dr. R. T., with the condition of whose heart I had been familiar for fourteen years, the comparison between my first examination in 1889 and that in 1893 showed very little change beyond the slightly greater dislocation outwards of the apex beat. In several of the cases the absence of any change in the character of the heart murmur and the remarkably quiet, negative state of the organ were urged strongly against the existence of endocarditis. It is rather remarkable, considering the anatomical changes, that so little alteration may occur in the physical signs. In Case VI, Dr. B. T., the murmur of aortic insufficiency became more intense towards the close, but in no instance was there the development under observation of alterations in the physical signs such as are sometimes seen in acute ulcerative endocarditis.

Embolism, to cause symptoms, occurred in four cases of the series—in Cases III, IV, and IX in the brain with haemiplegia, Case VIII in the retinal arteries and in the spleen and kidneys. This is in striking contrast to the frequency of this complication in the more acute types of endocarditis.

One of the most interesting features of the disease and one to which very little attention has been paid is the occurrence of ephemeral spots of a painful nodular erythema, chiefly in the skin of the hands and feet, the *nodosités cutanées éphémères* of the French. My attention was first called to these in the patient of Dr. Mullen of Hamilton, whose description is admirable: 'The spots came out at intervals as small swollen areas, some the size of a pea, others a centimetre and a half in diameter, raised, red, with a whitish point in the centre. I have known them to pass away in a few hours, but more commonly they last for a day, or even longer. The commonest situation is near the tip of the finger, which may be slightly swollen.' Spots of this character occurred in seven of the cases and in three at least they were of importance in determining the diagnosis. Thus in the case of Dr. Carroll, the well-known American Army Surgeon, the collaborator with Dr. Reid in the brilliant work upon yellow fever, the presence of these spots appeared to me to clinch the diagnosis. They are not beneath but in the skin and they are not unlike an ordinary wheal of urticaria. The pads of the fingers and toes, the thenar and hyperthenar eminences, the sides of the fingers, and the skin of the lower part of the arm are the most common localities. In one case they were present in the skin of the flank. I have never seen them haemorrhagic, but always erythematous, sometimes of a very vivid pink hue, with a slightly opaque centre.

The diagnosis in this group of cases may offer great difficulties. For weeks,

indeed for several months, there may be only fever, and unless there have been special features pointing to the heart, such as the development of a diastolic murmur or the great intensification of a mitral bruit, it may be impossible to settle the diagnosis. There are, indeed, cases in which from beginning to close no heart murmur has been present. By far the most suggestive features are: (1) a knowledge of the existence of an old valve lesion. This was present in every one of my series. (2) The occurrence of embolic features, sudden swelling of the spleen, with friction in the left flank, sudden attack of haematuria, embolism of the retinal arteries, hemiplegia or the blocking of a vessel in one of the limbs. (3) The onset of special skin symptoms, purpura, and more particularly the painful erythematous nodules to which I have referred. Present in seven of the ten cases, these are of definite diagnostic import. They are in all probability caused by minute emboli. (4) The progressive cardiac changes, the gradual increase in the dilatation of the heart, the marked change in the character of a mitral murmur, the onset of a loud rasping tricuspid murmur, or the development under observation of an aortic diastolic bruit.

With carefully made blood-cultures one should now be able to determine the presence of the septicaemia. This was easily done in three of my more recent cases. An onset with chills and fever and slight swelling of the spleen almost always leads to the diagnosis of malaria, more particularly in regions in which this disease prevails, but in not one of my cases was there any difficulty in excluding this by careful microscopical examination of the blood. It was not always possible to convince the physician. With slight cough tuberculosis may be suspected, as happened in two or three cases of my series. For many weeks the patient may present nothing but a pyrexia, of doubtful origin, or a cryptogenetic septicaemia, and as he may look very well and may feel very well, and there are no special symptoms, and with a heart-condition that may have remained unchanged for years, it is not easy to reach a positive diagnosis. The blood-cultures and the presence of the painful erythematous nodules and the occurrence of embolism furnish the most important aids.

The anatomical condition in these cases is quite unlike that of the ordinary ulcerative endocarditis. In the three specimens I have had an opportunity of studying there was no actual ulceration, but large proliferative vegetations, firm and hard, greyish yellow in colour, projected from the endocardium of the valves like large condylomata, encrusting the chordae tendinae and extending to the endocardium of the auricle. The condition is quite unlike the globose vegetations of the pneumococcal and gonorrhoeal endocarditis or the superficial ulcerative erosions of the acute septic cases.

The organisms responsible for this condition have been carefully studied. In my series cultures were made in six cases. In three they were negative. In two streptococci were present, in one a staphylococcus. While, as a rule, this condition is much more commonly caused by the streptococcus other organisms may be present. Thus Fraenkel has reported one instance of a pneumococcus endocarditis persisting for nearly six months (*Deutsche med. Woch.*, 1900). Of

sixteen cases of this chronic form, the clinical course of which extended from four to eight months, Harbitz (*Deutsche med. Woch.*, 1899) found pneumococci in four, streptococci in nine, and in eight other micro-organisms. Lenhartz (*Deutsche med. Woch.*, 1901), who has reported sixteen cases with a duration of from three to seven months, found staphylococci and streptococci the common organisms, the pneumococcus once and the gonococcus once. In the majority of cases it seems to be a mild streptococcus infection, possibly by a special form. Possibly in some instances there may be a special resistance on the part of the host, but these are points which must be settled by future investigations. These are cases in which the possibility of successful vaccine treatment should be considered. It was tried in two cases of my series, but in both rather late, and in neither did it seem to have special influence. Horder has treated a case of this chronic type with a vaccine prepared from the patient's organism, but without success. The results in the acute forms are discussed by him in the *Practitioner*, May, 1908. Abstracts of the cases are here given.

Case I. J. M., aged 28. I saw this patient with Dr. Mullen of Hamilton, Ontario, in 1888, during my occasional visits to that town, on my way to Toronto. A point of special interest is that the sister of the patient, a trained nurse, had kept a very accurate temperature chart from July 17, 1888, to July 7, 1889, nearly twelve months. Sheets of the four-hourly temperature charts, pinned up on the wall of the bedroom, provided a very remarkable picture.

The patient had had good general health, but at twelve years of age had had rheumatic fever. In February, 1888, she got cold and had pain in the chest. Early in the summer she began to feel badly and had attacks of faintness and the fever came on in the afternoon. When she returned to her home in the first week of July the temperature was as high as 104° in the evening, and she was thought to have typhoid fever. The fever persisted and she had profuse sweats. I saw her in the end of September, and though a systolic murmur was present I did not appreciate that the condition was one of endocarditis. I saw her again at Christmas time, when she seemed very much the same, except that she had been having severe rigors followed by very high fever and profuse sweating. This was the first case in which I noticed the remarkable skin lesions. She had a great many crops which were at first thought to be urticaria. Dr. Mullen's description is most characteristic: 'The spots continue to appear at intervals. They are erythematous, some as small as a pea, others a centimetre and a half in diameter with a white point in the centre. They often pass away in a few hours and rarely last longer than the evening of the day on which they appear. They are not numerous. The commonest situation is near the tips of the fingers, which for a short time become swollen.' These spots were seen more or less throughout the illness, less towards the close than at the early part. At this visit at Christmas we made up our minds that the condition was one of endocarditis. The heart murmur had intensified and there were signs of dilatation of the organ. I saw her again in April, 1889, when there was little or no change, except that she was weaker. She died July 7, 1889, more than thirteen months from the onset of the illness. Dr. Mullen very kindly sent me the heart for dissection. The mitral valves were a little thickened; the orifice admitted two fingers. The margins on the auricular side were covered with large vegetations, many of them extending on to the wall of the left auricle. The chordae tendinae were shortened and thickened and encrusted with vegetations. There were signs of old infarcts in the spleen and kidneys.

Case II. T. B., aged 43, admitted to the private ward, Johns Hopkins Hospital, March 13, 1892, complaining of weakness and fever. He had had very good health, with the exception of an attack of typhoid fever twenty years previously and chronic malaria when a lad. Early in December, 1901, he began to have loss of appetite, malaise, and fever with enlargement of the spleen. The fever was of an intermittent type, ranging from 102° to 103° . He had occasional sweats. The spleen was enlarged, and very naturally the condition was thought to be malaria. Throughout the winter the temperature persisted and he had cough, and there was a loud systolic murmur detected at the apex. When admitted to hospital the examination was everywhere negative, except in the heart, the impulse of which was in the sixth interspace, three centimetres outside the nipple line. There was a loud systolic murmur of a musical quality heard as far as the angle of the scapula. The sounds at the aortic cartilage were clear. There was no anaemia. The patient was under observation from March 15 to May 10. The temperature rose daily to between 102° and 103° ; about four or five o'clock in the afternoon he sweated. He gained slightly in weight. He complained a little of pain on the left side in the splenic region. Throughout May and June the temperature range was from 97° to 103° . In July the fever was less marked. There were several days when the temperature was almost normal. Early in July for the first time the petechiae appeared. At intervals there were very profuse sweats. Throughout August and September there were groups of days in which the temperature was normal or subnormal, sometimes as low as 95° . He died September 16, about ten months from the onset of his illness. The autopsy by Dr. Block showed an extensive mitral disease. The ventricular surfaces of the valves were studded with enormous masses of vegetation. The chordae tendinae were thickened and encrusted with firm yellow outgrowths. The aortic valves and those of the right side were normal. The spleen and kidney showed infarcts.

Case III. Florence M. D., aged 21, seen March 16, 1899. The patient was well and strong as a girl; at seventeen she had severe anaemia. Through the summer she was very well, but tired easily on exertion. In October she began to have feelings of chilliness and irregular fever, and sometimes the joints were a little stiff and sore, but never red. The doctor thought she had slight rheumatic trouble and gave her salicylates, but she never got perfectly well and grew pale and nervous. She had a little cough and it was suggested that she might have tuberculosis. Early in February she had a severe chill. Subsequently she had slight ones at intervals, following which the temperature would rise to 103° . It was then discovered for the first time that she had heart trouble. As she had a cough as well, it was decided to send her South and she was brought to see me on the way through Baltimore.

She was a tall, well-nourished girl, looking a little pale. I was surprised to find the temperature above 103° . The pulse was rapid. The heart's action was violent, the apex beat in the fifth space outside the nipple line. There was a very intense apical systolic murmur, transmitted loudly to the back and also heard in the left sternal margin. There was a soft bruit at the aortic cartilage. There was no swelling of the joints, but on the radial side of the first phalanx of the right index finger were three raised red spots, each about a centimetre in diameter and very tender. They appeared that day, and she stated that they came at various places on her hands and feet and lasted two or three days. The patient was so ill that they were not able to proceed on their journey, and I saw her at intervals for the next six weeks. Symptoms of severe endocarditis increased. Early in April she had left hemiplegia and the spleen enlarged. Numerous crops of the painful spots of the skin came out, four or five at a time, usually about the hands and feet, occasionally in the forearms and legs. She could tell at once when a fresh one started because of a peculiar hot and tingling

sensation. Then it grew red, became swollen and very tender. After lasting from twenty-four to thirty-six hours they gradually faded. They were not specially connected with the tendons. They were in the skin and perhaps a larger number occurred in the palmar surfaces of the hands, particularly about the pads of the fingers. She died April 25, between seven and eight months from the onset of the illness. There was no post mortem.

Case IV. Mary B., aged 19, seen with Dr. J. K. Mitchell of Philadelphia, June 16, 1890. The patient had had rheumatic fever as a child but had got fairly well and strong. Her illness began with chills and fever which were thought to be malarial, but no parasites could be found in her blood. When I saw her there were signs of an old mitral lesion—apex beat outside the nipple, impulse forceable, and a loud systolic murmur propagated to the back. The spleen was enlarged. The temperature ranged from 102° to 103° and she had profuse sweats. Crops of painful spots appeared from time to time upon the hands and feet, and a few on the skin of the flanks. This was the second case in which I had seen them. They were red, raised, from 3 to 5 mm. in diameter, and often very painful. The fever in this case lasted about seven months. Towards the end embolic symptoms occurred, with hemiplegia.

Case V. July 16, 1902, I saw with Dr. Samuel Ward of Albany, Mr. B., of Cincinnati. I had seen Mr. B. about for several days and noticed that he was not looking very well, but was surprised to find on examining him that he had an old heart lesion, well-marked aortic insufficiency, a loud aortic systolic murmur, and a rough murmur of mitral regurgitation. The patient stated that he had been having malarial fever since the end of May. He had been subject to the disease since 1879. In 1884 he had typhoid fever. He had had attacks of arthritis which were called gout, in one of which in 1898 he had some affection of the heart. The attack at the end of May did not yield to the usual remedies of quinine and Warburg's tincture, and early in June he had a severe chill followed by fever and sweats. He had been up and about, but he had had fever ever since, the temperature occasionally rising to 103° .

From the outset I had no doubt of the nature of the trouble, and had no belief in the malarial theory of the fever, though he came from a malarial district and he had had attacks. Under these circumstances it is always possible to have malarial complications, but there were no crescents in the blood and no pigmented leucocytes. Dr. Ward ascertained that in the second week of April he had bruised his foot on one side, which became red and inflamed, and hot poultices had to be applied. He was in bed for four days. It is quite possible that this may have been a local focus of infection. I saw the patient at intervals with Dr. Ward through August. He had three severe chills. The temperature became more irregular and reached a higher point. He was removed to his home at Cincinnati under the care of Dr. R. W. Stewart. A pure culture of *staphylococcus aureus* was obtained from the blood. There were no embolic features. He died September 16, 1902, about four months from the onset of the fever.

Case VI. Dr. B. T., aged 33, seen September 25, 1902. Early in May while hard at work he began to have fever. As he had been to the eastern shore of Maryland, it was thought to be malaria. Once or twice a week his temperature would rise to 101° or 102° , sometimes with a chill. He lost in weight, but was able to continue work, and in July while away for a holiday he seemed better, though he still had occasional attacks of fever and sweats. For the previous six weeks he had had daily temperature from 100° to 101° and had sweated at night. Occasionally he would feel very cold and at night when getting into bed the teeth would chatter. He had consulted one or two professional

friends who thought he possibly had chronic malaria, and pulmonary tuberculosis was suggested. He had become a little thinner and paler.

He had been a remarkably healthy man with a very good family history. He never had had rheumatic fever or chorea. He had not had gonorrhoea. On close questioning he stated that in April or May, he forgot which, he had a little swelling and tenderness in some of the joints, but it was quite trifling. In 1890 in an examination for Life Insurance Dr. Chew found aortic insufficiency, but he had never had the slightest cardiac inconvenience.

The patient was a very well-built, well-nourished man, looking a little pale. The right wrist-joint was a little tender on pressure, there were no subcutaneous fibroid nodules. There was a well-marked collapsing pulse. The apex beat was outside the nipple line, not forcible. There was a little diffuse pulsation to right of sternum and second interspace. At the apex the heart-sounds were flapping and clear. At the second right intercostal space there was a short, rough systolic, and a well-marked diastolic murmur of slightly wiry quality was heard down the sternum. The spleen was not enlarged. The patellar tendons on either side were tender on pressure. He assured me that the heart features were very much like those which Dr. Chew had noted in 1900, and I felt convinced that the case was one of endocarditis. Throughout October he became worse and was confined to bed. On November 26, when I saw him, he had changed remarkably. He was very pale. Visible pulsation was seen everywhere in the smaller vessels. The spleen was enlarged. The heart had become more dilated, but there was very little change in the murmurs, except that there was now a loud apical systolic. He had had several very painful spots about his fingers and toes, lasting for a day or two. The blood-cultures were negative. I saw him again on December 8, and he was much worse. His feet were oedematous, with petechial spots here and there. He died in January, about eight months from the onset of the fever.

Case VII. Dr. R. H. T. In 1889 and again in 1890 I was consulted by Dr. T. for an old mitral lesion which was associated with slight enlargement of the left ventricle. As a boy he had had a mild attack of rheumatic fever. For the next ten or twelve years I saw Dr. T. at intervals and never found any special change in his heart. He was a man who lived a very active life and was able to do a great deal of work, though with limitations. During the year 1903 he was not very well and throughout February he had an irregular fever, never very high, not often reaching 102° . He felt very well and he had no chills. From early in March until his death, October 3 (eight months), he was confined to bed and was under the care of Dr. H. B. Thomas, to whom I am indebted for the copy of the temperature chart. I saw him at intervals. Briefly summarized, the main features were, first, fever, which rarely rose above 102° . After June it became a little higher and a little more irregular and sometimes reached 103° . In August and September it was lower, and after September 17 until his death it was normal. There were no chills. He had occasional sweats.

The condition of the heart was very interesting. In June and July when I saw him the pulse was good, heart's action regular, and there was very little change in the mitral murmur, which presented practically the same characteristics with which I had been familiar since 1889. He had no cardiac distress, as a rule, but just before he was moved in the summer there were two attacks of what were supposed to be angina.

The only embolic features were two attacks in the vessels of the retina in July. He had no painful spots on the skin, but he had painful fingers. On one of my visits he had a well-marked, localized red spot about three millimetres in extent on the pad of one finger. He died suddenly October 3, after an illness of more than eight months. The post mortem, by Dr. MacCallum, gave the

following: vegetative and ulcerative endocarditis affecting tricuspid, mitral, and aortic valves and wall of left auricle; rupture of chordae tendinae and encrustation with vegetations; embolic occlusion of anterior coronary artery at orifice; embolic necrosis of myocardium, cardiac hypertrophy and dilatation; infarctions of various ages in the spleen and kidney; focal haemorrhages in the intestines; acute splenic tumour; the vegetations everywhere were firm, yellowish white, and from the mitral orifice a great mass projected into the auricle and there were large irregular masses on the aortic valves. The cultures showed a streptococcus.

Case VIII. In November, 1906, I saw with Dr. Fuller England in Winchester Mr. W., aged 36. He had been under the doctor's care many years previously for acute rheumatism which had left his heart damaged. There was a loud mitral systolic, but there was perfect compensation. Through the summer of 1906 he was not very well and complained of shortness of breath, and in July had frequent attacks of shivering. He began to have inability to rest comfortably at night in the recumbent posture. He lost in weight and became anaemic. He had also slight fever. When I saw him he had been for some weeks in a nursing home. His temperature had ranged from 100° to 101.5° . It was very frequently subnormal in the morning. He had profuse sweats. There was some little doubt at first in the diagnosis, as he had tenderness in the region of the spleen and a dilated stomach. There was a history of tuberculosis in his family.

The patient was very pale and looked thin and ill. There were the signs of old mitral disease with moderate hypertrophy of the heart, a loud thrill and a very intense apical systolic murmur. There was slight infiltration of the bases of both lungs. The spleen was enlarged, but at the time of my visit there were no embolic features. Cultures were made from the blood and a streptococcus was obtained. Numerous injections of a polyvalent serum were made which seem to have reduced the fever slightly, and it caused a good deal of drowsiness. For a month before his death there were numerous embolic patches on the skin with purpura. The patient lingered until December 8. The temperature chart is very interesting. The fever was never high, not once passing above 102° . Towards the end, for the month before his death, it was rarely above 100° . Anti-streptococcic serum seemed to have reduced the fever very much.

The entire duration was about six months. A point of interest in the diagnosis is that the case began with symptoms of shivering, sometimes a definite chill, and as he had an enlarged spleen it was suggested at first he had malaria. Then the distension of his stomach and indefinite swelling in the left side of the abdomen aroused the suspicion of cancer. Later, a slight cough, the fever, the infiltration of both bases, and the man's general appearance suggested tuberculosis.

Case IX. May 8, 1907. I saw in Washington, with Dr. Hardin, Dr. J. C., aged 52, well known in connexion with his work on yellow fever. He had had the ordinary diseases of childhood, typhoid fever in 1886, yellow fever in 1900. He passed the physical examination for the Army in 1902. For several years he had known that there was a lesion of the mitral valve which was detected in a Life Insurance examination. On the evening of February 18 he felt chilly and did not rest well. The next forty-eight hours he was depressed, had cough, and his temperature rose to 102.8° . From that time until the day I saw him he had had regular fever, rarely reaching above 102.5° . He had sweats, more particularly in the early morning hours. As he had a little cough and had lost in weight, it was very natural that tuberculosis was suspected. Dr. Ruffin, Dr. Thayer, Dr. Barker, and others saw him and it did

not seem possible to arrive at a satisfactory diagnosis, as the physical signs were so slight and there was nothing but the fever.

He looked very well, not specially changed in appearance since I had last seen him. There was no alteration in the skin. I made a careful examination, which was negative everywhere except the heart. There was slight enlargement of the left ventricle and there was an apical systolic murmur propagated beyond the mid axilla, and there was a loud pulmonic second sound. His physicians could not determine that there had been any special change in the condition of the heart or in the murmur. He complained of very peculiar spots on his skin, chiefly about the arms and fingers, sometimes on the toes and feet. They came in crops, lasting from one to five days. Each spot was raised, a little red, and felt like a localized infiltration of the skin. They were chiefly on the fingers and on the palms of the hands, sometimes along the forearm. When I saw him, two or three were just disappearing. I did not think that there was any question as to the nature of the case. The mitral lesion, the irregular, persistent fever, and the spots suggested strongly the chronic septic endocarditis. Throughout the summer the condition remained practically the same. The fever persisted, the oscillations of temperature a little greater; he continued to have occasional eruptions of the spots on his fingers, the crops lasting for two or three days. There were no other signs, no audible change in the heart lesion. On September 15, 1907, he suddenly lost power of speech and got right hemiplegia, and he died in fourteen hours. About fifteen blood cultures were taken, all negative. The duration of this case was exactly seven months.

Case X. January 13, 1908. I saw, with Dr. Ward and Dr. Powel of Southampton, Alice A., aged 20. Five years previously she had rheumatic fever, a severe attack with cardiac complications and very slow recovery. Twelve years previously she had a very deep-seated gland removed from the right side of the neck. It was probably tuberculous. The hypoglossal nerve was involved and it had left her with atrophy of one side of the tongue. The previous winter she 'came out' and had a very busy season. She danced and skated and seemed very well. In February she had tonsilitis, not a very severe attack, but she had not been quite well since. She was pale and was often weak and nervous. This was attributed by her mother and the doctor to a love affair which had worried her. Some weeks later she began to have a slight fever and the doctor at first suspected that she might have tuberculosis, but the lungs were negative. Then through the summer she was not well, and on and off had febrile attacks, which increased in September. In October it was thought best that she and her mother should go abroad and spend the winter. On the steamer she got very much worse and it was found she had a temperature of 103° . She landed about the end of October and had been in a nursing home ever since. The symptoms had been—(1) Fever, which had ranged from 100° to 102° , only within the past week had it crossed the 103° limit; (2) she had had at times drenching sweats so that the bed-clothes had had to be changed; (3) she had lately had great irritability of the stomach, constant nausea; (4) on several occasions on the tips of the fingers there had appeared red spots, exceedingly tender swellings, looking very angry and almost, as Dr. Ward said, as though they would suppurate and then they gradually subsided.

There was no pain and no distress about the heart; the urine was clear; the sputum had been examined, as, of course, tuberculosis was at first suspected. She had wasted a good deal. I found a girl looking a little pale, but not so thin in the face as in the body. There was marked general anaemia of the skin, much more so than the face would indicate. The pulse was small, about 110. There were no petechiae. The heart was moderately enlarged, the impulse forcible, wavy, and extended from the second interspace to the fifth, an inch

outside nipple line. There was a very intense mitral systolic heard everywhere over the heart, loudly up the left sternal margin and transmitted to the spine. Though rough and harsh, Dr. Ward did not think it had specially changed in character. The second sound was everywhere clear.

Within three or four days there had been a slight infiltration at the lower lobe of the left lung. The percussion note was impaired and the breath sounds tubular. The apices and other parts were clear. The abdomen was a little swollen, nowhere tender, slightly tumid in the epigastric region; the liver was not enlarged, the edge of the spleen only just palpable. She died about seven months from the onset of the fever. It is quite possible that the onset of the attack may have been in February, when she had tonsilitis, in which case the duration was over a year.

Tuberculosis Exhibition & Conferences

Oxford, Nov. 8-13, 1909

**What the Public can do in the
Fight Against Tuberculosis**

BY

**THE REGIUS PROFESSOR OF
MEDICINE**

**OXFORD: PRINTED FOR PRIVATE CIRCULATION
BY HORACE HART**

WHAT THE PUBLIC CAN DO IN THE FIGHT AGAINST TUBERCULOSIS

THAT was a very happy remark of Tennyson, 'knowledge grows but wisdom lingers.' After all, the greatest difficulty in life is to make knowledge effective, to convert it into practical wisdom. We often confuse the two, thinking they are identical. But it was another poet—Cowper—who said that far from being one they often have no connexion whatever. Now, wisdom is simply knowledge made efficient; and you are asked in Oxfordshire to *join in a campaign of efficiency*, a campaign of education, against one of the most dreaded foes of the race.

There is a grisly troop of infections that we all know only too well, called the fevers, with which two of the greatest illustrations of human efficiency may be said to be connected; for if you look over the record of human achievement there are not more than four or five which can be placed in the same category with antisepsis or asepsis and preventive medicine—the *two most important victories of science* in the last half century. All know what Lister has done in introducing cleanliness in wounds and operations, what we call *asepsis*, and how it has revolutionized the practice of our hospitals. Of the other victory, that of preventive medicine, a special glory of England—let me give one example. Until about the middle of the last century typhus fever ravaged the country. Even in the decade from 1871 to 1880 there were 7,495 deaths from this disease in Ireland alone; but in 1905 there were only 68! Of this victory many of you

are not aware. You do not remember it, but perhaps your fathers have told of the terrible days in the forties, when the awful plague of typhus almost decimated Ireland. If there is one record of which the medical profession may be proud, it is that of their battle with typhus fever. Let me illustrate it by one fact. In 1847—the year of the great epidemic—*one-fifteenth of the entire medical community of Ireland died*. According to Stokes's investigation on causes of mortality among 743 physicians in Ireland, the deaths of 331 were caused by typhus fever—nearly 45 per cent. Not only has this disease disappeared, but enteric fever is gradually going, and within the next twenty-five years a case will be as rare as is now one of typhus. And in other directions this victory of human efficiency may be illustrated. I will mention another disease, the greatest, perhaps, that the white man has had to contend with—namely, malaria. The victory over it is to-day practically complete, and we may say that the solution of the white man's position in the tropics has been solved by the scientific investigations of Laveran and Ross and of others.

A great scourge remains—‘the white plague,’ as Oliver Wendell Holmes calls it—a disease which kills, it is estimated, at least a million annually—the terrible malady tuberculosis, which this exhibition serves to illustrate. This, too, is a disease upon which we may entertain a full measure of optimism: just as full, indeed, as about enteric fever. In the past twenty-five years there has been an extraordinary increase in our knowledge relating to it. We know *eight* things about the disease.

In the first place, we know the germ—the cause. We can pick it out as easily as you pick out a beech-nut from other nuts. Give to any professor of Pathology a group of these germs and he will pick out that of tuberculosis as a farmer will sort oats from wheat.

Secondly, we know whence it comes—its two great sources, the sputum of persons affected with consumption, and the milk of tuberculous cows.

Thirdly, we know how it gets into the body—through the breath and swallowed with the food.

Fourthly, we know what happens to the germ when it enters the body. Like seed sown in any other way, it illustrates the old story—the parable of the sower. Some of the seed, you remember, fell by the wayside, and the birds of the air picked it up. Fortunately, a great many of the germs of tuberculosis fall by the wayside and never get into us. Some of the seed falls on stony ground, and it does not flourish because of the lack of depth of earth. And just so, into a certain number of us these seeds of tuberculosis enter; but fortunately we are of rocky constitutions, and they do not develop. And some of the seed fell among thorns, and the thorns sprang up and choked it. Now, it is a very fortunate thing for some of us that we have thorny constitutions, and when the germs get in there may be a growth for a short time, and they may thrive and develop, but in a little while thorns spring up. In other words, the constitutional resistance is so great that the germs are killed, and the patient is cured. But, alas! too much, indeed, falls on good ground, and you know then what happens. It brings forth a hundredfold, and tuberculosis in some form results.

Fifthly, we know how the good ground is prepared. It is well to remember that the seed is not everything—the seed is everywhere—it is the soil that is important. Now, how do we prepare the ground for the seed that it may grow to tuberculosis? There are the three ‘bads’—bad food, leading to ill-nutrition, which is the great preparation of the ground; bad air in wretched habitations and miserable cabins; and bad drink, alcohol. Those are

the three 'B's' for you to remember with reference to the preparation of the soil for consumption. And just as a farmer has not his crop of grain unless he cultivates the ground properly and prepares it and fertilizes it, so the great majority do not get tuberculosis if they avoid these three 'B's', and do not cultivate a body-soil proper for its growth.

Sixthly, we have learned how to recognize the disease. Upon this point I need not enlarge further than to say that we now see the cases earlier, and are able to advise treatment in the curable stage.

Seventhly, we have learned how successfully to prevent it. And it seems so easy—first by the destruction of the germ, and secondly by making the soil unsuitable.

Then, *eighthly, we have learned how to cure the disease.* The all-important matter is to *get the cases early.*

And, *lastly*, to the great consolation of the public, *we know that the disease itself is not directly hereditary.*

Within half a century the death-rate from tuberculosis in England and Wales has fallen from 3·3 per thousand living to 1·6, and yet in 1907 56,101 persons died of the disease. In Oxfordshire there died 255, which means that there are about 2,500 cases in the county.

What can the public do to still further reduce the mortality from this disease, and hasten the day, which is well within the vision of sanitary science, when there will be no more tuberculosis?

First, help in a campaign of education. This is being undertaken by the National Association for the Prevention of Tuberculosis, and the Exhibition to be held in the Schools for the week beginning November 8 will do much to teach just what the people should know about the disease. Through the press, the pulpit, by private effort, by lectures and pamphlets, a campaign of incessant activity must be waged.

All who can should join the National Association, 20 Hanover Square, London. Annual subscription, 5s.

Secondly, notification of all cases to the Health Authorities. The only possible way to get at a disease is to know where it is, and this may be done without personal inconvenience or discomfort to anybody.

Thirdly, in each county provision should be made for the care of advanced cases of tuberculosis among the poor.

Fourthly, special dispensaries for tuberculosis should be established. It is well known that a great many early cases do perfectly well in their own homes, if they are taught how to live properly. The questions as to how to provide accommodation for the tuberculous poor will be discussed at the Public Meeting by Drs. Newsholme and Phillip, two of the leading authorities on this subject.

Tuberculous patients should not be looked upon as social outcasts, to their own great distress and to the alarm of their families. For this feeling there is no justification. So long as a patient with tuberculosis takes the proper precautions there is no risk in close contact. If you are afraid of taking consumption, and desire a place of safety free from the germs of the disease, live in a first-class sanatorium, where fewer germs are scattered about than in the cities.

Finally, in this crusade against tuberculosis there are two indispensable factors, *enthusiasm for the work*, which should not be hard to maintain, since we are everywhere fighting a winning battle; and the second essential factor is *perseverance*. It is not a year's work, nor five years' work; a decade will make a great difference; a generation should see a reduction in the mortality of 50 per cent., and your children and grand-children should be able to point at a victory over tuberculosis as memorable as that which our fathers have won against typhus and typhoid fevers.

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OLD AND NEW.

ANNUAL ORATION ON THE OCCASION OF THE OPENING OF THE NEW BUILDING OF THE MEDICAL AND CHIRURGICAL FACULTY OF THE STATE OF MARYLAND, MAY 13, 1909.

BY WILLIAM OSLER.

Regius Professor of Medicine, Oxford.

In the collegiate churches and cathedrals of England before the sermon, the preacher, in what is known as the "bidding prayer," asks the people, often in very quaint phraseology, to pray, among other things for the estates of the realm, and then he offers a special prayer of thanks for the

liberality of founders and benefactors, "men in their generation famous and in ours never to be forgotten." At Oxford in the University church every Sunday in term it is interesting to hear recalled the memory of the Duke Humphrey, the Lady Margaret and other worthies. And whoever the preacher may be he finally mentions the founders and famous men of his particular college. Following this happy custom I would ask you in the first place to be profoundly thankful to the men of 1799 who gave this Faculty to the country and who made this day possible. Out of the speechless years let us recall their good deeds, and I would ask that this occasion be blessed by invoking their memory. Part at least of the success of this Faculty may be attributed to the pious care with which their example has been cherished. Long before I knew this city, Dr. Quinan's *History of the Medical Profession of the State of Maryland* was familiar to me; and we have to thank our indefatigable colleague, Dr. Cordell, in whose *Annals* (by far the most complete history of the profession of any State in the Union) we can read of the planting of the acorn, of the day of small things in which we had our origin. As Emerson says, "we cannot overstate our debt to the past." The plans, the money, the anxious thought, the long hours spent in meetings, the labors of the various committees represent but the completion of a great work, the foundations of which were laid in other generations. All the same let us be profoundly grateful to the Building, Finance and Arrangement Committees, and to our Presidents of the past five years—Dr. Brush, Dr. Earle, Dr. Woods, Dr. C. O'Donovan and Dr. Goldsborough for their extraordinary efforts. I hope somewhere in this building a brass tablet will permanently record their names.

It would take a long bidding prayer to express the thanks of an academic wanderer like myself, who has had so much given to him in so many places. In deeds rather than in words I have tried to be thankful, but it is hard to find gratitude enough to go round. My heart resembles one of those old manuscripts, the parchment of which has been used over and over again and while it looks as if there was only one writing, the expert is able to decipher beneath the palimpsest, as it is called. It is hard on the parchment and it is not always easy to decipher the writing, but the characters traced by my associations in this city must ever remain fresh and clear. A unique opportunity indeed was the founding of the Johns Hopkins Hospital. That those of us entrusted with its organization should have won your esteem and should have been adopted by the city and by the State is by far the best testimonial of our character and of our work. Considering the circumstances it might easily have been otherwise. But the success of that experiment must not be attributed altogether to the professional side. Such men as Francis T. King, Judge Dobbin, Dr.

Carey Thomas and Francis White were equal to the occasion and we owe much to their wisdom and good management. But to one man more than all others I would like to express my personal thanks—Daniel C. Gilman, whose name will be forever associated with fundamental reforms in American educational methods. And at the Johns Hopkins Hospital we shall always cherish his memory for the work done in connection with its organization, and for his unfailing interest in the work of the medical school. When I heard of his happy death the words of Elisha rose to my lips, "My father, my father! the chariot of Israel and the horsemen thereof." It is one of my deep regrets to miss on this occasion the greetings of a man whose encouragement and support meant so much in my life here.

I would recall with gratitude the kind reception given to me and to my colleagues by the older men of this Faculty, to whose genial influence it was that we were soon made its devoted children. This might indeed have been no easy matter had not the way been prepared by a man whose Galenic touch has ever been an "open sesame." Better men than Frank Donaldson, Christopher Johnson, Allan Smith, George Miltenberger, Henry P. C. Wilson, John Van Bibber, John Morris, Aaron Friedenwald, Francis T. Miles and A. B. Arnold never served the State. And there were the younger generation with whom the work of the Faculty brought me into close contact. Brune, cut off so prematurely; Michel, devoted to its interests; Rohé, so versatile and energetic; Chatard, whose family in this city forms a sort of hereditary Æscupalian guild; Atkinson, type of the ideal physician; George Preston, always faithful and hopeful, and the lovable Ridge Trimble. How glad would they have been to see this day.

The living well know how deeply I appreciate your friendship of which you have given this new and enduring testimony. It does not often happen that a man is called upon to participate in the dedication of a Hall to himself. More often it is a posthumous honor for which the thanks are tendered by relatives or friends. It is difficult for me to express the deep gratitude I feel for this singular mark of affection on your part. The distinction is not a little enhanced by the association with corresponding halls in other cities of the names of some of the most distinguished of American physicians, Oliver Wendell Holmes in Boston, David Hossack in New York, and S. Weir Mitchell in Philadelphia. If by any process from the large lump of your gracious kindness the grains of merit on my part could be extracted they would be found to consist of that all precious material faith—the pure gold of faith which I always had in the future of the Faculty. Just twenty years ago I joined this society and began my professional life here by giving the Annual Oration. Its history and tradition appealed to me strongly and I soon began to find my way to the old quarters under the Historical Society's Hall. Dismal, dark and dusty

yet the rooms contained much of interest and there were always a few choice spirits to be found, most often our learned historian, then the librarian, George Preston, Bond, Brune and others.

We liked the old place with all its dust and dirt, and it represented much solid effort on the part of better men than ourselves. For years there had been a strongly expressed wish to move to larger quarters, and with many misgivings and by a not very large majority it was decided in 1895 to buy the house, 847 N. Eutaw Street. Our optimistic Treasurer, Dr. Ashby, really made us move. Knowing frenzied finance thoroughly and running the Faculty on credit, yet he inspired faith in his colleagues who were financial babies in his hands. No one knows how he succeeded in paying for No. 847 and for the Hall we there built. We were always hard up, always spending more than our income and Dr. Ashby had to meet our ever-increasing extravagances, but you all know how well it was done, and how in a few years, somehow, the house and the Hall were paid for. With our increasing library it was soon found that we needed skilled assistance and one extravagance, as some thought, has proved a great blessing. In securing a well-trained librarian, Miss Noyes, to take charge of our books we did one of the best strokes of business ever done for the Faculty, and it appeals to one's sense of the fitness of things that after years of labor in very cramped surroundings she should now have library accommodations equal to the best in the country. How much the success of this meeting is due to the efforts of Miss Noyes and her staff the members of the various committees can testify.

It is an immense gratification to think that my name will remain permanently associated with this Faculty. Among many kind tributes for which I have to thank my friends none has ever touched me so closely. As a boy some of my happiest recollections, in the early sixties, are of school days in a small Canadian town, where in the summer evenings we paraded the streets, company formation, with a bonnie blue flag bearing a single star and singing "Maryland, my Maryland." Little then—or later—did I dream that my affiliation would be so close with this State, and that with it, through your gracious act today, my name may find its most enduring remembrance. These festivals illustrate how quickly the memory of a name perishes. In how many minds did the mention of David Hossack arouse a thrill of remembrance? His works—and they were good ones—have perished, and his most enduring association is with the Hall of the Academy of Medicine which bears his name—and this is likely to be my fate. We can imagine a conversation in a library—2009—between two assistants wearily sorting a pile of second-hand books just sent in. "What are we to do with all this old rubbish by a man named Osler? He must have had very little to do to spoil so much paper. Where did he live any

way?" "Oh, I don't know. Baltimore, I think. Anyhow they have a Hall there that bears his name."

And now that you see fulfilled the desire of your eyes in the possession of the beautiful new building, what is the special message of such an occasion? A double one—to the profession at large and to ourselves in particular. This is the home of the physicians of this State, with all the advantages and association which we connect with that word. The Faculty, as has already been remarked upon, represents a unique type of organization in this country. State societies exist everywhere, state examining boards are universal, and libraries are multiplying rapidly, but only in this State are the three so combined as to give to the profession its proper solidarity. This means much more than is represented by the Academy of Medicine, New York, the Library Association of Boston and the College of Physicians, Philadelphia, which are local civic institutions. Here the organized profession of the entire State is in control. It is to be hoped that the good example of Maryland may be followed, and that other state medical societies may secure in each capital a building for the accommodation of the Examining Board, the State society and a library. The leaven of progress and of unity has been working and the reorganization of the American Medical Association has aroused great activity in the State and county societies. And to the energy and business skill of one man may be attributed much of the phenomenal success of late years of the American Association and its Journal. Dr. Simmons has done a work of which every member of the profession should be proud. In part this building may be attributed to the new spirit and we may hope to see before long in Trenton, Richmond, Harrisburg, Albany and other capitals homes on similar lines. No one can have participated as I did in the work of this society without feeling that it is one of the most potent factors for good in the city and State. The annual and semi-annual meetings, benefiting alike hearts and heads, have brought us together in friendly rivalry, and have strengthened the bonds of good fellowship. All crave companionship and encouragement, particularly when young, and these gatherings help to counteract the sterilizing influence of that isolation in which so many men have to work. Look about and ask who are the happiest men in our ranks! Those who do not neglect the gathering of themselves together at our meetings. Who are the busiest? Those who are the most faithful in the discharge of their duties to the society. Who are the most prosperous? Those who have given to it much of their time and substance. I could enumerate other benefits, but we are fortunate to have this year as our President one of those typical products of the Faculty, a man whose family has had affiliation with it since the foundation, and who represents in his character the highest type of physician and the best stamp of citizen-

ship. It is one of the great merits of this society that it holds up to emulation and delights to honor men of this stamp, who have loyally maintained our best traditions while living the exacting lives of general practitioners.

This Faculty represents an organic pattern in which the old and the new form the warp and the woof of the life of the profession of this State. Father Time, who plies the shuttle to and fro, has inserted webs of innovation as in 1895 and 1909, but the pattern remains essentially the same. We, the members, pass on, the Faculty endures, the lives which make it die, but its life survives. The past has a charm and a use not always evident to ordinary eyes. In the orderly evolution of nature the old and the new are never dissociated. Of this our bodies offer many illustrations. In the very temple of the mind itself, stowed away in its depths, lies the mysterious pineal gland, the seat of the soul, said the old philosophers; but to him who can read, here, in the presence of the latest and most complicated bit of nature's mechanism is a remnant of the very old, of a third eye which was of use to an early vertebrate ancestor as he flopped about in the primeval marshes. Why should it be there? Of what use? Why should we be full of these vestiges, useless, often harmful? It is part of the purpose of life ever in this way to blend the old with the new. Habits, customs, opinions, beliefs influence us out of the past, sometimes helpfully, at others hurtfully. For example, in any medical organization on such an occasion as the present, when a device was needed for the beautiful medal which has been designed by Max Broedel, it was not possible to use anything else but the *Æsculopian* serpent, an emblem which speaks to us of a long past, when we took our origin in the most gracious and useful of the Grecian cults. Every prescription we write tells of the days when the Arabian was our master, when Avicenni swayed the profession to a unit. And still more does our every day language call back theories and opinions which have long since passed into oblivion and are as useless as the pineal gland or the vermiform appendix.

The secret of success in an institution of this kind is to blend the old with the new, the past with the present in due proportion, and it is not difficult if we follow Emerson's counsel: "We cannot overstate," he says, "our debt to the past, but the moment has the supreme claim; the sole terms on which the past can become ours are its subordination to the present." Let me indicate very briefly how the old and the new may be interwoven in the life of this Faculty.

The written records of the profession of the State will be found on our shelves. Let it be known that collections of letters and of documents of all sorts will here be housed in a fireproof building, catalogued bound and indexed, and there will soon be additions of value to the interesting papers already in our possession. The Nathan Smith letters should be here on

deposit with the story of that noble man's work at Dartmouth and at Yale. Perhaps it might be more fitting to see them in the library of one or other of those institutions, but for three generations the family has been intimately associated with this Faculty and with the life of this State. Let people know that we are not greedy in this matter, but only anxious that such priceless treasures should be on deposit where they are absolutely safe. From these records, the private letters of the old doctors written to their friends, patients and relatives, we get a vivid picture of the past and are enabled to reconstruct their lives and their times. Throughout the State there are scores of documents which it is to be hoped will gradually find their way to our archives. In each generation some one man knows the value of such documents and is willing to collect and classify them. It makes one sad to think what we missed in American medical history when the Toner collection slipped out of our hands, and I am glad to think an accident of that sort could never happen again. A good start has been made and you will see treasures which the care of former librarians has preserved. The first medical diploma issued in America, to Dr. John Archer, a Maryland man, hangs on the wall, and a picture of his old Medical Hall, a sort of private cross-roads medical school. I would urge upon the Library Committee the importance of fostering this side of its work. Nowadays the arrangements for binding, cataloguing, and displaying letters and manuscripts have reached a high grade of perfection and the knowledge that there is here a fireproof building should attract many important documents relating to the profession. The Library has more than doubled since our removal to 847 N. Eutaw Street, and now contains 17,533 volumes and 10,869 monographs and reprints. A great majority of these additions are new, the books having been bought by the Frick Fund, and by The Book and Journal Club.

Nothing neutralizes the new more effectively than the presence of old books. An Aldine here and there, a few fine parchment-bound Juntas, an Oporinus or a Froben in the original boards and stamped pigskin, a fine Paris Stephanus, an Elzevir or a Plantin give tone to the shelves, just as do the Stuarts and Copleys to the dining-room in an old mansion. The difficulty is that for library purposes nearly all books are old. Nothing ages so quickly as a book—no life so short. Often still-born from the press, not one in ten thousand has the life of its generation, not one in a hundred thousand lives out the allotted years of its author; one or two in each generation are immortal, having in them that potency of life of which Milton speaks. On what principle then should a library of this character select old books? For reading purposes a decade will age every book issued from the press this year; that, no doubt, is the hidden meaning of the old proverb about every book having its fate. Under such circumstances

deliberately to buy old books may seem a superfluity of naughtiness on the part of a librarian. There is an immense old literature which it is not worth while to seek. In our large collections miles, literally miles, of shelves are filled with books as dry as the bones in the catacombs. Some one library in the country must have all the books, and in the Surgeon-General's library there is a collection which aims at completeness. If you wish to see all the Junta editions of Galen, go there; if you wish to see a pamphlet by John Smith, of New Orleans, on the treatment of yellow fever by the application of sulphur to the soles of the feet, go there; all the odd and out of the way literature may there be consulted, and the student who wishes to know the story of Valentine Greatrakes and of Perkins Tractors has only to go to Washington. We cannot be too grateful to the men who have established this great national institution, one of the most successful of modern libraries—to Surgeon-General W. A. Hammond, the founder, to Dr. Billings, the maker, to successive Surgeons-General, the promoters, to Dr. Billings and to Dr. Fletcher for the Index Catalogue, one of the most important works on bibliography ever undertaken. To the national library then may be left the duty of indiscriminate purchase, on the principle that it should have everything that any one can possibly ask for. The local libraries have a much more limited, but not less interesting field to cultivate. In the first place all the medical literature of the State should be here—the Journals, the Reports, the Transactions and the editions of all the books written by men who have been connected with the State. By no means an easy task; it takes years of anxious hunting to fill gaps. This work generally falls to the lot of some enthusiast on the Library Committee. Fortunately keen eyes for many years looked out for these items and this part of our collection is on a fair way to completion. Then there is a group of books which may be called American medical classics, the more notable contributions to medicine and surgery made in the eighteenth and nineteenth centuries; Morgan's Essay, which led to the foundation of the University of Pennsylvania; Jones' Manual of Military Surgery; Nathan Smith on Typhus Fever—works of this sort should be on our shelves. Thirdly, the bibliography of the more distinguished American physicians and surgeons should be made as complete as possible. Of the writings of some forty or fifty men every scrap deserves to be sought for—men of the stamp of Nathan and Nathan R. Smith, the Bigelows, Samuel D. Gross, Austin Flint, Henry I. Bowditch, W. A. Gerran, Daniel Drake, and Oliver Wendell Holmes.

And, lastly, a library with any ambition will wish to have the original editions of the great medical books of the world. Care must be exercised not to allow a library to be made the dumping ground for all the old quartos and folios of the seventeenth and eighteenth centuries. There are plenty

of very handsome volumes not worthy of shelf room. This part of the work takes time and money and more of both than are usually at the disposal of the Library Committee. In every city of this size there is usually a physician with the happy combination of literary tastes, leisure and a long purse—to whom should be entrusted this part of the literary work. With only the taste and the knowledge he can use his colleagues' purses and induce *Dr. Blank* to give an original Harvey *de motu cordis* or a Jenner pamphlet or an early Mundinus. The fine old books on exhibition show that much has been done already in this direction and I have no doubt that within a few years this department will grow rapidly. To mark this happy occasion, and to rejoice Miss Noyes' heart I could not resist buying in Rome the original edition of Vesalius, 1543—one of the two medical works which has most powerfully influenced modern medicine. Special collections are of exceptional interest and we are fortunate to have the library of Dr. Upton Scott, our first President, of Dr. Charles Frick and a unique group of 120 Edinburgh theses by American students of the colonial and early 19th century days.

With manuscripts and books, pictures are naturally associated, and our gallery, old and new, grows rapidly. You remember how the centennial celebration brought out a group of fine portraits and we benefited in getting the Baker, the Buckler, Miltenberger, Wilson, Frick, Arnold, Friedenwald, Archer, Stokes, N. R. Smith, Atkinson, Rohé, Preston and other pictures. There are many others in the State and city whose ultimate destiny should be these walls—if not the original, good copies supplied by our families are very welcome. This is our Pantheon in which there should be a memorial of some sort to every distinguished Old Maryland physician. When we look about and see what has been done since the removal to Eutaw Street the Faculty may well feel encouraged. One of the most fortunate events of the past fifteen years was the memorial room and library given by Mr. W. F. Frick in memory of his brother Charles, a most distinguished physician of this city and a devoted member of the Faculty. To the Frick family we are under a deep debt; not only has the special library been an inestimable boon, as with the money annually given a large proportion of the new books have been bought, but it has been also a happy example followed in the new building and there rooms are devoted to the memory of Dr. Aaron Friedenwald and Dr. Samuel Baker. In what happier way could these families have paid for themselves and for us the debt of the past?

But let us not forget that the moment, the Now, the Present has, as Emerson says, the supreme claim to which the Past must be subordinate. The most important single function of this corporation is educational. This is really a post-graduate college of which the members remain students.

I am delighted to see that a room has been provided, through the liberality of Dr. Hugh Young, in which members may do their own laboratory work. This is a feature in the life of the Faculty which should develop and be most helpful. It should be the ambition of every young man as soon as possible after registration, to join the Faculty. Until within the fellowship he can scarcely be called a member of the guild. Take the group which has joined recently, bringing in youth and enthusiasm; year by year they will grow into the life of the Faculty and upon them time will stamp the slow insensible changes which hall-mark the generations, but which shade so gradually that there is no sharp cleavage, but the seniors and the juniors, the new and the old are blended into one homogeneous body.

By far the most important channel through which the new pours in to mingle with the old is the current literature of all lands with which our shelves groan. An important function of this Faculty is to furnish first-hand information from every medical center in the world, and this it does through journals, transactions and reports. A library such as this has to cater to three groups—the laboratory workers, the specialists, the general practitioners. and it has become increasingly difficult to meet their demands. In a city with large laboratories there should be close coöperation, so that expensive journals are not duplicated, and workers should know just where to look for sets of rare proceedings or transactions. In the present congested condition of medical literature only Washington can hope for completeness and the laboratory men and specialists must not complain at the large size of the lacunæ on our shelves. It is not so difficult to keep up with the demands of the man in active practice, who wants the current journals, the new editions, the monographs and the systems, and it is upon these the main energies of the library must be spent, but it passes the capacity of all but a few great libraries to deal with the perfect avalanche of special literature at the present day. In certain directions the *Index Medicus* is an immense help and meets a pressing demand, but we have reached the stage when every tenth year, or indeed every fifth year, stock should be taken by some international coöperative organization which should deal with the large problems of analyzing the data pouring in from every quarter, upon every possible subject.

During the next century the new and the old will fight it out in these rooms in keen discussions, just as they have done since the days of Hippocrates. Time and again it will happen that the new will not be true and the true will not be new. The yesterday is forever being brought to trial at the bar of today and the verdict is rarely unanimous, often it is wisely a case of judgment deferred. Look over the questions discussed twenty years ago—some are dead, judgment gone by default; some are still pend-

ing; a few are settled, or we think they are; many seem antiquated. Turn to the programme of the present meeting and we find new problems propounded, sometimes in language which requires interpretation, old problems that the present seems never able to get rid of, and in others we recognize old friends in disguise. How interesting to look back over the Faculty attitude towards the subject of tuberculosis, with the modern history with which it is coeval! Brought up in the hazy pre-tuberculosis days, what did Upton Scott, our first President, think of the young men fresh from Paris, and their demonstrations of Laennec's views? A generation or two later Power and Buckler and Charles Frick were propounding Louis. Then in the seventies the heresies of Niemeyer and Virchow were discussed by Donaldson, Chew, W. T. Howard and others. How the hosts of the past fought against the bacillus when it was announced, and did not prevail; how the public was finally awakened; how tuberculosis was put in the list of preventable and curable diseases that are questions of recent history. In this quintette of problems in but one disease, which it has taken a century to solve, the new and the old are curiously blended again; they are not in clear-cut strata. The idea of contagion in tuberculosis goes back to Fracastorius and even earlier, while you will find in Celsus excellent direction for the fresh-air cure combined with a milk diet. To meet the educational side of the Faculty the entire organization has been changed and the special sections and the publication of its own journal are important new departures.

Amid these hopeful and splendid surroundings, which cannot but influence it profoundly, the old organization enters a new era. Do not forget that it takes some time for the domestic machinery to get into good working order, but the rapidity with which the rooms have been prepared, the books moved and the whole place made comfortable speaks for the great efficiency of the staff.

In one of his Hibbert lectures last year at Oxford, William James made a remark that clung—"We live forward, we understand backwards. The philosophers tell us that there is no present, no now—the fleeting moment *was* as we try to catch it." In the opening of this new building we have today made a happy addition to a happy past. Towards this day we have all lived forward, and the future should still be in our thoughts. This old Faculty must continue to be our rallying ground—once inside its portals, schools, colleges, hospitals, societies, all other affiliations are absorbed in something vastly greater, which includes all and claims from all devoted service, *the united profession of the state*. The progressive evolution of such an organization demands the loyal support of every member. In all societies differences of opinion are not only inevitable but salutary. From time to time many of you will not approve the policy of

the officers of the day—do not let your annoyance dim your loyalty. Professional politics have never been, and I hope may never be, a marked feature of this body, but whenever any of you feel sore at the action of those in charge let me ask you to find a cure in devotion to the scientific work of the sections or to the library.

The best of all old things about this Faculty is that subtle force by which the men of the past influence us today—not by tradition, by the spoken word, handed on from father to son, teacher to pupil; not by the written record in which one generation reads of the deeds of another, but by that intangible, mysterious force hard to define but best expressed in the words *noblesse oblige*—that obligation to act in a certain way, to foster certain habits, to conform to certain unwritten laws—a sacred obligation, as potent now as in the time of Hippocrates, the alchemy of which at once turns to gold whatever may be leaden in the new of today.

Friday, May 14, was devoted mainly to scientific sessions of the Faculty, many interesting and instructive papers being read. In the evening the Annual Dinner was served in Osler Hall, about 150 members being seated. Dr. Goldsborough presided and Dr. Robert W. Johnson acted as Toastmaster. After-dinner speeches were made by Mayor Mahool, Hon. Charles J. Bonaparte, and Drs. William H. Welch, Thomas A. Ashby and Charles O'Donovan.

On Saturday, May 15, a special train carried the members of the Faculty and state officials to Sabillasville to participate in the dedication of the new State Sanatorium for Tuberculosis. The dedicatory address was delivered by United States Senator John Walter Smith. On returning, in the evening the closing exercises of the annual meeting of the Faculty were held, the principal business being the final reports of the Building Committee, presented by Drs. Brush and Linthicum.

THE MEDICAL LIBRARY IN POST-GRADUATE WORK.

An Address delivered at the Inaugural Meeting of the Medical Library Association held at Belfast, July 28th, 1909.

BY

WILLIAM OSLER, M.D., F.R.S.,
President of the Medical Library Association.

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Remarks

ON

THE MEDICAL LIBRARY IN POST-GRADUATE WORK.*

BY
WILLIAM OSLER, M.D., F.R.S.,
PRESIDENT OF THE MEDICAL LIBRARY ASSOCIATION.

WITH collectivism the order of the day it is very natural that those interested should associate themselves in an organization which has for its object the welfare of the Medical Library. As stated in the circular, the Provisional Committee has given the new society a wide basis. The objects are:

- (a) To bring together those engaged in or interested in medical libraries and medical literature, and for the discussion of matters associated with their fostering and care;
- (b) To maintain an exchange for the distribution of duplicate books and periodicals;
- (c) To increase the facilities for reference work;
- (d) To encourage the study of the history of medicine;
- (e) To issue publications dealing with medical library work;
- (f) To form a library union amongst those of the medical libraries between which the exchange of books can be arranged—

all unexceptionable objects, and with the additional merit of being within reach of accomplishment.

Let me say at the outset that this is not to be simply a society for those whose work is more or less officially concerned with libraries, but it is for all interested in the book as a living factor in the education of the members of a learned and consequently of a very bookish profession. Whether the British doctor has been a better book-lover or book-maker is an open question, but from the first Oxford movements in the thirteenth and in the early fifteenth centuries we find him ever in the ranks of the keenest bibliophiles. He has never been a great student of the book as such, and it is strange not to find in the long line of splendid bibliographers, from the lovable Conrad

* Delivered at the inaugural meeting of the Medical Library Association, held at Belfast, July 28th, 1909.

Gesner to the encyclopaedic Billings, an Englishman of the first rank. I do not forget the useful books of Douglas, of Young, and of Forbes, nor the Rabelaisian (in the mirth-loving sense) two-letter bibliography of Atkinson †; but they are feeble efforts in comparison with the works of our foreign and American brethren. But the Englishman has made up by being a great book-lover. Some of the best known of collections have been made in this country by physicians. It would be impossible to parallel elsewhere the libraries of Mead, Askew, and William Hunter. The sale catalogues of the former tell of treasures (and of prices) that send a thrill of regret through the book-lover that his lot was not cast in those happy days. The William Hunter Library met a better fate, and in the University of Glasgow is an enduring and worthy monument to the elder of the two great brothers, so unlike in mind and manners, so like in the capacity to see the true value of collections. It is to be hoped that a complete catalogue of this library may be issued before long, in companion volumes to the splendid catalogue of the manuscripts recently edited as a memorial to the late Professor Young.

It is safe to say that in proportion to population there are more medical libraries in these islands than in any other country in the world. We hope before long to have a proper census of them, and meanwhile I base the statement on casual observation. One of the first questions I ask on visiting a new town is, "Where is your medical library?" and I have been astonished at their extent and value. Usually in connexion with the county hospital or the medical society, or both, many of them go back to the middle or later part of the eighteenth century, and bear witness to the culture and intelligence of the provincial physicians of those days.

There are three groups:

First, in the national libraries of the capitals and of the universities, such as the British Museum and the Bodleian, are large collections of medical books—that of the British Museum the largest in the country. Upon these public storehouses of bibliographical knowledge we all draw freely. In many of the small libraries there are special collections of great intrinsic or historical value. The college libraries of Oxford and Cambridge contain manuscripts and old books of exceptional interest. Diel's topographical catalogue shows how rich some of the colleges are in the Greek medical manuscripts, particularly Balliol, New, Merton, All Souls, and Caius. Stowed away on their shelves are many fine folios, the gift of old members. Gulston's books are at Merton; New College has a very choice collection, including some of Walter Bayley; Floyer's books are at Queen's, Paddy's at St. John's, Coggan's at Oriel—indeed there is scarcely a college library without interesting medical associations.

† The only man, so far as I know, who has had the courage to write a diverting bibliography, but unfortunately he only got through A and B.

Secondly, the medical libraries proper, among which those of the Royal Colleges of the three capitals are the most important. Easily first in extent and in the wide sphere of its influence is that of the Royal College of Surgeons of England, which is a model of good management. The library of the Royal Society of Medicine is the largest, I believe, connected with any medical society, and with the new organization is rapidly growing. The libraries of the Faculty of Physicians and Surgeons of Glasgow, of the Medical Institution of Liverpool, of the Birmingham Institute, of University College, Bristol, the Worth Library of the Steevens Hospital, and the Manchester Medical Society, form collections of the first rank. One of the most valuable of professional libraries is that of the British Medical Association, under whose auspices, so to speak, we meet to-day. Founded in 1889, it now possesses more than 20,000 volumes, with a card catalogue. The books are chiefly modern, with a large proportion of monographs and valuable sets of foreign periodicals. It receives also, and this is a very important point for borrowers, the theses of the French universities. Through it the Association has already done good work by aiding in the formation of local libraries, and between 6,000 and 7,000 duplicates have already been distributed. An important step has recently been taken to make this a lending library for members of the Association, who will be able to borrow expensive works and periodicals such as are only occasionally required for consultation. Having frequently visited the library in the old building, I very gladly bear testimony to its usefulness and to the admirable way in which it is managed by the librarian, Mr. Honeyman. I am not surprised to hear that the annual number of readers is very large, more than 6,000 in 1906. In the new building the arrangements are excellent, and I have no doubt that provincial members visiting London will more and more resort to this library. In all matters of management and detail these large libraries will be able to guide and assist us with their experience. Certainly we shall get much more from them than they from us, but theirs will be the richer blessing of the giver. With a well-managed exchange we may be able to help them fill the lacunae on their shelves, and it should be our aim to make these national collections more and more complete.

By far the best work we can do is in the organization, preservation and extension of the smaller libraries already existing in the provincial cities and towns. Many of these are already well housed and well arranged, as for example the Reading, York and Norwich libraries, to speak of those which I know personally. There are scores of hospitals with good collections, some of the greatest value, as those of Exeter and Bath and the Brackenbury Library, Preston. Some of them have associations of exceptional interest. I have always been an admirer of Caleb Hillier Parry of Bath, type of the old naturalist-physician, more common a few generations ago than now.

His library in the Royal Hospital remains a fitting monument to a scholarly man of wide sympathies, and who left a deep impression on that part of the West Country which has given us such men as Jenner, Pritchard and Symonds. In those days life was not so full, and competition was less keen, so that men had more time to read and to think. Many of the best of these smaller libraries date from the latter part of the eighteenth century and the beginning of the nineteenth century. Some of them have died into cupboards and barrels, and sadly need the kind care of a Philip de Bury, one of the founders of Oxford libraries, who, in the fourteenth century, complained bitterly that he found precious volumes defiled and injured by mice, worms and moths. A collection of this sort, offered me a few years ago, I was able to buy through a friend, for the Johns Hopkins Medical School. It had associations with Joseph Priestley, with John Aikin, Thomas Percival and James Kendrick, well-known names in the North. As illustrating how valuable may be some of these out-of-the-way collections, there were in this one scores of seventeenth and eighteenth century pamphlets which were not in the London libraries.

Our best work will be in stimulating an interest in these smaller libraries, either in connexion with the medical society or with the hospital, and in helping to organize them; and from every one of them we hope to have in our society a representative.

And, lastly, there is the private library of the practitioner, the scope of which will depend on his training, his tastes, and his purse; and this brings me to the subject of my remarks, "the value of the library in post-graduate study."

Some of the best of men have used books the least, and there is good authority for the statement that shallowness of mind may go with much book-learning. Descartes, one of the most brilliant of thinkers and observers, had no library. At Egmond, asked by a friend the books he most read and valued, he took him into his dissecting room and showed him a calf—"There is my library." An identical anecdote is told of John Hunter. But these were exceptional men; and few will be found to doubt the importance of books as a means to what the same author called the end of all study—the capacity to make a good judgement.

It cannot be denied that many men practise, and do so successfully, with few journals and still fewer books. Radcliffe, whose memory is enshrined in two of the finest library buildings in the kingdom, and whose travelling Fellows are supposed to have at least a triennial thirst for new knowledge, neither read nor wrote books; and he is credited with the famous *mot* that he could set down the whole art of medicine on a sheet of paper. But conditions have changed, and medicine is now a rapidly progressive science, as well as an exceedingly complicated art, of which, at qualification, a man has only laid the foundation; and if he is to develop his intelligence—that is, get an education—it must be by systematic post-

graduate study. Out of leading-strings he must himself be at once teacher and pupil, and make and keep certain self-made laws. Whether he will get this education, whether, indeed, he will be able to keep what he has, will depend in part upon the sort of training he has received, and in part upon the type of mind with which he has been endowed. Unless as a student he has got that "relish of knowledge" of which Locke speaks; unless he has got far enough to have his senses well trained to make accurate observations; unless he has been taught how to use his intelligence so as to form a good judgement, the teacher will have more or less of a fool for a pupil, and between them make a sad mess of an education. After a few years such a man gives up in despair, and without mental exercise grows stale and is fit to do only the ordinary reflex practice, in which cough means an expectorant mixture, and heart disease digitalis, just as surely as a tap on the patellar tendon brings out the knee-jerk. A glance at the consulting-room suffices for the diagnosis of this type: the *BRITISH MEDICAL JOURNAL* or *Lancet* lies uncut in heaps on the table, and not a book is in sight! Some of the men of this type play a good game of tennis, others shoot and ride well, more play a good game of bridge, but they are lost souls, usually very dissatisfied with the profession—the kickers, the knockers, the grumblers, without a glimmer of consciousness that the fault is in themselves.

Post-graduate study is a habit of mind only to be acquired, as are other habits, in the slow repetition of the practice of looking at everything with an inquiring spirit. A patient with pneumonia has grass green sputum. "Have I ever seen it before? Have I a note of it? Where can I get a good description of it? What does it signify?" These are questions preliminary to getting a bit of clinical education, trifling in itself apparently, but when stored up and correlated with other facts may become the basis for an intelligent judgement on an important case.

There are many factors in this training—note-taking, reading, the medical society, and the quinquennial brain-dusting at a hospital or a post-graduate school. But I am only here concerned with one—books. I would like to speak of the value of notes, however brief, collected through long years as the sole means whereby a man gets his experience codified and really helpful; but I cannot wander to-day from the book, in which I include the *JOURNAL*.

But how can a busy man read, driven early and late, tired out and worried? He cannot. It is useless to try, unless he has got into the habit when he was not so busy; then it comes easy enough, and the hardest-worked man in the land may read his journals every week, even if he has to do it in his carriage. My old teacher and colleague at McGill, Palmer Howard, was the busiest practitioner in Montreal, but the weeklies and the monthlies, English and French, the good old Quarterly, the hospital reports, the new monographs—nothing escaped him, and I have

often heard him say that he did his best reading as he drove from patient to patient.

It is not so much a question of *when* but of *what* and of *how*. What sort of reading will best help a man in his education, will help him to keep up with the times and to develop into a thinking, reasoning practitioner? Let him get rid of the notion that much has to be read; one or two journals, a good weekly—the *Lancet* or the *BRITISH MEDICAL JOURNAL*—a good monthly—the *Practitioner* or the *American Journal of the Medical Sciences*—suffice; but let them be read thoroughly. Then each week strip the husk of advertising sheets, and keep on the desk a file of reasonable proportions, and to the articles which have been of interest refer again and again. At the end of the half-year bind your journals and insert slips where you have found articles bearing directly on your cases.

Carefully studied, a couple of journals are the very basis of post-graduate work, and year by year the files on the shelves become not simply the nucleus of, but actually a good working library, and, well marked in his mind, he has in them volumes on every special disease and a complete summary of the progress of medicine.

Let him follow the same practice with books. Buy with discrimination, and not too many, as here again it is a question of reading. If, as is said, the man of one book is dangerous, the man of a few books is more useful and more apt to keep the open, plastic mind. A good "System" of medicine and of surgery, an occasional monograph or work on special diseases, a new edition of a favourite textbook (when you can trust that it is really an editor's, not a publisher's, edition!), should suffice, and do not mean a large annual expenditure.

It is much simpler to buy books than to read them, and easier to read them than to absorb their contents. Too many men slip early out of the habit of studious reading, and yet this is essential to a man if he is to get an education. To be worth anything it must be associated with concentration—with that mental application which means real effort. Of the new Allbutt and Rolleston "System" I can read comfortably about twenty pages in an hour—sometimes of a tough author not more than fifteen. Half an hour a day would finish the six volumes already published within a year.

More than once I have referred to the three essentials in the house of the general practitioner—the library, the laboratory, and the nursery—and of these the first is much the easiest to get, as he starts with a nucleus in his students' textbooks. Effort and system gradually train a man's capacity to read intelligently and profitably, but only while the green years are on his head is the habit to be acquired, and in a desultory life, without fixed hours, and with his time at the beck and call of everybody, a man needs a good deal of reserve and determination to maintain it. Once the machinery is started, the effort is not felt in the keen interest in a subject. As Aristotle remarks, "In the case of our habits we are only masters of the

beginning, their growth by gradual stages being imperceptible, like the growth of a disease"; and so it is with this habit of reading, of which you are only master at the beginning—once acquired, you are its slave.

So far as the library is a factor, the greater part of a man's post-graduate education must be at home. In this country no man practises very far from a county town in which there is a medical society or a general hospital with a library attached. A notebook for special points to look up, or for certain books of reference, will get him into the habit of frequenting it, and he should become a subscriber, as in this way not only does the library widen its influence, but finds means for its support. The county library, wherever situated, should be the much-esteemed consultant of the general practitioner.

But it is in the towns of 20,000 in population and upwards that the library is of the greatest value, and where it becomes a factor of the first importance in the development of the progressive man. These are days of great opportunities, when we have discovered other ways to the top, toilsome all the same, than up the old rungs of the academic ladder, or the weary climb of the stairs of a London hospital. We are waking up to the fact that the man may make his own environment, and may make it just what and where he pleases; he may even perform a miracle—the mountain may come to Mahomet. Let me give you a notable illustration.

A few years ago when two young Irish-Americans called Mayo began to frequent the surgical clinics of Europe, no one knew where they came from; no one had ever heard of Rochester, Minnesota, and when informed that it was on the "Prairies," about 1,000 miles north-west of Chicago, there was a shrug of the shoulders and "Oh!" Self education, post-graduate study, books, journals, laboratory work, have enabled these remarkable men to build up one of the largest and in some respects the most important surgical clinic in the world, and a town of less than 20,000 inhabitants has become the Mecca of all surgeons.

To the man who is ambitious to use his opportunities in a town or city, a well selected library is essential, and whether he be surgeon, physician, or specialist, he needs as a rule more than his own shelves supply, often indeed a good deal more than the library can offer. As I have already stated, the library of the British Medical Association is offering great facilities to its members. In England, too, he can and should join the Royal Medical Society, from which monographs and special journals may be had, but he cannot always wait, and there is no reason why in the larger towns there should not be a library which ministers to the ordinary wants of all ranks. The journals at once become a serious consideration—French, German, and American—but a few of the best suffice when supplemented by the admirable German *Centralblätte*. By means of an exchange this association can render great assistance, while in the thickly populated districts a system of exchanges between libraries would cut in half

the cost of the more expensive journals. In this matter, too, a central library like that of the British Medical Association may be most helpful.

In large cities the profession should have its own home in connexion with the leading medical society, and of such an organization the library forms an important part. Belfast has set a good example, and through the munificence of Sir William Whitla you have a splendid building for the Medical Institute. About such rooms or buildings should centre the life of the profession, present and past. Portraits of the old worthies, memorials of friends, and to our heroes (such as the beautiful stained-glass window in the Institute here to Dr. William Smyth), show-cases full of the interesting relics of the profession, with manuscripts and books illustrative of local history—all these memorials make the past live again. At York you may see in the medical library the actual forceps with which Dr. Slop broke the bridge of Tristram Shandy's nose, and in every county there are relics of the profession well worth preserving.

It should be the ambition of the men in each county to have well-equipped rooms, such as those I have visited with much pleasure at York and Norwich. If, as at Reading, Exeter, Preston, and Dublin (Steevens' Hospital), rooms have been furnished in the hospital, see that the equipment is attractive; many libraries have deservedly fallen into disuse because men will not seek books or journals in dull, dark, cold, dusty, uninviting rooms.

Like everything else that is worth having, a library costs money. Do not try to do too much, strive to have a large membership, which enables the fees to be low; and when the library is in connexion with a hospital, the current English journals should be furnished by the governors to the staff. In towns with a tax for the upkeep of a public library, a grant should be made for the medical library. But the financial and other questions of organization and support will be discussed, I hope, at an early meeting.

Were there time I should like to say a few words on the subject of *how* to read, but the essence of the whole matter I found the other day in the Bibliotheca Lancisiana, Rome (founded in 1711, and containing the books of the famous Lancisi). In the opening address, 1714, *De recto usu Bibliothecae*, the Abbé Carsughi discusses the subject in three sections, and gives some good rules. The first section, *Librorum scilicet delectum*, need not detain us, but in the second, *Legendi methodum*, he urges two important points—to read in a certain order and with a definite object, and *lente festinans*, “unhasting but unresting.” In the third section, *Adnotandi modum*, he urges the necessity of careful note-taking, quoting the praise of Clement of Alexandria, “Oblivionis medicamentum, monumentum senectutis et adjumentum memoriae.” He dwells upon the importance of study in the morning, which was all very well in those days, but is not one hour after six in the evening worth now two before

eight in the morning? (I am sure it is to me!) With half an hour's reading in bed every night as a steady practice, the busiest man can get a fair education before the plasma sets in the periganglionic spaces of his grey cortex.

But there is another side of the question of books and libraries—man does not live by bread alone, and while getting his medical education and making his calling and election sure by hard work, the young doctor should look about early for an avocation, a pastime, that will take him away from patients, pills and potions. One of the best features I find in my "old country" colleagues is the frequency with which they have hobbies. No man is really happy or safe without one, and it makes precious little difference what the outside interest may be—botany, beetles or butterflies, roses, tulips or irises, fishing, mountaineering or antiquities—anything will do so long as he straddles a hobby and rides it hard. I would like to make a plea for the book, for the pleasant paths of bibliography, in which many of us stray to our great delight. Upon this how charming is old Burton (really one of us, "by profession a divine, by inclination a physician," he says), whose *Anatomy of Melancholy* is the only great medical work ever written by a layman. "For what a world of books offers itself, in all subjects, arts, and sciences, to the sweet content and capacity of the reader! In arithmetic, geometry, perspective, optics, astronomy, architecture, sculpture, painting, of which so many and such elaborate treatises are written; in mechanics and their mysteries, military matters, navigation, riding of horses, fencing, swimming, gardening, planting, great tomes of husbandry, cookery, falconry, hunting, fishing, fowling, etc., with exquisite pictures of all sports, games, and what not! In music, metaphysics, natural and moral philosophy, philology, in policy, heraldry, genealogy, chronology, etc., they afford great tomes, or those studies of antiquity, etc., *et quid subtilius Arithmeticis inventionibus, quid jucundius Musicis rationibus, quid divinius Astronomicis, quid rectius Geometricis demonstrationibus!* What so sure, what so pleasant?"

Our society will, I am sure, be very helpful to men who take up this study. We hope to have two groups, mutually helpful—the professional bibliographers, the men in charge of our libraries, who have to do with the book, as such, and who care little or nothing about its contents; and amateurs, like myself. As Professor Ferguson says in his charming essay¹:

He (the bibliographer) has to do with editions and their peculiarities, with places, printers, and dates, with types and illustrations, with sizes and collation, with binding and owners, with classifications, collections and catalogues.

There are scores of book collectors whose hobby also takes them in this direction, but we should have a large amateur group who will be happier in following other lines. Personally, I collect on two principles—first, interest in an author, which is a good guide, as the book

illustrates the biography, a principle which has the advantage of helping at least to keep you within the limits of purse and shelves, more the latter than the former. Take, for example, the two small groups of books I have placed in our exhibition, the one illustrating Servetus, the other Ulrich von Hutten. Valuable as they are from the standpoint of the professional bibliographer, this is nothing to the interest awakened in the men themselves, in their aspirations, their labour, and their tragic fates. For the amateur this personal note clothes the dry bones of bibliography and makes them live. And my other principle is this: a student of the history of medicine, I look out for books which have left their impress on it in some special way. If one is particular to examine carefully into the claims of a book before admitting it to the select company on your shelves, you here again cultivate a due regard for purse and space. For example, five or six books illustrate the whole subject of auscultation and percussion, only the masterpieces are chosen. I confess there may be a certain satisfaction in tracing out the biography of a book, but it is cold work unless you love the author.

Judiciously cultivated, bibliography has many advantages as a pastime for the doctor; a little patient care, a very small expenditure of money, and a constant look-out for the books wanted are the essential requisites. Nor is there ever any difficulty in the choice of a subject—anything he may be interested in has its bibliographical side. One friend (Dr. Turrell), a very busy man, is a keen fisherman, and has found the time to collect a library on this subject, and has written the article on it for the *County History of Oxfordshire*. Another man has kept up his classics, and collected everything relating to Horace. Another has a library relating to the order of St. John. Another friend in large general practice has found time to make a collection of the masterpieces of English literature, which has not only been a diversion and an education, as it has brought him into the best company of the past four centuries, but he tells us there is another side—it has been a better investment than life insurance. A member of our profession, the late Professor Corfield, made one of the best modern collections of bindings, the sale of which at Sotheby's in 1904 was one of the bibliographical features of the year. Once in a subject it is extraordinary how it grows and develops. As Atkinson says, "It is an art of itself, which is not easily sought into or acquired, but which, if so acquired, may stand both his pleasure and profit in very great stead in a very long or a short life." And the busiest general practitioner may find the time for first-class work. Many of you may have seen a book issued two years ago from the Oxford Press on Greek and Roman medical and surgical instruments, the only separate treatise on the subject which has appeared in English. It illustrates the hobby of a very hard-worked practitioner in the town of Hartlepool—John Milne, whose spare time and whose vacation have been spent in studying this aspect of Greek and Roman archaeology.

We shall hope to have in our society both the professional and the amateur—the man whose life-work is in libraries, and those of us who are fond of books, either from a biographical or a bibliographical standpoint. We should be able to encourage library organization, and once established as a common meeting ground for all interested, the society should be of great value to the profession. We look for a large membership, and many will join who do not belong to either of the above-mentioned groups, the men who feel that, as a matter of policy, such a society should be supported. *Non sibi sed toti*—let us work in the spirit of this motto, and our future is assured.

In starting an organization of this sort the work always falls on one or two men. We have to thank Dr. Stanley Hall, of Bristol, and Mr. C. E. A. Clayton, of the Manchester Medical Library, to whom is due entirely the success of this preliminary meeting. We have also to thank the university authorities for allowing us to meet here, and furnishing us with rooms for the exhibit.

REFERENCE.

- ¹ *Some Aspects of Bibliography*, Edinburgh,

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THE TREATMENT OF DISEASE

THE ADDRESS IN MEDICINE BEFORE THE
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TORONTO, JUNE 3, 1909

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I

As true to-day as when Celsus made the remark, 'The dominant view of the nature of disease controls its treatment.' As is our pathology so is our practice; what the pathologist thinks to-day the physician does to-morrow. Roughly grouped, there have been three great conceptions of the nature of disease. For long centuries it was believed to be the direct outcome of sin, *flagellum Dei pro peccatis mundi*, to use Cotton Mather's phrase, and the treatment was simple—a readjustment in some way of man's relation with the invisible powers, malign or benign, which had inflicted the scourge. From the thrall of this 'sin and sickness' view man has escaped so far as no longer, at least in Anglo-Saxon communities, to have a proper saint for each infirmity. Against this strong bias towards the supernatural even the wisdom of Solomon could not prevail; was not the great book of his writings which contained medicine for all manner of diseases and lay open for the people to read as they came into the temple removed by Hezekiah lest out of confidence in remedies they should neglect their duty in calling and relying upon God? And the modern book of reason, which lies open to all, is read only by a few in the more civilized countries. The vast majority are happy in the childlike faith of the childhood of the world. I am told that annually more people seek help

at the shrine of Ste. Anne de Beaupré, in the Province of Quebec, than at all the hospitals of the Dominion of Canada. How touching at Rome to see the simple trust of the poor in some popular Madonna, such as the Madonna del Parto ! It lends a glow to the cold and repellent formalism of the churches. In all matters relating to disease credulity remains a permanent fact, uninfluenced by civilization or education.

From Hippocrates to Hunter the treatment of disease was one long traffic in hypotheses ; variants at different periods of the doctrine of the four humours, as dominated by some strong mind in active revolt it would undergo temporary alteration. The peccant humours were removed by purging, bleeding, or sweating, and until the early years of the nineteenth century there was very little change in the details. To a very definite but entirely erroneous pathology was added a treatment most rational in every respect, had the pathology been correct ! The practice of the early part of the last century differed very little from that which prevailed in the days of Sydenham, except, perhaps, that our grandfathers were, if possible, more ardent believers in the lancet.

In the past fifty years—in the memory, indeed, of some present—our conception of the nature of disease has been revolutionized, and with a recognition that its ultimate processes, whether produced by external agents or the result of modifications in the normal metabolism, are chemico-physical, we have reached a standpoint from which to approach the problems of prevention and cure in a rational way. Let me indicate briefly the directions in which the new science has transformed the old art.

In the first place, the discovery of the cause of many of the great scourges has changed not only its whole aspect, but, indeed, we may say, the very outlook of humanity. No longer is our highest aim to cure, but to prevent disease ; and in its career of usefulness the profession has never before had a triumph such as we have witnessed in the abolition of many fearful scourges. Great as have been the Listerian victories in surgery, they are but guerrilla skirmishes, so to speak, in comparison with the Napoleonic campaigns which medicine is waging against the acute infections. These are glorious days for the race. Nothing has been seen like it on this old earth since the destroying angel stayed his hand on the threshing-floor of Araunah the Jebusite. For seven years Cuba, once a pest-house of the tropics, has been free from a scourge which has left an indelible mark in the history of the Englishman, Spaniard, and American in the New World. To-day the Canal Zone of Panama, for years the graveyard of the white man, has a death-rate as low as that in any city of the United States. In the island of Porto Rico, where many thousands have died annually of tropical anaemia, the death-rate has been cut in half by the work of Ashford and others. But, above all, the problem of life in the tropics for the white man has been solved, since malaria may now be prevented by very simple measures. These are some of the recent results of laboratory studies which have placed in our hands a power for good never before wielded by man.

Secondly, a fuller knowledge of etiology has led to a return to methods which have for their object, not so much the combating of the disease germ or of its products,

as the rendering of conditions in the body unfavourable for its propagation and action. How fruitful in practical results, for example, have been the new views on tuberculosis! Not that the discovery of the bacillus itself modified immediately our treatment of the disease, but, as so often happens, a combination of circumstances was responsible for the happy revolution—the recognition of the widespread prevalence of the infection, the great frequency with which healed lesions were found, and the knowledge of the importance of the character of the tissue soil, led to the substitution of the open-air and dietetic treatment for the nauseous mixtures with which our patients were formerly drenched. We scarcely appreciate the radical change which has occurred in our views even within a few years. Contrast a recent work on tuberculosis with one published twenty-five or thirty years ago. In the latter the drug treatment takes up the larger share, while in the former it is reduced to a page or two. And it is not only in the acute infections that the use of the ‘non-naturals’, as the old writers called them, has replaced other forms of treatment, but in diet, exercise, massage, and hydrotherapy, we are every day finding out the enormous importance of measures which too often have been used with greatest skill by those outside or on the edge of the profession.

Thirdly, the study of morbid anatomy combined with careful clinical observations has taught us to recognize our limitations, and to accept the fact that a disease itself may be incurable, and that the best we can do is to relieve symptoms and to make the patient comfortable. The relation of the profession to this group, particularly

to certain chronic maladies of the nervous system, is a very delicate one. It is a hard matter, and really not often necessary (since Nature usually does it quietly and in good time), to tell a patient that he is past all hope. As Sir Thomas Browne says : ' It is the hardest stone you can throw at a man to tell him that he is at the end of his tether ' ; and yet, put in the right way to an intelligent man it is not always cruel. Let us remember that we are the teachers, not the servants, of our patients, and we should be ready to make personal sacrifices in the cause of truth, and of loyalty to the profession. Our inconsistent attitude is, as a rule, the outcome of the circumstances that of the three factors in practice, heart, head, and pocket, to our credit, be it said, the first named is most potent. How often does the consultant find the attending physician resentful or aggrieved when told the honest truth that there is nothing further to be done for the cure of his patient ! To accept a great group of maladies, against which we have never had and can scarcely ever hope to have curative measures, makes some men as sensitive as though we were ourselves responsible for their existence. These very cases are ' rocks of offence ' to many good fellows whose moral decline dates from the rash promise to cure. We work by wit and not by witchcraft, and while these patients have our tenderest care, and we must do what is best for the relief of their sufferings, we should not bring the art of medicine into disrepute by quack-like promises to heal, or by wire-drawn attempts at cure in what old Burton calls ' continue and inexorable maladies '.

Fourthly, the new studies on the functions of organs

and their perversions have led to most astonishing results in the use of the products of metabolism, which time out of mind physicians have employed as medicines. The old recipe-books are full of directions for the use of parts of animals or of various secretions and excretions. Much of the humbuggery and quackery inside and outside of the profession has been concerned with some of the most unsavoury of these materials. The seventeenth-century pharmacopoeias were full of them, and in his oration at the Hunterian Society, 1902, Dr. Arthur T. Davies has given an interesting historical sketch of their use in practice. Metabolic therapy represents one of the greatest triumphs of science. The demonstration of insufficiency of the thyroid gland is a brilliant example of successful experimental inquiry, and as time has passed the good results of treatment in suitable cases have become more and more evident. Before long, no doubt, we shall be able to meet, in the same happy way, the perverted functions which lead to such diseases as exophthalmic goître, Addison's disease, and acromegaly; and as our knowledge of the pancreatic function and carbo-hydrate metabolism becomes more accurate we shall probably be able to place the treatment of diabetes on a sure foundation. And it is not only on the organic side that progress has been made. Important discoveries relating to the metabolism of the inorganic constituents, such as those relative to acidosis, have opened a new and most hopeful chapter in scientific medicine.

But the best of human effort is flecked and stained with weakness, and even the casual observer may note dark shadows in the bright picture. Organotherapy illus-

trates at once one of the great triumphs of science and the very apotheosis of charlatanry. One is almost ashamed to speak in the same breath of the credulousness and cupidity by which even the strong in intellect and the rich in experience have been carried off in a flood of pseudo-science. This has ever been a difficulty in the profession. The art is very apt to outrun or override the science, and play the master where the true rôle is that of the servant.

And, lastly, we have advanced firmly along a new road in the treatment of diseases due to specific micro-organisms, with the toxic products of which we are learning to cope successfully. The treatment with anti-toxins and bacterial vaccines, so successfully started, bears out the truth of that keen comment of Celsus: 'He will treat the disease properly whom the first origin of the cause has not deceived.' We are still far from the goal in some of the most important and fatal infections, but any one acquainted in even slight measure with the progress of the past ten years cannot but have confidence in the future. Considering that the generation is still active which opened the whole question, we cannot but feel hopeful in spite of disappointments here and failures there. But in our pride of progress let us remember cancer and pneumonia. The history of the latter disease affords a good illustration of the truth of the remark of Celsus with which I began this address. Year by year the lesson of pneumonia is a lesson of humility. For purposes of comparison statistics are not available, but it is not likely that the great masters from Galen to Grisolles lost a larger number of cases than we do.

Pneumonia has always been, as to-day, a dreaded and a fatal disease. For one thing let us be thankful. We have had the courage to abandon the expectorant mixtures, the depressants, the cardiac sedatives, the blisters, the emetics, the resulsives, the purges, the poultices, and, to a great extent, the bleedings. Surely our forefathers must have killed some patients by the appalling ferocity of their treatment, or to have stood it the constitutions of those days must have been more robust. We still await, but await in hope, the work that will remove the reproach of the mortality bills in this disease. I say reproach because we really feel it, and yet not justly, for who made us responsible for its benign or malignant nature? We can relieve symptoms, but we must find the means which will, on the one hand, limit the extension of the process, loosen the exudate, minimize the fluxion, control the alveolar diapedesis, and, on the other hand, diminish the output of the toxins, neutralize those in circulation, or strengthen the opsonic power of the blood. But some one will say, Is this all your science has to tell us? Is this the outcome of decades of good clinical work, of patient study of the disease, of anxious trial in such good faith of so many drugs? Give us back the childlike trust of the fathers in antimony and in the lancet rather than this cold nihilism. Not at all! Let us accept the truth, however unpleasant it may be, and with the death-rate staring us in the face, let us not be deceived with vain fancies. Not alone in pneumonia, but in the treatment of certain other diseases, do we need a stern, iconoclastic spirit which leads, not to nihilism, but to an active scepticism—not the passive scepticism

born of despair, but the active scepticism born of a knowledge that recognizes its limitations and knows full well that only in this attitude of mind can true progress be made. There are those among us who will live to see a true treatment of pneumonia ; we are beginning to learn the conditions of its prevalence, it may yet come within the list of preventable diseases, and let us hope that before long we may be able to cope with the products of the pneumococcus itself.

II

Along these five lines the modern conception of the nature of disease has radically altered our practice. The personal interest which we take in our fellow creatures is apt to breed a sense of superiority to their failings, and we are ready to forget that we ourselves, singularly human, illustrate many of the common weaknesses which we condemn in them. In no way is this more striking than in the careless credulity we display in some matters relating to the treatment of disease. The other day the *Times* had an editorial upon a remark of Bernard Shaw that the cleverest man will believe anything he wishes to believe, in spite of all the facts and textbooks in the world. We are at the mercy of our wills much more than of our intellect in the formation of our beliefs, which we adopt in a lazy, haphazard way, without taking much trouble to inquire into their foundation. But I am not going to discuss, were I able, this Shavian philosophy, but it will serve as an introduction to a few remarks on the Nemesis of Faith which in all ages readily over-

takes doctors and the public alike. Without trust, without confidence, without faith in himself, in his tools, in his fellow men, no man works successfully or happily. For us, however, it must never be the blind unquestioning trust of the devotee, but the confidence of the inquiring spirit that would prove all things. But it is so much easier to believe than to doubt, for doubt connotes thinking and the expenditure of energy, and often the disruption of the *status quo*. And then we doctors have always been a simple, trusting folk ! Did we not believe Galen implicitly for 1,500 years and Hippocrates for more than 2,000 ? To have the placid faith of the simple believer, instead of the fighting faith of the aggressive doubter, has ever been our besetting sin in the matter of treatment.

In the progress of knowledge each generation has a double labour—to escape from the intellectual thralls of the one from which it has emerged and to forge anew its own fetters. Upon us whose work lay in the last quarter of the nineteenth century fell the great struggle with that many-headed monster, Polypharmacy—not the true polypharmacy which is the skilful combination of remedies, but the giving of many—the practice of at once discharging a heavily-loaded prescription at every malady, or at every symptom of it. Much has been done and an extraordinary change has come over the profession, but it has not been a fight to the finish. Many were lukewarm ; others found it difficult to speak without giving offence in quarters where on other grounds respect and esteem were due. As an enemy to indiscriminate drugging, I have often been branded as a therapeutic

nihilist. That I should even venture to speak on the subject calls to mind what Professor Peabody, of Harvard, remarked about Jacob Bigelow, that, 'for his professorship of *Materia Medica* he had very much the same qualifications that a learned unbeliever might have for a professorship of Christian theology. No other man of his time had so little faith in drugs.' I bore this reproach cheerfully, coming, as I knew it did, from men who did not appreciate the difference between the giving of medicines and the treatment of disease; moreover it was for the galled jade to wince, my withers were unwrung. The heavy hands of the great Arabians grow lighter in each generation. Though dead, Avicenna and Averroes still speak, not only in the Arabic signs which we use, but in the combinations and multiplicity of the constituents of too many of our prescriptions. We are fortunately getting rid of routine practice in the use of drugs. How many of us now prescribe an emetic? And yet that shrewd old man, Nathaniel Chapman, who graced the profession of Philadelphia for so long, used to say: 'Everything else I have written may disappear, but my chapter on emetics will last!' How much less now does habit control our practice in the use of expectorants? The blind faith which some men have in medicines illustrates too often the greatest of all human capacities—the capacity for self-deception. One special advantage of the sceptical attitude of mind is that a man is never vexed to find that after all he has been in the wrong. It is an old story that a man may practise medicine successfully with a very few drugs. Locke had noticed this, probably in the hands of his friend Sydenham, since

he says: 'You cannot imagine how far a little observation carefully made by a man not tied up to the four humours . . . would carry a man in the curing of diseases, though very stubborn and dangerous, and that with very little and common things and almost no medicine at all.' Boerhaave commented upon this truth in a remark of Sydenham 'that a person well skilled in cases seldom needs remedies'. The study of the action of drugs, always beset with difficulties, is rapidly passing from the empirical stage, and this generation may expect to see the results of studies which have already been most promising. It is very important that our young men should get oriented early in this matter of drug treatment. Our teachers used to send us to the works of Forbes (*Nature and Art in the Treatment of Diseases*) and to Jacob Bigelow (*Nature and Disease*) for clear views on the subject. A book has been written by Dr. Harrington Sainsbury, the well-known London physician and teacher (*Principia Therapeutica*, Methuen), which deals with these problems in the same philosophic manner. It opens with a delightful dialogue between the pathologist and the physician. He lays his finger on the weak point of the pure morbid anatomist who thinks of the lesion only, and not enough of the function which even a seriously damaged organ may be able to carry on. The book should be in the hands of every practitioner and senior student. Some of you may have heard of the lecture-room motto of that distinguished pathologist and surgeon, and the first systematic writer on morbid anatomy in the United States, S. D. Gross: 'Principles, gentlemen, principles! principles!!' And it is upon these funda-

mental aspects that Dr. Sainsbury dwells in his most suggestive work, which I would like to see adopted as a textbook in every medical school in the land.

And we are yet far too credulous and supine in another very important matter. Each generation has its therapeutic vagaries, the outcome, as a rule, of attempts to put prematurely into practice theoretical conceptions of disease. As members of a free profession we are expected to do our own thinking; and yet the literature that comes to us daily indicates a thralldom not less dangerous than the polypharmacy from which we are escaping. I allude to the specious and seductive pamphlets and reports sent out by the pharmaceutical houses, large and small. We owe a deep debt to the modern manufacturing pharmacist, who has given us pleasant and potent medicines in the place of the nauseous and weak mixtures; and such firms as Parke, Davis & Company, of the United States, and Burroughs & Wellcome, of England, have been pioneers in the science of pharmacology. But even the best are not guiltless of exploiting in the profession the products of a pseudo-science. Let me specify three items in which I think the manufacturing pharmacists have gone beyond their limit and are trading on the credulity of the profession to the great detriment of the public. The length to which organotherapy has extended (not so much on this side of the water as on the European continent) beyond the legitimate use of certain preparations is a notorious illustration of the ease with which theoretical views place us in a false position. Because thyroid extract cures myxoedema and adrenalin has a powerful action, it has been taken almost for granted

that the extract of every organ is a specific against the diseases that affect it. This forcing of a scientific position is most hurtful, and I have known an investigator hesitate to publish results lest they should be misapplied in practice. The literature on the subject issued by reputable houses indicates, on the one hand, the pseudo-science upon which a business may be built up, and, on the other, the weak-minded state of the profession on whose credulity these firms trade. A second most reprehensible feature is the laudatory character of literature describing the preparations which they manufacture. Foisted upon an innocent practitioner by a travelling Autolycus, the preparation is used successfully, say, in six cases of amenorrhoea; very soon a report appears in a medical journal, and a few weeks later this report is sent broadcast with the auriferous leaflets of the firm. A day or two before I left England a pamphlet came from X. & Co., characterized by brazen therapeutic impudence, and indicating a supreme indifference to anything that could be called intelligence on the part of the recipients. That these firms have the audacity to issue such trash indicates the state of thralldom in which they regard us. And I would protest against the usurpation on the part of these men of our functions as teachers. Why, for example, should Y. & Co. write as if they were directors of large genito-urinary clinics instead of manufacturing pharmacists? It is none of their business what is the best treatment for gonorrhoea—by what possibility could they ever know it, and why should their literature pretend to the combined wisdom of Neisser and Guyon? What right have Z. & Co. to send on a card directions for

the treatment of anaemia and dyspepsia, about which subjects they know as much as an unborn babe, and, if they stick to their legitimate business, about the same opportunity of getting information? For years the profession has been exploited in this way, until the evil has become unbearable, and we need as active a crusade against pseudo-science in the profession as has been waged of late against the use of quack medicines by the public. We have been altogether too submissive, and have gradually allowed those who should be our willing helpers to dictate terms and to play the rôle of masters. Far too large a section of the treatment of disease is to-day controlled by the big manufacturing pharmacists, who have enslaved us in a plausible pseudo-science. The remedy is obvious: give our students a first-hand acquaintance with disease, and give them a thorough practical knowledge of the great drugs, and we will send out independent, clear-headed, cautious practitioners who will do their own thinking and be no longer at the mercy of a meretricious literature which has sapped our independence.

Having confessed some of our own weaknesses, I may with better grace approach the burning question of the day in the matter of treatment. An influenza-like outbreak of faith-healing seems to have the public of the American continent in its grip. It is an old story, the oldest, indeed, in our history, and one in which we have a strong hereditary interest, since scientific medicine took its origin in a system of faith-healing beside which all our modern attempts are feeble imitations. Lincoln's favourite poem, beginning 'We think the same thoughts

that our fathers have thought', expresses a tendency in the human mind to run in circles. Once or twice in each century the serpent entwining the staff of Aesculapius gets restless, untwists, and in his gambols swallows his tail, and at once in full circle back upon us come old thoughts and old practices, which for a time dominate alike doctors and laity. As a profession we took origin in the cult of Aesculapius, the gracious son of Apollo, whose temples, widespread over the Greek and Roman world, were at once magnificent shrines and hospitals, with which in beauty and extent our modern institutions are not to be compared. Amid lovely surroundings, chosen for their salubrity, connected usually with famous springs, they were the sanatoriums of the ancient world. The ritual of the cure is well known, and has been beautifully described by Pater in *Marius the Epicurean*. Faith in the god, suggestion, the temple sleep and the interpretation of its dream were the important factors. Hygienic and other measures were also used, and in the guild of secular physicians which grew up about the temples scientific medicine took its origin. No cult resisted so long the progress of Christianity; and so imbued were the people with its value, that many of the practices of the temple were carried on into the Christian ritual. The temple sleep and the interpretation of its dreams were continued long into the Middle Ages, and, indeed, have not yet disappeared. The popular shrines of the Catholic Church to-day are in some ways the direct descendants of this Aesculapian cult, and the cures and votive offerings at Lourdes and Ste. Anne are in every way analogous to those of Epidaurus.

As I before remarked, credulity in matters relating to disease remains a permanent fact in our history, uninfluenced by education. But let us not be too hard on poor human nature. Even Pericles, most sensible of men, when on his deathbed, allowed the women to put an amulet about his neck. And which one of us, brought up from childhood to invoke the aid of the saints and to seek their help—which one of us under these circumstances, living to-day in or near Rome, if a dear child were sick unto death, would not send for the Santo Bambino, the Holy Doll of the Church of Ara Coeli? Has it not been working miracles these four hundred years? The votive offerings of gold and of gems from the happy parents cover it completely, and about it are grateful letters from its patients in all parts of the world. No doll so famous, no doll so precious! No wonder it goes upon its ministry of healing in a carriage and pair, and with two priests as its companions! Precious perquisite of the race, as it has been called, with all its dark and terrible record, credulity has perhaps the credit balance on its side in the consolation afforded the pious souls of all ages and of all climes, who have let down anchors of faith into the vast sea of superstition. We drink it in with our mother's milk, and that is indeed an even-balanced soul without some tincture. We must acknowledge its potency to-day as effective among the most civilized people, the people with whom education is the most widely spread, yet who absorb with wholesale credulity delusions as childish as any that have ever enslaved the mind of man.

Having recently had to look over a large literature on

the subject of mental healing, ancient and modern, for a new edition of my textbook, just issued, I have tried to put the matter as succinctly as possible. In all ages and in all climes the prayer of faith has saved a certain number of the sick. The essentials are first a strong and hopeful belief in a dominant personality, who has varied naturally in different countries and in different ages. Buddha in India, and in Japan, where there are cults to match every recent vagary ; Aesculapius in ancient Greece and Rome ; our Saviour and a host of saints in Christian communities ; and lastly, an ordinary doctor has served the purpose of common humanity very well. Faith is the most precious asset in our stock-in-trade. Once lost, how long does a doctor keep his *clientèle* ? Secondly, certain accessories—a shrine, a grotto, a church, a temple, a hospital, a sanatorium—surroundings that will impress favourably the imagination of the patient. Thirdly, suggestion in one of its varied forms—whether the negation of disease and pain, the simple trust in Christ of the Peculiar People, or the sweet reasonableness of the psycho-therapist. But there must be the will-to-believe attitude of mind, the mental receptiveness—in a word, the *faith* which has made bread pills famous in the history of medicine. We must, however, recognize the limitations of mental healing. Potent as is the influence of the mind on the body, and many as are the miracle-like cures which may be worked, all are in functional disorders, and we know only too well that nowadays the prayer of faith neither sets a broken thigh nor checks an epidemic of typhoid fever.

What should be the attitude of the clergy, many of

whom have been drawn into the vortex of this movement? I feel it would be very much safer to hand over this problem to us. It is not a burden which we should ask a hard-working and already overwrought profession to undertake or to share. It might be a different matter if it were really a gift of healing in the apostolic sense, but we know this was associated with other signs and wonders at present conspicuous by their absence. Then think of the possibilities for self-deception—of the saintly Edward Irving and the gift of tongues; of Monsieur de Paris, the French Priest, and the miracles at his tomb, to the truth of which two fine quarto volumes, with ‘before and after’ pictures, attest! The less the clergy have to do with the bodily complaints of neurasthenic and hysterical persons the better for their peace of mind and for the reputation of the Cloth. As wise old Fuller remarked, Circe and Aesculapius were brother and sister, and the wiles of the one are very apt to entrap the wisdom of the other.

III

It adds immensely to the interest in life to live in the midst of these problems which concern us so closely. We must meet them with an intelligent cheerfulness, in the full confidence that the Angel of Bethesda never stirred the waters without happy results. It is for us to see that the soldiers we are training for the fight against disease, bodily and mental, are well equipped for the battle; and let me briefly, in conclusion, indicate how I believe we should teach the art—the management of patients and

the cure of disease. To know how to deal with disease is the final goal, to reach which the whole energies of the student should be directed. We all recognize that it is in the out-patient departments and in the wards—I wish I could add in the homes of the general practitioners—that he must get this part of his training, not in an elaborate course of lectures on the properties and action of drugs. In the congested curriculum it is by no means easy to find the proper amount of time even for this, the most essential part of his education. But as we learn the futility of the lecture-room as an instrument of teaching men the Art, so, I think, we shall gradually be able to adapt the courses so that plenty of time may be given to the practical study of the treatment of cases under skilled direction. We should take over to the hospital side of the school the whole subject known in the curriculum as therapeutics. The composition of drugs, the method of their preparation, and the study of their physiological action should be taught in practical classes in the pharmaceutical laboratories. In the out-patient departments and in the wards much more systematic practical instruction should be given how to treat disease and how to manage patients. If we could only get the students for a sufficiently long period in the hospital, what helpful courses could be arranged in the senior years! Certain aspects of the subject must be ever kept before the assistants¹ and the students, considered, per-

¹ A post-graduate course in medical pedagogy would be most helpful organized by five or six of the large colleges and conducted by them in rotation with teachers selected from the different schools. Many able young fellows take years to acquire methods to which they might be introduced in a six-months' course.

haps, by different men associated with the clinic according to the special capacity of each one. The fundamental law should be ingrained that the starting-point of all treatment is in the knowledge of the natural history of a disease. Typhoid fever, tuberculosis, pneumonia, and, where possible, malaria, should be used for this important lesson, and in the everyday routine observation of cases the student would learn to know the course of the disease, its obvious features, the complications likely to arise; and he would be taught how to discriminate between the important and the unimportant symptoms of a case. This work should form the very basis of his course in medicine, and it should be accompanied by a *seminar* to take the place of set lectures, in which the features of all the common diseases would be discussed.

The hygienic and dietetic management of patients has now come to be such a prominent part of the work of our hospitals that the student may become acquainted with the open-air treatment, the various modifications of diet suitable to different diseases, and the use of massage, electricity, and other physical agents. But too often he is allowed to pick up this information in a haphazard, irregular fashion. One assistant of the clinic should be detailed to see that every member of the class knows, for example, how to arrange the open-air treatment for a tuberculous patient, and how to supervise the diet of a diabetic case. The student should prepare personally the various nutritive enemata, and be able to give the different kinds of massage, and I would have him thoroughly versed in all branches of hydrotherapy. A serious difficulty is that nowadays the nurse does

a great many things that it is essential the medical student should know how to do—the administration of hypodermics, the giving of a cold pack, &c.

Much more attention should be paid to the important subject of psychotherapy. It is not every teacher who has a special gift for this work, but if the professor himself does not possess it, he should, at any rate, have sense enough to have an assistant familiar with and interested in the modern methods. How many of our graduates have been shown how to carry out a Weir Mitchell treatment or to treat a patient by suggestion? The student should be taught that the very environment of a well-managed clinic is in itself an important factor in psychical treatment. A Philadelphia friend once jokingly defined my practice at the Johns Hopkins Hospital as a mixture of hope and *nux vomica*, and the grain of truth in this statement lies in the fact that with many hospital patients once we gain their confidence and inspire them with hope, the battle is won.

And lastly, from the day the student enters the hospital until graduation, he should study under skilled supervision the action of the few great drugs. Which are they? I am not going to give away my list. A story is told that James Jackson, when asked which he considered the greatest drugs, replied: 'Opium, mercury, antimony, and Jesuit's bark; they were those of my teacher, Jacob Holyoke.' 'Yes,' replied his interlocutor, 'and they were those of Holyoke's master, James Douglas, in the early part of the eighteenth century.' Mine is a much longer one! The student should follow most carefully the action of those drugs the pharmacology of

which he has worked out in the laboratory. He should be sent out from the hospital knowing thoroughly how to administer ether and chloroform. He should know how to handle the various preparations of opium. Each ward should have its little case with the various preparations of the ten or twelve great drugs, and when the teacher talks about them he should be able to show the preparations. He should study with special care the action of digitalis on the circulation in cases of heart disease. He should know its literature, from Withering to Cushney. It should be taken as the typical drug for the study of the history of therapeutics—the popular phase, as illustrated by the old woman who with it cured the Principal of Brasenose; the empirical stage, introduced by Withering in his splendid contribution, a model of careful clinical work of which every senior student should know; and the last stage, the scientific study of the drug, which he will already have made in the pharmacological laboratory. He should day after day personally give a syphilitic baby inunctions of mercury; he should give deep injections of calomel, and he should learn the history of the drug from Paracelsus to Fournier. He should know everything relating to the iodides and the bromides, and should present definite reports on cases in which he has used them. He must know the use of the important purgatives, and he should have a thorough acquaintance with all forms of enemata. He should know cinchona historically, its derivatives chemically, and its action practically. He should study the action of the nitrites with the blood-pressure apparatus, and he should over and over again have tested for himself the action,

or the absence of action, of strychnine, alcohol, and other drugs supposed to have a stimulating action on the heart and blood-vessels. While I would, on the one hand, imbue him with the firmest faith in a few drugs, 'the friends he has and their adoption tried,' on the other hand, I would encourage him in a keenly sceptical attitude towards the pharmacopoeia as a whole, ever remembering Benjamin Franklin's shrewd remark that 'he is the best doctor who knows the worthlessness of the most medicines'. You may well say this is a heavy contract, and one which it is impossible to carry out. Perhaps it is with our present arrangements, but this is the sort of work which the medical student has a right to expect, and this is what we shall be able to give him when in his senior years we give up lecturing him to death, and when we stop trying to teach him too many subjects.

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By WILLIAM OSLER, M.D., F.R.S.,

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THE patient before you attracts attention by his healthy appearance, a fresh complexion, iron grey hair, and a general bearing which suggests at once the man who has served "with the colours," whether on land or sea. To outward appearance the most vigorous person in the ward; you will all have noticed one peculiarity of great importance, marked inequality of the pupils. The right, the larger, is moderately dilated; both react to light, and on accommodation. It seems an instance of simple anisocoria. On more careful inspection no change is noticed in the eye-lids or eye-balls. The skin on the two sides of the face has the same tint and moisture, and the ears have the same degree of pinkness. Stripped he shows a strong frame; both sides of the neck are equal; there is no special congestion of the skin; impulse is visible in both carotids; the arms look natural; both hands are large and show slight congestion. Sitting directly in front and looking closely at the chest, nothing is to be noticed, but if he is turned, or if you move so as to look obliquely, there is seen to the right of the sternum, extending from the clavicle to the third rib, a slight heaving impulse. Once your attention is called it is easily recognised, and one may even see that the sterno-clavicular articulation is slightly moved with each beat. There is no prominence, and it is just the sort of impulse that requires careful inspection, good eyes, and a good light. I would ask you to note particularly that, sitting in front of him and looking directly at the chest, the pulsation is scarcely visible. The cardiac impulse is not seen, and there is no pulsation behind on either side of the spine.

On palpation the heart beat is not to be felt; the hand placed to the right of the sternum in the first, second, and third interspaces, feels a heaving impulse, which is appreciated

slightly at the sterno-clavicular joint, on the clavicle itself, and is strong enough to move the fingers. It is not felt on the manubrium or in the notch above. There is no shock of either sound to be felt. Both carotids throb, the one not more than the other. The brachials and radials appear about equal on both sides. There is no retardation of the right radial pulse. The superficial arteries feel stiffened. The blood pressure, which has been taken by Dr. Gibson, is a little higher in the left arm than the right. On putting the trachea on the stretch with the fingers hooked under the cricoid cartilage, one appreciates immediately a very characteristic tugging, synchronous with the throbbing of the arteries. Percussion gives an area of impaired resonance from the clavicle to the third rib on the right side, and to a point three inches from the sternal margin. The area of cardiac flatness is not increased.

On auscultation, the sounds are clear at the apex and over the body of the heart; towards the base the aortic second sound is loud; over the area of impulse there is a soft, only just audible systolic murmur, and the second aortic sound is well heard. There is no murmur to be heard in the sternal notch or along the carotid arteries.

These are the main points to be determined by examination. I may add that there is nothing of any moment in the abdomen. The diagnosis is evident—an aneurysm of the arch of the aorta, projecting to the right, possibly involving the beginning of the innominate. The X-ray photograph taken by Dr. Sankey shows very clearly a large aneurysm extending above as high as the clavicle and projecting farther to the right than the examination suggests.

We may now ask a few points in his history. He has been a soldier, and has had fairly good health, but, as is so often the case, Mars and Venus have been in conjunction, and he had syphilis 15 years ago, not a severe attack, and for which he says he was well treated. He has had no symptoms for many years. He has worked hard; is a moderate drinker, and until a few months ago regarded himself as quite well. He then began to have irregular pains in the chest and shoulder, which were thought to be rheumatic. He had occasional flushes and giddiness, but no special shortness of breath. He

has evidently not had very active symptoms, and the aneurysm, which has come on slowly and gradually, is now one of physical signs rather than of symptoms.

Our interest to-day is in the state of the pupils in relation to aneurysm. It is an old story which you will find very fully discussed in Gairdner's *Clinical Medicine*, and in his article in the first edition of Allbutt's *System of Medicine*, and by Ogle in his classical paper in the *Royal Medical and Chirurgical Transactions*, 1858.

We have been in the habit of explaining a condition such as exists in this patient in very simple terms; the unilateral dilatation is due to irritation of the dilator fibres of the sympathetic nerve by pressure of aneurysm. If the pupil on one side is contracted the dilator influences were supposed to be completely suppressed, and allowed the unopposed action of the sphincter controlled by the third nerve. Of late years we have found that the matter is not quite so simple; there are in reality three groups of cases.

I. *Cases due to Involvement of the Sympathetic Nerve.*—The distance from the right margin of the arch of the aorta to the cord of the sympathetic is only a few centimetres, so that one can readily understand how an aneurysmal sac growing to the right may involve the nerve. In reality in the post-mortem examination one very rarely sees the sympathetic cord compressed. Clinically, in the great majority of all cases of aneurysm, pupil features are present without other indication of the involvement of the sympathetic system. Only in a few instances, in my experience not more than four or five were there other signs, such as flushing and sweating of one side of the face, ptosis, and retraction of the eye-ball. In this patient, for example, there is no indication either of irritation or of paralysis of the cord of the sympathetic, and what you see is present in a large majority of cases of aneurysm with pupil symptoms, viz., simple dilation. It is possible, however, that the nerve may be irritated, as dilatation of the pupil on one side may be the sole indication of pressure. We see it sometimes in pneumonia, in tuberculous disease of the apex of the lung, or in a chronic pleurisy, in which cases the pupil symptoms usually occur alone. The X-ray picture shows the sac to pass far over the right, quite far enough, one would say,

to reach the sympathetic cord. Unilateral flushing, increased heat and sweating with mydriasis are less common than myosis with profuse sweating, and occasionally slight ptosis. The arm may be involved, and I have seen the skin of the hand wrinkled like that of a washerwoman; but these are very rare cases.

II. *Cases due to Changes in the Vascular Condition of the Iris.*—It has long been known that with a low blood pressure the pupils are large. On the other hand, small pupils are often seen in association with the high arterial tension of chronic interstitial nephritis, arterio-sclerosis, and old age. It has been much discussed whether changes in the blood vessels of the iris are accompanied with narrowing or dilatation of the pupil, and one well-known theory explains these variations as due to a diminution or increase in the contents of the vessels. Working on this theory, Wall and Ainley Walker¹ have studied a series of cases of thoracic aneurysm, and have come to the conclusion that the most common cause of anisocoria is unequal blood pressure in the ophthalmic arteries. They explain the relationship between the arterial blood pressure and the size of the pupils by the anatomical peculiarities of the vessels of the iris. "As Waller originally showed, they are spiral or zig-zag, so that during contraction or dilatation their lumen is not changed in calibre. It is a well-known physical fact that the raising of the pressure in a fluid tends to cause elongation and straightening of the tube. From this it follows that a rise of blood pressure in the spiral blood vessels of the iris would tend to lengthen them and lead to narrowing of the pupil, and vice versâ, a fall in the blood pressure to shortening of the vessels and enlargement of the pupil." Local variations in blood pressure occur in aneurysm. The radial pulse on one side is often smaller, and inequality of the carotid and temporal pulses is by no means uncommon. In 26 cases of thoracic aneurysm in which notes were made concerning the relative size of the radial pulse and of the pupils, these authors found that in 11 the radial pulse was larger on the side on which the pupil was smaller; so it does not necessarily follow that because there is inequality

¹ *Lancet*, July 12, 1902.

of the radial pulses there must be a similar inequality in the ophthalmic arteries. They studied and compared the relative sizes of the temporal arteries, and found that in all their cases the smaller pupil corresponded to the larger temporal pulse. Experimentally, digital compression of one carotid sufficient to abolish or partially arrest the temporal pulsation was associated with gradual enlargement of the pupil on the same side, followed a little later by enlargement of the pupil on the other side. They attributed the dilatation on the same side to the immediate fall of pressure in the ocular vessels, which results from the compression of the carotid. The gradual enlargement on the other side is due to the general fall of pressure in the circle of Willis, which results from the same cause. The explanation of the anisocoria which these authors give holds good in a large proportion of all cases of aneurysm of the thoracic aorta. In this patient the situation of the sac suggests involvement of the orifice of the innominate or of the vessel itself, though palpation of the carotids and temporals cannot determine any difference between the two sides, and the blood pressure in the brachials is only a few millimetres lower in the right arm.

III. *The Babinski Syndrome—the Association of Pupil Symptoms, Aneurysm, and Tabes.*—In a third group the pupil features and the aneurysm itself are part and parcel of a syphilitic infection. The distinguished Parisian clinician, Babinski, in 1901, first called attention to certain cases of aneurysm in which the irregularity of the pupils, or the myosis, had nothing to do with compression by the sac, but were the ocular manifestation of a tabetic or a tabo-paretic state. In the cases which he reported,¹ both in women, both syphilitic, with aneurysm of the arch of the aorta, in one the right pupil was smaller than the left, neither reacted to light, but did on accommodation; the knee-jerks were absent. In the other case the left pupil was dilated, the right pupil was normal, and the light reflex was not completely abolished. The knee-jerk on the right side was lost. Since the publication of this paper Babinski's syndrom has been used to designate a condition in which aneurysm is present, in association with tabetic features—the Argyll-Robertson pupil or unequal pupils

¹ *Bul. et Mem. de la Société Médicale des Hôpitaux*, Tome 18, p. 1121, 1901.

with absent knee-jerks or lightning pains. There have been several additional papers on the question, and the condition is now well recognised.

The man before you has had syphilis. There is a large aneurysm, and the pupils are unequal, and now on testing the knee-jerks we find that they are absent. He has never had any lightning pains, his station is good, and there is nothing else to suggest locomotor ataxia. We know that a large proportion of all cases of aneurysm in young and middle-aged men are due to a syphilitic mesaortitis. Absence of knee-jerks alone may be scarcely sufficient to warrant a diagnosis of tabes, but, taken in conjunction with the history and the presence of an aneurysm, we may say at any rate that this man is in the quaternary stage of the infection, in which among the earliest symptoms of locomotor ataxia is abolition of the reflexes. The pupil symptoms here are more likely to be vascular than tabetic. The light reflex is not abolished, and while one can make out no difference between the radials, carotids, or temporals on the two sides, the position of the aneurysm in the X-ray picture indicates that the innominate artery is involved, and the blood pressure on the right arm is lower than on the left side.

A more characteristic case seen last year was a professional man living in South America, aged 46, who consulted me for unpleasant sensations in the head and chest, and irregular shooting pains in the legs. He had had syphilis 20 years before, and considered himself cured. There was pulsation of the manubrium, trachial tugging, and well-marked signs of aneurysm of the arch, though the X-ray picture showed a condition suggestive rather of diffuse dilatation. Both pupils were contracted, and did not respond to light, the knee-jerks were absent, and he had had well-marked attacks of lightning pains.



L O N D O N

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VI

The Lumleian Lectures

ON

ANGINA PECTORIS

Delivered before the Royal College of Physicians of London

BY

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LECTURE I.

Delivered on March 10th.

INTRODUCTION.

MR. PRESIDENT AND FELLOWS,—Twenty-five years have passed since I stood here, a much embarrassed junior, as Goulstonian lecturer. I have always had a keen sense of gratitude to the College for according recognition to a colonial worker at the time of life when such an action counts for so much, and I recall the intense pleasure of my colleagues at Montreal that one of their number had been selected for the honour. The subject of those lectures came within the ken of the younger Fellows, whose work is, or should be, largely in the post-mortem room and laboratory. And now kindly time has moved me among the seniors, and I have to thank you, Sir, for the opportunity to deliver the course distinguished among all others in the College, since in these Lumleian lectures the incomparable Harvey laid the sure foundations of modern experimental medicine.

I make no apology for the subject I have chosen—Angina Pectoris. In a very special way it is *our* disease, having been first fully described at this College by the English Celsus, William Heberden, and in a manner so graphic and complete as to compel the admiration and envy of all subsequent writers.

Like books, diseases have their destiny. Could Heberden return for a month's busy practice his surprise would be not less at the new cohorts of disease than at the disappearance of familiar enemies. How staggered he would be at the *Nomenclature* of the College! And he would be keen to write new commentaries upon old diseases with new names. How the word appendicitis would jar his critical ear, but how rejoiced he would be to see light on that dark malady, "inflammation of the bowels." Living through a century of

theory, he died at the outset of the great awakening in clinical medicine, bequeathing a precious legacy of experience greatly appreciated by several generations of students, and leaving in this College a precious memory which it is our delight to cherish.

Looking through the famous *Commentaries*, one is impressed with the value, with the rarity too, of the old-fashioned, plain, objective description of disease ; and one is impressed also with the great gulf which separates the clinical medicine of to-day from that of our great-grandfathers. Page after page of the *Commentaries* are as arid as those of Cullen or of Boerhaave, and then we light upon an imperishable gem in the brilliant setting of a master workman, whose kinship we recognise with the great of old—with Hippocrates, with Aretæus, and Sydenham. Such a clinical gem is the account which Heberden read at the College, July 21st, 1768, “ of a Disorder of the Breast,” to which he gave the name “ Angina Pectoris,” based on the study of 20 cases. When he incorporated the description in his *Commentaries* (written in 1782) his experience had extended to 100 cases.

Historical details I have dealt with at length elsewhere, but in passing one must just mention the predecessors of Heberden, particularly Rougnon, the old Besançon professor. There is no question as to the nature of the case which he describes ; you can read for yourselves, as through the kindness of Professor Roland, a distinguished successor of Rougnon at Besançon, I am enabled to show, for the first time, I believe, in this country the rare “ Lettre,” published in March, 1768. As Rougnon antedated Heberden a few months, so did Morgagni precede Rougnon, and in his excellent report the symptoms are even more fully described, including for the first time the brachial numbness and the aortic lesion ; and we get back to classical days if Seneca’s disease, which he calls *meditatio mortis*, and the “ paradoxon ” of Erasistratus, are regarded as angina.

For more than a century the chief contributions to the pathology of the disease have been made by members of this society, and to-day our Fellows number many of its best known students, among whom, Sir, you rank *primus inter pares*. And yet so far as I can ascertain angina pectoris has never been formally considered in one of the College courses. It is, too, a disease for a senior to discuss, since juniors see it but rarely ; indeed, I had reached the Fellowship before I saw a case in hospital or private practice. And then I take it that in this course the College wishes an expression of opinion on some affection to which the lecturer has paid special attention. Circumstances have given me a somewhat unusual experience. The lectures published in 1897 were based on a study of the literature and 60 cases ; since then I have seen 208 additional cases, and I propose to present very largely my own impressions of the disease.

Let me ask at the outset, What is angina pectoris ? Who

will give an answer to satisfy all of us? The subject is full of knotty problems, which lend themselves to speculation. I could wish for a more active scientific imagination that amid webs of fancy I might entangle and darken the maturer counsels of some of my distinguished auditors. But with neither the brains nor the inclination for such a task, in a more modest flight I shall consider it as—*A disease, characterised by paroxysmal attacks of pain, pectoral or extra-pectoral, associated with changes in the vascular walls, organic or functional.*

Primarily an affection of the arterial system—of the pump and the pipes, of the system in which are literally the issues of life and death—its protean features cannot be understood unless we remember that between the chief parts of this system, the heart and the arteries, there is no essential difference, since the arteries are only a long-drawn-out heart and the heart but a bulbous expansion of an artery. A physical unit, and worked as such, it is controlled at every moment by an outside mechanism, an elaborate system of nerves which penetrate every part, and even lose themselves in its structures.

The problem before us is the anginal paroxysm in all its grades, from the trifling sense of substernal distress to the vascular *ictus* by which a man is felled as with a club. After a few etiological details I shall discuss briefly the clinical types and certain extra-cardiac features of the disease. In the second lecture I shall consider the pathology, and in the concluding one speak of prognosis and treatment.

GENERAL ETIOLOGY.

Has angina pectoris increased in the community? Has the high-pressure life of modern days made the disease more common? There is an impression among consultants in the United States that there has been an increase of late years, a view not borne out for this country by the figures available. In 1908 there were 929 fatal cases in England and Wales—617 men and 312 women. For the 20 years, 1888 to 1907, the average number of deaths was about 700; in 1905 the number rose above 800; and in 1907 to 942; but the average number of deaths per 1,000,000 living has not materially increased, ranging from 20 to 25, but in 1907 it reached 28. In England the population of the registration districts of England and Wales is about 35,000,000. The statistics for the United States in a registration area, embracing 45,000,000 of people, show a decidedly greater prevalence of the disease. The total deaths in 1908 were just under 3000. But the average number of deaths per 1,000,000 of population have not varied much within the past ten years, but it is more than double that of England and Wales, ranging from 66 to 70 per 1,000,000 of inhabitants.

It is not a disease for which hospital figures are of much service, and yet it is interesting to compare the large institutions on the two sides of the Atlantic. At the Montreal General Hospital in 10,934 admissions for the ten years 1900 to 1909 there were 6 cases diagnosed as angina pectoris. At the Royal Victoria Hospital, Montreal, among 10,510 admissions in ten years in the medical ward there were 9 cases. At St. Bartholomew's Hospital in 1907 there were 2 cases in 2602 medical admissions; in the same year at St. Thomas's Hospital in 2261 medical admissions there was only 1 case. This gives an average of 1 case a year in the wards of the large general hospitals. The figures at the Johns Hopkins Hospital are scarcely available for comparison, since they embrace a very large number of patients admitted to the private wards, and even into the public wards many of the farmer class are admitted from the country at large.

These figures bear out a remarkable fact with which we are all familiar—that angina pectoris is an affection of the better classes, and not often seen except in private practice. During 10 years I did not see a case at the Montreal General Hospital, and only one case at the University Hospital, Philadelphia; and I have no notes of a case seen at the large Philadelphia hospital. It is only as the consultant's work increases that he begins to see the disease, and then a man in active practice may see 10, 15, or more cases in the course of a year. This was about my average, and I see from the statements of our President, and of the late George Balfour of Edinburgh, that this is about the figure reached in this country by the consultant with recognised cardiovascular leanings. Once there was the unusual experience of eight cases in a month (May, 1899), three of which died in the same street within a short distance of each other, or, to be more accurate, one died on the steps of the cathedral, the other two in adjacent houses not far away.

Let me give as briefly as possible my personal statistics. I have notes of 268 cases in all—231 men, 37 women. If we recognise, as was my custom, mild neurotic or pseudo, and a grave organic or true form, there were of the former 225, and of the latter 43. I have not counted *les formes frustes* unless a case had subsequent severe attacks. As Heberden remarked, women are rarely affected, only 3 of his 100 cases. Of the severer form of 225 cases there were only 14 women. On the other hand, of the minor type, of 43 cases there were 23 women. It is somewhat surprising to see that in this country in the registered fatal cases of angina for the past 20 years the ratio of women to men was 1 to 1·8—5133 women to 9303 men.

The age incidence is late, the largest number of cases occurring in persons over 50. Of the 612 deaths in England and Wales, only 36 occurred between the ages of 35 and 45; while between 45 and 65 there were 291 deaths. In my list

the age was much the same. There were under 30 years of age, 9; between 30 and 40, 41; between 40 and 50, 59; between 50 and 60, 81; between 60 and 70, 62; between 70 and 80, 13; above 80, 3. In women the age incidence is, on the whole, a little lower than in men.

An interesting point in my series relates to the race incidence. Of 268 cases 37 were in Jews. Nowhere in the world are members of this gifted race seen to greater advantage than in the United States, where the opportunities of a rapidly growing country give scope to their exceptional genius for business. Living an intense life, absorbed in his work, devoted to his pleasures, passionately devoted to his home, the nervous energy of the Jew is taxed to the uttermost, and his system subjected to that stress and strain which seems a basic factor of so many cases of angina pectoris. It is only fair to state that this high percentage scarcely represents a true state of affairs, since certain circumstances gave me an exceptional *clientèle* among the Hebrews.

Angina in doctors.—A point that stands out prominently in my experience is the frequency of the disease in our profession. For the same reason doubtless that Sydenham gives for the incidence of gout “more wise men than fools are afflicted,” angina may almost be called “*morbus medicorum*.” 33 of my cases were in physicians, a larger number than all the other professions put together. Curtin¹ in his study of 60 fatal cases notes that a fourth were in physicians. This large percentage in my list may in part be attributed to the circumstance of the publication of lectures on the subject in 1897. But the frequency with which doctors die from the disease has become the subject of common remark. From John Hunter onwards a long list of most distinguished men have been its victims. Not to mention the older physicians, among our contemporaries was Nothnagel, himself one of the ablest students of the disease, whose last act in life was to describe his own fatal attack. A tragic interest relates to this incident in the career of the great Vienna clinician. I do not know that the note has ever been transcribed in English; it reads as follows: “Anginal attacks with very severe pains. Pulse in the attack very variable, at one time slow, 56 to 60, quite regular, high tension, and then again rapid, 80 to 90, tolerably even and regular; then again quite unrhythmic, unequal at one time, rapid another, slow with changed tension. The first sensation of this attack dates three or four years back, at first slight, gradually becoming more pronounced. Very severe attacks with great pain have only come on within the last five or six days. Written on July 6th late in the evening, after three very severe attacks.” Within a few

¹ Transactions of the American Climatological Society, vol. xxiii.

hours after this note the end came. Charcot, the founder of modern neurology, died in an attack in the arms of his friend Straus, who himself succumbed to the same disease not long after. The distinguished neurologist Joffroy died from it in Paris last winter. Our much-beloved friend and Fellow, Cullingworth, was its victim, and the list could be much extended. The most brilliant and devoted physician of his generation in the United States, the late William Pepper, died with coronary arteries like pipe-stems. The Provost, indeed the maker, of a great University, the very head and front of every important public movement in a city of a million inhabitants, a universally sought consultant, an enthusiastic teacher, a prolific author, in him was incarnate the restless American spirit, which drove him into a premature grave at the height of his career at the comparatively early age of 55.

I have looked over carefully the notes of the 33 cases to see if any factors could be said to favour. Only 7 were above 60 years of age, one a man of 80 with aortic valve disease. The only comparatively young man in the list, 35, was seen nearly 20 years ago in an attack of the greatest severity. Worry and tobacco seem to have been the cause. He has had no attack now for years. Two cases were in the fourth decade, 13 were in the fifth, and 11 in the sixth.

For the purpose of this analysis we may exclude the cases above the age of 60, after which age no man, much less a doctor, need apologise for an attack of angina pectoris. Neither alcohol nor syphilis was a factor in any case; of the 26 cases under 60, 18 had pronounced arterio-sclerosis and 5 had valvular disease. In a group of 20 men, every one of whom I knew personally, the outstanding feature was the incessant treadmill of practice; and yet if hard work—that “badge of all our tribe”—was alone responsible would there not be a great many more cases? Every one of these men had an added factor—worry; in not a single case under 50 years of age was this feature absent, except in Dr. G., who had aortic insufficiency, and who had had severe attacks of angina years before, probably in connexion with his aortitis. Listen to some of the comments which I jotted down of the circumstances connected with the onset of attacks: “A man of great mental and bodily energy, working early and late in a practice, involved in speculations in land”; “domestic infelicities”; “worries in the Faculty of Medicine”; “troubles with the trustees of his institution”; “law-suits”; “domestic worries”; and so through the list. At least six or seven men of the sixth decade were carrying loads light enough for the fifth but too much for a machine with an ever-lessening reserve.

It is a significant fact that in Ogle's well-known study²

² Transactions of the Royal Medical and Chirurgical Society, vol. lxi.

"Statistics of Mortality in the Medical Profession," among 3865 deaths 444 were undefined diseases of the heart and circulatory system, though only 34 deaths were specified as due to angina pectoris. The same dominance of cardiovascular disease is indicated in the Registrar-General's Report.³

CLINICAL TYPES.

It is interesting to look over a long series of some one affection with a view to classification. Angina pectoris offers notorious difficulties, and I do not suppose there are any two of us who would agree.

As far as symptoms are concerned my cases fall into three groups: (1) *Les formes frustes*; (2) mild; and (3) severe.

1. *The mildest form, "les formes frustes" of the French.*—Substernal tension, uneasiness, distress, rising gradually to positive pain, a not infrequent complaint, one, indeed, from which few of us escape, is associated with three conditions. Emotion is the most common and the least serious cause. How often does it happen on getting up to speak, or when beginning to read a paper, that a man experiences a sense of tension just beneath the breast bone, a curious indescribable feeling, not of pain, yet sometimes working to a degree of uneasiness that is only relieved by firm pressure? The slight associated pallor indicates a vaso-motor disturbance which may increase, and a man may have to stop speaking; indeed, I have known instances in which fainting has occurred. In one of my physician-patients, a well-known author, the attacks of true angina began in this way; while lecturing he would experience a feeling of substernal tension and for years had nothing else and had it under no other circumstances. He could play golf and ride, and do an extraordinary amount of work without any uneasiness. Only a single action may bring it on. Dr B. could lecture and hold his clinic without experiencing any difficulty, but if he read a paper before the Medical Society, or if he gave an address in public, the substernal tension was certain to come on. In this form the condition is very transient; while sometimes a danger signal, in many cases it may be disregarded altogether. Not so the second form, in which this substernal distress is associated only with muscular effort—the slightest ascent, the extra round of golf, a sudden hurrying, as to catch a train. Much more frequently the precursor of angina, it is remarkable for how long a person may have slight attacks without aggravation. In a tranquil life the individual is perfectly comfortable. As old Dr. K—— of Philadelphia used to say to me, "I can stand anything in life but a hill or a stair." A Mr. W—— could walk a mile

from his home to his office, but for several years he could not walk back on account of the slight up-grade. He never had an attack of angina, though he died from myocarditis and a dilated heart. In these emotional and muscular types of the "formes frustes" the condition is usually transient. But there is a third variety, the *high-pressure form*, in which day after day, for weeks or months, the individual may never be free from a sense of tension beneath the breast-bone. It is not pain; it has no accurate localisation except that it is directly substernal; there is no radiation; it is not increased by emotion or by exertion, but obtruding itself into consciousness as an unpleasant reminder it means just one thing—that the machine is being driven at too high a speed. The general manager of one of the railways of the Southern States used to call it his "hot box"—i.e., his "hot axle." It is met with in men who are burning the candle at both ends—working hard at business or in a profession and at the same time treading the "primrose path." It is not always of sufficient severity to cause the patient to consult a physician. The Sunday rest may cause its disappearance. Not always a high-pressure affair alone, it is aggravated by worries, particularly the possibility of not carrying through some big scheme or the onset of a financial crisis. With the harness off it may disappear completely. One man writes: "The second day out on the steamer from New York I am free, not the slightest sensation of my enemy." In looking up the history of these cases, in three only did severe angina follow. I have not included "les formes frustes" in my list unless there were other features, such as definite paroxysmal attacks. It is only occasionally severe enough to make a patient seek advice. It is significant that of five cases of which I have notes of the blood pressure, in all it was above 180 and in one 250.

2. *The mild form*.—Under the mild form, *angina minor*, come 43 cases of my series. I have grouped under these the neurotic, vaso-motor, and toxic forms, the varieties which we used to speak of as false or pseudo-angina, a term which I agree with Gibson and others is best given up, since, as I hope to show in the next lecture, the basic features of all forms are identical. Still, it is a very useful exoteric term, a comfort to the patient and his friends. The special features of this variety are—the greater frequency in women, the milder character of the attacks, and the hopeful outlook.

3. *Severe angina, angina major*.—This group is represented in my series by 225 cases, of which 211 were in men. The two special features here are the existence in a large proportion of all cases of organic change in the arteries and the liability to sudden death. It is not easy, nor is it wise, to class cases by symptoms alone, but all the same there is

an interest in so doing, and my list may be divided into four groups.

A. Cases in which death occurred in the first or second attack, or in connexion with a series of rapidly recurring attacks—the so-called *status anginosus*. We do not know how many instances of sudden death in the street or in bed at night are due to angina pectoris, but only three cases in my series died in the first attack. The mode of death is not always the same. In certain cases it is the most rapid we see—without warning, or after a few minutes of unpleasant substernal sensation, or possibly in some act, combining intense emotion with muscular effort, there is a rapid change, a sudden unconsciousness, a stony stare, a slight change in the facial expression, and then with two or three gasps all is over; no pulse is to be felt at the wrist; the respiration stops, but even when the patient is apparently dead a feeble heart impulse may be felt or faint heart sounds heard.

B. The patients have had a series of characteristic attacks ranging from two or three to scores during the course of a few months or a year or more, and in a severe paroxysm or in a series death occurs. The final event has not the same suddenness, nor is there the rapid loss of consciousness; the patient may indeed be moribund and quite conscious, though this is unusual. The mode of dying in these cases is very remarkable. In a number of instances I have made careful notes. Two are worth quoting:—

On Thursday, May 25th, 1899, while at work in the ward, Dr. Knox called me to see a patient in an attack of angina. I found a man, aged 41, who had been admitted the previous day complaining of pain in the heart. He had been a heavy worker, a large eater, had not had syphilis. Five years ago while rowing he had an attack of pain and shortness of breath, which lasted for a few minutes. On and off since then similar attacks have occurred, always brought on by exertion, now even by very slight effort. He had aortic insufficiency, and a very soft low tension pulse. About 9.30 A.M. his hands and feet had become cold and a little cyanosed, and he had a slight attack. It continued on and off all the morning. I saw him at five minutes past 12; he was propped up in bed moaning with pain, but was not sweating; the pulse was soft, regular, and feeble—100 to the minute, the left smaller than the right. Everywhere over the chest in front and back were medium-sized râles; the pulmonary resonance reached almost to the costal border on the right side, and the superficial cardiac flatness was completely obliterated; there was a soft apex systolic murmur, and a soft diastolic aortic heard along the sternal border. At 12.15 he had a sudden collapse, became pulseless, the features set, and he gave one or two gasping respirations, which recurred at intervals of about five minutes. No pulse could be felt in carotids or brachials. Remembering the remarkable case reported by Sloan, I performed cardio puncture, thrusting a long thin aspirator needle into the heart through the fourth right interspace. This was followed at once by one or two faint inspirations; the needle showed a cardiac impulse very plainly, beating 52 to the minute. At 12.25 the needle was moving much more slowly and more feebly—44 to the minute. A saline injection was made directly into a vein. At 12.28 the cardiac beats as shown by the needle were still regular—32 to the minute,

without any tremor in the interval, such as might be given by fibrillation. At 12.37 the excursion of the needle was a little stronger. No heart sounds could be heard; no pulsation in the veins of the neck. At 12.44 I injected a tenth of a grain of strychnine directly into the wall of the left ventricle. The needle in the right fourth interspace continued to show definite movements, gradually getting feebler, and stopped at five minutes past one, 50 minutes from the onset of the collapse, and exactly 45 minutes from the last inspiratory gasp.

Nov. 4th, 1901.—I was sent for hurriedly this morning to see a stout, healthy-looking man, aged 57, whom I had known for some years, and had seen at intervals. As I entered the room at 8.15 the patient apparently was *in articulo mortis*; indeed, I thought he was dead. The eyes were fixed, the pupils dilated, the face of an ashy colour, and he was not breathing. Seeing my startled look, Dr. Atkinson, who was just preparing a hypodermic injection of ether, said: "It is all right; he will come to; he has had four such attacks in the night." There was no pulse in either radial, but listening over the heart one could hear feeble distant heart sounds. In about a minute (it seemed to me longer) the patient began to breathe; inspiration and expiration were somewhat noisy and deep, and accompanied everywhere with loud bronchial râles. He did not recover consciousness. He became more livid in the hands and face, and the pupils became contracted. The pulse could be felt, small at first, but it then became of much better volume and ranged from 56 to 68. In the course of ten minutes the breathing became less laboured; his colour improved and lost the ashy look, but he did not regain consciousness. The heart sounds could be well heard; the pulse was full and soft, 62. At 11.15 the patient died in another attack. He had not regained consciousness. He had had his first attack of angina on Nov. 2nd.

C. A chronic form, represented in my series by 10 cases, all of which were characterised by frequent recurring attacks over a period of more than 10 years. John Hunter, you remember, had had his first seizure in 1773, 20 years before his death, and he had many in the intervals. One special feature of this form is the frequency with which certain special actions are associated with the attacks. A patient may be perfectly comfortable and remain free if he leads a tranquil life with little or no muscular effort: a slight hill, the act of dressing himself, may be sufficient to bring on an attack; or in another patient an indiscretion in diet. This is a form with which the patient may feel comfortable for a great many years. I have had several friends, two of them medical men, who have managed very comfortably for more than 10 years, in spite of the liability to attacks. On the other hand, they may be among the most distressing cases we see. A Mr. D. of Wilmington lived a life of martyrdom for more than 10 years; emotion, cold, exercise, eating, would bring on the attacks, and his existence was a burden—not a week passed without an attack. He was thought to be neurotic and hysterical, though a man of 60. He had remarkable quivering of the fingers in the attacks, and on several occasions became unconscious. He threw himself about and was in intense distress during the paroxysm. I saw him in an attack and felt sure the condition was serious. The left radial pulse became very much smaller than the right. He died suddenly after nearly 11 years of suffering. Both coronary arteries were calcified.

D. A group of cases, not large, I am sorry to say, in which after attacks of great severity, recurring for months, or for as long as two years, complete recovery takes place. These are cases I shall deal with more fully in speaking of prognosis.

EXTRA-PECTORAL FORMS.

Angina pectoris is an affection of the arteries. The studies of Nothnagel in 1867 on the vaso-motor phenomena of the attacks widened enormously our conception of the nature of the disease, and we have come more and more to regard the symptoms of the attack as an expression of a *vascular crisis*, to use the apt term introduced by James Collier. I shall try in the next lecture to discuss the disease from this point of view. Meanwhile here may most conveniently be considered certain extra-pectoral, or, more properly speaking, extra-cardiac features, which have a direct bearing upon our conception of its pathology. Following this wider conception it is interesting to note in the literature the use of such terms as "angina abdominis," "angina cruris," "angina brachialis." In looking over my list I find a considerable number of instances in which prominent features of the disease were extra-pectoral or there were symptoms suggestive of vascular disturbance in distant parts. It is difficult to make a classification of the symptoms, and certainly one cannot take for granted that they were always due to vascular crises. But I may roughly group the cases into those with (A) peripheral, (B) abdominal, (C) pulmonary, and (D) cerebral features.

A. *Peripheral angina*.—Heberden first recognised that the patient could die from angina pectoris without any pain in his chest. In his *Commentaries* he describes the case of a man, aged 60, who began to feel, while walking, an uneasy sensation in the left arm, never while in a carriage. After continuing for ten years it would come upon him two or three times a week at night, and he would have to sit up for an hour or two. In all other respects he was healthy and strong, and he never had a pain in the chest. Then he added: "This disorder, its seat excepted, perfectly resembled the angina pectoris, gradually increasing in the same manner, and being both excited and relieved by all the same causes. He died suddenly without a groan at the age of 75 years." In the case of Lord Clarendon's father, as noted by Blackall in his famous book on *Dropsies*, the pain was brachial, even in the fatal attack.

Four cases in my series presented in some degree this brachial peculiarity. In L. N. H., aged 58, the pain began in the middle of both forearms; when walking he would be warned at once of the onset by sharp pains appearing simultaneously about the middle of both arms; if

he stopped to look at a window the pain would disappear, if he attempted to proceed it would increase in severity, and he would begin to feel faint; sometimes then the pain would extend to the chest. The first occasion on which I saw him the pain was entirely in the arms; there was no cramp, and he pointed to a position about the centre of each forearm. There was moderate sclerosis of the brachial and radial arteries. In Mr. D., aged 42, the pain always began in the left elbow where it would sometimes stay, though more frequently it extended up the arm to the heart. Dr. M. C. G., aged 69, insisted that the pain which "pulled him up short" on exertion was in the elbow, or rather at a point 2 inches above it, in the biceps muscle itself. So severe would it sometimes be that he would turn pale and sweat. He subsequently died in an attack.

In three instances the chief symptom was at first in the legs. My distinguished friend, Dr. W. W. J., for many years the leading physician of Washington, D.C., at the onset of the attacks had remarkable pains, with numbness in the left leg; there were no cramps, but the pains were sometimes intense, and he called it his "signal symptom." In a letter containing a very accurate analysis of his attacks he says that the painful sensations in the left leg seemed to initiate the outburst, though sometimes the pains remained limited to the leg. In F. L., aged 58, whom I saw in many attacks, some of maximum severity, they began with pains in the legs. I never saw a patient so drenched with sweat in the paroxysm, he was literally dripping, and could not have been more soaked had a hose been turned upon him. As he expressed it, he did not know which caused him the greater trouble, the painful cramps in the legs or the pain in the chest. He had indeed typical features of intermittent claudication, as the pain, sometimes with, sometimes without, actual cramp in the muscle, would pull him up short in the street.

It is a noteworthy circumstance that all the vaso-motor phenomena, even to fainting, may be associated with extra-pectoral pain. Colonel E., aged 66, had agonising attacks of pain without cramp in the left leg, in the first of which he turned pale and fainted. The true nature of the attacks was not recognised until he began to have substernal pain and angina pectoris, in an attack of which he died.

I witnessed a remarkable attack in which the pain was limited to the right pectoral muscle. The man, aged 55, when shown into my consulting-room had an ashen grey colour and looked faint. He said at once: "Doctor, I am in an attack." Though his pulse was 172, and he looked faint and was sweating, he preferred to walk about. I was apprehensive lest he should drop dead on the spot. He pointed to and grasped the right pectoral fold, repeating the words, "Here is all my trouble." He had had attacks of great severity for four years. The pain always began in the

right pectoral muscle, and sometimes stayed there, but if very severe it went down the right arm. In the attack in which I saw him the skin was not hypersensitive, there were no tender spots anywhere, but the muscle itself was very sensitive; he winced at once when it was touched. It would remain sore sometimes for hours after the attack had passed off.

In only one of these cases were the features those of intermittent claudication, *angina cruris*, as Walton terms it, which has close analogies with *angina pectoris*, particularly its paroxysmal character, the pain, which is not necessarily associated with cramp, and the cessation when the patient comes to rest. In a syphilitic woman, aged 37, admitted on March 7th, 1900, with severe *angina*, in two attacks in December the left foot and leg became oedematous and painful. The arteries and veins of the limb were normal.

Pain in the *testicle*, sometimes with swelling, is mentioned by one or two writers as an occasional feature during the attack. In the case of our late colleague, Dr. C., the pain was sometimes very severe in this region, and the attack would even begin there. It is possible that the pain may be limited to the testis; at any rate, the following is a very suspicious case. A man, aged 56, while speaking at a meeting, was seized with an agonising pain in the left testis, and became pale and faint; there was no swelling, no tenderness, no radiation of the pain, but his condition must have been very serious, since the doctor did not think he would survive. He had attacks at intervals of every two or three months. Four days before I saw him he had a very severe paroxysm, in which he became faint and sweated, and for the first time had a sense of tension and distress just below the ensiform cartilage. He was extremely feeble and collapsed, and the attack lasted for 12 hours. He had slight arterio-sclerosis, with accentuation of the aortic second sound.

B. *Angina abdominis*.—That *angina* attacks may begin in the abdomen has long been recognised. Several writers have called attention to the similarity of the gastric crisis of locomotor ataxia to *angina*. In my series there have been three groups of cases with abdominal symptoms. An important form is met with in nervous and hysterical patients with the combination of throbbing, tender, and mobile abdominal aorta and recurring crises of gastric pain. The pains may radiate to the chest, or gastric and thoracic crises may alternate, as in an extraordinary case in a lad aged 17—"a bundle of nerves"!—who nearly died in the paroxysms. The extreme tenderness of the aorta in some of these cases led Potain to suggest the existence of aortitis, while the radiation of the pain, &c., has given the term *syndrome solaire* to the group of symptoms. In some 10 or 12 cases in men of middle age the anginal symptoms at first were abdominal, and the true nature was not suspected. In

many cases the attack starts in the upper abdomen. As Mr. C. expressed it, "a wave starts here"—pointing to his stomach—"and passes up with a feeling of fright, and when it gets beneath the breast-bone it cuts me short as though the machinery of life had stopped." In my "Lectures" I have reported several cases of the pseudo-gastralgic type, as Huchard calls it, but in reality Leared in 1867 first called attention to these disguised cases. The difficulties in diagnosis may be very great, particularly in the form which resembles the tabetic crisis. A Mr. P., aged 58, seen on Feb. 11th, 1897, had attacks of cramp-like pains in the upper abdomen passing to the back, in which he became completely prostrated and sweated and vomited, and only morphia gave relief. The pains began just under the ensiform cartilage but never ascended. He had not had syphilis, the knee-jerks were present, the pupils were normal. He had aortic insufficiency and sclerotic arteries. There was no lead-line. He was a very healthy, robust man, only every month or few weeks he would be prostrated in an attack, in one of which, Dec. 20th, 1899, he died. In three other instances in the series gastralgia had been diagnosed, in one the malarial form, but the character of the attacks altered and left no doubt as to the nature of the trouble. And lastly, I have a group of three cases in which attacks of typical angina pectoris were complicated with abdominal pains, like gall-stone colic and jaundice. The combination may be quite accidental, but abstracts of the cases are worth recording.

Captain M——, aged 60, seen Jan. 13th, 1897, had had in 1890 attacks of angina pectoris of the most characteristic type. In 1893 he had pains in the region of the liver with jaundice; these recurred at intervals, and he was operated upon by Mr. Mayo Robson at Leeds, May, 1895, but no gall-stones were found. He consulted me for pain in the abdomen, crossing from one side of the costal arch to the other, like a band or constriction; at times it became very aggravated. Food made no difference, and there was no tenderness on pressure and no enlargement of the liver. While more or less constant the abdominal pain comes on in spells, and sometimes makes him feel faint and sick at the stomach.

Mr. A. W.—, seen April 4th, 1903, aged 59, in the first attack of angina four years ago had pains in the abdomen of great severity, and he was jaundiced after the attack. It was supposed to be gall-stones. Four months ago he had a very bad night, with attacks of pain in the chest and much discomfort in the epigastrium; on the following day he was jaundiced. The curious thing was that he could not differentiate the pain in this epigastric attack from the furious seizures of definite angina, in many of which I saw him during the six weeks that he was in hospital. He died in an attack of angina some months later.

Dr. J. C. T., aged 64. After a day or two of indigestion and irregular pains had on Oct. 27th a severe attack of pain in the chest, with extension into the arm, evidently of great severity. On the 30th the pain was more abdominal, and he was very sensitive over the region of the gall-bladder; on Nov. 1st and 2nd the pain was abdominal, and tenderness marked over the gall-bladder, and he had become jaundiced. This relieved our minds, as we were afraid from the character of the early attacks that it was angina. By Nov. 9th he was very much better, and the pains had almost disappeared, and at 6 o'clock when I

saw him he seemed nearly well; but at 8 o'clock, while his son and the nurse were in the room, he gave one or two short, quick, sighing inspirations, his head dropped on his chest, and he died instantly.

C. Respiratory features of angina.—The pulmonary symptoms of the attack have been carefully studied by many observers. A man may die from angina without any change in the respiratory function other than abrupt cessation; indeed, the death may be at the medulla, so suddenly does respiration cease, even for nearly an hour before the heart ceases to beat. Ordinary cardiac asthma is a common symptom—the orthopnoea, the light cyanosis, and the feeble pulse of myocardial weakness. Cheyne-Stoke breathing is not infrequent, and in the status anginosus may be present for weeks. But there is another type much more characteristic and quite unlike the ordinary cardiac asthma: it is paroxysmal, occurring abruptly, often at night; it is not associated necessarily with signs of myocardial weakness; it is accompanied with very high tension; it may alternate with attacks of angina or come on in one, and sometimes bears the stamp of an acute oedema of the lungs. There are four special features.

First, the universal distension of the lungs in an acute emphysema as Goodhard described it; the inspiratory excursion is limited; expiration is prolonged; in one patient the chest even looked larger; and the increase in the volume of the lungs may be demonstrated by percussion. The condition is what von Basch has called “*lungenschwellung*” and “*lungenstarrheit*,” a state which he believed to be due to distension of the capillary network, with swelling of the alveolar walls.

Secondly, the rapid onset of the physical signs, like those of an acute attack of bronchial asthma, wheezing, fine bubbling râles, and prolonged expiration. Within ten minutes the attack may be in full swing.

Thirdly, acute oedema of the lungs may follow, indicated by a great increase in the bubbling râles and the rapid expectoration of large quantities of a thin, frothy, sometimes blood-tinged, liquid. The attacks may be transient, lasting only for a few hours, and give a very special pulmonary stamp to the attack.

Fourthly, increased blood pressure, rising to 250 millimetres and over (Riva-Rocci). In one case (Dr. J. H. K.) the record was 340 millimetres during an attack, in the intervals it was 250. On three occasions he brought up large quantities of a clear fluid, with blood.

In May, 1899, I saw on several occasions with Dr. Atkinson Mr. G., aged 65, who had had his first and very

characteristic attack while walking up a hill on April 27th. It was probably an attack associated with acute infarct of the ventricle, as a pericardial rub was detected the next day. On the first occasion I saw him he was propped up in bed, wheezing audibly, expiration was prolonged, and cardiac flatness was obliterated. The pulmonary resonance on the right side extended to the costal margin. He was coughing and bringing up a considerable quantity of frothy, liquid expectoration. The pulse was full, regular, 100, and of high tension; the heart sounds were muffled and obscure; he had at the time no pain, but this acute condition of emphysema had followed the attack in the morning; within a few hours it had disappeared and Dr. Atkinson thought that there was a definite reduction of the lower limits of the lungs.

The condition may be associated, as just mentioned, with extraordinarily high tension. A man, aged 43, was admitted to Ward C, Nov. 17th, 1900, complaining of shortness of breath and attacks of substernal pain. He weighed 190 pounds, was a very heavy eater, and had not had syphilis; the blood-vessels were sclerotic; he had loud aortic second sound; the blood pressure was very high. I saw him in an attack of pain on Dec. 11th; he was not cyanotic, the pulse was regular; very high tension; the heart sounds were clear, loud, and sharp; he then turned pale and sweated, and the pulse at the wrist became almost imperceptible. He began to wheeze, and in a few minutes one heard on auscultation high-pitched sibilant râles mixed with fine crepitations. These were very intense and sounded close to the ear, suggesting at first a friction rub; the percussion note over the lungs became hyper-resonant and on the right side reached almost to the sternal margin. A hypodermic of morphia relieved his pain. The hyper-resonant condition of the lungs persisted for two days; a remarkable change in his facial expression occurred, as after the attack he had for days retraction of the upper eyelids. A Mr. C., aged 62, who had very characteristic attacks of angina pectoris, had several severe but transient pulmonary attacks, in one of which he had hæmoptysis.

One of the most remarkable cases was that of a coloured woman, aged 54 years, who was in the hospital for several weeks, and who died in an attack on Jan. 28th, 1897. She would wake at night from a sound sleep with pain in the region of the heart, and in five minutes she would have urgent dyspnœa, noisy respiration, with coarse râles everywhere over the chest. A hypodermic of morphia with atropine would quiet her within an hour or two. She was under observation on and off for more than a year, and she had scores of the pulmonary attacks, sometimes with pain but very frequently without. In the severer attacks she would have strong tonic contractions of her fingers and hands. We often discussed the character of this paroxysm, as it was suggested that she might have had asthma previously. In

the suddenness of the onset and the rapidity with which the attacks came on, the limited duration and prolonged expiration suggested bronchial asthma. She did not always have a cough and rarely had expectoration.

One case in the series had indications of consolidation of the lower lobe of one lung in connexion with an attack, and curiously enough, while preparing this lecture, Dr. T. McCrae, knowing my interest in the subject, sent notes of the case of a man, aged 35 years, who died from angina. The attacks yielded promptly to amyl nitrite, but in the last one there were acute pulmonary symptoms for 24 hours, oppression, cough, &c., and scattered areas of consolidation with tubular breathing and râles.

A case with extraordinary respiratory features was that of Captain H., whom I frequently saw with Dr. McCormick. A man of extraordinary vigour and health, aged 71 years, and of great intelligence, he had, as is not uncommon, studied his case most closely. For years he had had to be very careful in doing all the small actions which necessitated stooping, as in tying his shoes or in getting into his bath-tub, as he would experience such intense pressure in the chest which would render him immobile for a moment or two. Then he had a second variety, which corresponded to ordinary severe attacks of angina, terrible paroxysms of great severity. And thirdly, he had respiratory attacks, in which, waking from a sound sleep, he would gasp as if every breath would be his last, and then he would choke and begin to cough; the respiration became wheezing and the piping râles came everywhere over the whole chest just as in a severe attack of asthma. In from 10 to 15 minutes he would bring up large quantities of frothy, sometimes blood-stained, expectoration, as much as a large teacupful. He died in an attack of angina.

D. Cerebral features of angina.—Unconsciousness may occur during an attack. Epilepsy, believed by Trousseau to be closely related to angina, occurred in two cases, in neither in direct connexion with the paroxysm. Certain of the reported cases may have been the Stokes-Adams disease, in which the epileptiform attacks are sometimes preceded by pain about the heart. In only three cases transient cerebral symptoms occurred during attacks. T. S., aged 51 years, had had for three years occasional paroxysms. On Sept. 20th, 1901, while in a seizure, he had transient numbness of the left hand and foot and side of the face. The left leg dragged. These symptoms disappeared in the course of the day, but he complained of his eyesight and was found to have lateral hemianopia. The condition resembled closely the transient cerebral attacks so common in arterio-sclerosis.

Aphasia is a rare complication. I. B., aged 63 years, seen Jan. 14th, 1900, had had angina on and off for five years. In four attacks he had had transient aphasia without losing

consciousness. In a recent attack he was speechless for an hour, and once eight hours passed before he could say a word. Dr. McKnew said that there was no trace of paralysis and that he could understand everything and write. He had widespread sclerosis of the vessels. He died in an attack.

A remarkable feature existed in the case of Mr. M., who in the attacks had an intense pain at the back of the head, inside he insisted, and he would hold his head between the hands to avoid pain on movement.

L. S., aged 31 years, was admitted on Feb. 21st, 1898, with paroxysms of severe angina, which had recurred for several years, usually following exertion. Five attacks occurred in the month before admission, one with unconsciousness. He had not had syphilis, nor was there heart disease. He had had on several occasions temporary loss of power in the left hand with numbness. In the paroxysm just before admission, which was of great intensity, the left arm and leg were paralysed for two days. The face was not involved.

I have dwelt upon these extra-cardial features with a special object, as they throw light upon the essential nature of the disease, which I propose to discuss in the next lecture.

LECTURE II.

Delivered on March 15th.

PATHOLOGY.

Had Heberden listened to my first lecture he could have remarked very justly: "Well! they have not got much ahead since my day." In descriptive symptomatology we have not, and among 100 cases of angina pectoris there is no reason why Heberden should not have met all the important anomalies and complications. He had the good sense not to say much about the cause of the disease, and the good fortune to get very close to the truth in what he did say. I do not propose to weary you in a vain repetition of the scores of explanations which have been offered since his day. The older ones are to be found in the monographs of Parry and Jurine, the more recent in the *Traité* of Huchard, in the writings of our President, and in those of Allbutt, Bramwell, Gibson, Morrison, MacKenzie, and others. At the outset let us frankly face certain obscurities which have not yet been cleared up. Why is it more common in the upper classes? Why do we not see it more often in hospital practice? Worry and work are the lot and portion of the poor, among whom vascular degeneration is more widespread. It is as though only a special strain of tissue reacted *anginally*, so to speak, a type evolved amid special surroundings or which existed in certain families. Or there may be a perverted internal secretion which favours spasm of the arteries, as Harvey at Cambridge has shown to be the case with pituitary extract and the coronary vessels. And a case of aortic valve disease is reported in which the use of this extract caused anginal attacks. This suggestion is supported by the fact that in myxœdema anginal attacks may be caused by thyroid extract. I saw last year a patient of Dr. Lafleur's of Montreal with this most distressing peculiarity, which was mentioned to me also by Dr. Allan Starr of New York. The disease may occur in three generations, as in the Arnolds, and a father and four children have been affected. In three instances of my series father and son were attacked; in two, brothers; and in one, a brother and sister. It is not the delicate neurotic person who is prone to angina, but the

robust, the vigorous in mind and body, the keen and ambitious man, the indicator of whose engines is always at "full speed ahead." There is, indeed, a frame and facies at once suggestive of angina—the well "set" man of from 45 to 55 years of age, with military bearing, iron-grey hair, and florid complexion. More than once as such a man entered my consulting-room the suggested diagnosis of angina has flashed through my mind. Still more extraordinary and inexplicable is an imitative feature, if one may so speak of it, by which the repeated witnessing of attacks may induce one in the observer. The case of Senator Sumner attracted widespread interest on account of his distinguished public position. Two weeks after his death Dr. Hitchcock, his physician, died in an attack with coronary artery disease and acute infarct of the myocardium. Tabor Johnson, his other physician, at that time a young man, had two attacks, diagnosed by Brown-Sequard as angina, and he had seen some twenty cases of what may be called the manufactured variety. Straus died not long after his friend Charcot. A young man, aged 28, whose father, a very vigorous planter, had through the spring and summer of 1900 severe attacks and died in one Sept. 28th, consulted me the following January for angina. I had seen the father, and had been a witness to the devotion of the son during the terrible paroxysms. Within a month of the death of the father he began to have severe pain in the chest, with pallor, sweating, the pains down the left arm, which became numb and tingled. The sister said the paroxysms were identical with those of the father, and naturally the family were greatly distressed. The patient was a healthy, robust fellow, very neurotic, and almost frightened to death. A reassuring prognosis was all the treatment he required. He has had no further attacks. A woman, aged 38, after her father's death from angina, had severe pains about the heart, and attacks which she insisted were of the same character, but she, too, got quite well. A still more remarkable illustration of the imitative, emotional influence was seen in the outbreak of angina-like attacks among the sailors of the French corvette *L'Embuscade* reported by Gelineau.

There are two primary features of the disease, pain and sudden death—pain, paroxysmal, intense, peculiar, usually pectoral, and with the well-known lines of radiation—death in a higher percentage than any known disorder, and usually sudden. Often, indeed, it is, as the poet says, "Life struck sharp on death." The problems for solution are: What is the cause of the pain? Why the sudden death? The secondary features of the attack, the vaso-motor phenomena, the radiation of the pain, the cardiac, respiratory, and gastric symptoms are of subsidiary interest.

MORBID ANATOMY.

Naturally, in the presence of a disease with such startling characters, men have sought an explanation in the bodies of its victims. And angina pectoris has a very definite morbid anatomy, few affections more so, since in practically all cases vascular disease exists. With Morgagni, Jenner, Fothergill, and Parry, a majority of authors have correlated the fatal symptoms with the arterial disease; others have reached the less satisfactory, if more philosophical, position of Rougnon, who, taking all the circumstances into consideration, concluded, "Monsieur Charles est mort parce qu'il est mort." Not a hospital disease, one naturally does not see many necropsies. I have notes of 17 post-mortem examinations, all in men, 8 of them in men under 40 and 4 of them with a history of syphilis, and dying at the ages of 34, 38, 37, 39. They fall in three groups—aortitis, coronary artery disease, and a negative case.

A. Aortitis.—From the publication of Morgagni's famous case writers have recognised the importance of aortic changes at its root. The special importance of this has been dwelt upon by my brother regius of Cambridge, whose many publications upon the subject, dating from his remarkable study of syphilitic arteritis² in 1868, have edified his colleague and students. For our purposes here there is but one aortitis—the syphilitic. Occasionally a fairly acute process occurs at the root of the aorta in the specific fevers, but this is very uncommon, except in connexion with endocarditis. Chronic atheromatous changes in the aorta of the aged are very rarely associated with angina unless the coronary arteries are involved. Syphilitic aortitis is a most distinctive lesion. I pass round the beautiful plate of Corrigan's paper, in which he brings out for the first time I think, and with great clearness, the connexion of the disease with this lesion. The frontispiece of Balfour's book on "The Senile Heart" gives an equally good representation. Upon its anatomical features I need not dwell further than to refer to its predilection for the supra-sigmoidal region, the sectional limitation, and the great frequency of its association with aneurysm.

Of the post mortem examinations of my series only one offered a good illustration of the supra-sigmoidal type; a negro, aged 38, who had had syphilis about a year before. The attacks of angina began in December, 1904; they lasted for from 15 minutes to half an hour, with very characteristic distribution of the pain; in severer paroxysms he had fallen unconscious. The attacks recurred even when he was in bed and quiet. There was diffuse cardiac impulse, the area of

² St. George's Hospital Reports, 1868.

flatness was increased, but there were no murmurs; the blood pressure was 188 mm. Hg. On the evening of admission he had a very sharp attack, and another at 1.30 A.M., in which the pain was chiefly epigastric; he sweated profusely and became very weak, and at 2.30 was found unconscious, and died at 4 A.M. The heart weighed 490 grammes; the free edges of the valves were a little thickened; the only important lesion was an extensive fresh-looking aortitis, involving the root of the vessel and narrowing the orifice of the left coronary. The right coronary orifice was normal; the coronary arteries themselves were not affected.

Another syphilitic patient, W. A. M., aged 38, admitted Feb. 20th, 1895, had very severe paroxysms of angina, with aortic insufficiency. The aortic segments were thickened and curled; the coronary arteries were small but healthy; there was the characteristic sclerotic aortitis not confined to the root. The smaller arteries of the body, particularly the splanchnic, were tortuous and thickened.

In a third syphilitic case, J. W., negro, aged 34, admitted May 25th, 1897, the paroxysms were most characteristic, and had recurred since March; in several attacks he had become unconscious, and following them he had transient weakness of the left arm. During the fortnight he was in hospital he had several severe attacks; the left arm was distinctly weaker than the right, particularly the grasp of the hand; the heart appeared to be normal. On June 8th he complained of a great deal of coldness of the hands and feet; at 6.10 in the evening he threw up his hands suddenly and died within a few minutes. Widespread aortitis of the sclerotic type, with here and there plaques of atheroma, were the only lesions. The coronary arteries were not involved; they looked small, the walls thin, but there was no occlusion.

B. Coronary arteries.—We are all united in the acceptance of the Jennerian view of the close connexion of lesions of the coronary arteries with the disease. As shown in the extensive analysis by Huchard, a very large proportion of all the cases show changes in these vessels. Of the 17 necropsies of my list, 13 illustrated all the varieties of the lesions.

(a) Narrowing of the orifices is a very common occurrence, particularly in the syphilitic aortitis, but not often met with without some involvement of the branches. In the case of a man who died suddenly in my wards after recurring attacks the sclerosis of the ascending part of the arch was marked and the orifices of the coronary arteries were extensively contracted; as the post-mortem report states, "they admitted only a bristle." The arteries beyond were nearly normal, showing only slight sclerotic change.

(b) Blocking of a branch with a fresh thrombus is very

common in cases of sudden death in angina. In my post-mortem experience this has been more frequent in the medico-legal cases of sudden death without symptoms of angina. One of the main stems or a small branch may be plugged with the formation of fresh infarct. In patients who live some time the infarct may soften and pericarditis may be excited. A specimen in McGill College, from a man who died suddenly the day after an attack, shows the left coronary artery blocked by the thrombus and perforation of the softened anterior wall of the ventricle.

(c) Obliterative endarteritis, if we may judge from the reports of fatal cases collected by Huchard and others, is *the* lesion of the disease; it was present in nine cases of my series. The most remarkable peculiarity is the variation in the extent of involvement. The angina may be associated with obliteration of a comparatively small branch, or with a most widespread involvement of all the vessels. In the younger subjects the process is a gradual endarteritis with narrowing, and even complete occlusion of the vessel. In older subjects, the arteries may be converted, as in John Hunter and in William Pepper, into "open bony tubes." In one instance of my series the vessels were calcified to their smallest branches. Four cases showed disease of the coronary arteries alone; five in connexion with aortitis. In looking over these notes one is astonished at the comparatively small extent of coronary tubing which is sufficient to carry on the myocardial circulation. Mr. G., aged 39 years, an extraordinarily vigorous, muscular man, after a day full of effort and strain, had read an important paper at a college society and died the following night in an attack. Not more than a third of his coronary vessels were in use. It has long been known that advanced coronary artery disease may be present without much disturbance of the function of the heart. There is not a clinician among us who could not furnish from his notes a dozen cases of this kind. A man may get on very comfortably with only the main branch of one coronary, practically a fourth of the whole system. A heart once in my possession showed almost complete obliteration of the left coronary, only a pin-point channel could be traced for a short distance. Of the right branch, the main division passing between the auricle and the ventricle was completely obliterated, so that the only one of full size passed in the posterior interventricular groove. The heart came from a large, very muscular imbecile, aged 36, an inmate of the Institution for the Feeble-Minded, at Elwin. I knew him well; a good-natured, helpful fellow, constantly employed in carrying about, and attending to, the more helpless children. He died suddenly one day in a fit. The coronaries are not endarteries in the sense of Cohnheim, and disease of their branches is not necessarily associated with angina.

(d) And in a few fatal cases no lesions whatever are found;

we must accept the fact that angina pectoris may kill without signs of obvious disease in heart or blood-vessels. Such an instance has been reported by Dr. Bullard and myself.³ The case was regarded by all who saw it as one of so-called functional angina. The patient, aged 26, was very strong and robust, devoted to athletics, and a heavy smoker. He had served in the United States Army, but was discharged in the spring of 1896 for attacks of angina. The chief feature was pain in the heart, and "awful cramps," as he described them, in his arms. The attacks were so severe that at times he became unconscious, and after one he was thought to be dead, and was about to be removed to the dead-house! The attacks were brought on by cold and exertion. The pain was evidently very severe, and in the major paroxysms respiration would cease, and his pulse would become so feeble that he seemed to be dead. Only chloroform and morphia were of any avail in the attacks. He had an extraordinary number of attacks in 1896-7; Dr. Bullard had notes of 105. In 1898 he was better and had not nearly so many attacks, and was able to be at work. On Nov. 27th at 11.30 he had an attack of great severity; at 12.55 the doctor gave him chloroform; the attack was very prolonged, and the muscles of the chest became fixed, and remained so; he had a series of paroxysms and died at 6.40 in the morning. Except a few pleural adhesions, there was nothing special to be noted. The heart weighed 14 ounces; the muscle and the valves were normal. Just above the ring the aorta measured not quite 6 centimetres, a small vessel for a man of 5 feet 10 inches, weighing just over 13 stones. There was no disease except a flake here and there of atheroma. There was no thickening about the pericardium, and the sections showed no changes in the cardiac nerves.

PUMP AND PIPES.

The circulation as a whole may be compared to a vast irrigation system, with innumerable sub-districts of varied extent, under the control of local officers, but all under one central bureau, with which they are connected by telephone and an automatic signalling apparatus. The engine, pumping night and day, keeps a steady, uniform supply in the mains. The efficiency of the system depends upon the care with which the managers of the sub-stations regulate the flow to different plantations as occasion demands; the slightest disturbance in the most distant district is at once indicated by telephone to the central office, or in some instances automatically to the pump itself. Into certain vast irrigation areas with large sluice-ways all the water of the system can be diverted; and through carelessness of the men in control

³ Medical News, vol. lxxvii., p. 974.

or through misinterpretation of a message from the head office, it sometimes happens that these sluice-ways are left wide open and the whole system is wrecked. Or strikes arise in local, outlying districts, the distributing mains are closed, and the pumping reservoir is flooded and permanently disabled. Or things go wrong in the central bureau—supplies are not forthcoming to keep up the plant, or there is litigation with neighbours, and the works are shut down, sometimes abruptly and without warning. What happens in a great irrigation plant happens also in the vascular system of the animal body, the mechanism of which, pump (heart), mains (aorta), sluices (arteries), and lakes (capillaries), is very much the same. Take two illustrations of its working. In Hill's experiment—hold a tame rabbit up with the forelimbs spread, and the gates of its splanchnic sluices will open so wide that the head office, pumping station, and whole irrigation system are wrecked in a few minutes. Try the same with the wild rabbit, whose splanchnic dam is under the control of trained officials—nothing happens. The pumping-engine itself is as sensitive as a galvanometer and has a marvellous mechanism for relieving and preventing any strain or tension on its machinery. Irritate with a probe, as in Stewart's experiment, the inner surface of the left ventricle, just enough to suggest or imitate tension, and automatically messages are sent, opening wide the most distant sluice-gates to prevent any strain on the pump itself. Or damage the main valve of the pump so that there is a leak with increased central strain, as in aortic insufficiency, and all the outlying territories open their sluice-ways to relieve the pressure. The circulation is maintained, equalised, and regulated by one working element—the muscle in the walls of its system, a peculiar, indeed a unique, type in the pump, ordinary unstriped fibre in the distributing channels. Both constituents, heart and arteries, are elaborately “wired” with nerves, which end about possibly in the muscle fibres, and there are peculiar end organs widely distributed (Paccinian bodies). Just as in the irrigation fields, pump and channels are connected by wires with the local and central offices of control, so the arteries and the heart are connected with centres, local and general, which act directly upon their muscular elements, by which the whole system is worked and regulated—an automatic set of fibres which keeps the head office constantly informed as to pressure conditions in the engine, a set which slows, and a ~~set~~ which hastens its action. Moreover, a complicated, subsidiary system coördinates the different parts of the heart ministered to by a tissue of special type, unlike the fibres of the heart itself or of the arteries. Not only does the muscular element maintain the circulation, but it keeps the vascular walls in a state of tension, a tonus or tautness which has an all-important influence in relieving the strain on the non-muscular elements. As Harry Campbell remarks

in his recent Study of the Circulation,⁴ "The greater the tonus of the muscular elements the more exclusively does the vascular strain caused by the blood pressure fall on them."

INVOLUNTARY MUSCLE PAIN.

Involuntary muscle pain has its peculiarities, and whether in artery, bowel, ureter, gall-duct, or uterus, comes in crises, storms, and outbursts. I have recently taken advantage of an unpleasant experience in my own person to observe the phenomena of these paroxysms in a ureter struggling with a calculus. Periods of complete freedom, extending from two to three, to eight or ten hours, attenuated with three types of disturbance of sensation—a dull, steady, localised pain, the situation of which could be covered with a penny. It could be imitated exactly by firm pressure with the handle of a knife, or, indeed, with a finger upon a bone, particularly upon that tender spot on the sternum just a little above the ensiform cartilage. Lasting for hours and unmoved it was fairly bearable. Now and then, when free from pain, there were remarkable flashes, an explosive sort of sensation, not actually unpleasant, and accompanied by a glow-like wave along the course of the ureter and out through the flank, as it were through the muscles. And then abruptly, or working out of the steady pain, came the paroxysm, like a twisting, tearing hurricane, with its well-known radiation, followed by the vaso-vagal features, the pallor, cold extremities, feeble pulse, sweating, nausea, vomiting, and in two attacks, a final, not altogether unpleasant period, when unconsciousness and the pain seemed wrestling for a victory reached only with the help of God's own medicine—morphia.

Any portion of the arterial system taken as a unit may present the phenomenon of involuntary muscle pain, and herein, I think, lies the key to the explanation of the anginal attack. The intermittency, the suddenness of onset, the steady, dull, enduring pain, and then the paroxysm, with its associated vaso-motor features, sometimes unconsciousness, and the radiations are paralleled in other involuntary muscle crises. Paralleled, but not equalled, and not often associated with the dangerous collapse symptoms, and rarely causing sudden death. And yet a man may die in renal or biliary colic, borne down in a vaso-motor storm, as happened in the only case of the kind I have seen.

CARDIO-VASCULAR PAIN.

What do we know about cardio-vascular involuntary muscle pain, and under what circumstances do we meet it? Like

⁴ THE LANCET, Jan. 15th, 1910, p. 193.

other viscera, the heart itself is insensitive to ordinary stimuli. You remember how this so amazed Harvey when handling the apex of the heart of the young Viscount Montgomery. Even his Most excellent Majesty, who studied the case with him, "acknowledged that the heart was without the sense of touch; for the youth never knew when we touched his heart except by a sight or the sensation he had through the external integument."

In most affections of the heart pain is conspicuous by its absence, particularly in the more serious maladies, so that it has almost become an axiom that "not much is the matter when a patient complains of his heart." Pericarditis may pass through all its phases without pain. Occasionally it is present in a marked degree, and it may be a special feature in the chronic mediastino-pericarditis.

In acute endocarditis pain is rarely present, and ulceration of valves or of the wall may proceed to a most extreme degree without any sensory disturbances. Of valvular lesions mitral disease is often associated with slight pain, particularly in children with greatly enlarged heart. And sometimes in women the pain is of great severity and persistence, but it rarely has the characters of true angina. There are a number of cases on my list with mitral lesion, stenotic or regurgitant, but, curiously enough, the only instance of attacks which I could call genuine angina pectoris in the stage of cardiac insufficiency occurred in a young girl of 11. And in this point I see that my experience coincides exactly with that of Nothnagel. On the other hand, lesions of the aortic ring are often painful, and attacks of true angina are common, particularly when the root of the aorta is involved.

Arterial pain is met with under many different circumstances, and may present all the features of angina. In the first place, external pressure directly upon the wall is associated with agonising pain. Those of us who as students took our turn in digital compression of the femoral artery for popliteal aneurysm have a lively recollection of the misery suffered by the poor patient.

Secondly, pressure from within; the pain caused by an embolus may be of the most terrific character. A man admitted to the Radcliffe Infirmary under Dr. Brooks—an old examination case of aortic insufficiency, with a loud, musical, diastolic murmur—had a sudden pain in his right leg, just below the popliteal space, and for days was in such agony that he had to have repeated hypodermics of morphia. As the swelling and pain subsided signs of an aneurysm became evident, and it was noted that the loud, musical murmur had disappeared. A calcified fragment whipped off from the aortic valve had torn the wall of the artery. Not only sharp emboli but the soft ones of ulcerative endocarditis cause intense pain. As I was going up the steps of the house of a patient, the diagnosis of whose trouble had

wavered between typhoid fever and ulcerative endocarditis, I heard loud screams and found a young fellow in great agony, and he pointed to a spot below Poupart's ligament which he would not allow us to touch. He had embolism of the femoral artery, with subsequent gangrene of the leg. The intense colic of mesenteric embolism, such as we see in aneurysm, and occasionally in endocarditis, is of the same character, and it is diagnostic point between thrombosis and embolism of the cerebral arteries.

Thirdly, spontaneous tear of the arterial coats is associated with atrocious pain, with symptoms, indeed, in the case of the aorta of angina pectoris, and many instances have been mistaken for it. In this remarkable drawing which I pass round, of a split, fissured, and healed rupture of the internal coats of the aorta just above the valve, the patient was thought to have angina pectoris, and in the second attack, from which he died a year or more subsequently, a fresh split of the internal coats was found, which had ruptured into the pericardium.

Fourthly, as a result of extreme dilatation, distension, and stretching. Following the application of an Esmarch bandage, the arteries of the limbs dilate and throb, and there may be pain of a very intense character. In chilblains and in erythromelalgia the pain is probably arterial, and may be greatly aggravated with each systolic distension. In the excessive dilatation of the vessels following frost-bite the more rapid the dilatation the more intense the pain. As boys we had to give practical recognition to this point; if after a snowball fight anyone was foolish enough to put his cold hands into warm water he would be sure to suffer agonies of pain. An every-day cause of arterial pain is met with in aneurysm. In 132 cases of thoracic aneurysm the histories of which were carefully revised for this symptom pain was present in 104, and in 62 the trouble began with it. A feature of special interest to which attention has been called by many writers is the occurrence of attacks of angina pectoris as the first symptom. This happened in four cases in my series, and in every one of them the anginal attacks disappeared with the increase in the size of the aneurysm. There are other mechanical causes of pain in aneurysm, but I think we all accept the fact that pain is a very constant feature in the early formation and growth of the sac. Stretching of the aorta without disease of its coats, as seen in the dynamic dilatation of aortic insufficiency and certain neurotic states, is not necessarily painful.

Fifthly, spasm of the arteries may cause severe pain. Slow, gradual contraction of the peripheral vessels due to cold is associated with a sense of numbness but not of actual pain. Scores of everyday vascular actions illustrate the same thing, and the radials may be contracted to obliteration of the pulse without any abnormal local sensations. On

the other hand, there are types of arterial spasm accompanied with acute pain. Dubois, you may remember, referred the pain of hemicrania to angio-spasm. And our distinguished emeritus registrar, in his classical monograph on the disease, notes a number of instances and discusses this theory very fully. One does occasionally meet with an extraordinary degree of contraction of the temporal arteries during a paroxysm, but I have never seen an arterial distribution of the pain, nor are the vessels themselves sensitive.

The painful extremities in the various pathological states described as Raynaud's disease afford the best illustrations of disturbance of sensation as a direct result of angio-spasm. In a great many of the cases there is either obliterative endarteritis or the thrombo-angiitis of Buerger. But numerous observations show that spasm alone may account for all the symptoms. The paroxysmal character of the attacks, the intensity of the pain, the direct association with angio-spasm, suggest its vascular origin. It is an interesting point, too, that angina pectoris has been met as a complication of Raynaud's disease. In the case reported by Cleeman, a man, aged 62 years, had from his fiftieth year severe attacks of Raynaud's disease, chiefly in the hands, and usually in the winter season. Following several pronounced attacks of local asphyxia, and local syncope in the hands, he had one day a very severe paroxysm of angina pectoris; the pain lasted for two hours and was of such intensity that he was greatly prostrated. The association of migraine with angina pectoris, particularly the vasomotor type, has long been recognised, and is discussed by Dr. E. Liveing; two of my patients had been great sufferers with typical migraine.

ARTERIAL SPASM.

Let us now consider in what conditions we actually see spasm of the arteries; and by spasm I mean a persistent contraction leading to ischæmia, with disturbance of function of the parts supplied. Raynaud's disease is, of course, the type of an angio-spastic affection. One does not actually see the arteries contract, but one may feel the gradual reduction in volume of the pulse, even to obliteration. One may feel a full, easily palpable radial contracted to a narrow cord, followed by a gradual blanching of the skin of the hands. The spasm may affect the smallest twigs, such as those distributed to the extreme tips of the fingers, or it may be the tip of one finger only. The spasm is not always painful, but it may be associated with intense pain, and I have noted in one or two instances that there is greater pain with the local syncope, and the reactionary intense hyperæmia, than with the cyanosis. Of late in so many

instances of so-called Raynaud's disease arteritis has been discovered that it is well to insist upon the fact that the most advanced necrosis may occur as a consequence of spasm in vessels apparently healthy. Russian Jews are subject to a very remarkable malady studied by Buerger of the Mount Sinai Hospital, New York. While similar in some features to Raynaud's disease, it differs anatomically in having widespread obliterative endarteritis, with thrombosis of the veins; indeed, the disease may begin in the veins, so that Buerger calls it "thrombo-angiitis." The same condition has been shown by Parkes Weber in several Russian Jews at the Clinical Section of the Royal Society of Medicine. Buerger writes me that in two cases of typical Raynaud's disease in which he performed amputation of the leg the arteries were found normal; evidence of exceptional value, as this observer has made a special study of the condition of the vessels in some 30 or 40 cases of thrombo-angiitis of the leg.

There is one place in which we can actually see spasm of the arteries associated with loss of function. In numbers of instances of amaurosis spasm of the papillary arteries has been noted by Priestley Smith and others. I have seen but one case myself—a man with small contracted kidneys and the usual associated vascular changes, became blind while walking from the out-patient department to the ward, and was unable to see for some hours. The retinal arteries on both sides were strongly contracted and I had the advantage of the confirmation of the observation by my colleague, Buller, the well-known ophthalmic surgeon. In Raynaud's disease a similar contraction of these vessels has been seen, originally by Raynaud himself, since then by a number of observers, and quite recently in an interesting case reported by Friedman.⁵ In none of these cases has pain been mentioned as a symptom. I know of no other conditions in which we actually see angio-spasm with disturbance of the function.

And now let us leave the solid ground of observation for a few minutes. As I mentioned in my first lecture, the term "vascular crises" was introduced by James Collier in discussing the features of erythromelalgia, and it is a most useful term which admirably expresses the state of affairs in the recurring paroxysms of Raynaud's disease. It has been used with great effect by recent authors, particularly by Pal of Vienna, in whose monograph, "Gefässkrisen" (Leipsic, 1905), the whole question is exhaustively considered, more particularly in reference to its association with high tension and arteriosclerosis. The profession is at present riding on the top of a cardio-vascular wave, and it is impossible to approach questions without considering blood pressure and sclerosis. In Pal's hand the vascular crisis is a key to unlock many of the mysteries of disease in head,

⁵ Friedman: American Journal of Medical Sciences, February, 1910.

chest, and abdomen. Paroxysmal high tension we know with its remarkable phenomena—cardiac dyspnoea, cardiac pain, headache, uræmic symptoms, nausea, vomiting, and convulsions. No one who has seen much of blood pressure work can doubt that in patients with arterio-sclerosis these paroxysms play a very important part; but when we come to conditions of *local* high tension associated with contraction of the arteries, I confess that we are a little bit in the spray of the wave, and yet it may be used as a working hypothesis to explain a whole group of obscure conditions. As briefly stated, Pal's contention is: "Where the tension is produced by contraction in a definite vascular area, local consequences follow and dominate the picture. These are manifest chiefly by a peculiar painful sensation and local disturbance of function. General phenomena to a greater or less extent are manifest at the height of the tension." One is a bit staggered at the very free use which many writers make of the vascular crises, but it is a seductive theory and only the name is new. We have, I think, evidence that sclerotic arteries are specially prone to spasm. In many of Buerger's cases of thrombo-angiitis the symptoms were in part due to spastic contraction; in intermittent claudication vascular spasm plays a part, and one may actually see the foot get pale, as the patient begins to complain of pain and stops walking. We have really very little positive evidence of angio-spasm of the internal vessels. In a few remarkable cases of Raynaud's disease transient cerebral symptoms have occurred—aphasia, monoplegia, epilepsy, either at the time of or alternating with peripheral attacks. So transient has been the disturbance of function that it could be scarcely any other condition than angio-spasm. This was the view I took of the two remarkable cases which I reported some years ago. Now we have in arterio-sclerosis identical transient cerebral attacks for which it is scarcely possible to offer any other explanation. The condition, familiar to me for more than 25 years, was brought to my notice by the illness of a warm personal friend, who before his forty-fifth year was the subject of the most advanced sclerosis, with high tension. He had literally scores of attacks of transient paralysis, of monoplegia, asphasia, occasionally hemiplegia for 24 hours; and once as he got off the steamer after a trip to England he became paraplegic and remained so for nearly two days. The attacks are not always associated with very high tension. The cases are by no means uncommon, and a peculiarity is the extraordinary frequency of the attacks and their transient character. The question has recently been reopened in an interesting discussion on intermittent closure of the cerebral arteries by Lauder Brunton, William Russell, and Hobhouse in the *British Medical Journal* towards the end of last year. The correspondence shows how numerous are the cases. It will be fresh in your memory how ably Dr. A. E. Russell supported the vaso-motor or arterial-spasm

view of the origin of epilepsy in the Goulstonian lectures of last year.⁶

What evidence is there of the existence of angio-spasm in angina pectoris? In many cases the attack begins directly as a peripheral vaso-constrictor storm, with cold hands and cold feet, pallor of the face, and sweating. Nor is this simply in the so-called functional type, but in the severest forms an emotional disturbance may initiate a widespread contraction of the arteries. During the paroxysm it is by no means uncommon to find the radial pulse on one side very much smaller than on the other. I have notes of six cases in which this observation was made, and there may be associated pain, numbness, and tingling. In a few instances spasm of local arteries has occurred with the features of Raynaud's disease. I have already mentioned Cleeman's case in which the diseases coexisted. And Worton⁷ has reported an instance in a woman, aged 54 years, in whom after attacks of angina the tip of the left middle finger always became dead white and numb. That is as far as the facts carry us, and they indicate a widespread tendency in the disease to angio-spasm. I discussed in the last lecture with a purpose the extra-pectoral phenomena of the disease, as these receive their most suitable explanation in the spasm of the arteries. In one case the attacks of pain in the leg occurred with intermittent claudication. The sensations in the leg in Dr. W. W. J.'s case, which initiated the attack, were identical with those I have seen in the arm, with definite contraction of its blood-vessels. The three cases with transient aphasia or paralysis during the paroxysms are suggestive of intermittent closure of the vessels, particularly when one considers the similar attacks in Raynaud's disease and the frequency of such a transient paralysis in arterio-sclerosis. It is quite possible that the pain in the testis, such as I have reported, and of which there are a number of cases in the literature, may be associated with arterial spasm, and a suggestive fact is that the organ may become swollen after the attack.

A consideration of the very important group of cases in which the pain is limited to the abdomen throws light on the question. Except in distribution the symptoms may be identical. Pectoral and abdominal attacks may alternate, or one may spread into the other. Death may occur with only the abdominal pain. Special consideration of this angina abdominis may be found in the "*Archiv für Verdauungs-Krankheiten*," Band IX. and X., by Buch. These attacks have a striking resemblance to three well-known forms of abdominal crises—the lead, the tabetic, and that met with in purpura and angio-neurotic œdema.

⁶ THE LANCET, April 3rd (p. 963), 10th (p. 1031), and 17th (p. 1093), 1909.

⁷ THE LANCET, April 16th, 1898, p. 1053.

The whole question of visceral pain has of late years undergone revision. Haller, Mackenzie, Lennander, and others conclude that practically all organs innervated by the sympathetic and vagus are insensitive to ordinary stimuli. After having gone through a painful visceral experience, one appreciates the force of Dr. Johnson's method of refuting Bishop Berkeley's theory of the non-existence of matter. "I refute it thus," he said, kicking a stone; but of course they refer to ordinary extrinsic stimuli. It was Riegel, I believe, who first suggested that the pains of lead colic were due to spasm of the branches of the intestinal arteries, with ischæmia and œdema of the wall. Pal explains the abdominal pains in tabes as a vascular high-tension crisis, with spasm of the smaller intestinal arteries, and stretching of the nerve plexuses of the proximal arterial wall. Very high peripheral blood pressure exists during the paroxysms, as in a case recently reported by L. F. Barker,⁸ in which, in a woman, the pressure rose to 210 mm. Hg. It is a reasonable inference that the crises of these two states are really vascular. We have positive evidence of it in the extraordinary abdominal crises of purpura and angio-neurotic œdema. There are now nearly a score of cases which have been operated upon for "the acute abdomen." Œdema of the wall of the stomach or bowel, or œdema with hæmorrhage, has been the usual condition found; though, as in the remarkable case reported in last week's LANCET by Collinson, intussusception may be present, and it would be very apt to follow a localised œdema. I do not know that these cases specially favour a view of angio-spasm, but they, at any rate, point to a vascular origin. We may accept the view that the bowel wall is insensitive to ordinary stimuli, but the visible peristaltic colic of any chronic obstruction, with its character of smooth muscle pain, demonstrates in blunt Johnsonian fashion the existence of nerves capable of transmitting painful sensations from intrinsic stimuli, whether they exist in the arteries alone, as some believe, or are distributed among the tissue elements of the wall itself.

THE CONCLUSION OF THE MATTER.

After all this talk, what in a few words is a reasonable explanation of the pain in angina? Angina results from an alteration in the working of the muscle fibres in any part of the cardio-vascular system, whereby painful afferent stimuli are excited. Cold, emotion, toxic agents interfering with the orderly action of the peripheral mechanism, increase the tension in the pump walls or in the larger central mains, causing strain, and a type of abnormal con-

⁸ Johns Hopkins Hospital Bulletin, February, 1910.

traction enough to excite in the involuntary muscles painful afferent stimuli. Mackenzie suggests that there is rapid exhaustion of the function of contractability, which is after all only the *fatigue* on which Allan Burns laid stress; but I feel that in disturbance of this Gaskellian function is to be sought the origin of the pain, whether in heart or arteries. This is practically the explanation given by the late T. K. Chambers and by Lauder Brunton and has received, Sir, your sanction. In stretching, in disturbance of the wall tension at any point, and in a pain-producing resistance to this by the muscle elements, lie the essence of the phenomena. In a man with arterio-sclerosis and high pressure, and all the more likely if he has a local lesion, a syphilitic aortitis for example, disturbance, at any point, of the tension of the wall permits the stretching of its tissues. Spasm or narrowing of a coronary artery, or even of one branch, may so modify the action of a section of the heart that it works with disturbed tension, and there are stretching and strain sufficient to arouse painful sensations. Or the heart may be in the same state as the leg muscles of a man with intermittent claudication, working smoothly when quiet, but instantly an effort is made, or a wave of emotion touches the peripheral vessels, anything which heightens the pressure and disturbs the normal contraction, brings on a crisis of pain. I do not know of any better explanation of anginal pain, and it is nice to think that in its main features it came from one of the earliest and ablest of British student of diseases of the heart—Allan Burns.

What is the explanation of the sudden death? There are three modes of dying in angina pectoris. The one which specially interests us here is the form which, as Walshe says, "is sudden, instantaneous, coeval, with a single pang." It is the quickest death we see, and is that which may have been in John Henry Newman's mind when he penned the lines describing the death of his mother—

"One moment here, the next she trod
The viewless mansions of her God."

No form of death so placid, so peaceful, and so much to be envied, as it probably is without a pang. The functions of life appear to stop abruptly, with a gasp or two all is over. It is extraordinary how little a man may be disturbed in this death. An old doctor whom I knew well stopped at his house to write a prescription. With pen in hand he died at the desk, where I found him, as if in sleep, with his head peacefully on his arm and pen in hand. Another friend the subject of angina, whom I had only left a few minutes previously, talking quietly to Dr. Thayer, fell over on his bed, both pulse and breathing seemed to stop simultaneously. It must be a vagal death, a sudden inhibition of the inspiratory centre in the medulla. No other explanation seems possible for such a condition as that

which I described in the last lecture, in which the respiration stopped abruptly and in which a feeble heart's action continued for 45 minutes. It is exactly paralleled in chloroform death, when the inspiration stops abruptly, while the heart may continue to beat. In a third case in which I saw the death the suddenness with which the change took place was extraordinary. He was a man, aged 48, who had had very severe attacks. During my visit he was very comfortable, and he talked pleasantly and hopefully about getting back to his work. I was about to leave the room when he gave a sudden cry, clasped his hands over his heart, the eyes became fixed, and he fell over dead after giving two inspiratory gasps. No pulse could be felt at the wrists, but feeble heart sounds could be heard for three minutes.

A second mode of death is also seen in which, following a series of severe attacks, the heart grows gradually feebler, and the patient dies in progressive asthenia, often with Cheyne-Stokes respiration.

And thirdly, a certain number of patients die in the cardiac complications, and it is interesting to note how after great misery, caused by repeated attacks, when cardiac insufficiency is established, even with the dyspnoea, the patient is much happier, and dies slowly, if not so suddenly and placidly.

LECTURE III.

Delivered on March 17th.

PROGNOSIS.

How well the introduction to the "Prognostics" fits angina pectoris! A very excellent thing is it indeed, Hippocrates says, for the physician to cultivate prognosis, and nothing so much inspires confidence as the power of foreseeing and foretelling in the presence of the sick the present, the past, and the future, and he will indeed manage the cure best who has foreseen what is to happen. And almost as if he had this very disease in view he adds: "For it is impossible to make all the sick well; this indeed would have been better than to be able to foretell what is going to happen; but since men die, some even before calling the physician, from the violence of the disease, and some die immediately after calling him, having lived perhaps only one day, or a little longer, and before the physician could bring his art to counteract the disease, it therefore becomes necessary to know the nature of such affections."

The essence of prognosis lies in recognising, as Hippocrates says, "the nature of affection." And yet the thought must arise how futile to discuss the future in a disease, aptly described in so large a number of cases in Sencea's words as "meditatio mortis." I am sorry my figures do not allow me to agree with my brother regius of Cambridge, that of "all perilous maladies it [angina pectoris] is perhaps the most curable."

A consultant has great difficulty in making his experience of any disease effective, particularly in this matter of prognosis. A patient seen once or twice arouses intense interest, and then vanishes from his clinical ken, and the oft-repeated impressions of other cases leave a blurred image like that of a composite photograph. My practice was to get the notes of each angina case in good order at once, typewritten, and filed away, and then at intervals my secretary could write to the medical man in charge and add a note on the patient's condition.

It takes courage to make a prognosis. Fulness of knowledge does not always bring confidence; the more one

knows the more timidity may grow. The faculty which enables a man to look all round a question, to take a philosophical view of it, may be tempered with doubt, and an inability to reach a conclusion. A cocksure diagnosis and a positive prognosis may express the assurance of ignorance. In reviewing a long series, the high mortality and the great frequency of sudden death give a sombre tint to the picture, and yet I shall hope to show you plenty of bright patches. Seeing the more severe cases, the experience of the consultant is apt to be misleading, nor is always the lesson of his mistakes so thoroughly learned as by the general practitioner who lives in the same town with them. To know of the future is naturally the ardent desire of the patient and his friends, and whether we like it or not an opinion must be expressed. Sometimes out of pure kindness the tongue belies the head and always the great aphorism rings its warning—Experience is fallacious and judgment difficult. Now that we know more of the diagnosis of disease we talk less about prognosis, and to be of any value the latter must follow the former and grow out of it naturally. Often the one thing needful, the diagnosis, may embrace both prognosis and treatment; more than once this has happened in connexion with the disease under consideration. The first step is to get a clear idea of the nature of the affection—Is it an expression of organic disease of heart or arteries or is it only a painful disturbance of vascular function?

PROGNOSIS IN RELATION TO ETIOLOGY.

From the standpoint of prognosis the disease may be studied in various ways. Naturally the most important consideration relates to etiology. In any case three questions are suggested: Is it syphilitic mesaortitis? Are the arteries involved in a general or local sclerosis? Is it a so-called functional condition unassociated with organic lesion of the arteries?

Syphilis is of the first importance, and we have learned to recognise the frequency with which this disease attacks the root of the aorta, causing angina pectoris, aortic insufficiency, or aneurysm. In 17 cases of my series there was a history of syphilis, and it is interesting to note that a majority of the patients were under 45 years of age. In many of the cases it was not possible to connect the attacks directly with the disease. I have already spoken of the lesion—a mesaortitis—sometimes limited to the supra-sigmoidal area. A characteristic paroxysm may be the first symptom; a patient may, indeed, die in the initial attack. Nothing may be detected on physical examination; there may, perhaps, be slight superficial tenderness on pressure over the region of the aorta. Insufficiency of the valves may come on under observation. A striking result of the extended use of Wassermann's

reaction has been to show the importance of syphilis in aortic valve disease. The disease is not always confined to the root of the aorta; in three of my patients it was of the diffuse sclerotic type without special limitation. The prognosis is often very favourable.

The first case of angina pectoris I saw in Baltimore was a lieutenant in the navy, aged 30 years, who had had syphilis six years before. For a year he had attacks and had had to be off duty for many months. There was no enlargement of the heart, but there were systolic murmurs at both mitral and aortic areas. With the iodide of potassium he improved sufficiently to return to duty. After having lost sight of him for many years I then heard of him again, that he had remained perfectly well. A man, aged 58 years, seen on Oct. 28th, 1904, had severe attacks with moderate arteriosclerosis. I would not have recognised the specific nature of his trouble had I not seen him in 1898 with a most interesting syphilitic nephritis and periosteal nodes. The blood pressure was high, the aortic second sound ringing; but it was a favourable circumstance that the albuminuria had disappeared. He stood an anti-syphilitic treatment very well, progressively improved, the attacks gradually lessened, and he has remained well.

It is not always easy to determine whether or not syphilis is a factor, and yet it is well to give the patient the benefit of the doubt. A man, aged 56 years, who had had for three months very characteristic anginal attacks, had lived just the sort of life likely to bring them on—a gross eater, hard worker, heavy smoker, and yet the arteries were not specially sclerotic; the heart was not enlarged and the sounds were clear. He had had syphilis 30 years before. He improved with the use of iodide of potassium, and had no attacks for more than four years. I saw him very frequently, and it was not always possible to keep him in the “straight and narrow way.” He died suddenly one night, probably in an attack, before a medical man could reach him.

In persons under 40 years of age it is always well to bear in mind the possibility of syphilis. A woman, aged 37 years, whose case had been a great anxiety, had paroxysms of angina with hypertension and acute pulmonary symptoms. There was no doubt as to the severity of the disease. The question of syphilis had not been discussed until she complained of an ulceration of the throat, which Dr. Warfield at once diagnosed as syphilitic. The transformation in a month was nothing less than marvellous. I had not thought of a possibility of her recovery.

The outlook is not always so satisfactory. I followed for a couple of years, with Dr. Julius Friedenwald, the various phases of aortic root syphilis in a man, aged 36 years, who had paroxysms of great severity, often associated with collapse, and once on the street with unconsciousness. Aortic insufficiency arose under observation. When I saw

him on Feb. 2nd, 1904, he was having attacks every day, and could not walk more than 100 yards without pain and oppression in the chest, "as though there was a stone under the breast-bone growing larger and larger." Marked improvement followed anti-syphilitic treatment, and he was able to go back to his business for a year or more, and was comparatively free. Then, in spite of vigorous treatment, the attacks returned, and finally in one of them he died.

The sclerotic aortitis may be the only lesion. John W., aged 24 years, a farmer, died in an angina attack, of which he had three or four during the fortnight. He was admitted to the hospital on May 25th, and died on June 8th, so that his illness did not last more than three and a half weeks. He had had syphilis nine years before. He was a healthy, muscular fellow, with a good pulse, sclerotic arteries, and an apex-beat a little out from the normal position. The attacks were severe, and in one he died suddenly. Beyond dilatation of the chambers and some chronic passive congestion there was nothing special; the valves were normal, the orifices not narrowed; characteristic sclerotic aortitis involved the entire vessel. Many of the smaller arteries were thickened.

INDIVIDUAL HISTORY, CHARACTER OF ATTACKS, AND VASCULAR CONDITION.

"The cardinal fact in the prognosis of real angina is its uncertainty," with which statement of Walshe we all agree, and further he confessed that he knew no method by which we can reasonably tell whether a sufferer will be cut off the next minute or survive many years. The individual history, the character of the attacks, and the vascular condition are the important elements in the prognosis—taking it for what it is worth.

Much depends on the patient himself—on the life he has led—the life he is willing to lead. The ordinary high-pressure business or professional man may find relief, or even cure, in the simple process of slowing the engines, reducing the speed from the 25 knots an hour of a *Lusitania* to the 10 knots of a "black Bilbao tramp." The difficulty is to induce a man of this type to lessen "the race, an' rack, an' strain." As William Pepper used to say: "Give me the life of a hare rather than the existence of a tortoise." Not even the terrible outbursts of pain may suffice to check men of this stamp, and yet, like Kipling's ship, *The Haliotis*, many a sensible fellow, whose engines at 50 or 55 years of age had gone to pieces on the "long trail, the out trail," has been refitted and enabled to reach port in safety. We doctors are notorious sinners in this respect, but it is so hard to lessen work when in full swing, so much harder than to give up altogether, and how few of us at 50 or 55 are able to do this!

A severe attack of angina may save a man's life. A Congressman had burnt the candle at both ends—work and whisky, wine and women, had made a wreck of him at 49; and a spree culminated in a paroxysm of angina in which he nearly died. Five years subsequently he was in excellent health, in spite of a high blood pressure and moderate sclerosis of the arteries. He dated the change of life from the attack which had frightened him into sobriety. A group of most encouraging cases show that long intervals of good health, and even complete freedom, may follow the adoption of reasonable habits. Let me refer to one or two. Last summer I met in London a distinguished American lawyer, whom I had seen ten years ago in a series of severe attacks, one of which nearly proved fatal. Following in the track of the intercostal pain he had an outbreak of herpes, the only instance I have seen of this complication. After six months' rest he resumed work at an easy pace. I saw in the papers a few weeks ago the death of General P. whom I saw in 1901, then aged 65 years. For two months he had attacks of angina, and once had a succession of paroxysms which kept him in bed for three days.

Not much stress can be laid on the character of the attack so far as the ultimate outlook is concerned. The immediate prospect is always doubtful; a mild paroxysm may be succeeded by a severe one, or death may occur with the appalling suddenness which is one of the features of the disease. The vaso-vagal features—pallor, sweating, faintness, and nausea—are serious in proportion to their prolongation and to the resistance they display to remedies. A man may come out of a state which seems absolutely desperate. One does not often see recovery and subsequent good health after such a paroxysm as in the following case, which was studied with great interest by Dr. McCrae and myself.

J. H. W., aged 60 years, admitted to a private ward on March 24th, 1904, was a vigorous, active man, the victim of many acute infections, but not syphilis. He had taken an average quantity of whisky and had worked hard. In June, 1902, when salmon-fishing, he had his first attack, then a second one in January, 1904; a third on Feb. 22nd, which was very severe, as he lost consciousness; a fourth on March 10th, also very severe; and a fifth a few days before he came into the hospital. He was a robust, healthy-looking man with a good colour, a feeble heart impulse, no superficial heart dulness, distant sounds; pulse of good volume, slightly irregular; marked sclerosis of the arteries. On April 4th at 1 P.M. he had an attack in which he looked as if he were dying; the hands and feet were cold and clammy, and at intervals he sighed deeply and threw up the chin; he was conscious; the pulse was from 42 to 48, regular but small; the heart sounds were feeble and distant. By 1.30 the ashen grey colour was replaced by slight lividity; the pulse rose to 52; the blood pressure was 120 mm. of mercury.

At 2 o'clock the pulse was 60, better, quieter, and there was less cyanosis. At 2.30 the pulse was 68; he vomited several times, and at intervals had very deep sighing respirations. He was in a very critical condition all the afternoon, but gradually improved. Two days later, at 1.30 A.M., he had a mild attack of pain in the region of the heart with intermittency of the impulse. He gradually improved and left the hospital on June 23rd. Through Dr. McCrae I have heard from him at intervals, and he has kept very well. This man had six severe cardiac attacks, in one of which he nearly died, and yet he has now remained well and active for the past six years.

In the attack itself there are two bad prognostic signs—disturbance of respiration and slow, irregular heart action. The acute orthopnoea with signs of emphysema and œdema of the lung is serious, and not met with except in grave cases. Death may occur or the attacks may replace those of angina. Slow, grasping breathing, particularly if the patient has become unconscious, is of bad omen. Cheyne-Stokes respiration, a frequent accompaniment, is a bad sign when it comes on in a man who has not had it previously, in connexion with cardio-vascular or renal disease. The state of the heart is very deceptive. A man may die shortly after an apparently satisfactory examination. Listen to this report, jotted down at the bedside of a man in an attack, and who died five hours subsequently. "Pulse 92, at first regular and of good volume, but subsequently one or two beats dropped. There is nothing to attract one's attention in the pulse itself. (The blood pressure taken in the same afternoon was 160 mm. of Hg.) The arteries are not sclerotic; the apex beat is not visible; and between a high stomach tympany and an inflated edge of the lung it is not easy to make out the heart limits; the sounds are clear at apex and base, a beat drops occasionally; there is no gallop rhythm, nothing to indicate any serious disturbance; there is no heightened sensibility of the skin over the heart." This man had had anginal attacks on and off for a year. The heart was working with not more than 30 per cent. of a coronary circulation; one main stem was entirely obliterated, the other partially.

The small, feeble, rapid pulse is not of such ill omen as one of fuller volume, with marked arrhythmia; and a slow pulse with unconsciousness is always of grave import.

The circumstances that bring on an attack are almost of as much moment in the prognosis as its character. We all recognise the three chief factors—emotion, distension of the stomach, and muscular effort. Of the three emotion is of the least significance. Many instances of slight anginal attacks are brought on by anger, worry, or sudden shock; and while in individual cases they may be serious, yet the cause is rather easier to avoid, and always has seemed to me to be less dangerous, though John Hunter neither thought so

nor found it so. In many elderly persons with stiff arteries the commonest cause is stomach disturbance; a full meal, indigestion, flatulence, particularly at nights, is certain to bring on an attack. And there are individuals who are sensitive to this cause only. As one patient expressed it: "Had I not to eat I never would suffer."

The angina of effort, the paroxysm that comes on invariably after a man walks a few hundred yards or after using his arms, is a coronary artery affair, and is, as a rule, more serious than that which comes on spontaneously or as a result of emotion. This feature is the most common indication of what you, Sir, call "primary cardiac angina." The parallel between the angina of effort and intermittent claudication has often been drawn, though the cardinal difficulty has been pointed out that in the one case a man stops walking, in the other the heart continues to work. A curious feature in some cases of this type is that a man may be able to walk freely in his place of business, or in his house, and not be able to do so on the street. While constituting some of the most distressing cases, since even the act of dressing may bring on pain (*angor de toilette*), yet life may be prolonged, as in the case I mentioned of the man who had been a victim for some 11 years, and whose coronary arteries were calcified to their finest ramifications.

And the third important factor in prognosis is the patient's cardio-vascular condition. Persistent high tension with marked sclerosis of the arteries occurs in a very large group of cases, but it is important not to over-estimate their seriousness. The outlook may depend much less upon the existence of these factors than on the sort of man in control of them. An engineer of the "McAndrew" type will so handle his machine that the ship makes the voyage round the Horn to London with safety; whereas a man of a different type will wreck the engines and leave his ship a derelict. A large majority of all cases of angina pectoris have no obvious signs of disease of the heart itself. Of valvular lesions the aortic alone is important—insufficiency in the young man usually means syphilis; stenosis in the old means calcified aorta, narrowed coronary orifices, and rigid coronary arteries. Disease of the aorta itself is not often recognised. The prognosis of cases of aneurysm beginning with angina is, of course, serious, though as the sac grows the attacks may disappear.

FORMS OF ANGINA PECTORIS.

It was a distinguished President of this College, John Latham, who in 1812, I believe, first recognised that "certain symptoms did not always denote angina pectoris," and spoke of angina notha; and it is a useful division which recognises a minor and major type of the disease—or what I think is still better, a form without, and a form with, organic

lesion of the cardio-vascular apparatus. A diagnosis of these two forms from each other is an essential preliminary to successful prognosis. It may have surprised some of you that the number of cases of mild or functional angina in my list was so small, but I carefully excluded all trifling forms of heart pain in nervous women, and have only considered the cases which presented the features of an anginal paroxysm. Of the 43 cases there were 23 in women, not so large a percentage as given by many authors. It is a useful division to group the cases of this type into the neurotic and toxic; the former occur much more commonly in women and the latter in men. In looking over the histories of 14 cases of the severer organic angina pectoris in women I see that in only two or three cases was the diagnosis in doubt. The average age was much above the other group—56 years. In not a single instance was there absence of sclerosis, high pressure, or heart disease, and the character of the attack in almost every instance stamped the nature of the case. I have more frequently mistaken organic angina for the functional form than *vice versa*. Two of my worst mistakes were in medical men, and for their sakes I did not regret it, since both derived great comfort from the thought that they were not the subjects of angina vera. One man would have deceived Heberden himself, as he had hysterical attacks, at any rate, nervous outbreaks with spasm of the larynx, a sort of child-crowing, and a nervous dysphagia. Let me read the note I dictated at the end of his report:—"Against recurring attacks of moderate severity in a man of 53 must be balanced a healthy heart, a very nervous temperament, and the occurrence of laryngeal and oesophageal spasm. The patient is very apprehensive and feels sure he is going to die. I think the balance is in favour of a neurotic, functional condition." I was wrong; three years subsequently he died in an attack. The other patient had not a trace of obvious organic disease, but he had driven his engines very hard. He had smoked excessively, and at the time of the attack was very emotional. He improved so much that we all congratulated ourselves upon the correctness of our treatment and diagnosis. He dropped dead while speaking at the telephone.

Many subdivisions have been made of the neurotic form, but for prognosis they roughly fall into two, the distinction between which is the predominance of the vaso-constrictor or vaso-dilator phenomena. Many cases resemble what Gowers describes as vaso-vagal storms. Beginning with coldness of the hands and feet, numbness and tingling, with small pulse, pains are complained of in the heart itself, often more to the left, and in the pectoral rather than in the sternal region; the radiation may be marked, up the neck and down the arm, and much more than in the organic form superficial sensitiveness of the skin is noted. The attacks may pass off in the course of an hour or two, but in the

severe ones there may be nausea and vomiting; the respiration is quickened, and there is an indescribable sense of fear and dread. With it all the patient may move about, and there is rarely present the characteristic immobility of the severe forms.

When the vaso-dilator features predominate the patient complains of fulness in the head, of a terrible distress in the back of the neck, or a general sense of superficial tension. As one woman expressed it: "I feel just like an inflated balloon on the point of bursting." The heart's action may be forcible, and there is widespread throbbing of the arteries. The face and hands may be congested and hot, the face sometimes slightly livid. Following these symptoms, or coming on at the same time, the patient begins to have heart pain, which may become very severe; the lines of radiation may be characteristic, and with these symptoms there may be remarkable prostration. One patient whom I saw very often in this type of attack never had cold hands or cold feet, and on several occasions so distended was the superficial vascular system that bleeding was suggested, but she would never consent. There is rarely much difficulty in determining the character of these attacks, with which are often associated neurasthenia and hysteria. Occasionally one meets with paroxysms of great intensity, in which as the pain reaches a maximum the patient is thrown into a sort of tetany. In a man aged 32 years, whose troubles began with palpitation, the pain was apparently very severe, and he had stiffness and cramp of the fingers, a sort of tetany in which they could not be moved. Sometimes he would get into a state of general rigidity, all the time complaining of terrible agony in his heart. Many patients have phobæ.

The majority of these cases do well, and it sometimes happens, particularly in a man, that a reassuring diagnosis is all the treatment required. In attacks of extraordinary severity a fatal event may happen, as in the patient of Dr. Bullard, to which I referred in the last lecture. While gradual recovery in the course of a few months or a year is the rule, some cases are very obstinate. A man of 28, who had not worked for five years owing to constant recurrences of pain in the heart and along the inner side of the left arm, was exceedingly nervous, and after months of treatment we could do nothing with him. As he wrote pathetically: "I heard you say to the students that there was nothing wrong with my heart, but if you had it for a few nights and felt the pain in it, you would think quite differently."

The worst sort of neurotic angina may follow influenza, and the rapid recurrence of the paroxysms may render a man's life unbearable. An old student and valued friend in practice near Philadelphia, who was a little nervous and had occasionally had migraine, a month after influenza began to have the most extraordinary attacks. The pallor

and coldness of his extremities exceeded anything I have ever witnessed ; nothing could warm them ; even after his legs had been for 15 minutes in water as hot as he could bear, when taken out he complained that they felt cold. In the attacks the mental distress was agonising, and he had a sense of terrible constriction across the upper part of the chest. He threw himself about the bed, and the condition was most painful to witness. He gradually recovered.

My experience of an angina which may be termed toxic is very limited. I have not seen more than a dozen instances in which to tea, coffee, or tobacco could the attacks be attributed. We may look forward to an increasing number of cases of heart pain, and of the mild type of angina in women, with the rapid increase of cigarette smoking. I saw last winter in Italy an American woman whose daily allowance of cigarettes was never under 25. She had an unusual feature—cardiac pain only after rising from a recumbent posture, and this would worry her for half an hour, so that it made dressing in the morning difficult.

It is interesting to note that very heavy smokers may die a vagus inhibition death, just such as we see in angina pectoris. Three robust, healthy persons of my acquaintance, not known to have had heart disease, but all incessant smokers of very strong cigars, died suddenly in this way, without warning—one aged 53 while walking ; one a man of 36 fell off a chair at his club ; the other a man of 38 died on the beach after bathing.

TREATMENT.

A retrospect of one's experience in treatment will be coloured by the general character of the special disease under consideration. I look back with unmixed satisfaction at my experience with typhoid fever, every aspect of which may indeed be dwelt upon with pride by every member of the profession. On the other hand, pneumonia arouses feelings, also unmixed, but of a totally opposite kind. There have been certain gains : we know our enemy better, but there is no pleasure to be had in looking back upon the record. And the other night, in going over case after case of my typewritten reports, I could not help taking stock in this way of angina pectoris. And on the whole, in spite of the frequency of the broad arrow, the feeling was one of satisfaction. Terrible as it is in certain aspects, angina has many circumstances in its favour : it kills late, it kills quickly, we are able to do much to lessen the sufferings of the victims, and we cure a certain number of cases. There are but few deaths under 40 years of age ; no known disease kills so peacefully, so painlessly, and there has been real and solid progress in the advance of our knowledge of how to treat it.

As with prognosis, so with treatment: there are three great groups to be considered—syphilitic, neurotic, and arterio-sclerotic.

When a man gets a specific aortitis it means he has not had efficient treatment. There is nothing in the lesion of the arterial wall which mercury and iodide of potassium cannot control. The spirochætæ excite a diffuse granulo-matous mesaortitis, with destruction of muscle and elastic fibres, and the chief difficulty arises from its insidious progress, so that irreparable damage may be done before any warning is given. The details of treatment offer nothing upon which I need dwell in this audience. The value of mercury, no matter what the stage of the syphilis, is emphasised when one actually sees the spirochætæ in large numbers in the aortic wall, as has been demonstrated by J. H. Wright, since so far as we know the metallic drug alone acts as a specific. Iodide of potassium clears up the exudate and, as is well known, will cause a node to melt away even faster than will mercury. One thing, too, it does with almost invariable success—relieves pain. Here is the secret of its great influence in aneurysm in which in the early stage it is as good as morphia in giving relief, clearing the exudate in the media and adventitia, and in this way relieving the pressure on the nerve elements.

In the neurotic cases, with a recognition of a basic disturbance in the vaso-motor apparatus, the treatment is most satisfactory, and only a few cases prove refractory. A modified Weir-Mitchell cure with hydrotherapy meets the important indication. Long experience has taught the value of the wet pack in restoring stability in vascular ataxia. Counter irritation over the heart is sometimes helpful. Of drugs the patients have usually had enough by the time they reach the consultant, and one part of the battle is to wean them from all sorts of mixtures. One patient laid out before me 22 prescriptions, and was much aggrieved not to have a twenty-third. Sometimes a reassuring diagnosis is the only treatment needed. I have always been sorry that an article on angina pectoris was in the “British Encyclopædia,” since it has helped to make the very name deadly in the ears of the public; and there is an advantage in speaking to nervous patients of a false variety, which may mimic every phase of the true disease. When high tension is present, which is not infrequently the case in neurasthenia, the nitrites are helpful, and they have a very special value in the toxic forms, particularly that due to tobacco. In the cases with extreme vaso-motor ataxia I have long used the extract of ergot (ergotin) with advantage two or three grains three times a day.

I have nothing to add to the general knowledge which we all have of the treatment of the severer type of the disease, but I may give you my experience very briefly: first of the treatment of the paroxysm itself and then of the general

conditions out of which it arises. It was not to be expected that our generation could have in any one disease a second therapeutic boon of equal importance to that given us by our distinguished Fellow, Lauder Brunton. Of the value of amyl nitrite in loosening arterial spasm and relieving the tension and strain upon which the pain depends we are all agreed. We see its remarkable benefit, more particularly in the cases which begin with a widespread vaso-constrictor influence. Many practitioners express disappointment that it does not always relieve the pain promptly in the severe paroxysms; but it is not itself an analgesic, but only loosens the muscle grip; and it may well be that the painful effect of the disturbance of tension may persist after the spasm itself has disappeared. At any rate, experience teaches us that we often have to resort to morphia to relieve the atrocious character of the pain. Moderate doses, as a rule, suffice; but it is to be remembered that, as Burney Yeo pointed out, there are cases extraordinarily resistant; and I have reported an instance of status anginosus in which, between 10 o'clock on Saturday night and 1 P.M. on Sunday, five grains of morphia were given hypodermically and by the mouth with relief of the pain, but without giving sleep. In these terrible cases, in which attack follows attack, the nitrites are of as little use as water. In despair one may have to resort to chloroform. I well remember to have done so at first with fear and trembling, as the patient's heart was feeble, but it seemed imperative to give the poor fellow relief. I have used it many times since, and never with ill effects; in no case did sudden death occur during the administration or immediately after it. Theoretically the practice is a risky one, but neither in my hands nor in those of the late George Balfour of Edinburgh were there ill consequences.

Oxygen inhalations are useful, particularly when there is a dusky cyanosis and in the asthma-like dyspnoea. In the weak, failing, irregular heart one is tempted to give digitalis, and it may be tried, preferably by the hypodermic method. There is one type of case in which the drug should be used—when marked cardiac weakness follows an acute single attack in a comparatively healthy man. Post-mortem experience shows that the lesion in such a case is very likely to be blocking one of the coronary vessels. While anatomically the coronaries are not endarteries, functionally they are, and an infarct is, we know, very apt to follow; and if after the attack a pericardial rub is heard we may be certain this has happened. By maintaining the pressure within the myocardial vessels the extent of the anæmic necrosis may be lessened.

For the general condition the value of iodide of potassium in arterial lesions, and specially in the syphilitic variety, is universally recognised, and it may be given at intervals for months. Last winter I had an interesting talk with the

distinguished Roman clinician Marchiafava, whose experience in angina pectoris is very large, and he gave me reports on cases treated with theobromia, from 20 to 30 grains in the day. A number of them were greatly benefited. I have only had the opportunity of trying it twice; in one case the use had to be interrupted on account of a complication; the other patient has been remarkably helped, particularly in the capacity of taking more exercise.

In the middle-aged man who has had an attack of angina it is usually a question of high tension with beginning or actual sclerosis of the arteries. So soon as a man has crossed that point in life when the pace is the fastest, whether we put it at 25 with Plato, at 40 with Montaigne, or to be more kind, let us put it with the sexagenarian himself, at the grand climacteric (63), the tubing begins to show signs of wear and tear, and the blood pressure gradually rises. Now there is nothing more difficult than permanently to reduce persistent high blood pressure. Drugs have really very little influence. The nitrites are helpful in temporarily lowering it; but take a man with a persistent pressure of 230 to 240 mm. of Hg, and you may get the record to 210 or 220, but to get it back to 150 or 160 and keep it there is not often within our power. Much more important results may follow change in a man's habits of life. I usually give two prescriptions—"Go slowly," "Eat less"—on which I find a great many patients put about the same value as did Naaman on the prescription of Elisha. A man who has kept a full head of steam in the boilers must learn to lower the pressure and be content with the quiet 10 knots an hour speed. It is very difficult to stoke the engines in due proportion to the work expected. No wonder there is high pressure and the machine goes to pieces when the furnaces are stoked for the *Lusitania* and the engines are asked to do the work of an ordinary ocean tramp. Like longevity, angina pectoris is largely a question of the arteries. It is an old story, this association of a long life with a small intake, a story well told by Cornaro in the sixteenth century, and in our own day by our own Cornaro, Sir Herman Weber.

If, Mr. President, I have dealt with this important subject in a somewhat sketchy manner my apology must be that before such an audience I could not discuss trite and everyday features of so familiar a disease, so I thought it would be more interesting to give you my personal experience. It adds salt to life when men react differently to the same impressions. It is always with a shade of regret to find a colleague of the same way of thinking with myself on every question, so that I hope you have not all agreed with all of my conclusions. At any rate, Sir, mindful of the wise counsel of Lucretius,¹ I have tried not to base wide opinions on small signs, and so involve myself in the snare of self-deceit.

¹ Bk. iv., 816, 817.

CERTAIN VASOMOTOR, SENSORY, AND MUSCULAR PHENOMENA ASSOCIATED WITH CERVICAL RIB.

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THE symptoms of cervical rib have attracted much attention of late years, and are discussed in the exhaustive papers of Keen,¹ Thorburn,² and Lewis Jones.³ The nervous and muscular features are those which most often attract attention. Last year I saw two remarkable cases, one of which threw light on a very inexplicable condition of the arm, which I had described years ago.

Mrs. L., aged thirty-one years, a strong, healthy woman, was referred to me by Dr. Andrew, of Thame. There was nothing special in her family or personal history. For ten or twelve years she had noticed a pulsation above the clavicle on both sides, most marked on the left; the physicians who first saw her suggested the possibility of an aneurysm. What has troubled her of late has been that after using the left arm for a short time there is a sensation of numbness, sometimes of "pins and needles," and if she continues to work, the skin gets red, and the arm feels swollen and hot; then in a little while she is quite unable to use the arm, and even has dropped things from her hand. The condition has increased very much of late, and it is for this that I was consulted. When quiet and at rest the arm feels natural, and she can do the ordinary work with her fingers. It is only when she attempts to use the arm that numbness and tingling begin; then if she persists, redness and swelling follow, and finally she has to give up work. She has become nervous about it, and two months ago she appears to have had an attack of unusual severity, in which she fainted.

She was a very healthy looking woman with high color, no cyanosis; the radial pulses were equal; above the clavicles there was pulsation, somewhat more forcible on the left side on which it extended from the outer end of the clavicle upward and inward toward the thyroid. It was very noticeable, and one was not surprised that it had been regarded as aneurysmal. There was no pulsation to be seen in the sternal notch. After exertion, and in the erect posture, the left

¹ AMER. JOUR. MED. SCI., 1907, cxxxiii, 173.

² Med.-Chirurg. Society's Trans., 1905.

³ Quarterly Jour. Med., vol. i.

supraclavicular space looked fuller than the right, and a marked pulsation occupied the whole of the lower triangle. On palpation, no definite tumor could be felt, nor could one grasp a vessel between the fingers, and yet the pulsation was marked and distinctly arterial. The swelling was a little tender; on deep pressure one felt a resistance suggestive of a cervical rib. On auscultation, there was a systolic murmur over the vessel on the left side, none on the right. The left arm looked smaller than the right. There was no wasting of the muscles of the hand. Sensation was everywhere perfect. After moving the arm up and down, and working the muscles, she complained that the skin felt prickly and numb, and a flush extended over it, but no swelling followed. This, she says, only comes on if she persists in using the arm. The heart's impulse was a little forcible, but the sounds were loud and clear. Dr. Sankey took an x-ray picture, which showed well-marked cervical ribs on both sides, curiously enough, the larger one on the right.

The special point of interest about this case to me was the explanation it offered of two very remarkable cases, one of which I showed at the Philadelphia Neurological Society.⁴ I give here a brief abstract: A man, aged forty-eight years, always very healthy and strong, a carpenter by occupation, complained of inability to use the right arm, which had been gradually coming on for some time. When at rest and quiet, it felt perfectly natural, and all the ordinary actions of life could be done without discomfort. There was no pain, no numbness or tingling, and the hand and arm looked natural; but when he worked, or used the right arm for more than a few minutes, he began to feel an unpleasant sensation and numbness and great tenderness; the color of the skin changed, and the whole arm became congested and swollen. This would occur in a very few minutes, and the veins would stand out with great prominence. There was a general dusky lividity of the skin. If the exercises were continued, the arm became visibly swollen. At rest, the circumference of the thickest part of the forearm was eleven inches, after exertion twelve and one-half inches. At rest, the radial pulse on the two sides seemed normal and equal; after exertion the right radial became very small, only just perceptible. When the arm was held up above the head, the congestion and swelling rapidly disappeared. Nothing whatever could be felt in the axilla, or in the course of the bloodvessels. I saw this patient at intervals of six months longer; he could do no heavy work, but all ordinary minor actions could be done without any swelling of the arm. The case was one that excited a good deal of interest, but no very satisfactory explanation could be offered. Unfortunately we did not at that time appreciate the importance of cervical rib, which I do not doubt was the cause of the remarkable disturbance in this case.

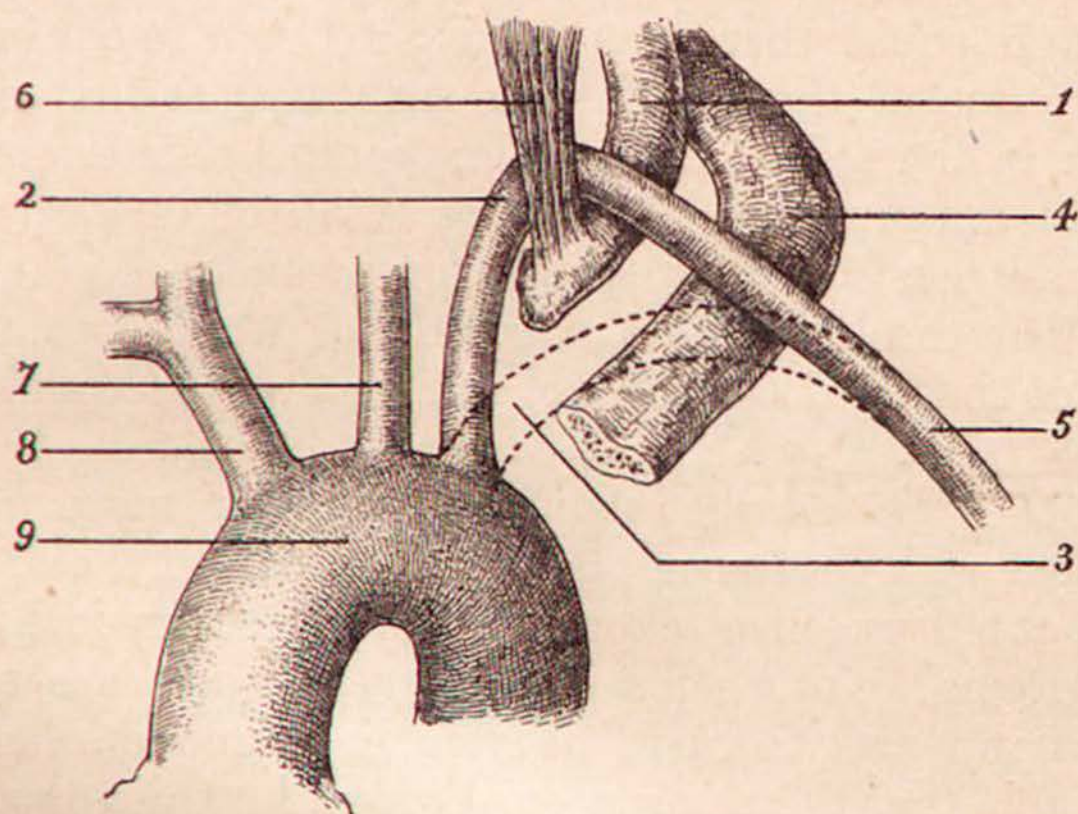
⁴ Jour. Nerv. and Ment. Dis., 1888. p. 248.

The other case was a woman, aged thirty-eight years, who came to my out-patient clinic at the Johns Hopkins Hospital, complaining of redness, pain, and stiffness of the right arm on exertion. At rest, the arm looked natural, but when used for ten or fifteen minutes there was a remarkable change—the skin became flushed, the fingers slightly cyanotic, and she complained of a feeling of stiffness with numbness and tingling, and if she continued to work the hand, the forearm became swollen and so stiff that she had to stop. There was no disturbance of sensation, no atrophy of the small muscles; the pulses were equal; there was nothing to be made out in the chest, or in the course of the arteries. I suspected at first pressure of glands high in the axilla, but nothing could be determined by the most careful examination. I did not think of cervical rib. The condition had persisted at intervals for several years and was the cause of great disability, as she could not work continuously for any length of time. If she did not use the arm there was no inconvenience.

In both these cases the symptoms, though more aggravated, were identical with those complained of by Mrs. L., and I have no doubt that, could we have taken *x*-ray pictures, cervical ribs would have been found. In Keen's paper several cases are reported in which the hand and forearm became livid and swollen. But it seems probable that there is a special group in which the symptoms come on only after exertion, and they resemble closely the condition known as intermittent claudication. In many cases the subclavian artery has been compressed in the angle between the rib and the scalenus anticus. When at rest, and with very slight muscular effort, enough blood reaches the limb, but the demand for more blood which follows exertion is not met, and there is stiffness and numbness with vascular changes. So marked may these latter be, that there are cases reported suggesting Raynaud's disease, and Keen states that in at least seven instances local gangrene has followed.

An important suspicion was raised in this case as to the existence of aneurysm. As Keen remarks: "On the whole, the evidences of true aneurysm in most of the cases in which it has been reported are, to my mind, by no means always convincing. Usually the diagnosis has been based on the strong pulsation, sometimes with bruit and thrill. In a few cases, as in my own, the artery has been found, at operation, moderately enlarged, or in one case (Murphy's) flattened. In several cases operation has, therefore, disproved the presence of the supposed aneurysm. The postmortem in Adam's case disclosed a cylindrical aneurysm. Bearing upon the history of pressure or tension of the artery as it crosses the cervical rib, it is significant in Fischer's (Braun's) case that when the arm hung down (pressure or tension) a bruit was present, and when it was held up (relief of pressure) the bruit disappeared."

But unquestionably, in a few cases, dilatation of the vessel, a cylindrical aneurysm, or even a sacculated tumor, has been present. In the case here reported, though the pulsation was diffuse and suggestive, there was no evidence of aneurysmal dilatation. To the Infirmary for Nervous Diseases, Philadelphia, Rose D., aged nineteen years, an inmate of the Pennsylvania Blind Asylum, was brought for a supposed aneurysm of the subclavian. There were the local paralysis and atrophy which one now recognizes readily enough as



Scheme to show the changed course and the consequent angulation of the subclavian artery when it passes over a cervical rib. The dotted line (3) represents the normal gentle curve of the artery. 1. Cervical rib. 2. Subclavian artery passing over the cervical rib. Note its high position, its angulation, and the likelihood of pressure by the scalenus anticus 6. 4. First dorsal rib. 5. Axillary artery. 7. Left carotid. 8. Innominate. 9. Aortic arch. (Keen.)

characteristic of cervical rib. Over this, no doubt, the subclavian artery was hooked, as in Keen's diagram, which I here reproduce, as it shows this angulation and elevation. It explains the position of the swelling in these cases, and the high pulsation. In the case of the blind girl just referred to the swelling in the supraclavicular region was marked, and while the mass itself did not pulsate, the vessel could be readily traced, and there was a loud murmur heard along its course.

An Address
ON
THE HOSPITAL UNIT IN
UNIVERSITY WORK

Delivered before the Northumberland and Durham Medical Society

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An Address

ON

THE HOSPITAL UNIT IN UNIVERSITY WORK.

GENTLEMEN,—I offer no apology for bringing before you an academic subject. Though the society has no direct university affiliation, as individual members you are interested in the development of the profession, and you take a pride in the rapid growth of the provincial universities, among which that of Durham, the northern sister of Oxford and Cambridge, takes precedence. What is university work? What is a hospital unit? What connexion have they with each other? And what interest have they for us, and for the community at large?

THE FUNCTIONS OF A UNIVERSITY.

All are agreed that a university has a dual function—to learn and to advance learning. I use the word “learn” in the old sense—met with in the Bible and still used colloquially—as it expresses the mental attitude of the student towards his *alma mater*, “*totius litteratorii studii altrix prima*.” In mind, manners, and morals the young man seeks life’s equipment when he says to his *alma mater* in the words of the Psalmist, “O learn me true understanding and knowledge.” To learn the use of his mind, to learn good manners, and to learn to drive Plato’s horses, form the marrow of an education within the reach of every citizen, but to which universities minister in a very special way; and it should be comprehensive, fitting a man in Milton’s words “to perform all the offices, private and public, of peace or of war.” The other great function of a university is to advance learning, to increase man’s knowledge of man and of nature. Looking over the lecture list of any modern university one is impressed with the bewildering complexity of subjects taught, from Homer to Victor Hugo, from Tamil to internal secretions; but they may be roughly grouped into those dealing with man and those dealing with the cosmos about him. At any time these 800 years this division has been

recognised, and though we have travelled a long way from the seven liberal arts which once comprised the whole range of study, it is not so much the nature of the subjects or their division that characterises modern education as a new spirit, a new attitude of mind towards them. No real progress was made until we returned to the Greek method—the pursuit of knowledge for its own sake. Out of the laboratories, as the result of work done by men absorbed in study and usually without the slightest bearing upon practical problems, came the three great revolutions of the nineteenth century—the annihilation of time, the substitution of the machine for the hand, and the conquest of disease. Physics, chemistry, and biology have given us control of the forces of nature. Faraday has harnessed Niagara, the power of which is now transmitted hundreds of miles away; the Curies have found the magic vril of Bulwer Lytton's "Coming Race"; and Pasteur has revealed one of the greatest secrets of life. It is characteristic of modern conditions that, hovering on the borders of the charmed circle of pure science, are those keen to turn every discovery to practical use. What good is knowledge unless it can be utilised in the service of man, asks a utilitarian age? The university of to-day, while ministering to the advancement of learning, is ready to teach how to make the learning profitable, so that everything in practical science, from household economy to aviation, finds its place. Schools specially adapted to special needs stand out as dominant features in the new programme, and Oxford and Cambridge, as well as Newcastle, Leeds, and Bristol, have felt the strong impulsion to develop the science which deals with human well-being. Of the old faculties which made up the *studium generale* medicine has been the one most profoundly affected by growth of modern science. What a revolution in our generation! Anatomy, physiology, and pathology, with their subdivisions of histology, embryology, physiological chemistry, and pharmacology, are now in laboratories controlled by specialists, whose ideals and work differ in no respect from those of their colleagues in the departments of physics, chemistry, and biology; and in many places large separate institutes are devoted to these subjects. The urgent need to-day is to extend this type of university work into our medical schools, so that *all* branches of the curriculum are included—medicine as well as pathology, surgery as well as anatomy, midwifery and gynæcology as well as chemistry. But here comes a difficulty—the practical schools which deal with these important subjects and their subdivisions are not under the control of the university, or at best have a very feeble affiliation. In this country the hospitals are either independent corporations, as here, or the medical school has evolved from the hospital, as in London, or there exists a mutual arrangement between the university and the hospital,

as in Edinburgh. The difficulty is not insuperable—the same public-spirited citizens support both institutions ; the hospital staff includes the teachers in the medical school. It only needs a rearrangement of responsibility, financial and educational.

THE HOSPITAL UNIT.

What is a hospital unit, and how can it be brought into line with university work ? First a word on what a hospital stands for in the community. Primarily for the cure of the sick and the relief of suffering ; secondly, for the study of the problems of disease ; and thirdly, for the training of men and of women to serve the public as doctors and nurses. A majority of hospitals deal only with the first of these objects, and incidentally with the third. All agree that a study of the problems of disease and the training of men and women in the technique of the art come within the sphere of the university. England has suffered sadly from an absence of great medical faculties, such as exist on the Continent ; and nowhere is this more evident than in the dissociation of the hospital from the university. One consequence has been that the hospitals have been built by men who had no idea whatever of their scientific needs, and too often staffed by men who knew little and cared less for anything beyond their primary function. The present plan of hospital administration is a legacy from a period when university ideals had not reached the practical side of our medical schools. I need not do more than to refer to the arrangement of the staff which exists everywhere—three or four physicians, two or three surgeons, one or two gynæcologists, other specialists, and a group of juniors who serve as out-patient assistants, waiting for promotion to the wards. The pathological department, often only a dead-house so far as the hospital is concerned, is in no way coördinate with the others. Laboratories of bacteriology, clinical chemistry, microscopy, and of clinical physiology may or may not exist. This English system, which has spread to the United States and to the Dominions, has worked well in some ways, and is responsible for the general excellence of the hospitals, large and small. Go where you may, from the cottage hospital to the big city infirmary, the internal economy, so far as cleanliness, general care of the patients, and nursing, is admirable. Speaking from a comparatively wide experience of hospitals, I say unhesitatingly that the average level of comfort and care is nowhere so high as in this country, and in no small measure is this a tribute to the character and training of the women connected with them. But there are very glaring defects, foremost among which is the absence of proper laboratory accommodation in pathology, bacteriology, clinical chemistry, and microscopy. Time and again in large well-arranged hospitals I have asked for the patho-

logical laboratory, and have been shown a dead-house ; for the clinical laboratory, and have been told that it did not exist ; and have been chagrined to find that even in so simple a matter as the determination of the nature of a tumour, or the bacteriological examination of a fluid, the institution had to depend upon the excellent clinical research laboratories of London. But an equally grave defect is in the internal organisation. The general hospitals, even those connected with medical schools, are as a rule overstaffed, four physicians or three, where there should be but one or two, and the same with the surgeons. On the other hand, in many the resident staff is miserably inadequate, and their time so taken up with routine that any scientific study of cases is impossible. A keenly interested physician has a capable house physician in good training—off he goes at the end of six months ! and the same weary process begins of putting a fresh man into harness. In the very best hospitals, with medical school affiliation, the arrangements are on old and very unsatisfactory lines. In long, uphill years the ambitious young man goes through the position of resident physician, medical registrar, assistant physician, and at 40 (if he is lucky !) gets wards. Then a visit two or three times in the week with a house physician, a certain amount of teaching, and possibly some laboratory work, but he has a living to get and practice becomes the first consideration. He has precious little pay, if any ; there are no paid assistants ; there is no continuity in the organisation ; in fact, there is no organisation on modern lines. This can be changed if we can convince the authorities that the subjects of clinical work come directly within the sphere of the university, and that certain hospitals must be adapted to meet the demands of the scientific study of disease and the scientific training of students. The problem is how to place a dozen or more teachers in every medical school in the same relation with the university as the professors of physiology and of physics—how to give to each one of them a department organised on university lines, in which the three functions of a hospital may be utilised and coördinated. The hospital unit meets the condition—a department under the complete control of the university, or under the joint control of hospital and university. Take a medical faculty with, say, 300 students, for which the necessary hospital accommodation would be about 500–600 beds, a unit would represent a clinique in the continental sense, of which there would be five or six major, and as many minor—the former including medicine, surgery, midwifery and gynaecology, psychiatry and neurology, pædiatrics, and ophthalmology ; the latter, dermatology, dentistry, laryngology, otology, syphilis, and genito-urinary diseases. There might be, as at Berlin and Vienna, two or three medical and the same number of surgical units. In Vienna, for example, there are three completely equipped midwifery and gynaecological units, each with lecture rooms, laboratories, rooms

for students, and the whole paraphernalia for teaching and research.

THE ORGANISATION OF THE UNIT.

Let us take medicine, the one with which I am familiar. The components are the professor or director, 60 or more beds, an out-patient department, four or five laboratory rooms, and a staff. Let us deal with these in detail.

The *Professor* has three duties—to see that the patients are well treated, to investigate disease, and to teach students and nurses. He should be a man with wide sympathies and of trinocular vision. He should have a comprehensive and thoroughly scientific training, and should enter clinical medicine through one of three portals—physiology, chemistry, or bacteriology and pathology. He must be keenly practical, keenly scientific, fond of his patients, fond of his work, and devoted to his students. He should live as much in his wards and laboratories as do his colleagues in their laboratories of anatomy, physiology, chemistry, or physics. The question at once comes up, Is this possible? Can we expect surgeons, physicians, obstetricians, and specialists to devote themselves entirely to University work, and to carry out the three functions of the hospital, without regard to the public outside? Theoretically it sounds feasible, but in practice I do not believe it to be possible. In the case of a successful teacher with a widespread reputation, the public, to say nothing of the profession, could not be kept away from him. But it would not be unreasonable to ask such a man to devote at least one-half, or even more, of his time to the hospital duties. For the heads of the different units the university would go into the open market and seek the best men available. Under our present system the university choice of professors in the practical departments of the faculty of medicine is, as a rule, limited to men who hold hospital positions in a town. It is encouraging to see that the provincial universities are departing from this old practice, and I am very glad that you lost your distinguished townsman, Dr. George Murray, who was appointed to the chair of medicine in Manchester.

But it may be urged—have we not heard that the day of the pure clinician is over?—did not our *Opsonator maximus*, Sir Almroth Wright, pronounce his funeral oration a few months ago at the Royal Society of Medicine? Do not listen to him—*Clinicus perniciosus*, to quote Mindererus, with vision so myopic that he can see only applied bacteriology in clinical medicine. As is the twig, so is the tree, and with his upbringing such opinions are perhaps natural; and it is not for me to abuse an old friend, of whose good work no one has a higher appreciation. But in these days so winged are Sir Almroth Wright's words that they fly far and

need a protest from one who has been keenly alive to every bacteriological advance in medicine. Think of what would have happened if a man of Sir William Broadbent's wide sympathies, clear judgment, and enthusiasm had had a great modern clinique at St. Mary's Hospital, such as those of Leyden or of Kraus at Berlin—do you suppose the bacteriological tail would have wagged the clinical dog? Far from it! Sir Almroth would have done just as good work as director of the bacteriological laboratory of the clinique, and vaccine therapy would not have received such tardy recognition, and would have been in just as satisfactory, or possibly in a more satisfactory position. A striking comment, too, on Sir Almroth's claims is the fact that the medical and surgical staff at St. Mary's are still on duty!

Patients.—In the case of the medical clinique the number will depend upon the size of the medical school. In a hospital to which many acute cases are admitted a male and a female ward with about 30 beds each, and with a few small extra rooms, would furnish ample clinical work for a senior class. There are continental cliniques in which double this number of patients are treated, and the matter is one for organisation. To make the teaching and the work of the unit effective, it is essential to give the professor control of an out-patient department, with proper arrangements for the study of the cases and for the teaching of the junior students. In how many out-patient departments is the university side of the hospital problem considered?

Laboratories.—It is a characteristic of modern medicine that every available science is pressed into her service in the study and treatment of disease. Any sort of rooms will do for laboratories. The very best of work has been done with the meanest sort of equipment. The ideal plan is that followed in certain hospitals, the new cliniques, for example, of the Cochin in Paris, in which each unit consists of two wards on either side of a central building, the lower floor of which is devoted to administration, and the upper to laboratory purposes. In every way it is a convenience to have the laboratory rooms in close proximity to the wards, and when feasible they should form an essential part of the unit, but for the sake of economy they may be merged, and all the pathological work concentrated in one building. Nowadays provision should be made for (1) cardio-respiratory physics and physiology; (2) bacteriology and vaccine therapy; (3) chemistry; (4) microscopy; (5) X ray and electrical work; and (6) a general laboratory for the students. From the standpoint of the teacher the most important of these is the large laboratory for the students, in which the subject of clinical microscopy is systematically taught to the juniors, each man having his own place and his own microscope, and

in which the seniors work while acting as clinical clerks. No benefaction to the Johns Hopkins Hospital was more helpful to the medical school than that in which some kind friends gave the necessary money for a clinical laboratory. The best general clinical and pathological laboratory I have seen lately is that newly opened at the hospital which gave me my start in life, the Montreal General. The arrangements for students are admirable.

The staff.—The present arrangement existing in almost all English, American, and Dominion hospitals is antiquated, and in every way ill-adapted to modern conditions. A man is given a house physicianship for six months, or possibly a year; there is a senior resident physician, and there are laboratory assistants, who may or may not be at the disposal of the professor. Gradation, permanency, and specialisation should prevail as in any other university department. There should be four groups. First, the senior assistants nominated by the professor, holding university as well as hospital appointments, and who should be prepared to remain for an indefinite number of years. In a clinique of moderate size three such could be utilised. The first assistant, a man of some maturity, should be in full charge of the department in the absence of the professor. The position should be made attractive and ample opportunities should be given for original work and for teaching. From this group the professoriate throughout the country would be recruited. Secondly, the junior assistants, house physicians, appointed annually and by competition from the members of the senior class. Thirdly, laboratory chiefs, who need not be resident; but it is a good plan to have one of the senior assistants in charge of the laboratories, and one who is at the same time responsible for the laboratory teaching of the students. The arrangements vary greatly at different clinics in accordance with the leanings of the professor towards chemistry, physiology and physics, or bacteriology. Fourthly, an out-patient staff made up of assistant professors in the department, as a rule men in private practice, and who are in charge of the junior teaching. At the Johns Hopkins Hospital we had three men in charge of the medical out-patients, each of whom took two days in the week, each with his own staff of assistants and a group of students assigned as clinical clerks. Special out-patient departments may be managed by the clinique; for example, the Tuberculosis Dispensary, which at the Johns Hopkins Hospital, under the care of Dr. Hamman, has grown to be one of the most important departments of the hospital.

Teaching.—Entering one of the clinical units, a student should be made to feel a part of it, having his share in caring for the patients and in studying the disease, and even in the teaching. He should be made to feel that

the hospital is his home. This has been one of the special boons enjoyed by the British medical student in his senior years; the hospital has been in reality the medical school, and there has not been that disassociation between the two which exists too frequently elsewhere. The teaching should be entirely practical. In a few systematic lectures some of the more rare affections may be considered. Brought into daily contact with disease, the students gradually learn to recognise it, and are taught the management of patients. In clinical lessons and in demonstrations the professor and the assistants would in the course of a year cover the ground very thoroughly. In amphitheatre clinics it is easy to keep all senior students in touch with the department, while the special group, acting as clinical clerks, spend the greater part of their time in the wards. The five years of the curriculum should be divided equally, and the 30 months given to the hospital would enable a man to go the rounds of the departments and get a very full insight into the work. Hospitals have no vacations, and the old-time vacations should be done away with, and the school year divided into quarters, during which the work would proceed continuously. A man could take a week or so of vacation when he felt it was necessary, but it is high time a stop was put to an atrocious waste of time on the part of the students. The professor and his assistants should keep in mind the fact that the men entrusted to their care are to become practitioners, and as far as possible the practical work of the wards should be done by them. Upon one thing I would insist—that every assistant connected with the clinique taught. A few exceptional men, like the distinguished physicist, the late Professor Rowland, are really too good to teach; but for the majority, daily contact with students, and a little of the routine of teaching, keep us in touch with the common clay and are the best preservatives against that staleness so apt to come as a blight upon the pure researcher.

Research work.—Just as the big chemical laboratory of the university exists for research, so should the clinical units help to advance our knowledge of the causes of disease and of its treatment. The problems are innumerable, and in a well-organised clinique there will be men working at them in almost every department. A few of the better students may always be utilised for this purpose. The important thing is to keep one section at least of the clinique well in the fighting line, battling with the problems of to-day, in metabolism, immunity, cardio-respiratory physics, &c.

The other units would be organised in the same way, and, as I remarked, in large schools there could be three, or even four, medical and surgical clinics. The important thing is to organise each unit on university lines. For example, the professor of psychiatry should be *ex-officio* in charge of

the city asylum, managed as one of the departments of the university, and into which, as a matter of routine, each medical student would pass for one of his ten hospital trimestres.

The truth is, we need an active invasion of the hospitals by the universities. But—and here comes the rub—the universities must be willing to undertake their share of the expenses, and the men in charge of the units must be paid salaries sufficient to enable them to devote one half at least of their time to hospital work—to give it the first place in their lives. At present in many places, indeed one may say everywhere, the university does not pay enough for its hospital privileges. How much, I would like to know, does the University of Durham pay to the Royal Victoria Infirmary? Nowadays the physicians and surgeons give their time, but the public, through university channels, should pay this group of men, not only to care for their sick poor, but to train their doctors and nurses, and to study for them the problems of disease. It is impossible to separate the three primary functions of a large hospital, of the machinery of which the medical student is just as much a part as the nurse, and so involved are the new methods of diagnosis, of laboratory treatment, and of research with the utilisation of skilled scientific assistants that it would puzzle anyone to assign the proportion of cost to A, B, or C. A good rule is that followed at the Johns Hopkins Medical School—the University paid half of the salaries of those members of the staff who were directly engaged in teaching and one half, I think it was, of the laboratory expenses.

As the old order changes new developments must be met, and here in the provinces, less hampered by traditions and not tied in the chains of vested rights, you can reorganise the hospitals on these lines through the universities. I have not been discussing Utopia; it is being done elsewhere. In the United States and the Dominions these changes are rapidly progressing, and the hospitals, for example as in Toronto, are being built on a modern plan, with units such as I have described. It will take time and much money, but it can be done; in fact, it has to be done if British medicine is to adjust itself to the new conditions, and so maintain its splendid traditions. Nor is it a matter which concerns the mother country alone. In former days the over-seas students came here for all their work; now the majority of them take their qualifying studies at home and come abroad for post-graduate work. The students from various parts of the Empire should come to our universities and hospitals and find thoroughly organised departments, with laboratories as well equipped for the study of the problems of disease as are those of chemistry and of physics for the study of these subjects.

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SULLE TELANGIECTASIE
EMORRAGICHE EREDITARIE

Estratto della " Riforma Medica ,, Napoli, 1911 - N. 3



NAPOLI
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Sezione " Riforma Medica ,,
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A partire dal 1901, epoca in cui io riferii, nel Bollettino dell' Ospedale Johns Hopkins, intorno ad una forma familiare di epistassi ricorrente, con telangiectasie multiple della pelle e delle mucose, numerose comunicazioni sono state fatte su questa malattia, la quale sembra, perciò, non essere molto rara. Essa era stata segnalata anche prima, da varii osservatori. È quasi certo che i casi di epistassi ricorrente in cinque generazioni, riferiti da B a b i n g t o n (*Lancet*, 1865), appartengono a questo gruppo. Nel 1876, W i c k h a m L e g g riferì, nel *Lancet*, l'osservazione di casi di epistassi in tre generazioni, in individui che presentavano delle telangiectasie sulla faccia e sul corpo. Nel 1887, C h i a r i (*Erfahrungen auf dem Gebiete der Hals und Nasenkrankheiten, Wien*) riferì intorno a casi di epistassi ricorrente, con telangiectasie multiple della pelle e delle mucose, in tre generazioni di una famiglia, ed in quattro di un'altra. Nel 1896, C h a u f f a r d (*Bull. et Mém. de la Société Médicale des Hôpitaux de Paris*, 1896, Tome XIII) descrisse un caso in cui producevansi non soltanto delle epistassi, ma anche altre emorragie ricorrenti, da telangiectasie cutanee e mucose. Nello stesso anno, R e n d u (*Gaz. des Hôpitaux*, 1896), descrisse un caso di epistassi, con numerose telangiectasie delle membrane mucose e della pelle.

In tutti questi casi, la malattia fu ritenuta associata, in qualche modo, all'emofilia. C h a u f f a r d

propose, per essa, il nome di emofilia cutanea. R e n d u la chiama « pseudo-emofilia ».

I primi casi da me osservati furono due fratelli, nella cui famiglia erano stati affetti sette membri. I pazienti avevano sofferto di epistassi sin dalla fanciullezza, ed oltre a ciò erano andati soggetti ripetutamente ad emorragie da numerosi piccoli angiomi cutanei. Nel terzo caso da me riferito, trattavasi di un uomo di 49 anni, il quale, sin dal suo decimo anno d'età, andava soggetto di quando in quando ad epistassi, ed oltre a ciò ad altre emorragie, da telangiectasie della lingua, delle labbra, della faccia e delle mani. Le emorragie nasali provenivano da numerosi angiomi disseminati. All'epoca in cui pubblicai questo caso, io riferii, giusta le informazioni avute, che nessun altro membro della famiglia era affetto ; appresi però posteriormente, che uno dei figli del paziente presentava dei nevi vascolari. Il quarto caso da me osservato, concerneva un uomo di 53 anni, nella cui famiglia avevansi delle epistassi e delle telangiectasie già da tre generazioni. Questi quattro casi trovansi riferiti per esteso nel *Quarterly Journal of Medicine*, Oxford 1907.

La malattia in parola ha attirato l'attenzione di molti osservatori, e parecchi casi sono stati riferiti da K e l l y (*Glasgow Medical Journal*, 1906) H a w t h o r n e (*Lancet*, 1906), P a r k e s W e b e r (*Lancet*, 1907), S y d n e y P h i l l i p p s (*Royal Society of Medicine Proceedings*, Vol. I), K e l l y (*Royal Society of Medicine*, Vol. I), B a l a n t y n e (*Glasgow Medical Journal*, 1908), W a g g e t t (*Royal Society of Medicine*, Vol. I), H a n e s (*Johns Hopkins Bulletin*, 1909).

Recentemente ho osservato un altro caso, in cui erano affetti un padre ed una figlia.

Quest' ultima era una signora trentacinquenne, la quale fu da me osservata insieme col D.r A n d e r s o n , di Londra. Il padre della paziente soffriva già da molti anni di gravi epistassi ricorrenti, ed avea la faccia coperta di telangiectasie. Oltre a lui, non vi fu nella famiglia alcun altro caso, se non

quello di sua figlia. Questa soffre, sin dall'infanzia, di epistassi ricorrenti, e non è passato quasi mai un intero mese, senza che essa vi sia andata soggetta. La paziente ha presentato, sin dall'infanzia, alcune telangiectasie; ma il numero di queste è considerevolmente aumentato negli ultimi sei anni, massime sulle labbra. Essa è stata sottoposta, con notevole vantaggio, alla cauterizzazione delle telangiectasie nasali e delle linguali. Oltrechè da queste due sedi, la paziente ha presentato emorragie anche dalle labbra.

L'inferma è una donna di statura media, con viso spiccatamente pallido. Essa presenta piccole telangiectasie disseminate sulle due guancie, ed una di circa 3 millimetri di diametro sul dorso del naso. Sulle labbra si osservano molte piccole telangiectasie di color rosso vivo, di 2-4 millimetri di larghezza, ed oltre a ciò, tre o quattro angiomi più grandi, rosso-bluastrì, di 10-15 millimetri d'estensione, che sporgono come tumoretti emisferici. Questi erano da prima assai più piccoli, e sono man mano aumentati di volume negli ultimi anni. Sulla lingua vi sono una mezza dozzina di nevi, due dei quali di 5 millimetri di diametro, e forse più. Nessuno se ne osserva alle guance, nè alla faringe. Sulle dita vi sono alcune telangiectasie puntiformi disseminate, una delle quali sotto l'unghia dell'indice sinistro. La pelle del resto del corpo ne è libera. La mucosa del setto nasale è coperta d'una spessa crosta di sangue, per effetto d'un'emorragia verificatasi due giorni prima.

Il solo fattore etiologico di qualche importanza è l'eredità. Nella letteratura son ricordate, sinora, 14 o 15 famiglie, nelle quali la malattia occorse per due a cinque generazioni. L'affezione sembra manifestarsi con ugual frequenza nei due sessi. Talvolta essa incomincia sin dall'infanzia, tal'altra le telangiectasie non appaiono che nell'età adulta. La pelle della faccia e la mucosa del naso, delle labbra e della bocca, sono prevalentemente affette; meno spesso la pelle delle mani; di rado quella delle altre parti del corpo.

Le emorragie provengono sempre dalle telan-

giectasie, ed il più spesso dal naso. Esse possono essere gravissime. Uno dei miei pazienti ebbe delle epistassi ricorrenti per più di 40 anni. Non poche volte l'emorragia era di estrema gravezza, ed in parecchie di tali occasioni l'infermo fu ricevuto nell'ospedale in uno stato di profonda anemia. Le emorragie possono anche prodursi da telangiectasie delle labbra, della faccia, della lingua. In uno dei miei casi, l'infermo aveva frequenti emorragie da nevi vascolari delle mani; in un altro caso, producevansi emorragie da un nevo dell'avambraccio.

La malattia è molto facilmente riconoscibile, nè esiste alcun' altra affezione con la quale la si possa confondere. Alcuni dei casi meno recenti furono riferiti come casi di emofilia. Anatomicamente, la lesione è costituita da una dilatazione dei capillari e delle piccole vene, per lo più sotto forma di caratteristici nevi vascolari. Spesso si osserva un nodulo centrale, leggermente sporgente. Col progredire dell'affezione, possono aversi sulla faccia angiomi solidi disseminati. In alcuni casi, come in quello che ora ho riferito, si hanno formazioni angiomatose abbastanza grandi.

Molto può farsi per la cura della malattia, distruggendo le piccole telangiectasie con la cauterizzazione. Solo così può sperarsi di ottenere una cessazione od un'attenuazione delle epistassi ricorrenti. In un caso riferito da C o e , si ricavò gran giovamento dalla somministrazione di lattato di calcio. Allorchè si tratta di angiomi di una certa grandezza, come quelli delle labbra nel caso su riferito, è consigliabile di sperimentare il radio.

TRANSIENT ATTACKS OF APHASIA AND PARALYSES IN STATES OF HIGH BLOOD PRESSURE AND ARTERIO-SCLEROSIS

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HHEADACHE, vertigo, convulsions, aphasia, paralyse, and a progressive dementia are among the cerebral manifestations of arterio-sclerosis. Death "at the top" may be slow, as in the old oak with which Dean Swift compared himself; or it may be sudden, when a vessel ruptures; or more gradual, if thrombosis occurs. These may be called the major manifestations, but there are others less serious though of great importance, as their significance may be overlooked or misinterpreted. To headache and vertigo I shall not refer, since every one now recognizes how common they are as early symptoms of arterio-sclerosis in the young, and more constant features in the aged. It is more particularly to the transient aphasias and paralyse, cerebral crises as they have been called, occurring in states of high blood pressure and in arterio-sclerosis, to which I wish to call attention. Within a few weeks of each other I have recently seen two cases which illustrate the character of the attacks, and the first case is unusual since, so far as could be determined, only high blood pressure existed.

A well-built, active man of forty-three, who had driven his engines at a maximum speed for twenty-five years—keenly occupied in business, using tobacco freely, and intensely devoted to Bacchus, Venus, and Vulcan,—returned on the afternoon of March 1st, 1910, to his hotel, rang the bell for the servant and found that he could not speak. Perfectly conscious, he could not say a word, and was very much upset, and still more so when he found he could

not write. He was a little dazed mentally, as he could not tell the time. He became emotional, and the doctor found him crying and still unable to speak. In a few hours he could say a few words, but incoherently. The next day he could talk, but not quite freely. There was no paralysis, no disturbance of vision, and no headache. Within three or four days he was quite well, and could talk perfectly. The blood pressure was found to be 212 mm., and the attack was regarded as possibly a slight hæmorrhage. I saw him on May 18th, 1911, nearly fifteen months after the attack. Very well, except that he has become very nervous and apprehensive, he has given up work, and has wandered about, and has been under the care of a great many doctors.

On examination he was a very healthy-looking man of good colour and good physique. The radial arteries, with the blood current flowing, could easily be rolled under the fingers. The pulse was recurrent, with practically no difference in the fulness of pulsation beyond the point where the artery was compressed. In a section of the emptied radial, no arterial wall could be differentiated with the finger. It was the same with the temporals and the brachials. With the blood current flowing they could be rolled under the fingers. Emptied they were not palpable. Neither the brachials nor the femorals were sclerotic. The retinal arteries looked prominent. The apex beat was inside the nipple line. There was no evidence of enlargement of the heart; the second aortic sound was ringing. The blood pressure was 220 mm. in spite of the fact that he had been taking for more than a year nitrites and potassium iodide. He has had no other cerebral attack. His general condition was very good, but he was morbidly apprehensive about his condition.

A very different picture was presented by Mr. ———, aged sixty-two, seen June 6th, 1911; a man who had worked hard in many parts of the world, but had not been a heavy drinker. A wiry, tough-fibred man, he had always kept himself in very good condition, but had used tobacco to excess. One afternoon, just a year ago, while waiting for tea, he went out to say something to the gardener, and to his surprise found it impossible. He did not feel giddy or dazed, and five minutes later he could speak quite well. He returned to the house, and about an hour afterwards some people came in, and to his surprise he could not say how-do-you-do, could only nod and give a grimace. He could see the people were very much upset, and he was mortified to feel that perhaps they thought he had been drinking. He was greatly embarrassed as he could not say a word. The gentlemen urged him to see a doctor at once.

He walked out to the garden gate with them but could not say good-bye. He then went across the road to the doctor, but could tell him nothing. He had no headache and he felt quite clear in his mind. In the course of ten to fifteen minutes he began to say a few words, though not quite clearly; in a day or two he could say everything. He remained in bed for a couple of days on low diet. His blood pressure was found to be 200 mm., and for the first time it was found that his arteries were sclerosed. He was a healthy-looking man of good colour. He had lost more than twenty-five pounds in weight, and had been very much worried about the high blood pressure. There was an extreme degree of arterio-sclerosis. Brachials, radials, and ulnars were visible in their entire course, with forcible pulsation. The pulse was recurrent; the radial wall, very much thickened. There was not much difference in the sensation given to the finger between the vessel full and empty. Blood pressure, 130 mm. He had worried incessantly about the high blood pressure and had become greatly depressed. This is not the first instance in which I have known worry and loss in weight to be the most effective means of lowering high tension.

My introduction to this condition occurred under peculiar circumstances: As a young man in Montreal there were two doors I never passed,—47 and 49 Union Avenue; going up I called on Dr. Palmer Howard, and if he was not in or was engaged I called on Dr. George Ross; going down, the reverse. Any growth in virtue as a practical clinician I owe to an intimate association with these two men, in whom were combined in rare measure enthusiasm and clear vision. One morning I had a shock, the first of the kind I had ever felt—I realized that my dear friend George Ross was seriously ill. He had always seemed well and strong, though one hot day, in 1878, at the old Savile Club in London, he had an attack of shortness of breath. This day he told a strange story: he had been awakened by the night bell, and, attempting to put out his right hand to get the match-box, he found he had lost power in it. With his left hand he struck a match and rang the bell. When the servant came he could not speak. He realized perfectly what had happened—that he had had a stroke; but to his surprise in a few hours power had returned to his arm, and he could speak, but not quite clearly. When I saw him he was quite himself—no trace of paralysis, and the speech was clear. Arteries like whip-cord—apex beat out—the usual story that we now know so well. This was the first of a series of transient attacks of aphasia, monoplegia, and hemiplegia extending over four or five years, with intervals of good health during

which he lectured and carried on his practice. Once, on his return from Europe with Dr. Roddick and Dr. Alloway, he had an attack of partial paraplegia and had to be helped off the steamer, but it disappeared in the course of a couple of days.

These not uncommon features of arterio-sclerosis have had an abiding interest ever since. In the first edition of my textbook, 1892, I mentioned that: "transient hemiplegia, monoplegia, or aphasia may occur in advanced arterio-sclerosis. Recovery may be perfect. It is difficult to say upon what these attacks depend. Spasm of the arteries has been suggested, but the condition of the smaller arteries is not very favourable to this view. Peabody has recently called attention to these cases, which are more common than indicated in the literature." The subject had been brought before the Association of American Physicians by Dr. George Peabody at our meeting in 1891, in a very thorough study of the relation of arterial and visceral changes (Transactions of the Association of American Physicians, Vol. VI, p. 170). In one of his cases a man aged fifty-six, with well-marked arterio-sclerosis had an attack of transient hemiplegia without loss of consciousness. Then, in the course of ten days, he had four or five attacks in which he lost the power of speech, and had incomplete paralysis of the right side. He died in a very severe attack in which he had complete right hemiplegia with unconsciousness. Extensive arterio-sclerosis was found in the cerebral vessels, but there was no local lesion, no areas of special œdema, or any foci of hæmorrhage or softening. So far as I know Dr. Peabody was the first to offer a reasonable explanation of the condition:

"It seemed to me that there might perhaps have been a spasmodic contraction of the muscular coat of the middle cerebral artery, or of several of its branches; which, in addition to the encroachment upon its lumen, produced by the new growth, was sufficient to cut off blood supply to the parts to which it was distributed; that this had occurred several times, causing each time temporary ischæmia of important brain centres; and that in the final attack it had lasted long enough to produce death, but that it was not complete enough, or of long enough duration, to cause softening."

Peabody urged that as spasm could be seen in the retinal vessels, with transient loss of vision, the same very probably occurred in local vascular areas in the brain causing ischæmia and loss of function. No one has stated the case more clearly, and I am glad to refer to this important, initial bit of work which has not received

recognition except in my text-book. Since then I have seen a score or more cases, which fall into three categories: (a) Healthy individuals with high blood pressure, but without signs of arterial disease. The first case mentioned in this paper had no obvious sclerosis of the palpable or visible arteries. I have seen only two other patients in which hyperpiesis existed alone—one a man aged fifty-one, who had numbness of the left side and hemianopia, which passed away in the course of a day; the other a young man aged thirty-one, who had not had syphilis but who had high pressure and angina and in several attacks loss of power in the left hand with numbness. (b) Patients with well-marked arterio-sclerosis, in whom the cerebral attacks have come on without warning, sometimes as the signal symptom. A majority of my cases come in this group. (c) In advanced sclerosis with cerebral changes, manifested by progressive mental and muscular weakness, all possible types of these transient seizures, including convulsions, may occur. The attacks are most frequent in the aged, but men in the fifth and sixth decades are also affected.

The symptoms are extraordinarily varied, but tend in individual cases to repeat themselves in the attacks. *Transient aphasia* is one of the most common. The account given by the two patients whose cases are here reported is singularly accurate—inability to talk, consciousness of it, no paralysis, emotional disturbance, and, within a few hours, complete recovery. One patient had at least twenty attacks, all of very much the same type. Loss of the power to write and hemianopia may be present.

Sensory disturbances rarely occur alone, but one patient had day-long attacks of numbness of the face and right hand with loss of the finer movements of the fingers. *Paræsthesiæ* may exist with the aphasia.

Motor paralysis is the most common symptom, and may be hemiplegia, or only the face and hand or arm may be involved. The paralysis, rarely complete, has a transient character, which with the recurrences gives it a peculiar stamp. Complete recovery is of course seen in monoplegias and hemiplegias of organic origin, but not in a few hours or in a day. I have had a letter in the evening from a man who at 9 a.m. could not button his shirt collar. In one instance paraplegia of brief duration occurred.

The *mental features* are interesting. Confusion of thought is common and emotional disturbances, which are very natural under the circumstances. The transient attacks of mental aberration—forgetfulness or slight delirium—seen sometimes in arterio-sclerosis,

may be the psychical counterparts of the motor attacks, and cases have been reported by Edgeworth and William Russell. Loss of consciousness has not been common in my experience. I saw a patient in Washington whose attacks were always ushered in by a short cry, followed by fainting, and on recovery the right arm and face were paretic and there was transient loss of the power of speech. He had a pulse of sixty, and the question of Stokes-Adams disease was considered.

The mode of origin of these cerebral crises in arterio-sclerosis has been much discussed of late years by William Russell in his work on *Arterial Hypertonus*, etc., (1907); by Edgeworth,¹ Parker,² Langwill³ and Heard,⁴ Allan⁵, and others.

An interesting discussion in the *British Medical Journal*, 1909, II, followed a paper by William Russell on "Intermittent Closing of the Cerebral Arteries." When Peabody brought forward the view that in these cases a transient arterial spasm occurred, I was doubtful how far this was possible in sclerotic vessels; but I have since come round to his view, and I do not think any other explanation is more plausible than that these attacks represent vascular crises.

We have plenty of evidence that arteries may pass into a state of spasm with obliteration of the lumen and loss of function in the parts supplied. In the peripheral arteries in Raynaud's disease we can sometimes feel the spastic, cord-like vessel; in the retina we can sometimes see the arteries contracted. Both in Raynaud's disease and in the remarkable thrombo-angitis described by Buerger the obliteration may persist until necrosis occurs, but in many instances it is only transient and the circulation is restored. A case of Raynaud's disease,⁶ with recurring attacks of aphasia, hemiplegia, and loss of consciousness, some occurring coincidentally with the local asphyxia and necrosis, convinced me that intermittent closing of the cerebral vessels could occur, and the transient nature of the attacks with the complete recovery seems to offer no other explanation so satisfactory. And we know now that there are neither anatomical nor physiological objections to this view as applied to the cerebral arteries.

Transient paralyses in uræmia may be due to œdema, as suggested by Traube (*Gesammelte Beitrage*, Bd. 2, p. 551); but the condition is rarely transient and is more often a terminal event. It is possible that there are cerebro-spinal manifestations in angio-neurotic œdema, as in the extraordinary case which I reported⁷ of a physician aged twenty-nine, who had right hemiplegia and aphasia at the age of

nine, and, within a year, five or six attacks of transient hemiplegia, subsequently migraine, and well-marked attacks of angio-neurotic oedema. Howland⁸ has recorded a case of this disease with spinal symptoms. The association of migraine with cerebral symptoms is well known, and Mitchell Clarke⁹ has reported a familial form with which hemiplegia occurred in three generations.

The *diagnosis*, usually easy, is based on the existing conditions of high tension or sclerosis or both, the slight and transient character of the attacks, and the recurrences. Slight paralyses due to hæmorrhage or softening rarely pass away so quickly, and it may be weeks before a patient speaks clearly or uses the hand freely. Numbness, tingling, and slight weakness of one side with headache may be precursors of a "stroke" in which case the symptoms are not transient but progressive. In sclerosis of the cerebral arteries small foci of softening are not rare and some of these may produce symptoms. An artist friend motoring in the neighbourhood of Oxford felt so badly in his head that his wife insisted upon coming at once to my house. He was a bit dazed and could not sit at luncheon, but there did not seem very much the matter. He said, however, that he felt "queer in his head," and could not see properly. I could find nothing wrong with the retinæ but I did not take the fields. Two days later he consulted Mr. Lawford who found a quadrantic hemianopia, which has never cleared up. Here no doubt was a definite lesion.

The *prognosis* is largely that of the sclerosis. Patients may live for years and be very comfortable in the intervals. While writing this I had a visit from my old friend, Dr. Litchfield, of Pittsburg, who happened to mention the case of a Mr. L., whom I had seen with him eleven years ago with transient attacks of what Dr. L. called "mutism," often associated with numbness and tingling on the right side. The patient had arterio-sclerosis, and I remember we discussed the possibility of the condition being due to angio-spasm. He has had in all ten or twelve of such attacks: they pass off in a few days; associated with the feeling of fulness and headache. Once or twice he has had a transient diplopia. In the intervals he is pretty well, though it is difficult to keep down his blood pressure. An interesting point of which Dr. Litchfield reminded me was that this man's father had had similar attacks, beginning when he was a comparatively young man, and lasting until he was over seventy. Of considerable moment, as illustrating the necessity for a more widespread recognition of this condition, is the fact that Mr. L. a few years ago consulted a well-known heart

specialist, who said that he had chronic meningitis, gave him bromides, and his friends a hopeless prognosis.

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THE PATHOLOGICAL INSTITUTE OF A GENERAL
HOSPITAL.

BY SIR WILLIAM OSLER, BART., M.D., F.R.S.,
Regius Professor of Medicine, Oxford.

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I WONDER if you appreciate in Glasgow the delightful memories that crowd the mind of a man familiar with the story of medicine in Great Britain, when the name of your Royal Infirmary is mentioned—memories of men who, by their life and doctrine, have set forth not alone the very best the profession has had to offer, but the very best that man has ever offered to his fellowmen. I am fully aware of the presence of those who will regard my memories as illustrating how slight and imperfect my knowledge is of this old foundation; but I have an abiding faith in the general ignorance of an audience, and I know that I know many things that many of you know that you should know, but don't know, about the men who have made the Royal Infirmary famous. In any case I am going to use this knowledge, imperfect as it may be, as a setting for the main theme of my address—the place of the pathological institute in a general hospital.

I am glad you have adopted the name institute—for the first time, I believe, in Scotland. Plato made the curious remark that while it was a slow and arduous process to get men to change their ideas, it was an easy matter to get them to accept new names, and under these gradually to bring about wished-for changes. I am sure that the name indicates that you feel the infirmary should bear its share with the University in advancing scientific medicine; for an institute is something more than a dead-house, and very much more than an ordinary pathological laboratory. It is the cerebrum of the infirmary, the place where the thinking

¹ An address at the opening of the new Pathological Institute of the Royal Infirmary, Glasgow, 4th October, 1911.

is done, where ideas are nurtured, where men dream dreams, and thoughts are materialised into researches upon the one great problem that confronts the profession in each generation—*the nature of disease*.

Ask the editors of the hundreds of archives, journals, annals, magazines, bulletins, Comptes Rendus, Centralblätter, Zeitschriften, devoted to the service of medicine, what is their chief aim—their *raison d'être*? Ask the professors of all the medical schools of Europe and America, the directors of all the laboratories, what is their chief problem? Go back in history and ask Hippocrates, Galen, and all the great students of medicine down to Cullen and the Hunters, what one thing influenced their lifework? Ask the surgeon why, a few minutes ago, he removed an appendix in the operating-room near by, or the doctor why he has just given a doze of antitoxin to an infant with diphtheria? From all come the one monotonous answer—*the nature of the disease*. There is not a page of this month's number of the *Glasgow Medical Journal* but reflects this all-powerful, all-pervading influence; the whole life of the profession, whether moving in the units or expressed in its great institutions, is controlled to-day, as it ever has been controlled, by what we think of the nature of disease. Why is a right judgment on this one point the aim of medical education and of research—the be-all and the end-all of our efforts? Because upon correct knowledge depends the possibility of the control of disease, and upon our views of its nature the measures for its prevention or cure.

This institute itself is a witness to the wonderful transformation in our knowledge of the nature of disease, in which this old infirmary has played a splendid part. Let me indicate briefly the steps in this transformation. Hippocrates looked at patients with keen eyes and a clear brain, and, as a product of his period, when the nature of nature began to be recognised, he could not but deduce from his observations the naturalness of disease—that it was not an entity apart from man, but a part of man himself. And this was the great contribution of the Greeks, who first taught us to look with the seeing eye at disease. Observation *plus* thinking has given us the vast stores of knowledge we now possess of the structure of the bodies of living creatures in health and disease. There have been two inherent difficulties—to get men to see straight and to get men to think clearly; but in spite of the frailty of the instrument, the method has been one of the most powerful ever placed in the hands of

man. It gave us Vesalius and the new anatomy, Newton and a new universe, Morgagni and the new morbid anatomy, Laennec and the new medicine, Virchow and the new pathology, Darwin and a new outlook for man on the world.

Let me give you an illustration of the application of this method and of its limitation. The ancients knew aneurysm of the external vessels, and if I had my choice in time of witnessing an operation I would ask to see Antyllus in the third century tackle a femoral aneurysm. Vesalius and Fernelius, Lancisi, John and William Hunter, Scarpa, and some hundreds of keen observers have taught us the structure of aneurysm and the means by which it may be recognised. Take the work of Allan Burns on *The Heart*, published in 1809, one of the best contributions to clinical medicine of the Glasgow school, and by the best, the very best member of one of your best families, distinguished alike in science and commerce. Read his chapters on the arteries, and you will see how far a shrewd observer could go in the recognition of anatomical changes and clinical features. And no Scotsman ever used his favourite instrument to better effect than did Allan Burns in the clear logical reasoning with which he lays down what is now known as the intermittent claudication theory of angina pectoris. Or take a work of another famous Glasgow teacher, whom I was proud to know as a friend, Professor Gairdner, whose *Clinical Medicine* is a storehouse of valuable facts. Turn to the chapter on aneurysm, and see how the art of observation may be made to lighten the dark corners of disease, in the wards and in the dead-house. These two men may be taken as types of the workers who, between Morgagni and Virchow, revealed to us the seats of disease. You remember the title of the great Morgagni's work, *De sedibus et causis morborum*, and while he did illumine the structure of disease and correlate the symptoms in life with the appearances after death, the work had the limitation expressed by the sub-title, *per anatomen indagatis*. This was the *organon* with which was built the broad and deep foundations of clinical medicine and morbid anatomy. Observation alone could give a complete knowledge *de sedibus*, but never *de causis morborum*. Other men with other minds and other methods had to give us this through the long and painful experience of many centuries. Seeing and thinking have done much for human progress; in the sphere of mind and morals everything, and could the world have been saved by armchair philosophy, the Greeks would

have done it; but only a *novum organon* could do this, the powerful possibilities of which were only revealed when man began to search out the secrets of nature by way of experiment, to use the words of Harvey.

The ancients thought as clearly as we do, had greater skill in the arts and in architecture, but they had never learned the use of the great instrument which has given man control over nature—experiment. Dumas, in a letter to Pasteur, made a clear statement of the two methods: "The art of observation and that of experiment are very distinct. In the first case, the fact may either proceed from logical reasons or be mere good fortune; it is sufficient to have some penetration and the sense of truth in order to profit by it. But the art of experimentation leads from the first to the last link of the chain, without hesitation and without a blank, making successive use of Reason, which suggests an alternative, and of Experience, which decides on it, until, starting from a faint glimmer, the full blaze of light is reached." There is not one of us to-day who has not benefited by the countless thousands of experiments which have made modern life what it is; the physical sciences, with the practical application of which you have had so much to do, have re-made Glasgow as they have re-made the world. And there has not been a single advance of the first importance which is not a fruit of this scientific modernism. This institute which we open to-day is a manifestation of the new spirit. We did not get very far in our knowledge of the workings of the animal body in health and in disease until we began to use experiment. A few of the old Greeks appreciated its value, Galen in particular, but it was not until the Renaissance, until the advent of Galileo and of Sanctorius, that men realised how powerful it might be. Harvey made use of it in a golden discovery, and his monograph, *Exercitatio anatomica de motu cordis*, is the first great product of the experimental method applied to medicine. Thousands of men with keen eyes had watched the heart beat, had seen arteries spurt red blood, had seen the black blood flow from the veins, and they had thought and thought and thought of how the heart beat and how the blood flowed, but all in vain until, in a few simple experiments, the problem of its circulation was demonstrated. Since the days of Harvey we have gained extraordinary insight into the processes of the animal body, and in almost every department by the use of his methods. Take, for example, the work of one of your

infirmary surgeons, in which I was always deeply interested. From the days of Cain man had seen that "ganz besonderer Saft," the blood clot, and from Galen on speculation had been rife as to its cause. Much had been demonstrated by John Hunter, and much more by Hewson, but it was not until 1831 that the problem was approached in a productive way by Andrew Buchanan, a young surgeon, for long years connected with this infirmary, and for thirty-seven years Professor of the Institutes of Medicine in the University. By a series of ingenious experiments he showed that the act of coagulation was not the effect of any spontaneous property existing in the fibrin, but that it only occurred under the influence of suitable re-agents, and he compared it very properly with the action of rennet in effecting the coagulation of milk. We have travelled far from Buchanan's "washed blood-clot," with which we older teachers of physiology used to work and do our class experiments, but the fundamental facts as demonstrated by him remain, fully substantiated by the subsequent work of Schmidt, Hammarstin, and others. Buried in the new terminology you students may find it hard to recognise the merit of the old Glasgow physiologist and surgeon, and I doubt if he himself could make very much of the following definition of the nature of coagulation which I quote from a recently issued work on *Physiology*:—"The activator thrombokinese, in the presence of free calcium ions, activates the thrombogen, or prothrombin, with the result that the active thrombin-thrombosin, fibrin enzyme, is formed. Fibrin enzyme so produced acts upon soluble fibrinogen and converts it into insoluble fibrin."

What, you may ask, has all this to do with the nature of disease? The new method has at last put in our hands a means to obtain certain knowledge of the nature of some of the most important of diseases; and what is more important, the methods for their effective control. Morgagni to-day would make the title of his book *De sedibus et causis morborum per anatomen et experimentum indagatis*. At the middle of the last century we did not know much more of the actual causes of the great scourges of the race—the plagues, the fever, and the pestilences—than did the Greeks. The facts that fevers were catching, that epidemics spread, that infection could remain attached to particles of clothing, &c., all gave support to the view that the actual cause was something alive—a *contagium vivum*. This was really a very old view, the germs of which may be found in the

Fathers, but which was first clearly expressed, so far as I know, by Fracastorius, a Veronese physician in the sixteenth century, who spoke of the seeds of contagion passing from one person to another; and he first drew a parallel between the processes of contagion and the fermentation of wine. This was more than one hundred years before Kircher, Leeuwenhoek, and others began to use the microscope and to see animalcula, &c., in water, and so gave a basis for the "infinitely little" view of the nature of disease germs.

It was a shrewd, but very characteristic, remark of Robert Boyle that he who could discover the nature of ferments would be able to explain the nature of certain diseases. In August, 1857, a young teacher of the University of Lille read a paper at the Scientific Society on "Sour Milk Fermentation." Louis Pasteur was a chemist, accustomed to accurate observation and careful experiment. At Lille the opportunity offered to study the problems of fermentation in the making of beetroot alcohol, and this led to a comprehensive study of the whole question, from which he concluded that the transformation of sugar into alcohol, and carbonic acid, the souring of milk—in fact, all the processes which we know as fermentation—are co-relevant to a phenomenon of life. A parallel between fermentation and an acute infection had been drawn centuries before, but it came practically home to Pasteur's mind with the suggestion, in his own words, "what would be most desirable would be to push those studies far enough to prepare the road for a serious research into the origin of various diseases." If the changes in fermentation are due to minute living organisms, why should not the same tiny creatures make the changes which occur in the body in putrid or suppurative diseases? And the great Frenchman took an early opportunity that offered to test the truth of this suggestion, and the unravelling of the nature of the silkworm disease was the first great victory of the experimental method applied to a biological problem of disease.

Judging from the history of science, it could scarcely have been expected that these brilliant studies of Pasteur would have borne fruit so soon; but the spirit of research was abroad, and there were keen men everywhere trying to solve the ever present problem of the nature of disease.

You had the singular good fortune in 1860 to appoint to your Chair of Surgery a young Englishman, named Joseph Lister, already with, for his age, a reputation as a strong surgeon; but he was much more than this, he was a trained experimental physiologist and a good microscopist. His

early important studies were on inflammation, on various disturbances of the circulation, and on the coagulation of the blood. In this infirmary, as early as 1865, his attention was turned to the question which, above all others, disturbed the practical surgeon—how to prevent the appalling mortality in surgical cases after wounds and operations. It had long been recognised that now and again a wound healed without the formation of pus, that is, without suppuration, but both spontaneous and operative wounds were almost invariably associated with that change; and, moreover, they frequently became putrid (as it was then called—infected, as we should say), the general system became involved, and the patient died of blood poisoning. So common was this, particularly in old, ill-equipped hospitals, that many surgeons feared to operate, and the general mortality in all surgical cases was very high.

Believing that from outside the germs came which caused the decomposition of wound, just as from the atmosphere the sugar solution got the germs which caused the fermentation, Professor Lister applied the principles of Pasteur's experiments to their treatment. It may be well here to quote from his original paper in the *Lancet*, 1867:—"Turning now to the question how the atmosphere produces decomposition of organic substances, we find that a flood of light has been thrown upon this most important subject by the philosophic researches of M. Pasteur, who has demonstrated by thoroughly convincing evidence that it is not to its oxygen or to any of its gaseous constituents that the air owes this property, but to minute particles suspended in it, which are the germs of various low forms of life, long since revealed by the microscope, and regarded as merely accidental concomitants of putrescence, but now shown by Pasteur to be its essential cause, resolving the now complex compounds into substances of simpler chemical constitution, just as the yeast plant converts sugar into alcohol and carbonic acid."

From these beginnings modern surgery took its rise, and the whole subject of wound infection, not only in relation to surgical diseases, but to childbed fever, forms one of the most brilliant chapters in the history of preventive medicine. Brilliant researches, helpful to our fellows, and a source of pride to your city, will come from the University laboratories and the hospitals, but it is difficult to imagine the possibility of another such revolution as that which Joseph Lister effected from the wards of the old infirmary—a revolution so far-reaching that we, blessed still by the presence of the

Master, while keenly appreciating can scarcely realise its true greatness.

The institute, an integral part of the infirmary, the director and staff co-ordinate with the physicians and surgeons and their staffs, the other departments should be dovetailed in such a way that every member has an interest in its work. I have often remarked that the secret of the success of the Johns Hopkins Hospital lay in the dominating influence of the pathological department. Everything depends upon the organisation. With two modern hospitals the problem of the relation of their pathological departments to the pathological department of the University has been settled in the only way. In the interest of both institutions the union has been made organic, and the professors of the subject at the University have the same relation to the pathological laboratories of the hospital as the professors of surgery have to their wards in the infirmaries. Only with this type of organisation can a great institute as a university unit fulfil its threefold mission, to the students, to the staff, and to the public. Here, after passing the Vesalian stage in anatomy and the Harveian in physiology, the student learns with Morgagni and Laennec the structural changes wrought by disease. Here he recognises the correlation between the symptoms in life and the *post-mortem* appearances, which is the bed-rock in the art of diagnosis. And here he reaches the stage in which Virchow and Koch teach the true nature of the intimate processes of disease, *de causis* as well as *de sedibus morborum*. All this before in the final stage he sees in the wards the marvellous benefits which have followed the practical application by Pasteur and Lister of the methods of science. Just as the embryo passes through life of lower grade, before resulting in the thinking man—the ontogeny reproducing the phylogeny—so the career of the medical student follows the evolution of the marvellous knowledge that has made our profession the most helpful of all to humanity. And do let him feel that he is at home in the institute, a part of it in work and in teaching. Let me urge you not to neglect the Morgagni side, not that it is likely in a thoroughly practical school like this; but so deep may be the absorption in the problems of disease that the virtue of teaching, the labour of drilling the students in the technique of *post-mortems*, the patient line-upon-line, precept-upon-precept method becomes a burden, and the priceless lessons of the dead-house are not enforced by the voice of a master. Only in one way lies redemption for the director

of any institute or laboratory, he must have associates who know more about certain subjects than he does himself. An Admirable Crichton in these days is a quack, and in the art of delegation, in the subdivision of labour, in specialisation among his subordinates, the director will find safety. The patient demonstrator who spends two hours with a group of students at a section has a place of equal importance with the man who is chasing the secret of anaphylaxis. In the hurly-burly of to-day, when the competition is so keen, and there are so many seeking the bubble reputation at the eye-piece and the test-tube, it is well for young men to remember that no bubble is so iridescent or floats longer than that blown by the successful teacher. A man who is not fond of students and who does not suffer their foibles gladly misses the greatest zest in life; and the teacher who wraps himself in the cloak of his researches, and lives apart from the bright spirits of the coming generation, is very apt to find his garment the shirt of Nessus. Encourage the students to help in the teaching, and arrange the time of sections not for your own convenience, but for the students and staff. I had a practice of making the clinical clerk tell the story of the case, not read an abstract, but speak it out and tell its difficulties and the diagnosis, right or wrong. It was good for us all, the teacher and the taught, and we met on the same levels as seekers for truth. How far should students be encouraged to do original work? As much as possible, though in the present congested state of the curriculum the possibility is not a very big one. A keen man who has had a good chemical training may find time to work out a small problem in metabolism suggested by one of his cases in the ward. A student in physics may have ideas on blood-pressure, an advanced student in physiology may wish to test the teaching of the laboratory in a problem suggested by a cardiac case. A laboratory without a few undergraduate research students is scarcely fulfilling its mission. There are difficulties, I know, but let them be on the side of the student, not on the part of the institute.

I said the institute of pathology was the cerebrum of the infirmary, the thought-centre for the staff; but let it be remembered that the institute exists for the infirmary, not *vice versa*. In many ways it may be helpful to every man working in the wards and in the out-patient departments. The best doctor, like the successful general, is the one who makes the fewest mistakes. In the dead-house, by the contemplation of the mistakes of nature and of our

own, we glean a wisdom which enables us to correct the one and to avoid the other. No man becomes a sound physician or a good surgeon who does not frequent the dead-house. Fortunately the infirmary has splendid traditions of the co-operation between the laboratory and the wards. At my first visit to Glasgow in 1872 I recall with pleasure the acquaintance I then made with Joseph Coats, whom I saw at work in the dead-house, and whose studies in pathology brought so much credit to the Glasgow school. And Professor Macewen's masterly researches upon *Infective Diseases of the Brain and Spinal Cord*, a *magnum opus* worthy of a successor of Lister, tells on every page of the benefits a surgeon may derive from an intimate association with pathological laboratory. Every one of the young men on the staff should be workers in the institute, each with his place, each with his problem. Even the older men when not over-burdened with practice will find mental refreshment and stimulation in a few hours of laboratory work. It is a sad day when the world is so much with the clinician that he cannot spend part of it in the pathological or the clinical laboratory. Here comes the question of the relation which should exist between these two important parts of a hospital. Often they may be combined, but a special advantage of a separate clinical laboratory is that each student in his senior years can have his own place to work, his own microscope and apparatus, a place at which he can keep up the laboratory habit acquired in the medical school. Then, too, we must look forward in this country to the organisation of our clinics on University lines, when the professors are not simply attending physicians but directors of hospital units which have the same relation to the University as the other scientific departments, with subdivisions in the clinical laboratory of bio-chemistry, cardio-respiratory physics, and bacteriology, each under the guidance of a skilled assistant. When this can be carried out the pathological institute does not suffice, and other arrangements must be made. Here, too, the practical man comes for inspiration, for new ideas, and here he finds the touchstone by which he can tell the true in the new. That is to say, if he has sense. A very practical man, dependent for his large *clientèle* on a winning smile and a smooth tongue, reported to a medical society a new tip which, he said, was derived from a visit to a well-known pathological laboratory. He had seen brains hardened in bichromate of potash and chloric acid. Happy

idea! He began the treatment of cases of softening of the brain with these drugs with, he assured us, the most excellent results!

Oliver Wendell Holmes remarked that knowledge and timber should not be used until they are seasoned, and here should be found for the staff and for all members of the profession in the city and district that seasoned knowledge which alone can make us wise unto the salvation of our fellowmen.

And, lastly, this institute exists for the benefit of the public. There is not a patient in the wards who will not be helped by the work done here. Nowadays laboratory methods of treatment and diagnosis are more and more in vogue. This will be the routine of service, but the larger public that pays the piper has the right to call the tune; and the demand which they make, and with just right, is that the resources of the institute should be requisitioned in the fight which science is making against unnecessary disease and untimely death. From laboratories have come not alone the war cries of modern medicine, but the chief weapons against the acute infections. The incentive, the intense conviction of the necessity of the fight, and of its hopefulness, has come from the men who realised that the general infections, whether endemic in cities or widespread epidemics, were preventible could we but get a knowledge of their causes, could we but know their nature. Even before this knowledge was complete we had recognised the association of disease with dirt, and of fevers with overcrowding and with poverty. And Glasgow was early in the field. The sanitary story of your city in the last half century is one of which you may be justly proud. Under the intelligent direction of Professor Gairdner, Dr. Russell, and of your present efficient health officer, Dr. Chalmers, from the worst, or one of the very worst, you have become the best, or one of the very best. To wipe out typhus, to have made typhoid a last ditcher, to have cut in half the mortality from tuberculosis, are among the peace victories in which you citizens have shared. Given to pessimism, the Briton loves to look on the dark side of things. There is no such medicine for the malady as a study of the health records of our great towns—a story of marvellous progress, better housing, better feeding, better drinking, better health, and, as a consequence, better citizens.

Two problems remain. First, to make effective the knowledge we now possess, and this is largely a question of

intelligent organisation. When the public awaken, what has been done for typhus and typhoid will be done for tuberculosis, malaria and plague, as well as for a host of minor maladies, the causes of which we know.

But in a vast field we need new knowledge and seasoned knowledge, and this the other great problem directly concerns the institute. Four riddles of the first rank await solution. Cancer killed in this city, in 1910, 845; in 1909, 34,053 in England and Wales. Literally thousands of workers are struggling to unravel its mystery, and while much has been done, its heart has not been unlocked—the nature of the disease is unknown. The key may be in other hands; and so interlaced are these biological problems, so conditioned by our knowledge of chemistry and physics, that some young Pasteur at Lille or a young Helmholtz at Königsberg may be twirling it in his fingers all unconscious of its use. The exanthems are still with us, still killing thousands, and we await the researches which will reveal the causes of measles, scarlet fever, and small-pox. Perversions of metabolism are every day yielding up their fascinating secrets, but we lack the sure and certain studies that alone can give us control of such common diseases as diabetes, gout, and arthritis.

And, fourthly, we are entering a new chapter in the researches upon the internal secretions, on the functions of those mysterious glands, so insignificant anatomically but so potent in their influence upon growth and nutrition. These and scores of minor problems are to be solved by this generation, and there is much knowledge to be seasoned before it can be used to the best advantage. For example, the whole vaccine problem is being kiln-dried; and the rapid seasoning of Professor Ehrlich's great discovery will give an immense impetus to the study of specifics, torpedo-remedies, as Huxley called them, agents that will kill the enemy and spare the host. I told you in illustration of the value of observation the story of aneurysm, how we had known the external from since the days of Galen, and the internal from Vesalius. Twenty years ago we felt we had a very full knowledge of the subject, and even ten years ago had any one suggested that we might some day be able to prevent aneurysm he would have been thought a dreamer. The clear vision of Francis Welch had given an inspiration *de causis*, but it was not till the demonstration by Schaudrim of the germ of syphilis that we recognised fully its enormous importance in the causation of arterial disease in general,

and aneurysm in particular. And now Ehrlich comes forward with a remedy which, widely and carefully used, should prevent these specific lesions of blood-vessels, and cut in half the incidence of aneurysm in the community.

The most vivid recollections of my boyhood in Canada cluster about the happy spring days when we went off to the bush to make maple sugar—the bright sunny days, the delicious cold nights, the camp fires, the log cabins, and the fascinating work tapping trees, putting in the birch-bark spouts, arranging the troughs, and then going from tree to tree collecting in pails the clear, sweet sap. One memory stands out above all others, the astonishment that so little sugar was left after boiling down so great a cauldron of liquid. And yet the sap was so abundant and so sweet. The workers of my generation in the bush of science have collected a vaster quantity of sap than ever before known; much has already been boiled down, and it is for you of the younger generation while completing the job to tap your own trees. Considering the enormous quantity of sap we have collected, you may feel disappointed at the comparatively small bulk of sugar left after complete boiling, but sweeter or better sugar has never been tasted than that of our making; and among all samples in the market, no brand ranks higher than that from the old Glasgow Royal Infirmary. It is for you in this new infirmary and in this splendid institute to see that the quality is maintained.

An Address
ON
HIGH BLOOD PRESSURE:
*ITS ASSOCIATIONS, ADVANTAGES, AND
DISADVANTAGES.*

DELIVERED AT THE GLASGOW SOUTHERN MEDICAL SOCIETY.

BY

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THE SOCIETY.

LIFE is correlated in every way with tension of a certain quality—with a force, a pressure that keeps the atoms whirling in organic circles. Lower, beyond a certain point, the pressure with which the blood flows in the medulla, changes the surface tension of the fluid in which a leucocyte swims, or an amoeba crawls, and the atoms of the man, of the leucocyte, and of the amoeba soon cease to swing in organic rhythm, and change to that to which all inorganic matter has been attuned since, in the words of Lucretius, “the atoms fell into such a disposition as those whereby our world of things created holds together.”

Blood pressure—the force with which the blood circulates—maintains in organic activity every part of the body. With the five factors concerned in its maintenance I need not detain you. The heart pump supplies a force which the elastic coats of the large arteries store to convert an intermittent into a continuous stream. The small arteries act as sluices or taps regulating the supply to different parts. Over the capillary bed the nutritive fluid is distributed. And there is a drainage system of veins and lymph channels. Life depends on the maintenance of a due pressure in the irrigation fields, to the canals of which Galen first likened the blood vessels: “So it is with the animal body. Many canals dispersed through all its parts convey to them blood, as those of a garden convey moisture, and the intervals separating those canals are wonderfully disposed by Nature in such a way that they should neither lack a sufficient quantity

of blood for absorption, nor be overloaded at any time with an excessive supply." On a huge scale, one sees this in a land like Egypt, the very life of which depends on the height of the pressure of water, whether in the annual rise of the Nile, or as it is dammed and stored artificially.

A man's life may be said to be a gift of his blood pressure, just as Egypt is a gift of the Nile (Herodotus). It is interesting to see at first hand how this pressure is kept up in Egypt by the big dams at the Delta, at Assiut, at Esna, and the monster one at Assouan. When raised 15 ft., the last named will give life to another one and a half million acres of dead sand. Along the Nile big steam pumping stations keep certain canals and reservoirs full. For thousands of years, long before dams were built, the patient fellaheen have baled the water from level to level with a bucket at one end of a crossbeam, counterpoised with a weight at the other. Of the three forces which now keep Egypt watered, gravity, steam, and human muscle, the first is the most important. In the human irrigation scheme there is nothing to correspond with this—indeed, gravity in the circulation of all living things is a great obstacle, to overcome which the pump had, in animals at least, to be introduced. The man with the shadoof working on the banks of the Nile, the immediate agent in the old-fashioned plan of irrigation, represents rather the living capillary cell. And the Nile mud itself is alive, not alone in the magic potency which gave man his earliest civilization, but in plastic qualities which enable the fellaheen to build the dykes and dams with canals and rivulets, making every acre a miniature of Egypt itself. In the fields, as in the body, are schemes for distributing the vital fluid, for varying the pressure in different parts, and two all-important things are arranged—the final channels of distribution between the cotton rows or the corn are kept free from weeds and obstructions, and provision is made for drainage, for carrying off the surplus water, to prevent dropsy of the soil.

The whole question of blood pressure is too vast for me to do more than touch upon two points essential to my purpose this evening. The smaller arteries act as stopcocks—taps which regulate the flow to the vascular areas according to requirements. Under the control of various stimuli—vasomotor, hormonal, physical, and postural—they are sluice-gates to be open or shut. The mean pressure in them depends less on the forces of the pump than on the distribution of the blood bulk, the state of the arterial walls, and the state of the capillary bed. So important is distribution that a person may bleed to death into his own vessels, splanchnic or systemic. Hold a hutch rabbit up by the ears, and so much blood accumulates in its splanchnic reservoir that the pressure falls in the smaller arteries of other regions, and the animal dies. The average pressure in the various territories to be irrigated is regulated from the vasomotor centres, just as a man in charge of a big irrigation plant controls the sluices, often nowadays raising or lowering them by simply touching an

electric button. In man a mean arterial pressure is maintained—about 125 to 130 mm. of Hg, and 140 to 160 mm. in persons over 50. A permanent pressure above 160 mm. may be called high, but we must not forget the great regional variations pointed out by Leonard Findlay and others.

In the capillary lake into which the arterial stream widens the current slows and the pressure lessens, though on the latter point authorities are not agreed. There are probably great variations. The Nile, when in low water, takes ninety days to flow from Lake Victoria Nyanza to the sea. Between Gondokoro and Khartoum it passes through the great capillary lake known as the Sud, and more than one-half of the time—forty-six days—is taken to pass this short region. But when in flood it takes only fifty days from Lake Victoria Nyanza to the sea, twenty-eight of which are occupied in passing through the Sud. But it is not merely a matter of rate-flow and pressure in the capillary bed; there are two other factors of prime importance. In the brief fraction of a second, and in a short quarter to three-quarters of a millimetre of space, the business of life is transacted, for here is the mart or exchange in which the raw and the manufactured articles from the intestinal and hepatic shops are spread out for sale. The endothelial capillary cell is not a simple dead membrane under the laws of diffusion, but has an active selective power. Playing the part of a middleman, it is everywhere a free trader in the bread stuff of life, oxygen, but a strong protectionist in certain commodities. Thus the renal capillary cell trades in water, salts, urea, and uric acid, but has a high tariff wall against proteins and sugars. In the secretory glands the selective capacity of the capillary wall must be of the first importance, as here the middleman and the retailer are cheek by jowl, and their shops abut, back to back, opening to different streets. These retail shops, represented by the gland and body cells of the capillary areas, do a roaring trade, partly in common commodities—water, oxygen, salts—and partly in special goods made up on the spot for the use of the body. Each cell, factory as well as shop, collects a great deal of dust and rubbish, and special provision is made for getting rid of this, part being dumped back into the common river, and part into a special lymphatic drainage system, which keeps the irrigation fields free from weeds and dirt. The transactions which take place between the middleman (the capillary cell), the factory and shop-people (in the gland or body cell), and the sanitary department (represented by the lymph circulation), are regulated in part by the laws of diffusion and osmosis, and partly by the cell specialists (enzymes of various sorts), some of which, for example, enable the liver cells to make bile, others to make glycogen. All this activity is associated with movement. The force taking the protein molecule through a capillary cell, through the furnace of a muscle cell to make it appear in the lymph space as sarcolactic acid and other organic compounds, is not simple osmosis;

but in its working currents caused by the machinery of the cell must set from blood to lymph stream. Though we know very little about it in the animal body, this *vis a fronte*, which Galen compared very aptly to a magnet, is not a negligible quantity. We know of its immense power in plants, and I believe botanists agree that the force which may lift water to a height of 300 feet or more in a tree is a *vis a fronte*, and not a *vis a tergo*. All this is preliminary to the main topic of my address, the associations, advantages, and disadvantages of a high blood pressure.

Some years ago I wrote a short paper with a somewhat paradoxical title: "The advantages of a trace of albumen and a few tube casts in the urine of men over 50 years of age." It was written with the specific object of allaying the unnecessary fears of physicians obsessed with the old idea that the presence of these bodies in the urine always indicated serious and progressive disease of the kidneys. This bogey has been to a large extent replaced by that of high blood pressure, a knowledge of which has filtered to the laity with the usual disastrous results. A good many people are unnecessarily alarmed, and much needless worry and anxiety has been caused. For example, a robust, full-blooded country girl was taken to a physician for some menstrual disturbance, and was told that her blood pressure was 140, and that the outlook for her was serious. The poor girl, very much depressed, regarded her condition as hopeless, particularly in so far as a married life was concerned. She was a strongly built, plethoric, muscular girl, who only needed the reassurance that with her physique such a pressure was as natural as one of 90 would be in a thin, pale delicate girl.

What are the conditions in which we see permanent high pressure, and what are its advantages and disadvantages? For practical purposes we may consider three groups of cases: Simple high tension, hyperpiesis, without signs of arterial or renal disease; arterio-sclerosis, with the associated high tension, renal, and heart changes; and chronic nephritis, with secondary high pressure, arterio-sclerosis, and heart changes.

I. HYPERPIESIS.

Hyperpiesis signifies simple high pressure without signs of cardio-vascular disease. We have learnt to recognize an average pressure, as taken with ordinary instruments, and the figures given are usually accepted. There are, of course, great variations, usually temporary, but now and again we meet with individuals whose pressure is permanently high—above 180—without, so far as can be ascertained, arterial, cardiac, or renal disease. Of course the difficulty is to exclude internal, not discernible, alterations in the splanchnic and other vessels, since, as is well known, vascular disease may be very localized, but, clinically, the group, well defined and very important, has been carefully studied by Allbutt and others. We see the condition most often in men who work hard, drink hard, and smoke hard, particularly in keen business men with

heavy responsibilities, and we see it now and then in neurasthenic and gouty persons. Let me give a few illustrative cases :

A man just over 40 years of age, 13 st. 7 lb. in weight, of excellent family history and no syphilis, had lived a business life of the greatest possible intensity. Early successful, he began to speculate, and made and lost several fortunes, lived "high," as the saying is, smoked eight to ten cigars and several cigarettes in the day, took a dozen drinks of Scotch whisky, always champagne at dinner, and with it all found time for a moderate amount of exercise, chiefly riding. In short, he lived the "hustling" life of Wall Street. He regarded himself as "hard as nails," nothing could hurt him. The ill effects of the night disappeared with the morning cold bath. He was always ready for his breakfast, and sharp as a hawk for business at 9 o'clock in the morning. Suddenly one day, without warning, after a heavy dinner, he lost the power of speech, and for nearly three days was confused in his head and could not express himself intelligently. There was no paralysis of face or arm, and at the end of a week he was quite himself again. A trace of albumen and a few tube casts were found in the urine, and he had a blood pressure of 212. Of course this was a terrible shock. He gave up business, went to Carlsbad and various health resorts. I saw him just a year after the attack. He was still very apprehensive and worried, and had had a few attacks of pain about his heart after exertion. He was a big, healthy-looking man, of good colour and good physique. Careful examination showed no alteration in any of his viscera. The pulse was 80. Both the radials and temporals could be rolled under the finger, and the pulse could be felt just as well on the distal side of the pressure. Compressing a section of the radial at a distance of 2 in. apart, the intervening portion of the vessel full of blood felt firm, and could be readily rolled under the finger. If, however, with gentle pressure, the blood column was forced out of about 2 in. of the radial, its wall could not be felt or differentiated in any way from the tissues about it. The same held good for the temporal. With a similar experiment it was not easy to feel the wall of a brachial artery. The retinal arteries looked large and full, but they did not compress the veins specially. The apex beat was not outside the nipple line. The cardiac flatness was not increased, but there was a snapping, valvular aortic second sound. The systolic blood pressure was 235. No difference in the recumbent position and after exertion. The specific gravity of the urine was 1020, and at times there had been a slight trace of albumen. There was none when I first saw him. There were no tube casts.

Here was a man whose arteries, as far as one could make out, had not thickened palpably, certainly not beyond his age. His heart was not hypertrophied, but he had a very high blood pressure, and he had had one of those peculiar but not very uncommon attacks of aphasia in connexion with it.

It is interesting, sometimes distressing, to see a man of great vigour, in the prime of life, full of work and energy, in the first shock of the realization that he is a machine, with the works of which there is something radically wrong.

A fine strapping fellow of 48, a lawyer of distinction, and among his friends a boon companion, full of work, public and private, suddenly noticed a slight obscurity of vision. As he was going off for his holiday in Europe he consulted an ophthalmic friend, who told him he had retinal haemorrhages

and disease of his arteries. To a man who had never realized that his body was a mechanism it was a great shock to find himself "out of gear," and as he said pathetically, "it did not seem the same world when I had to give up cigars, champagne and Scotch whisky, and pleasant evenings at the club." I saw him in July, 1909, the picture of health, and with the frame of a prize-fighter, but self-centred, nervous, apprehensive, worrying all the time lest another blood vessel might break. He had had a permanent blood pressure above 220, records taken by a dozen different doctors, and he had copies of the analysis of his urine, and had provided himself with Theodore Janeway's book.

It is not always possible to suggest the factors causing the high blood pressure. It may be met with unexpectedly and determined only by the apparatus; indeed one may feel a keen sense of disappointment that the educated finger should be so far astray. It may sometimes be the initial event in an inherited bias towards cardio-vascular mischief, without the occurrence of any of the usual factors.

I saw this year, with Dr. Lichfield of Pittsburg, a healthy looking woman, aged 46, whose father, mother, several brothers, and a sister had died comparatively young of heart or arterial disease, and in whose family there was marked gout. She had herself been very healthy, except for occasional "nervous attacks." She is stated to have had congenital syphilis. She had had some pains in the muscles, rheumatic or gouty, and Dr. Lichfield was astonished to find that her blood pressure was above 200. She was a well nourished, healthy looking woman, without luetic stigmata. The peripheral arteries were nowhere sclerotic. The empty radial artery could not be felt. The temporals were not palpable. The heart impulse was not forcible, and the aortic second sound was not specially accentuated. To the touch I could not determine that the pressure was high in the peripheral arteries, but it was above 200 mm. The urine was of low specific gravity; no casts.

Where is the change in these cases? Not, so far as one can say, in the heart, not in the mains, not in the supply pipes, but to keep up a normal irrigation in the capillary beds there has to be a widespread increase of pressure in the smaller arteries. Where is the first link in the chain? In an altered condition of the vessels in the splanchnic area? In a toxæmia from the bowels? In an over-secretion of pressor substances by renals and adrenals? More likely the block is in the irrigation fields. If the director of a large irrigation plant found the pressure rising in the supply pipes of the third and fourth dimensions, and there was nothing wrong in the pump or the sluices, he would go directly to the fields to see if the channels were free, and to see that the drainage was proportionate to the supply. I believe that in these cases the primary mischief lies between the capillary cell and the lymph spaces, in the working area of the body—a row between the middle man, the manufacturers, and the sanitary authorities—a sort of general strike, to overcome which the Government has to intervene. Remember, as I mentioned, vegetable physiology teaches plainly that the *vis a fronte* is a powerful factor in the metabolism of the cell, and it may be disturbances in this sphere that necessitate, as a conservative action, an increase in the pressure

with which the blood flows in the supply pipes. Or there is a difficulty in clearing of ashes and cinder the furnaces which keep up the fires of life in every unit of the bodily frame. The engines are stoked for the Glasgow express on the London and North-Western Railway, but put to work shunting empty trucks in the station yard!

Cannon and others have shown that in emotional states there is an increase in the adrenal flow, and this is a factor which has to be considered in the high pressure of modern life. Understand one thing clearly—this high pressure is not itself the disease, but a compensatory, salutary state, if not for the man, at any rate for his circulation. That this is so, try to reduce it below a certain point. You may, for a time, but up it goes again, and the man only feels comfortable when you allow him to live at a certain high level. By diet, a change in the mode of life, etc., the pressure may be kept at a reasonable rate, but in my experience, never again does it fall to the normal. The first patient illustrates how difficult or impossible it may be to permanently keep down the blood pressure. He had been at spas for special treatment; he had taken nitrites and potassium iodide; he had had “high frequency” treatment and a special course of sterilization of his colon—but all of no avail, as the pressure kept up. As he had become morbidly apprehensive and self-centred, I urged him to resume his business, lead a rational life, and stop taking “cures.”

The disadvantages are: (1) Just such transient cerebral attacks as the first patient had, or headache, vertigo, flushings, or an anginal attack, or transient bouts of dyspnoea with palpitations. But more serious still is (2) the certainty that sooner or later sclerosis of the arteries will follow. And this brings me to the consideration of group II.

II. ARTERIO-SCLEROSIS WITH HIGH TENSION AND ASSOCIATED CARDIAC AND RENAL CHANGES.

There are two essential factors in arterio-sclerosis—the quality of the tubing and the way in which it is treated. The marvel is that any set of pipes could be constructed to stand the continuous strain to which for years the human blood vessels are subjected. To use a well-worn simile—very different qualities of rubber are used in the make up of our tubing, and longevity is very much a matter of its quality, whether good Para or not. There is, too, that curious and inexplicable element which brings such uncertainty into our calculations. Take two 1910 motor cars turned out from the same shops and by the same workmen and with the same parts. The one may give no trouble, the other may be half the time in the repair shops. Of a dozen blades of a Gillette safety razor, all identical in appearance and in fineness of edge, some may be used for weeks, even months; others may have to be cast aside in a few days. So it is with man and his blood vessels. The contract calls for from sixty to eighty years of usage. Some hold out well, and even after nine^{ty}

years are still fairly good, but the personal equation has always to be considered. The ordinary wear and tear of life may bring about arterial degeneration in a temperate man of 40 years; on the other hand, who has not seen lusty octogenarians with untouched hearts and arteries?

The commoner causes of arterio-sclerosis need not detain us, toxic agents, chiefly, exogenous or endogenous, some of them acting directly on the vessels, others by disturbing the circulation in the cell factories, calling for higher pressure in the supply pipes, and so leading indirectly to sclerosis.

I should like to refer to two other causes, one of which has a note of personal appeal. There is an old motto, "It is the pace that kills," and nothing is more certain than that the pace of modern life kills many prematurely through the complications of arterio-sclerosis. The keen, sharp business or professional man, year in, year out giving his engines no rest, leading a life of high pressure, though a teetotaler and temperate in his diet, and a non-smoker, may have so driven his machine that at 50 it is only fit to be scrapped. These tragedies of life are only too common among us. It is not only a great leader like William Pepper, who died an arterial death at 55, but we see it in the men who live the hard, unselfish lives of general practice. I have notes of at least a score of physicians wrecks before 50—men, too, who had enjoyed their work, untiring, unsparing of themselves and of their time—sensible fellows in everything but in the care of their machine. Some were victims of angina pectoris, some of myocarditis, others of progressive cardiac failure, many more of the complications of arterio-sclerosis—all of the high-pressure life too often nowadays the necessary accompaniment—the penalty—of success. And I think we must recognize another factor—prolonged overuse of the muscles. That athletes die early is well recognized, but it is not easy to determine always how far the cardiovascular changes are due to muscular effort alone. Take a not uncommon picture:

An exceedingly vigorous man, aged 50, spare, weighing only 10 st., with a good family and a good personal history. He had never had syphilis, but at 28 he had had a bad attack of typhoid fever. He had lived an out-of-door life, and had used his muscles incessantly in sports as a young man, at cricket and hunting, and when at college as a long-distance runner; no gout in his family. He had been a moderate user of alcohol and had smoked cigars and cigarettes, but not in excess. Four or five years ago he began to have headaches, which have bothered him at intervals ever since; but he has kept at work, has played tennis and golf, and it was only a few months ago that he consulted his doctor for the headaches. A very healthy-looking fellow, strong and muscular; his pulse was 80—the vessel rolled easily under the fingers. The pulse was recurrent, and there was practically no difference as one felt the vessel with the blood current in or when it was pressed out. The arteries were like whipcord. The temporals could be easily felt. The walls of the retinal arteries looked thick and they compressed the veins. The apex beat bulged the fifth interspace an inch and a half outside the nipple line—a strong, forcible, and visible beat, localized in the one interspace. The

shock of both sounds was palpable, and the shock of the aortic second sound so intense that it could be heard six or seven inches away from the chest wall. The first sound at the apex was booming, a little murmurish. The urine had a specific gravity of 1020, and he did not pass an excessive amount; it showed a few hyaline casts. The blood pressure was 212.

It is true the man had had typhoid fever, and a bad attack, but the arterial changes of the acute infections rarely take the form of a widespread sclerosis. I have notes of cases of angina pectoris in comparatively young men, not syphilitic, in whom the sole factor leading to coronary artery degeneration was persistent over-exertion.

As a rule men under 60 years of age with primary arterio-sclerosis have high blood pressure, indeed the highest known records are in this condition.

In this group of cases it is well to recognize that the extra pressure is a necessity—as purely a mechanical affair as in any great irrigation system with old encrusted mains and weedy channels. Yet the victims are often robust, energetic men of great vitality. Get it out of your heads, if possible, that the high pressure is the primary feature, and particularly the feature to treat. We tied up one evening near a big pumping station on the Nile, and in conversation the Scottish engineer in charge told me that the two essential factors in maintaining uniformity in irrigation were keeping the terminal channels free between the rows of cane, and maintaining the drainage. Obstruction in the fields could be overcome by increasing the pressure, to a certain point, but it was cheaper and safer to clear out the weeds. The difficulty, I believe, is to keep the human irrigation plant free from weeds, the sud that chokes the capillary bed, through which it takes a greater force to drive the fluids. We too often tinker at the pump and the mains, instead of looking for the real seat of trouble in the fields.

It is alarming to find that a patient may only be comfortable with a pressure about 200 mm., but, as a rule, do not take too gloomy a view of the condition, which is often not so bad as it looks. For years a man may enjoy good health and do hard work with high-pressure, whipcord arteries and a hypertrophied heart. Take warning, pessimists, from this story:

I saw on June 21st, 1901, a judge, aged 46, a man of good habits, except that he had been a very heavy eater. He had been very moderate in alcohol and tobacco, and had not had syphilis. He had taken a great deal of exercise, and had always regarded himself as in the pink of condition. A year before I saw him he began to have a little shortness of breath, particularly if he played too much golf or went uphill rapidly. He consulted Dr. Delafield, who told him he had sclerosis of the arteries and enlargement of the heart, and who urged him to change his habits of life. He presented the usual picture—markedly sclerotic arteries, very high blood pressure, a strong, forcible apex beat 3 in. by measurement outside the nipple line. The aortic second sound at the base was much accentuated. The specific gravity of the urine was high; no albumen, no tube casts. Now that did not look a very satisfactory condition in a

comparatively young man who had never had syphilis nor any serious infections. He was a sensible fellow—cut down the intake of fuel, lived an easy life, attended to his duties, and has got on very comfortably. He called on me last summer; unfortunately I was away, but a message on his card read: “Am feeling very fit”!

“Judgement is difficult,” says Hippocrates; but I never knew a man with so marked hypertrophy of the left ventricle to have an extension of life even beyond that granted to Hezekiah. I do not think even the most optimistic would have given him five years; Nature gave him twenty!*

High tension is not always associated with arterio-sclerosis, though present in a large majority of all patients under 60. Normal or low pressures may occur in three conditions: (1) In elderly persons with extensive sclerosis of the aorta and its chief branches; (2) with a general failure of health and strength; and (3) in the late stages with the failing, dilated heart.

What is the condition of the kidneys in these cases? This important question is not always easy to decide. In many instances the urine presents no abnormalities. There may be a trace of albumen, particularly in the morning, and a few tube casts, but the output is up to the mark, and certainly patients may for years have extreme arterio-sclerosis without serious kidney disease. And *post-mortem* studies show this to be the case. With permanent high tension alone, or with high tension *plus* arterio-sclerosis, the kidneys have been found in a few cases practically normal. We must remember that no one at 50 has kidneys completely normal histologically. In the cases of chronic arterio-sclerosis which came to necropsy from my wards in the Johns Hopkins Hospital three types of kidneys were found.

1. The full-sized, hard, beefy organ, often with a smooth surface, sometimes with slight adhesion of the capsule, but an organ obviously not contracted. When I lived in Philadelphia a remarkable man was demonstrator of morbid anatomy at the university, and coroner's physician, the late Dr. Formad. He had had a rich experience in medico-legal cases. I remember he brought before us the results of the study of the kidneys in some 250 cases of sudden death in alcoholics—176 men and 74 women—the great majority of them above the middle period of life. Accurate figures were not given of the causes of death, but the interesting feature is that nearly all of these patients had somewhat enlarged, hard kidneys, frequently, too, of the rounded, sausage-like or pig-backed form. Emerson's analysis of our cases of patients dying with features of general arterio-sclerosis showed that in 60 per cent. the combined weight of the kidneys was above 300 grams. The general experience is that in a very considerable proportion of all middle-aged persons with arterio-sclerosis the kidneys are not contracted.

* Since giving this lecture, Dr. McCrae tells me of his death—the usual way, gradual heart failure, with the distressing mental symptoms so often seen.

2. The patchy arterio-sclerotic kidney, which presents atrophy of surface areas, or sometimes an extensive section of the end of one kidney, and everywhere showing the effects of irregular vascular sclerosis.

3. The small, red, granular kidney, the final outcome in a limited number of cases of renal arterio-sclerosis.

I need not dwell upon this side of the question further than to ask you to bear in mind that conditions of chronic hypertension and of advanced arterio-sclerosis may exist without serious interference with the renal function.

Many of these patients have been condemned as cases of incurable Bright's disease without full knowledge. Fully fifteen years ago I saw an old friend with slight swelling of the feet, cardiac weakness, retinal haemorrhages, traces of albumen in the urine, and tube casts. In a man of 60 who had worked very hard such a state certainly looked serious. He had stiff arteries and an accentuated aortic second sound. Though urged to retire, like a wise man he decided to slow the engines but to continue the voyage. I saw him a few weeks ago, now a man of 75, who meanwhile has travelled much, organized new departments of his work, and has been an active, though not a vigorous man. On and off his ankles have swollen and he has been short of breath on stairs and hills; but, like the ship in Kipling's *Devil and the Deep Sea*, with patched machinery he has been able to keep up an 8 to 10 knot rate. I was interested to examine him carefully, and found his blood pressure above 180; cardiac impulse outside the nipple line and diffuse; the pulse regular, moderately stiff vessels, a small amount of albumen with tube casts in the urine, and in one eye a fading retinal haemorrhage.

III. CHRONIC NEPHRITIS WITH ARTERIO-SCLEROSIS AND HIGH PRESSURE.

Only a man of brazen boldness will speak dogmatically on this last, long and much-discussed group. That hyperpiesis may lead to arterio-sclerosis, that arterio-sclerosis in turn may lead to sclerosis of the kidneys, that there are primary lesions of the kidney associated with fibrosis, which lead secondarily to high blood pressure, sclerosis of the arteries, and hypertrophy of the heart—these are points upon which most of us are agreed. Here, of the two important divisions—the chronic nephritis of the infections, and the nephritis of the intoxications, gout, lead, alcohol—the end-product in both may be the small, hard, contracted kidneys. In a large proportion of all cases there are associated gradually hypertension, arterio-sclerosis, and hypertrophy of the heart. To distinguish between the two sets of cases, the primary arterio-sclerotic and the primary nephritic, is not often difficult. In the infectious group the history is generally very distinct, the patients are younger, and they rarely have the general vigour of the arterio-sclerotic form. In the lead and gout toxæmias one is rarely in doubt, though in the latter the etiology is often over-

looked. On the other hand, the urinary changes in both differ from the arterio-sclerotic form in the persistent low specific gravity, the lower nitrogen output, the more constant presence of albumen (though in slight amount) and the persistence of granular casts. The symptoms, too, are renal and cerebral in the nephritic group, cardiac in the arterio-sclerotic. Uraemic features, progressive pallor, headaches, and marked ocular changes are very much more common in the primary nephritic form, and the retinal changes are degenerative, not simply haemorrhagic. There are transitional stages, and the end of the arterio-sclerotic kidney may be small, red and granular. Intercurrent acute or subacute attacks of nephritis may at any time blur the picture. I have not infrequently been mistaken, led astray usually by the robustness of the patient, and forgetting that chronic interstitial nephritis leading to extreme contraction of the organ may be consistent with good health up to the very onset of fatal uraemic convulsions. In this nephritic class we see remarkable variations in the arterial tension, persistently high in some cases, in others quite moderate, though with extreme arterio-sclerosis and hypertrophy of the left ventricle. The hypertension, doubtless compensatory, and so far as it goes salutary, is caused possibly by increased discharge of pressor substance, and in any case is imperative in the irrigation fields of kidneys choked with débris and overgrown with the weeds of connective tissue growth. The disadvantages are obvious when the chronic hypertension leads to arterial degeneration and renders the patient liable to rupture of the cerebral vessels—a common mode of death in these cases. Careful study of the blood pressure is demanded in the form in which we see hypertensive crises associated with severe headache, often the precursor of uraemia or of transient aphasia with or without paralysis, attacks which a timely bleeding, or purge, or a sweat may ward off.

Lastly, a few words on the care of these cases. Differing as they do so much in etiology and symptoms, a thorough study of each patient is required. At the same time do not lay too much stress upon the hypertension, particularly in nervous patients. When the first intimation comes in the form of an angina, or of a cerebral attack, a man naturally becomes very apprehensive. Patients easily become hipped on the subject of blood pressure; one man had his records carefully charted for eighteen months, and talked like a lay Marey on the various methods. I am not sure whether he was consoled or disappointed to be assured that it was a very good thing for him that his engines had kept up a pressure of about 180 mm.

I.

The first thing is to determine the nature of the case whether simple hypertension, arterio-sclerosis, or chronic nephritis, or all combined. In the case of the active, driving, business man, who has unconsciously damaged the machine, let him reduce the speed from the twenty-four knots of a *Lusitania* to the ten knots of the ocean tramp.

It is interesting to note that the worry and apprehension associated with the first shock of the discovery that something is wrong may cause loss of weight and with it reduction in the blood pressure. A man of 62, whose first indication of trouble was an attack of transient aphasia, lost 2 st. in weight in a year, and his blood pressure sank from 200 to 150. He has been better since he has taken a philosophical view of the situation, and his blood pressure has risen to 180.

II.

The second thing is to lessen the intake. We all eat too much, and in no age was the saying more true that "the platter kills more than the sword." Time and again I have been impressed with this as a possible factor in obscure forms of hypertension and arterio-sclerosis in persons otherwise temperate. Largely a matter of habit, the amount of food taken should be just enough to keep the engines going at a steady speed. A diet of low protein content is best, and fairly large quantities of liquid should be taken.

III.

Thirdly, elimination should be promoted in every way, by making the action of the kidneys, bowels, and skin thoroughly efficient.

IV.

Fourthly, of drugs none are entirely satisfactory in chronic hypertension. Nitrites in various forms may be used, and are often of temporary benefit, but I think the general opinion now is that neither the nitrites nor potassium iodide are of permanent benefit; though now and again one meets with an instance in which the prolonged use of potassium iodide is followed by marked lowering of the pressure. A preparation of mistletoe has also been much lauded, but it, too, is very variable in its effects. Be careful in this point—if the patient does not feel so well, and begins to get thin and look badly, stop all drugs, trust to general measures, and let the pressure rise. In the robust man of full habit in the hypertensive crises with headaches, dyspnoea, or angina, a free venesection is indicated, to be followed by mercurial and saline purges.

The clinical picture which I have thus briefly sketched of chronic hypertension with its associations, advantages, and disadvantages, may not have all the outlines or full details which an artist with more pains and greater skill would put on his canvas, but it is a fair presentation of the subject as I have seen it, and you cannot expect more. The colours, necessarily a bit sombre, have been brightened when possible. And I believe Candide to be wrong—life at the best is not a bad bargain. Even the victim of high tension may find it useful and enjoyable if, following the rest of the moral, he will *cultivate his garden*—weeding the irrigation channels, and keeping free the drainage.

SPECIALISM IN THE GENERAL HOSPITAL.

By SIR WILLIAM OSLER, BART.,

*Regius Professor of Medicine, Oxford; Honorary Professor of
Medicine, The Johns Hopkins University.*

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It is not easy to put in words my appreciation of the honor [167]
of delivering one of the formal addresses at the opening of this
institute or to express my gratification at the inauguration of
this new development in the Johns Hopkins Medical School.
The pleasure is heightened by the thought that the generosity
of an old and valued friend has made today possible. This
hospital has already experienced the wise liberality of Mr.
Henry Phipps, one of whose tuberculosis foundations, under
its management, ranks as a model of its kind.

That, after nearly a quarter of a century, all those pro-
fessionally concerned in the early working of the hospital are
here to take part in this ceremony, is, for us at least, a happy
circumstance. One man I should like to have seen with us,
Francis T. King, the first president of the hospital, whose
devotion to its interest and whose faith in its future were the
stay and support of his declining years. Three of those closely
connected with the early organization have passed away. Dr.
John S. Billings was, from the first, the adviser of the board
of trustees, the real designer of the hospital, and the friend
to whom we all turned for advice. I know with what satis-
faction he looked back on this part of a life great in achieve-
ments for the public and the profession.

No one of all that fine band of men with whom we were
associated, Judge Dobbin, Judge Gwinn, Mr. Francis White,
Mr. Lewis Hopkins, Mr. W. T. Dixon, Mr. G. W. Corner, Dr.
Cary Thomas, Dr. Alan Smith, Judge Brown, Mr. James

* Remarks made at the opening of the Henry Phipps Psychiatric
Clinic of The Johns Hopkins Hospital, April 16, 1913.

[167] Cary, Mr. Joseph Elliott, Mr. C. Morton Stewart, would have appreciated to-day more keenly than Daniel C. Gilman, whose work in connection with the opening of the hospital must never be forgotten. He was a man with rare vision and one also who could drive the straight furrow, as the people of this state—of the country at large—well know. And how Isabel Hampton would have rejoiced to see this day—with its great opportunity to develop the special work so dear to her heart. How full of gratitude must be our first director, Dr. Hurd, to see the fruition of many years of strenuous, hopeful toil!

In 1889 this institution seemed to many the last word in hospital construction, and those of us who were fortunate enough to take charge of the departments felt that here was something to be lived up to, something in which our dreams could be realized. Only when in working order did we feel its incompleteness. We had no medical school, a big gap quickly filled by the generosity of Miss Garrett and her friends. Year by year saw new departments added, new lecture rooms, operating rooms, laboratories, additions to the out-patient departments, to the Nurses' Home, and, by Mr. Marburg to the private wards; and hand in hand, an internal growth in efficiency, and an ever-widening sphere of influence, educational and philanthropic. Our ambition was to do for medicine what Mr. Gilman and his faculties of the university were doing in arts and science, and at a pace hard to follow. The race was not an easy one, but fortunately there were close bonds between the two training stables, and we had the advantage of the prestige of their 13 years of brilliant success.

[168] Only a few impressions of life endure. We use the same cylinders over and over again, the dots and markings become confused, and when we call for a record, a jumbled medley is poured out, a confused message from the past. But certain records are time-fast, and bite in such a way that no subsequent impressions can blur the clearness, and the story comes out fresh and sharp. So it is when I call up those early years so full of happiness, so full of hope. And to have seen in so many ways the fulfillment of our heart's desire is more than we could have expected, more indeed than we deserved.

I am sorry for you young men of this generation. You will [168] do great things, you will have great victories, and, standing on our shoulders you will see far, but you can never have our sensations. To have lived through a revolution, to have seen a new birth of science, a new dispensation of health, reorganized medical schools, remodeled hospitals, a new outlook for humanity, is not given to every generation.

By temperament a dreamer, wherever I have worked, visions of the future have beset me, sometimes to my comfort, more often to my despair. In desolate days I have wandered with Don Quixote, tilting at windmills; in happier ones I have had the rare good fortune to dream dreams through the gate of horn, and to see their realization, to have both the vision from Pisgah and the crossing of Jordan. I have seen the school at which I began in Toronto, in an old building, dirty beyond belief, transformed into one of the most flourishing on the continent, a staff of seven teachers increased sevenfold; my alma mater, McGill, prosperous even then in men of mettle, but housed in wretched quarters, now in palatial buildings, and in affiliation with two of the best equipped of modern hospitals. How paltry were my aspirations of those days! How insignificant do they seem. My feelings when Sir Donald Smith, now Lord Strathcona, gave us the first endowment of \$50,000, could not be stirred to the same intensity to-day by less than a million! Nearly 30 years have passed since I joined the University of Pennsylvania, the premier school of the country. There were new buildings, and a new hospital grouped about a single arts building. But what a transformation since! Whole squares of West Philadelphia annexed and covered with laboratories, dormitories and lecture halls and largely due to the magic energy of a prince of dreamers, William Pepper.

It has been my lot to see others do what I should have liked to do myself, and to feel that it has been better done! Looking back over a somewhat vagrant career, my fission from an academic body has always been a stimulus, and has invariably quickened the pace of progress. And this thought was a consolation when I left this comfortable billet, a few years ago. Among the scanty seeds scattered in my peaceful valedictory

[168] only those in which I ventured into the dangerous region of prophecy appear to have fallen on good ground.

I spoke of the needs of special departments—hoping that within 25 years we should have a psychiatric institute, a children's hospital, a genito-urinary clinic and a special building for diseases of the eye, ear and throat. Two of these are already accomplished facts—the Harriet Lane Johnston Children's Department, has been opened; to-day we open the Phipps Psychiatric Institute, and for the new genito-urinary clinic, that money has been furnished through the liberality of Mr. James Buchanan Brady. Others will follow rapidly, and it is safe to say that within a dozen years there will be as many special departments, semi-independent units in a great organization. The occasion seems fitted for the expression of a few thoughts on specialism in the general hospital.

The work of the units is identical; each a place where rich and poor receive the best skilled help that the profession can command; each a place where students are taught; each a center of study and research. Let us consider briefly these three functions. Similar in diversity, each unit in organization, in aims, and in methods, is a replica of the other. Each represents a technical school linked to the university by the medical faculty of which, by Mr. Hopkins' will, this hospital was to form a part. They differ from the more purely scientific departments of the medical school in one important particular. The hospital units mint, for current use in the community, the gold wrought by the miners of science. This is their first function.

A mother to-day brings her child to Dr. Harry Thomas, at the neurological department, a poor dwarfed, idiotic creature, but all the same very dear to her heart. It is a far cry from the little laboratory where Schiff made his immortal experiments, and literally thousands of workers in the mines of science have slaved years to find the pure gold, handed out freely from this hospital to that poor woman, with which salvation was wrought for her poor child. It seems so easy now. "Ah, a cretin. How interesting! How old do you say? Eight? Why, she looks three. All right, do not worry, the

child will get well quick; get these powders. Yes, three [168] times a day!"

An anxious mother, whose son goes to Manila next week, brings him to Dr. Barker in the private ward for an anti-typhoid inoculation. Again a far cry from Zurich, where Klebs—so often a pioneer—first saw the typhoid bacillus. Again, a host of miners and a vast store of gold—golden knowledge, with which, would they but use it, people of the country could redeem from certain death thousands of their sons and daughters.

The two incidents I have mentioned illustrate what is going on in every unit of a hospital today. Take another—that street brawl last night. "Yes, he was shot through the abdomen." "A dozen wounds in the bowels, you say? Hum! What a job! Must have taken you a long time—doing well, of course." "Oh, yes, we got him early—they all do well [169] now!" Who would have believed such a story in my student days? Again, the pure gold dug out by the elder Gross, Lister, Halsted and thousands of miners, minted in the laboratories and handed out, Mr. President, to the public last night by your surgeons.

We sit over the fire in the evening and pile on the coal without a thought of the dark and dangerous lives of the poor miners who risk so much for so little. It distresses my soul to think that we have done so little for the miners of science, and it does not lessen my distress to know that very often they do not give a thought to us. That coal put on the grate last evening—do you think the Hungarian in West Virginia thought how comfortable you would be over the fire? No! Nor did Schiff realize that his work would be utilized to brighten the hopes of thousands of mothers or that he was following a lode richer for humanity than the Golden Fleece. Only a cold-hearted, apathetic, phlegmatic, batrachian, white-livered generation, with blood congealed in the cold storage of commercialism, could not recognize the enormous debt which we owe to these self-sacrificing miners of science; and yet there are to-day sons of Belial, brothers of Schimei, daughters of Jezebel, direct descendants of the Scribes, Phari-

[169] sees and hypocrites in the time of Christ, who malign these prophets and wise men, winners in a fight for humanity unparalleled in the annals of the race.

The perfect physical form in man or woman is much more sought than found. The perfect mental form is even more rare. The best to hope for in the average man, from nature and nurture, is to have a right judgment in all things. In how few of us is this consummation reached! One philosopher made the comforting remark that "Every man has a sane spot somewhere." Burton, in his survey of humanity in the famous *Anatomy of Melancholy* concludes that the whole world is mad, and needs a journey to Anticyra, (where the best hellebore, a specific against madness, was grown).

There should be, Mr. President, no lack of candidates for help from the unit we open to-day. Many a man goes to his physician now for an overhauling of his machinery. I found a big West Virginian in the private ward one morning. The history was colorless. I went over him thoroughly. "There is nothing the matter with you," I said. "I did not say there was," came the reply, "that is what I wanted to know."

We are all a bit sensitive on the subject of our mental health, but a yearly stocktaking of psychic and moral states, under the skilled supervision of Professor Meyer, would be most helpful to most of us.

Mr. J. A tendency to irritability of temper.

Mrs. R. Too much given to introspection.

Miss B. Over-anxious about her soul.

Master G. Worried by a neurasthenic mother.

These would be some of the headings in the diagnosis slips. But the Institute will have enough to do—meeting a demand for the early treatment of borderland and acute cases.

The progress in the rational treatment of insanity is a bright chapter in the history of the past century. The story recently told by Dr. Hurd, of the changes in this country within forty years, is full of encouragement. The larger staff, the skilled assistants, the scientific study of the cases has become a rule and this community has had the benefit of the up-to-date methods of the Sheppard-Pratt Hospital, and has

seen with pride the rapid development of the work of the state [169] institutions. New methods of treatment will be tested, every advance in technique controlled, and to new theories will be applied the touchstone of science. A wide diffusion of its benefits should take place through the nurses who will pass through the institute. The discreet, even-balanced, thoroughly trained mental nurse will be a great boon in general practice, and she will have a sociological value amid the widespread activities that have been aroused in connection with mental hygiene.

That the medical student is an essential factor in the life of a great general hospital, has been of slow recognition in this country. Admitted to the dispensaries, welcomed in the amphitheater, he has been, until recently, rigidly excluded from the wards, except as a casual attendant on ward classes. I am glad to say that from the day he leaves the medical school laboratories, he is in this hospital a co-worker with doctors and nurses, in every one of its activities, and as his right, not as a privilege grudgingly granted by the trustees.

And so it should be in all general hospitals. Every unit must be so organized as to make him fit in as part of its machinery. It is his business to know disease, and for the sake of the public, every possible opportunity should be given to him. I would even throw open the private wards, that the clinical clerks and surgical dressers might see the vagaries of sick life in all classes of society. In the palmy days of Rome, the physician was followed to the houses of the wealthy by his pupils—a practice we could emulate in our private wards—limiting, of course, the numbers, and selecting the cases.

But with the medical student there is a real difficulty, expressed 25 centuries ago by the Father of Medicine, in the famous aphorism "Life is short; the art is long". The stay of the medical student in the hospital is so brief, the amount to be learned so vast, that we can only hope to give him two things—method (technique) and such elementary knowledge as how to examine patients, the life history of a few great diseases and the great principles of surgical practice. He cannot be expected in the short period of the curriculum to go

[169] the circle of the units, spending time enough in each to master the chief details of a dozen specialties.

In most schools, a system of elective studies has been arranged to meet this really pressing and serious condition, which has grown in acuteness with the multiplication of the specialties? How can an institute like this touch the medical curriculum? At many points, directly and indirectly. The very existence in a general hospital indicates the recognition of psychiatry as part of its legitimate work. One of the tragedies of the subject has been a dissociation from centers of active professional and university life. A department of medicine, with the closest affiliation with the life of the community, has been segregated and stamped with a taboo of a peculiarly offensive character. Here it will take its proper place—a unit in the work of the medical school of a university.

[170] This, in itself, will be a lesson to the student. A new atmosphere will be diffused, a new group of energies and activities will come into the hospital, which cannot but be helpful. The director, his staff, and the nurses will play a new rôle, which will greatly enhance the reputation of the old company. Living as he does in such close fellowship with the staff of the hospital, the medical student will be influenced in this way by the very presence of the institute.

It is to be hoped too, time may be found for general instruction of the senior class in the elements of neuro-psychology, and with the elective system, an active group of students be found to whom this study will appeal strongly. But after all as practical men, we have to face the Hippocratic aphorism—the art is getting longer and longer, the brain of the medical student, not getting bigger and bigger, has its limits; and though keener and more industrious than ever in history, the time is too short for a man already burdened to the breaking point, to study any specialty from the standpoint of the specialist.

To a large outside body, this institute should cater with extraordinary benefit. There must be a thousand or more assistants in the asylums of the country, whose pineal glands are not yet crystallized, and who should find here inspiration

and help. Amid isolated and depressing surroundings, these [170] men do yeoman work in the profession. From the director and his staff, they will receive that warm and encouraging sympathy, the very leaven of life, a quality which has been the inspiration of the benefactions of the founder of this institute. And I hope room and plenty of it will be found for the general practitioner, through whom more than any other group, the benefits of this institute may be distributed. He needs enlightenment, instruction and encouragement—enlightenment as to the vast importance of early deviations from normal mental states, instruction in new methods of diagnosis, and treatment and encouragement to feel that in the great fight for sanity in the community he is the man behind the guns.

A larger outlook is connected with the third function of a hospital unit. The old Greek, with his quick sense of helpfulness, always asked about a work: "Does it make life a better thing?" and Prof. Gilbert Murray remarks that one who wished to give the greatest praise to the Athenians said, "They strove to make gentle the life of the world." The American, the modern Greek—mentally if not orally—always asks the same practical question; sometimes, in the case of pure science, when it is both foolish and fruitless. But he may ask legitimately how such an institute as this may be helpful in studying lapses and freaks of the human mind—I cannot give the answer. "It is not in the book I learned out of" as the children say. I could tell you in internal medicine, and could refer you to the long list of studies in dysentery, malaria, typhoid fever, pneumonia, heart diseases and blood diseases that have come from the medical unit. But a psychopathic unit is a novelty in a general hospital, designed for the study as well as for the cure of mental aberrations.

We talk a great deal about the human mind, and, when cornered, quote Hamlet to cover an unpleasant ignorance of its true nature. The modern student, like the ancient, takes his stand either with Plato and compares the mind and brain to a player with his musical instrument, or with Lucretius to a musical box wound up for so many years to play so many

[170] tunes. Authorities lean to one or other of these views, and I have a shrewd suspicion that some of our distinguished visitors, great representatives in this specialty, do not see eye to eye in this matter. Three things we do know, departures from normal states are extraordinarily common—they are the most distressing of all human ills—they should be studied systematically by experts, with a view to their prevention and cure.

When Dean Swift left the little wealth he had to found a house for fools and mad, he could not forego the pleasure of adding the satiric touch: "No nation needed it so much." This idea, was not, I am sure, in the large heart of Mr. Phipps; but a wide-spread feeling has arisen in this country that the hygiene of the mind is just as important as the hygiene of the body—that we must return to the Greek ideal of the fair mind in the fair body. How beautifully Plato visualizes the day (in a passage I am never tired of quoting)—"When our youth will dwell in a land of health amid fair sights and sounds and receive good in everything; and beauty, the effluence of fair works, shall flow into the eye and ear like a health-giving breeze from a purer region, and insensibly draw the soul from earliest years into likeness and sympathy with the beauty of reason." (Republic, Bk. II.)

What a revelation of an awakening in the community that it was possible to organize such a Congress of Mental Hygiene as was held here a few months ago under the auspices of the Medical-Chirurgical Faculty! The program itself was an inspiration. In this country, to recognize a wide-spread need is to meet it; and such gatherings held under auspices of the National Committee will go far to lessen the sad prevalence of early nervous breakdown.

What a philosopher said of the Melissians may be said of many people—they are not fools, but they do just the things that fools do, in the matter of training the young. Unfortunately, we cannot pick our parents, and still, as of old, our hearts give our hands, regardless of our heads. Dr. Mott will tell a tragic tale of heredity in relation to insanity. I am afraid several generations must pass before we see any practical results of the present active eugenic crusade, but there

is an immense and hopeful work to be done in educating [170] parents in training-stable methods. An Ethiopian cannot change his skin, but a queen bee results from a change of diet. This institute, I am sure, will play its part in this national campaign of prevention of mental ill health through education—a campaign as important to the public, and just as worthy of support as the great struggles against tuberculosis [171] and infant mortality.

It will be helpful too, to study in a sane, sober and sympathetic way, epidemics of mental, moral and even economic folly as they sweep over the country. The present opportunity should not be missed. With causes just as definite as small-pox or yellow-fever, they never occur under exactly the same conditions, but all have their basis in, and are mere specks upon, that fine old humanity that is ever fighting its way towards the light.

The present out-break has not been equaled since the capture of the Roman world by Oriental cults. The same old-fashioned credulity exists that enabled Mithras and Isis, Apolonius and Alexander to flourish then as the new cults do to-day—and for the same good reason. There is still potency in the protoplasm out of which arose in primitive man, magic, religion and medicine. Circe and Asculapius were probably twins! Historically our fringe of civilization is of yesterday, if we compare the six or seven thousand years of its record with the millions which must have passed since man assumed his present form on the earth. In this vast perspective Aristotle and Darwin are fellow-students; Hippocrates and Virchow are contemporaries.

Primitive views still prevail everywhere of man's relation to the world and to the uncharted region about him. So recent is the control of the forces of nature that even in the most civilized countries man has not yet adjusted himself to the new conditions, and stands, only half awake, rubbing his eyes, outside of Eden. Still in the thaumaturgic state of mental development, ninety-nine per cent of our fellow creatures, when in trouble, sorrow or sickness, trust to charms, incantations and to the saints. Many a shrine has more followers than Pasteur; many a saint more believers than Lister. Less

[171] than 20 years have passed since the last witch was burned in the British Isles!

Mentally the race is still in leading strings, and it has only been in the last brief epoch of its history that Esop and Lewis Carroll have spun yarns for its delight, and Lucian and Voltaire have chastized its follies. In the childhood of the world we cannot expect people yet to put away childish things. These, Mr. President, are some of the hopes which fill our hearts as we think of the future of this new department.

One word of appeal to the units. Members of a corporate body, successful life will depend upon the permeation by harmonics which correlate and control the functions. Isolation means organic inadequacy—each must work in sympathy and in union with the other and all for the benefit of the community—all toward what Bacon calls the lawful goal of the sciences, that human life be endowed with new discoveries and power.

Syphilis of the Liver with the Picture of Banti's Disease

BY

SIR WILLIAM OSLER, Bt., M.D., F.R.S.

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Syphilis of the Liver with the Picture of Banti's Disease.

By Sir WILLIAM OSLER, Bt., M.D., F.R.S.

FROM the tangled skein of splenic pathology we have for years been trying to unravel one definite thread, and it looks as if, at least, the attempt had been successful. There is now recognized a disease of splenic origin characterized by:—

(1) Progressive enlargement of the organ, lasting for many years, and not necessarily impairing the health.

(2) Anæmia of a secondary type, with leukopænia, which may come on acutely and recur at long intervals.

(3) A final stage, with cirrhosis of the liver, jaundice and ascites.

That permanent cure follows the removal of the organ, even in long-standing cases and after the jaundice has supervened, is a strong warrant for the belief that the primary lesion is in the spleen itself.

It is a serious difficulty that a motley group of maladies is associated with big spleen and anæmia. From the form just described, which may be called Banti's disease, we have gradually separated off other conditions, such as splenomegaly with acholuric jaundice, splenomegaly of the Gaucher type, splenomegaly with primary pylethrombosis, and certain forms of tropical splenomegaly. Then in a few cases of chronic infectious endocarditis the early history suggests splenic anæmia. Parkes Weber has reported such a case with enlargement of the spleen, and a red blood count of 1,700,000 and a leucocyte count of 1,900. I have recorded a very similar one, in which the picture of the spleen and the low blood count led to the diagnosis at first of splenic anæmia.¹ No condition is more apt to cause confusion than splenomegaly associated with various forms of cirrhosis of the liver. Occasionally in the ordinary Laennec type the spleen is greatly enlarged, and the anæmia is pronounced. More than once I have been deceived by this picture.

¹ *Interstate Med. Journ.*, St. Louis, 1912, xix, p. 103.

In this brief paper I wish to call attention to a group of cases of syphilis of the liver in which the splenomegaly and anæmia are so dominant that splenic anæmia or Banti's disease is diagnosed. The first case of this kind which I saw was in a girl, aged 22, admitted to my wards in November, 1890,¹ with ascites. She had been a delicate child; had not walked until the fourth year. When aged about 15 she had an obscure illness with trouble in the abdomen, with which she was confined to bed for six months. Ever since the abdomen had been somewhat enlarged. For the past three years she had been fairly well. Her present illness dates from two weeks ago, when she had a chill, headache, and pain in the left side, with fever. She has been at work until two weeks ago.

Condition on admission: The patient was a small, delicately built, anæmic girl, with a very sallow facies. She sat up in bed; was unable to lie down on account of pain. The temperature was 103.5° F., the pulse 120, respirations 36. There was marked deformity of the chest, owing to a flattening of the right side from old disease. The left side of the chest was large and moved very freely. There was a marked curvature of the spine due to the old contraction, following the chronic pleurisy. The abdomen was distended, measuring 78 cm. at the level of the navel. The enlargement was not symmetrical, but was more marked in the left flank and in the hypochondrium. There was also a distinct protuberance in the right hypochondrium. The superficial veins were slightly enlarged. On palpation the abdomen was sensitive, particularly on the left side, and at the edge of the ribs there could be felt a firm mass, which extended nearly to the left inguinal region. Towards the right a sharp edge could be distinctly felt. It was movable on bimanual palpation. There was no question that this was an enlarged spleen. On the right side, occupying the epigastric and hypochondriac regions and the upper umbilical region, there was an irregular firm mass which extended a little below the level of the navel. The edge was rounded and hard. Deep in the right flank and apparently connected with it there were two smaller masses to be felt. These descended with inspiration, and they were thought to be in connexion with an enlarged liver. The inguinal glands were a little larger than normal, and were very firm. The epitrochlear glands were enlarged and firm; the glands in the neck and axilla were moderately enlarged, freely movable, and nowhere matted together. The blood count was:

¹ *Johns Hopkins Hosp. Bull.*, Baltimore, 1891, ii, p. 18.

2,234,000 reds per cubic centimetre, and a ratio of white to red of 1 to 25; hæmoglobin 28 per cent. On November 14 the ratio of white to red was 1 to 16.

The temperature fell from 103° F. on November 11, and on November 14 was 99.5° F. She complained a great deal of shortness of breath, vomited, and seemed very ill. The urine was scanty, specific gravity 1020, contained a small amount of albumin and a few hyaline casts. The pulse became very rapid. On November 15 and 16 she had nausea and vomiting, became unconscious on November 16, and died early on the morning of November 17.

Autopsy (Dr. Councilman).—The external lymph glands were enlarged and hard. The peritoneal cavity contained 200 c.c. of slightly bloody fluid. The lower border of the spleen was 11 cm. from the ribs. The mesenteric and peritoneal lymph glands were moderately enlarged and hard. Both liver and spleen were surrounded by firm fibrous adhesions. The liver was brownish-yellow in colour, very tough and hard. It was divided into a number of nodular masses from the size of an apple to that of a filbert, some of them almost separated from the liver and only connected with it by a thin pedicle. The greater portion of the liver was made up of an enlarged left lobe. The right lobe was divided up by bands of connective tissue into the nodular masses already mentioned. On section of the liver there were large bands of connective tissue which traversed it in different directions, and from which smaller bands were given off. The largest of these bands ran between the right and left lobes. There were in addition fibrous gummata which projected from the capsule into the liver substance, and in these were hard necrotic areas. The portal vein was dilated to double its normal size. The spleen measured 23 cm. by 16 cm. The surface was covered by slight adhesions, but was otherwise normal. The surface of the section was firm, of a dark purple-red colour. Neither the trabeculæ nor the Malpighian bodies were visible. The organ weighed 1,510 gm. The right lung was small and firmly bound down by old adhesions. In the lower part of the pleural cavity there was a cavity containing 70 c.c. of opaque, gritty, semi-fluid material.

The blood-picture was that of leukæmia. It was before the days of accurate differential counts. A very similar case has been reported by Hoche from von Jaksch's clinic¹ in a girl, aged 20, admitted with

¹ *Berl. klin. Wochenschr.*, 1902, No. 16.

the clinical picture of splenic anæmia. With a progressive fall in the red corpuscles there was an increase in the leucocytes, which reached 58,400 per cubic centimetre—1 to 46 red. The autopsy showed syphilis of the liver.

A very similar picture may be present in acquired syphilis. On December 11, 1897, a man, aged 34, was admitted to the Johns Hopkins Hospital with an enormously enlarged irregular spleen, a red blood count of 1,400,000, leucocytes 7,500 per cubic millimetre. The patient had had syphilis, and three years ago had been in another hospital with jaundice and dropsy, both of which had gradually disappeared. For eighteen months he has noticed the gradual increase of a mass in the left side of the abdomen, and he has become anæmic. The spleen extended beyond the navel and below the level of the anterior superior spine of the ilium. It was freely movable, irregular in shape, the edges rounded, but notches could not be felt. The liver formed an irregular mass in the right hypochondrium, with rounded edges and fissured surface. The picture was very like that of the primary splenic anæmia, but the history and the condition of the liver left, I think, no doubt of the nature of the disease.

For the past four or five years there has been under observation at the Radcliffe Infirmary a boy who, at the time of his death, was aged 11. In 1906 and 1907 we had him in the ward for the examiners for the M.B. as a case of splenomegaly. We did not recognize the nature of the trouble until some three or four years ago, when he was admitted with nodes on the shins and syphilitic arthritis on the left knee. At this time the liver was slightly enlarged and a little irregular, but the blood count was practically normal. The father had died of obstruction of the bowels. The mother had lost several children, but there was nothing to suggest syphilis in the family. The spleen was very large, reaching to the right beyond the navel and below the anterior superior spine. It was smooth, not painful, and the notch could be felt. When first under observation the liver was enlarged and irregular, the left lobe easily palpable. Subsequently the liver decreased in size and the rounded irregular edge could at once be determined. His last admission was under Dr. Collier on Christmas Day, 1912. The following is an abstract of a long history:—

He looked fairly well. Red blood corpuscles, 5,770,000; leucocytes, 4,640; hæmoglobin, 65 per cent. The spleen was about the same size as on previous admission, filling the greater part of the left half of the abdomen. The liver could not be felt in the middle line. In the nipple

line an ovoid, somewhat irregular, smooth tumour could be felt. The fingers could be placed beneath it and the under surface was distinctly irregular. In January the ascites came and increased rapidly, so that he had to be tapped. On February 15 he had bleeding from the gums; on February 23 a severe attack of vomiting of blood. The anæmia then became pronounced, the red blood corpuscles falling below 2,000,000, the ascites recurred, and he had to be tapped several times. On March 11 he had several large bloody stools. On March 12 he vomited twice in large amounts, the spleen became much reduced in size. There was a slight rise in temperature, and during the day he had to be tapped frequently. On February 24 he again had vomiting of blood, and he died on the night of February 27. The Wassermann reaction was negative.

The post-mortem, by Dr. A. G. Gibson, showed (1) the usual features of anæmia; (2) œsophageal varices, from one of which the bleeding had come; (3) a greatly enlarged spleen; and (4) a syphilitic liver, which presented very remarkable features. The left lobe was reduced to a thin flat band; the right lobe was reduced in size, much scarred, fissured, and cirrhotic, with many coarse bands dividing islands of greyish-yellow liver substance. The most interesting feature was the oval mass which was felt during life, as it was attached to the anterior portion of the right lobe, the capsule somewhat thickened; in section the surface was smooth and of a normal, red-brown colour, without a trace of cirrhosis, but there were several small gummata, from about 3 to 4 mm. in diameter. This was really the only normal portion of the organ.

The point which I wish to emphasize in this paper is that syphilis of the liver may present a picture clearly resembling Banti's disease, the splenomegaly, anæmia and hæmatemesis completely overshadowing the hepatic features. The spleen has been removed as in the case of splenic anæmia reported by Dr. S. Coupland.¹ Splenectomy was performed by Mr. Pearce Gould. Two year later the patient died with melæna, hæmatemesis and ascites. The post-mortem showed typically scarred syphilitic liver, with varicose veins in œsophagus and rectum.

¹ *Brit. Med. Journ.*, 1886, i, p. 1445.

An Introductory Address

ON

EXAMINATIONS, EXAMINERS, AND EXAMINEES

*Delivered at the Opening of the Winter Session at St. George's Hospital
Medical School on October 1, 1913*

BY

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An Introductory Address

ON

EXAMINATIONS, EXAMINERS, AND EXAMINEES.

GENTLEMEN,—In every department of human knowledge men are asking guidance in the solution of a world-old problem—how to train the mind and heart and hands of the young. The past and the present are in the melting pot—the moulds are ready, and all await with eagerness the result of the casting, and none with greater eagerness than our own profession. For we are in a quandary. Naturally conservative, we are bewildered by the rapidity of a forced progress and change. There is a new outlook in every department—not alone in the fundamentals of science and in methods of practice, but in the relations of the profession to the public and to the State. The actual care of the sick, once our sole duty, is now supplemented by such a host of other activities, social, scientific, and administrative, that an ever-increasing number of our members have nothing to do with patients as such. But the chief difficulty is the extraordinary development in every subject of the curriculum—a new anatomy, a new physiology, a new pathology, new methods of practice, to say nothing of phenomenal changes in physics, chemistry, and biology. Everywhere increased complexity and mind-burdening terminology. What is the teacher to do? And more important, What can the poor student do, confronted with so much new knowledge and a Rabelaisian onomatomania? How simple was a cell in the days of Schwann and of Schultze—nucleus, nucleolus, protoplasm, and cell membrane; to-day in one of the very briefest of recent descriptions I counted 40 new names, not one apparently superfluous. Turn to the index of a new treatise in embryology, to a work on immunity, or to a text-book on neurology, and you will appreciate the extraordinary complexity of the diet of the modern student. Even the titles of the journals startle, and to read intelligently an article in the *Zeitschrift für Chemotherapie* or in the new archives dealing with immunity and metabolism requires a special education.

The truth is, we have outrun an educational system framed in simpler days and for simpler conditions. The pressure

comes hard enough upon the teacher, but far harder upon the taught, who suffer in a hundred different ways. To help you to realise this pressure and to suggest measures of relief are the objects of this address.

EXAMINATIONS AND THEIR RELATIONS TO EDUCATION.

What a student knows and what he can do—these are judged by examinations, oral, written, and practical. Tests of progress, tests on behalf of the public of fitness to follow certain callings, they have always loomed large in educational systems. At the best means to an end, at the worst the end itself, they may be the best part of an education or the worst—they may be its very essence or its ruin. Helpful if an integral part of the training, they may, and do, prove the intellectual ruin of many good men. Long practice as an examiner—year by year since 1875—in many subjects, in many methods, and in many places, an intimate relation with a large body of students, and a keen interest in medical education give me the assurance, if not of wisdom, at least of experience. Moreover, at the old universities survives a mediæval tradition of the omniscience of the professor, and with my brother Regius of Cambridge I enjoy the rare privilege of examining in every subject in the curriculum, from organic chemistry to obstetrics, a privilege with this advantage—it enables me to see the work of many examiners.

Regarding examinations, I have one question to ask—Are they in touch with our system of education? and one suggestion to make—That from the day he enters the school, in laboratory, class-room, and wards, the work of the student should count, and count largely, in the final estimate of his fitness.

The Influence of Examinations on Medical Education.

Apart from a general feeling of dissatisfaction with the present system, two things strongly suggest a negative answer to the first question. As a discipline of mind and memory examinations play a leading part in all educational schemes. How they may finally control and sterilise the mind of a nation may be read in the story of China. For this has come about, not from lack of brains, not from any failure to appreciate the value of learning, not from any defect in the system itself, which is more rigid and exacting than anything in Western life, but from the blighting influence of an education directed to a single end, the passing of examinations. To test an education by its practical results at the table is to sin against the spirit of the Greeks, who first taught the fundamental lesson that the pursuit of knowledge to be productive must be disinterested. Nothing is more fatal to a true intellectual training than a constant preoccupation with its practical results. To be of any value an education should prepare for life's

work. To train the senses for observation and the mind for reasoning, and to acquire a knowledge of the human machine and its disorders, a man spends five or more years at a medical school. Given a knowledge of the sciences on which it is based there is no more fascinating study, since medicine is the only one of the great professions engaging equally head and heart and hand. In its subject matter there is everything in its favour, and it is the easiest possible thing to carry out John Locke's primary canon in education—arouse an interest. With our present methods there is scarcely a subject which cannot be taught easily, and so many of them are practical, manipulative, and not at all difficult to acquire. To an inquisitive mind the study of medicine may become an absorbing passion full of fascinating problems, so many of which present a deep human interest. In the long category of man's conquests none are more brilliant than those with which a teacher of medicine can inspire his class. It is hard indeed to name a dry subject in the curriculum. And yet in an audience of medical students such a statement nowadays raises a smile. Why? Because we make the examination the end of education, not an accessory in its acquisition. The student is given early the impression that he is in the school to pass certain examinations, and I am afraid the society in which he moves grinds this impression into his soul. Ask *at* what he is working, and the student will answer *for* his first M.B. or his final. The atmosphere is Chinese, not Greek, and too often the one aim is to get through. We have become quite shameless about it, and practically admit a failure in our teaching when we advertise special tutorial classes for the different examinations, and consign a large proportion of our pupils to the tender care of "grinders"—and to no purpose! The spirit is taken out of instruction, and teacher and taught alike go down into the valley of Ezekiel—where they stay among the dry bones.

The Number of Rejections.

And a second circumstance proclaims loudly how out of touch are our tests with our teaching. The qualifying examinations of this country are well organised and admirably conducted, and, speaking by the book, I may say that nowhere is the knowledge that a man can use so freely tested in the laboratory and at the bedside. And it has been so for several generations, yet year by year the General Medical Council issues a report that gives any teacher food for serious thought, as it demonstrates, beyond peradventure, how completely out of touch he or the student, or both, has got with the examiner. A medical school is a human factory, turning out doctors as the finished product at the end of five years of careful preparation and fitting of the mental machinery. Failure is incidental to every human effort, and even the Rolls-Royce Company turns out cars from their shops that fail in the tests, but not many. But from our

shops, after five long years or even more, we send our medical motors to be tested for the road by the official experts, and nearly one-half are declared to be defective and sent back to the shops. Use and Wont, those "grey sisters," have so dulled the edge of this bitter experience that we have become accustomed to conditions nearly insupportable. Year by year for a generation the returns in the two great final subjects, the most attractive and the easiest to teach, show from 35 to 45 per cent. of rejections.

To the question much thoughtful attention has been given, and in the General Medical Council so far back as 1896 Mr. Pridgin Teale introduced a motion with the following preamble: "That the present system of accumulated examinations and the enormous increase in the number of rejections resulting from it are not only unjust to the student but damaging to medical education." Mr. Teale pleaded wisely and forcibly for a reduction of the examinations and for the substitution in certain subjects of certificates from the teachers and class examinations.

The Council reports show that the percentage of rejections at the final examinations has progressively risen from 12·4 in 1861 to 22·2 in 1876, to 34·8 in 1886, and to 41·9 in 1895. Mr. Teale, who quotes these figures, remarked that with the multiplication of examinations the more fatal do they become. The figures for the five years 1908 to 1912 show a continuation of the upward movement. Take the great final subjects, medicine and surgery, at the three Boards before which we may say the average student presents himself. I will put the collected figures as concisely as possible. The English Board: medicine—passed 1842, rejected 1135, percentage 38·12; surgery—passed 1821, rejected 1506, percentage 45·23. Scotland: medicine—passed 489, rejected 653, percentage 57·18; surgery—passed 492, rejected 731, percentage 59·77. Ireland: medicine—passed 322, rejected 231, percentage 41·77; surgery—passed 326, rejected 239, percentage 42·30. In the five years a total of 4572 students were examined at the Conjoint Boards of the three kingdoms in medicine, of whom 2019 were rejected, a percentage of 44·16. Of 5105 examined in surgery 2475 were rejected, a percentage of 48·48. Take for comparison the three universities—Edinburgh, Oxford, and Cambridge—for the five years ending 1912. At the Scotch capital there were 985 examined in medicine, of whom 267 were rejected, 27·10 per cent.; in surgery 974, of whom 317 were rejected, 31·52 per cent. In Oxford, where the three final subjects are taken together, it is impossible to say upon which subject a man came down, but in the final examination of 135 candidates 47 were rejected, a percentage of 34·81. At Cambridge during the five years, in medicine of a total number 519, 365 passed and 154 were rejected, a percentage of 29·67; and in surgery of a total 603, 233 were rejected, a percentage of 38·64.

There is not so much difference, you notice, between what may be called the pass men of the Conjoint Boards and the men entering the universities, and I do not believe there is any special difference in stringency between the Oxford and Cambridge examinations and those of the London Conjoint Board. There are two other examinations which the élite of the student body affect. How do they stand? All regret that in London only the select and the elect attempt to get the degree of their own University. And it is difficult! Twice in the past five years more students have failed than have passed the final subjects for the M.B. The total figures for the period are: of 1061 candidates examined 481 were rejected, a percentage of 41·01. And, lastly, to one other qualification, greatly prized, sought only by the very best men, the Olympic athletes of their classes, I will refer—the F.R.C.S. Eng. Consider, please, how carefully this group is trained—only the very best venture to compete, and they have a diet of which the intellectual calories are gauged with surpassing accuracy. There is no doubt they are our very best, the picked steeple-chasers of our stables. How do they fare? I am almost ashamed to read the figures. Your ears have tingled already, but only those hardened by familiarity will not be shocked at the demonstration of such a chasm between education and examination. Of 1186 men who have tried for the primary Fellowship examination of the Royal College of Surgeons during the past five years 821 were rejected, 69·45 per cent. Of 680 men at the final Fellowship examination 294 were rejected, 43·23 per cent. The high-water mark of examination futility was reached in May, 1912, when of 118 candidates for the primary Fellowship only 31 were approved. These are picked men, our very best students, the most carefully prepared, who rarely attempt the trial without months of extra study and attendance upon grinding classes. Of the ploughed I have known personally, many seem to have been over-trained, others had spent their time in unprofitable original research; but all, passed and plucked alike, I maintain, are of the highest type of our students, whose calamities proclaim to the world the breakdown of our present educational system.

The failure is general all along the line and in all grades—at the licensing boards, at the older Universities of Oxford and Cambridge, at Dublin and Edinburgh, at South Kensington, and at Lincoln's Inn-fields; with singular uniformity all tell the same tale. There have been uneasiness and talk, but too much self-satisfied indifference, and even after the famous rout for the primary Fellowship in May last year I am told that satisfaction was expressed with the scope and method of the examination! Satisfactory to the examiners, perhaps, though I doubt it; but most unsatisfactory to the teachers, most painful to the students, and by no means a pleasure to the public as represented by the parents.

HOW MAY RELIEF BE OBTAINED?

I venture to offer a few suggestions. First, by simplifying the curriculum to give the students more time. Allow the teachers a free hand in the matter of systematic lectures. Let them be reduced to a minimum or abolished altogether. One advantage they have—subjects may be dealt with which cannot possibly be illustrated in the wards. But such may be better presented in the “seminar” form, the senior students arranging the subjects among themselves under a skilled assistant. London students still have too many lectures in medicine and surgery to attend; Scotch students many more. I do not speak without experience when I say that the subject of medicine, for example, may be taught without the set lecture. The lecture has its value, a precious one from some lips—a Watson’s or a Trousseau’s; but its day has gone, to give place to other methods better adapted to modern conditions. Think of the saving of time if the lecture list was snipped in half, or if the lecture was limited to a few subjects, such as physiology and pathology, and if it were an offence for a senior student to be seen in a lecture-room!

Then let us boldly acknowledge the futility of attempting to teach all to all students. Burn the anatomical fetish to which we have sacrificed long enough, and to our great detriment. Just glance at “Cunningham’s Anatomy”—1465 pages, many in small type, not one of which is without a water-jump for the first Grand National of the medical student. It is barbaric cruelty with so much ahead to burden the mind with minutiae which have only a Chinese value—a titanic test of memory. To schedule a minimum of the essentials should not be difficult, once the great principle is acknowledged that in all departments of the curriculum only a few subjects can be mastered thoroughly. I am afraid the secret of the tragic tale I have related lies in a quotation which Socrates made to Alcibiades:

Full many a thing he knew,
But knew them all badly.

I acknowledge the difficulty of defining in different subjects a minimum of the essential, but it is not insuperable, and such schedules are issued in some universities.

Secondly, relief may be obtained by giving credit for work done throughout the course, changing the present system of “signing up” for one of reports by demonstrators and assistants on the character of the work done by each student. Let all who teach examine. Let education and examination go hand in hand. Let the day’s work tell from the moment a student enters the school. Everyone from the junior demonstrator who supervises the student’s first dissection to the professor—all should weigh while teaching. Day by day as I see John Smith in the wards, and read his notes, and watch his clinical work and discuss the features

of the patients, or as he narrates his case to the class about the bed and he and I have a Socratic dialogue, instruction and examination go hand in hand, and in such a way that at the end the formal tests should be but an amplification, an extension, and an inclusion of the scores of examinations which have been part of the routine of his life. Perhaps at present Utopian, this plan will be feasible in a new and reorganised generation ; indeed, it is feasible now in self-contained universities. Once accept the principle that instruction and examination should go hand in hand and the difficulty is solved. The returns are automatically passed on to the head of the department. Yes, but someone will say, "Take the judgment of a group of young teachers? It is absurd!" Not a bit. They see more of the students, come into closer contact, and are better able to judge of the quality of their work than the professor, and much more than any outside examiner. According to the character of his work a student should acquire much or little merit, and should be able to take to the examination table enough to pass, or at any rate to make the final test in any subject *pro forma*. Where the classes are small, as in many of the provincial universities, this plan could be easily worked. I have had practical experience of it and came to the conclusion early that the judgment of the man who was fit to teach could be taken in estimating the progress of the student's education. And the system is being adopted. A few months ago I went into the beautiful clinical and pathological laboratory of the new Toronto General Hospital, and in one room I found an examination in pathology going on. The candidate had a set of cards in his hands, on each of which were written the details of the post-mortem examination he had made with a careful discussion of the case. Pass or pluck really depended on the cards a man held. He brought his marks with him—instruction and examination had gone hand in hand. I was delighted to hear from Professor MacKenzie that the system, introduced at McGill by my pupil and successor, the late much lamented Wyatt Johnston, had proved very successful in both Canadian schools.

Thirdly, simplify the examinations. Cut off some of the written papers. In the final subjects the long report on cases, the bedside *viva*, supplemented if need be by a special "oral," will give examiners the necessary knowledge of a candidate's mental outlook. If they will consider, not how much he knows, but how he knows what he knows, the long "written" is superfluous. As one watches a man handle a patient it is easy to tell whether or not he has had a proper training, and for this purpose 15 minutes at the bedside are worth three hours at the desk. We must substitute for the quantitative estimate the qualitative, and judge the student as much by manner as by matter.

Fourthly, when possible, evidence of original work should be substituted for examination. Think of the stimulus to British surgery if, in place of the Egyptian tyranny to which

our best students now slavishly bow, the President and Council of the Royal College of Surgeons selected for the Fellowship each year the 15 or 20 of the men under 30 who had distinguished themselves most highly in surgical research. It would change the mental attitude of the younger generation, instil the spirit of Hunter into its members, and prevent the paralysing mental sterility that overtakes many good men who now spend precious plastic years in the dry drudgery of examination details.

Fifthly, compel no student to pass an examination twice in the same subject. At present brain and pocket alike suffer, and the burden could be lightened by a free reciprocity between the examining boards.

EXAMINERS AND THEIR DUTIES.

Men are usually very superior to the system in which they work, and so it is with examiners. After what has been said you may be disappointed not to hear a tirade against them; but I have had a singularly happy experience with my fellow inquisitors, whom I have found, as a rule, among "the mildest-mannered men that ever scuttled ships or cut throats." The two extreme types, the metallic and the molluscoid, illustrate inborn defects of character. The aggressive, harsh nature comes out strongly at the table, and the hard face, with its "what-the-devil-do-you-know" expression, sends a chill to the heart of the candidate, and it reaches his bone marrow when the first question relates, perhaps to a serious mistake in his paper. Imagine the mental state of a poor chap greeted with, "What did you mean by saying that the ciliary muscle is supplied by the pneumogastric nerve?" And the worst of it is that the metallic examiner may have no sense whatever of his failings, but is rather apt to pride himself on a keen appreciation of his duties. I remember a hard-faced inquisitor who took, so it seemed, the greatest pleasure in torturing his victims—dwelling with fiendish glee on all the small mistakes he could find, criticising the spelling, and ending on one occasion with the cheerful remark, "Mr. Jones, who taught you to write?" That evening, talking about examinations, I said in a joking way: "Judge Jeffreys, you are a heartless brute; I wonder some student has not assaulted you." He took it very much to heart, and I had a long letter about the great responsibility of the position and the rigid sense of duty he felt towards the University and the public. And the facial expression of the fellow examiner is not without importance, whether sympathetic, neutral, or antagonistic. One co-examiner always had a sardonic expression, a sort of Arian grin, plainly saying, "Well, you are a hopeless idiot!" The examination room may have the atmosphere of a cold storage chamber, and a student knows at once the type of man with whom he has to deal.

At the other extremity is the invertebrate examiner, so soft and slushy that he has not the heart to reject a man. It is

a variety not often met with in this country, but it exists. Sympathy with the student and a strong feeling for his position may completely overmaster the sense of duty to the university and to the public. A former colleague was made unhappy for days if he had to reject a candidate. For some years I sat on an examination board with an elderly professor, a man of great force of character and ability, who never gave a candidate less than 80 per cent. of the possible marks. In the case of the most hopeless duffers with 20, 30, or 40 per cent. in other subjects he would call out "pass." He was a great grief to me, as well as a mystery. At the last meeting which he attended as an examiner he tossed his book to me with a malicious smile. There were 116 candidates, not one of whom he had rejected, and not one of whom had less than 80 per cent. 1

Between the metallic and the molluscoid is the large group of sensible examiners who try to put the candidate at his ease and to find out what he knows in a simple, sympathetic manner. But in any case the examiner is apt to take an unfair advantage of his position, and quite unconsciously. A specialist to whom the facts of his subject have become familiar and ingrained is apt to forget the years that have given the facility and the knowledge; and he may wonder when a man hesitates over an Argyll-Robertson pupil or mistakes a pericardial rub for an aortic insufficiency murmur. The most grievous mistake of the examiner is to regard the candidate as his mental equal and to expect from him knowledge of the same quality as that which he possesses, ignoring his long years of study and the short years into which the student has had to cram the knowledge of a dozen subjects.

Examining is often a heart-breaking task, with little to relieve the monotony of the long-drawn papers. It is distressing to meet with abysmal ignorance of elementary facts, and to realise with sorrow how many more minds are constructed as sieves than as sponges. But there are compensations, and who is there among us who does not appreciate Comte's statement that there were few more delightful experiences than the sweet and softened feeling when a young man's examination was thoroughly satisfactory? But it is much nicer to watch the gradual growth of a student's knowledge and to get it out retail day by day than to drag it out wholesale at set times. One thing is certain—the best we have should be devoted to our duties as examiners. Men should give their whole time to the business when at it. Much-engaged men should not be chosen, and to examine in the evening, after a hard day's work, is to handicap the candidates. We shall no doubt come to a time when professional examiners will be appointed by the General Medical Council to act as associates and assessors to the professors. That it is not a task lightly or inadvisedly undertaken the returns I have given indicate only too clearly. Not that we can lay at the

doors of the examiners the responsibility for the lamentable state of affairs to which I have referred. No doubt there are unduly severe examinations, and there are examiners with hearts as hard as pieces of the nether millstone, but these are exceptions.

THE EXAMINEE AND HIS POSITION.

When quoting figures I purposely dealt chiefly with the results of the final examinations, and I am sure the feeling uppermost in your minds was one of sympathy with the hundreds of young men who, after five years of hard work, fail in ordinary tests, and this brings us to a brief consideration of the examinee and his position. In two respects he is an unfortunate victim. Of one I have already spoken—the enormous development in the subjects of the curriculum; and here, I am sure, lies his serious difficulty. It is the case of a quart measure and a pint pot. Intellectual dyspepsia from cramming is at the bottom of his trouble. It is like a diet of hot bread, which a man can stand at first, but, as Lowell says in the “Fable for Critics”—

By gradual steps he
Is brought to death's door by a mental dyspepsy.

Another cause of the widespread rejections is defective preliminary education; but let me emphasise the fact that the percentages of rejections are nowhere higher than among the very best students—e.g., Cambridge men, among whom in some subjects more than 50 per cent. are rejected. I do not deny that much could be done to relieve the present stasis if all medical students began thoroughly trained in physics, chemistry, and biology. In this respect matters are improving year by year. And we should be more honest with the feeble ones, not fitted either by breeding or by pasture to pursue their studies, who should be asked early to withdraw. It is infinitely kinder to stop a man in his career than to allow him to struggle on painfully and submit to the humiliation of half a dozen or more rejections.

The conclusion of the matter is, the student needs more time for quiet study, fewer classes, fewer lectures, and, above all, the incubus of examinations should be lifted from his soul. To replace the Chinese by the Greek spirit would enable him to seek knowledge for itself, without a thought of the end, tested and taught day by day, the pupil and teacher working together on the same lines, only one a little ahead of the other. This is the ideal towards which we should move. The pity of it all is that we should have made an intolerable burden of the study of one of the most attractive of the professions, but the reform is in our own hands and should not be far off. A paragraph in an address of the late Dr. Stokes contains the pith of my remarks: “Let us emancipate the student, and give him time and opportunity for the cultivation of his mind, so that in his pupilage he shall not be a puppet in the hands of others, but rather a self-relying and reflecting being.”

THE MEDICAL CLINIC :

A RETROSPECT AND A FORECAST.

An Address

DELIVERED BEFORE THE ABERNETHIAN SOCIETY, ST. BARTHOLOMEW'S
HOSPITAL, LONDON, DECEMBER 4TH, 1913.

BY

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THE MEDICAL CLINIC:

A RETROSPECT AND A FORECAST.

UNREST and change are the order of the day, and it may be taken as a good sign that the medical profession is bestirring itself about many problems, one of the most important of which relates to the future of our medical schools. Those who have followed the discussions of the past few years will have noticed that two diametrically opposite opinions have been expressed. On the one hand, there is a group thoroughly satisfied with existing conditions—and with themselves—the teaching was never better, the students never more contented, and any change could not but be for the worse. On the other hand, there are those who say that the existing conditions in our large hospitals are inadequate to meet the modern needs of student and of staff, that the teaching is defective, that the rejections at the examinations are shockingly high, that there is inadequate provision for research, and that an entire change is needed in the organization of the clinical departments of our medical schools.

Upon one point all are agreed—that in these islands during the past century an admirable system of teaching medicine and surgery has been evolved. I wish there were time to trace its historical growth; but the practical outcome is that the medical student, in his last years, lives and moves and has his being in the hospital. But with this there has been no internal development of the hospital at all commensurate with the growth of the science of medicine. The century-old custom prevails of a group of physicians and surgeons whose individual “services” are organized neither for teaching nor for research. On the Continent there has grown up a different system. In the medical schools there has gradually been organized separate clinics, each with a head, a graded staff, laboratories, and an organization resembling in every respect that of any other scientific department of the university. The burning question to-day is whether these systems cannot be combined, whether the Continental cannot be safely grafted on the English system. Practically in the large clinics of Paris the two have been combined for more than a century. The medical student is as much at home in the

Paris hospital as he is in the English, but there is not everywhere the complete organization of the German clinics. My address this evening is a small contribution to this problem, as perhaps I am the only English speaking teacher who has combined successfully both systems, and I am going to give you my personal experience. I would not bother any audience with it did I not feel that, at the present moment, it may have a certain value. Montaigne somewhere remarks that to talk about oneself cannot possibly be done without detriment to the person talked about, but you will overlook, I am sure, the necessary personal element in the story.

When I began clinical work in 1870, the Montreal General Hospital was an old coccus- and rat-ridden building, but with two valuable assets for the student—much acute disease and a group of keen teachers. Pneumonia, phthisis, sepsis and dysentery were rife. The “services” were not separated, and a man for three months looked after medical and surgical patients, jumbled together in the same wards. The physic of the men who were really surgeons was better than the surgery of the men who were really physicians, which is the best that can be said of a very bad arrangement. The talk of the teachers was of the Royal Infirmary of Edinburgh, or of Glasgow, of the Meath Hospital, of the Rotunda, and of Bart’s, of Guy’s, of St. Thomas’s; and in a town four-fifths French the lights of Paris medicine burned brightly. Scottish and English methods prevailed, and we had to serve our time as dressers and clerks, and, indeed, in serious cases we very often at night took our share in the nursing. There were four first-rate teachers of medicine on the staff—Howard, Wright, MacCallum and Drake—three of whom had learned at first hand the great language of Graves and of Stokes. The bedside instruction was excellent and the clerking a serious business. I spent the greater part of the summer of 1871 at the hospital, and we had admirable out-patient clinics from Dr. Howard, and a small group worked in the wards under Dr. MacCallum. An excellent plan, copied from an old custom of the *Lancet*, was for the clinical clerk to report the cases of special interest under *Hospital Practice* in the local medical monthly. My first appearance in print is in the *Canadian Medical and Surgical Journal*, reporting cases from Dr. MacCallum’s wards. Our teachers were men in whose busy lives in large general practice the hospital work was a pleasant and a profitable incident. A man like Palmer Howard got all that was possible out of the position, working hard at the hospital, studying the literature, writing excellent papers, and teaching with extraordinary care and accuracy; naturally such a man exercised a wide influence, lay and medical. I left the old General Hospital with a good deal of practical experience to my credit and with warm friends among the members of the staff.

In the summer of 1872 after a short *Rundreise*, Dublin Glasgow, and Edinburgh, I settled at the Physiology

Laboratory, University College, with Professor Burdon-Sanderson, where I spent about fifteen months working at histology and physiology. At the hospital across the way I saw in full swing the admirable English system, with the ward work done by the student himself the essential feature. I was not a regular student of the hospital, but through the kind introduction of Dr. Burdon-Sanderson and of Dr. Charlton Bastian, an old family friend, I had many opportunities of seeing Jenner and Wilson Fox, and my notebooks contain many precepts of these model clinicians. From Ringer, Bastian, and Tilbury Fox, I learned, too, how attractive out-patient teaching could be made. Ringer I always felt missed his generation, and suffered from living in advance of it.

The autumn semester of the next year was spent in Berlin, where I had my first introduction to the medical clinic on a large scale. Professor Burdon-Sanderson had given me a letter to Frerichs, who very kindly assigned places in the arena of his clinic to Dr. (afterwards Sir) Stephen Mackenzie, and to Dr. (afterwards Sir) Charles Hutchinson, and myself. To Hoffmann, Riess and Ewald, his assistants, we were under obligation for many attentions. The other clinic of the Charité was in charge of Traube. The experience of the semester was invaluable. Systematically, day by day, the more important cases of the wards were shown, the symptoms, pathology, and treatment discussed at length. To each case a student was called, who was supposed to take charge of the examination and to answer questions. Sometimes this was serious for the student, though very often quite formal. He was supposed to keep himself informed of the progress of his patient day by day. I remember one morning Professor Frerichs called down a student who had had a case the day before, and he asked, "How is your patient this morning, Mr. Schmidt?" To which the reply, "Very well indeed, very well; he is much better than yesterday." To which the professor replied in his slow, quiet way, "Very well indeed; he died this morning; you will see what was the matter shortly."

The wealth of material in each department, the systematic arrangement of the clinic, the graded assistants, all men of experience working at the problems of disease, was a striking contrast to the small hospital service of the London clinician, with his single house-physician and absence of all laboratory accommodation. Traube made a great impression upon me as an ideal physiological clinician, and to the three volumes of his *Gesammelte Beiträge* I still turn for clinical information.

The first five months of 1874 I spent in Vienna attending the clinics of Hebra, Bamberger and Widerhoffer. In Bamberger I found another ideal clinician—accurate, painstaking, devoting the whole morning to his teaching and "rounds."

When I returned to Montreal in September, 1874, the Professor of the Institutes of Medicine had had to retire on account of heart disease, and instead of getting, as I

had hoped, a position as his demonstrator, the faculty appointed me lecturer with the ghastly task of delivering four systematic lectures a week for the winter session, from which period dates my ingrained hostility to this type of teaching. Four years in the *post-mortem* room of the general hospital, with clinical work during the small-pox epidemic, seemed to warrant the governors of the general hospital in appointing me, in 1878, full physician, over the heads—it seems scandalous to me now—of the assistant physicians. The day of the election I left (with my friend George Ross) for London to take my Membership of the College of Physicians and to work at clinical medicine. For three months we had a delightful experience. Murchison, whom I had seen before in 1873, was most kind, and I do not think we missed one of his hospital visits. He was a model bedside teacher—so clear in his expositions, so thorough and painstaking with the student. My old friend Luther Holden introduced us to Gee, in whom were combined the spirit of Hippocrates and the method of Sydenham. Fred. Roberts, at University College Hospital, showed us how physical diagnosis could be taught. We rarely missed a visit with Bastian and Ringer, and at Queen Square I began a long friendship with that brilliant ornament of British medicine, Gowers. With my old comrade Stephen Mackenzie we went to Sutton's Sunday morning class at the London—his "Sunday School" as it was called—and we learned to have deep respect for his clinical and pathological skill. I mention these trivial details to indicate that before beginning work as clinic teacher I had at least seen some of the best men of the day.

In the summer session of 1879 I had my first clinical class. We worked together through Gee's *Auscultation and Percussion*, and in the ward visit, physical diagnosis exercises, and in a clinical microscopy class the greater part of the morning was spent. I came across the other day the clinical notebook I had prepared for the students with a motto from Froude, "The knowledge which a man can use is the only real knowledge, the only knowledge which has life and growth in it, and converts itself into practical power. The rest hangs like dust about the brain, or dries like raindrops off the stones." The next five years passed in teaching physiology and pathology in the winter session and clinical medicine in the summer. In 1884 I spent four months in Germany, chiefly at Leipzig, working at pathology with Weigert, and clinical medicine with Wagner, a model teacher who devoted the whole morning to hospital work, and whose clinic was splendidly arranged for post-graduate study. After a preliminary visit to the ward he would enter the amphitheatre with clock-like regularity, and day by day demonstrate the more important cases, always finishing the morning's work with a visit to the *post-mortem* room.

This year I accepted the chair of clinical medicine in the University of Pennsylvania, Philadelphia, the premier medical school of the United States, founded in 1789 by

Morgan, Shippen, and Wistar, a group of men who had come strongly under the influence of John Hunter. The teaching of medicine was by lectures and the theatre clinic, which, with the large classes and short period of study, had become an important educational feature. In the hands of a man like William Pepper it resembled rather the larger French clinic, but all through it was an affair of the professor, who demonstrated three or four cases, and dwelt specially upon the diagnosis and treatment. Ward classes for physical diagnosis were in vogue, but clinical clerks were unknown and theoretical lectures occupied a large share of the student's time. The University Hospital and Blockley, the large city hospital, contained an abundance of clinical material which could be utilized for physical diagnosis and for general clinical instruction. I started a small clinical laboratory, which was in charge of Dr. George Dock, now Professor of Medicine in St. Louis. At the Infirmary for Nervous Diseases I became associated with that remarkable man, Dr. S. Weir Mitchell whose career illustrates how a great clinician may develop apart from academic influences or work. The pleasantest memories of five years' sojourn in the "Quaker city" are associated with my friendship with this modern Francesco Redi.

The opening of the Johns Hopkins Hospital in 1889 marked a new departure in medical education in the United States. It was not the hospital itself, as there were many larger and just as good; it was not the men appointed, as there were others quite as well qualified; it was the organization. For the first time in an English-speaking country a hospital was organized in units, each one in charge of a head or chief. The day after my appointment I had a telegram from Dr. Gilman, president of the university, who had been asked to open the hospital, to meet him at the Fifth Avenue Hotel, New York. He said to Dr. Welch and me: "I have asked you to come here as the manager is an old friend of mine, and we will spend a couple of days; there is no difference really between a hospital and a hotel." We saw everything arranged in departments, with responsible heads, and over all a director. "This," he said, "is really the hospital, and we shall model ours upon it. The clinical unit of a hospital is the exact counterpart of one of the subdivisions of any great hotel or department store."

Fortunately the university had not enough money at first to open the medical school, so that we had several years to wait, during which there was only post-graduate teaching, and we were able to complete our organization.

I am going to show you, illustrated by lantern slides, the method of work gradually adopted in the medical unit. But first let me say that we had the good sense to make a high standard for entrance to the school, either the B.A. or the B.Sc. Through the influence of Professor Newell Martin, to whom American biological science owes a deep debt, and Drs. Remsen and Welch, an

admirable three years' preliminary course to medicine was offered by the university.

By the time the first class of medical students had reached the final stage the hospital was in very good working order. The medical unit consisted of about seventy beds (the number gradually increased to above one hundred), a large out-patient department, and a clinical laboratory close to the chief wards. In charge was the head, *ex officio* professor of medicine in the university, a resident staff of first, second, and third assistants (nominated by the professor), a fourth assistant in charge of the laboratory; and in addition four house physicians, appointed annually. The first assistant, a man of experience, remained for some years, and in the absence of the chief was in complete control of the department. He had rooms in the hospital and was paid £200 a year, half by the hospital, half by the university. All of the assistants were engaged in teaching and were paid. The appointments were for no fixed period, and during the sixteen years of my control there were only five first assistants, Dr. Lafleur, now Professor of Medicine at McGill, Dr. Thayer, Professor of Clinical Medicine at the Johns Hopkins Hospital, Dr. Fitcher, Associate Professor of Medicine at the Johns Hopkins Hospital, Dr. McCrae, Professor of Medicine at Jefferson College, Philadelphia, and Dr. Cole, at present Director of the hospital connected with the Rockefeller Institute. In each instance these men had lived as junior and senior assistants in the hospital for seven, eight, or more years. I had the good fortune to have in charge of the clinical laboratory for some years Dr. Emerson, now Professor of Medicine in the University of Indiana.

I have always felt that the success which followed this experiment—for such it was in hospital work in the United States, at any rate—was due to the type of men we had as senior assistants in the various departments. We chose the best that were to be had; the nomination was in the hands of the chief of the department; they were given responsibility, encouraged to teach, and to write, and their professional development was promoted in every way. An excellent plan, greatly favoured by the director of the hospital, Dr. Hurd, was to allow the senior assistants every couple of years a vacation of from four to six months to go abroad for study. The out-patient section of the medical unit was in charge of a separate staff, usually men who had been senior assistants and had gone into practice in the city. There were three; each took two days a week, and had his own staff of three or four assistants, and all were directly engaged in teaching. You may gather from this some idea of the size of a medical unit and of the number of men at work in it, at least twenty-three or twenty-four when I left the hospital. This may be said to be an impossible task for one man to control. Not at all; it is all a question of organization, of subdivision of labour, and of co-operation among workers, and the introduction into a department of modern business methods.

To come now to the actual work. The first duty in the unit is the care of the patient. For the sake of hospital managers I would like to make a statement. If one wishes patients well taken care of, their diseases thoroughly studied, and their treatment in every detail up to date, have medical students in the wards and out-patient departments. They represent the suprarenal extract of the body medical, maintaining the tonus and furnishing the working stimulus. A man's attitude towards his fellow-creatures is largely temperamental. If naturally devoid of the milk of human kindness, to assume a kindly interest in the sick is impossible. This was the meaning of that striking remark of Hippocrates that to a proper love of the profession must be joined a love for humanity—or words to that effect. In any ward visit one can see immediately the spirit in a hospital—whether patients are regarded as just so much material, or as our brethren deserving under all circumstances of every possible consideration and kindness. I have always felt that in this respect we can all take a lesson from our French colleagues, whose gentle courtesy towards their patients has always made a deep impression upon me. In the wards of the Bicêtre, or of the Salpêtrière, where congregate the very dregs of humanity, the greetings of the old men and women show how they feel that in their physician one friend at any rate is left.

The second great function of the clinic is concerned with teaching—assistants, students, nurses. One of the special advantages of an organization of this kind is the progressive training of a group of young men who take part in the work and are taught progressively, often unconsciously, how to teach.

The first assistant is the understudy of the chief, the second of the first, the third of the second, and any one at a moment's notice is able to take the duties of the other. If Professor Halstead was absent at any time or during his summer vacation, the first assistant did the operative work and had charge of the clinic. If I was away, my first assistant took my place, and did my day's work in the hospital. In this way a group of men are educated who are fit to take teaching positions, and a source of the most legitimate pride in a teacher is to have his old associates scattered over the country in responsible positions. The organization of the university clinic exists primarily for the training of the student, who has a right to demand systematic, thorough, and punctual instruction, enough to give a working knowledge of his profession. With students in a hospital as part of its machinery, and if you do not try to teach them too much or lecture them too much, in two years, given a thorough preliminary training, they should get a very fair knowledge of medicine and surgery.

JUNIOR CLINICAL CLASS.

We divided the classes into junior and senior, representing the third and fourth years. As our numbers were

limited we rarely had more than sixty to seventy in each. They were arranged in three groups in each year—medical, surgical, obstetrical and gynaecological—each of which spent about three months and a half in medicine and surgery and the rest of the time in obstetrics and gynaecology. Let us take first the junior class. A strong believer in the out-patient department for teaching purposes we utilized this almost exclusively for the junior students. The arrangement was as follows:

(a) *Physical Diagnosis.*

The three men in charge of the out-patients were demonstrators or associates in medicine, and responsible for the routine instruction in physical diagnosis. To each one a small group of students was assigned who day by day



Fig. 1.—Out-patient clinic.

helped in the work and were taught practically physical diagnosis. As the school grew this teaching fell into the hands of experienced men such as Dr. Thayer, Dr. Fletcher, and Dr. McCrae, and it was with special satisfaction that I saw the full development of this work. The out-patient department was arranged with suitable teaching rooms and a small laboratory. When the Phipps Tuberculosis Dispensary was opened as an annex, each member of the junior class passed through it in the routine of training. The out-patient room offers much the best opportunities for the beginner. He sees the sick man or the sick child as he is, and he can be taught much more satisfactorily how to take the histories provided that he has plenty of time, numerous instructors, plenty of patients, and ample accommodation. In medicine the work of a junior student was to get a knowledge of

disease and of its methods of recognition in the out-patient department. To supplement this, three times a week, at the close of the out-patient hours, was held—

(b) *A Systematic Out-patient Clinic.*

I used to call this an observation class, as its primary function was to train men in the use of their senses. My instruction to the assistants was "send in anything the men can see or handle." The picture (Fig. 1) shows the out-patient clinic at work in a room large enough to hold thirty men comfortably seated. Students were taken in routine, and by this next picture (Table I) it is seen how

TABLE I.—*Cases for the Month of January, 1901.*

Date.	Clerk.	Case.
Jan. 3	Riggins	Periostitis, luetic.
" 3	Oschner	Chlorosis.
" 10	Wright	Haemachromatosis.
" 10	Scholl	Enlarged liver, syphilitic.
" 12	Simpson	Cancer of stomach.
" 12	Steele	Lues, secondary.
" 12	Talant (Miss)	Tachycardia.
" 15	Silverberg	Aneurysm, carotid.
" 15	Wight	Angiomata, nasal haemorrhage.
" 15	Williams (Miss)	Dementia praecox.
" 15	Williams	Lues, secondary.
" 17	Arsdall	Phthisis.
" 17	Browne	Aneurysm, thoracic.
" 19	Auer	Haemoglobinuria.
" 19	Briggs	Thickened pleura.
" 22	Bruns	Epithelioma of lip.
" 22	Bryan	Acute pleural effusion.
" 24	Bush	Tuberculosis, pulmonary, pleural, and peritoneal.
" 24	Churchman	Malignant disease of oesophagus.
" 24	Clarke	Gout.
" 29	Cook	Pleurisy, tuberculous.
" 29	Coons	Tabes, mitral disease.
" 29	Dolley	Polypnoea, neurasthenia.
" 29	Duffy	Pulmonary tuberculosis.

the scheme worked. The clerk's name was put down, the name of the patient, and then the ward if he was admitted.

The clerk was expected "to keep track" of his case, and to report on it in a way that you will hear in a few minutes. Upon one strong conviction I have always tried to act—to make as far as possible the student participate in the teaching. The next picture (Table II) illustrates

TABLE II.—1900-1901.

Date.	Name.	Subject.	Read.
Oct. 6	Bryan	Pediculi and peliomata	x. 14
„ 9	Dohme	Method of healing of aneurysm	x. 16
„ 9	Bush	Fowler and Fowler's solution	v. 8
„ 9	Coons	Virchow's original description of leukaemia	x. 30
„ 11	Duffy	Huntingdon's paper on chronic chorea	x. 20
„ 16	Ferry	Lung stones	x. 15
„ 16	Frankenthal	Gastric ulcer at early age	x. 25
„ 18	Haynes (Miss)	Diagnosis of varieties of tape-worm	x. 25
„ 20	Hirshberg	Hippocrates's description of phthisical chest	xi. 12
„ 25	Lehr	Bronchiectasis, pathology of	xi. 1
„ 30	Reede	Round-up for October	xi. 8
Nov. 13	Briggs	Argyria, smallest amount of nitrate of silver to cause,	xi. 22
„ 13	Williams (Miss)	First description of mitral stenosis	xi. 22
„ 15	Wright	History of Peruvian bark	ii. 21
„ 17	Bruns	Nerve changes in herpes zoster	xi. 22
„ 17	Clarke	Visible peristalsis in pregnant uterus and in distended bladder	xii. 4
„ 22	Cook	Analysis of lithia waters	xii. 13
„ 24	Dolley	Re discovery of thyroid feeding	xii. 11
„ 24	Duffy	St. Vitus	xii. 24
„ 27	Ferry	Round-up for November	xii. 5
Dec. 4	Frankenthal	Subcutaneous fibroid nodules	xii. 6
„ 6	Erving	Glycosuria in tuberculosis	xii. 11
„ 6	Glenny	Who first described the <i>bruit de diable</i>	xii. 13
„ 6	Hardy	Weir Mitchell's paper on post-hemiplegic movements	xii. 20
„ 11	Lootz (Miss)	Re prognosis of diabetes in the young	i. 3
„ 13	Haviland	Acquired lues in congenital syphilis	i. 8
„ 17	Karsted	Necrosis in chrome workers	iii. 7
„ 20	Meisenhelder, J. E.	Round-up for December	i. 5

how this was carried out. At the top of the list you see the words "pediculi" and "peliomata." A case had come in with this association. It is an interesting point, and Mr. Bryan, the student who happened to be called up, was

asked to report on the subject the next week. If you go down the list you will see what a motley group of subjects came under discussion. Take, for example, No. 3 on the list, Fowler. I would ask: "Who is Dr. Fowler who introduced Fowler's solution? Where was the article published?" Of course, Mr. Bush had not the faintest notion; but he was at once reassured when I told him that I also did not know. Nor could he give an affirmative to the next question: "Where will you look for it?" In such cases they were always referred to the *Index Catalogue* of the Surgeon-General's Library; sometimes to Neale's *Medical Digest*, and if the books were not in our own library they could be procured from the Surgeon-General's. Two things were required from the student who presented his report—brevity and lucidity—and, as far as possible, men were encouraged to speak, not to read from a MS. You see from the list how varied were the subjects presented during one semester. I got a great deal of instruction myself, we saw a great deal of valuable medical literature, it did not take very much time, and it was a great help in the education of the individual student.

On the table you will see at the end of each month the word "round-up," which we took from a practice of the Western cattle ranches. The last man called at the end of each month had to report the next week on the cases that had been before us during the month. In this way we kept in touch with them, and at the end of the session a complete report was presented by the eight or nine men who had had the monthly round-ups. Table III shows the

TABLE III.

(Cases, 230; deaths, 15; mortality, 6.5 per cent.)

	Cases.	Deaths.
1. Specific infectious diseases ...	61	6
2. Diseases of digestive system ...	35	7
3. Diseases of respiratory system ...	21	0
4. Diseases of circulatory system ...	32	1
5. Constitutional diseases ...	17	0
6. Diseases of blood and ductless glands	20	0
7. Diseases of kidney ...	5	1
8. Diseases of nervous system ...	22	0
9. Diseases due to animal and vegetable parasites ...	4	0
10. Diseases due to intoxications ...	6	0
11. Pregnancy ...	1	0
12. Anatomical and pathological curiosi- ties ...	6	0

analysis of the session's work. You see that 230 cases were presented in 1899-1900, and I pass round a typewritten copy of the report which each student could procure. It illustrates the wealth of material available for teaching in the out-patient department of any large general hospital. You will be impressed with that first item on the list—61 cases of specific infections. It is a great advantage to see these in the unwashed, unprepared condition in which they present themselves at the hospital; and an analysis such as you see in the next figures could only be arranged by a great deal of co-operative work among the

TABLE IV.—*Specific Infectious Diseases.*

A. <i>Malarial Infection</i> (12 cases ; 1 death).				Cases.	Deaths.
(a) Aestivo-autumnal	...	...	...	3	1
(b) Single and double tertian	...	...	...	9	0
October	...	...	...	5	
November	...	...	...	3	
December	...	...	...	2	
February	...	...	...	1	
(11 cases; history of chills and fever during summer.)					
April (tertian infection)	...	...	...	1	
(No history of chills and fever during previous summer.)					
Fatal case (aestivo-autumnal infection): Malarial nephritis.					
B. <i>Typhoid Fever and its Sequelae</i> (5 cases).					
(a) Abortive typhoid (October and November)	...	...	...	2	
(b) Obliteration of femoral vein (ten years' duration)	...	...	...	1	
(c) Hemiplegia with athetosis (two years' duration, developed three weeks after attack)	...	...	...	1	
(d) Peripheral neuritis (seen October, 1899, developed ataxia, at present greatly improved)	...	...	...	1	
C. <i>Sequelae of Diphtheria</i> (4 cases).					
(a) Peripheral neuritis (all in children developing during or from two to four weeks after attack)	...	...	...	4	0
Pathological lesion—					
(1) Paralysis of palate in	...	...	...	4	
(2) Ptosis in	...	...	...	3	
(3) Paralysis of iris in	...	...	...	1	
(4) Paralysis of legs developing two weeks after paralysis of palate	...	...	...	1	
(All made complete but slow recoveries.)					
D. <i>Pneumonia</i> (1 case with extensive pleurisy)	...	...	...	2	0
E. <i>Varicella</i>	...	...	...	1	0
F. <i>Parotitis</i>	...	...	...	1	0
(The last two patients were both negro children.)					
G. <i>Febricula</i>	...	...	...	1	
H. <i>Amoebic dysentery</i>	...	...	...	1	
I. <i>Gonorrhoeal Arthritis</i> (five years' duration, girl 15)	...	...	...	1	
J. <i>Syphilis</i> (other than of the liver)	...	...	...	15	0
(a) Secondary (rash appearing five weeks to eight months after primary sore)	...	...	...	9	
(b) Tertiary	...	...	...	4	
(1) Perforation of palate	...	...	...	1	
(2) Periostitis	...	...	...	1	
(3) Arthritis...	...	...	...	1	
(All in women 25 to 40 years.)					
(4) Gumma of scalp	...	...	...	1	
(c) Congenital	...	...	...	2	0
(1) Girl, 18					
(2) Negro child, 3 months.					
K. <i>Tuberculosis</i>	...	...	...	18	5
(a) Pulmonary	...	...	...	15	4
(12 men, 3 women, about equally divided between negroes and whites. 10 under 3 years, 5 over 30 years, greatest number between 20 and 30 years.)					
(b) Peritonitis	...	...	...	1	1
(c) Ulcer of lip	...	...	...	1	0
(d) Lupus (5 years' duration)	...	...	...	1	0

students. Table IV, a page of the report, shows the analysis of the cases of specific infectious diseases. Of course such a rich group of interesting cases could only be obtained through the keen co operation of assistants



Fig. 2.—Clinical laboratory.



Fig. 3.—Clinical laboratory.

always on the look-out after suitable cases to show at this third-year clinic. For the teacher himself this type of class is ideal, only it must be thoroughly practical, theoretical discussions must be tabooed, and the student

must do as much work as possible. It is an ideal way in which to begin the study, as the young men are encouraged to look up the literature, and to visit their own cases whether in the homes or in the wards, and it gives good men an opportunity to show what they could do in the way of presenting the reports.

(c) *The Clinical Laboratory.*

The young medical student needs above all things method and technique, and to be trained early in the use of instruments of precision. In the physiological and pathological classes he becomes adept in the use of the microscope, etc., and when he comes to the hospital side he should have opportunities to apply this knowledge in the study of disease. He may get this haphazard, doing work in the out-patient rooms and in the wards, but it is very much better to have well-organized instruction extending throughout the entire session. In the scheme which we followed each student had his place in the laboratory with a microscope, always a good one, rented to him by the school for £1 a year. Here three afternoons a week throughout the entire session the junior class had routine instruction in clinical laboratory methods. The next two pictures (Figs. 2 and 3) represent the class at work. How much really good work may be done in classes of this sort may be gathered from Emerson's *Manual for the Clinical Laboratory*, which is largely based on material collected by the students. I was fortunate to have in charge of the laboratory such men as Lazier (who sacrificed his life in the yellow fever investigations), Camac, Emerson, and Cole.

In a laboratory of this type the student feels at home, with his own apparatus and reagents; here he can do his private work, always in reach of skilled assistance, and in a scientific atmosphere, as researches were always in progress.

The junior clinical student had plenty to do, with physical diagnosis classes the routine work of the out-patient department, the tri-weekly out-patient clinics, and three afternoons weekly in the clinical laboratory. He had one other class—

(d) *The General Clinic.*

The general clinic, which both the juniors and the seniors attended, and of the organization of which I will speak in a few minutes. You notice that the work of the junior student was almost exclusively in the out-patient department. There are those, I know, who feel that instruction may be better given to him in the wards, and that, as a senior, he appreciates more the out-patient department, but if the out-patient work is suitably arranged, and if teaching is made a predominant feature, there are many advantages in confining the work of the juniors to this section of the hospital. Of course, there is no objection whatever to the teaching of physical diagnosis in the wards, but one has to consider the patients.

SENIOR CLINICAL CLASS.

In the three chief subjects the men were assigned for work in the wards as clinical clerks or surgical dressers in groups of 20 to 25.

(a) Ward Work.

Each morning until 12 o'clock was free for it; the ward visit was made at 9 o'clock sharp. The number of beds assigned to each clerk varied—five, six, or eight, or even more. Under the direction of the house-physician, the clerk took the history and worked up the case, doing



Fig. 4.—Ward visit.



Fig. 5.—Ward visit.

himself the various analyses. For this purpose each clinical clerk had to have his own microscope, rented from the school, and his own place with the reagents, etc., in the clinical laboratory. The ward visit was on the plan with which you are so familiar. I show you a couple of pictures (Figs. 4 and 5) which illustrate its disadvantage—namely, the crowding round the bed—and in the next figures (Figs. 6 and 7) you may see the professor dictating a note or listening to a student making a report. Of a new case the clerk was encouraged to give orally a summary, not to read a full elaborate history. In this

way he was again made to help with the teaching, and, in fact, he was encouraged to do as much of the talking as possible. The Socratic dialogue is the ideal bedside



Fig. 6.—Ward visit.



Fig. 7.—Ward visit

method, in which long harangues are out of place, and, after all, the priceless value of the system is not in the tongue of the teacher, but in the daily routine of personal

contact with the patient, who is really the teacher. The assistants shared the ward work with me, and on alternate days, when I had the out-patient clinic, they made the visit with the clinical clerks.



Fig. 8.—Theatre teaching.

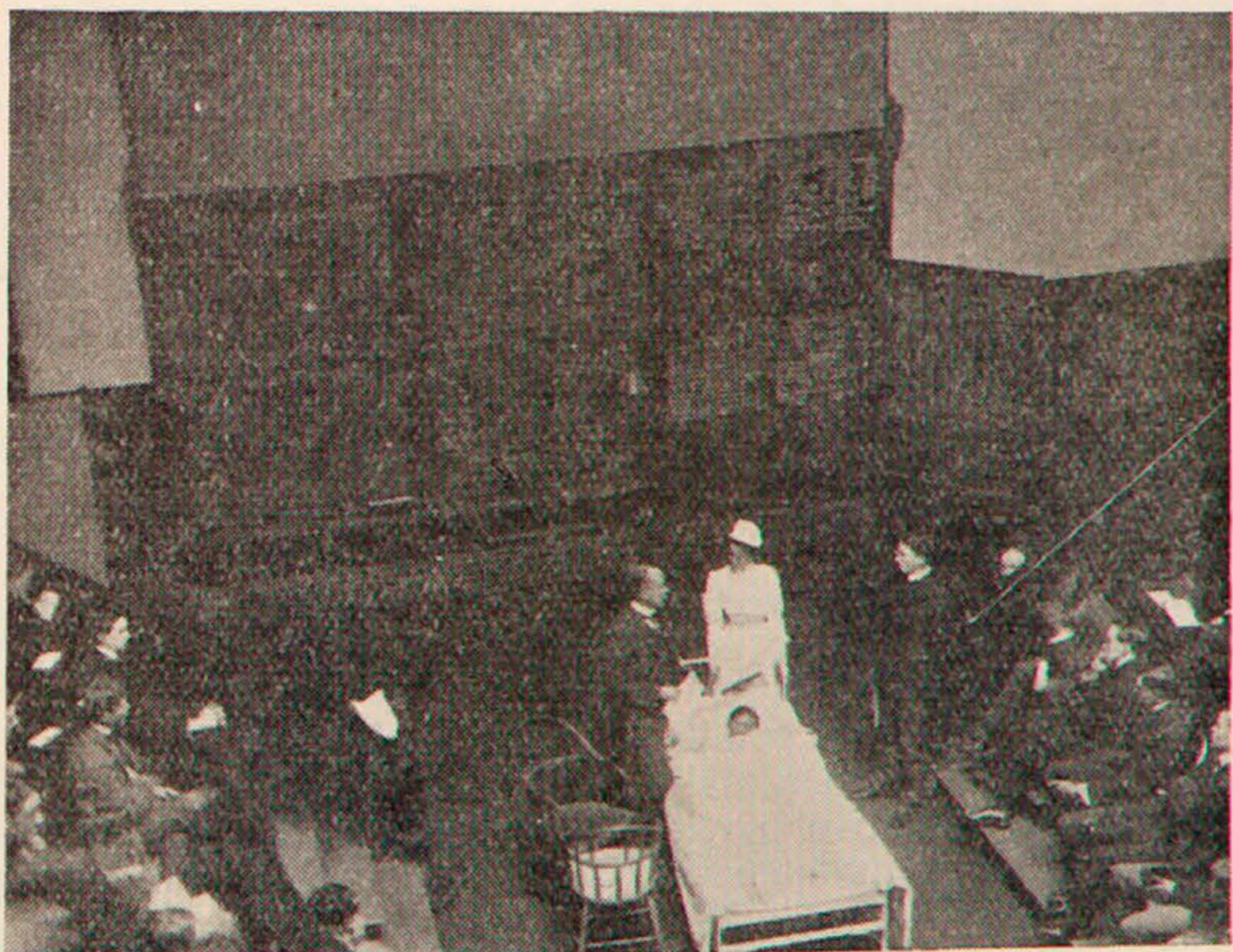


Fig. 9.—Theatre teaching.

(b) *The General Clinic.*

There are several methods of conducting what may be called the theatre clinic of a hospital. In the German method a series of cases is usually presented, on which the professor gives a more or less elaborate lecture. In

France, from the days of Corvisart, the ward visit has been the feature, after which the teacher lectures, usually without the cases before him, on special affections. Sometimes these lectures are extraordinarily complicated. I heard Dieulafoy lecture three successive Saturdays on the same case.

I utilized the theatre clinic largely to present to both the junior and senior students the general work of the wards. These next two pictures (Figs. 8 and 9) illustrate the theatre and the method of teaching. As far as possible we followed the seasons and their acute diseases; typhoid fever and malaria in the early autumn, then pneumonia as the winter progressed. Special emphasis was always laid on the more common affections. The clinical clerk described the main features of the case, if possible without his notes, talking, as I always insisted, to the back benches. This, again, was for a definite purpose—to teach the young fellows to control their vasomotors and to stand and think and talk simultaneously. In response to a question a keen student would give an answer that contributed not a little to the lecture itself. You notice on the second figure of the clinic (Fig. 9) the large blackboards. The lists of cases that you see represent an important feature of the clinic. As I mentioned, its special object was to present, week by week, to the third and fourth year students—all of whom were required to attend—the work of the wards. On the important diseases committees of the students were appointed to report. The tabulated lists on the blackboard represent the cases of typhoid fever and pneumonia entered week by week. Only the typhoid cases with complications were put up, but the entire experience of the clinic with pneumonia was presented. One of the first questions asked was for the chairman of the typhoid and pneumonia committees to report. In the longer list on the blackboard you see for the session 1900–1901 some 60 cases of pneumonia, very many of which were shown at the clinic, and all of which we reported upon. At the end of the session typewritten copies of these lists were circulated among the students. By the end of his fourth year a man could have a knowledge of at least 70 or 80 cases of pneumonia and of the complications of several hundred cases of typhoid fever.

Very special stress was laid upon this side of the work, and here again you see the important feature of making the student an active participant in the teaching. As far as possible groups of cases illustrating special features of disease were presented; very often an assistant participated in and was asked to present a case which he worked up specially. Sometimes we had a symposium conducted by the students. I remember on one occasion, when we had in the wards a number of cases of diabetes, the students held the clinic, and six of them presented the various features of the disease. Of course, they could not let the occasion pass without a joke, and on my table and in their buttonholes were sweet-peas! One last feature

remains to be noticed. The concluding remark always was: What deaths? what *post-mortems*? If a *post-mortem* examination had been held, the clerk whose patient had died was responsible for the demonstration of the lesions. In making it as far as possible a student's affair the clinic may lack the dramatic unity of the French or the thoroughness of the German, but I claim for the method an educational feature of a high order; well arranged by the assistants and students, there is one thing it will not miss—the power to draw large and appreciative audiences.

(c) *Seminar Classes.*

In a very busy clinic there is neither the time nor is there the necessity for systematic lectures, but even in a rich hospital service it is impossible to show the student even types of all diseases, so that it is necessary to supplement in some way the teaching of the wards, the dispensary, and the theatre. We managed this in two ways. One of the assistants held each week what is called a "recitation" class, in which the students were examined upon set subjects given out previously. Sometimes textbook chapters were put down for study, sometimes journal articles, and, as far as possible, the important literature of the subject discussed was placed on the table. In this way one feels sure that the student gets at least some knowledge of the more obscure and less common maladies.

Then, a couple of years before I left, the assistants and the clinical clerks started a weekly *seminar*, in which, seated about a long table, the important recent contributions in the literature usually to the diseases under observation were reported upon and discussed.

(d) *Research.*

The third function of the clinic is organization for research, a side of the work which presents many difficulties. If a laboratory man, the professor may neglect patients and students, and if an old time bread-and-butter clinician he may neglect the laboratory side. He sets the pace, but one thing is certain, that in a university clinic the interest of the student should be paramount.

Every patient presents problems for research, and the clinical clerk should be able to carry out the necessary investigations. For this purpose there must be skilled assistants, directly attached to the clinic, who are able to advise and control his bacteriological, chemical and physiological studies. For example, in pneumonia and in typhoid fever the bacteriological work should be done under skilled supervision, and the clerk should be able to make his own blood cultures or to plate out a stool. In gout and diabetes he should carry out his own chemical studies with the help of a trained clinical chemist in a laboratory attached to the clinic; and in a case of heart-block he should have at hand all the graphic and electrical apparatus necessary for this study. The student should

himself carry out researches, particularly if he comes into the ward with a good chemical training. With reference to the arrangement of the laboratories one of two plans may be followed. In very large hospitals they may be concentrated in one building and even combined with pathology, but in the university medical clinic there are great advantages in having small laboratories of bacteriology, chemistry and pathological physiology associated directly with the wards.

In every university department the chief research must be done by the young assistants and special students under the direction of the chief, who fertilizes them with ideas. Here again it is a matter largely of organization, only I feel strongly that however important research may be every man associated with the clinic should take his share in teaching, and should be made to feel that the student is the pivot round which the machine works. Research becomes very absorbing, and in some men fosters a seclusive selfishness that is most deplorable. I can testify in an interesting way to the large amount of good work that may be done by the students and young assistants. When I left the Johns Hopkins Hospital, the graduates of the first eight years of the medical school presented me with twelve handsomely bound volumes containing just five hundred contributions they had made.

As briefly as possible this is a summary of my life as a clinical teacher. At a farewell dinner given to me by the profession of the United States and Canada, I expressed the pious wish that my epitaph should be, "He introduced routine bedside teaching into the United States"; and I think I may claim for my colleagues that in all the departments of the Johns Hopkins Hospital the English and Continental systems of teaching were combined with great advantage.

A FORECAST.

Now, in a few concluding words, let me give you a forecast. I designedly took this subject for my address because the future is with you young men, who are certain to see within the next few years radical changes in the medical schools of this country. There are two important problems. Is it possible to organize in the English hospitals university clinics such as exist on the Continent, and such as those which we had at the Johns Hopkins Hospital? There are difficulties, of course, but they are not insuperable, and, once started, clinics of this type will be instituted in every school in the kingdom. Only let them be complete; the chief in full control, responsible for the teaching, responsible for the work of his assistants, and let them be well equipped with all modern accessories for research. The other problem is more difficult. Shall the director of such a clinic devote his whole time to the work, or shall he be allowed to take consulting work? For the former many advantages may be claimed, though the plan has nowhere yet had a practical trial. The amount of work in a modern clinic is

enormous—quite enough to take up the time and energies of any one man in conducting the teaching, treating the patients, and superintending the researches. Then it is attractive to think of a group of super-clinicians, not bothered with the cares of consulting practice, and whose whole interests are in scientific work. It is claimed that as much good will follow the adoption of the plan of whole-time clinicians as has followed the whole-time physiologists and anatomists. Against it may be urged the danger of handing over students who are to be general practitioners to a group of teachers completely out of touch with the conditions under which these young men will have to live. The clinician should always be in the fighting line, and in close touch with the rank and file, with the men behind the guns, who are doing the real work of the profession. The question, too, is whether the best men could be secured; whether academic and scientific distinctions would satisfy these men. Then for the hospital itself, would it be best to keep our best in clinical seclusion? Would there not be the danger of the evolution throughout the country of a set of clinical prigs, the boundary of whose horizon would be the laboratory, and whose only human interest would be research? I say frankly that I am not in favour of the whole-time clinical teacher. This is not surprising, as my life has been largely spent in association with my professional brethren, participating in the many interests we have had in common. At the same time let me freely confess that I mistrust my own judgement, as this is a problem for young men and for the future. I know how hard it is “to serve God and mammon,” to try to do one’s duty as a teacher and to live up to the responsibility of a large department, and at the same time to meet the outside demands of your brethren and of the public. And if added to this you have an active interest in medical societies, and in the multifarious local and general problems, the breaking point may be reached. I had had thirty-one years of uninterrupted hard work. William Pepper, my predecessor in Philadelphia, died of angina at 55; John Musser, my successor, of the same disease at 53! After listening to my story you may wonder how it was possible to leave a place so gratifying to the ambitions of any clinical teacher: I had had a good innings and was glad to get away without a serious breakdown.

REMARKS ON THE DIAGNOSIS OF POLYCYSTIC KIDNEY

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REMARKS ON THE DIAGNOSIS OF POLYCYSTIC KIDNEY ¹

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POLYCYSTIC kidney in the adult is not often recognized. It is a rare disease, but, following the law of dual coincidence, there are two cases at present under observation. In the patient before you, a woman, aged 52, sent by Dr. Hayward, of Abingdon, the diagnosis has already been made by Dr. Thompson, the house physician. She is thin, semicomatose, with purpuric spots about the face, and there is a blood-stained fluid oozing from her mouth. She is very apathetic, and it is difficult to get her to reply to questions. Interesting and, in my experience, unique features are seen on inspection of the abdomen. It is enlarged, particularly in the flanks, which bulge. But what catches the eye at once, particularly on the right side, are large, hemispherical projections between the navel and the costal borders. On the right side there is a whole series—one as large as an orange above the level of the navel, while below, extending to Poupart's ligament, are half a dozen, ranging in size from a small marble to a large walnut. On the left side they are smaller, but very distinct, particularly as the tumors descend on inspiration. It is a very remarkable pattern of abdominal tumidity—the bilateral swelling, the marked prominence of the flanks, and the hemispherical projections seen beneath the thin abdominal wall. One could not go far wrong in making the diagnosis on inspection alone of bilateral cystic kidneys. On palpation large tumors can readily be felt passing posteriorly deep into the flank, and firm, resistant cysts of various sizes project from the surface. The heart does not appear to be much enlarged, the arteries are sclerotic; the urine is very scanty, with a low specific

¹ Radcliffe Infirmary, Oxford, November 23, 1914.

gravity, and contains numerous hyaline tube casts. The history of the case is remarkable. At the fourteenth year she had the first attack of hæmaturia, with colic, and naturally the diagnosis was made of stone. These have occurred at intervals, sometimes of a few months, sometimes of a year or more, but she has had fairly good health, and has been able to work hard. About two years ago she had a uræmic attack. Last year, for the first time, the tumor on the right side was detected. She had felt the abdomen increasing in girth; she was at that time much stouter, and a well-known gynæcological surgeon suggested that it might be an ovarian tumor. Within the past few weeks she has had constant vomiting, has been very drowsy; a purpuric rash has broken out, and there has been slight bleeding from the gums. She has grown progressively worse, and is in a very critical condition.

[The patient died the next day, unfortunately, before a photograph was obtained of the abdomen. The post-mortem showed enormous bilateral cystic kidneys. The large cyst on the right side extended into the pelvis, and was in contact with a small pedunculated fibroid of the ovary—a very puzzling condition, I should think, for a gynæcologist. The colon was completely pushed aside and lay to the left of the kidney. As is often the case, the liver contained numerous cysts; one on the upper surface of the right lobe was larger than the fist, and was filled with a clear fluid. The heart was not enlarged, but the arteries were sclerotic.]

The other patient, a woman, aged 39, has been admitted once or twice to the surgical side, where, too, the diagnosis has been made. She is, as you see, very healthy looking, not thin, and with a good color. About ten years ago, after an aching feeling in her right side, she passed two stones, with hæmaturia. Since then she has had several attacks of pain, associated with passage of blood, and twice she has passed small calculi. In the intervals the urine has always been clear, and it now has a specific gravity of about 1.014, and is without albumin.

On inspection of the abdomen, the flanks bulge, more to the left than the right, but there is no special prominence in front. On the right side a large tumor occupies the flank, passes high beneath the costal border and into the epigastric region, and below reaches

to the level of the anterior superior spine. The colon can be felt passing over the tumor, the surface of which presents numerous irregular bosses or projections. On deep palpation from behind the tumor mass can be moved forward, and lifts the skin. The left side is occupied by a smaller mass with similar characters. The liver is not enlarged. The superficial arteries are palpable, the blood-pressure is only 130 mm., the apex beat cannot be felt, the heart does not appear to be large, and the aortic second is not specially accentuated. There are no other special features on examination. Her eyes are normal. The X-ray picture shows, on the right, three or four small shadows, suggestive of stones, far away from the kidney position, but quite within the limits of the tumor mass.

The pathology of polycystic kidneys has been much discussed. They are often congenital, and the tumors may be at birth of enormous size. They may be associated with other anomalies. They may be quite small at birth, as in a child with several congenital malformations, in whom both kidneys were slightly enlarged and uniformly occupied by small, just visible cysts, lined with epithelium. A very remarkable feature is the hereditary character. In 1902 I reported the case of a man, aged 39,² whose mother died of the same disease. As the subsequent history of the case has never been given, I may state that between 1902, when I saw him, and 1906, when he died of uræmia, he had many attacks of hæmaturia, and the kidneys increased greatly in size. The right kidney weighed 4370 grammes, the left kidney 5270 grammes. Three cases have been reported in one family, and a woman has been known to give birth to five children in succession with the disease. The origin of the condition has been much discussed, but the view put forward by Koster is probably correct, that in an error of development there is failure in the union of the secretory and collecting tubules, which develop separately. Very strong confirmation of this view has been recently brought forward by Forssman,³ who, studying the problem by the method of reconstruction, arrives at the conclusion that there is a failure of the union of the collecting canals, which develop from the ureter section, with the tubules of the metanephric portion. His

² *American Medicine*, vol. iii, p. 951.

³ *Ziegler's Beiträge*, vol. lvi, 1913, p. 511.

paper is illustrated by many figures showing an interruption in the development and the failure in many places of the union of the two systems. An extraordinary feature is that they may remain stationary for years, and then somewhat rapidly increase in size. This has been the case with two patients I have studied, and Dr. Alfred King, of Portland, Maine, noted within three years rapid growth. They may remain of very moderate size until middle life. The condition is consistent with robust health for many years.

Early and common symptoms are pain and hemorrhage, which lead to the diagnosis of stone. Hæmaturia may be a predominant feature for years, and it has to be borne in mind that this is one of the causes of obscure recurring hemorrhage. In 1907 I saw a lady, aged 60, who had led a life of unusual physical vigor. From childhood she had had at intervals hæmaturia, for which she had consulted numerous physicians on the continent and in this country. She had many letters about her case, in which she herself took a very intelligent interest. The bleeding had recurred at intervals of about eight months. She did not think that from her girlhood she had ever passed six months without an attack. One of her physicians—I suspect Sir William Gull—told her not to bother as it was of no more moment than nose-bleeding. I could not get from her that he used the term renal epistaxis, which has been attributed to him. When I saw her the diagnosis was simple enough—enormous bilateral tumors, with irregular surfaces, sclerotic arteries, colossal heart, with apex beat in the axilla, low specific gravity of the urine, and oncoming uræmia, of which a few weeks later she died.

Hæmaturia has been present in five out of the six cases in adults of which I have notes. The urine usually presents the features characteristic of chronic interstitial nephritis—constant low specific gravity, with a slight trace of albumin, hyaline tube casts, and there may be constantly a small number of red blood-corpuscles. Associated with these are the usual cardiovascular changes of chronic nephritis—sclerotic arteries, high tension, except in the last stages, and hypertrophy of the heart. These features have been well marked in four of the six cases. In one, as I have already mentioned, the enlargement of the heart was enormous. I do not know that I have ever felt an apex beat so powerful or so far to the left. On the other

hand, in the cases at present under observation, the cardiovascular changes are not marked, and at post-mortem in the first case the heart was not at all enlarged.

The physical signs are distinctive. No other condition gives the same picture of bilaterally enlarged kidneys with numerous elevated projections, and usually one kidney is much larger than the other. Occasionally, when unilateral, it would be difficult to distinguish the condition from hydronephrosis. In the second case the passage of calculi would suggest an ordinary hydronephrosis, but I do not think it at all likely, as the urine is clear, except during the spells of hæmaturia, and she has never passed pus. The type of dendritic calculus may be associated with progressive increase in the size of the kidneys and a gradual onset of chronic interstitial nephritis, with sclerotic arteries and enlarged heart. There may be no colic, extraordinarily little pyelitis, and progressive hydronephrosis may follow. In such cases the tumors are not very large, and I think it much more likely that this patient has bilateral cystic kidneys complicated with calculi.

When affecting one kidney the tumor has been mistaken for an ovarian. In rare instances, as I have already mentioned, it is unilateral, but, as a rule, both kidneys are involved, so that removal of one deprives the patient of so much valuable secreting tissue. A fatal uræmia has followed the removal of the larger of two cystic kidneys, so that surgeons now make it a rule to examine both organs before attempting to remove one.

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THE WAR AND TYPHOID FEVER.

BY

SIR WILLIAM OSLER, BART., M.D., F.R.S.,

Regius Professor of Medicine in the University of Oxford.

(Paper read at a Meeting of the Society of Tropical Medicine and Hygiene, Friday, November 20th, 1914).

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I.

From the days of Homer, Apollo, the far darter, has been a much more formidable foe than his colleague Mars. With the two in conjunction unspeakable woes afflict the sons of men. In his great strait David, you remember, chose three days of pestilence as the equivalent of three months' military disaster. To-day the front of Mars is wrinkled, the world is at war, and the problem for the children of Aesculapius is to keep grandfather Apollo from taking a hand in the fray. In this game another member of the family, Hygeia, holds the trump card and gives victory to the nation that can keep a succession of healthily efficient men in the field. The Empire is confronted with a great task, in the successful performance of which the medical pro-

fession may play a leading part. For generations the health of the army and navy has engaged the attention of the very ablest men in our ranks. Let me quote a sentence written in 1785 by GILBERT BLANE, a pioneer in sanitation, and as true to-day: "The great importance of the subject (that is, prevention) will plead my excuse for again calling to mind that such attentions are not only dictated by humanity, but would be the greatest wisdom in an economical and national light, considering how expensive it is to *replace* men and to support invalids, not to mention that it is upon the health and lives of men that every public exertion essentially depends, and upon which even the character of officers in the day of battle may depend."¹

Of the camp diseases, typhus, malaria, cholera, dysentery, and typhoid fever, it is a reasonable hope that the armies of the West will escape the first three. Dysentery is pretty sure to cause trouble; but with regard to enteric fever we are on trial as a nation and as a profession, in what way it will be the object of this address to shew.

The nineteenth century saw the discovery of the cause of typhoid fever, the recognition of its transmission through polluted water or milk, and the enforcement of sanitary measures, which have caused a steady and gratifying reduction in its prevalence. Those of us brought up upon the writings of SIMON, BUCHANAN, BUDD, and MURCHISON, and convinced of the truth of the water-borne and milk-borne theories, were often confronted with epidemics in schools and barracks and private houses in which it was not possible to trace the infection to either of these sources. Yet experience lent little support to a doctrine of direct contagion. There was some other factor. Even with the purest supply of water and of milk, cases would crop up and local outbreaks occurred. Within the past ten or fifteen years we have not only filled gaps in the etiological picture, but we have added so many details that the canvas is approaching completion. Let me dwell upon four points in our new knowledge.

I. THE IMPORTANCE OF THE INDIVIDUAL CASE AS A FACTOR IN INFECTION.

Though the infectiveness was recognised, only within the past decade have clinicians made it an essential feature to completely sterilize the dejecta, urine and fæces, and to avoid all possible contamination about the patient. As in surgery, we have changed the antiseptic to an aseptic

battle, and nowadays the physician feels as keen a duty to keep the surroundings of a patient sterile as to treat his symptoms.

This in itself is a great gain, as the possibility of the abolition of the disease is a problem of the sterilization of the individual cases as they occur. I cannot here enter into the question of the methods of conveyance, but it is sufficient to say we have recognised fingers and flies as two of the chief, and the special liability in houses and wards of food contamination.

II. RECOGNITION OF THE PROTEAN CHARACTER OF THE DISEASE.

Not only are there differences in the germ that causes typhoid, but the clinical picture itself varies from the text-book standard very much more than was dreamt of by LOUIS, BUDD, FLINT, or MURCHISON. A transient febrile attack, a slight diarrhoea, bronchitis, acute nephritis, an attack of pneumonia, cholecystitis, acute pyelocystitis, may be a manifestation of the infection. In endemic areas mild, indefinite illness in children may be due to the typhoid bacillus. The organism, indeed, may lodge and live in an individual without ever causing symptoms, and then acutely excite an illness without a trace of resemblance to the disease we usually associate with its name. One of the first cases in which this was recognised I saw with Dr. CUSHING in Dr. HALSTED'S wards—a woman, aged 26, who had a clean bill of health except for occasional attacks of abdominal pain and vomiting. It was evident at the time of examination that she had acute cholecystitis. Dr. CUSHING removed fifteen large gall stones; pure cultures of the typhoid bacillus were isolated from the mucous contents of the bladder. Here was a woman who had never had, so far as could be ascertained, typhoid fever, and yet she had probably had for years the organism in her gall bladder, which had ultimately caused the formation of the stones. This case at the time unique, is no longer so. In the Spanish-American war, and in the South African war, there were an extraordinary number of mild ambulatory cases, which in the former were frequently reported as malaria. In public health work it is all-important to recognise these mild atypical cases. Dr. CHALMERS, in the Health Report of the City of Glasgow for 1913, calls attention to the simulation of enteric by mild pneumonia and by intestinal catarrh.

Eight cases of enteric appear to have originated from an undetermined case of the latter in a child.

III. THE DISCOVERY OF TYPHOID CARRIERS.

Briefly stated, in from 1 to 3 per cent. of cases of enteric fever the bacilli do not disappear from stools or urine. The patient becomes a chronic carrier and a possible menace to the community. It has been estimated that, in countries in which typhoid fever prevails, the typhoid carriers number from 2 to 3 per 1,000. Infectivity may exist for years, and scores of small epidemics have been traced to carriers. How persistent the infection may be, and how difficult to get rid of, is well illustrated by the case studied for the past five or six years by DAVIES and WALKER HALL, of Bristol. The patient had enteric in July, 1905, and eight instances of infection had been traced to her. The special interest in the case is the careful study of the different plans of treatment and the variability of the presence of the organisms in the urine. They were also isolated from her blood five years after the original attack.² The relation of the carrier to public health is of vital importance, particularly the question of the detention of notorious carriers who follow dangerous occupations. The New York Board of Health was judged to be within its rights when an action was brought against them for the illegal detention for three years of the celebrated "Typhoid Mary." Carriers should not follow the occupation of cooks, butchers, grocers, as the fingers deposit bacilli on everything they touch, unless scrupulous attention is paid to cleanliness after defæcation. The good effect of precautionary measures in the case of chronic carriers is illustrated by the report of LENTZ from the Oberstein district.³ For ten years the disease had been endemic, and then a systematic attempt was made to discover the carriers, of whom six were found in 1894, two in 1897, and one in 1898. They were practically all mothers with large families. It was impossible to enforce vigorous methods of isolation, so that repeated warnings were given, and instructions as to scrupulous cleanliness, particularly after defæcation, never to touch an article of food without a systematic washing of the hands, and having their under-linen carefully sterilized. The fever in the district has practically disappeared.

IV. IMMUNISATION.

Lastly, and the most important point of all, is the discovery of immunisation against the disease, for which we are indebted to the brilliant investigations of Sir ALMROTH WRIGHT. The net result of the enormous amount of work which has been done since the publication of his first paper—September, 1896—is that, for a time at least, man may be immunised safely and surely. It is only by the statistical method that we are able to judge of the results of the practice. While in a way this is unfortunate, as figures have an extraordinary mobility as manipulated by different individuals, still, practical men have to use them and to form judgments by their help. The new iatro-mathematical school of KARL PEARSON and his scholars have made the profession cautious in drawing results from statistics; but in the matter under consideration the figures are, I believe, trustworthy. I will only give a few, the more important.

For many years the death-rate from typhoid fever in the United States has been very high. The disease prevails widely in the country districts. During 1912 it was 16·5 per 100,000 of the population—the lowest for many years. Antityphoid inoculation was voluntary in the U.S. army from 1909 to part of 1911; it was made compulsory in part of 1911 and in 1912 and 1913. Major RUSSELL's last report, dated May 2nd, 1914,⁴ gives the following figures:—

Typhoid Fever, 1907 to 1913, for the whole Army, Officers and Enlisted Men, American and Native Troops.

Year.	Mean Strength.	Cases.		Deaths.		Percentage of Total Cases.	Occurring among those who were Vaccinated.	
		No.	Ratio per 1,000 of Mean Strength.	N.	Ratio per 1,000 of Mean Strength.		Cases.	Deaths.
1907	62,523	237	3·79	19	0·30	8·0	—	—
1908	74,692	339	3·20	24	0·31	10·0	—	—
1909	84,077	282	3·35	22	0·26	7·8	1	0
1910	81,434	198	2·43	14	0·17	7·1	7	0
1911	82,802	70	0·85	8	0·10	11·4	11	1
1912	88,478	27	0·31	4	0·044	14·8	8	0
1913	90,646	3	0·03	0	0·0	0·0	1	0

Major RUSSELL states that no harmful effects have been produced. The newspaper reports of death following antityphoid inoculation in the United States have been shewn to be erroneous. In the case of Private Pantzer, of the National Guard, Brooklyn, death was shewn to be due to malignant endocarditis, and in no way the result of inoculation.⁵ The value of these results must be taken in connection with the fact that in many places the barracks are situated in districts in which typhoid fever prevails. In 1911 and 1912 there was a concentration of many thousands of United States troops on the Mexican border in localities quite as favourable to the spread of enteric as in the Spanish-American war.

Apart from vaccination, there has been in all armies a reduction in the number of cases of typhoid fever; thus, between 1882 and 1909 the incidence of the Prussian army dropped from 6·7 per 1,000 to 0·4, while in the same years in the French army a reduction from 16·6 to 3·4. But the special value of the experience of the American army is the remarkable drop in the case incidence which followed antityphoid inoculation without special change in the sanitary environment of the troops. An interesting comparison is reported⁶ of two divisions stationed in nearly the same latitude for about the same length of time each on a good site, with artesian water of unimpeachable purity. In the one at Jacksonville, Florida, in 1892, among 10,759 men there were 1,729 certain cases, probably 2,693 (the question of diagnosis of typho-malaria, etc.), with 288 deaths. In San Antonio, Texas, in 1911, among 12,659 men, all inoculated, there was one case of typhoid fever, and no death. In France the results appear to be equally satisfactory, and there is no country in which measures of protection are more needed, as during the past twenty years among the French troops in France there have been 66,000 cases, with 10,000 deaths.⁷ Professor VINCENT reported to the International Medical Congress last year that among 30,325 vaccinated men no case occurred, while in the unvaccinated the case-rate was 2·22 per 1,000 in the metropolitan troops and 6·34 in the colonial. Specially good results have been met with in Algiers and Morocco, where the inoculation is compulsory, and the incidence per 1,000 has fallen from 15 to 5. A striking illustration is reported from Avignon by PAGET, in a recently issued Research Defence Society pamphlet. Out of 2,053 men 1,366 were protected and 687 were not. The non-protected had 155

cases with 21 deaths; the protected had not a case. The Italian experience in Tripoli shews that the incidence of the disease among the unvaccinated was 35·3 per 1,000, while among the vaccinated the incidence for those inoculated once was 1·34 per 1,000, for those inoculated twice 1·65, and for those inoculated three times 0·49. The most careful study of the statistics for the British army are those presented in the report of the Antityphoid Committee, 1912:—"The histories, as regards typhoid fever, of 19,314 soldiers, whose average period of service abroad was twenty months, were carefully followed, and every precaution possible was taken to verify the diagnosis bacteriologically. Of this number 10,378 were inoculated and 8,936 not inoculated. The case incidence of typhoid fever among the inoculated was 5·39 per mille, and among the non-inoculated 30·4 per mille.

"There is no reason for supposing that this difference can be attributed to a want of homogeneity between the two groups. The age distribution among inoculated and non-inoculated was approximately the same. They were intermingled and lived under identical conditions."

The profession is greatly indebted to Sir WILLIAM LEISHMAN and his colleagues, HARRISON, SMALLMAN, and TULLOCK, for the good work they have done in connection with this subject.

SYMPTOMS FOLLOWING INOCULATION.

As in this country the practice is voluntary, and as in certain quarters opposition has been offered, I have thought it well to collect data of any untoward effects, and I have to thank many correspondents who have replied to my note in the *British Medical Journal* of October 10th. In the first place it may be stated that with ordinary care and precautions large bodies of troops may be successfully inoculated with extraordinarily little discomfort or disability. Colonel HODGETTS has kindly given me the figures of the recent inoculations of the Canadian contingent, some 31,000 strong, made under his supervision in the camp at Valcartier in the Province of Quebec. Of the total number only one had a local abscess at the site of injection, and there were no serious sequelæ. This may be said to be an exceptionally good record. The inoculations in this country during the past three months have been on a larger scale than ever before attempted, and considering the enormous number—several

hundred thousand—the serious sequelæ have been very few. We may group the symptoms as follows :—

1. A varying proportion no symptoms, other than a little headache or malaise, with slight redness and swelling at the point of inoculation.

2. A large proportion run a normal course of what may be called the inoculation fever, which has many resemblances to the so-called serum sickness. The temperature rises within ten or twelve hours, sometimes with a slight feeling of chilliness, and vomiting may occur. There are headache, fugitive pains in the back and joints, sometimes abdominal tenderness, and for twenty-four or thirty-six hours the patient may feel very badly. In mild forms the temperature rises to 101° or 102° ; in the more severe to 103° and 104° , or even higher. Sometimes there is diarrhœa; in other cases, perhaps in the majority, there is constipation. Giddiness and fainting are reported, and one physician within the first ten days had curious nervous symptoms, feelings of apprehension, and a transient state of neurasthenia. He felt inability to control his muscles, and dreaded lest he should be unable to avoid some impulsive act. There was a slight mental disturbance, and he had what he called “dreadful feelings,” and had difficulty in forcing himself to do the simplest acts. In the North Midland Division, among nearly 16,000 inoculated, a man, two days after inoculation, had marked mental symptoms suggestive of confusional insanity, which, fortunately passed away. I saw with Dr. COLLIER an officer whose case was very fully reported to us by Dr. JOYCE of the 4th Royal Berkshire Regiment. He was inoculated on September 14th and, after the usual slight local and general symptoms, on the 17th the temperature was normal. On the 18th he had giddiness, and on returning to his billet when the door was opened he mistook the parlourmaid for the colonel, and raising his hand to the salute overbalanced and fell unconscious. He had a few days' leave, and some weeks later had several giddy attacks.

Heavy exertion and exposure within twenty-four hours after inoculation may be followed by sharp general symptoms. In connection with the abdominal pains that may occur, it is interesting to note that Professor BOYD of Winnipeg, now associated with the 3rd North Midland Field Ambulance, reports two cases (admitted on the same day) with appendicitis—one on the third day after inoculation, the other within twenty-four hours. Both had acute perforation. There

have been several reports of sharp localised pain in the region of the caecum, with slight diarrhoea. The highest temperature recorded in the notes sent to me (Professor BOYD) was 106.4° , four days after inoculation.

In what may be called the normal course there is oedema and redness at the site of inoculation varying in extent, and several correspondents have noted a curious migration of the erythema downwards towards the elbow, and even reaching to the wrist. Blotchy erythema may occur about the joints, and purpura has been noted.

CASES WITH UNTOWARD EFFECTS, LOCAL OR GENERAL.

(a) *Locally*, the redness, swelling, tenderness rarely persists for more than a day or two, and may be equally marked at both inoculations, or may be slight at the first and abundant at the second, or *vice versa*. The local process may go on to suppuration. How rare this is may be judged from the experiences of the Canadian contingent already referred to, in which only one abscess occurred among some 31,000 cases. This is, indeed, a remarkable record, so I doubt if there is any hospital in the kingdom in which during a year's experience abscess does not follow some form of hypodermic injection. I have had no report of severe sepsis following the local abscess. Lance-Corporal Goatley, whose case has been exploited by the "antis," had a septic wound, which proved, on investigation by Surgeon-General WHITEHEAD, to be an abscess following ordinary vaccination for small-pox, and the report states that the bad arm directly followed from his own neglect. And I may state that he was not discharged from the army for ill-health due to the vaccination.

(b) *General*.—The inoculation fever and its symptoms rarely last more than a couple of days; but in a few cases unpleasant, or even serious, complications may follow.

With the fever there may be pains in the joints, superficial redness, and even effusion. A patient was admitted to the base hospital, Oxford, with effusion in the left knee, following antityphoid inoculation three weeks previously. It resembled a gonorrhœal synovitis, but there was no urethral discharge. I have already referred to the abdominal pains on pressure in the caecum region and the coincidence of appendicitis in two cases. Jaundice has been noticed in a few instances. There

were four in the North Midland Division, coming on about a week after inoculation (BOYD). Symptoms suggestive of enteric, and enteric itself, may follow inoculation.

Dr. WALTER BROADBENT, of Brighton, sends a report of a case: Second inoculation on October 13th, followed by headache and pains in the limbs on the 14th, then fairly well until the 20th, when he had headache, a temperature of 103.4° ; on the 21st the temperature ranged from 101° to 102° , on the 22nd from 98.6° to 102° , then gradually fell to normal. On the 26th the tongue was very furred, there were no spots, but there was a positive Widal reaction on the 24th. The case was not treated as enteric.

In a case, the notes of which were sent by BOYD, the second dose, given on October 16th, was followed by sickness and giddiness. On October 19th and 20th he had diarrhoea, for which he saw the regimental medical officer. On October 23rd he was seen by the surgeon of the 1st North Midland Field Ambulance, who found him with a temperature of 101.5° , constipation, rose spots, slight abdominal tenderness, large spleen. After consultation, it was decided that it was a typical typhoid case, and he was sent to the 2nd General Hospital, London.

Occasionally septic fever follows unassociated with the local lesion. A case of this type, under the care of Colonel HOOD and Dr. HOBHOUSE at Brighton, I had the privilege of seeing at the height of his illness. I am indebted to Dr. HOBHOUSE for the notes:—

On October 23rd I saw at Brighton, with Dr. HOBHOUSE and Dr. HOOD, Private Walter Fuller, aged 23, No. 8 Bedfordshires, who had his first inoculation on October 3rd. Slight headache on the 4th, with fugitive pains, but he did not feel badly until the 7th, when there were fever and pains in the joints. On admission to hospital on the 9th the temperature was 102.5° . On the 11th his temperature was 104° , much pain, particularly in the joints, slight swelling and redness of the ankles and the smaller joints of the hands, with great stiffness and inability to use the muscles. On the 17th he began to have pain in the chest, with signs of involvement of the right base. On the 18th the leucocyte count was 15,300 per cubic millimetre, the pains in the chest were worst, he had cough, and the consolidation in the right lower lobe had increased. The Widal reaction was markedly positive. Between the 16th and the 23rd the temperature rose to about 103° each

day, there were pain and swelling in the joints, redness over the ankles and knuckles, and much disability. When I saw him on the 23rd he looked very ill, the respirations were 40, pulse 100, the small joints of both hands shewed swelling with slight erythema, tenderness on pressure and on movement, redness over the left ankle, moderate effusion in the left knee-joint and right elbow, consolidation of the right lower lobe, and left pleural effusion reaching to the fourth rib in front. The heart sounds were clear; the spleen was not palpable. There was no redness or swelling at the site of inoculation. The patient remained very ill for the following week, although the temperature was lower, rarely going much above 102° . There was a to-and-fro pericardial murmur. The patient then began to improve, and on October 30th the temperature for the first time fell to 99° . Between October 30th and November 5th it fluctuated around 100.5° , and then fell to normal. The smaller joints remained painful, and it was not until November 11th that he began to use his hands and arms. He is now convalescent.

In the same ward I saw, with Dr. HOBHOUSE, a man with dermatitis in the region of one axilla, which had spread rapidly after inoculation. He had symptoms suggestive of peripheral neuritis, stiffness of the arms, and loss of the knee-jerks. He had had zinc ointment used for a very large area, which Dr. HOBHOUSE thought might possibly be the cause of the neuritis.

The importance of avoiding exposure for a day or two after inoculation is emphasised by the fact that cases of pneumonia have been reported by several observers. In the North Midland Division series, among nearly 16,000 instances, in two cases lobar pneumonia followed within twenty-four hours (BOYD). Pneumococci were present in the sputum in both cases.

Private G. B. Jones, 12th Sherwood Foresters, reported by Dr. WALTER BROADBENT, was inoculated October 6th; chill on the 7th, and on the 8th was admitted to the 2nd General Eastern Hospital with pneumonia of the middle and lower lobes on the right side, and the lower lobe on the left, with a temperature of 103° , pulse 120, and much delirium. He had a very severe illness, and died on October 14th.

Reports of death as a result of the inoculation are false. Dr. SELBY wrote from Aldershot (October 17th, 1914):—

This morning I was trying to persuade my Kitchener army men to be inoculated, when I was confronted by one man who said he went down to Shorncliffe last week-end and that there they had told him that three men had died within twenty-four hours of inoculation.

I wrote to Colonel WILSON, who replied (October 21st, 1914) that there had been no death from this cause, and giving particulars of the fatal cases from accident or disease since the formation of the camp.

The Beaujon Hospital nurse, Paris, whose case is so often quoted, died of typhoid fever a month after the last inoculation. She might very possibly have contracted the disease previously. The Neckar Hospital nurse received therapeutic injections of typhoid serum during the course of the disease, not a protective inoculation.

Private Pantzer of the National Guard, Brooklyn, died of malignant endocarditis and the inoculation had nothing to do with his fatal illness.⁸

II.

Perhaps the best chapter in British sanitation is that which deals with typhoid fever. While a decrease in the incidence of the disease has been more or less general throughout civilised countries, nowhere else has the fall been so progressive and striking. Twenty years ago the death-rate per 1,000,000 of inhabitants was about 300; in 1912 it had fallen to 44, the lowest ever recorded; indeed, up to 1904 the rate had never fallen below 100. Enteric fever may be said to be in its "last ditch," but that it is still putting up a strong fight is indicated by 1,600 deaths in England and Wales in 1912. It prevails less in London than in the Midlands and in the South, and is much more frequent in the North, in both urban and rural districts. In certain urban districts the highest case-rate per 100,000 of the population was 34. In many of the large cities in the North, as in Liverpool and Glasgow, in which the disease was very prevalent, the fall has been progressive and rapid. In the former city in 1895 there were 1,300 cases. In 1911 it had fallen below 200. In Glasgow the case-rate per 1,000,000 has fallen from 1,386 in 1891 to 232 in 1913, and the death-rate per 1,000,000 from 218 in 1891 to 36 in 1913. General betterment of sanitation, particularly improved housing, better diagnosis,

greater care of the individual cases—to these factors may be attributed a large part of this decrease. But there is another to which the attention of the medical officers of health has been strongly directed—namely, the removal of local sources of infection by the isolation of the sick in hospitals,⁹ in which in some cities the proportion of cases treated has risen from 30 or 40 per cent. to 80 and 90. It has been well said that enteric fever is the sanitary index of a country; and that to-day our camps are not hotbeds of the disease is the result of more than half a century of intelligent and efficient sanitation.

Neither the profession nor the people at large appreciate fully the extraordinary sanitary advantages enjoyed by this country. In medical practice, if I were asked to state the most striking difference between England and the United States and Canada, I should say the absence of enteric fever in hospital and private work. The tragedy of typhoid fever was ever present, and one felt constantly outraged at the wantonness of the sacrifice. In full measure the tragedy was brought home to the United States during the Spanish-American war. There never has been in history a campaign so fatal to an army not yet in the field. Listen for a moment to the story of what may happen after mobilisation in a typhoid ridden country. Returning to the United States from a visit to England in the autumn of 1898, I found but one subject engaging the attention of the profession—the appalling outbreak of typhoid fever in the volunteer army, distributed in seven camps in different parts of the country. The figures published by REED, VAUGHAN and SHAKESPEARE in their elaborate report, of which a good epitome is given by Dr. CHRISTOPHER CHILDS¹⁰ shew that in six months, among 107,973 men, there were 23,738 cases of typhoid fever and 1,580 deaths. At Camp Alger, near Washington, with a mean strength of 21,988 men, there were 1,951 cases of typhoid fever. Never have I seen so many cases of fever concentrated together, barrack after barrack filled with the victims of neglected sanitary precautions. The lesson drawn by the authors of the report on this epidemic was that the disease was not water-borne, but that nearly two-thirds of the cases were examples of “connectible attacks”—that is, due to infection within the tent or from adjacent tents. It was the first great epidemic to call attention to the importance of local infection by means of fingers, food and flies. Two other points

were brought out—the frequency with which erroneous diagnosis was made, particularly in the southern camps, where many cases were supposed to be malaria; and the large number of minor attacks indicated by nothing more than transient malaise, slight fever, or a gastrointestinal attack.

RECOMMENDATIONS.

More than three months have passed, and the reports from the camps indicate that nowhere is typhoid fever prevalent. That isolated cases have occurred should make the medical officers of health and the military surgeons redouble their efforts to prevent the spread. These should be watched with the utmost care, since, as Dr. CHILDS points out, epidemics in camps are usually preceded by scattered cases or by the unusual prevalence of diarrhœa. *Watch the common ailments*, should be the motto of the camp surgeons. The following measures are indicated:—

1. Every recruit should be asked whether he has had typhoid fever, or if during the previous twelve months he has lived in a house with a case of fever. An affirmative answer should mark the man for laboratory study. This may seem an irksome precaution, but in preventive medicine nothing necessary is irksome.

2. A realisation of the extremely protean character of typhoid fever, so that mild cases of enteritis, obscure forms of bronchitis and pneumonia, and mild cases of fever should be watched with care.

3. Every typhoid patient should be regarded as a focus of infection, and should be suspected as long as the bacilli are present in the discharges. The cases should not be treated in the general wards with other cases. Measures should be taken in the larger camps and in the garrison towns to segregate the cases.

4. No typhoid patient should receive a clean bill of health until he has been shewn by bacteriological examination to be harmless.

5. Ample provision should be made for the careful bacteriological examination of all suspected cases.

III.

Fever in various forms has proved more destructive to armies in the field than powder and shot. It has been well said that bullets and bacilli are as Saul and David, "Saul has slain his thousands and David

his ten thousands." The story of the destructive character of fevers has never been so well demonstrated as in the great Civil War of the United States, during which malaria, dysentery, typhoid fever, and other diarrhoeal diseases were fatal foes. Woodward's *Report of the Medical History of the War of the Rebellion* is a perfect storehouse of information on camp diseases. It is not easy to pick out the exact percentage of typhoid fever, as a large proportion diagnosed as diarrhoea and many of malaria belong to this disease; but the official figures for the army of the North are sufficiently appalling—79,455 cases and 29,336 deaths! There is the same story in the Franco-Prussian war; among the German troops there were 8,000 deaths from typhoid fever, 60 per cent. of the total mortality! It is said that the typhoid fever existed in every army corps at the outbreak of the war, and the campaigns were carried on largely in infected regions. I have already referred to the terrible experience in the Spanish-American war among the volunteer troops in the home camps. The sad memories of the South African war still haunt the memory. That was a war which brought out many new details in campaigning, but the sternest lesson taught is the one we are now considering, as it, too, was a war in which the bacilli counted for more than the men. Of the 22,000 lives lost, the enemy is debited with only 8,000; preventable febrile diseases for 14,000. And amongst these, as usual, typhoid fever headed the list, 57,684 cases, of whom 19,454 were invalided, and 8,022 died. The *Bacillus typhosus* alone did more damage than the Boers. Here again, as in the Spanish-American war, it was not so much water-borne typhoid as camp infection by fingers, flies, dust and food.

We are now in the fourth month of the war, and, so far as one can gather from the somewhat meagre reports, the health of the troops at the front has not been damaged to any extent by fever, and, so far, the sad losses have been from bayonets and bullets. On active service the soldier may take typhoid fever with him, or he may find it in the country. A large body of men has a certain percentage of carriers, any one of whom may act as a focus of distribution. The conditions in camp life are peculiarly favourable to case infection; thus it would be impossible for a carrier cook not to contaminate the food of an entire company. Of equal moment is the state of the country in which the troops are working. During the Spanish-American war it was

not possible in the United States to locate a camp in a typhoid-free position. In this country it is not possible to pitch a camp in an infected district. In South Africa both conditions prevailed; infection was brought by the soldiers, and was abundant in the country. It seems not unlikely that the troops in France and Belgium are reaping the benefit of the past ten years of active campaign against typhoid fever. Details are not at hand as to the prevalence of the disease in the eastern and north-eastern regions of France, but I am told there has been a great reduction in the incidence of the disease in Belgium, and that the troops have heretofore suffered but little. The Rhenish provinces should reap the benefit of the remarkable antityphoid campaign of the past ten years. Certainly it is very gratifying, particularly at this season of the year, that comparatively few cases have occurred. Among 2,000 German, English and Belgian troops who have been, or are at present, in the base hospital at Oxford, there have only been five cases of typhoid fever; and this, I believe, to be the experience in other large hospitals throughout the country. It will be a great triumph to go through this war without a devastating experience of typhoid fever. In the fighting line it is not possible always to ask the soldier to carry out sanitary precautions, and in a very infected country, even with the best of intentions, he cannot avoid exposure. Here we may expect to find the protective value of inoculation, and it is very satisfactory that the value of the measure has been so generally recognised by officers and men. An immense proportion of those who go with the Expeditionary Forces will have been protected—for a period at least. While with our present knowledge we cannot but regret that the inoculation has not been made compulsory, let us hope that a sufficient number have taken advantage of the procedure to make impossible a repetition of the enteric catastrophe in South Africa.

In the midst of this great struggle we stand aghast at the carnage—at the sacrifice of so many lives in their prime—

That many men so beautiful,
And they all dead did lie.

The bitterness of it comes home every morning as we read in the Roll of Honour the names of the much loved sons of dear friends. Strange that man who dominates Nature has so departed from Nature as to be the only animal to wage relentless war on his own species.

But there are wars and wars, and let our thought to-night be of the other army waging peaceful battles against our true foes. No one has so well contrasted the work of these two armies as the poet laureate of the profession, Oliver Wendell Holmes—

As Life's unending column pours,
Two marshalled hosts are seen—
Two armies on the trampled shores
That Death flows black between.
One marches to the drum-beat's roll,
The wide-mouth clarion's bray,
And bears upon a crimson scroll,
"Our glory is to slay."
One moves in silence by the stream,
With sad yet watchful eyes,
Calm as the patient planet's gleam
That walks the clouded skies.
Along its front no sabres shine,
No blood-red pennons wave;
Its banner bears the single line,
"Our duty is to save."

We shudder at the needless slaughter of the brave young fellows— allies and foes alike—but think of the slaughter which goes on in our homes, just as cruel as, often more cruel than, that of the battlefield! Tuberculosis alone will kill more than ten times as many this year in Great Britain than will die abroad for their country. Comparing the death-rate in England to-day with that of fifty years ago we may say that, as a result of the work of the other army, more will be saved from death by enteric fever in 1914 than will be killed this year in the war. Eberth's *Bacillus typhosus* will kill in 1914 in the United States more than will German shrapnel and bullets in the Expeditionary Force. Moving in silence, the great army of sanitation, with a general staff and leaders of all lands and languages, claims allegiance only to Humanity. In war it has not often fought winning campaigns, but the new knowledge is full of such promise that even the vanquished may be victors.

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BY

WILLIAM OSLER.

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STUDIES IN TYPHOID FEVER.

EDITED BY WILLIAM OSLER.

PARTS I, II. & III.

IN ONE VOLUME OF 763 PAGES.

Johns Hopkins University Press, Baltimore. 1901.

This volume contains the experience of Professor OSLER and his Assistants in Typhoid Fever at the Medical Clinic, Johns Hopkins Hospital.

ON
CEREBRO-SPINAL FEVER IN CAMPS
AND BARRACKS.

BY SIR WILLIAM OSLER, Bt., M.D., F.R.S.,
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SLIGHT outbreaks in two of the camps in this country have aroused interest in this disease, to which soldiers have been peculiarly liable.

Few infections have so remarkable a history. Belonging to the *nova februm cohors* of Horace, it appeared (or revived?) in the early years of the nineteenth century. It is not likely that an affection with such striking symptoms could have been overlooked by the seventeenth and eighteenth century physicians. Geographically it has a world-wide distribution, as may be seen by reference to vol. ix of Series I and vol. x of Series II of the *Index Catalogue* of the Surgeon-General's Library, in which epidemics are noted in all quarters of the globe, with special prevalence in France, parts of Scandinavia, and the United States. These islands have enjoyed a singularly happy freedom. Dr. Ormerod's list in vol. i of Allbutt and Rolleston's *System of Medicine* shows how slight and unimportant have been the outbreaks until the Glasgow epidemic of 1907, with 1,000 cases and 595 deaths (Chalmers); and that of Belfast, with, for the eighteen months ending June, 1908, 725 cases, with 548 deaths (Robb).

There has been lately an increase of the disease in England. Dr. Newsholme has kindly furnished me with the figures taken from the investigations of Dr. R. J. Reece. In 1912 there were 272 cases; in 1913, 304; and in 1914, 310. This notable increase above the 30 to 40 cases annually in the eighties and nineties may be accounted for in part by the more accurate diagnosis, and the existence of a meningitic type of poliomyelitis, but there appears to be no doubt that sporadic cases have become more frequent. From inquiries at some of the London hospitals I cannot find that there has been an increase during the past few months. Both of the present outbreaks in camps are in the southern counties. There was a local epidemic

in Bristol and the neighbourhood in 1913, reported by Michell Clarke and Symes.¹

Waves of epidemics occur, of which we are in the fifth since 1805. The present period began about 1893, and has been characterized by some of the most severe epidemics on record, notably that of New York, and for the first time in its history the disease became serious in this country.

The disease spreads slowly, or not at all, from foci of prevalence in various parts of a country. For example, in 1893 it broke out in two or three mining towns in Western Maryland, dragged on for the winter months, did not extend, then disappeared, and we heard nothing more of the disease in the State until 1898, when an outbreak occurred in Baltimore and Washington. In this year it prevailed in a mild form in twenty-seven States of the American Union. In 1904-5 a very severe epidemic occurred in New York, while Philadelphia, less than 100 miles distant, was not attacked. The cases may be confined to a gaol or barrack, or to a few scattered villages, as in the outbreak a few years ago in the Eastern Counties, or to a single house. It has prevailed chiefly in the winter and spring months, and an epidemic rarely lasts into the summer.

With a higher death-rate than any acute infection except plague and cholera, the total mortality is not great, as the case incidence in the community is low. With these two diseases it shares the malign capacity to kill within twenty-four hours. Death has indeed followed within six hours of the onset. During the outbreak in 1898 a healthy young man was attacked at 4 p.m. with pain in the head, dizziness and vomiting. At 6 p.m. he had a convulsion; at 10 p.m., when I saw him, the temperature was 105° , a pin-point purpura was beginning in the hyperaemic skin, the neck was drawn back, he was unconscious, and death occurred a little after 4 a.m., just twelve hours from the onset. Among types of inflammation of the meninges this is the only one from which recovery takes place, in from 25 to 50 per cent. of the cases.

The meningococcus, first described by Weichselbaum, has well-defined cultural and morphological properties, and, like the pneumococcus, has various strains. It is found in the cerebro-spinal exudate, in the blood, in the joints, in the visceral lesions, and in the secretions of the naso-pharynx. A curative serum has been prepared with which good results have been obtained, but in the preparation it is probable that sufficient attention has not been paid to the strains of the germ. Prophylactic vaccination has been carried out on a small scale, and Sophian and Black have found immune bodies in the blood more than two years after inoculation. The meningococci are found in the naso-pharynx of patients, but what is of special importance is the discovery that persons in contact with the sick may harbour the germs in the nose and throat. During outbreaks carriers have been found in large

numbers among those living in close contact with the sick; in fact, the intensity of an epidemic appears to bear some proportion to the number of the carriers. As a rule, the germs disappear from the naso-pharynx of healthy contacts in the course of a few weeks. Like the pneumococcus, the germ may be found in the naso-pharynx of healthy persons not exposed to infection—in 158 soldiers among 9,111 in the Munich garrison at a time when the disease was not prevailing!

To these main facts in the story of epidemic cerebro-spinal fever there remains to add another—namely, the constant sporadic presence of the disease as the posterior basic meningitis of children, and as an acute meningococcus meningitis of young adults. A large proportion of the 310 cases for 1914 certified in this country were doubtless of these types, though the pneumococcus and the streptococcus may also cause primary meningitis. The posterior basic form of Gee and Barlow occurs in children under 2 years of age, but in young adults the meningococcus meningitis is not very uncommon, and during an epidemic wave cases may occur in places far distant from the centre of prevalence. Thus in 1893, when meningitis was prevailing in Western Maryland, but not in Baltimore, two young adults were admitted to my wards with the disease; and 5 cases occurred in one household in the city—the mother, two sisters, and two brothers, one of whom came under my care.

In certain characters cerebro-spinal fever resembles pneumonia—in the epidemic localization in gaols, barracks, and houses; in seasonal peculiarities, in the fibrinous quality of the pathological exudate, and in the prevalence of the organism in the naso-pharynx of healthy persons. On the other hand, there are striking differences—in the age incidence, in the dominance of sporadic cases, and in the character of the complications. Briefly, then, the meningococcus is a germ of low virulence, widely spread in the community, and of intense virulence in an individual once it has passed the portals of protection. It is doubtless carried from one person to another, not necessarily from patient to patient, as nurses, doctors, and attendants are very rarely attacked, but in a large proportion the germ is transmitted by a healthy carrier. That the carrier does not always, as has been suggested, harbour a mild, non-pathogenic type is shown by the occurrence of meningitis after the presence of the germ has been determined. How the germ gains access is still under discussion—whether by direct invasion of the meninges from the naso-pharynx through the ethmoidal or sphenoidal routes or by the blood stream. I think the latter the more likely, as no evidence has been found of special involvement of the tissues in either of the routes suggested. Then the fulminant form kills with the features of an acute septicaemia. Since 1899, when Gwyn first isolated the meningococcus from the blood of one of my patients, the organisms have been frequently found in blood cultures.

The localization in the meninges is no proof of direct invasion, as tuberculous meningitis, obviously a blood-stream infection, presents the same peculiarity.

Of the causes of the outbreaks, whether increased virulency in a widespread germ, or increased susceptibility under changed atmospheric or telluric conditions, we are as ignorant as when Sydenham summed up the experience of twenty years' close study of the *genius epidemicus* of London:

Wherefore I conjecture that diseases have certain periods according to the occult and unaccountable alterations which happen in the bowels of the earth, to wit, according to the various age and duration of the same.

In cerebro-spinal fever we may be witnessing the struggle of a new disease to win a place among the great epidemics of the world. In the past decade it has everywhere shown an ominous activity. Again, Sydenham touches the marrow of the matter in a famous passage in which he refers to the briefness of our experience in comparison with the long ages of the world.

And as there have been other diseases heretofore which are either now utterly extinct, or at least, being almost wasted by age, fade away, and very rarely appear . . . so the diseases which now reign will vanish in time, and give place to other kinds, whereof indeed we are not able so much as to guess. This may be so, whatever we, who are so short-liv'd, think of it, who are born as it were one day and die another; nor are the most ancient authors that have written observations of diseases of much longer age, if they are compared with the beginning of the world.

Our present interest relates to the disease as met with in barracks, camps, and campaigns, and this comforting fact comes out of a review of the outbreaks—that while soldiers are peculiarly liable, cerebro-spinal fever has never been a great war pestilence. Jaeger (to whom we are indebted for important studies on the meningococcus) has published a monograph dealing with the occurrence of the disease in armies, and for this purpose has tabulated the epidemics of the nineteenth century in different countries. France, which has suffered most severely, had sixty-two epidemics, of which forty-three (69 per cent.) were confined to troops. In Germany there have been many small outbreaks in garrisons, particularly in Würtemberg and Bavaria. The incidence of the disease has risen during the past twenty-five years. In Italy the outbreaks have been chiefly in the military population. In these islands there has been no severe outbreak in garrison or camp. In 1868 four cases occurred within three weeks at the Shorncliffe Camp, and in 1876 two cases were reported among the militia at Oxford. Jaeger's analysis shows an increase of the disease in the European armies since 1870. The epidemics are usually small, restricted to a garrison, sometimes to a single barrack in a town.

It is reassuring to find that in the great campaigns of the nineteenth century cerebro-spinal fever played no part as a camp disease. There is no reference to it in the Napoleonic, the Crimean, the Italian, or the Danish wars. In the Franco-Prussian wars there were a few cases, chiefly about Paris. Isolated cases occurred in the Russo-Japanese war, but no serious epidemic, and the same is true of the South African war. The only exception in the history of the century is the Civil War in America, during which there were outbreaks in both the Northern and Southern armies in '61, '62, '63, none of them, however, very widespread, and as a camp disease it did not enter into the same category with typhoid, dysentery, and malaria.

Meningitis is a rare disease among the troops in these islands. Sporadic cases occur, but neither at home or abroad has it ever prevailed as an extensive epidemic, so far as I can find, in any camp or barracks. In 1910-11 there were 10 cases, with 8 deaths; in 1912 there were 6 cases, with 5 deaths; no differentiation is made between the forms of the disease. I have not heard of any cases among the Expeditionary Force. The existing outbreaks are not extensive, in one less than 40 cases occurred in four months among more than 30,000 men. Details of the others have not yet come to hand.

The German troops from the south-west may carry the disease into the field, and the French army has always centres of infection. Metz and Strassburg have a bad name in the history of the disease; but we may hope that the experience of 1870-71 may be repeated.

In the outbreaks among the troops there have always been three strong predisposing factors: overcrowding in camps or barracks, the cold winter weather, and over-muscular exertion among young recruits. Two of these conditions have prevailed in this country during the past three months. The weather has been atrocious, and an enormous number of young recruits have been in active training. One cannot say that there has been special overcrowding, but a great many men have been in tents, in the ordinary regulation form of which nine men live in close contact, and I can testify from personal examination that the ventilation is not always good. It is this very intimate contact that seems to favour the communication of the disease. With fresh air, sunlight, and scrupulous personal cleanliness, the epidemics, as a rule, quickly subside.

I may add that stringent preventive measures have been taken—isolation of the sick, systematic examination of the contacts, and the disinfection of the naso-pharynx of any carriers, which should suffice to limit the outbreaks. In a circular issued a year or two ago in the French army Vincent recommends the following mixture as an inhalation: Iodine 12 grams, guaiacol 2 grams, thymol 35 cg., alcohol 200 grams, with 6 grams of potassium iodide, used five or six times a day. Disinfection of the pharynx is carried out by swabbing

with a 3 to 5 per cent. solution of glycerine and iodine. In the recent Texas epidemic Sophian found that hydrogen peroxide 1 per cent., with argyrol 9 per cent., used as a spray, destroyed the meningococcus quicker than any other measure. Urotropin, which is secreted into the cerebro-spinal fluid, has been recommended by Cushing as a prophylactic.

The reader is referred to Stillé's monograph, 1867, for the fullest details as to symptoms; to Hirsch's *Geographical Pathology* for the epidemics; to Jaeger's *Die Cerebrospinalmeningitis als Heeresseuche*, Berlin, 1901, for an exhaustive consideration of the disease as it affects soldiers; to Koplik's article in my *System of Medicine*; and for bacteriology and treatment to the recent publication of Sophian, *Epidemic Cerebro-spinal Meningitis* (London, Henry Kimpton, 1913), and to Heiman and Feldstein's *Meningococcus Meningitis* (London, J. B. Lippincott Co., 1914).

REFERENCE.

- ¹ BRITISH MEDICAL JOURNAL, June 13th, 1914.

Remarks
ON
ARTERIO-VENOUS ANEURYSM

*Made at a Symposium on the Subject at Radcliffe Infirmary,
Oxford, on March 26, 1915*

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GENTLEMEN,—Better than any other disease aneurysm illustrates how borderless are the boundaries of medicine and surgery. Here am I talking on the most surgical of all its aspects, while very likely not far away a surgeon is practising the best possible prevention against internal aneurysm in giving a syphilitic patient an injection of salvarsan! Aneurysm has been a medico-chirurgical affection ever since some bungling young “minutor” first nicked the brachial artery in performing venesection. One of the earliest and most interesting references in literature is to an instance of this kind. Galen was called in consultation by a young and inexperienced surgeon who had opened the artery at the bend of the elbow instead of the vein, and the blood spurted out “clarus, rubens, lucidus et calidus.”

“I took in the situation at once; there happened to be an elderly physician with me, so we prepared a medicine, viscid, conglutinable, and obstructive, and placing it strongly against the lips of the wound bound over it a soft sponge. The surgeon who had opened the artery wondered, but said nothing. When we went out”—note the professional touch!—“I said to the surgeon that he had opened the pulsating vessel, and charged him not to dress the wound before the fourth day, and not without me.”

¹ In which Colonel Dodds-Parker, Major Mallam, and Captain Bevers took part.

The cure was complete, and Galen remarks that this was his only successful case of the kind, as in all others aneurysm had followed. This account, taken from Symphorien Campegius "*Claudii Galeni Pergameni Historiales Campi, Basilaë*," 1532, p. 43, is doubtless of the case referred to in the "*Methodus Medendi*."² The only other references to aneurysm in Galen are in the "*De Tumoribus præter Naturam*"³ and in the "*De Curandi Ratione per Sanguinis Missionem*,"⁴ in which he refers to the possibility of gangrene.

HISTORICAL SURVEY.

Rational surgery was one of the gifts of the Greeks, but in the 800 years between Hippocrates and Oribasius few names have survived specially associated with this branch of medicine. Who among us off-hand could recall more than two or three in addition to Hippocrates and Galen? Yet in this period scores of important schools flourished with great teachers of surgery, men honoured in their generation and the glory of their times. As one reads the partial list in Haller's "*Bibliotheca Chirurgica*" and scans the few golden remains of their writings fortunately preserved by encyclopædists such as Oribasius and Paul of Ægina, the truth of Sir Thomas Browne's remarks comes home: "Who knows whether the best of men be known, whether there be not more remarkable persons forgot than any that stand remembered in the known account of time?" Two of these comparatively unknown men created the surgery of arteries, Rufus of Ephesus and Antyllus, the Cosmas and Damien of Greek surgery.⁵

² Linacre's edition, 1517, f. lxii., v.

³ Junta, fifth edition, 1576, iii., p. 84.

⁴ Ibid., vi., p. 21.

⁵ These practitioners, who became the Christian saints of surgery, suffered martyrdom in Cilicia in the third century. In their Western Mother Church, on the Roman Forum, I have seen the little parcel said to contain the instruments with which they performed the most famous operation in hagiological surgery, substitution of the healthy thigh of a just-dead man for one that was gangrenous.

Rufus of Ephesus.

To generations of practitioners unworthy to hand him ligatures Rufus of Ephesus (Reign of Trajan, early part of second century A.D.) was known by the "pilulæ Ruffi," "the pills I would not be without"—"pilulæ sine quibus esse nolo"—still in the British Pharmacopœia as the pill of aloes and myrrh. In the brilliant Ionian profession of the early days of our era Rufus doubtless had predecessors and teachers, but he stands out a strong, clear figure, a great "magister chirurgiæ," a title justly earned by his remarkable contribution to the surgery of hæmostasis. We know it only through a section in Aetius, a sixth-century physician.⁶ Nothing is lacking in a description, which might be transferred to any modern textbook—digital compression, styptics, the cautery, torsion, and the ligature—only I am sorry not to find, as is sometimes said, a description suggestive of arterio-venous aneurysm, though he speaks of the possibility of traumatic aneurysm.

Through the Arabians the name of Rufus was on the lips of every mediæval physician, and we find him among the favourites of Chaucer's well-read Doctor. In one of the earliest and most beautiful of medical manuscripts, the famous "Juliana Anicia Dioscorides" (A.D. 525), of the Vienna Library, he is figured with Galen, Hippocrates, and others.

Antyllus.

Upon the other great surgical figure of antiquity, Antyllus, so blindly has oblivion scattered her poppies, to quote Sir Thomas Browne again, that not a fact of his life is known; yet through the mists of 18 centuries he looms large as one of the most daring and accomplished surgeons of all time. A resector of bones and joints, one of the first to perform tracheotomy, the founder of the surgery of fistula, a successful operator upon cataract, and we may say the creator of the surgery

⁶ Tetrabiblos, lib. xiv., cap. 51.

of the arteries—these are among his known achievements. His remains are chiefly in the works of Oribasius, the physician and friend of the Emperor Julian.

Nowhere are we impressed with the note of directness so characteristic of the Greek (see R. W. Livingstone's "Meaning of the Greek Genius," second edition, 1915) as in the brilliant account given by this author of aneurysm, of which he was the first to recognise two forms—one by dilatation, the other following wound of the artery. So far as I can gather, he was also the first to describe the thrill or bruit so characteristic of the latter form. No ancient writer has anything like the same accuracy of pathological description, and you may search the surgical literature for centuries before there is found such a gem as the account of his method of operation still in use, and by which his name has been permanently enshrined. Not finding one in English, I asked Mr. Livingstone, of Corpus Christi College, to give us a complete translation of the fragment.

About Aneurysms (from the works of Antyllus⁷).

There are two different kinds of aneurysms. The one kind occurs when there is a local dilatation of an artery (this was the origin of the name aneurysm or dilatation). The other kind arises from the rupture of an artery and the discharge of the blood into the flesh beneath it. Aneurysms due to the dilatation of an artery are longer than others; those due to a rupture are rounder. In the former there is a thicker layer of tissue; in the latter you can hear a certain crepitation if you press them with your finger; while in aneurysms due to dilatation there is no sound.

It is foolish to follow the practice of the ancient surgeons and decline to treat any aneurysm, but it is dangerous to apply surgical treatment to all types. So we will excuse ourselves from treating aneurysms in the armpit, groin, and neck on the ground that the vessels are large and that it is impossible or dangerous to isolate and tie them. We also decline exceptionally big aneurysms, even if they occur elsewhere. But we will operate as follows on aneurysms in the extremities, the limbs and the head.

⁷ Oribasius, iv., p. 52 (ed. Daremberg).

If the aneurysm results from dilatation, we will make a straight incision in the skin the whole length of the vessel ; then, after separating the edges of the incision with hooks, we will carefully sever all the membranes between the skin and the artery. Then pushing aside with blunt hooks the vein adjacent to the artery, we will expose the dilated portion of the artery on all sides. Next, we will introduce the head of a probe underneath, and, lifting the aneurysm, insert along the probe a needle with a double thread, so that it passes beneath the artery. We will cut the thread at the eye of the needle, making two threads and four ends of thread ; then, taking the two ends of one of the threads, we will pass them gently to one end of the aneurysm and tie them with precision. Similarly, we will pass the other thread to the opposite end of the aneurysm, and then tie up the artery, so that the entire aneurysm lies between the two ligatures. Then we will lance the aneurysm with a small incision at its centre ; in this way its contents will all be evacuated without any danger of hæmorrhage. Those who tie the artery, as I advise, at each extremity, but amputate the intervening dilated part, perform a dangerous operation. The violent tension of the arterial pneuma often displaces the ligatures.

If the aneurysm originates in the rupture of an artery, isolate with your fingers as much of the aneurysm as you can, including the skin. Then below the isolated part introduce a needle with a double thread of flax or of gut ; after passing it through cut it at the needle's eye, forming two threads. Take hold of the two ends of one of these and pass it to the right, there tie it tightly, so as not to slip. Pass the other end similarly in the opposite direction—to the left. If there is any fear of the threads slipping, pass a second needle with a similar double thread through the same spot, intersecting the first thread and crossing it in the form of the letter X (chi). Cut the threads as before, and tie them like the first ones, so that four threads form the ligature. Then open the tumour at its top, and, after evacuating the contents, remove the superfluous skin, leaving the part tied by the threads. In this way the operation is effected without hæmorrhage.

And I must read Mr. Livingstone's comment :—

It certainly is a beautiful piece of lucid writing. I felt that if I was alone on a desert island with someone suffering from aneurysm, and the tide had washed ashore sufficient ἀγκίστρα, &c., that I shouldn't have minded trying the operation. And Antyllus had real literary power. What an admirable phrase is ἐκπύεται, the "spitting out" of the ligature by the throbbing artery : I don't think you can get it in English, and I fell back on a lame substitute, "displaces."

Not unjustly does Paul Broca in his great monograph, "Des Anévrismes," claim that not only did Antyllus create operative medicine but the pathology of aneurysm: "À chaque ligne on reconnaît l'écrivain qui parle de ce qu'il a vu, de ce qu'il a fait."

Decay and Revival of Vascular Surgery.

Aetius in the middle of the sixth century describes the method for cure of aneurysm at the elbow, known later as that of Anel (1710), ligation of the brachial artery three or four fingers' breadth below the axilla, followed by opening the sac, which was allowed to heal by suppuration. A curious error of Sprengel has led to the connexion of the name of Philagrius, a fourth century surgeon, with this operation. In the fragments of this writer given by Aetius aneurysm is not mentioned, but Sprengel never noticed that the extract on aneurysm which follows directly after one upon ganglion by Philagrius did not belong to this author but to Aetius himself.

A casual perusal of the fragments of the Greek surgeons of the first three or four centuries of our era as given in Gurlt's "Geschichte der Chirurgie" gives the impression of a great and fruitful period with scores of men whose qualifications were those demanded by Thomas Fuller for the good operator—the eagle's eye, the lion's heart, and the lady's hand. Then came the tragedy, the death in the West of the science of the Greeks. The Church took over their philosophy, the Arabs absorbed much of the best of their medicine and added to it, but surgery as a progressive science and a successful art died with its founders, the great Greeks of the Græco-Roman Empire. So far as the surgery of arteries is concerned we might take a jump of a thousand years or more were it not for an Arabian, Albucasis of Cordova (tenth century), who wrote a famous surgical treatise, of which we have in the Bodleian the two earliest manuscripts. A young scholar of Wadham and student of Christ Church, John Channing, in 1778 issued from the Clarendon

Press a beautiful edition. The description which he gives of aneurysm with its treatment is practically that of Antyllus. He notes the stridor to be felt, which indicates that he was probably dealing with the arterio-venous form.

In vascular surgery the men of the Middle Ages and of the Renaissance, Henri de Mondeville, Guy de Chauliac, and even Ambroise Paré, were blind followers, who never even approached the position of their masters. Not much more than a century has passed since men of the John Hunter type took up vascular surgery where Rufus and Antyllus had left it, and only to this generation of experimental surgeons, such as Eck, Ballance, Matas, J. B. Murphy, Halsted, Carrel, and Guthrie, could the best of the Greeks go to school. You may think perhaps, that I am scarcely just to the great mediæval surgeons, particularly to such a master as Ambroise Paré, who reintroduced the ligature, but in vascular surgery, the touchstone of the position of the art, they never wholly regained what the profession had lost.

Our modern knowledge dates from William Hunter, in whose "Medical Observations and Enquiries,"⁸ in a paper on Aneurysm of the Aorta he asks, "Does it ever happen in surgery when an artery is opened through a vein that communication or anastomosis is afterwards kept up between the two vessels?" He then describes, in a case following bleeding, the swelling, enlargement of the veins, and "a tremulous jarring motion" strongest at the part that had been punctured. In a subsequent paper, 1761,⁹ he described two cases very fully, and recognised the enlargement of the arteries and of the veins and the characteristic hissing noise "as if there was a blast of air through a small hole and interrupted, answering precisely and constantly to the stroke of the heart or diastole of the artery."

It is true that in the seventeenth century Sennertus, the distinguished Wittenberg professor, noted in this form of aneurysm the characteristic thrill which he compares to the boiling of water, "*quasi bullientes aquae*," not only palpable but

⁸ London, vol. i., 1757.

⁹ Further Observations upon a particular Species of Aneurysm Medical Observations and Enquiries, London, 1761.

audible, as if the vital spirits were passing through a narrow orifice.¹⁰

RARITY OF ARTERIO-VENOUS ANEURYSM.

It is remarkable how few specimens of arterio-venous aneurysm of the external vessels are in the museums of this country. I have only been able to get references to some half dozen cases. One is astonished not to find any in the Army Medical Museum, Millbank, or at Haslar or Greenwich. Nor is there an example in William Hunter's Museum at Glasgow. The Royal College of Surgeons of England has only three, including a recent uncatalogued one sent by Sir G. H. Makins. Its most remarkable specimen was sent in 1867 by Dr. Beaumont, of Toronto, an old teacher of mine. I was not a little surprised and greatly pleased to find a pathological memorial of this fine old St. Bartholomew's man, a fellow pupil of Paget, who went out to Toronto in the early "forties" and became professor of surgery in the newly founded King's College. It is an admirable specimen as illustrating the late changes in the veins. The case is fully described by Beaumont in the *Medical Times and Gazette* for July, 1867. A man, aged 45, had 11 years previously been stabbed in the upper part of the thigh. There was a very large pulsating tumour in the upper part of the right thigh, fully six inches in extent in either direction and extending nearly to Poupart's ligament. The patient died under chloroform, which was administered for the purpose of ligaturing the external iliac artery. The specimen shows a venous sac as big as a small cocoanut, measuring $14\frac{1}{2}$ by $12\frac{1}{2}$ inches, very thin walls containing some old laminated fibrin, and the walls were in places calcified.

The truth is, this is not a country of brawls and dirks, and pistol wounds are rare in civil life. It is strange that no specimens found their way to the museums from the South African War. The

¹⁰ Opera, Ludg., 1676, p. 51.

Army Medical Museum, Washington, has only two examples (Lamb).

The rarest of all forms, arterio-venous aneurysm, is occasionally met with in the medical clinic as when a small aortic aneurysm opens into the superior vena cava, while on the surgical side trauma is responsible for 99 per cent. of those connected with the external vessels. Until the recent wars stab wounds accounted for the large majority of cases, but in the Japanese, the South African, and the Serbian wars the high-velocity bullet heads the list of causes.

PERSONAL EXPERIENCE OF WOUNDS OF ARTERIES.

Naturally, as a physician my experience with wounds of arteries has been very limited—until recently only 10 cases, in 5 of which arterio-venous aneurysm followed. The other 5 cases came in medico-legal post-mortem work in Montreal, and they may be just mentioned for their interest.

1. A soldier during the vaccination riots in Montreal gave a man a prod with his bayonet, which passed through the top of the left lung and cut the subclavian artery just as it leaves the arch to curve over the pleura.

2. A man in a brawl received a stab with a penknife at the root of the neck, followed by a traumatic aneurysm, which was operated upon unsuccessfully; the tip of the knife had cut the vertebral artery between the lateral processes of the fifth and sixth cervical vertebræ.

3. A man received a blow on the head in a tussle, and some days later died suddenly of hæmorrhage from the nose; a fracture of the sphenoid was found with laceration, or erosion, of the internal carotid just where it turns into the sella turcica.

4. A man in riding jerked against the pommel of his saddle and drove a dirk which he was carrying into his femoral artery.

5. A fatal bullet wound of the left internal iliac artery.

The arterio-venous cases I will quote in connexion with their most striking features. Within

a few months I have seen as many instances as in 40 years of hospital work: two cases at the American Hospital, Paignton, in one of which Dr. Beal did a successful Antyllus operation; a patient of Mr. R. B. Wright at Chester, to whom I shall refer in connexion with the physical signs; and the two patients we have the opportunity to study to-day—for one we are indebted to the kindness of Captain Mowat, of Sheffield, the other is under the care of Major Ernest Mallam at the base hospital.

Exhibition of Two Cases.

W. W., aged 28, a private, had served in the Northumberland Fusiliers for eight and a half years, was always well and strong and never had a serious illness. On Oct. 19th at about 11 A.M. at La Bassée he received three shrapnel wounds, one in the left thigh. Was in the trenches until 7 P.M. Lost an enormous amount of blood. The fragment entered the left thigh just 3 inches below Poupart's ligament, and the piece is still in the leg. There was a great deal of swelling and a good deal of disability at first. The leg did not change in colour, but he was very weak from loss of blood. The wound did not suppurate. Captain Mowat noticed the swelling in the left leg and felt the murmur. He was at Sheffield from Oct. 23rd to Dec. 10th, and gradually got well. Captain Mowat took a remarkable phonograph record of the murmur, which I heard a few weeks ago at Sheffield.

Now the man is healthy-looking, of good colour; he limps on the left leg; there is no swelling or discolouration. The left thigh looks a little smaller than the right, particularly in the antero-lateral region. There is a healed wound just 3 inches below Poupart's ligament in the lower end of Scarpa's space, where there is a diffuse swelling not very marked, and then a little groove-like wasting in the line of the femoral artery. The greatest prominence is at the site of the entrance of the bullet. The pulsation is diffuse, but does not extend above Poupart's ligament. The veins are not greatly distended, but the internal saphenous is visible, and those on the left side are larger than on the right.

On palpation the characteristic thrill is felt of maximum intensity over the injury, and it is felt down the course of the femoral. There is a slight firm induration just beneath the scar, but not a definite tumour. Pressure on the femoral stops the pulsation at once. The thrill is felt above Poupart's ligament. There is no pistol-shot sound to be felt. Pulsa-

tion in the popliteal and tibials not palpable. On auscultation a machinery murmur of extraordinary intensity is heard of maximum intensity at the site of the injury, propagated down the femoral, heard in the popliteal. The arteries are not sclerotic and the heart sounds are clear.

Major Mallam's case is an exact counterpart.

Bullet wound of the thigh on Dec. 30th, passing through Scarpa's space. Much blood was lost, but the orifices of entrance and exit healed rapidly. A large effusion of blood in the upper region of the thigh at first masked the nature of the lesion, and it was not until the swelling subsided that the characteristic signs of arterio-venous aneurysm were noted. There are now moderate swelling in Scarpa's space, pulsation palpable, thrill felt with greatest intensity at the point of maximum impulse, and a loud machinery murmur.

ANATOMICAL VARIETIES AND RESULTING CHANGES.

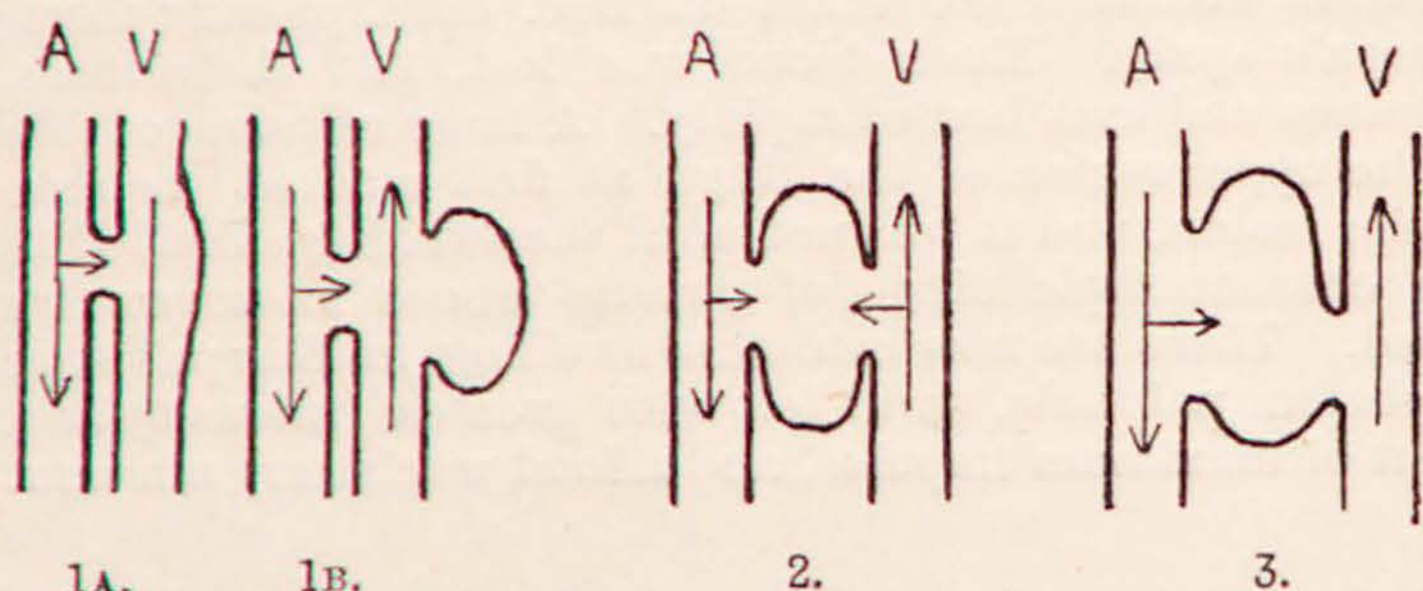
We need not take time to discuss the anatomical varieties which are all modifications of two types, the simple tangential opening between an artery and a vein—aneurysmal varix, and the formation of a sac communicating with both vessels—varicose aneurysm. The accompanying diagrams (Figs. 1 and 2) from Lexer's "Handbuch der allgemeinen Chirurgie" show all possible forms.

The changes that follow are: (1) The blood current is reversed, to a certain extent, in the veins; (2) the blood pressure is increased in them; (3) their walls become arterialised; and (4) the blood pressure in the artery is heightened on the proximal and lowered on the distal side of the lesion. In smaller vessels very slight changes occur. I show you a drawing of an aneurysmal varix of the anterior tibial vessels from a case in the Strassburg clinic, in which a year after the accident the vein was little if at all dilated. In lesions of the vessels of the neck and arms the venous stasis is much less than in the legs, in which the effect of gravitation is so felt that year by year the changes become more pronounced, until, as in the photographs I show, large varicosities and sacculi are formed. Femoral and popliteal arterio-venous aneurysms may last for years without great

involvement of the veins, but in a majority of the cases venous stasis forms the most serious sequel of the disorder.

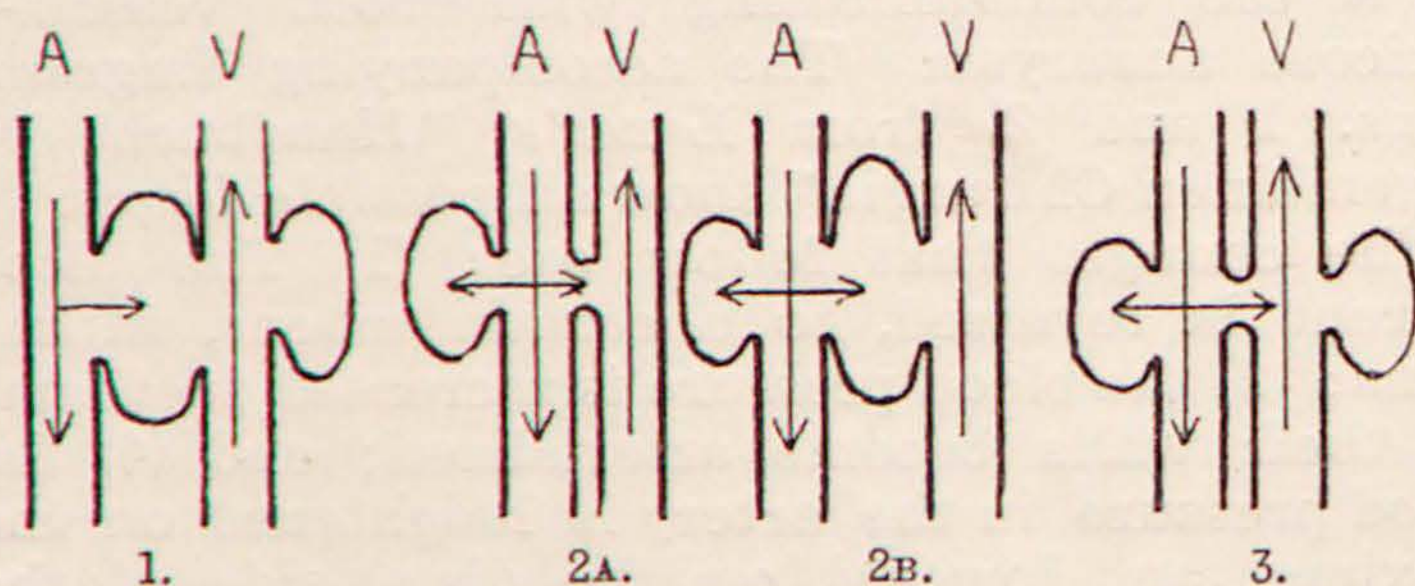
The changes in the arteries on the proximal side of the lesion are less striking, but sooner or later

FIG. 1.



1. Arterio-venous fistula without (1A) and the same with (1B), a venous sac—varix aneurysmaticus. 2. Arterio-venous aneurysm with false intermediary sac—aneurysma varicosum. 3. Arterio-venous aneurysm with arterial sac. Secondary arterio-venous aneurysm.

FIG. 2.



1. Arterio-venous aneurysm with false intermediary sac and varix on outer side of vein, due to double injury of the latter. 2. Arterio-venous aneurysm with immediate communication (A), or with false intermediary sac (B), and with a false arterial aneurysm, due to a single venous and double arterial injury. 3. Arterio-venous fistula with opposing sacs, due to a double injury of both vessels.

sclerosis occurs with dilatation, and sometimes with saccular aneurysm opposite the orifice of communication. Even within two months of the injury the femoral artery may be felt to be larger and with stronger pulsation (Paignton case). Remote

effects on the general circulation are rare, particularly in aneurysms of the vessels of the head and arms. One of my patients (Case 3) died from heart disease which may have had some connexion with his long-standing lesion. In the leg progressive dilatation of the vessels may lead to serious effects. In the case of Captain Mosher,¹¹ wounded in the middle of Scarpa's space 1898, at the time of death (1911) the dilated arteries extended from the bifurcation of the common iliac to the lower third of the thigh. Hypertrophy of the heart followed, and death from progressive failure of the circulation.

PHYSICAL SIGNS.

In no form of aneurysm are the physical signs so distinctive. *Inspection* may not show much, as in the cases you have just seen: diffuse pulsation at the site of the communication, moderate swelling, but not necessarily any early venous engorgement.

In the carotids, subclavians, and axillaries the condition may persist for years without much swelling or great enlargement of the veins. On the other hand, in the form that was so common at the bend of the elbow in venesection days the circulation is much interfered with. Even in smaller vessels such as the occipital the venous swelling may be enormous, as in a patient operated upon by Dr. Cushing at the Johns Hopkins Hospital in 1905. This case illustrates, too, the progressive nature of the lesion, as year by year the vessels on the side of the head grew larger, and after seven years they formed a large pulsating mass which had to be resected, after ligation of the external carotid artery.¹² In the leg, particularly in the situation in the cases you have here seen, venous engorgement sooner or later dominates the scene,

¹¹ Reported in Lagarde's Gunshot Injuries, 1914, p. 281.

¹² Journal of the American Medical Association, Dec. 23rd, 1905.

and after some years the appearance may be very remarkable, as in the following case.

CASE 1. *Illustrating the development of enormous venous sacculi.*—The patient, aged 31, was shown at the Johns Hopkins Hospital Medical Society on Jan. 16th, 1905. In his eleventh year he had a knife wound just above the right knee; not long after pulsation was noticed along the femoral artery, with marked swelling. He has had good health, with very little disability, except from the increasing varicose veins, which sometimes burst and caused troublesome bleeding. The leg presented a very remarkable appearance, as shown in Figs. 3 and 4. The superficial veins were everywhere varicose; those of the antero-lateral aspect of the thigh were of enormous size, extending into the flank, and many of them were filled with thrombi. The course of the femoral, particularly in Scarpa's space, was occupied by a prominent pulsating tumour, the outline of which can be just seen in Fig. 4. Over this there were an intense thrill and a loud humming murmur with systolic accentuation; pulsation was everywhere forcible. Above Poupart's ligament, lifting the entire iliac fossa and extending into the hypogastrium, was a second tumour, in which the pulsation was very strong, a marked thrill, and the same loud murmur. The size of the tumour, which extended fully 8 inches transversely, can be well seen in Fig. 4. It increased in the sitting posture. The patient said this had been present for many years, but had, he thought, increased in size. It felt very solid and firm and the pulsation was extensile and strong. His only serious disability was from the varicose veins.

The tumours both above and below Poupart's ligament were huge venous sacs. When I demonstrated this case a doubt was expressed whether these really could be venous sacs, but there are many specimens, as in the one I refer to of Dr. Beaumont, and cases are recorded showing a similar condition. A recent one was reported by Eisenberg¹³ of a man, aged 65, wounded 18 years before in the thigh, and in addition to great dilatation of the femoral vessels there was a sac 3 inches in diameter of the iliac vein above Poupart's ligament. Additional features that may be noticed on inspection are the increased size of the limb; an actual increase in growth has been noted by Broca in the young; the skin may be

¹³ Ibid., Dec. 13th, 1913.

FIG. 3.



CASE 1.—Arterio-venous aneurysm of the femoral vessels of 20 years' standing.

FIG. 4.



Same patient as Fig. 3, showing the varicose veins and two huge venous sacculi, one above, the other below, Poupart's ligament.

much rougher, covered with a thicker growth of hair, and in long-standing cases varicose ulcers are common.

On *palpation* the characteristic thrill is felt, vibratory, rough, continuous, and increasing in intensity with the diastole of the artery. Except in its roughness it is quite unlike any other thrill felt in cardio-vascular lesions, and is pathognomonic. It has an interest, too, as one of the oldest of recognised physical signs, having been described by Antyllus. While of greatest intensity at the site of the lesion, it may be widely diffuse and even felt at the finger tips in an axillary or brachial aneurysm, and at the toes in a femoral. In the patient seen with Mr. Wright¹⁴ at Chester a few weeks ago, there was an additional physical sign which I have never before noted, nor in looking pretty carefully through the literature do I see it mentioned—a pistol-shot sound of great intensity, exactly such as one feels and hears in aortic insufficiency. It was an arterio-venous aneurysm of the popliteal vessels caused by a bullet wound on Jan. 29th. The note which I dictated was:—

On palpation an intense vibratory thrill, continuous, with diastolic intensification, is felt over the area of pulsation, not below the middle of the leg. The striking feature is the pistol-shot shock felt during the diastole of the vessel, exactly resembling that which one hears and feels in the femoral in aortic insufficiency. It is felt only over the area of pulsation, not in the femorals, and there is no valvular disease. In addition, one feels the strong, firm, aneurysmal pulsation.

In the second case at the American Hospital, Paignton, there was no pistol-shot sound over the popliteal tumour, but one of great intensity could be heard, without the slightest pressure, over the femoral artery. On the other side it could be brought out only with pressure of the stethoscope. In the early stages the tumour may not be large, or where it is simply an aneurysmal varix little or no swelling may be present. If there has been

¹⁴ On March 26th Mr. Wright operated, tying the artery above and below and closing the direct orifice into the vein. There was no sac. The vein was unusually large.

effusion of blood the tumour, as in Major Mallam's case, may diminish considerably in size. Subsequently the diffuse swelling may be largely venous, but a circumscribed tumour may be either sacculi in connexion with the vein or artery, or sacculi at some distance from the original site of the injury, and there is not infrequently aneurysmal dilatation of the artery above the lesion.

On *auscultation* the second characteristic physical sign is heard—a loud, rough, humming-top murmur, continuous, with marked intensification during the cardiac systole. During distension of the vessel the murmur is rough, harsh, and vibratory; during its contraction it has a graver, deeper quality. It may be widely diffused, heard up and down the vessels even to the finger-tips in the brachial and axillary aneurysms, and to the toes in the femoral. It may even be intense enough to be heard at some distance from the site of the aneurysm.

Practically these are the three great physical signs of arterio-venous aneurysm: the dilatation of the veins, the thrill, and the murmur. Other minor features may be mentioned—absence or lessened pulsation below the site of the tumour, the remarkable influence of posture on the venous engorgement, the pulsation in the peripheral distended veins, the frequency with which phleboliths and thrombi may be felt.

COLLATERAL CIRCULATION.

From the surgical standpoint it is important to determine the adequacy of the blood-supply beyond the lesion. Recumbent the legs, for example, may look alike, but within a few minutes after assuming the erect posture the one on the side of the lesion may become dusky in colour, and the veins dilate. It is not easy to determine the blood pressure in the arteries below the lesion. Korolkow uses a modified Gärtner's tonometer, and Matas lays down the rule:—

If the peripheral blood pressure is shown by the manometer (a modified Gärtner's tonometer) to be normal or well sustained after compression of the main trunk above the

aneurysm then the obliterative operation may be safely applied. If, on the other hand, the blood pressure falls to zero it is evident that the collateral circulation is inadequate, and that no chance should be taken with the obliterative operation or with any procedure whatever (ligature, extirpation, &c.) which would permanently occlude the parent artery.¹⁵

Another test is after application of an Esmarch bandage apply pressure on the artery above the aneurysm, and note the state of the circulation and the time taken for the skin vessels to fill. In one of the Paignton cases (popliteal) in the sound leg it took three minutes to obliterate the anæmia caused by the bandage while the femoral was compressed above Hunter's canal, but in the affected leg the skin vessels of leg and foot were filled within a minute! The femoral artery on this side felt larger and had a much more powerful pulsation.

RESULTS.

Left alone, what becomes of these cases? Much depends upon the position of the aneurysm. Those in the upper extremities are more favourably situated than in the lower. The following may happen:—

Non-Intervention followed by Good Results.

1. The aneurysm may remain unchanged for years and interfere little, if at all, with the patient's health and vigour. Particularly is this the case with the cervical and axillary vessels. Case 3 of my series illustrates this in a remarkable way, as for years he rowed in races and lived a very athletic life. Case 2 also illustrates the wisdom of non-intervention.

CASE 2.—On April 9th, 1900, Dr. Alderson sent me from Russelville, Kentucky, a man, aged 29. On the night of Jan. 5th he had received four bullets, one in the left

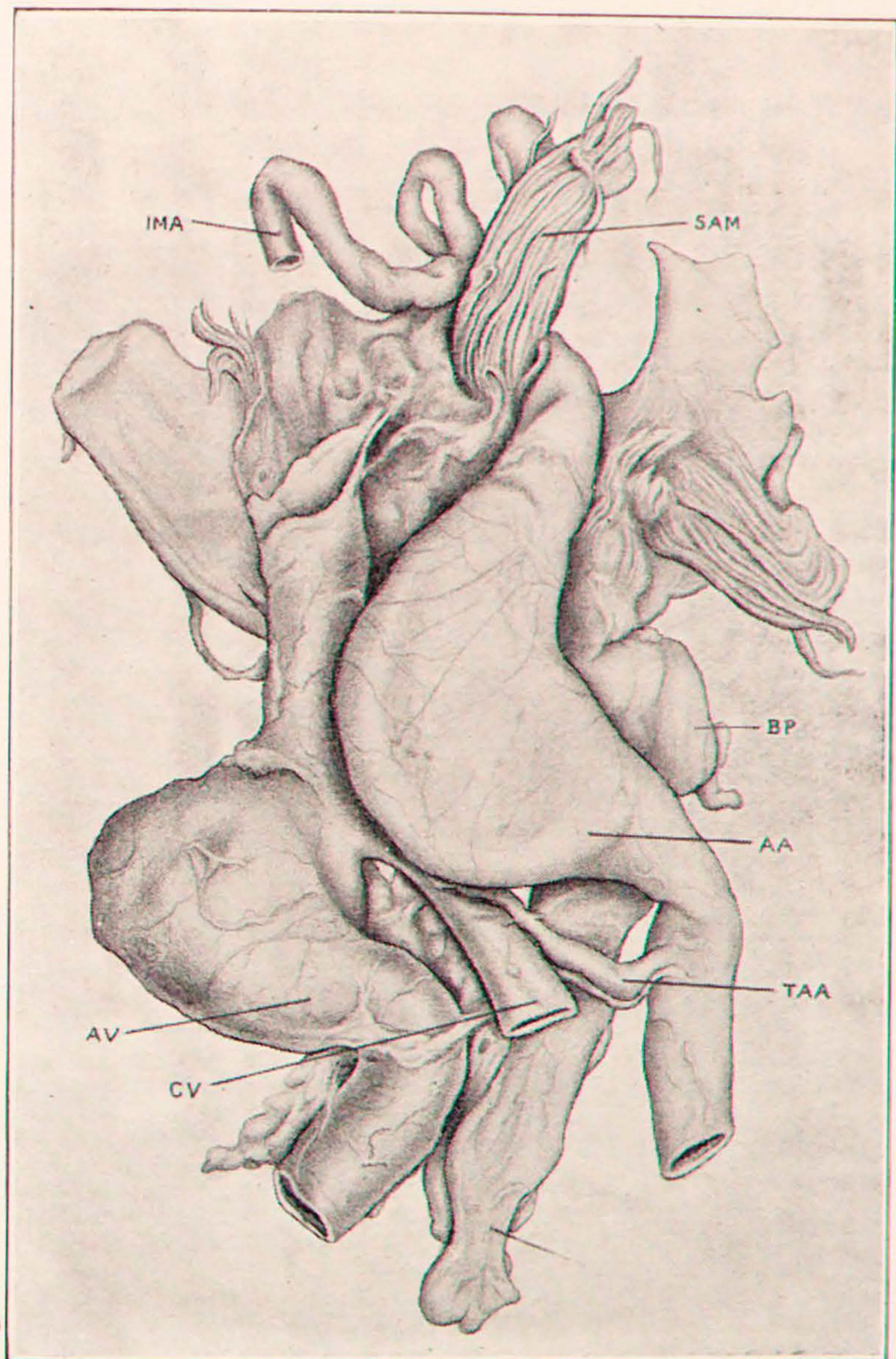
shoulder, one in the back of the left arm, one in the left lower axillary region, and the fourth, the important one, entered the middle of the fold of the left trapezius muscle, passed inwards and downwards in front of the spine, and came out under the right clavicle. All the wounds healed rapidly, but at first he had some difficulty in swallowing. The right supraclavicular fossa was occupied by a pulsating swelling extending for about 7 cm. upwards and outwards. There was a marked thrill and a loud humming-top murmur with systolic intensification, which was heard up the neck and down the vessels of the arm. The bullet could be felt just below the clavicle. The tumour had increased, and the question was whether it was safe to leave him alone. This was the policy I urged strongly. Twice he narrowly escaped operation. Two years afterwards I heard from him and he remained well; the tumour was somewhat smaller, but the bruit was still a little troublesome. Five years after the accident I heard again. He had remained well, the tumour had not increased in size, and he was able to use his arm and do everything.

Spontaneous Healing.

2. Spontaneous healing may occur, the orifice closing between the artery and the vein. This must have happened in Case 3, as a careful dissection by Professor J. J. Mackenzie, of Toronto, failed to demonstrate any communication between the greatly dilated vessels. As such a mode is rare, I give an abstract and a sketch of the dissection. (Fig. 5.)

CASE 3.—I reported the case originally in the *Annals of Surgery*, 1893. In 1878 the man, in running down a sloping grass plot, fell and forced a lead pencil into the arm-pit; a gush of blood followed and the arm became black and blue to the wrist. The aneurysm involved the axillary vessels. He subsequently lived a very athletic life, rowed in the Argonaut Boat Club, and served in the South African War, where he came under Sir G. H. Makins's care. He was invalided in consequence of a sudden pain on the left of the head and neck, and the patient was positive that the tumour had enlarged. He wrote to me on Oct. 17th, 1904, saying that he had marched 610 miles in 32 days and fought 16 battles, with the result of increasing his aneurysm very materially, particularly at the base of the neck. He died in May, 1909, 31 years after the accident, of gradual heart failure.

FIG 5.



CASE 3.—Arterio-venous aneurysm of the axillary vessels thirty-one years after the injury. S.A.M., Scalenus anticus muscle. B.P., Brachial plexus. A.A., Axillary artery. T.A.A., Thoracico-acromial artery. C.V., Cephalic vein. A.V., Axillary vein. I.M.A., Internal mammary artery.

There are many cases in which the condition has lasted quite as long as this with equally good health; but the special point of moment in this case is that in the careful dissection of the vessels made by Professor Mackenzie no communication could be found between the greatly dilated axillary vessels. The final report in this case was given in *THE LANCET* of Nov. 1st, 1913. Closure of the orifice is exceedingly rare. Another case is reported by Pluyette¹⁶:—

A man, aged 33, applied in October, 1904, with a traumatic arterio-venous aneurysm of the right subclavian produced by a revolver bullet. The physical signs were of the usual character. On Nov. 15th he returned to the hospital, having had severe pains in the right hand and arm during the night. The parts were cyanosed, the pulse was scarcely palpable, but what was most remarkable was the disappearance of the thrill and murmur over the site of the aneurysm. There was pain in the course of the arteries, particularly the axillary and the brachial. The radial appeared to be large and hard, and there was no pulsation. It seems to have been an instance of cure by the formation of a thrombus in the arteries.

Occurrence of Sudden Death.

3. Sudden death may occur, either from heart failure or from embolism. Nothing was found to account for the sudden death in Case 4 of my series.

CASE 4.—A man, aged 29, admitted in November, 1904, had received 15 years previously a pistol shot in the lower third of the thigh; following this a tumour appeared, which had been present ever since. There was much disability owing to enlargement of the leg, with great distension of the veins, much lividity, and a persistent ulcer above the ankle. He died suddenly, apparently of syncope. Clinically there was a large pulsating tumour at the lower end of Scarpa's triangle, not easily compressible, with a continuous machinery murmur and a thrill transmitted up and down the leg. Anatomically the condition found by Dr. Rufus Cole and Dr. W. G. MacCallum was very remarkable. The femoral artery was dilated, and at the beginning of the lower third of the thigh presented two perforations separated by a narrow bridge of tissue; the femoral vein just opposite showed a

¹⁶ Bulletin et Mémoires de la Société de Chirurgie de Paris, 1906.

perforation at the same level. A probe could be passed from the artery into the vein through these apertures. On the inner side and in front of the artery and vein, and communicating with both, was a sac 12 cm. in diameter formed of dense fibrous tissue and lined by a granular, deeply pigmented clot. "This sac does not form the communication between the vessels, although the probe passes readily through either into it, nor are they (i.e., the sac and the vessels) directly united, but rather by way of a small space or vestibule which lies in front of the orifice of the sac." The veins were enormously distended both above and below the level of the communication.

Evidently this large venous sac, which communicated freely with the artery, formed the pulsating tumour to be felt in the front of the thigh.

4. *Rupture* may occur with fatal hæmorrhage, of which a number of cases are recorded.

Disability from Varicose Veins and Thrombosis.

5. In the crural vessels progressive disability may result from the varicose veins, thrombosis, and ulceration. When left too late the condition of the vessels is unfavourable to operation and specially favourable to thrombosis—the surgeon's chief danger. These accidents are well illustrated in the following case.

CASE 5.—A man, aged 34, whom I saw with Dr. Halsted and Dr. Bloodgood, was admitted in May, 1897. Eight years before he was shot in the popliteal space. He did not notice the tumour for a year. It was a large spindle-shaped mass filling the popliteal space, with a well-marked continuous thrill felt over the tumour and far down the leg. The femoral artery was ligatured in Hunter's canal. The leg became gangrenous and had to be amputated. On dissection, just where the femoral becomes the popliteal there was a communication between the vein and the artery, an opening 1 cm. in diameter. Opposite to this on the wall of the artery was a sac measuring 2 by 3 cm. Above the opening the veins were greatly distended and dilated, with thickened walls. At the time of the operation it was noted

that some of them were thrombosed and there was a small clot in the artery, and the communication between the artery and the vein was also closed by a small thrombus.

Widespread thrombosis probably accounts for the sudden onset of swelling and disability of a limb many years after the accident. Evidently this happened in the remarkable case reported by Rokitansky.¹⁷

A man, aged 62, admitted Nov. 28th, 1842, was in 1809 shot in the shoulder. The bullet was removed, but some grains of shot remained. He recovered, but had always a cramp-like feeling in the tips of the fingers of the left hand. For two years there was an increase in the size of the whole arm, which had increased rapidly in the six weeks, and on admission was œdematous and cold, with the skin of a dark red colour. In the arm-pit was an old pulsating tumour the size of a hen's egg, with marked thrill. The subclavian was tied on Sept. 23rd. He died 15 days afterwards of secondary hæmorrhage. There was an arterio-venous aneurysm of the axillary vessels, which were greatly enlarged and sclerotic, and there was a clot in the veins.

And lastly, the vascular tissue involved in the aneurysmal area may take on a nævoid growth. Apart altogether from arterio-venous aneurysm, the entire vessels of a limb, arteries and veins, may take on active growth, as in the extraordinary specimen of macroangiosis of the arm in the Charing Cross Hospital Museum, in which the growth of the vessels followed an injury. This has happened in certain cases of arterio-venous aneurysm of the vessels of the head, and though the orifice of communication may be small, within a few years the vessels (as in Cushing's case already referred to) may become enormously enlarged, much more than can be accounted for by any increase in pressure.

¹⁷ Observation 46 of his great monograph Ueber einige der wichtigsten Krankheiten der Arterien.

TREATMENT.

It is not my place to speak of treatment, but we all agree, I think, with the conclusion arrived at by Subbotich, senior surgeon of the Belgrade State Hospital, from his experience in the Balkan War, "that arterio-venous aneurysms should be operated upon, as they offer small prospect of spontaneous cure, although they often remain stationary for a long time and cause relatively little trouble." It is a good deal a question of situation and technique. As the cases here reported indicate, with the lesion of the axillary and subclavian vessels good health may be maintained for years without any serious trouble, but there are always risks, particularly of thrombus formation in the distended veins, and even after lasting 30 or 40 years serious trouble may arise. Urgency is greater in the case of the lower limbs, and I should say that it would be very much safer in the two cases we have just seen to operate before the venous engorgement becomes excessive.

A new and truly marvellous technique has been developed in vascular surgery, very largely owing to the work of Alexis Carrel, and the increasingly favourable results in this all-important department of surgery have followed directly upon animal experimentation. It is not too strong a statement to make that up-to-date vascular surgery cannot be done in a hospital whose younger surgeons have not full opportunities to experiment upon animals. The extraordinarily delicate technique of vascular suturing is an art acquired only with much practice. It is a chapter in the history of surgery of which our colleagues may be proud. I was greatly impressed with the statistics given by Matas at the last International Congress of Medicine dealing with operations on aneurysm generally.

Of the 225 cases collected 194 affected the lower limb, 23 the upper limb, 4 involved the carotid artery, 4 the abdominal aorta. Of the whole number, 53·3 per cent. were aneurysms of the popliteal. As to the operation involved,

in 150 cases the obliterative operation was done, in 50 the restorative, and in 25 the reconstructive. Of the 225 cases 206 were successful, in 4 cases gangrene followed, and all four operations on aneurysms of the abdominal aorta were followed by death.¹⁸

Within the next year there will be greater opportunities for vascular surgery than have ever before been offered. The results of the last wars should be carefully studied by our surgeons, those given by Stevenson for the South African, by Saigo for the Japanese, and by Subbotich for the Balkan. The statistics will be found in great detail in the monograph by Monod and Van Vert.¹⁹ They are also given by Sir G. H. Makins in the Bradshaw lecture on Gunshot Injuries of the Arteries,²⁰ 1913; in Bernheim's (of the Johns Hopkins Hospital) recently issued monograph on "Surgery of the Vascular System";²¹ and may I refer the younger army surgeons to the section on aneurysm in "Keen's Surgery" by that modern Antyllus, my old and valued friend Rudolph Matas, of New Orleans.

In conclusion, may I put in a plea for the museums? Specimens should be sent to the Army Medical Museum, Millbank, and to the great Hunterian Collection at Lincoln's Inn Fields; and may I ask that very careful reports of the cases be sent to the Central Committee for preparation of the medical and surgical history of the war, 34, Guilford-street, Russell-square, London, W.C.

¹⁸ THE LANCET, August 23rd, 1913, p. 550.

¹⁹ Revue de Chirurgie, vols. xli. and xlii., 1910.

²⁰ THE LANCET, Dec. 20th, 1913, p. 1743.

²¹ Lippincott Company, 1914.

LEEDS LUNCHEON CLUB

Nerve & "Nerves"

Address given by

SIR WILLIAM OSLER

BART., M.D., F.R.S.

Regius Professor of Medicine in the
University of Oxford.

1ST OCTOBER . 1915

NERVE AND "NERVES"

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University of Oxford.



LOOKING for a subject on which to address you, I thought at first of some local topic, as the influence of a University on industrial life, or a problem of public health—smoke abatement, or housing. Of the former I happen to know something in connection with the rapid growth of your scientific departments, and the good work of the Medical School, which has maintained and extended the reputation which Leeds has long enjoyed as a medical centre. I knew, too, that your city had done much to better the condition of the working classes, and that it had an enviably low death rate. Your M.O.H., Dr. Angus, kindly sent me the public health report for 1914, and it was particularly gratifying to see that your death rate was only 15 per 1,000, a reduction of 50 per cent. in fifty years, only 7,000 deaths instead of 14,000, if your rate of the middle of the last century had been kept up. I could not but look at certain figures of a disease in which I am much interested—tuberculosis—and I should like to refer to them, not to discourage you, but to indicate how much remains to be done. There were 782 deaths from tuberculosis—not a specially high rate for a city of this size—but there is a statement which shows that you are doing a great deal to further the spread!

Of 1,428 cases recently visited there were 812, or 57 per cent., in which more than one person occupied the patient's bedroom, and in 640, or 45 per cent., there were others sleeping in the same bed with the patient. That is a bad record—not worse, I am sorry to say, than many other places, not so bad indeed—but it is a striking illustration of the importance of the housing question in connection with the white scourge.

But all local problems sink to zero before the great struggle for national existence in which we are engaged.

Where the greater malady is fixed
The lesser is scarce felt;

so I decided to offer a little medicated advice on how to get the best work out of the human machines of the nation in these times of stress and strain.

The other day I asked a battle-bronzed veteran fresh from an inferno of shell fire if he thought any single factor would decide the war. "Yes," he said, "*nerve*; the men who can best stand the racket will win." I must confess to a little surprise, as I expected him to say men, or money, or munitions. I could not get a definition of nerve from him, but he said, "If a fellow after 18 days' of hell has energy enough left to take off his clothes he is full of nerve." I then turned to the Oxford Concise Dictionary, and found the word given as *vigour, energy, well-strung state*. "Ah!" he said, "that last is what I mean; you may have men, and money, and munitions, but unless you have taut, well-strung nerves there is no chance for final victory." The phrase is a good one, dating from the days when English bowmen fought where now not arrows but shell and shrapnel darken the air. It means command of the machine and all its resources. Take

in illustration a man on his feet, speaking—command of his legs, command of his thoughts, command of his tongue, all at the same time. Not one of these came to him naturally, but by training. Anyone can do it, but it takes a nerve only acquired by training; and a successful speaker adds by practice such control of the machinery in his head that he translates thoughts into speech without the intervention of hand or pen. Though partly a natural gift, education is the important factor. The nerve of the soldiers and sailors is largely given by training. It is not alone the capacity to draw on all the resources available that enables a man to rise superior, as we say, to an emergency, to mobilise forces which are not called upon in everyday life, but which are on tap. There is with it a consciousness of power, which comes from a knowledge of the machine and of its capacities, with a self-control which never for a moment loses grip of the wheel. In peril it is nerve which enables a man to act promptly and surely. A pilot 6,000 feet up who could swing with the right arm under his machine and do a bit of essential repair had nerve. I saw a surgeon open a big artery accidentally—a terrifying spurt of blood; a glance of the eye brought the assistant's finger on the main trunk of the vessel, and the surgeon coolly turned, scrubbed his hands afresh, and very quietly gave the nurse directions to get ready the necessary instruments. No fuss or fluster; just the quiet nerve in control of the situation the nerve of knowledge. An extraordinary feature in the human machine is its reserve stores of energy. You cannot get 30 horse-power work out of a 20 horse-power motor, but you can change a 50 horse-power man into one of 100 or more. That is because we habitually work at only about 25 to 30

per cent. of our capacity—mental or physical. Take in illustration the most wonderful engine ever built—the heart; in not one of you is it working 25 per cent. of its capacity. Some years ago, at Columbia University, New York, I heard that American Socrates, William James, deliver a remarkable address on “The Energies of Men,” in which he contended that our organism has stored up reserves of energy ordinarily not in use, but that may be called upon; deeper and deeper strata of material ready for use, on tap if we care to call upon it. Run a hundred yards, a sense of tire or fatigue comes, and we get short of breath—some of us would be pulled up at 50 yards—and if we go on there comes a moment when we feel we must stop; but force yourself, and something surprising happens. The sense of fatigue passes away, and we are able to go on—a man has got what is called his second wind, he has tapped a new level of energy. And there is the same phenomenon in mental states. Beyond the point of fatigue-distress may be found “amounts of ease and power we never dreamt ourselves to own—sources of strength habitually not taxed at all, because habitually we never push through the obstruction, never pass those early critical points.” Our energy budget has really never been exploited. Kipling has the secret in a verse in the famous poem “If” :—

If you can force your heart and nerve and sinew
To serve your turn long after they are gone,
And hold on when there is nothing in you
Except the Will which says to them “hold on.”

As with the individual so with the nation. Nerve is a special trait of the Briton, who has always displayed a dogged determination and a capacity to hold

on, so well expressed in the lines I have just quoted. The nation, too, has its reserves of energy, upon which in the present trial we must call. We are standing well the change of gear. New and unthought-of levels of energy are available, on tap at *will*. We are being tried—like the crew of a submarine which has the nerve test applied—hatches closed, lights out, ballast tanks filled, and down she goes in the darkness. This is repeated day by day, and any man who shows signs of “nerves” is weeded out.

There is a state the very opposite of that of which we have been speaking, seen in man and nations, and best described by the word *nerves*, a word not in the dictionary. It is slang, but we all know the meaning, the unstrung state, the inability to get work, or the best work, out of the machine, a jumpiness and instability. A man may inherit a weak, irritable nervous system, another may spoil a good one with bad habits or bad training, or a good one may be shocked out of action by the blows of circumstance. In any case, the chauffeur loses control of the machine. How tragic are the cases of “nerves” returning from the front! A shell shock may knock a man out completely, hitting *central* in the big telephone system of his brain; dazed in mind, slow in speech and action, it may be weeks before control is regained. Or only a local group may be hit, the telephone girls in charge of hearing, or of speech, or of sight, or there may be nothing more than a jumpiness, with inability to concentrate in any effort, mental or physical. In addition there are scores of cases in which the condition has passed beyond the stage we can rightly call “nerves.”

Unfortunately, it is not a matter for the individual alone. “Nerves” may attack whole communities. We

are all apt to be swayed by states of mind which are rarely associated with any clear consciousness of their causes. They may be nothing more than moods, but they spread like measles, or any other infection. What a contagion is fear, a state in which the nerves are unstrung. How its voice rings through history. The spirit of fear may come on a people like pestilence, and in the Middle Ages was responsible for that black record of witches and witchcraft. Waves of emotion play on man's nerves as the wind on an Æolian harp.

Even strange bodily states may be induced, as in the mania of the Middle Ages, which sent the population of whole districts dancing wildly over the country. The herd instinct, so dominant in animals, is present also in man, and the psychology of the crowd has become a favourite study. In a great crisis like the present, we are all a bit surcharged emotionally. Feed a frog with small doses of strychnine, and to the slightest touch it responds with an unnaturally violent kick or jump. The daily dose of strychnine which we get each morning now at breakfast-table has made us a bit jumpy, and we, too, like the frog, respond to stimuli in a very abnormal way. We get "nervy," and lose control of the machine. Judgment becomes difficult, and we are swayed by emotions that sweep over the crowd regardless of any basis in truth. We become weak-minded, and believe anything any Ananias says. Who would have dreamt that so early in the war there could have been so many liars in the country as the men and women who saw Russian troops! An instability of this sort leaves us easy prey to the Yellow Press. Think of the legless, armless, eyeless Belgians that crowded their columns—all had been seen by these perverts, few, if any, by the camera. What

a triumph of unstrung nerves was that matter of the war babies. Thousands of girls were pregnant in consequence of the conjunction of Mars with Venus in the last quarter of 1914. In one town of 18,000 inhabitants 2,000 were expected! It was gravely suggested that the workhouses should be converted into maternity hospitals. Oxford expected a huge crop, but the rate has scarcely reached normal! The "*Liar*" of Lucian should be reprinted and spread broadcast as the true model for these modern Cretans.

Collectively, we need steadying, more self-control, more cultivation of the *will*, which alone has the key to our reserves of unused energies. We should avoid everything that artificially stimulates, and so irritates the nervous system. It indicated a certain lack of nerve, an oyster-like flabbiness in the nation, not to have followed the King's example in the matter of alcohol. Nothing so weakens the will of the worker, of mind or of muscles, as leaning upon that Egyptian reed. Too much tobacco also increases the irritability of the nervous system, and many of our young soldiers smoke far more than is good for their hearts or brains. Another serious promoter of "nerves" is the combination of gossip, gabber, and gas which we have dealt out by the penny dreadfuls, and too often poured by people into our too willing ears. I wish we could catch and intern one person, a lying knave, an Autolycus, who flits from house to house, in most, alas! very welcome, called "a friend of mine." That appalling third person is responsible for apprehension and mistrust where confidence should reign, and very often for a limp, flabby public opinion instead of "nerve"—that well-strung state so needful for our final victory.

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INTENSIVE WORK IN
SCIENCE AT THE PUBLIC
SCHOOLS IN RELATION TO
THE MEDICAL CURRICULUM

BY

SIR WILLIAM OSLER, Bart., M.D., F.R.S.

Regius Professor of Medicine, Oxford.

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INTENSIVE WORK IN SCIENCE AT THE PUBLIC SCHOOLS IN RE- LATION TO THE MEDICAL CUR- RICULUM.¹

By Sir WILLIAM OSLER, Bart., M.D., F.R.S.

Regius Professor of Medicine, Oxford.

FORTY and more years' experience with the finished article as turned out from your shops should give assurance of a knowledge on my part of your methods of work and endeavours. General impressions are rarely accurate, but it may be worth noting that a composite picture of the thousands of students who have left impressions on my mental films is one to be looked at with pleasure; and not without a feeling of gratitude to schoolmasters who have passed on so many men well fitted to study medicine. I do not say well prepared, but 99 per cent. have possessed the essential factor in a successful education, interest, a living interest in the subject. I am taking advantage of the honour you have conferred to urge that by a more intensive method of the study of the sciences,

¹ Presidential address delivered to the Association of Public School Science Masters on January 4th, 1916.

boys designed for the medical profession may leave your hands prepared to begin their special studies.

In a presidential address, and to this audience, a preliminary reminiscent note may be pardoned. As a boy I had the common experience of fifty years ago—teachers whose sole object was to spoon-feed classes, not with the classics, but with syntax and prosody, forcing our empty wits, as Milton says, to compose “Theams Verses and Orations,” wrung from poor striplings like blood from the nose, with the result that we loathed Xenophon and his ten thousand, Homer was an abomination, while Livy and Cicero were names and tasks. Ten years with really able Trinity College, Dublin, and Oxford teachers left me with no more real knowledge of Greek and Latin than of Chinese, and without the free use of the languages as keys to great literatures. Imagine the delight of a boy of an inquisitive nature to meet a man² who cared nothing about words, but who knew about things—who knew the stars in their courses, and could tell us their names, whose delight was in the woods in springtime, who told us about the frog-spawn and the caddis worms, and who read to us in the evenings Gilbert White and Kingsley’s “Glaucus,” who showed us with the micro-

² Rev. W. A. Johnson, Founder and Warden of Trinity College School Canada.

scope the marvels in a drop of dirty pond water, and who on Saturday excursions up the river could talk of the Trilobites and the Orthoceratites, and explain the formation of the earth's crust. No more dry husks for me after such a diet, and early in my college life I kicked over the traces and exchanged the classics with "divers" as represented by Pearson, Browne, and Hooker, for Hunter, Lyell, and Huxley. From the study of nature to the study of man was an easy step. My experience was that of thousands, yet, as I remember, we were athirst for good literature. What a delight it would have been to have had Chapman's "Odyssey" read to us, or Plato's "Phædo," on a Sunday evening, or the "Vera Historia." What a tragedy to climb Parnassus in a fog! How I have cursed the memory of Protagoras since finding that he introduced grammar into the curriculum, and forged the fetters which chained generations of schoolboys in the cold formalism of words. How different now that Montaigne and Milton and Locke and Petty have come to their own, and are recognised as men of sense in the matter of the training of youth.

I wonder how many of you have a first-hand knowledge of these great masters in your Israel. For a man who, as Montaigne says, has only nibbled upon the outer crust of knowledge in his nonage, and has only retained a

general and formless image, it smacks of impertinence to offer idle whimsies to a group of experts. I have a mental reflex when I meet a young man engaged in teaching, and almost involuntarily out come the questions: Have you read Milton's "Tractate"? Do you know Locke's "Thoughts"? Have you ever tried a boy on Montaigne's classical diet? What do you think of Petty's "Ergastula Literaria"? I know what he thinks of me at the close of a few minutes' conversation! But seriously, who does not envy the happy issue of the noble experiment in education made upon the person of the great essayist, whose influence may be seen in the contributions of Milton and Locke? I was glad to read a few months ago the strong tribute paid by Sir Henry Morris (*Lancet*, September 18th, 1915) to these two great English reformers.

May I for a moment in passing say a word or two about the fourth, Sir William Petty, whose "*Advice . . . to Mr. Samuel Hartlib for the advancement of some particular parts of learning*" touches us very closely to-day. It is interesting that it should have been addressed to the man—himself a great educational reformer—at whose request Milton published his "Tractate." When written, the country was in the midst of civil turmoil, with a larger proportion of the population fighting than at any period in its history until the

present. The Universities were deserted, education neglected, and upon the old soil thus upturned Petty scattered the seed—to fall among thorns. Only in our day we have seen his three far-seeing propositions realised. Many of our schools are *ergastula literaria*, literary workshops, “where,” as he says, “children may be taught to do something towards their living as well as to read and write”; and he was keen that the children of the better classes be taught some “genteel manufacture in their minority,” and a delightful list is given. His *Gymnasium mechanicum*, or College of Tradesmen, is represented by our technical schools. Petty’s fertile mechanical genius foresaw the enormous advantage of such institutions in stimulating trades and inventions. “What experiments,” he says, “and stuffs would all these shops and operations afford for active and philosophical heads.” And what a wonderful design is his third institution—a *Nosocomium academicum*, “a hospital to cure the infirmities both of Physicians and patients,” a great scientific school for the study of disease and its cure.” Neither Montaigne nor Milton nor Locke had the wide national outlook on education displayed by Petty, who alone almost of his generation realised that the problems of natural philosophy, as it was then called, must be attacked in a systematic and co-operative

study by a group of men "as careful to advance the arts as the Jesuits are to propagate their religion." One cannot but regret that the Professor of Anatomy at Oxford, and the Vice-Principal of Brasenose College, should have been diverted to a turbulent and disheartening career in Ireland, and to-day the identity of the founder of English political economy and of public health statistics is merged in the author of the Down Survey, and the Beginner—to use Fuller's word—of a great family³ (Lansdowne).

To come now to the subject-matter of my address—the earlier and more intensive study of science at school to save time at the university.

For fifteen years the slowly evolving sprightly race of boy should dwell in a Garden of Eden, such as that depicted by the poet—no sense of any ills to come, no care beyond the day, buxom health, wild wit, the sunshine of the breast, the lively cheer—

The thoughtless day, the easy night,
The spirits pure, the slumbers light.

During this blissful period a boy is an irresponsible yet responsive creature, a mental and moral chameleon taking the colour of his environment, very difficult to understand, often

³ Petty's "Advice" appeared in 1648 (4to, Lond.), and is also in vol. vi. of the "Harleian Miscellany." I hope to see this remarkable contribution to educational methods reprinted.

never understood by parent or teacher—yet, tied about his neck is a *clavis symphonia* with which anyone may unlock his heart and control his life. Rather an ideal sketch you may think, and doubtless Plato's description fits better with your experience—"and of all animals the boy is the most unmanageable, in so much as he has had the fountains of reason in himself not yet regulated; he is the most insidious, sharp-witted, and insubordinate of animals." What concerns us to-day is that about the fifteenth year there comes a change in this mysterious being—physical, mental, and moral. Consciousness that he is a man and has man's duties is forced upon him, and repeating the tragedy of the Garden, he awakens to the knowledge of good and evil. It is fitting to mark this change with a change in his education. Plato did it. Following two three-year periods devoted to general and humane studies came the maturer pursuits fitting the young citizen for service in the State. My plea is to follow this plan, as for one profession at least it is most desirable.

At fifteen a boy should have had sufficient general education—the three R's, a fair knowledge of the history and literature of his country, and in the public schools enough classics to begin a technical training and to pass the ordinary entrance examination. Now comes the fateful period in which the bent of

the boy's mind is determined. A difficulty exists in only a small proportion; a large majority have already selected careers, and the work of the sixteenth and seventeenth years should be determined by this choice, whether professional, commercial, academic, or the Services. The classical, modern, and scientific departments of the schools now meet these demands.

The profession of which I can speak is in a serious quandary. With the rapid development of science the subjects of study have become so multiplied that the curriculum is overburdened, and the five years is found to be insufficient. Men come up later, remain longer, and the twenty-fifth or twenty-seventh year is reached before the qualification to practise is obtained. A measure of relief to this heavy burden—and it is one not likely to lighten during the next decade—is in your hands. Devote the sixteenth and seventeenth years to the preliminary sciences—physics, chemistry, and biology—and send us at eighteen men fit to proceed at once with physiological chemistry, physiology, and anatomy.

To do this three things are needed: teachers, laboratories, and a systematic organisation of the courses.

I put the *personnel* first, as the man is more important than his workshop. Your society indicates the position which the science master

has reached in our public schools, not without long years of struggle. The glamour of the classics lingers, but the shock which the nation has had in this great war will make us realise in the future that to keep in the van we must be in the van intellectually in all that relates to man's control of nature. Science "Heads" at Winchester, Eton, and Harrow would give the death-blow to the old-time Anglican tradition so well expressed in a Christmas sermon by the late Dean Gaisford, that classical learning "not only elevates above the vulgar herd, but leads not infrequently to positions of considerable emolument." There is an initial difficulty apt to block good men, the fear of overburdened teaching, since it is not always possible for a school to pay an adequate staff; but the past twenty years have seen the whole situation changed. The posts have become more and more attractive and better paid, so that a definite career is now offered to able young men. Many original contributions to science made by the members have given a proper *caché* to the association, and, I may say, have added enormously to its intellectual status. Men feel proud to have as colleagues distinguished workers. Let us not forget that Priestley got his F.R.S. while a master at the Warrington Academy. The exhibits by members at this meeting indicate a fertility of invention in the highest degree creditable.

Brains, not bricks, should be the school motto in the matter of laboratories. A young Faraday in a shed is worth a dozen scientific showmen in costly buildings with lavish outfits. The accommodation, I am told, is at present ample in the larger schools. I have, indeed, seen laboratories which the most up-to-date college would envy. In the smaller schools it has not always been easy to get either the men, the space, or the equipment for teaching all the branches, and if an attempt is made to give earlier and more intensive science teaching there will have to be improvement all round.

The real crux is not with men or with buildings, but so to organise the teaching of the school as to have a continuous science course through two years. What is done now occasionally by the individual, I should like to see done by all the science men coming up to the universities or to the medical schools. A few men take the preliminary scientific subjects on entering Cambridge. Though possible, this at Oxford is rarely done; indeed, the examination is not at a suitable time! For some years now I have watched the results of the chemistry "prelims" at Oxford, and have consulted with many examiners, and I am sorry to say that the opinion usually expressed has been that in this subject the teaching in the schools is not yet up to college standards.

Here is where my appeal comes to the school authorities. Give us the boys of the sixteenth and seventeenth years for well-organised thorough courses in biology, chemistry, physics, and the associated mathematics. You have the teachers and the "plant." Think what could be done with a class of bright boys in two full years, who had *nothing else to do*. No, I would let them have two other subjects, French and German, taught *à la Montaigne*, by making the boys use elementary French and German text-books. With reading clubs, Selborne clubs, and historical clubs, conducted by the boys themselves in the laboratories, the literary side of their education would be continued, and a sympathetic teacher would not be above putting a little English polish on, say, a short essay on Lavoisier. Judiciously mixed, chemistry through two years, biology through two, and physics in one—how I envy the teachers, how I envy the taught! A full year would be gained, as the two spent at the school in science would be the equivalent of the one now spent upon the preliminary subjects after entering the medical school. It would indeed be possible to allow those who came up to a certain standard to cut off the fifth year. By shortening vacations, and rearranging methods of instruction, we could return to a four-year curriculum. Practically that is what it is

now, as a majority of men spend the first year in preliminary sciences, to teach which is really no business of the medical schools. With this arrangement the average man could qualify at twenty-two years of age, spend a year in hospital or at post-graduate study, and start in "life" at twenty-three. We are now losing valuable time and wasting much needed money. What a present to make to our young men—two full years! It is worth while; and it can be done, and should be done.

My colleague, Prof. Arthur Thomson, has suggested that during the present emergency special arrangements should be made to pass on the boys at an earlier age, with their chemistry and physics well in hand. The plan I urge would make a radical change in the constitution of some schools. Not that science is not taught and well taught, but it should be given its proper place, as the dominant partner in the educational family, not a Cinderella left in the kitchen. From an intellectual standpoint the advantages are obvious. The mental exercise of the physical and mathematical sciences, combined with the technical training in the use of apparatus, gives a type of education singularly stimulating to boys. How many of our great inventors have lamented colourless careers at school! Things, not words, appeal to most boys. What an evolution of mind and hand is wrought by

a year in a well-conducted physical laboratory. The fascination of making and fitting the apparatus, the wonders of electricity, and the marvellous laws of heat and light—into this new and delightful world a boy of sixteen may pass safely for a thorough training. Only it must not be a mere dabbling, to which the physical laboratory too often lends itself, but a serious day by day, week by week, gradual progress. The senior boys could keep their knowledge of the subject fresh by acting as demonstrators in the junior classes. Many lads show an extraordinary aptitude for physics; there is always a boy Pascal in a big school, and no subject is so suited to arouse a fervid devotion to science. It would do the nation great good to have each generation, at the sixteenth or seventeenth year, pass automatically through a laboratory of physics.

I have spoken of the doubts expressed whether chemistry in the public schools can be taught at a college level. Of course it cannot as a subsidiary subject, to which only a few hours a week are devoted, but in a course extending over two years, as a major subject, with laboratory work four or five mornings a week, surely a youth in his sixteenth and seventeenth years should be able to put in the foundation stones, and in individual cases it is done already. As a mental discipline chemistry almost rivals physics; indeed, the

new physical chemistry is a blend which appeals with magic potency to all science students.

But no subject attracts the young mind so strongly as biology, in its varied aspects. Elementary teaching is now admirably arranged, and in a two-year curriculum it should be an easy matter to cover much more ground than in the preliminaries demanded for medicine. Field classes in botany, gardens, museum work, should all be utilised. I would like to see at every school that excellent plan adopted by the late Sir Jonathan Hutchinson at his village museum, Haslemere—nature lectures on Sunday afternoons, with exhibition of the flowering plants of the season, with any other specimens of interest. The biology class gives an opportunity of a clear statement of the facts of sex, always so hard to discuss with boys.

There are objections, of course, to extensive and intensive teaching of science in schools. It is the business of the college, not of the school, to prepare boys for technical studies; but if it is the business of the school to teach science at all, why not teach it thoroughly? The general influence of the school may be trusted to counteract the evil possible in a too early concentration upon special subjects. Nature is never special, and a knowledge of her laws may form a sound Grecian founda-

tion upon which to build the superstructure of a life as useful to the State, and as satisfying to the inner needs of a man, as if the groundwork were classics and literature. The two, indeed, cannot be separated. What naturalist is uninfluenced by Aristotle, what physician worthy of the name, whether he knows it or not, is without the spirit of Hippocrates. It has been well said that instruction is the least part of education. Upon the life, not the lips, of the master is the character of the boy moulded; and doubtless the great master of masters had this in mind when he said: "It may be, in short, that the possession of all the sciences, if unaccompanied by knowledge of the best, will more often than not injure the possessor." (Plato, "Alcibiades," ii.)

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AS ILLUSTRATED BY

SHAKESPEARE, BACON, AND BURTON

*Remarks made at the opening of the Bodley Shakespeare
Exhibition, April 24, 1916,*

BY

WILLIAM OSLER

AT the command of Prospero, the authors of the one and a half millions of books and manuscripts that rest in and beneath these historic buildings would arrange themselves in three groups—creators, transmuters, and transmitters. The first would not crowd the benches of this school; for the second it would be easy to find accommodation in the city; while the third would swarm black over Port Meadow and ‘the soft, low-lying Cumnor hills’. So restricted is the intellectual capital of the race that it goes easily on the seven-foot shelf of President Eliot’s (of Harvard) library. The vast majority of all books are dead, and not one in ten thousand has survived its author. Like the race of leaves the race of books is. The Bodleian is a huge mausoleum. Books follow a law of nature. Thousands of germs are needed for the transmission of an individual of any species. In the case of the salmon only one in a thousand is fertilized and of these not one in a thousand reaches maturity. So it is with books—a thousand or more are needed to secure the transmission of a single one

of our very limited stock of ideas. Were all the eggs of all the salmon to reach maturity the sea could not contain this one species, while the world itself could not contain the books that would be written did even one in a thousand transmit a fertile idea. It is enough, as some one has said, if 'every book supplies its time with a good word'.

In the days when Sir Thomas Bodley concluded to set up his staff at the Library door at Oxford, there lived in this country the last of the great transmitters, Robert Burton; the first of modern transmuters, Francis Bacon; and the greatest of the world's creators, William Shakespeare.

Emerson's remark that 'every book is a quotation' is true in a special sense of the encyclopaedias and dictionaries that fust unused on our shelves. From the huge tomes into which, at the behest of St. Louis, Vincent of Beauvais in the thirteenth century boiled down all knowledge—the earliest edition we have in Bodley weighs above one cwt.!—to the last issue of the *Encyclopaedia Britannica*, writers have striven to transmit the stores of human knowledge. Such 'systems' have their day and then cease to be. The individual fares better than the encyclopaedia, but not often. The *Discoveries* of Ben Jonson, a timbered mosaic, so skilfully designed that even the glue is invisible, is dead. No one now reads the *Sylvae Nuptialis* of Joannes Nevizano, a mere string of quotations; few have even heard of the *Zootomia* or *Moral Anatomy of the Living by the Dead*, by Richard Whitlock—though he was a Fellow of All Souls; or of scores of the sixteenth- and seventeenth-century patchworks. Only the golden compilation of Robert Burton lives, and lives by the law so well expressed in the lines:

Sappho survives because we sing her songs,
And Eschylus because we read his plays.

The silent, sedentary, solitary student (as he terms

himself) in the most flourishing college of Europe, *augustissimo Collegio*, with Saturn lord of his geniture, to relieve a *gravidum cor*, swept all known literature into a cento. No book was ever so belied by its title as the *Anatomy of Melancholy*. In reality the anatomy of man in all possible relations it is easy to read the secret of its salvation. The panorama of human life is sketched in broad, firm outlines by a man of keen humour and kindly satire. Though page after page is laden with what Milton calls 'horse loads of citation', the golden links are of Burton's own fashioning. Even the dry bones of bibliography come to life as he pours out a torrent of praise upon the 'world of books that offers itself in all subjects, arts and sciences to the sweet content and capacity of the reader'. Except Shakespeare, no writer has realized more keenly that all thoughts, all passions, all delights, and whatever stirs this mortal frame, minister to the one great moving impulse of humanity. It is not a little surprising that from a student of Christ Church, an old bachelor, and the Vicar of St. Thomas the Martyr, should have come the most elaborate treatise ever written upon love. There is no such collection of stories in all literature, no such tributes to the power of beauty, no such pictures of its artificial allurements, no such representation of its power of abasement. The thoughts and words of more dead writers are transmitted to modern readers by Burton than by any other seventeenth-century author. That the *Anatomy* is not in the cemetery of dead books is due to the saving salt of human sympathy scattered through its pages. Burton comes within the net of the Baconians, but it was much discussed by the late Mr. George Parker, of the Bodleian, and Mr. M. L. Horr¹ of Denver whether it was not more likely that he wrote the plays of Shakespeare.

¹ 'Who wrote Shakespeare?' by 'Multum in Parvo' (M. L. Horr), from the Denver (Colorado) *Tribune-Republican*, 1885. 4 pp. (In Bodley.)

The melting-pot of the transmuters has changed the world. They have been the alchemists at whose touch the base metal of common knowledge has been turned to gold. Among them Francis Bacon takes a high place, not so much for his inductive philosophy, really a new creation, as for the convincing demonstration that the relief of man's estate was possible only through a knowledge of the laws of nature. A great transformer of the mind, he realized, as no one before had done, that 'within the reach of the grasp of man lay the unexplored kingdom of knowledge if he will be but humble enough, and patient enough, and truthful enough to occupy it'. With a Pisgah-sight of Palestine, he lacked the qualities of a Joshua to enter himself upon campaigns of conquest; but he was one of the world's seers with a vision of the possibility of man's empire over nature. The singularly human admixture of greatness and littleness was in his works as well as in his life.

History repeats itself. Greek philosophy, lost in the wandering mazes of restless speculation, was saved by a steady methodical research into nature by Hippocrates and by Aristotle. While Bacon was philosophizing like a Lord Chancellor, two English physicians had gone back to the Greeks. 'Searching out nature by way of experiment' ('tis Harvey's phrase), William Gilbert laid the foundation of modern physical science, and William Harvey made the greatest advance in physiology since Aristotle. Reckless of his own rede Bacon failed to see that these works of his contemporaries were destined to fulfil the very object of his philosophy—the one to give man dominion over the macrocosm, the world at large; the other to give him control of the microcosm, his own body. A more striking instance of mind blindness is not to be found in the history of science. Darkly wise and rudely great, Bacon is a difficult being to understand. Except the *Essays*, his

books make hard reading. In the *Historia Naturalis*, a work of the compiler class, one would think that a consideration of Life and Death would so far fire the imagination as to save an author from the sin of dullness. Try to read it. A more nicely tasteless, more correctly dull treatise was never written on so fruitful a theme. There is good sense about medicine and nature, but with the exception of the contrast between youth and old age, which has a fine epigrammatic quality, the work is as dry as shoe-leather, and the dryness is all his own, as other authors are rarely quoted. Only a mollusc without a trace of red marrow or red blood could have penned a book without a page to stir the feelings and not a sentence with a burr to stick in the memory. Bacon students should study the lengthy consideration given in it to the spirits, and then turn to Schmidt's *Lexicon* to see how very different in this respect are the motions of Shakespeare's spirit. The truth is Bacon had in a singular degree what an old Carthusian (Peter Garnefelt) called 'the gift of infrigitation'.

What a contrast when a Creator deals with Life and Death! The thoughts of the race are crystallized for ever. From Galen to Laurentius, physicians have haggled over the divisions of the ages of man, but with a grand disregard of their teaching. Shakespeare so settles the question that the stages are stereotyped in our minds. We can only think of certain aspects in terms of his description. The vicissitudes of every phase are depicted. The shuddering apprehension of death we can only express in his words.

The transmuters have given to man his world dominion. The raw ore of Leucippus and Democritus has been refined to radium by Crookes, Ramsay, and the Curies; the foundations of Krupp are laid in the *De Re Metallica* of Agricola; the defenders of Verdun use the expanded formulae of

Archimedes and Apollonius; Lamarck and Darwin, Wallace and Mendel are only Anaximander, Empedocles, and Lucretius writ large; Poppy, Mandragora, and other drowsy syrups had been in use for centuries to make persons insensible to pain, but the great transmutation did not take place until October 16, 1846, when Morton demonstrated at the Massachusetts Hospital the practicability of aether anaesthesia; Pasteur, Koch, and Lister are Varro, Fracastorius, and Spallanzani in nineteenth-century garb. Only by the labours of transmuters has progress been made possible, and their works will fill the shelves of the concentrated *Bibliotheca Prima* of the future.

Whether the benches of this school would seat the members of our third group, the creators, would depend very much on the judgement of Prospero. Thus to Harvey claiming admission, he might say, 'You simply took the idea of a movement of the blood which had been current knowledge since Solomon, and by experiment demonstrated a motion in a circle and not by ebb and flow'. And this is true. Without Aristotle, Galen, and Fabricius there would have been no Harvey. Transforming their raw ores by methods all his own, he made the *De Motu Cordis*, 1628, a new creation in the world of science. Not by the material, not by the method of its manufacture, but by the value of the finished product is the author's position to be judged. In Science the best transmuters have been the fruitful creators. The same law holds in Art and in Literature. The Alchemy of Shakespeare made him a great creator. 'Self-school'd, self-scann'd, self-honour'd, self-secure,' in heaven-sent moments he turned the common thoughts of life into gold. From Carlyle and Emerson, the teachers who stirred our hearts, the youth of my day had a final judgement upon Shakespeare. After the two noble knights of literature¹ have spoken, it will be safer for

¹ Sir Walter Raleigh and Sir Sidney Lee.

a layman to express his feelings in the words of one of these masters :

What point of morals, of manners, of economy, of philosophy, of religion, of taste, of the conduct of life, has he not settled? What mystery has he not signified his knowledge of? What office, or function, or district of man's work, has he not remembered? What king has he not taught state? What maiden has not found him finer than her delicacy? What lover has he not outloved? What sage has he not outseen? What gentleman has he not instructed in the rudeness of his behaviour?—Emerson, *Shakespeare; or the Poet*.

Five thousand volumes in Bodley testify to a vast dominion unequalled in the history of literature. Once before in the world a poet held all the thoughts of his race. From Plutarch and Lucian we can judge how an educated Greek was really constrained to express himself in Homer's words. Such universality is to-day the prerogative of Shakespeare :

All pains the immortal spirit must endure,
All weakness which impairs, all griefs which bow,
Find their sole speech in that victorious brow.

As a little needful leaven and just to indicate the very present help he may be in these troublous times, let me quote Hotspur—any officer to any wife :

And, to conclude,
This evening must I leave you, gentle Kate.
I know you wise; but yet no further wise
Than Harry Percy's wife: constant you are,
But yet a woman: and for secrecy,
No lady closer; for I well believe
Thou wilt not utter what thou dost not know;
And so far will I trust thee, gentle Kate.

The exhibition which Bodley's Librarian and his Assistants have arranged with such care and the many

8 *Creators, Transmuters, Transmitters*

celebrations the world over will have one good effect—a heightened appreciation of the value of Shakespeare in the education of the young. In life's perspective we seniors are apt to resent that the rising generation should work out its own salvation in ways that are not always our ways, and with thoughts that are not always our thoughts. One thing is in our power, to admix in due proportions with their present somewhat rickety bill of fare the more solid nourishment of the English Bible and of Shakespeare.

Annual Oration
ON
THE CAMPAIGN AGAINST
SYPHILIS

Delivered before the Medical Society of London, May 14, 1917

BY
SIR WILLIAM OSLER, BART., M.D., F.R.S.

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MR. PRESIDENT AND GENTLEMEN,—With the flotsam and jetsam of the sale-room there came to my library the other day a book for the times, with the title “A Discourse of Constancy written in Latin by Justus Lipsius, Containing Comfortable Consolations, for all that are afflicted in Body, or Mind. London. 1654.” To have known of the “Discourse” through two admirable articles by Basil Anderton, of Newcastle,¹ gave an added welcome to Humphrey Moseley’s 12mo. “in the original state.”

In the dialogue the two friends discuss the miseries of the age, which had made the Low Countries almost as desolate as they are to-day, and the great Louvain Professor a homeless wanderer. To the despairing Lipsius his friend urged that “equal calamities and far greater had already fallen on the race,” and that after all it was the lot of man, his destiny, and that cities and people owe their ruin “by Commission of Providence.” As a tonic to their constancy they rehearse through many chapters the wonderful slaughters, the strange cruelties, the plagues and famines and rapines; and the conclusion reached was that Good comes out of Evil, and that the righteous are never forsaken. Having accepted this comfortable consolation, hard for us to read anywhere except on the title-page of the book, our neo-Stoical friends went to dinner!

THE CONQUEST OF THE GREAT INFECTIONS.

The past three years have seen the slaughter of man by man on a scale heretofore unknown except in the lively imagination of the Chronicler of the Kings of Israel. On the

¹ A Stoic in his Garden, and Justus Lipsius. The Library, 1915 and 1916.

illustrated title-page of the little book, Fate and Necessity beam from the sky dispelling the clouds and mist, and the light of Providence shines on the figure of Constantia. To us in these dark days comes a consolation denied to Lipsius and his friend. They did not realise as we do, that it is Apollo, not Mars, who slays most in war, that nature in the form of disease is more fatal to man than man with his weapons. The needless deaths of Peace far exceed those of the most disastrous wars. More people died of plague in two years in India than have been killed on both sides since the great war began. In 1915, while nine of our soldiers abroad died every hour to save their country 12 babies died at home in the same time, to the scandal of their country.

The knowledge of nature's laws has enabled men to devise really magnificent ways of wholesale butchery; yet with a delicious inconsistency the same knowledge has taught him the science of her ceaseless warfare through disease, and has enabled him to win the greatest victory in the history of humanity. Even in war time man displays just as much hostility to a hostile nature as he does to the enemy in the field. Bitter experience has shown him that disease is more fatal than powder and shot. The new knowledge has enabled him for the first time to reverse the ratio between bacilli and bullets. Full details are not to hand for the Allied Forces, but we know that the destructive pestilences have played a minor, not as heretofore the major, rôle. And it has been the same in the German armies in which the deaths from disease have been about 1 to 15 killed and died of wounds.

The story of the conquest of the great infections is the brightest single chapter in the history of science. The humanitarian aspect appeals to our better feelings, and hopes for the betterment of the race have been centred about health and homes and habits. There is a fly in the amber of course, and the vision is blurred (narrowed, indeed, to darkness!) as one looked in two directions—towards cancer and towards venereal disease. In choosing a subject for my address I could not let the opportunity slip of lending the weight of this ancient and honourable society to anything I might say upon the great awakening that has taken place with regard to syphilis and gonorrhœa. Among infections they stand alone. Against all others man wages a keen warfare. They present the remarkable and subtle combination of man and nature in an incessant and successful propaganda against the health of the nation. The report by Dr. R. W. Johnstone to the Local Government Board, 1913, and the report of the Royal Commission embrace every aspect of the question.

STATISTICAL DATA.

I propose to touch upon only two points—the importance of the enemy and the possibility of a successful campaign. I had the inestimable advantage of early professional association with a hero-worshipper. Dr. Palmer Howard, my teacher and for ten years at Montreal my revered colleague, was a man of keen intellectual attachment. Wide-awake when the dawn appeared, he saw with remarkable clearness the immense possibilities of preventive medicine under the guidance of such men as Chadwick, Budd, Simon, Farr, Ward Richardson, Buchanan, and Russell. When not talking of Bright and Addison, of Stokes and Graves, he was lauding these men, their ways, and their works. Important literary events were the arrival of Dr. Farr's Report and the Report of the medical officer of the Local Government Board, as they furnished ammunition for the year, and it was my privilege, if not always my pleasure, to dig out statistics of the various diseases or to abstract some special article. This, you may think somewhat irrelevant, statement is preliminary to an excursion I am about to ask you to make with me, not over unpathed waters, but through the familiar pages of the Registrar-General's Report—the just-issued volume for the year 1915. Custom has not made stale the awe experienced in the contemplation of its long rows of figures, the mystery of the position of the dots, and of such new expressions as standardised rates. And let me add a warning. No author of my acquaintance has been so uniformly unhappy as myself in dealing with statistics. And I have tried so hard! But there is scarcely a percentage in my Text-book that has not been challenged, and corrected, from various sources more than once. Like Lucian, then, in introducing his *Vera historia*, it may be well to solicit at the outset my hearers' incredulity.

The first thing to arrest attention in Sir Bernard Mallet's big Blue-book is the absence of all reference to venereal disease in the "Review of the Vital Statistics for the Year 1915," by Dr. T. H. C. Stevenson. Of 18 causes of death specially discussed, all but three belong to the infections, of which tuberculosis, pneumonia, and cancer² head the list—not a word about syphilis! For the report of 1912 Dr. Stevenson prepared a special discussion for the Royal Commission on Venereal Disease, and the difficulties of the whole subject, from the statistical standpoint, were exposed. The truth is, syphilis has been, and remains, the despair of the statistician. Trustworthy data are not forthcoming. Even in death a stigma is associated with it, and the

² I put cancer with the infections to use its mortality rates.

returns are everywhere but under the special caption of the disease itself. Among the 11 causes of infant mortality during the first year syphilis is not mentioned, though on p. xxii. it is twice alluded to casually—the only place in which the word occurs in the 46 pages of the review! This is no reflection on Dr. Stevenson who works with material furnished by the profession.

Where, then, do venereal diseases appear? At p. 142 (International List No. 37) syphilis is stated to have been responsible for 1885 deaths at all ages, and other venereal disease for 61. Not a very heavy bill, and of the 1885 deaths, 1162 were under a year, 1277 under five years. Of the ten best killers among the infections (exclusive of the motley group of diarrhoeal diseases of children) syphilis comes last. In order of potency they are (I give the round numbers), tuberculosis, 54,000; pneumonias, 49,000; cancer, 40,000; measles, 16,000; influenza, 10,000; whooping-cough, 8000; diphtheria, 6000; scarlet fever, 2400; cerebro-spinal fever, 2000.

REDUCTION OF TYPHOID FEVER.

But, Mr. President, I cannot pass these dry figures without a digression. To find syphilis among the ten great infections may cause surprise, but this is nothing to the astonishment at the absence of what has been in so-called civilised countries the very David among infections, typhoid fever—a paltry 1400 deaths! a rate of 35 per million. For 40 years physicians everywhere have consulted these reports for the statistics of this disease as the sanitary index of the most sanitary country in the world. Where and how was this great victory won? Where do you suppose? In a Government office—of all places! At the Local Government Board—of all places! and by a group of Government officials—of all men! by Simon, and his successors! Staff work, team-work, organised administration, have solved one of the greatest of the problems of public health.

To realise the magnitude of the victory one must have lived and moved and worked year by year in typhoid-stricken countries—helpless and hopeless without proper sanitary laws, or without the power to enforce them. To have succeeded within the memory of some who hear me in reducing the mortality of typhoid fever from between 700 and 800 per million living to the low figure 35 per million is one of the decisive battles of humanity. Conditions in this country have become so healthy that even with hundreds of thousands of recruits at the most susceptible age concentrated in camps the death-rate from typhoid disease has been the lowest in our history—and there is the added triumph of an enteric-free army in France. Inocula-

tion has done much ; but the conquest of enteric fever in this country was won by honest sanitation, carefully directed from a centre by experts, and by Government experts.

Mr. President, here, if ever, we may say with Simonides, "The State is a man's teacher," and for the benefit of the timid Ionian individualist we may add Plutarch's comment—that this lesson is only learned through many a bitter struggle and experiences. The immediate purpose of this digression will appear later in my address. Let us now return to the report.

GONORRHOEA AND RACE CONSERVATION.

Content at this stage the superficial reader will have a very erroneous idea of the position of venereal disease in the nation's life ; but before going deeper into its pages let me recall a few pathological and clinical details. Among the infections gonorrhœa and syphilis stand out as the great race poisons. No other germs act in precisely the same way. The gonococcus is not a great destroyer of life ; the figures given for 1915 convey the truth, only some 61 deaths. This tallies with clinical experience, as the fatal complications are very rare. But the gonococcus is the greatest known preventer of life—in fact, one of its cruel properties is to sterilise a very considerable proportion of its hosts. To realise the ravages of gonorrhœa, do not consult the Blue-books or the text-books, but study the reports of the gynæcological clinics and hospitals for diseases of women. As high as 25 per cent. of the major operations may be for gonorrhœa complications, which are among the commonest sources of chronic ill-health. Conservative estimates place the percentage of sterility in women due to gonorrhœa at 50. A large majority of these women are innocent victims of infection, often innocent infection, by husbands who thought themselves free from all traces of what they regarded as a harmless indiscretion of youth, and who could have been cured under a proper system of control treatment. Then the complicating epididymitis in the male is a common cause of sterility. One recalls the dictum of Noegerrath—the founder of our modern knowledge of gonorrhœa in the female—90 per cent. sterile women have husbands who have had gonorrhœa.

From the standpoint of race conservation gonorrhœa is a disease of the very first rank, and costs the country annually thousands of lives. With 30 to 40 per cent. of all the cases of congenital blindness, with the chronic pelvic mischief in women, and with the unhappiness of sterile marriages—with these and many minor ailments scored up against it, we may say that while not a killer, as a misery producer Neisser's coccus is king among the germs.

SYPHILIS.

The spirochæte of syphilis is easily the most notable among germs. A protozoon—it is the only protozoon, indeed, it is the only germ of world-wide dominion, irrespective of race or clime. From its well worked out biology, just two points suffice for our present purpose. The first, in some ways the most important single feature in its history, is the frequency of the transmission from parent to child. Congenital tuberculosis—how rare! Congenital pneumonia—unknown!—in fact, a killing transmission in the great infections is very rare. In syphilis it stands out less as a biological peculiarity than as a fact of supreme importance in the national health. The spirochæte may kill the child in utero, a few days after birth, or within the first two years of life, or the blighted survivor may be subject to innumerable maladies.

Stillbirths.

The stillborn are at last to be numbered. Until now they have remained the “hidden untimely births,” to use the language of Job. Sir Arthur Newsholme estimates them at close upon 100,000.³ What percentage of these deaths are spirochætal we do not know. This we do know, that syphilis is perhaps the most common cause of abortion, and that in examinations which have been made in large maternity hospitals more than 25 per cent. of the stillborn have been found infected. In this stage of big figures we can afford to be liberal, so let us reject the 80, or even the 50, per cent. of some estimates and let us put the “untimely hidden births” due to syphilis at 25 per cent. and tally them at, say, 20,000 for the year 1915.

Have we any data to justify these figures? I have looked through a great deal of literature, and was not a little pleased to find from my old hospital by far the most satisfactory information. Let me state that the obstetrical department of the Johns Hopkins Hospital was begun in a very quiet way. We put a good man in charge, Dr. Whitridge Williams, who has had first-class assistants, whole-time men, and a method of teaching which has enabled him to get a great deal of work out of his students. The result has been the output of valuable knowledge and the collection of a body of experience which bears directly upon the question before us. Of the first 10,000 cases in the clinic there were 705 foetal deaths—i.e., from the

³ Report on Child Mortality, 1916, p. 8.

seventh month on—7·05 per cent. In all cases the placenta was examined as well as the foetus. “By far and away the most common etiological factor in the producing death in the foetus is syphilis,” responsible for 26·4 per cent. in the series. This, too, is a low estimate, as at least 53 of the 127 macerated foetuses were probably syphilitic, though this could not be determined microscopically. I purposely refrain from quoting the statistics, also of 10,000 cases, of the Sloan Maternity, New York, from which the syphilitic are excluded. The small but very thoroughly worked out details of 500 cases by Dr. Slemons, of Yale Medical School, give 26 per cent. An investigation is in progress in London for the Local Government Board, and I am allowed to quote the figures to date, which give only 44 positive cases in 300—a much lower percentage than I have found elsewhere. A 20 per cent. estimate would, I think, be reasonable.

Infantile Mortality.

In 1915, of 800,000 children born, 90,000 died within the first year, the lowest number yet recorded. Add this heavy loss to the intra-uterine deaths, and it makes stock-raising for the human animal a very poor business. I have no time to discuss (but I may offer congratulations on) the efforts to lower this early death-rate by Mr. Broadbent, of Huddersfield, and by his colleagues in the great child-saving work they are doing for the nation. The reports on the physical welfare of mothers and children by Dr. E. W. Hope and Dr. Janet Campbell, just issued by the Carnegie United Kingdom Trust, will prove a boon and a blessing to sanitary workers.

Of what did these 90,000 children die? First let us note that about one-fifth of these died within the first week and a fourth within the first month. Ten causes are mentioned: whooping-cough; other common infections; diarrhoea and enteritis; premature birth; congenital defects; atrophy, debility and marasmus; developmental and wasting diseases; tuberculous diseases; convulsions; bronchitis and pneumonia; and then other causes. Again, the interest in this list centres in what is not there! Shades of Fracastorius! Syphilis is not even mentioned! When I was a pathologist and physician to an infants' home, we did not have—nor did we need!—Schaudinn or Wassermann or Noguchi to tell us of what 95 per cent. of infants died during the first month. Jonathan Hutchinson and Parrot and Diday and Fournier had told us that. The Registrar-General cannot go behind his returns, but it is worthy of comment that in Dr. Stevenson's discussion on the causes of infant mortality syphilis is only mentioned twice (p. xxii.), and that casually. When we turn to the total deaths from syphilis then we do get light, as among the 1885 deaths 1162 were under 1 year,

1277 under 5 years, but these figures are far below the mark. Careful work is in progress to determine the number of deaths within the first year from syphilis, and we shall not be far wrong in placing the figure at between 15,000 and 20,000. Dr. Helen Y. Campbell, in charge of the Bradford Infants' Clinic, reports for 1915 34·30 per cent. with the clinical features of syphilis among the 207 deaths in 3010 infants under one year.

WIDESPREAD MANIFESTATIONS OF THE SPIROCHÆTE.

The second point in the biology of the spirochæte is a peculiarity it shares with many other parasites of resting dormant in the body for years. As a rule such germs, even while retaining their virulence, do little or no damage. Not so the spirochæte, whose capacity to work evil is not to be measured by years. Since Schaudinn's great discovery there is a sharper point to Sigmund's oft-repeated aphorism, "Syphilis is the worm that never dieth." *Venus impura* is a hard mistress. Venus of the long arm she should be called, as 10, 20, 30, even 40 years from the date of infection the book bills are rendered, and she wrings the uttermost farthing out of her poor victims. One plain outcome of all recent work is that the untreated or the half-treated syphilitic is a bad life. No insurance company to-day will take a man who has a Wassermann reaction. So widespread are the manifestations of the spirochæte in the body that there is truth in the paradox I was in the habit of telling my students, Study one disease, study syphilis thoroughly and you take a knowledge of all others on the way—general medicine, nearly all surgery, and certainly all the specialties.

But I see an incredulous look on some faces, and I hear the whispered comment—'tis heard often enough! "Where is all this syphilis? It does not come my way." Yes it does. The syphilis we see but do not recognise everywhere awaits diagnosis, so protean are its manifestations. My colleague at the Johns Hopkins Hospital, Lewellys Barker, in a recent paper enumerates 19.⁴ A good test of the importance of a disease is to take the 37 volumes of the two series of the Index Catalogue of the Surgeon-General's Library, Washington, in which is indexed practically all medical literature between 1880 and 1917. In Vol. XVII. of the second series issued in 1912 are 207 double-columned pages of reference, against 117 pages in Vol. XIV. of the first series in 1893. No other single disease except tuberculosis has so much space devoted to it.

Syphilis illustrates the truth of the axiom that "Men do not die of the diseases that afflict them." Look up and down the columns on pp. 138–167 of the Report, and except in the

⁴ Medical News, Feb. 26th, 1916.

figures I have already given there is no reference to syphilis, and if from the 1885 deaths you take out 1277 before the fifth year, there is left the apparently comforting assurance of only 608 deaths among adults for the year 1915. Nothing could be more misleading.

The two-century-old conviction that syphilis was responsible for a great many internal disorders (Morgagni, 1761, and Lancisi, 1728) did not really bear fruit until the seventh and eighth decades of the last century. Fournier started the ball rolling; but it was the discussion on Erb's paper, "Syphilis and Tabes," at the 1881 London Congress that roused the profession. To the distinguished Heidelberg clinician, still more to the great syphilographer, Fournier, and to that model physician in mind and method, William R. Gowers, we owe the demonstration of the important part played by syphilis in the etiology of the chronic diseases of the nervous system. I remember the discussion as if it were yesterday, and I have re-read it with no little astonishment. And yet as the actual demonstration of to-day was lacking the clearest eyes saw but through a glass darkly and we must sympathise with an opposition which was able to bring so large a body of negative evidence against the new view. The evening after the discussion an interesting incident happened at Dr. Bristowe's house. Bouchard, Erb, and one or two others talked over the subject. Bristowe, who was a waverer, emphasised the point that many physicians had locomotor ataxia who certainly had not had syphilis. Turning to me he said: "Now our mutual friend X has surely not had it—he would have told me!" I felt sorry to have to say that I had seen our mutual friend on the continent under treatment with secondary symptoms!

The improved technique by which the spirochæte is demonstrated in the tissues and the serum reactions have opened a new chapter in our knowledge of the prevalence of the disease. The profession has read it with amazement, the sanitary authorities with bewilderment, but best of all the public is actually reading the chapter in the open!

EXAMINATION OF REGISTRAR-GENERAL'S MORTALITY RETURNS.

Let us see now what the Registrar-General can tell us about the book-bills of the Cyprian. Germs show singular preferences for different parts of the body—the tubercle bacillus for the lungs and lymph glands, the *Plasmodium malarie* for the blood, the lepra bacillus for the skin, and the *Spirochæta pallida* for the nervous system and the blood-vessels. Of the 562,000 deaths in 1915 about 58,000 were due to diseases of the nervous system. Two of these need not detain us. Locomotor ataxia and general paralysis of

the insane *are* syphilis and account for 735 and 2263 deaths respectively. Now that is as much as we can say positively about the lists on pp. 146 and 148 of the Report, but let us take the other diseases in order.

A certain number of cases of meningitis are syphilitic, but they cannot be picked out from Class C—returned as “Other forms,” numbering more than one-half of the total deaths from this disease. We may leave this out altogether. After locomotor ataxia comes “Other diseases of the spinal cord,” 2846 deaths, a larger proportion of them in the fourth to the sixth decades. Any neurologist would say that a reasonable estimate would take at least one-half of these—say, 1500. By far the largest single cause is cerebral hæmorrhage—apoplexy—25,423, a majority of the deaths occurring after 50, beyond which age it is the privilege of any man to rupture a blood-vessel in his brain without suspicion. 3713 of these deaths were between the ages of 25 and 50, of which 3000 could be claimed as due to syphilis. “Softening of the brain” should long ago have gone into the limbo of unused terms with “rising of the lights,” but there are 1472 returns under that caption; who could deny us 500 of these? The “Paralyses without specified cause,” 2983 cases, is a hopeless section, but as more than two-thirds were hemiplegia we could be given at least 500. That a certain proportion of other forms of mental alienation, 1100 deaths, were cases of G.P.I. is very probable. Judging from the studies of Leonard Finlay⁵ and of Fraser and Watson,⁶ epilepsy, spastic diplegias, and mental deficiency are common results of congenital syphilis. The extraordinary amount of latent neuro-syphilis in the community is well brought out by the studies of Southard and his colleagues at the Boston Psychopathic Hospital. From epilepsy, infantile convulsions, and “other diseases of the nervous system,” which mount up to about 15,000, we could claim a couple of thousand at least. This gives us a total from this section of about 10,000 deaths in which syphilis is a probable cause of death.

The spirochæte attacks the vascular system in preference to all other parts, and many of the deaths noted as apoplexy and meningitis, &c., are really from blood-vessel lesions. Aneurysm, the first important internal disease to be attributed to syphilis, and the aortitis on which it depends are usually spirochætal. Between the twenty-fifth and the fifty-fifth years the cases are always spirochætal; in the young they may be embolic and in the aged atheromatous. Of the 1141 deaths we could put down 1000 to syphilis. There is a terrible bill opposite organic disease of the heart, 56,000 deaths. About 17,000 of these are between the ages

⁵ Glasgow Med. Jour., 1914.

⁶ Journal of Mental Science, 1913.

of 30 and 55, and a majority of these are in men. Unfortunately, valvular disease and the myocardial cases are not differentiated from the others, nor the aortic from the mitral. For reasons to be referred to later we shall be safe in taking one-third of the cases between 30 and 55—say, 5000 at least—and we may take an equal number from the 10,000 dead of diseases of the arteries, atheroma and aneurysm. A low estimate would put the cardio-vascular deaths due to syphilis at above 10,000.

It is unnecessary to bring in the comparatively small number contributed by other organs, the liver, lungs, larynx, kidneys. We have enough to put the grand total of the ravages of the *Spirochata pallida* above 60,000, and to move syphilis from the tenth place in the Registrar-General's Report to which it belongs—at the top, an easy first among the infections. Many years ago in the "Life and Death of Mr. Badman," I came across Bunyan's phrase the "Captain of the Men of Death," which "caught on" in the literature. In his day it may have been true of consumption; it is so no longer; the headship in temperate climates belongs undoubtedly to syphilis.

POST-MORTEM EVIDENCE.

It was not without reason, some of you may now think, that I entreated my hearers' incredulity. There is a hazy uncertainty about these figures, I admit, but we shall find they are understated, not overstated. So impressed have clinicians and pathologists been with the absence of clear-cut evidence that in all parts of the world investigations are in progress dealing with the incidence of syphilis in ordinary hospital work. I cannot begin to quote all the papers, but I may refer to a few just to make you feel less incredulous about the character of my claims.

Dr. Warthin,⁷ one of the best known of American pathologists, whose technique is only equalled by his patience and thoroughness, investigated the tissues in a series of consecutive post-mortems with the most scrupulous care to determine the existence of the spirochæte. One-third of the autopsies in adults showed its presence somewhere in the organs. Of these 41 cases only 11 were known to have had syphilis, 5 had active lesions in the nervous system, and 25 had shown no clinical changes suggestive of syphilis. In 36 there were syphilitic lesions in the heart (spirochætes demonstrated), 32 in the aorta, 31 in the testicles, 4 in the liver, and 6 in the adrenals. He concludes that interstitial myocarditis, aortitis, and fibrous orchitis form a triad distinctively spirochætal. The material from which this study was made represents an average intake of a hospital supplied

⁷ American Journal of the Medical Sciences, 1916.

largely from the country and from smaller towns of the State of Michigan. It would be interesting to repeat in one of the large London hospitals a similar study in 500 bodies, though the prolonged and tedious character of the work makes it almost impossible unless a special staff (after the war) could be appointed. It is the type of work that carries conviction, as the parasites are demonstrated in the lesions.

THE WASSERMANN REACTION.

The other method of inquiry does not carry the same weight. Not that the Wassermann reaction is not a satisfactory test of the presence of syphilis, but the technique is delicate and beset with difficulties that may vitiate the results. I will only refer, then, to studies made under the control of men I know, and with as great care as possible to perfection of the technique. C. H. Browning's paper⁸ gives many details from English and Scotch sources.

My native country has a Conservation Commission which deals with everything from babies to beavers. I do not know the circumstances under which the Commission called for a report on the prevalence of venereal diseases, but they asked the members of the staff of the new Toronto General Hospital to undertake the work, and their report just issued (Jan. 17th, 1917) deals with all aspects of the problem. The point of interest here is that from 12 to 14 per cent. of patients admitted to the hospital show serological reactions characteristic of syphilis. In 60 per cent. of these persons the disease was not suspected. That the observations were made by Dr. Detweiler in the laboratory of Professor J. J. Mackenzie is a sufficient guarantee of the character of technique carried out.

The Brigham Hospital, Boston, is a new research hospital on the most advanced lines. Of 4000 patients examined by Walker and Haller,⁹ 600 had been infected—15 per cent. Here again the latent cases far outnumber the active. In Baltimore Dr. George Walker, a well-known specialist, examined 1080 patients, 10 per cent. of whom gave the reaction. Of 327 prostitutes, 67 per cent. were infected.¹⁰ Dr. John H. Musser, jun., reports that the examination of cases at the University Hospital, Philadelphia, gave 14 per cent. with the specific reactions for syphilis.

I know there are those who look askance at the results of the Wassermann reaction which has not, and does not claim, mathematical accuracy, and it is a test on which much depends in the personal skill and honesty of the pathologist.

⁸ Brit. Med. Jour., 1914, i.

⁹ Journal of American Medical Association, 1916, 1.

¹⁰ Ibid., lxxvi., 1738.

These figures, from sources well known to me personally, may be trusted as far as one can such slippery articles. Modern research everywhere leads to three conclusions : (1) that there is an immense body of latent syphilis in the community ; (2) that a very large number of persons have not been thoroughly treated ; and (3) that to the enormous groups of cerebro-spinal and cardio-vascular deaths syphilis is an all-important contributor.

GROWTH OF CAMPAIGN AGAINST VENEREAL DISEASES.

The discovery of the spirochæte in 1905 gave an enormous impetus to the study of syphilis, while the improved treatment announced by Ehrlich in 1910 aroused hopes that at last—with the cause known and the cure assured—we had in our hands weapons for an effective fight. The public and its incorporated activities, the State, had persistently ignored its existence. Centuries of silence had made venereal disease taboo. Press and pulpit alike ignored the unsavoury subject. I doubt if the word syphilis occurs in the index of the *Times* until 1910, when a brief announcement of Ehrlich's discovery was made. Venereal diseases are rarely mentioned until the recent Commission, though, of course, a great deal of discussion took place upon the Contagious Diseases Acts. History repeats itself. Imperial Rome is said to have been one huge brothel, in which sexual diseases were rife, though whether syphilis was one of them we do not know. The bibliophile Jacob (Paul Lecroix, who is also Pierre Dufour of the great work on prostitution) calls attention¹¹ to the hesitancy with which the Latin writers, medical and lay, refer to the *morbus indecens*, or, indeed, to any sexual disorder. To the rapid increase of venereal disease in them he attributes the appointment of State physicians by Nero.¹²

¹¹ *Recherches Historiques sur les Maladies de Venus*, Bruxelles, 1883.

¹² The question of the existence of syphilis in Graeco-Roman times has been re-opened with the proof of the presence of the disease in Europe before the discovery of America. I have asked Mr. Warde Fowler, the well-known authority in Roman social life, what he thinks of the bibliophile Jacob's statement. His reply is worth quoting :—"In my judgment the question depends on the evidence of Celsus entirely ; all the rest which Jacob adduces is vague and indirect, and apt to give way when you probe it. For example, he makes a great point of slave doctors kept in big establishments, who would keep unpleasant diseases secret, and so on. I have looked up the evidence about these, and there is nothing more in it than that in a few very big establishments it was convenient to have a doctor on the spot, as in a big ship. The economy of those big households or farms was self-sufficing, in this as in other ways. And it was far from universal even in large farms, for Varro expressly says that farmers preferred to use the doctors of the neighbourhood. Again, he quotes St. Augustine for the Syrian luxury that came to Rome in the second century B.C., and jumps to the

The beginning of the twentieth century saw us in a condition of hopeless apathy. Within a decade what a changed attitude in profession and public! You, Mr. President, started the former by the issue of your six-volume "System of Syphilis," which has proved such a useful armoury. Dr. Johnstone's report was an "eye-opener." The Royal Commission appointed in 1913 gave practical expression to a realisation of the importance of the problem by the public. Best of all, Lord Sydenham's report has not been sterile, as is so often the case with Royal Commissions. The rapidity with which it fertilised the House of Commons is unparalleled in the history of even that prolific lady. An outcome, too, of the work of the Commission was the founding in 1914 of the National Council for Combating Venereal Diseases, the primary function of which is educational. Under the wise guidance of Sir Thomas Barlow the Council has provided accurate and enlightened information to the public, and has been a rallying centre for the various professional bodies interested in the subject. The work of the Eugenic Education Society under Major Darwin has been most helpful.

The outset of the great war has stimulated, not retarded, the plan of campaign. Since that memorable scene which shook the gods in Olympus with inextinguishable laughter Venus and Mars have been inseparable. War means an enormous increase in the number of infections. The last quoted figures for the British Army at home are (Hansard, April 23rd): 71,000 cases of gonorrhœa, 21,000 cases of syphilis, and 6000 cases of soft chancre. In the Canadian Army to March 31st, 1917, there have been 18,335 cases of venereal disease—figures which have stirred public opinion in the Dominions to the boiling point.

conclusion that all kinds of evil diseases came with it. That may have been so, but it does not come out of Augustine's words; and I am pretty sure that if Augustine had wanted to say so, he would have said it without any scruple. But, on the other hand, supposing that the passage quoted from Celsus distinctly points to syphilis or something like it, the fact that there is no mention of such things in Roman literature would not be enough to damage Celsus's evidence. What survives of Roman literature is mostly clean and in good tone, and one would not expect to find any such allusion in it. The absence of any allusion in certain poems of Catullus, and in the great passage about love at the end of the fourth book of Lucretius, might suggest that one should be careful about interpreting Celsus, but would by no means be decisive. (I have just been over the Lucretius passage, and can find no trace of allusion to a morbus; and L. was very plain-spoken in such matters.) So I think that you must go by Celsus alone. Apart from him I should say there is no evidence of any weight, positive or negative." The difficulty with Celsus is a matter of interpretation. The lesions described are not necessarily sexual.

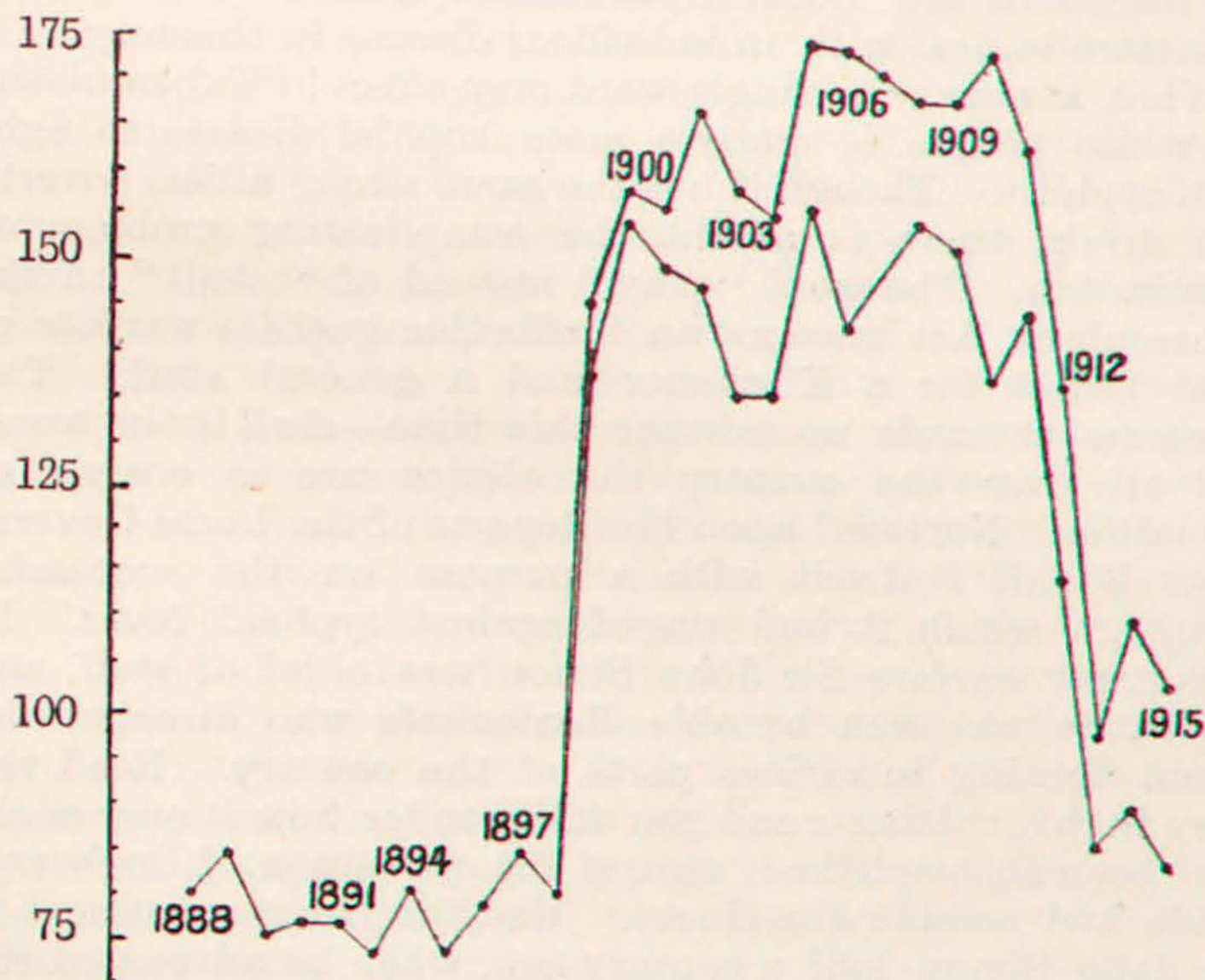
LEGISLATIVE ACTION.

Stricter prophylaxis should reduce these figures. I have had from Colonel Bradley, U.S.A., and Major Lyster, U.S.A., now stationed in England, the full details of the methods now carried out so successfully in the United States Army.

The annexed chart speaks for itself:—

Admission rates per 1000.

YEARS.—Lower line shows rates for enlisted force in the United States. Upper line shows rates for all enlisted force both in the United States and abroad.



1888-98.—During this decade the Army was stationed throughout the United States principally at small posts. No compulsory physical inspection; no systematic propaganda to reduce venereal disease. The rates represent practically those patients unable to do duty. Cases not treated or those doing duty were usually not recorded.

1898.—Spanish War. Militia called into service.

1898-99.—Great change in Army; marked expansion. Old soldiers disappear; volunteers come in. Young recruits sent to Cuba, Porto Rico, Philippines.

1899-1901.—Philippine Insurrection. Troops in Cuba, Porto Rico, China.

1901-09.—High rates prevail in United States and abroad.

1909-11.—Principles of preventive medicine applied; prophylaxis urged.

1911.—Syphilis increases. Wassermann test used in diagnosis.

1912.—Systematic measures. Fortnightly physical inspections and prophylaxis enforced by G.O., May 31st. Pay stopped, G.O. 31.

1914-15.—Concentration on Mexican border.

Various stimuli, public and private, have had at last the desired effect. The Government felt that opinion in the country was strong enough to act on the advice of the Commission and hand over the venereal problem to the public health authorities represented by the Local Government Board. The most sensible single bit of evidence given to the Commission was expressed by the Hon. Miss Brodrick, a trained nurse, that we should deal with the disease "as if it were small-pox or scarlet fever, simply as a disease quite apart from the moral side." This is what the Government has done. Recognising the existence of the disease as a great menace to public health, legislation has been enacted to fight the enemy on a settled plan at many centres under the control of the Local Government Board. It is a new departure to deal with an individual disease in this way.

What a change a single word may effect! Tuberculosis, the white plague, is really a more hopeful disease to fight than syphilis. Though it has the same strong allies, poverty and drink, there is absent the complicating problem of prostitution. The word "may" instead of "shall" in the Tuberculosis Act gave us an ineffective guerilla warfare of local bodies for a Kitchener and a general staff. The Government made no mistake this time—*shall* is the word, and all over the country the clinics are in course of formation. Nurtured upon the Reports of the Local Government Board, I dwelt with a purpose on the successful campaign which it had waged against typhoid fever. In that great warfare Sir John Simon was chief of staff, and the battle was won by able lieutenants who directed the actual fighting in various parts of the country. Read the story in his writings, and you will wonder how it ever could have been accomplished, against the opposition of Dogberrys inside and outside the House. Had the country listened to Sir John Simon half a century ago, when he advocated the "urgent need of control of the public health by a responsible Minister of State," our arrears in infant mortality and housing would not now be so heavy. Still, let us be grateful to him and to his successors for all the good work that has been done.

ESTABLISHMENT OF VENEREAL CLINICS.

No more hopeful legislation has ever been enacted than the establishment of these venereal clinics, with which the country will be equipped, though not fully, for the battle. But let the people and their representatives realise that they are dealing with the subtlest foe of humanity and the greatest sanitary problem which confronts civilisation. A general staff, controlling the campaign, will work from the Local Government Board (or before long, let us hope, from

a Ministry of Health¹³) with laboratory, statistical, and social service departments, a publicity bureau and a library. The centres will be units working with a single object, and the doctors, nurses, and social workers will be members of a great national army.

Already the Commission—for it is its work—has done what the profession has not been able to do in these long years—opened the doors of the general hospitals to these victims. The governors and trustees have lined up at last with the good Samaritan. There are many institutions in which an up-to-date scientific clinic with laboratories will be a great boon. The profession welcomes the scheme from the educational side, as there will be within easy reach opportunities for the study of all aspects of both disorders, and from the practical side they will be able to bring their patients freely for special treatment, for special consultation, and for the laboratory tests which are so essential. There will, I hope, be at each centre lectures and demonstrations as have been organised in Liverpool. A sympathetic and loyal feeling on the part of the practitioners in each district is really essential to the success of the work.

Between the clinical and the laboratory side there will be enough at each clinic to occupy a large part of the time of a male and female doctor, who will, I trust, become the skilled advisers of the profession and of the public in each district. It should be our business to make these positions sufficiently attractive to catch the very best, and I am sure the hospital authorities will welcome them warmly as members on the staff. In large cities they might well be whole-time positions, though I should prefer to allow their colleagues and the public to have the benefit of their ever-increasing experience. A great missionary field will be opened for women doctors, who should do the work among their own sex at the clinics.

EDUCATION OF THE PUBLIC.

Nowadays, in the hospitals the individual is studied and cared for, not solely his or her disease. Social workers of the right sort with the right spirit, the helpful sympathetic spirit which—

“Gently scans your brother man,
Still gentlier sister woman,”

will do much to make the clinics known and appreciated. The National Council could very well supervise this work which should be done by carefully selected volunteers. The

¹³ The Waldorf Astor Report just issued, “The Health of the People: a New National Policy,” should give a great stimulus to the unification of the many departments at present dealing with public health.

clinic should be the centre in each district of an active educational propaganda which should be stimulated and planned by the general staff, and not left to the timid discretion of the local authorities. By meetings, literature, placards—in every legitimate way—a knowledge of the dangers of venereal disease should be distributed, and the importance of early and thorough treatment insisted upon. The public lavatories, the toilet-rooms of restaurants, railway stations, hotels, and factories should be utilised in a crusade against advertising venereal quacks. The stage should be used actively, and such a play as Brioux's "Damaged Goods," while strong meat for the *young*, enforces on young men the lesson of the terrible risks better than the chapters in *Proverbs* or than any number of leaflets.

In every possible way the sympathetic coöperation of the public is to be sought. Get people to realise that it is a great communicable disease two-thirds of the victims of which are innocent, and much will be done to break down the present barriers of ignorance and false sentiment. For any legislation to be successful the people must be prepared. The problem bristles with difficulties, but the primary duty is to gain the confidence of the public and respect their feelings so far as they are consistent with the welfare of the State.

UNQUALIFIED TREATMENT.—NOTIFICATION.—COMPULSORY TREATMENT.

We are committed, then, to a campaign of education, and an elaborate scheme of treatment. Two circumstances make it probable that these measures—and a good beginning, let us grant—will not suffice in themselves to reach the enemy.

So deep is the stigma associated with the disease that patients avoid hospitals—even their family doctors—preferring quacks and others who promise a speedy cure. Legislation is in progress to prevent unauthorised treatment of the disease. The active sympathy should be sought of the 5000 men calling themselves herbalists, referred to by Mr. Hayes Fisher in the House. (Hansard, April 23rd, 1917.) I am sure the profession has no wish to interfere seriously with a calling which ministers to a thirst for "simples" so Gargantuan. These men have families and could be interested in public health; many of them are good botanists and of above the average intelligence. They know that syphilis and gonorrhœa are quite beyond the reach of herbs, and that even guaiacum—the holy wood—no longer avails.

To be successful in any fight the primary essential is to know where your enemy is placed. The Commission did not feel able to recommend confidential notification, nor does the new Act enforce it. Perhaps they were wise and knew their business better than some of us who advocate it. Realising as fully as anyone the strong arguments against notification, the gravity of the situation outweighs with me all private considerations, and I feel sure that within a year we shall be ready for the change. It works well, we are told, in Scandinavian countries, and it will be interesting to have the results from those Australian dominions in which it has been introduced.

Another point really more serious is also associated with notification. Both syphilis and gonorrhœa require protracted treatment. It is the partially or badly treated cases that come to us 10 to 20 years later with aneurysm or nervous breakdown. The primary symptoms are often so slight that it is impossible to get patients to continue a course of medication lasting a year or even more. Here is where the clinics will be on trial, and we shall watch their experience anxiously. I see reports from a Boston hospital at which 28 per cent. of the patients did not return, and to a New York venereal clinic 29 per cent. of the syphilitics came but once. To be successful in this fight we must have control of the patients—the treatment must be compulsory. It is so in the Army, from which the men with syphilis and gonorrhœa are not to be allowed to return to private life until a reasonable guarantee is given in each case of cure. If the House of Commons in any way represents outside opinion the public is a long way from appreciating the appalling risks they run. Though on the street to-day, the spirochæte may be in your home to-morrow. The very reasonable proposals of Captain Guest, Mr. Rawlinson, and Sir H. Greenwood (Hansard, April 30th), that sanitary and curative measures should be adopted in the case of persons, men and women, convicted of certain definite offences, was met by cries of ruthlessness and Prussianism. The probation officers and workers of the London Diocesan Police-court Mission know what they are talking about when they urge compulsory detention and treatment. Practised with Mars, it is no sex inequality to do the same with Venus, but the Government is committed, for a time at least, to a policy of persuasion, feeling that notification and compulsory treatment are too far in advance of public opinion. Mr. John Burns (Hansard, April 30th) thinks that the Local Government Board has the power to deal with the question of notification. I doubt if it could enforce the treatment of syphilis any more than it does in the case of tuberculosis.

THE OUTLOOK.

To many the venereal situation looks dark and hopeless. It is not. For the first time in history the outlook is bright, despite the fact of an inevitable increase of cases during and after the war. Three things have happened to justify this hope.

The public is at least awake to the necessity of an educational campaign, in which the appalling dangers of the disease shall be brought home plainly. Other means than those heretofore must be brought to bear in a full and free enlightenment upon the subject. Such literature as Corbett-Smith's "Problem of the Nations" and the various publications of the National Council are having an enormous influence. That the preaching of chastity appears a ghastly failure, in the face of the record of 800,000 fresh cases annually in this Christian kingdom (Melville White's estimate), is no reason why the earnest appeal for personal purity should not take the first place in the educational campaign. Where the Apostles had to confess defeat their successors need not feel discouraged, and had they not laboured so hard for so long the percentage of the poxed in the community might have been doubled. The reproach is not upon Christianity but upon earthen vessels too frail to hold it. Venereal disease has been called a bi-sexual problem. Patrol beside St. Martin's Church at this hour and you would be inclined to deny it; but remember, for the aggressive harlotage that still disgraces our streets man is primarily responsible. The blame, but not always the burden, is upon him. The pity of it is that the strong offences' cross is borne, not always by the offender, how much soever he may sorrow, but by innocent women and children who form more than one-half of the victims.

That the State has at last intervened is another ground for hope. In the matter of health you may trust the people. Once get democracy to realise that it is badly diseased and it displays a Job-like regard for its skin. Has not Tammany, a very synonym for corruption, given New York City the most progressive, up-to-date system of sanitation in the world? You will have gathered, Mr. President, that I am a strong advocate of strong central control in these matters. My inspiration does not come from Hegel or his bastard modern disciples, but from the fountain-head, the great teacher who tried in vain to bring the Athenians back to "thoughts of order, to disinterestedness in their functions, to that self-concentration of soul in one's own part, that loyal concession of their proper parts to others on which such order depends."¹⁴ Plato tells us "States are as the men are ;

¹⁴ Pater : Plato and Platonism, 1893, p. 216.

they grow out of human characters." How chastened has been the strong Ionian element in British life! The war has brought to the individual a Dorian realisation of duty never before witnessed. All that a man hath—all that he holds dearest are drawn into a new ideal of service to the State. It will not be so hard after this schooling to accept an ever-increasing control of the disease by a Ministry of Health, with notification and compulsory treatment.

Most hopeful of all is the changed heart of the people. At last the sinner is to receive Christian treatment. Above the mantelpiece of his library hung what the founder of my old school, the Rev. W. A. Johnson (Trinity College School, near Toronto), used to call the Magna Charta of humanity. In the centre of the most dramatic scene in the Gospels stood the woman taken in adultery. About her thronged the Scribes and Pharisees, with eyes turned from her to the Christ, stooping as he wrote with his finger on the ground the watch-words of the New Dispensation—"He that is without sin among you, let him first cast a stone at her." I should like to see a copy of this picture in every one of the new clinics in testimony that we have at last reached the full meaning of the priceless message, "Neither do I condemn thee; go, sin no more."

Fighting in this spirit, the soldiers of our "New Model" will put up an irresistible barrage against the most formidable enemy of the race—an enemy entrenched behind the strongest of human passions, and the deepest of social prejudices.

Section of the History of Medicine.

President—Dr. RAYMOND CRAWFURD.

The First Printed Documents relating to Modern Surgical Anæsthesia.¹

By Sir WILLIAM OSLER, M.D., F.R.S.

THE story of surgical anæsthesia illustrates how long it takes an idea to become effective. The idea of producing insensibility to pain during a cutting operation is of great antiquity—e.g., *vide* chapter ii, 21, in the Book of Genesis. Nor is the word anæsthesia modern, as is sometimes said, and invented by Oliver Wendell Holmes. It occurs, Withington tells me, first in Plato ("Timæus"), and is used by Dioscorides in the modern sense.

The extraordinary controversy which has raged, and re-raged every few years, on the question to whom the world is indebted for the introduction of anæsthesia, illustrates the absence of true historical perspective, and a failure to realize just what priority means in the case of a great discovery.

Why do we not give the credit to Dioscorides, who described both the general and local forms, or to Pliny, or Apuleius, or to Hiotho, the Chinaman, who seems to be next in order, or to the inventor of the *Spongia somnifera*, or to Master Mazzeo Montagna, in Boccaccio, or to any one of the score or more of men in the Middle Ages who are known to have operated on patients made insensible by drugs or vapours? Why do we not give the credit to Davy, who had the idea; or to

¹ Remarks made on presenting Morton's original papers to the Royal Society of Medicine, May 15, 1918.

Hickman, who had both idea and practice; or to Esdaile, who operated on hundreds of patients in the hypnotic state; or to Elliotson, who did the same; or to Wells, who, in 1844, operated under nitrous oxide; or Long, who frequently practised ether anæsthesia? Why? Because time out of mind patients had been rendered insensible by potions or vapours, or by other methods, without any one man forcing any one method into general acceptance, or influencing in any way surgical practice.

Before October 16, 1846, surgical anæsthesia did not exist; within a few months it became a world-wide procedure; and the full credit for its introduction must be given to William Thomas Green Morton, who, on the date mentioned, demonstrated at the Massachusetts General Hospital the simplicity and safety of ether anæsthesia. On the priority question, let me quote two appropriate paragraphs: "He becomes the true discoverer who establishes the truth; and the sign of the truth is the general acceptance. Whoever, therefore, resumes the investigation of neglected or repudiated doctrine, elicits its true demonstration, and discovers and explains the nature of the errors which have led to its tacit or declared rejection, may certainly and confidently await the acknowledgements of his right in its discovery" (Owen, "Homologies of the Skeleton," p. 26). "In science the credit goes to the man who convinces the world, not to the man to whom the idea first occurs" (Francis Darwin, *Eugenics Review*, 1914). Morton convinced the world; the credit is his.

Morton's original essays are among the *rarissima*, not existing, so far as I can ascertain, in any of the general or special libraries of this country. I have been looking for them in vain for many years. In a parcel of his father's papers recently received from William J. Morton, of New York, there were duplicates of "Letheon," and "On the Mode of Administration of Sulphuric Ether," which I have great pleasure in presenting to the Library. Also a duplicate copy of the *Boston Medical and Surgical Journal* of November 18, 1846, which contains the first printed account of the new procedure, by Dr. Henry J. Bigelow. In the same journal for December 9, Dr. J. Collins Warren (*primus*) gives an account of the operation at the Massachusetts General Hospital. These four papers stand out in the literature of surgical anæsthesia as fundamental, and truly epoch-making.

Morton called the drug "Letheon" and applied for Letters Patent to secure his rights—not an unethical procedure in the dental profession of America. This led to the publication of his first pamphlet called "Letheon," the bibliography of which some one should undertake.

The medium through which Dr. Morton communicated the results of experiments on etherization to the public, was a "circular" which he had printed, at his own expense, almost every week. It was at first, as its name imports, a mere letter of advice; but, as it became the receptacle of newspaper articles, and correspondence from every portion of the Union, announcing the success of etherization, it was necessarily enlarged into a large and closely-printed sheet of four pages. Soon this "circular" became a pamphlet, and of this five different editions were published, under Dr. Morton's immediate supervision, embodying a digest of all the authentic information, both from Europe and America, on "Anæsthesia" (Rice, "Trials of a Public Benefactor," 1859, p. 114).

The Index Catalogue, Surgeon-General's Library, only mentions a 14-page pamphlet, 1846, printed by Dutton and Wentworth, Boston. The early form of the circular may be seen on the back page of the *Boston Medical and Surgical Journal*, December 9. In the number for November 18, with Bigelow's paper, there is only an advertisement of Morton's courses of instruction in dentistry. The circular appeared first November 26, and is copied at pages 14 and 15 of the "Letheon" pamphlet, fifth edition. This pamphlet is made up of more than eighty short articles from medical journals and newspapers, and is of special value in giving the popular, first-hand impressions relating to the great discovery. There is very little of Morton's—only the circular already referred to, and, on page 16, the terms for the "Apparatus, a Bottle of the Preparation, Instruction, &c."

In 1847 Morton published a 44-page pamphlet on "The Proper Mode of Administering Sulphuric Ether by Inhalation" (Boston: Dutton and Wentworth), in which the original apparatus (now a treasured relic at the Massachusetts General Hospital), is described. In the early part of April he found that a sponge would serve the same purpose, and was less dangerous. The greater part of the pamphlet is taken up with general directions, the outcome of the author's experience.

The claims of Morton were very fully stated in a pamphlet published in Paris, 1847, with the title, "Mémoire sur la découverte du nouvel emploi de l'éther sulphurique," and in 1850 he published a small work "On the Physiological Effects of Sulphuric Ether and its Superiority to Chloroform," Boston. So far as I can ascertain, this completes his output on the subject of anæsthesia, except a posthumous pamphlet "On the Use of Ether as an Anæsthetic at the Battle of the Wilderness" (*Journal of the American Medical Association*, April 23, 1904).

The third item is No. 16 of vol. xxxv of the *Boston Medical and Surgical Journal* (then, as now, issued weekly) for November 18, which introduces to the profession modern surgical anæsthesia. Henry J. Bigelow, the distinguished surgeon, had been interested in Morton's private dental cases, and read a paper before the American Academy of Sciences, November 3, and at the Boston Society of Medical Improvement, November 9. It was called "Insensibility during Surgical Operation produced by Inhalation," and after referring to the early cases of Warren and of Hayward at the Massachusetts General Hospital, fuller details of the dental cases are given which he had seen with Dr. Morton. No small share of the early confidence inspired in the profession is due to this temperate statement by Dr. Bigelow, who fully realized the enormous value of the discovery.

In the literature of anæsthesia these are the three fundamental contributions. With them should be placed J. Collins Warren's account of the first operation, *Boston Medical and Surgical Journal*, December 9, and vol. xxxv of this publication, which contains some twenty-two papers on the subject, illustrating the rapid spread of the practice.

The opportunity here offers to suggest the arrangement of certain subjects in our libraries on an educational basis. For example, why should not the members of the Section of Anæsthetics of this Society collect and classify their literature on historical lines? Start with the documents that magnetized into life an antique practice—these pamphlets of Morton, Bigelow's paper, Warren's paper, and vol. xxxv of the *Boston Medical and Surgical Journal*. Put these together—all in vellum and lettered in gold—as the blastoderm from which the enormous literature has developed which could be arranged on the shelves in ten or more sections. The Index Catalogue of the Surgeon-General's Library has a good classification, but for my own collection I have used the following:—

(1) The general story, as given in such publications as the Jubilee numbers of the *British Medical Journal* and of the *Boston Medical and Surgical Journal*, and the text-books, in which the history of the subject is well given, as Snow, Foy, &c.

(2) Pre-ether period. On cards references to Gurlt's "Geschichte der Chirurgie," Bd. iii, p. 621, and vol. i of Simpson's works, from which sources most of the text-book and other descriptions are taken; and to Dioscorides, Pliny and Apuleius, to the *Spongia somnifera*, to Boccaccio and the numerous other early writers. Brief descriptions could be written on the cards. Then in order would follow the works

of Davy, of Beddoes, the tragic story of Hickman, the remarkable documents relating to anæsthesia produced by compression of arteries, veins, and nerves, Bartholinus's use of cold for local anæsthesia, and the section would conclude with the writings of Esdaile and of Elliotson on hypnotism in surgery. What an education, even to glance at this literature in due sequence on the shelves!

(3) The modern period beginning with Morton, Wells and Jackson, the story of the miserable priority claims, the congressional reports, the publications of the Morton Association, the topical literature, showing the introduction of the practice into different countries, the Long literature, &c.

(4) In chronological order the subject of anæsthesia in midwifery, embracing everything from Simpson's original pamphlet to the latest popular magazine article on twilight sleep.

(5) Chloroform and its introduction. The papers of the discoverers, Guthrie, &c., the Simpson pamphlets, his famous "Encyclopædia Britannica" article dealing with the subject of anæsthesia under the word "Chloroform," which led to the sharp Bigelow-Simpson controversy, the Hyderabad Reports, the British Medical Association and other reports and documents.

(6) Local anæsthesia from Dioscorides and Bartholinus to Kohler, Corning, Halsted, Cushing, and others.

(7) Agents other than ether and chloroform, used for inducing anæsthesia, arranged in order of introduction.

(8) Technique, including the various methods of administration, intravenous, intratracheal, and the literature of apparatus.

(9) Physiology.

(10) Pathology.

I speak as an amateur. Doubtless expert members could easily arrange a more comprehensive scheme. To separate in literature the quick from the dead is one of the functions of a well-ordered library, but much that we carelessly regard as dead is magnetized into life when put in its historical relations. The plan here suggested, which could be applied in other directions, sustains that continuity, to the study of which this Section is devoted. You remember the rings of Lucretius—well, there is a *vis et vincula librorum*, binding together books, a force just as potent as the *vis et vincula lapidis*, which supported the rings; and in the literature of anæsthesia this force is derived from the works here presented to the Library.

Observations

ON

THE SEVERE ANAEMIAS OF PREGNANCY AND THE POST-PARTUM STATE.

BY

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THOSE of us whose professional careers coincide with its modern study will remember how important was the part played by these conditions in severe anaemia. Channing (1842), Lebert (1853), and Gusserow (1871) dealt with this aspect of the subject. Many of Biermer's original cases were in pregnant women, and a large proportion of the cases forming the basis of the monographs of Müller (1877) and of Eichhorst (1878) were in this class. After 1885 the literature shows a striking reduction in the references, and Ehrlich and Lazarus, in Nothnagel's *System*, suggested that local influences in the cantons were responsible for the frequency of this association in the cases reported by the Swiss clinicians. So experienced a teacher as Ahlfeld, they state, had never met with a case. Considering how much has been written by British physicians on the various forms the literature on the anaemia of pregnancy and the post-partum state is very scanty—only one of nineteen in the *Index Catalogue* of the Surgeon-General's Library, both series. In Allbutt and Rolleston's *System* French makes only a passing remark on the association. With few exceptions the textbooks in obstetrics have very little to say, and the gloomy prognosis is an echo of the unfortunate experiences of the older writers. Among recent works Edgar's has the best section. That cases are rare in this country is shown by the absence of reference in the writings of so experienced workers as Byrom Bramwell and William Hunter. In the United States Channing's really remarkable study seems to have aroused an interest in the subject, and five American papers are quoted in Vol. I of the *Index Catalogue* before the appearance of Cusserow's in 1871. In Cabot's¹ series of 1,200 cases of progressive pernicious anaemia, in 35 the disease began during pregnancy or shortly after parturition, 18 during the former. This proportion—about one in thirty-five—is probably the average for the United States. Davis,² in reporting a

case, gives a very good summary of the older American literature; and Findley,³ who deals with the subject more recently, concludes that "in all well established cases the disease has proved fatal." In the discussion on this paper Richard Norris stated that there had only been one case among three thousand women at the Preston Retreat. Of the first twenty-three cases of "progressive pernicious" anaemia of which I have notes, all but one seen in Montreal, five were *post partum*. I saw two in Philadelphia, and there were a few at my Johns Hopkins clinic, but I have not the figures. The theses of Decroix,⁴ Husson,⁵ and Robert⁶ indicate that the association is not very common in France. The recent German and Swiss literature is given in Naegli's well known monograph on the blood. Possibly the existing conditions of under-feeding, etc., have led to an increase of cases during pregnancy, and the intense wave of streptococcus infection may have increased the cases of acute septic anaemia *post partum*.

The cases may be divided into four groups:

I. ANAEMIA FROM POST-PARTUM HAEMORRHAGE.

(a) The bleeding may be profuse and rapidly fatal. The physician sees fatal haemorrhage in aneurysm, in typhoid fever, in peptic ulcer, and in ruptured oesophageal varix, none of which conditions present the tragedy of the *post-partum* case. Only once has it been my misfortune to witness this peculiarly pathetic accident. Peace and quiet reign in the lying-in chamber and happiness in the household, for all has gone well, and the young mother is just beginning to realize the joy that "a child is born into the world." The doctor may have left, feeling safe and satisfied. The attention of the nurse is attracted by a sudden restlessness of her patient, whose face shows a beginning pallor, and she finds the dressings soaked with blood. Very soon the symptoms are those of acute anaemia—a rapid, jerky pulse, extreme restlessness, yawning, sweating, sighing respiration, increasing pallor, and with muscular twitchings, convulsions, or a sudden collapse all is over. This was what I saw one afternoon, called hurriedly to the house of a neighbour—a strong, healthy young woman *in articulo mortis*, after a normal delivery, as bloodless as if the carotids had been cut. No wonder that novelists have made such a tragedy the climax of a story. Hitchins, in *The Fruitful Vine*,⁷ makes Dolores die in this way; and it is possible that Walter Savage Landor had in mind this type of death in his beautiful little poem in *Pericles and Aspasia*:

Artemidora! God's invisible,
While thou art lying faint along the couch,
Have tied the sandal to thy veined feet;
And stand beside thee, ready to convey
Thy weary steps where other rivers flow

* * * * *

Fate's shears were over her dark hair unseen
While thus Elpenor spoke.

(b) *The Anaemia Following Repeated Small Haemorrhages*.—This not infrequently follows abortion, more rarely the repeated bleeding after a delivery at term. The following is a good illustrative case:

Mrs. B., aged 45; admitted October 8th, 1918, having had an abortion in the fourth month of her seventh pregnancy, one month previously. She had been losing blood intermittently, not any large amount, but every few days a clot or two would come away. There had been slight irregular fever, and a progressive anaemia. At times there was a slight purulent discharge. She was curetted, and with douches the discharges soon ceased. She looked profoundly anaemic, and with a sallow brown tint of the skin. The blood count was: Red blood corpuscles 2,106,000 per c.mm.; leucocytes 12,800. Ten days later the red blood count was 1,800,000 and the leucocytes 12,000. On the 21st thrombosis of the left femoral vein with swelling of the leg. The blood films showed the red cells irregular in shape and size, many normoblasts, and numerous platelets. In the open air with plenty of good food, iron and arsenic, she improved rapidly, and left the infirmary on December 3rd with a nearly normal blood count.

As in many cases, the anaemia here was due to a combination of repeated small haemorrhages and a mild sepsis. The general appearance was that of an ordinary Addisonian anaemia, for which any casual observer would have mistaken the case. In III and IV of my Montreal series the profound anaemia followed many small haemorrhages after abortion.

II. THE SEVERE ANAEMIA OF PREGNANCY.

The blood of the pregnant woman shows in the early months a diminution of red corpuscles, a low haemoglobin, and a slight leucocytosis (as is well shown in the composite chart in W. L. Thompson's⁸ study from Williams's clinic), to be followed by a rise to or near normal in the ninth month. A slight pallor in the early months is common, and is often associated with the morning vomiting or dyspepsia. That this so-called chloro-anaemia of pregnancy might pass on to a grave and fatal form was recognized by Channing and Lebert, but it was the full report by Gusserow⁹ of five fatal cases that roused the attention of the profession to the seriousness of severe anaemia in pregnancy. The following is a typical case:

On April 13th, 1917, I saw with Dr. Arthur F. Stabb and her husband Mrs. A., the wife of an army surgeon, a primipara of good previous health, though she had had a "tendency to anaemia." The pregnancy, which began in September, 1916, was uneventful until March, when anaemia began and increased rapidly, so that by April 1st she had dyspnoea and swelling of the feet. On April 3rd albumin appeared in the urine in large amounts. On April 10th the blood count was: Red blood corpuscles 864,000 per c.mm.; leucocytes 13,360; haemoglobin 20; colour index 1.12. The lymphocytes were increased 30 per cent., and the normoblasts were 6 per 100 leucocytes. There was the usual extreme irregularity in size and shape of the red cells. Labour began on the 9th, and on the 11th she was delivered of a stillborn child of normal appearance for the seventh month. There was very little

haemorrhage, and she stood the strain very well. When seen on the 13th she was well nourished, but with all the objective features of profound anaemia. There were no internal haemorrhages. The case was regarded as a typical example of the so-called toxic or haemolytic anaemia of pregnancy, and, based on an unusually fortunate experience, I ventured to give a favourable prognosis. The recovery was rapid and uninterrupted, as the blood counts show: April 18th, red blood corpuscles 1,036,000; April 26th, 2,368,000; May 3rd, 2,592,000; June 17th, 3,250,000; and December 4th, a practically normal count. The leucocytes rose on April 18th to 45,000 per c.mm., and fell to 3,360 on May 3rd. On April 26th the normoblasts rose to 16 per 100 leucocytes, after which date they disappeared.

III. POST-PARTUM ANAEMIA.

In this, the common form, after a normal delivery without excessive loss of blood, the patient begins to get pale, and within a few weeks the blood count may fall below 2,000,000 per c.mm., and the anaemia may progress and prove fatal in from eight to twelve weeks. How serious this type may be is seen from the high mortality in the series of Channing and of the Zurich clinicians. On the other hand, the experience elsewhere has been more favourable. Dr. Palmer Howard, one of the earliest and most careful students of the subject, insisted that the large percentage of recoveries in the *post-partum* cases, and the absence of recurrence distinguished this form from the true Addisonian anaemia, though clinically the cases appear to be identical. The five *post-partum* cases in my first series all recovered. One was alive more than thirty years after and had passed through two subsequent pregnancies without trouble. The following case gives a good picture of the disease:

Amelia T., aged 35; admitted February 2nd, 1888. In the October previous she had been delivered of her fourth child; no complications. She had begun to nurse the baby, but gradually got pale and weak and had frequent fainting fits and much shortness of breath. On admission the anaemia was so extreme that she could not sit up in bed without feeling faint. The red blood corpuscles were 1,170,000 per c.mm., with extreme irregularity in form and size and many nucleated red cells. The haemoglobin was 15 to 18 per cent. With rest in bed, good food, iron and arsenic, she improved rapidly and left the hospital with a normal blood count.

Not infrequently in severe anaemia there is a continuous fever, which may lead to error in diagnosis, even suggesting typhoid fever, a point to which Cabot refers. The fever may be more irregular, and even associated with chills, which in the following case led to the diagnosis of malaria.

L. T., primipara, aged 24, seen with Dr. Jenkins, October 6th, 1898. Though a difficult labour there were no complications, and for ten days everything was normal. Then she began to get pale and grew rapidly worse, and in the sixth week after confinement, when I saw her, the red blood cell count was 1,200,000 per c.mm., leucocytes 15,000, haemoglobin 15 per cent. Every fourth or fifth day the patient had a chill in which the temperature rose to 103-104°, after which she sweated profusely.

There was no discharge, no evidence of sepsis, other than the fever and the chills. The spleen enlarged, and as she lived in a region in which parturition was recognized as one of the factors determining recurrence of malaria this had been suggested in explanation of the chills. The blood was negative during a chill and after. The red cell count fell to 800,000 per c.mm. and her condition for weeks was critical, but she gradually improved, and four months later she had a nearly normal blood count.

IV. THE ACUTE ANAEMIA OF POST-PARTUM SEPSIS.

In certain types of sepsis there is rapid blood destruction. In acute endocarditis the anaemia with a large spleen may completely mask the clinical picture, as in cases which I reported a few years ago in the *Interstate Medical Journal* (1913). In no condition do we see such rapid haemolysis as in *post-partum* sepsis—a form of anaemia not sufficiently recognized or studied.

In 1882 I saw with Dr. Alloway, on the seventh day after delivery, a young woman in a state of profound anaemia. The blood loss had not been severe, but for some days there had been an unusually foul though slight discharge. The red blood cells were just 1,000,000 per c.mm., the leucocytes 20,000. I never saw the objective features of anaemia more pronounced, and her chief complaint was the painful throbbing of the abdominal aorta, which pulsated with extraordinary violence. She died on the twelfth day. There was “diphtheritic” endometritis, septic thrombi in the pelvic veins; no endocarditis.

Such extremely rapid cases are not common, but Cabot¹⁰ refers to one with identical features, in which the acute sepsis was not suspected. The red blood count was 800,000 per c.mm. “Diphtheritic” endometritis was found at the *post-mortem* examination, without which, as Cabot remarks, the case would have gone into the category of puerperal pernicious anaemia. While every patient with puerperal fever has some grade of anaemia, only in a few does the blood loss dominate the picture. In many of the best textbooks on obstetrics—for example, Edgar (1903)—the condition is not referred to. An excellent account is given by Lea,¹¹ who states that the loss of red cells may be at the rate of from 200,000 to 1,000,000 per c.mm. a week, and that the count may fall to 300,000 per c.mm. Three cases of puerperal sepsis recently in the Radcliffe Infirmary illustrate the condition very well.

Mrs. C., aged 24, admitted under Colonel Collier August 31st, 1918, had a miscarriage late in her second pregnancy. Fragments of retained placenta were removed. She had the typical sallow, pale yellow (not the brown-yellow) tint of skin, and the usual features of moderate anaemia. The red blood cells were 2,700,000 per c.mm., leucocytes 8,600, haemoglobin 46. She improved rapidly, and left the infirmary on September 21st, 1918.

Mrs. M., aged 49, admitted August 8th, 1918, under Colonel Brooks. Since the delivery of her eleventh child, July 16th, she had had severe sepsis with high irregular fever and a progressive anaemia. The blood cultures were negative. The blood count was: Red blood cells 1,580,000 per c.mm., leucocytes 13,400, haemoglobin 16 per cent., colour index 48.

Nothing special in the differential count other than a high percentage of lymphocytes. The irregularity in size and shape of the red cells was extreme, and there were many normoblasts. She died on September 8th in a state of profound anaemia.*

Mrs. W., aged 31, primipara, admitted under Colonel Collier, November 30th, 1918, having been delivered a week before. No complications. Acute sepsis developed with high fever and a very offensive discharge. When admitted the patient was very anaemic, with a sallow, sub-icteroid tint and all the symptoms of a severe infection. Streptococci were isolated from the blood, and she was given antistreptococcic serum on December 1st and 3rd. The red blood count was 2,250,000 per c.mm., leucocytes 9,600, haemoglobin 40. The differential count showed nothing special; normoblasts were present in moderate numbers. The anaemia progressed rapidly, the fever remained high, and she died on December 7th.

With an increased frequency of streptococcus infections and an unusual virulence of at least some strains in respiratory affections, it would be interesting to learn if puerperal fever has been more prevalent throughout the country. So far as I know, the *post-partum* sepsis cases have not shown a special tendency to haemorrhage, as have so many of the streptococcic infections of the past six months.

REMARKS.

To the nature of the haemolytic agent in the pregnancy and *post-partum* cases there is as yet no clue, any more than we have to the cause of that most baffling of all blood diseases, Addison's anaemia. The progress and the blood picture suggest the haemolytic type, which can be produced experimentally and which is caused by the poisons of the *Bothriocephalus*. In the profoundly changed metabolism of pregnancy and in the intensely katabolic metabolism of the *post-partum* states we assume the production of haemolytic agents—toxins—but, as French remarks, "the use of the word toxin almost connotes ignorance." Though progressive and often pernicious, the anaemia is caused by an agent which differs in one all-important particular from that which causes the anaemia of Addison. When recovery takes place it is permanent, and the woman may escape in subsequent pregnancies. The second patient in my series (whom I knew well) had an attack of extreme gravity, recovered, bore two children subsequently, and was alive thirty years after the attack. Recovery from the Addisonian form may last ten, fifteen,

* There may have been septic endocarditis in this case, as a few days before death there was a soft diastolic murmur along the left sternal border. The dancing, vibrating pulsation of the peripheral arteries was extreme and the pistol-shot sound unusually loud. In connexion with the production of this in the arteries, about which so much has been written recently, the following note, dictated September 2nd, 1918, is of interest: "A loud systolic bruit is heard over the abdominal aorta without pressure; but neither heart sound. Over the femoral, without the slightest pressure, two sounds are heard, quality and intensity about equal, and almost as loud as the sounds heard over the heart itself. With pressure both increase in intensity, then a loud systolic murmur develops, and on pressure to obliteration, a loud single pistol shot remains."

or even seventeen (McPhedran) years, but such instances are exceptional, and in the cases of reported permanent recovery there is always the question of mistaken diagnosis.

The blood picture may be of value in estimating the outlook. Signs of active regeneration may be present, as in Mrs. A.'s case, indicated by blood crises and a large proportion of red cells with signs of recent formation, and the basophilic granulation described by Boggs and Morris and by Milne, the mitochondria (Sappington) and the reticulation described by Robertson and Bock.¹² The number may rise from 1 per cent., the normal, to 20 or 25 per cent. with marked bone-marrow stimulation. A high colour index is the rule in the pregnancy and *post-partum* cases. The blood condition is uncertain, however, as well shown in two exceptionally well studied cases in Meyer's clinic, reported by Jungermann,¹³ in which the contrast was striking, the one with low colour index and features of an aplastic anaemia, the other the characteristic Addisonian picture. Both were pregnancy cases, and both had normal deliveries and recovered completely. The absence of platelets is a feature of the common idiopathic anaemia, contrasting, in this respect, with the post-haemorrhagic and septic forms. In the hands of skilful students the criteria offered by the blood examination should, as a rule, be of great value in the prognosis.

My individual experience is exceptional and much more hopeful than indicated in the literature, and particularly in works on obstetrics. The seven cases seen in Montreal and Philadelphia recovered. I have not at hand our large material from the Johns Hopkins Hospital; but I do not remember a fatal pregnancy or *post-partum* case. The later appear to be the more fatal, and the cases reported by Elder and Mathews¹⁴ show that a fatal termination may follow in spite of the most careful treatment.

Acute haemorrhage *post partum* may be rapidly fatal from reduction in blood volume; very large amounts may be lost extending over several days, and yet recovery takes place.

The report of Robertson and Bock, just mentioned, contains much information of value in estimating the blood loss in haemorrhage and the means of treatment. From what is recorded, and from personal experience, I should say the danger of a grave anaemia progressive in character is not great after a fairly profuse haemorrhage. Once the bleeding stops, recovery is progressive and often surprisingly rapid. On the other hand, repeated small losses of blood after abortion or a normal delivery may be followed by an anaemia out of all proportion to the quantity of blood lost. The starting point, indeed, of a few cases of Addison's anaemia appears to be repeated epistaxis or bleeding piles.

The treatment of the cases is that of the severer forms—fresh air, rest, food, iron, and arsenic (in which I still have faith); and if the blood count is very low, 20 per cent. of corpuscles and haemoglobin, transfusion may be employed.

The newer technique has many advantages, but the results do not, in Addison's anaemia at any rate, appear to be more favourable than those we had with the old Aveling or Roussel apparatus.

REFERENCES.

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TYPHOID SPINE*

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LET me begin at the end by reading a letter received January 3rd, National Hospital, Queen Square, London:

DEAR SIR WILLIAM—Sapper C., typhoid spine, was admitted yesterday. You will be interested to know that he is now walking normally. It was a good case, although he walked after ten minutes' treatment.

Yours sincerely,

L. R. YEALLAND.

Had Sapper C. gone to Lourdes—had he gone to our own Canadian Shrine, St. Anne de Beaupré, what a miracle! Paralyzed for nearly two years! unable to move body or legs; never out of his bed! and yet he walked in ten minutes! Well, it is a miracle all the same, an illustration of the faith that heals—not the same sort of faith, however, that the lame man at Lystra had, the firm persuasion that Paul and Barnabas were able to cure him, for I am afraid from what Dr. Yealland says, and from what we know, Sapper C. was not very anxious to get well.

Now to refresh your memory of the case, which is an important one from many standpoints. I saw the patient in April, 1916, with Dr. Whithall, at the V.A.D. Hospital, Maidenhead. The condition was as follows: Excessive nervousness and apprehension, so that he broke into a profuse sweat, trembled, and was very fearful lest we should attempt to move him. He was well-nourished, no mental disturbance, special senses normal, pupils widely dilated. When stripped a diffuse blush spread over the trunk, and there was an unusually persistent condition of goose skin. He was unable to move the body, any attempt being followed by agonizing pain in the back. The legs looked normal, and there was no wast-

* Clinical Remarks, January 7th, No. 15 Canadian General Hospital, Clevedon, Taplow.

ing, no disturbance of sensation. An attempt to sit up was followed by severe pain in the back; with great difficulty he was turned on the left side, but it was impossible to get him in the sitting posture. The spine was straight, no projection or unusual prominence. Below the mid-dorsal region it was very painful on pressure, and over the lumbar spines the slightest touch caused him to cry out. The examination of the abdomen was negative; nothing could be felt on either side or in the iliac regions on the deepest pressure. The spleen was not palpable. The legs could not be lifted from the bed or drawn up. On making the attempt they went into clonic spasm. The toes could be moved and the ankles flexed. The temperature of the legs was normal, and there were no trophic changes.

Sensation: Normal in hands and face. On the skin of abdomen, in a band about a hand's-breadth in width below the costal margin, there was extreme hyperæsthesia; the slightest touch caused him to cry out; he could not even bear the weight of the bedclothes. It extended to the back, but was not nearly so marked as in front. Below the navel the sensation was normal. On the skin of the legs he felt the pin-prick everywhere, and recognized the difference between heat and cold.

Reflexes: Knee-jerks exaggerated, slight rectus clonus, no ankle clonus; Babinski sign not present. Cremasteric and abdominal reflexes present. Bowels and bladder normal.

In February, 1916, the patient had an attack of typhoid fever, and was treated in the V.A.D. Hospital, Maidenhead. Though prolonged, it was not a severe attack, the temperature never rising above 104° F. The convalescence was slow, and he remained in the hospital all the summer. In October he had another febrile attack which was thought to be influenza. Following this, he began to have pains in the back and stiffness; these symptoms have persisted, and he has never been out of bed, and has become more and more incapacitated.

I asked to have the patient transferred here to the Duchess of Connaught's Hospital, Clevedon, where he was admitted May 7th, 1917. A spinal jacket gave great relief to the pain in the back, and the hyperæsthetic girdle rapidly disappeared. In the eight months the changes have been an improvement in his general condition, manifested in a gain of weight, in less marked basal motor changes, and less apprehension and dread of pain. The area of hyperæsthesia has disappeared. The rigidity and immobility of the back has persisted. We have never been able to get him to sit up.

An attempt to move the legs at once brought on the clonic spasm, and there always was an appearance of unusual effort in attempting to make the movement. Night and morning one of the nurses made him draw the legs up and down, and this of late he has been able to do pretty well, and with less tremor. The reflexes have remained the same, and there has been no anæsthesia, though at times the tactile sensations seemed less acute than at others.

Shortly after admission to Taplow an x-ray picture was taken which showed a very dark shadow in front of the lower dorsal and lumbar vertebræ, practically identical with the shadows shown in Figs. 2 and 6 of Dr. J. B. Carnett's article in *The Annals of Surgery*, 1915. I submitted the picture to a number of experts, some of whom expressed doubts as to the significance of so large and dark a shadow. Major Morgan, when he took charge of the department, very kindly made a special study of the case, and the subsequent x-ray pictures showed a spine normal in every particular.

The case has attracted a great deal of interest, and in the weekly demonstrations I could not always carry conviction to the minds of visitors that the condition was purely functional, and that the patient would ultimately get well. My personal education in the disease is worth noting:—

The first case one sees of a special disease or complication usually fixes itself in the memory. In 1887, I was asked by Dr. Grasset, of Toronto, to see with him a young officer invalided from India with paralysis after typhoid fever. Healthy looking, excessively nervous, unable to walk or to move in bed, the striking feature was a painful stiff back, so that any attempt to turn or move made him scream. There was nothing to be made out on examination except tenderness in the dorsal region. The legs were weak, but there was no paralysis, and the bladder and bowels were unaffected. The pain and stiffness had lasted for more than five months, and he was brought home believed to be permanently disabled. He was so nervous that I regarded the whole condition as functional, ordered a jacket with massage to the legs, urged him to get up and go out and gave a favourable prognosis. The improvement was rapid and progressive, and he got quite well. This was my introduction to the condition which Gibney, of New York, first described in 1887 as typhoid spine. In 1890, at a meeting of the Association of American Physicians, Dr. Loomis called our attention to Gibney's observations. In Series I of our "Studies in Typhoid Fever", *John Hopkins Hospital Reports*, vol. iv, p. 73, I wrote a paper with the title, "On the Neurosis following Enteric Fever, known as

the Typhoid Spine" (the first communication on the subject to follow Gibney's), in which I reported two cases, and, in opposition to Dr. Gibney, took the view that it was a functional disturbance, analogous to "railway spine" or "hysterical spine". I was much impressed with the rapidity with which the cases recovered—far too rapidly in Case II for a spondylitis. In Series II of the "Typhoid Studies", *John Hopkins Hospital Reports*, vol. v, p. 315, I reported three additional cases, two very mild, all negative on examination, which improved rapidly with the Paquelin cautery. In Series III of the "Typhoid Studies," *John Hopkins Hospital Reports*, vol. viii, p. 485, I reported a mild case of "tender spine". To this time I had seen nothing to make me change my view of the functional character of the trouble. Meanwhile we had seen many cases of the bone lesions following the disease, and it always seemed a strong point in favour of my view that the typhoid spine never presented any swelling, and never went on to suppuration. In 1902 I had to change my mind. I saw a patient of Dr. Reinhardt, in the fourth week of convalescence, with stiff, painful back, weak legs, excessive nervousness, but in addition a well-marked painful swelling just above the right sacro-iliac articulation. Convalescence was slow, but no suppuration followed. Several other cases were seen, and with the help of Dr. T. McCrae I reached the belief that Gibney's original view was correct for some cases. Careful x-ray examinations showed spinal changes, and in a patient at the Clinique in July, 1904, Dr. Baetjer demonstrated a definite deposit of bone filling the space between the second and third lumbar vertebrae. In 1906 Dr. McCrae reported this case and another with bone changes in the spine,* and in the "System of Medicine" we edited together he gave an excellent analysis of the condition, and grouped the cases into three categories. First, those in which the hysterical features predominate. Secondly, cases with periostitis, or spondylitis, with fever, pain, rigidity, and evidence of nerve root involvement. And thirdly, a group of cases with definite objective changes in the spine, as shown by the x-ray pictures, as well as by examination.

I confess freely to have taken too one-sided a view of the condition, but it was not without a strong basis of support. Such a prompt recovery, such as followed in several of the reported cases, seemed quite inconsistent with the existence of a spondylitis. In showing a case at the Johns Hopkins Medical Society, 1901, the

* *Amer. Journ. Med. Science*, 1906, ii, p. 140.

following features were dwelt upon as indicating the functional character of the condition: First a state of neurasthenia with vasomotor changes, and in not a few cases the definite stigmata of hysteria. Secondly, stiffness of the back, persisting for weeks and months, is associated with pain, sometimes of an agonizing character, on movement. Thirdly, pain on pressure over certain spinal processes. Fourthly, a negative local examination, with the absence of fever. And lastly, in many cases, prompt recovery, with the use of the Paquelin cautery, and measures directed to the neurotic condition.

This case of Sapper C. is a strong confirmation of this view. You saw him last Monday after the spinal jacket was removed—still very neurotic, the spine absolutely rigid; we could not induce him to sit up; he could just lift his legs off the bed with the same type of general clonic tremor. I know that some of you felt hopeless about him, and he had got hopeless about himself, but new surroundings, a new mind, and very skilfully applied methods did in ten minutes what we have failed to do in a year—put him on his feet. I saw him on the 3rd looking well, walking well, and very happy to be on his legs again.

The literature of typhoid spine to 1905 is fully analyzed by Karl Fluss, *Centralblatt f.d. Grenzgebiete der Medizin und Chirurgie*, Bd. viii, and by Elkin and Halpenny in vol. i of the *British Journal of Surgery*, 1914. More than 100 cases have been reported, a large proportion in males. The onset is usually during convalescence, but has been weeks after, and has followed a sudden jar or twist or a blow. Constitutional disturbances are present in all cases. Fever is usually absent, but a range of 100° to 100.5° F. is not uncommon. Paroxysms of fever have been described, and there may be marked leucocytosis. A change in the mental condition has been noted in the majority of instances. The patients are excitable, apprehensive, self-centred, with the features of neurasthenia, and very often positive hysteria. In Sapper C.'s case this has been a striking phenomenon throughout. He was like a shell-shock subject, and at the first examination had an emotional storm with profuse sweating, goose skin, and then a vasomotor hyperæmia spread over the entire trunk. I have not seen a case without neurotic manifestations in some degree, even when signs of local disease were present.

Perhaps the most interesting case on record is the study by Dr. Leonard Ely, of New York, of his own attack (*Medical Record*, September 20th, 1902). One hesitates to suggest the existence of

hysteria in a professional brother, but one may say, at any rate, that the condition simulated it, and he confesses to have been "considered hysterical by his nurses". The professional baseball pitcher, whose protracted case is reported by Carnett; the cases of Lovett and Withington and Taylor's case had hysterical features combined with organic changes.

Of the local features, pain in the back, particularly on movement, is the most constant, and it may be of extraordinary severity, so that the patient screams on the slightest movement. It comes on in paroxysms, and is aggravated by the slightest jar or at any attempt to move. Patients have had to be chloroformed when they use the bed pan, and the threat of suicide has been recorded in several instances. The pain may be of a definite nerve-root character, extending round one or both sides, or it may pass down one or both legs.

Tenderness on pressure is present over the spinal processes of varying numbers, sometimes limited in the lower dorsal and lumbar regions. Rigidity of the back is a constant feature; the patients are unable to stoop, and have a difficulty in raising themselves to the sitting posture. One patient came into the hospital supported by two friends almost bowed double, and it was only with the greatest difficulty that the back was straightened.

If, as some orthopædic surgeons hold, a rigid back indicates organic disease, all of these patients had it, and no case I have seen has been more marked than in Sapper C. Clonic contraction of the muscles has been present in a number of instances. It may be nothing more than the fine tremor on attempting moving of the legs; but there is one type of muscular contraction in these cases that is of great importance, as to my mind it is an unerring stigma of hysteria. I refer to the rhythmic contraction of the abdominal muscles, noted by Ely in his own case, and present in two of Carnett's cases. In a patient admitted in October, 1902, with pain in the back and the ordinary features of typhoid spine, the abdominal muscles were contracting at the rate of 75 to the minute, which gave a very remarkable appearance to the flanks, which were moved in and out like a pulsation.

Inability to use the legs is present in severe cases, but there is no actual paralysis, no wasting, and the features are quite unlike post-typhoid paraplegia from myelitis or from neuritis. Reflexes are increased, but not changed in type. Disturbances of sensation in the form of hyperæsthesia are common, particularly in the back. Anæsthesia may be present, and it is interesting that Dr. Yealland,

in Sapper C.'s case, found a stocking anæsthesia, which certainly was not present on any occasion on which I or others examined him.

The last and important point is the evidence which exists in some cases for disease of the spine. This is of two forms: Kyphosis has been present, and of a type that could only occur from positive disease of the bone. Swelling of the soft parts on either side of the spine has been described and was present, as I have stated, in the patient seen by Dr. Reinhardt, the only one of the ten or twelve cases I have seen in which on physical examination changes were present. Of ordinary scoliosis and of associated atrophy of the lumbar muscles one cannot be so certain, as they are common enough in hysteria.

The *x*-ray picture has been studied now in a large number of cases. Osteoporosis, absorption of the intervertebral discs, and local bone proliferation have been described. It is extraordinary how few satisfactory skiagrams of the condition exist. I have looked in vain for one through the special journals, and some that have been published elsewhere are in the highest degree unsatisfactory. It is not fair to criticize a print without the plate, but Figs. 2 and 6, illustrating Dr. Carnett's paper, have had an extraordinary resemblance to the first plate taken of Sapper C., but subsequent study showed them to be artefacts, and the spine and adjacent bones show no trace of disease.

Upon one remarkable feature all writers dwell. Unlike ordinary typhoid periostitis the spondylitis rarely (if ever) goes on to suppuration. When present the lesion must differ essentially from that which we see in the long bones and the ribs. Typhoid bacilli have been frequently found in the bone marrow of the vertebræ, and there is no inherent reason why similar inflammatory changes should not be produced as in other bones. We know, indeed, from the presence of the kyphosis and from the *x*-ray picture that such changes do occur. Why they are not seen more often is, I believe, that they are not always present, and that we must recognize functional variety, which has its counterpart in certain forms of hysterical and railway spine.

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