

Some account of cardiac aneurysms : being the Bradshawe [sic] lecture, read before the Royal College of Physicians of London on August 18, 1883 / by J. Wickham Legg.

Contributors

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Royal College of Surgeons of England

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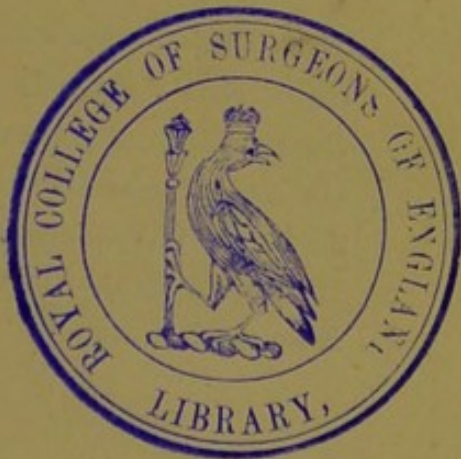


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SOME ACCOUNT
OF
CARDIAC ANEURYSMS



WORKS BY THE SAME AUTHOR.

On the Bile, Jaundice, and Bilious Diseases, 8vo. pp. 719.

A Guide to the Examination of the Urine, fifth edition, pp. 110.

A Treatise on Hæmophilia, Purpura, and other Hæmorrhagic Diatheses, second edition, *in the press*.

Diseases of the Gall Bladder and Gall Ducts, Gall Stones, Portal Thrombosis, Acute Yellow Atrophy of the Liver, Biliary Accumulation, Cirrhosis of the Liver, Nutmeg Liver, and Hæmophilia in Quain's *Dictionary of Medicine*.

On the Histology of the So-called Nutmeg Liver, *Medico-Chirurgical Transactions*, 1875.

Parenchymatous Degenerations caused by raising the natural temperature of the body, *Trans. of the Pathological Society*, 1873.

In St. Bartholomew's Hospital Reports.

On Cirrhosis of the Liver, 1872-73-77.

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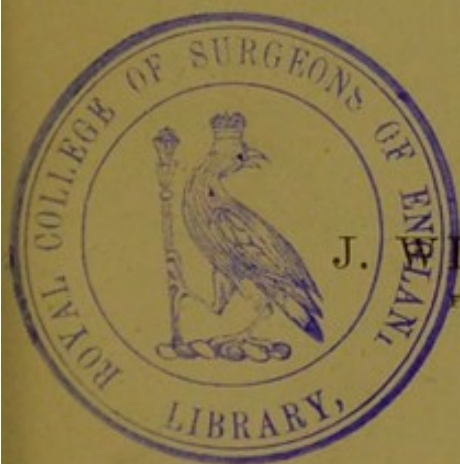
Rheumatic Purpura, 1883.

7
SOME ACCOUNT

OF

CARDIAC ANEURYSMS

*Being the Bradshawe Lecture, read before the
Royal College of Physicians of London
on August 18. 1883.*



BY

J. WICKHAM LEGG,

FELLOW OF THE COLLEGE.

PRESENTED
by the
AUTHOR.

Lo cuor che in sul Tamigi ancor si cola.

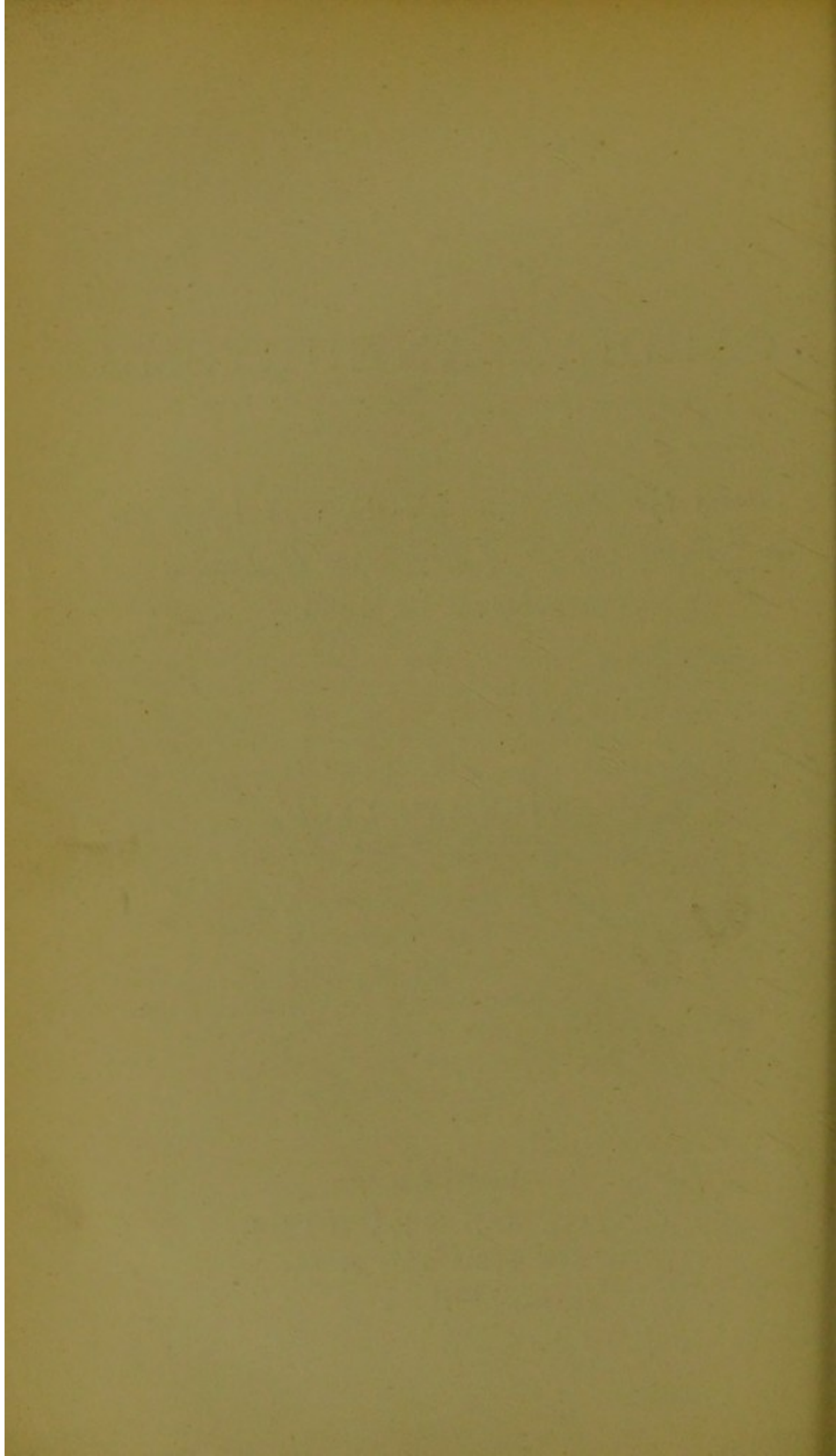
INFERNO, xii. 120.

LONDON

J. & A. CHURCHILL

11, NEW BURLINGTON STREET

1884



TO

SIR WILLIAM JENNER, BARONET,

KNIGHT COMMANDER OF THE MOST HONOURABLE ORDER OF THE
BATH, PRESIDENT OF THE ROYAL COLLEGE OF
PHYSICIANS OF LONDON

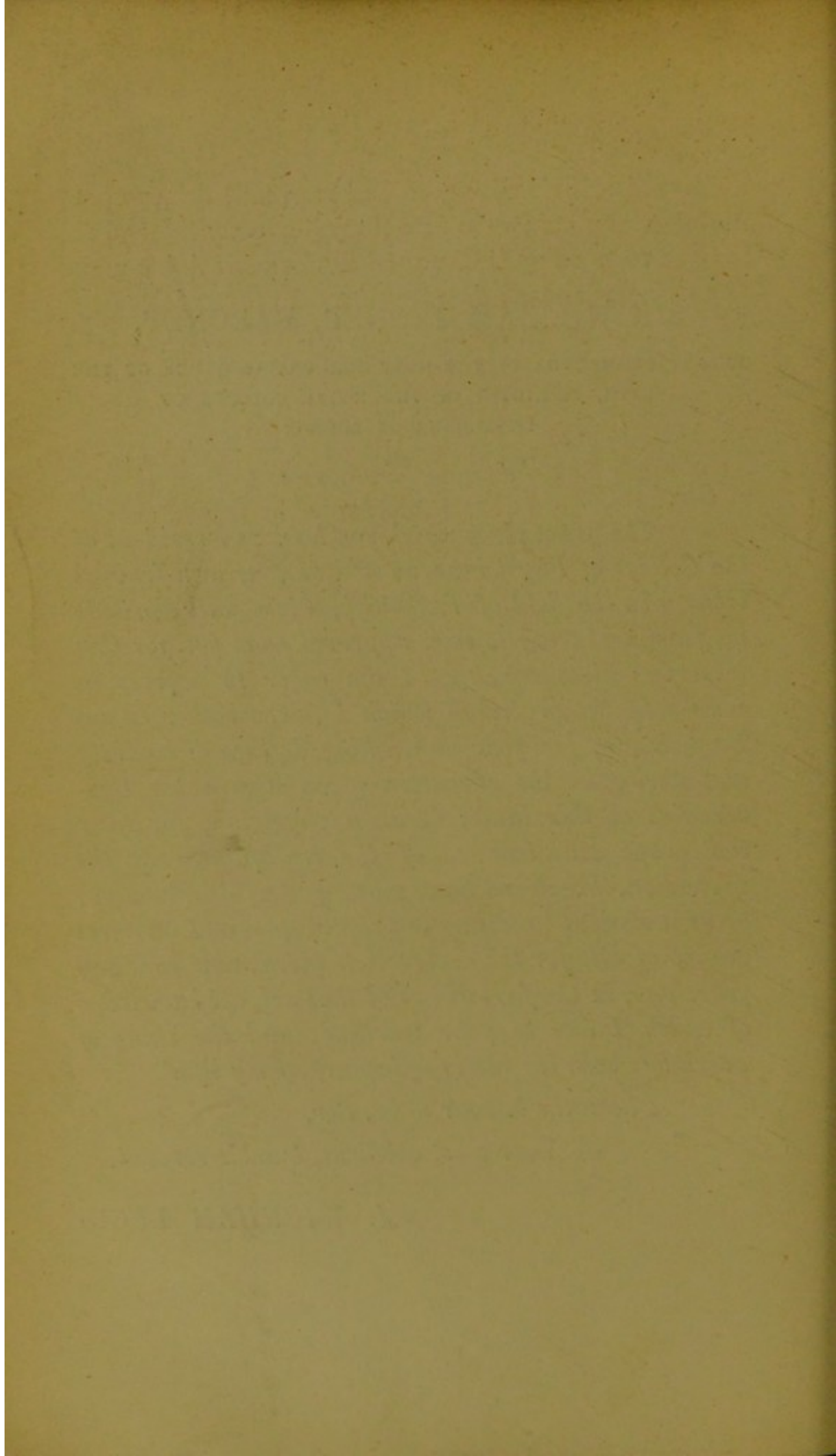
Sir,

The great place which you hold as President of the College of Physicians, as well as your own fruitful labours in the field of Pathology, might well dissuade me from venturing to seek approval from you for this imperfect discourse; yet I am eager to express in some way the gratitude which I feel, whether as an Englishman, for your unflinching defence of modesty and purity in the education given within the Universities of this land; or as a physician, for your continuous maintenance of the truthfulness of the profession, threatened by so many powerful influences; or as a student (and this is the strongest and warmest motive of all) for the instruction given, now so many years ago, in the first duties of that art, all knowledge of which I owe to your teaching, and the study of which has been the lasting pleasure of my life.

I have the honour to be, Sir,

Your most obedient, humble servant,

J. WICKHAM LEGG.



PREFACE

ALL roads lead to Rome, says the proverb, even from the most unlikely places. It is so now : the materials for this lecture could hardly have been put together, had it not been for the noble foundation of Rahere in West Smithfield ; and it was in the church of St. Bartholomew in the Tiber that Rahere first received the command to build the great hospital, which from its very beginning has so greatly relieved human suffering directly ; and indirectly, for the last two hundred years (in a way of which the founder can little have thought) by sending forth year by year men trained within its walls to heal the sick, and who practise their art as far as, or even beyond, the boundaries of Christendom. And the traveller who leaves the Church of St. Bartholomew, and crosses a branch of the Tiber, strikes at once upon the ancient Basilica which gave its title as cardinal to the great statesman and ecclesiastic to whom the College of Physicians owes its being. It is the parish church of a tribe of people whose boast it is that they have preserved untouched the blood and even the manners of the powerful com-

monwealth that gave to Europe the civilization which it has hitherto enjoyed, and of which our children may think themselves happy if they be able to save some fragments from the wreck that is upon us.

In these advanced days, the very existence of a lecture of any kind is thought by many people to be a relic of barbarism; but my chief regret in publishing this discourse is the fact that in a single lecture it is hardly possible to give a complete account of a subject. One hour confines all that may be said. Thus I have dealt very shortly with the history of cardiac aneurysms, and said nothing at all of their symptoms, diagnosis, and treatment. Silence upon these last troubles me the less, because I believe that nothing certain is as yet known concerning any one of the three. It may be noted, indeed, that of late years attempts have been made in both France and Italy to establish rules for a definite diagnosis of fibrous myocarditis. (See Rigal and Juhel-Rénoy, *Archives générales de Méd.* 1881. vol. ii. pp. 129 and 313. and L. M. Petrone, *Lo Sperimentale*, 1883. t. li. p. 113.) It would appear, however, that the symptoms described by these authors are not very definite, and the rules for diagnosis have not yet stood the test of time. Indeed, Juhel-Rénoy, in his recent publication of this year (*Arch. gén. de Méd.* juillet, p. 74.) would seem to admit their uncertainty.

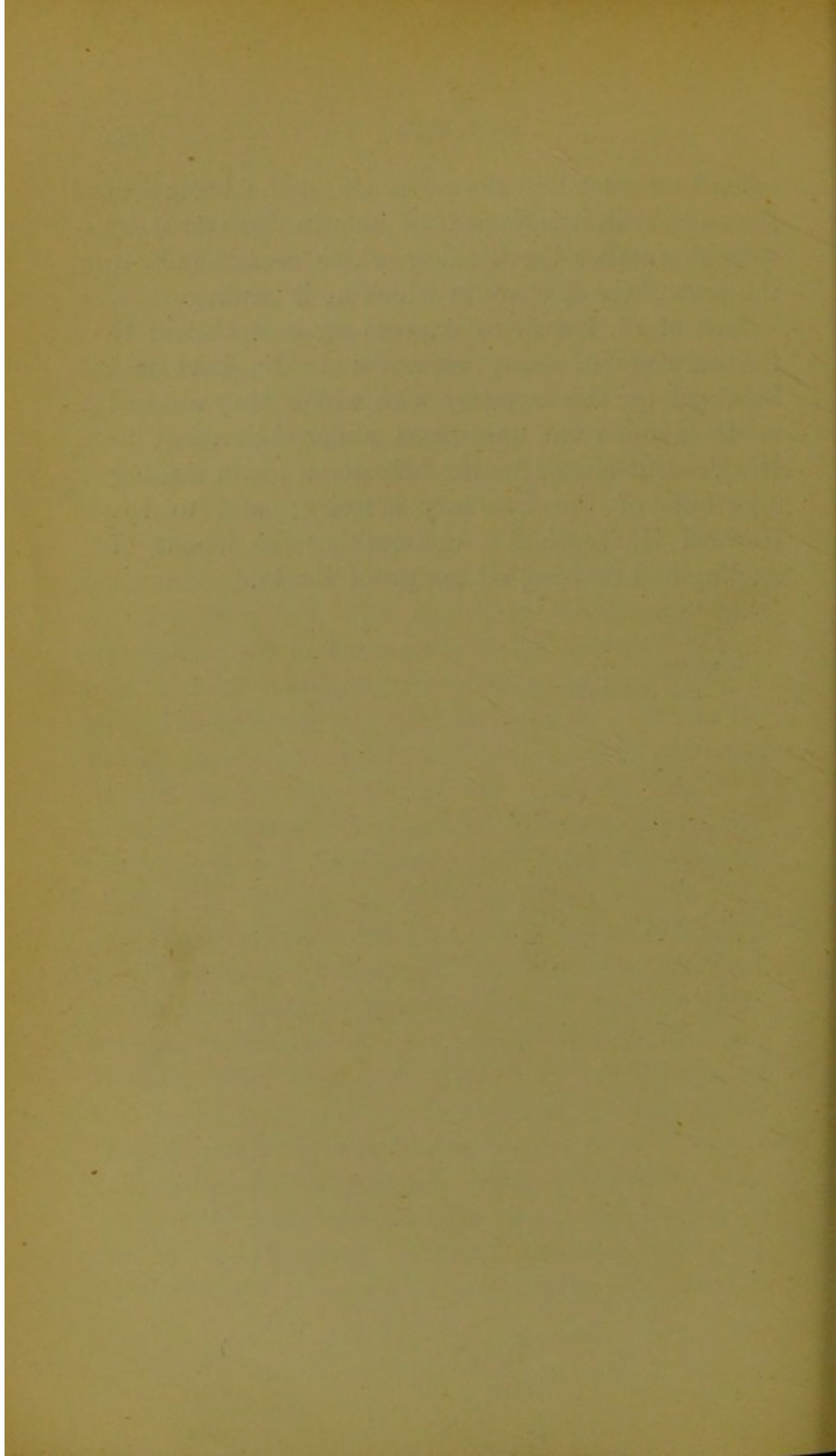
To avoid multiplying references at the foot of the page, there has been added to the lecture a list of the more important writings on, and cases of, aneurysm of the heart that are known. The reader,

when he cannot find the reference at the bottom of the page, will, it is hoped, be able to discover it by searching under the heading which corresponds to the part of the Lecture in which he is reading.

Last of all, I wish to express my best thanks to the curators of many museums in England and Scotland for the courtesy with which they allowed me to examine the specimens under their care; to Dr. Vincent Harris for the help given me in making injections of the coronary arteries; and to Dr. Howard H. Tooth for undertaking the labour of reading and revising all the proof sheets.

LONDON;

Dec. 28th, 1883.



THE BRADSHAWE LECTURE

ON

CARDIAC ANEURYSMS

WHEN, Sir, you did me the honour of nominating me to the office of Bradshawe Lecturer, I felt that, within the hour allotted to the discourse, I could not attempt to deal with any large or wide topic in Medicine or Pathology. I propose therefore to ask the College to consider the subject of aneurysms of the heart, appearances which are, indeed, but artificial varieties in the phænomena of myocarditis and of endocarditis; but in making a special study of which we are following in the footsteps of many distinguished Morbid Anatomists, whether within or without the threshold of this ancient and learned Foundation.

As everyone knows, the word *aneurysm* means a dilatation; and accordingly in the early days of morbid anatomy it was applied to that state of the heart which is now simply called dilatation; this manner of speech continued till late into the present century, so that we frequently find the word aneurysm of the heart used to signify only dilatation.¹

¹ Corvisart (*Essai sur les maladies et les lésions organiques du Cœur et des gros vaisseaux*, Paris, 1811, 2e éd. p. 64) says: "ainsi une fois pour toutes, anévrisme et dilatation seront indistinctement employés comme synonymes parfaits." Andral also uses the word aneurysm for general dilatation. (*Clinique méd.* Paris, 1839. 4e éd. t. iii. p. 62.) For a more modern instance see Forget, *Union méd.* 1859, p. 101.

But the first observers of partial dilatations of the walls, John Hunter and Matthew Baillie, used the word aneurysm to describe them; and this name of aneurysm to signify partial dilatations has been retained ever since.

The first observations of partial aneurysm of the left ventricle seem to have been made within a few months of each other. In 1757 Galeati published a case, which would seem in all likelihood to have been a ruptured aneurysm, but about which Dr. Peacock expresses some doubt. It was in the wall, not at the apex, of the left ventricle. But be this case aneurysm or not, there can be no doubt that in the April of the same year John Hunter found an aneurysm of the apex in the body of an old man who had suddenly died. In Hunter's exact words: "At the apex it was forming itself into a kind of aneurism, becoming there very thin: that part was lined with a thrombus just the shape of the pouch in which it lay."¹ Two other specimens are to be found in the Hunterian Museum and are described in the Hunterian MSS. Two years later, in 1759, Walter of Berlin received from Büttner of Königsberg a heart, which showed at the apex a sac opening into the left ventricle and which was almost as large as the heart itself. In 1785 he communicated an account of the specimen to the Academy at Berlin.

Under the head of "Aneurysm of the Heart" in the first edition of Matthew Baillie, there is a definition which is good even at the present day. "This disease," he says, "consists in a part of it (*i.e.* the heart) being dilated into a pouch which is commonly more or less filled with coagulated blood."² He thought its appearance at the apex was due to the weakness of the fibres at that spot, so that they could not resist the pressure of the blood. In 1799 he published a drawing of a preparation of an aneurysm of the heart from Dr. William Hunter's collec-

¹ Hunterian MSS. in Library of the Royal College of Surgeons, *An account of the Dissection of Morbid Bodys*, Case 32, p. 30, April, 1757.

² Matthew Baillie, *Morbid Anatomy*, London, 1793, p. 17.

tion, but unfortunately the specimen can now no longer be found in the Museum at Glasgow.

In 1796 Corvisart met with an aneurysm at the base of the left ventricle; the walls were cartilaginous and, according to Moricheau Beauchamp's account, even calcified. During the thirty years following, a few more cases were recorded, chiefly at Paris. In 1827 Breschet published the first monograph on the disease, collecting ten cases, and from these he thought himself justified in affirming that aneurysm affected more particularly the left side of the heart, and that the apex was the most usual seat of the disease. Following Scarpa in his classification of aneurysm of the arteries, Breschet gives the name of *false consecutive* to the cardiac aneurysm, because he fancied that all began in a rupture of the inner wall of the heart. In the same year, however, in describing a case which Breschet himself quotes, Cruveilhier first lighted on the doctrine of the cause of the cardiac aneurysm which holds its own even to this day. He found that the muscular wall of the heart underwent a fibrous change, and that this fibrous change once established readily led to a partial dilatation of the wall. He explained the frequent appearance of this fibrous change at the apex by supposing that the apex was the thinnest part of the ventricle, (just as Matthew Baillie thought it the weakest) and that the pressure of the blood was therefore greatest at the apex. This pressure led to the fibrous change, and the fibrous change to the aneurysm.

In 1834 Ollivier wrote a short article on aneurysms of the heart for the *Dictionnaire général des Sciences médicales*; and three years after appeared the admirable monograph of Thurnam to which there is little to add even now when the paper is near fifty years old.

In 1840 Löbl at Vienna, and in 1846 Hartmann at Strasburg, published inaugural dissertations upon aneurysms of the left ventricle; neither of which, unfortunately, have I been able to see. The year 1843 is marked by the appearance of the first edition of Rokitansky's

great work on Morbid Anatomy in which special attention is given to aneurysms of the heart. Rokitansky speaks of a new species, the acute aneurysm, due to an acute endocarditis, but it must be noted that this kind of aneurysm is rare and but seldom seen in this country. The second kind of aneurysm, following the greater number of writers, Rokitansky attributes to a fibrous degeneration of the cardiac walls.

About the same time Peacock and Craigie published accounts of cardiac aneurysms.

In 1867 Pelvet published an excellent monograph on aneurysm of the heart, including those of the membranous septum, of the valves, and of the coronary arteries; and it must not be forgotten in this College that in 1872 Dr. Quain devoted a part of the Lumleian Lectures to the consideration of aneurysms of the heart; he also contributed an article on the same subject to his *Dictionary of Medicine* published in the beginning of this year.

Matthew Baillie speaks of aneurysm of the left ventricle as a rare disease; and in this opinion, I think, most pathologists will agree. During the nine years that I was in the *post mortem* room at St. Bartholomew's Hospital, there were 1890 examinations made; and only three cases of aneurysm of the left ventricle were found. A higher ratio is given by Willigk of Prague. In this town from Feb. 1, 1850, to Feb. 1, 1852, there were 1600 examinations after death; and as many as 9 cases of "partial aneurysm of the heart" were seen. Heschl, as the outcome of 34,000 examinations at Vienna, would seem to give the proportion as 1 to every 200; it must be owned that his statement is not quite plain;¹ but, granting that it refers to cardiac aneurysms, his numbers agree more with those of Willigk than with mine.

Thurnam has applied the numerical method throughout to the ætiology of his cases. This plan of investigation, the favourite of Louis, so much in vogue when Thurnam

¹ Richard Heschl, *Compendium der allgem. u. spec. path. Anat.* Wien, 1855, p. 309.

wrote, has in our own time fallen again into disuse ; if, however, we desire to make any comparison between Thurnam's results and these of later observers, it will be necessary still to follow Thurnam's method ; and though I do not myself rate numeration as one of the most valued discoveries in the history of human progress, yet on this occasion we are forced to reckon with Thurnam's work, and we must therefore stand in Thurnam's ways. In order, however, to avoid using Thurnam's figures over again, and comparing together the same cases with only two or three more added to them (an error which on some occasions has not been avoided) I have taken only the cases which were published after Thurnam's essay, and I have therefore made my starting point the year 1840.

Of aneurysm of the left ventricle I have collected 90 cases ; (a few more in number than Thurnam's.) First as to the place of the aneurysm. With Thurnam we may say that no part of the left ventricle is exempt from aneurysm, though Breschet had earlier taught that the apex was the ordinary spot at which aneurysm formed. In Thurnam's collection there were 27 cases of aneurysm of the apex ; of other parts of the walls 39, 21 of which were at the base. So not only were other parts of the muscular walls besides the apex the seat of aneurysm, but the apex itself furnished a fewer number than the walls. In my own collection 59 were at the apex and 31 at other parts of the left ventricle, thus restoring the predominance of the apex, but by no means to the exclusive place which it took in Breschet's monograph. In 21 of Thurnam's cases the aneurysm was at the base of the ventricle, thus almost rivalling the apex. In the descriptions which I have seen, I did not find myself able to make any sharp separation between the aneurysms of the base and those of the walls.

Then as to sex. Thurnam has 30 men against 10 women. I find 64 men to 24 women ; a slightly higher proportion of women, therefore, than Thurnam. If the cases be divided into aneurysms of the apex and of the

walls, the proportion is somewhat altered. Of the apex, there were 41 men to 18 women; and of the walls, 23 men to 6 women.

As to age. Out of 35 cases, Thurnam found the highest number (9) between twenty and thirty; 3 between thirty and forty; 6 between fifty and sixty; 4 between sixty and seventy; and 7 between seventy and eighty. On the contrary, out of 81 I found the highest number, (19) between fifty and sixty; 14 between sixty and seventy; and only 9 between seventy and eighty. So also between twenty and thirty only 12 cases were found, and 6 between thirty and forty; 15 between forty and fifty; so that the greatest number fall between forty and seventy. Out of 81 cases, 48 were between the ages of forty and seventy.

The accompanying table will enable a comparison to be made between Thurnam's figures and my own. In it I have not included the cases of congenital diverticula from the apex.

Table of the Comparative Ages of Cases of Aneurysm of the Left Ventricle.

Age.	Aneurysm		Total.	Thurnam's Table.
	at apex.	in walls.		
1—10	0	0	0	0
11—20	0	2	2	1
21—30	8	4	12	9
30—41	6	0	6	4
41—50	9	6	15	3
51—60	13	6	19	6
61—70	9	5	14	4
71—80	7	2	9	7
Above 8	3	1	4	1
Not given	55	26	81	35
	4	5	9	
	59	31	90	

Loebl found in his collection that most of the cases were seen between twenty and thirty years of age, thus agreeing with Thurnam, though possibly from the date of Loebl's work it may reflect too accurately Thurnam's ideas. Loebl also found of 72 cases of aneurysm of the left ventricle, 39 at the apex, 22 at the base of the ventricle, and 16 at some other part of the lateral walls.¹

There exist one or two cases of congenital diverticula from the apex of the left ventricle which certainly deserve to be considered at the same time as aneurysms of the heart. The first, of which we may well regret that so few details have been given, was read before the Royal Society of Medicine at Bordeaux. Under the left ribs of a new-born infant there was found a tumour pulsating with each beat of the heart and becoming more prominent when the child cried. The little girl lived two years and a half; and the tumour showed no increase during this time. She died after a violent colic. Nothing was found in the belly or chest. The right heart was natural, but the left ventricle was adherent to the pericardium, and the apex of the ventricle showed an appendix which passed up to the umbilicus and formed the tumour which was felt during life.²

A case very like was this summer recorded by Gibert, also a French observer. In a new-born infant, there was found between the sternum and the umbilicus a tumour the size of a hen's egg, red, beating regularly, reducible like a hernia, the aperture through which the tumour escaped reaching from the umbilicus to the sternum. Some who saw the little girl thought that the tumour was the dilated umbilical artery, while Gibert himself hazarded the opinion that it was the heart which had passed through the diaphragm; and this opinion he thinks was justified by the following appearances which

¹ Loebl, *Comment. anat.-path. de aneurysmate cordis sic dicto partiali*, Vindobonae, 1840. Quoted by Dittrich, *Prag. Viertelj. f. d. p. Heilk.* 1852. Bd. xxxiii. pp. 59 and 67.

² *Archives générales de Médecine*, 1826, t. xii. p. 471.

could be ascertained when the child was two months old : the pulsations of the tumour were isochronous with those of the radial artery ; very distinct contractions could be felt in the tumour ; if it were taken between finger and thumb, and at the same time if much pressure were used so as to interrupt the pulsations, the child woke up, crying, and then became blue. The pulsating chord, passing from the sternum to the umbilicus, increased with the age of the little patient. At birth the size of a crow-quill, it became a little later the size of a goose quill, and at last as big as a man's finger. By passing the finger up the chord, the cavity of the chest could be entered, and the opening in the diaphragm distinctly felt. At ten months old, this little girl died of a double pneumonia, and an examination after death was with a good deal of trouble obtained. Blanchard described the heart as quite natural everywhere, with the exception of a diverticulum from the left apex, like the finger of a glove ; its walls were formed of muscular tissue, and were lined with *columnæ carneæ* directly continued from those of the left ventricle. The diverticulum had just the size of the little finger, and was 38 millimetres long, passing through the diaphragm by a large opening, and then keeping close to the anterior wall of the belly, to which it was adherent by a fold of serous membrane.¹

Putting aside these congenital diverticula from the apex of the ventricle, the youngest case yet known is one reported by Dr. Wilks. A little girl of 12. died suddenly while at play from the bursting of the aneurysm. The oldest is that of Mr. Meade's ; a man of 88. had always enjoyed good health up to the time of his death, which was sudden ; rupture of the heart with some bulging at the place of rupture was found on examination, though I must own that the evidence of aneurysm, as distinguished from fatty heart, does not seem to me perfectly convincing.

The size of the sac may vary from that of a nut, a

¹ Gibert, *Progrès méd.* 1883, p. 446.

marble, a thimble, a plover's egg, a hen's egg, (this is very common) a small orange, to that of a large apple or fist, or the sac may even equal in size the heart itself. In a man whose examination after death I made at St. Bartholomew's, and an account of which was afterwards published by Dr. Southey, the size of the sac was even greater than that of the heart. The heart itself was natural in size, while the sac had pushed the diaphragm five and a half inches below the ribs, and was at least equal to a large cocoa-nut in size.

The shape of the sacs nearly always tends to the round, whether they form at the apex or in some other part of the ventricular walls. At the apex, they are in some divided from the rest of the ventricle by a distinct sulcus, in others the ventricle is continued on to the aneurysm without any marked division; so that the diameter of the mouth of the aneurysm may be as large as that of the aneurysm itself; or there may be a very small opening into a large aneurysm. One of the aneurysms which I came across at St. Bartholomew's, of which I have just spoken and which I fancy may be one of the largest on record, had an opening into the apex of the left ventricle scarcely the diameter of a split pea; it would hardly take a No. 8 catheter, while the aneurysm itself was larger than a full sized cocoa-nut. (St. Bartholomew's Hospital Museum, No. 1265, p. 187 of Catalogue.)

Sometimes the aneurysm is divided into septa, and the septa seemed to be formed of partitions of fibrine from the blood; the same large aneurysm of which I have just spoken was divided by a horizontal septum into two nearly equal parts. Sometimes these septa become calcified, as in Hortolès' case.

When we consider the most common cause of aneurysm of the heart, and how diffused a chronic fibrous myocarditis is throughout the left ventricle, we may perhaps be surprised that aneurysms of the heart are so commonly singular. Two aneurysmal sacs, however, are not very rare; in one of my own cases there were two distinct

sacs separated from each other. In others there have been four; while in Dr. Hilton Fagge's famous specimen, which is preserved in the museum at Guy's Hospital, the wall of the left ventricle is simply covered with these bulgings, a veritable *aneurysma multiplex* of the heart.

Pericarditis is very common. In 18 out of my own 90 cases, the pericardium is stated to be universally adherent. Thurnam found the proportion much less: only 7 in 74 cases. Again, in 37 out of 90 there were such evidences of pericarditis, as old adhesions in the pericardium, or recent pericarditis. Thurnam found like evidences in about 30. This frequency of pericarditis inclined Thurnam to the view that the pericarditis might be the cause of the aneurysm rather than its consequence. The pericarditis might cause the weakening of the walls of the heart which led to the bulging of a part. It is but just to note that Thurnam did not look upon pericarditis as the only cause.

It would seem, however, that the pericarditis ought really to be set down as an effect of the aneurysm, not its cause. In many of the cases of hydatids in the substance of the heart, extensive pericarditis has also been found, and it would certainly seem somewhat more reasonable to believe that the hydatids in these cases have caused the pericarditis, rather than the pericarditis the hydatids.¹

Heschl has stated that rupture of the aneurysm is a very rare event. Thurnam, however, found it as many as 7 times in his collection and once the ventricle in the neighbourhood of the sac itself had given way. In one of Sir Astley Cooper's cases, spoken of by Thurnam, the sac had ruptured into the left pleura. In my own collection I also found 7 cases of rupture of the aneurysm. In one

¹ Charles Kelly, *Trans. of the Pathological Soc. of London*, 1869, vol. xx. p. 145. W. Moxon, *ibid.* 1870, vol. xxi. p. 99. T. B. Peacock, *ibid.* 1873, vol. xxiv. p. 37. George Budd, *ibid.* 1859, vol. x. p. 80. See also Louis de Welling, *Des Kystes hydatiques du Cœur*, Paris, 1872. Obss. xii. xix. xxiii. and p. 67. A praiseworthy thesis.

of Dr. Peacock's the hæmorrhage was much restrained by the existence of old adhesions, and it spread little beyond the neighbourhood of the apex. In Mr. Tufnell's case, the pericardium was found full of blood from rupture of a coronary vein.

Thurnam attempted to carry into the pathology of aneurysms of the heart the same multitudinous subdivisions which in his time perplexed the student of arterial aneurysms. It will be hardly necessary to do more than thus here to refer to them. The "diffused true aneurysm" of Thurnam must of necessity involve the apex of the heart, as it is part of its definition that the whole circumference of the ventricle is involved in the disease. The false aneurysms of Breschet and of Thurnam which begin with a rupture of the endocardium are so rare that they need hardly be considered; for at the present day it will be owned by all that, in the large majority of the cases of aneurysm of the left ventricle, the endocardium, however changed it may be, does enter into and clothe the inside of the sac. The endocardium is often much thickened before it enters the sac, in which it is covered with a layer of coagulum, often of long standing. It would almost seem likely that in some cases a thrombus forms upon the spot of myocarditis before the walls begin to bulge into an aneurysm. Usually it is thought that the thrombus thus formed arises as a protection to the already thinned and weakened wall.¹

The walls of the sac are usually exceedingly thin; they are said to be translucent, of the thinness of paper, or formed solely by the apposition of the endocardium with the pericardium. However changed the tissues may be, yet it is nearly always possible to recognise some representative of the myocardium between the two membranes which clothe the inside and the outside of the heart, though in a dozen, or more, tolerably recent cases and therefore such in which it may be thought that the microscope had

¹ W. S. Greenfield, *Trans. of the Pathological Society of London*, 1875, vol. xxvi. p. 58.

been used, it is said that the wall was formed of fibrous tissue. In some cases in which, from the naked eye appearances, nothing but fibrous tissue might have been expected, Pelvet has shown that muscular fibres may still be demonstrated under the microscope, and that not merely fibrous tissue but elastic tissue may form the bulk of the wall. As this writer has paid much attention to the histological characters of the wall of the sac, it may be well to give some of his results in the cases which he has examined. In Case xvii. he found four layers; i. layer of proliferation, made of rounded bodies, corresponding to the endocardium; ii. fibrous layer, made up of large cells; iii. layer of muscular tissue, much decreased in size, and taking up only the outside part; and iv. the pericardium. In Case xviii. the greater thickness of the sac was made up of elastic tissue in which a certain amount of fibrous tissue could still be traced. Here and there also could be seen spots of perfectly preserved muscular tissue without any fatty degeneration, though the nuclei of the sarcolemma had clearly multiplied. The calcified spots showed only layers of calcification, one over the other, but no trace of true bone tissue could be seen. In Case xix. much the same appearances were seen as in Case xvii. and Case xxv. will be spoken of later on.

Not unfrequently the sac becomes infiltrated with lime salts. It was so in Corvisart's, Cruveilhier's, and Harrison's early cases; and Thurnam had noted this in six cases, and since his time it has been seen in ten instances. (Arnott, Charcot, Fredet in Pelvet, Hilton Fagge, Hortolès, Sainton, Skrzeczka, Statz, Townsend, Wilks.) Dr. Wilks considered that the aneurysm in his case had been cured, and the patient would certainly appear to have died of another disorder, namely, phthisis. In Mr. Townsend's case, in many respects very like that of Dr. Wilks, death was caused by accident. But whether this justifies us in deciding that had the patients lived longer, the disease of the heart would have no further influence upon their health, seems doubtful. It is clear that calcification does

not always check the disease, as the other cases show. Both in Dr. Wilks' and Mr. Townsend's case, the calcification invaded the whole of the structures of the sac. In Hortolès' case not only was the sac calcified but there were calcified septa dividing the aneurysm. While in Sainton's, Statz' and Skrzeczka's the calcification was but partial. In its histological characters it would seem not to differ from ordinary calcification and to have no relation to true bone, as Dr. Wilks, Mr. Townsend, and Pelvet testify.

Matthew Baillie gave as part of his description of aneurysm of the heart that the pouch was more or less filled with coagulated blood; and to this day, very few indeed of the aneurysmal sacs are reported to be empty. The clots which they contain may be divided into two kinds, the old laminated clot, the "stratified fibrine" of the older pathologists found in arterial aneurysms; and more recent thrombi. These clots may sometimes travel and cause serious symptoms. In Dr. James Reid's case, sudden death seems to have been caused by a clot from an aneurysm filling up the space between the aortic valves: quite like those cases of loose masses of fibrine from the left auricular appendix which block up a narrowed mitral orifice and thus stop the circulation, to which some few years ago I drew the attention of the Pathological Society.¹

These clots sometimes undergo the puriform change; in which the contents of the cysts have all the naked eye appearances of pus, but under the microscope only granular debris can be seen. Thurnam speaks of this in his collection of cases. Charcot has noticed two cases in which large cysts containing puriform fluid sprang from the aneurysm at the apex of the heart. In one case the cyst filled two thirds of the left ventricle; in the other, the greater part.

Since the days of Cruveilhier it seems to have been agreed that the greater number of aneurysms of the left

¹ *Trans. of the Pathological Society of London*, 1878, vol. xxix. p 49.

ventricle have their source in the weakening of the walls caused by a degeneration of the muscular tissue into fibrous scars. As Cruveilhier says, this pathological state is not so uncommon. I have met with two forms: one is a firm, white, almost cartilaginous, extra-vascular growth, imbedded in the walls of the heart, scattered diffusely in islets around one large mass, or in several large masses at a distance from one another, irregular in shape and sharply separated from the surrounding tissue. Under the microscope there is seen a transparent or slightly fibrillar matrix in which appear nuclei, rounded in shape, and varying in size from a red to a white blood-corpuscle. Around the nuclei may be traced cells about double the size of the nuclei; rounded, oval, or even spindle shaped. At the borders of the new growth the matrix is the prominent feature, passing between, and separating, the muscular fibres, and containing but a small number of nuclei. Passing away from the edge towards the centre of the growth, the nuclei become much more abundant, until at last they form the greater part of the structure. In the middle of the tumour there is seen a confused granular mass in which no very definite structure could be made out, a few fibres and deformed nuclei being now and then detected. No giant cells can be seen.

The other form differs from that just described both in its naked-eye characters and in those seen under the microscope. It is of a white colour, not firm but compressible, tough, amply supplied with vessels, creaking under the knife like the cirrhotic liver, of a distinct fibrous appearance, the fibres having a definite direction usually following that of the muscular tissue which they have displaced. Commonly there is only one of these fibrous patches. Under the microscope the resemblance to ordinary fibrous tissue is more complete. Sometimes tissue with fine delicate wavy fibres, hardly to be distinguished from fibrous tissue, may be seen; at others, ill-formed, coarse fibres, with no definite direction, but rather tangled, and mixed with oil globules and granules, make up the bulk of the section.

In this form there are no large nuclei with cells, or translucent matrix, but the whole is formed of fibres. Now and then a muscular fibre, showing well-marked striation, will make its appearance running in the same direction as the fibres.

Whether these two forms be the same, differing merely by their age, I do not think that there are at the present moment sufficient grounds to determine. I incline, however, to the opinion that they are distinct. As early as 1872, I placed side by side for comparison instances of these two varieties of chronic myocarditis.¹

Of this fibrous degeneration of the heart, what is the cause? Professor Virchow (to whom I owe much gratitude for many acts of kindness to me when a student in Berlin, and whose opinions will be received everywhere as those of the first pathologist in Europe) is, it would seem, the main spring of the opinion that would refer all these changes to syphilis.² Doubtless, owing to his authority, these fibrous changes in the heart were for several years almost unanimously set down as a manifestation of syphilis. But of late years a reaction has set in. We have learnt to trust less to the anatomical structure of the growths, and more to the evidences of syphilis in the other parts of the body. Many cases of fibrous disease of the heart have been recorded in which no other evidence of syphilis could be found. Abundance of such cases may be found in the later volumes of the *Transactions of the Pathological Society of London*, where all the appearances, once thought diagnostic of syphilis of the heart, have been found, and yet no other signs of syphilis in the rest of the body have been noted, though diligently sought for.

Within the last few years there has been broached another theory which attributes these changes in the muscular walls of the heart to an interference with their

¹ *S. Bartholomew's Hospital Reports*, 1872, vol. viii. pp. 183—186.

² Virchow, *Arch. f. path. Anat.* 1859, Bd. xv. p. 282. For bibliography see Lancereaux, *Traité historique et pratique de la Syphilis*, Paris, 1873. 2e éd. p. 295.

nutrition by the coronary arteries. Theodor Simon in 1872 and Cohnheim in 1881 thought of the influence which a thrombus or other plugging of the coronary artery might have in causing aneurysms of the heart.

It is now more than thirty years ago since you, Sir, demonstrated that the ligature of the coronary arteries of the heart is quickly followed by sudden death.¹ It had been maintained by Chirac, late in the seventeenth century, that no sudden failure of life followed the occlusion of these arteries; he found that the heart continued to beat for seventy minutes, and even longer, after ligature of the coronary arteries.² And within the last twenty years Panum,³ Albert von Bezold,⁴ and quite lately Samuelson⁵ have expressed the same opinion as Chirac. But in the first few days of 1881, G. Sée with his fellow workers, Bochefontaine and Roussy, read before the Academy of Sciences at Paris a paper in which they gave the results of their experiments on occlusion of the coronary arteries.⁶ Within one or two minutes of the ligature of both coronary arteries, they found that the movements of the heart ceased; and much the same result followed if one or other coronary artery were tied, only that ligature of the right caused death a little less rapidly than ligature of the left. In the September number of Virchow's *Archives* for the same year,⁷ Cohnheim published a series of elaborate experiments on the same subject, but coming much to the same conclusion as Sée. Sudden cessation of the con-

¹ Sir William Jenner's experiments were never published. They were made, he tells me, upon young donkeys.

² Petri Chirac, *De motu cordis*, Monspeli, 1698, p. 121.

³ Panum, *Arch. f. path. Anat.* 1862, Bd. xxv. p. 311.

⁴ Albert von Bezold, *Untersuchungen aus dem physiologischen Laboratorium in Würzburg*, Leipzig, 1867, Theil i. p. 256.

⁵ B. Samuelson, *Zeitschrift f. klin. Med.* 1881, Bd. ii. p. 12.

⁶ G. Sée, Bochefontaine, et Roussy, *Comptes rendus*, 1881, t. xcii. p. 86. Read on January 10, 1881.

⁷ Julius Cohnheim and Ant. v. Schulthess-Rechberg, *Arch. f. path. Anat.* 1881, Bd. lxxxv. p. 503. (5 September)

tractions of the heart followed ligature of one coronary artery, on an average, in 100 seconds. Upon this proposition, that the heart ceases to contract immediately after occlusion of a coronary artery, Cohnheim has built a theory of the origin of fibrous myocarditis; viz. that it also is due to plugging of the cardiac arteries; in other words, that fibrous myocarditis is a necrobiotic process like that of infarction.

Karl Huber has thought to support Cohnheim's view of the part which the coronary arteries play in the formation of aneurysms of the heart by bringing together 18 cases of fibrous degeneration of the walls, noticed in the Leipzig Pathological Institute, in all of which he found highly marked atheroma of the coronary arteries.¹ Now in looking over Huber's tables, one is at once struck by the advanced age of nearly all his cases. Only four are below 62, the youngest being 47. Six of the rest are over 70 years, two over 80, and two over 90, so that it is hardly surprising that marked atheroma should be found in any artery. Indeed atheroma in the coronary arteries is no very rare disease. After 40 it is a common appearance, and indeed it may be seen much earlier. I have noticed it in a boy of 16, and some have thought the coronary arteries more prone to atheroma than any others in the body,² an opinion which my own experience leads me rather to accept than to reject.

Whether, on the other hand, some interference with the blood supply, in the shape of atheroma or plugging, invariably precede this chronic myocarditis, the following facts may help us to judge. There are at present in the Museum of St. Bartholomew's Hospital six specimens of aneurysm of the heart due to fibrous degeneration of the walls. All but one have been taken from young persons, below 40. The coronary arteries have been traced in all, but no marked alteration of the vessel discovered in any but in the heart taken from the man of 40 to 50 years of

¹ Karl Huber, *Arch. f. path. Anat.* 1882. Bd. lxxxix. p. 236.

² Hyrtl, *Lehrbuch d. Anat. des Menschen*, Wien, 1882. p. 979.

age. In this early atheroma was found. In the heart from a girl of 19 a branch of the left coronary artery passed over the tumour, and, as might be looked for, was there plugged by a thrombus. No source of emboli save the aneurysms themselves could be found in the hearts. In the published cases in which the coronary arteries were reported to be healthy, the patient was young, 25 in Craigie's case, 30 in Dr. Hilton Fagge's, 39 in Leyden's, or even 44 in Lancereaux's; while in the cases in which the arteries were diseased the age was in nearly every instance over 50. In Dr. Cholmeley's case, the man was 48; but even here the arteries, though thick walled and rigid, were permeable. In Dr. Thos. Barlow's the man was 42, and the right coronary artery had only one patch of atheroma on it. It seems more likely that the atheroma follows the age of the patient and is independent of the fibrous scarring, rather than that the atheroma causes the fibrous degeneration of the heart.

It is very likely that blocking of the coronary arteries of the heart causes sudden death; but it seems doubtful if it cause in all cases chronic myocarditis. Take Dr. Greenfield's case. A woman 27 years old died suddenly; "the orifices of the coronary arteries were completely concealed by the swelling of the coat of the aorta, and were indicated only by small vertical puckerings on the surface. It was found impossible to pass a bristle into either directly from the aorta, but by following them backwards from their branches small bristles were with difficulty passed through the orifices into the aorta." The muscular tissue showed no sign of fatty degeneration to the naked eye; and when examined with the microscope many hours after death slight but widely distributed molecular fatty change was found in the centre of many of the fibres. No disease beyond the endoarteritis deformans of the root of the aorta was found in the body. There were small patches of atheroma in the coronary arteries.¹

¹ W. S. Greenfield, *Transactions of the Pathological Society of London*, 1875. Vol. xxvi. p. 55.

Here is a very carefully examined case with no report whatever of fibrous changes in the heart; and there are several other cases recorded of a like character.¹

Further, if fibrous myocarditis be due to the plugging or occlusion of the coronary arteries, it is hard to explain why it should be so limited to the left ventricle. I have seen many cases of fibrous myocarditis, but, as far as I can remember, the disease had begun in all in the left ventricle, not in the right; and the same may be said of the cases collected by Dr. Hilton Fagge and by Huber, in which the right ventricle has very rarely shared in the disease; and even when this has been the case it was by spreading from the left ventricle rather than by the appearance of a fresh centre.

In ascribing the cause of fibrous myocarditis to blocking of the arteries, Cohnheim also appeals to a statement which may be found in many anatomical books, and which he himself professes to have confirmed, viz. that the coronary arteries do not anastomose. Undoubtedly this is an important aid to Cohnheim's view; I determined, therefore, to test it for myself. Accordingly in the Christmas vacation of 1882 a number of human hearts were collected, and the arteries injected with a blue coloured size. Nothing was easier than to fill one artery by injecting the other;² and communicating branches could be seen passing

¹ Rondeau, *Bulletins de la Société anat.* xl. année (1865.) p. 253.

² Norman Chevers, *Guy's Hospital Reports*, 1843, p. 109. note. Joseph Swan says the arteries communicate, but not freely. (*London Med. Gaz.* 1848. Vol. xlii. p. 750.) For the following account of the opinions of German writers I am indebted to Professor Thane: Hyrtl (*Nat. Hist. Review*, 1861. p. 321.) stated that the coronary arteries of the heart do not anastomose. In his *Lehrbuch*, (14th ed. 1878. p. 970.) he recognizes capillary anastomoses, and in the last edition of *topographische Anatomie*, (1882. Bd. i. p. 688.) he adopts the statements of L. Langer as to anastomoses of the coronary arteries with the bronchial, pericardial, etc. W. Krause (*Handbuch d. menschlichen Anatomie*, 1879. 3te Aufl. Bd. ii. p. 577.) contests Hyrtl's statement. L. Langer (*Wiener Sitzungsberichte*, 1880. article on Foramina Thebesii.) shows that communications do exist.

over the apex of the ventricles, the very place where there should be least supply of blood, if the explanation of the frequent appearance of aneurysms at the apex be due to lack of nutrition. These injections were kindly made for me by Mr. A. A. Bowlby, the Curator of the Museum of St. Bartholomew's, and in the following January I repeated them myself in the heart of the sheep, with the same result.

The results at which I have arrived are so like to those lately published by Dr. Samuel West that I am anxious to state that the experiments were made at Christmas, 1882. and that I was quite unacquainted with the fact that Dr. West had undertaken a research upon this subject until a fortnight or so before his results were published.¹ Thus my own experiments are quite independent of Dr. West's, and they were from the first intended to form part of the argument in this lecture, and to be read before this College.

There is one case, that of Mr. A. W. Stocks, which may be quoted as some support of the theory of aneurysm by want of nutrition. At the examination of a woman, aged 27, there was found local atrophy of the apex of the left ventricle, and here the wall was translucent; one coronary artery, judging from the description the left, was absent. This, then, seemed a case very much in favour of Cohnheim's view. Aneurysm is uncommon both in the sex and at the age of this case, and it might be contended that it was determined by the absence of the artery supplying the left ventricle. But I have communicated with Mr. Stocks, and he has very kindly informed me that the newspaper account which I have seen of his case, is not correct and that the distribution of the coronary arteries was quite natural, only they arose by a common trunk.

None of the causes of fibrous myocarditis which have been brought forward can be looked upon as proved. Thurnam suspected that the pericarditis which so

¹ Samuel West, *Lancet*, 1883. June 2. Vol. i. p. 945.

commonly attends aneurysm might be the cause rather than the effect; a speculation which I do not think would now find favour with many. Of the cause of fibrous myocarditis, it must be owned, we have as yet no clear knowledge; but I incline myself to the opinion that it will be found some day to be closely akin to those causes which make endocarditis and so many other pathological processes choose as their seat the left ventricle and its lining membrane rather than the other chambers of the heart.

There seems to be no great connexion between the processes of endocarditis, and of those of fibrous myocarditis in which aneurysms are formed. In my own collection of cases, I could only find 7 in which there were distinct evidences of endocarditis; in 16 there was evidence of atheroma in thickening, calcification, or change of colour; in 20 the valves are expressly said to be natural; and of the remainder no opinion is either expressed or can be formed.

It has been said that from the days of Cruveilhier and Thurnam, morbid anatomists have looked upon fibrous myocarditis as the chief cause of aneurysm. Dr. Hilton Fagge,¹ in the admirable paper on fibrous myocarditis which must be known to every Fellow of this College and to which I am myself much indebted, expresses the opinion that "cardiac aneurysm probably never occurs except as an accident in the course of that disease."

Let us then examine this proposition a little more closely. Let us first acknowledge, however, that as time goes on, the number of cases which are set down to any other cause than fibrous degeneration of the heart, hardly increases at all. Fatty degeneration, however, certainly deserves attention. Dr. Fletcher's case, which is sometimes quoted, seems to have been one of fatty heart only, without an aneurysm, and in Mr. Meade's case there was rupture of the apex and a bulging at the place of rupture

¹ Alas, that we should now have to lament his early departure from among us! (November, 1883.)

in a fatty heart : and some may doubt if any bulging were there before the rupture, and assert that it was the mere result of the rupture. But in Dr. P. M. Latham's first case there can be no doubt of the existence of an aneurysm with thin, easily torn walls, and that the whole muscular tissue of the heart " was flabby, pale, and lacerable, a condition which seemed to arise from its partial conversion into fat." Then Pelvet has himself observed the following case : A woman, 59. years of age, died with symptoms of angina pectoris in one of Potain's wards in the Hospital Necker at Paris. There was found in the lower third of the fore surface of the heart, close to the septum, a blackish brown, irregular, gangrenous patch, about the size of a 2 franc piece. This corresponded to a bulging, the size of a small orange, which was filled with laminated fibrine. The walls of this bulging were thin, and little resistant ; they were composed, however, of three layers, pericardium, myocardium, and endocardium, and the muscular fibres of the pouch showed a highly marked fatty degeneration with hardly any striation. The same morbid appearance could also be found, though in a less degree, in other parts of the heart.

There is also a case of Leyden's : In a man, 39. years of age, and very fat, an aneurysmal bulging of the left apex was noticed. No very great fatty degeneration of the fibres was noticed, but in some parts of the heart, especially at the apex of the left ventricle, there were found narrow septa of fatty tissue pushing themselves between the muscular fibres, and causing much separation of the fibres. There was also seen between the fibres a little fibrous tissue with few nuclei, and fewer fat drops. These fibrous patches were only large enough to be seen with the microscope, and Leyden thinks that they are the result of the absorption of the fat drops which first separated the muscular fibres from one another, leaving the fibrous tissue in its place. Our honoured colleague, Dr. Fagge, would doubtless prefer to read the phænomena backwards, but I submit that both Pelvet's and Latham's cases are worthy of consideration.

As to the rupture of abscesses or cysts into the cavities of the heart, or the escape of hydatids as causes of aneurysms, I am inclined to agree with the opinions of former writers that such are possible, but not yet proved. Nearly forty years ago Griesinger described the cavity left by the escape into the pulmonary artery of an hydatid which had formed in the septum of the ventricles.¹ The sac was large enough to hold a large walnut, and was lined by a smooth whitish membrane, through which could be seen the muscular tissue of the heart with a rough and uneven surface; the sac contained nothing but blood. Then some five and twenty years ago, the late Dr. George Budd laid before the Pathological Society a case in which an hydatid tumour had formed at the apex of the right ventricle, and the hydatid had escaped into the cavity of the ventricle and been carried into the pulmonary artery.² Soon after, Dr. Wilks described a like appearance at the apex of the left ventricle, and the hydatid was found loose in the heart. He describes the apex of the left ventricle as a hard, opaque, cartilaginous structure, of about the size of half a crown, and that the muscular tissue was at this spot quite absent.³ Now had the hydatid in this case been small enough to allow of its escape into the systemic circulation, (as in Otto Oesterlen's case⁴ where it caused gangrene of one extremity) it seems likely that an aneurysm would have been formed. I should much like to have seen the apex of the heart in this case; but, unluckily, only the hydatid has been preserved; and the apex of the heart, which to the student of cardiac aneurysms would have been the more interesting preparation, cannot be found.

As an instance of aneurysm by rupture of a cyst in the wall of the heart, Cruveilhier speaks of a small

¹ W. Griesinger, *Archiv f. phys. Heilkunde* 1846. Jahrg. v. p. 280.

² George Budd, *Transactions of the Pathological Society of London*, 1859. Vol. x. p. 80.

³ Samuel Wilks, *ibid.* 1860. Vol. xi. p. 71.

⁴ Otto Oesterlen, *Arch. f. path. Anat.* 1868. Bd. xlii. p. 404.

aneurysm at the base of the left ventricle which communicated with the chamber by a very narrow opening; it was thought that this aneurysm had formed by the rupture of an extravasation of blood into the left ventricle, seemingly on account of the great age of the fibrin found in the aneurysm. There appears, however, nothing distinctive in Cruveilhier's description.¹

Some of the cases which have been brought forward as cases of abscess bursting into the ventricle from the left apex seem to be probably cases of puriform softening of clots which have formed at the apex of the ventricle,² no uncommon spot for thrombi to form. I cannot find on record a case which satisfies me that an abscess of the wall of the left ventricle bursting into the circulation, has caused an aneurysmal pouch.

Most of the other cases of acute abscess of the heart have been seen below the aortic valves, and may be best considered with the acute aneurysms of the undefended space of Peacock. Such are the acute aneurysms spoken of by Ponfick as due to the friction of long vegetations from the aortic valves upon the septum of the ventricles.³ But there is an acute aneurysm according to Rokitansky; such has been recorded by Herzfelder, in which Rokitansky thought that there was an acute myocarditis with formation of an acute partial aneurysm.⁴ A man, aged 57 years, was ill for a week; during the first four days, fever and vomiting were the two prominent symptoms; he died suddenly in the streets of Vienna while returning for the first time after his illness to his daily work. There was found a dilatation of the ventricles of the brain with

¹ Cruveilhier, *Traité d'anatomie pathologique générale*, Paris, 1852. t. ii. p. 689.

² J. H. Stallard, *Transactions of the Provincial Med. and Surg. Association*, 1847. Vol. iii. N.S. p. 105.

³ Ponfick, *Arch. f. path. Anat.* 1873. Bd. lxxxv. p. 557.

⁴ Heinrich Herzfelder, *Zeitschrift der kk. Gesellschaft der AA. zu Wien*, 1860. p. 468. Cf. Rokitansky, *Handbuch d. path. Anat.* Wien, 1844. Bd. ii. p. 449.

some excess of fluid. In the heart, the anterior surface of the left ventricle was covered with delicate exudation, and bulged forward. The wall of the heart at this place was pale and of a bad colour, showing in some places reddish stripes, in other small rounded yellowish spots. The endocardium had a roughened and worm eaten appearance, covered with a layer of fibrine, which was thicker and firmer towards the apex.

There is a case recorded by Mr. E. J. Chance of abscess of the apex of the left ventricle and pericarditis which is often quoted as of importance to the pathology of acute aneurysm.¹ The abscess apparently communicated with the pericardium, though not with the endocardium; and I am unable to see how this case differs from the other cases of abscess in the heart communicating with the pericardium which do not in my opinion throw much light upon the ætiology of acute aneurysms.

The only case of aneurysm of traumatic origin that I can find is one described by Mühlig. Ten years before his admission into a hospital at Constantinople, a mason from Naples had received a stab in the chest from the effects of which he had recovered completely until a few weeks before his death. He then had œdema of the feet, for which scarifications were practised and sloughing ensued. Both heart sounds were replaced by murmurs. After death there was found at the insertion of the fourth costal cartilage a long oblique scar which could also be seen from the inside of the ribs. The pericardium was adherent, outside to the left lung, inside to the heart itself; a firm body in the right ventricle could be felt through the pericardium. The heart was as large as two fists: the left side much hypertrophied so that the right seemed a mere appendage. From within the right ventricle could be seen a rounded opening, with lips of firm tissue which would admit the little finger, leading into a cavity the size of a nut, and lined with firm uneven layers of fibrin, incrustated with lime salts. The wall of the

¹ E. J. Chance, *Lancet*, 1846. Vol. i. p. 548.

aneurysm was formed solely of the two layers of pericardium glued together; it was placed at the junction of the middle third of the right ventricle with the lower third, and communicated through the septum with the left ventricle by means of a hole, which would let in the tip of a little finger. The sides of the hole were clothed with cicatricial tissue, which also formed folds covering the opening in part. The aortic valves showed many vegetations, probably the cause of the murmurs heard during life.

ANEURYSMS OF THE RIGHT VENTRICLE.

WHEN it has been said that the chief cause of aneurysm of the muscular walls is fibrous degeneration, and that this fibrous degeneration chooses the left ventricle for its seat, it will surprise no one to hear that aneurysm is but rarely seen in the right ventricle, and the right and left auricles. A few cases only from each chamber are on record. To begin with aneurysms of the right ventricle. Putting aside the case of Mühlig which has just been described as an aneurysm caused by a wound of the heart, there remain three known cases of aneurysm of the right ventricle. One is a specimen now preserved in the Museum at St. Bartholomew's, (1266A.) the lower third of a heart, of which unfortunately no history can be had. There is, alongside of the apex of the left ventricle, but reaching as far down as the point, a dilatation of the right apex, able to hold a walnut. Its walls are hardly, if at all, thinned, and trabeculæ are still present on its internal surface. From the apex of this dilatation springs a secondary dilatation, the size of half an acorn, with thinned walls, showing no trabeculæ, of a fibrous appearance, translucent, and very thin in many places. The pericardial surface is scarcely bulged, and appears free from adhesions. There are also two other cases of aneurysm of the right ventricle, one described by Canella,

the other by Vidal. In Canella's case, a widow, sixty-two years old, apparently in excellent health, who had ailed nothing before, was peaceably talking to some other gossips when she fell on her right side, and instantly expired. Nothing of any importance was found but in the heart. The middle part of the right ventricle was deformed by a tumour, which was so soft that it could be pushed into the ventricle but it returned as soon as the pressure was left off. On being opened, two pounds of clotted blood came out of the tumour ; which appeared to be formed at the expense of the *columnæ carneæ*. Around the base of the tumour was a cartilaginous ring two inches in diameter, the greatest circumference of the tumour was 17 inches, while its walls were so thin as to be only 5 lines in thickness. No other disease was found in the heart or large vessels. It may perhaps be inquired how the diameter of a circle could be 2 inches and its circumference 17 ? Is it a misprint for 7 ?

By no means so large as this was the aneurysm of the right ventricle which Vidal showed to the Anatomical Society of Paris in 1850. It was at the apex of the ventricle and communicated with the interior by means of a narrow opening. It was clothed by a membrane continuous with the endocardium and held a clot recently formed. Like Canella's case, it came from an old woman, and had not been suspected in life.

ANEURYSMS OF THE LEFT AURICLE.

THERE are numerous cases given by Dr. Peacock with the title of aneurysm of the left auricle, but it must be admitted that they are nearly all cases of general aneurysm of the auricle, following constriction of the mitral valve. Early in the lecture it was pointed out that aneurysm was often used to signify what we now call dilatation ; and such cases of general dilatation of the left auricle are by no means uncommon. But cases of partial dilatation of

the left auricle are exceedingly rare. Sir Astley Cooper in his lectures speaks of an aneurysm of the left auricle of the size of a large walnut, which Thurnam later on pronounced to be an aneurysm of the mitral valve.

Chassaignac showed for Michon to the Anatomical Society of Paris in 1836 a tumour of the left auricle of the heart, the size of a hen's egg, which communicated with the left auricle, and was lined by its internal membrane. Later on it was again described by Cruveilhier; and his description differs from that of Chassaignac in some particulars. In one of Cruveilhier's accounts there is a printer's error by which the aneurysm is referred to apex of the left ventricle, instead of to the top of the left auricle; and the aneurysm is said to be of the size of a nut. According to Cruveilhier it was attached to the auricle by a hollow pedicle an inch long. The aneurysm itself contained old clots and its walls were formed of fibrous tissue.

Another case, (it may be regretted that so few details are given of the morbid appearances seen after death,) is recorded by Dr. Samuel Fenwick. A man had felt a strain during some violent exertion and showed symptoms of heart disease. Apparently Dr. Fenwick did not himself see the post-mortem examination done, but the following is reported: "Projecting from the side of the left auricle was a tumour the size of a small orange, which on being cut into was found communicating with the cavity of the auricle and almost completely filled with the fibrinous coagula usually found in arterial aneurisms."

There are also several other cases spoken of in books as instances of aneurysm of the left auricle; but on examination they prove to be cases of puriform softening of thrombi, of abscess in the left auricle, or of aneurysm of the undefended space opening into the left auricle.

ANEURYSMS OF THE RIGHT AURICLE.

OF aneurysm of the right auricle I met with an example in 1877. A woman aged 51. died with the symptoms of emphysema and bronchitis of many years' standing. Besides the morbid appearances due to these diseases, the right side of the heart was found greatly distended together with the veins opening into it. The valve which guarded the coronary sinus was much developed, showing several large threads and even, close to the wall, continuous membrane. In the wall of the right auricle, at the back, close to the *septum auricularum* and just above the ring which separates the auricle from the ventricle was a rounded almost hemispherical projection, covered with pericardium. It was about the size of a large cherry, 20 mm. in its longest diameter by 15 mm. in its shortest. The projecting surface was of a bluish colour and looked thin: the summit was covered by a whitish, shaggy looking, spot, not adherent to the opposite pericardium, and from this spot passed several white lines. The wall of the projection was only 2 or 3 mm. in thickness. Looking at the auricle from the inside an opening was seen corresponding to the projection, in a triangular space formed above by two *musculi pectinati* and below by the smooth surface over the attachment of the tricuspid valve. The larger opening was about 15 mm. in diameter, the deeper opening was not above 5 mm. and the whole of the projection beyond this deeper opening was filled with *ante mortem* clot. The tricuspid orifice was much dilated, the valves themselves were natural, save some thickening and opacity at the edges.

The history of this small aneurysm seems to be clear. It was caused by the great intra-auricular pressure, secondary to the tricuspid regurgitation of the emphysema and bronchitis. It had formed at a spot between the *musculi pectinati* where the auricular wall was least strong. Some support to the opinion that the aneurysm was con-

genital may be fancied to be given by the developement of the valve of Thebesius, but the weight of evidence seems to me in favour of the former view.

The following case recorded by Mr. T. Howitt is often spoken of as an instance of aneurysm of the right auricle. It appears really to be a case of pyæmic abscess and pericarditis, though the source of the pyæmia was not discovered. A boy, aged 8, complained of great pain in his calf, and periostitis was thought to be the cause. He died; but nothing amiss could be found anywhere save in the heart. "The pericardium instantly attracted our attention as appearing very much distended, and on cutting into it there gushed out, as near as we could guess, a pint of grumous fluid and pus, containing a number of curdy flakes, the whole interior surface being lined with a layer of cheesy, scrofulous-looking matter, apparently soft coagulated lymph, one sixteenth of an inch in thickness. On examining the external surface of the heart more particularly, we discovered a rounded eminence, situated just at the junction of the right ventricle, and which was darker in colour than any other portion. Upon making a crucial incision into this prominence, there flowed out about a teaspoonful of ill-conditioned pus, with a few curdy flakes. This small abscess communicated internally by a small ragged opening, with the right auricle, which contained a mixture of pus and blood. There was no communication with the sac of the pericardium."

Déville had the authority of Cruveilhier for giving the name of aneurysm to the following case. An hypertrophied heart had been taken from a person, aged from 55 to 60 and the subject of "rickets." There were calcareous deposits at some of the orifices: and the right auricle showed a deposit of lime salts in shape like a Phrygian cap. Here it must be regretted that the description hardly justifies the passing of a formal judgment upon the specimen.

A very noteworthy case of aneurysm of the right

auricle, passing through the chest walls and appearing as a pulsating tumour in the neighbourhood of the second and third ribs has been recorded by Berthold.

A man, who in his youth had been a soldier and suffered from syphilis, enjoyed fair health until his 56th year. While exerting himself about this time, he suddenly felt a pain in the third and fourth ribs. The pain was never very great, but it was continuous; and after a time there was perceived a slight tumour which rose at each beat of the heart. This tumour felt like cartilage, and was hardly at all painful. It continued to increase, first to the size of a walnut, then to that of a hen's egg. On listening, the heart's sounds were perfectly natural. Later on the tumour became the size of a man's fist, stretching from the second to the fourth rib, and its firmness at this time had decidedly diminished. The skin was tightly stretched over it, and began to shine and to grow red. There was great dyspnoea. At last the patient died in his 60th year. The examination was made 36 hours after death. The pericardium was quite natural, but the upper part was adherent to the bony chest wall. The right auricle was found dilated to about three times its natural size. The finger, carefully introduced into the auricle, passed out through the wall of the chest into the external tumour, which was then the size of a man's head and filled with abundance of coagula.

A case not unlike this, but of aneurysm of the left auricle was described by Dionis in 1712. A man deserting from the French army was struck in his flight on the chest by a bough of a tree; great pain followed, and later on a tumour developed on the left side of the chest. After visiting many hospitals, he returned to Avignon and there died. The four first ribs were found broken, and the left auricle was much dilated, forming the external tumour. Just before this case, Dionis also speaks of a greatly dilated right auricle which had become calcified. The subject of the disease was a sea captain.

ANEURYSMS OF THE MUSCULAR SEPTA.

WE will turn to the aneurysms of the muscular septa of the heart. Of bulging of the septum of the auricles, I can find only one instance on record; it is this specimen of Dr. Peacock's which by the courtesy of the authorities of the Royal College of Surgeons I have now the opportunity of submitting to the inspection of this College. It will be seen, Sir, that the membrane covering the foramen ovale is greatly expanded, concave on the right and bulging into the left auricle. No communication had apparently existed between the auricles. It was taken from the body of a woman, aged 54, who had died of phthisis.

Aneurysm of the muscular part of the interventricular septum is nothing so rare, though it is not common. It does not appear to differ greatly from the aneurysms of other parts of the muscular wall. The concave surface appears always to be on the side of the left ventricle, and the convex surface is therefore towards the right ventricle. There is an admirable specimen of this disease in the Museum of the University of Edinburgh. (No. 2125.) The aneurysm appears in the very centre of the *septum cordis*; the opening is round, with a distinct rim, about the size of a five shilling piece, the walls are thin and smooth; the tricuspid valve is pushed into the right side of the heart. The concave surface is of course towards the left ventricle. And in the Museum of the Middlesex Hospital there is a specimen of an aneurysm of the septum where it joins the wall of the ventricle; the sac has been perforated towards the right ventricle. The whole process appears to have been the result of an acute septicæmia. Dr. John W. Ogle has recorded a like case, but in this it was complicated by the appearance of a small aneurysm of the aorta which had burrowed into the substance of the right ventricle.

At this place it may be convenient to allude to those

cases which are described by Thurnam under the name of dissecting aneurysm of the heart, in which an aneurysm, he says, forms a canal under the lining membrane of the ventricle, which opens at some other point. Some of these, no doubt, are aneurysms of the aorta, which have formed just above or in the sinuses of Valsalva, and burrowing in the substance of the septum have opened again into some chamber of the heart. A still greater number are acute aneurysms of the undefended space which have burrowed in the septum of the heart and made their appearance at various points. A more minute description of these latter will be given very shortly. Though there are such high authorities for the use of the term dissecting aneurysm as Hope and Thurnam, yet it seems undesirable to create a new species of aneurysm for what is an unimportant variation in the history of aneurysm of the aorta, or of the undefended space.

If the term dissecting aneurysm were allowed, it might be applied to a very rare and curious specimen which is now in the Museum of the Middlesex Hospital, (52.) described some fifteen years ago by Mr. Henry Arnott. On opening the left ventricle there was seen to be leading out of its upper part, behind and below the aortic opening (not, however, in the undefended space, an idea which the specimen in the Museum clearly negatives) a large pouch, extending backwards, upwards, and to the left, with a patent orifice two inches in diameter. The sac was full of stratified fibrine, and its walls were calcified and cartilaginous. The aneurysm itself formed a canal able to take four fingers; it wound round the root of the aorta, completely encircling the base of the heart. The microscope gave no evidence of hydatids in the sac, nor of appreciable disease in the muscular walls of the heart. The next specimen in the same Museum (52. a) shows an appearance not very unlike. The left aortic valve has almost wholly disappeared, and its place has been taken by an aneurysm which rises up and forms a triangular sac by the side of the auricular appendage. Dr. Thomas Barlow

has also recorded a curious case in which an aneurysm of the base of the left ventricle communicated with the left sinus of Valsalva by an opening which admitted the end of a cedar pencil.

Mr. Pick has published a curious case which may conveniently follow those which have just been described. In the aorta, behind one of the aortic valves, at the bottom of one of the sinuses of Valsalva, there was an opening large enough to admit the tip of the little finger, passing down into a large sac in the septum ventriculorum, apparently formed by the separation of the two layers of the septum from one another throughout their whole extent. The sac also communicated with the cavity of the right auricle. Under the aortic valves there appears to have been also an aneurysm of the undefended space, and the tissue of the heart had undergone fibrous degeneration in many places. Did the aneurysm of the undefended space form one with the aneurysm of the septum?

ANEURYSMS OF THE UNDEFENDED SPACE.

It seems to be still undetermined by whom the membranous part of the septum of the ventricles was first described. Albers¹ apparently found it in the seal¹ before 1805. Thurnam² speaks of it as well known in 1838. and some French anatomists³ in 1818. would also seem to have been familiar with it. Peacock in 1846. uses the term 'undefended space'⁴ without any introduction. In Germany the undefended space was at this time but little known; so that it would appear that it was sometimes

¹ Quoted by Meckel in Reil's *Arch. f. d. Phys.* 1805. Bd. vi. p. 583. but no reference is given.

² Thurnam, *Med.-Chir. Trans.* 1838. Vol. xxi. p. 222.

³ Thibert, *Bulletins de la faculté de médecine de Paris*, 1818. t. vi. p. 362.

⁴ Peacock, *Trans. of the Pathological Society of London*, 1848. Vol. i. p. 61. Case read in 1846.

mistaken for disease. I have in my possession an Inaugural Dissertation¹ published at Würzburg in 1831. by Ernst Schliemann, doubtless working under Schoenlein's direction, in which the undefended space is spoken of as an appearance due perhaps to hæmophilia. In 1855. Hauska laid a claim to the discovery of the undefended space,² and in the same year Albini noted that it could be found in the dog, rabbit, rat, squirrel, pig, and hedgehog; in short, in all mammals that he had examined, with the exception of the horse.³ The bony plate of ruminants corresponds to the undefended space of other quadrupeds.

Despite a few unimportant observations early in the present century, aneurysm of the undefended space was but little noticed until Thurnam drew attention to the possibility of such a morbid appearance. He says: "It is well known to anatomists that the highest part of the septum, which occupies the angle between the posterior and right aortic valves, and which, in some instances of congenital malformation, is deficient, is in the human subject formed not of muscular fibres but simply of the endocardium of the right and left ventricles almost in apposition, and strengthened only by the interposition of a little fibrous tissue continuous with that of the aorta. In many ruminant animals this point is well secured by an osseous plate; but in man, as a comparatively weak spot, it is perhaps probable that occasionally it may become the seat of aneurismal dilatation." Later on in the same paper, Thurnam describes such an appearance in a heart belonging to the Museum of the Royal College of Surgeons, and says he had discarded the opinion that it was not congenital. Undoubtedly great credit is due to Thurnam for having thus foretold the spot at which the

¹ Ernestus Schliemann, *de dispositione ad hæmorrhagias perniciosas hæreditaria*, Wirceburgi, 1831.

² Hauska, *Wien. Wochenschrift*, 1855. No. 9. quoted from Canstatt's *Jahresbericht für 1855*. Bd. i. p. 66.

³ Albini, *Wochenblatt der Zeitschrift der kk. Gesellschaft d. AA. zu Wien*, 1855. p. 295.

disease was afterwards to be met with, and apparently he was the first to describe this particular form of aneurysm of the septum.

A few years after, single cases of like character were described by Peacock, R. B. Todd, and Pereira. And Dittrich of Prague did good service by showing how often the undefended space was attacked by disease. Yet any continuous study of aneurysm of the undefended space can hardly be said to have been made until Pelvet published his monograph on aneurysms of the heart. He showed how often aneurysm may be met with at this place; but at the same time he allows but one factor in the production of these aneurysms, endocarditis. Rokitansky, in his work on the imperfect septa of the heart published in 1875, some ten years after Pelvet, fully allows of congenital weakness as a cause of the aneurysm in this place: and I remember that at the same time that Rokitansky's book was published, and certainly without any knowledge of it, I showed a specimen to the Pathological Society in which it seemed clear that the aneurysm had a congenital origin, and that Pelvet had been too exclusive in assigning an acute endocarditis as the cause of all.

It will be desirable to divide the aneurysms which form at the undefended space into two groups: one, of congenital origin; the other, the result of acute endocarditis.

It will be, however, needful to discard mere openings in this situation which are solely the result of imperfect developement, and which show no appearance of having at any time in their history been aneurysms;¹ while it is necessary to retain the consideration of those aneurysmal sacs which have formed communications with the right side of the heart as a step onwards in the progress of the disease.

The aneurysm of the undefended space which owes its

¹ Corvisart, *Essai sur les maladies et les lésions organiques du Cœur*, Paris, 1806. p. 270. iv Classe, iii Art. § ii. Thibert, *Bull. de la faculté de méd. de Paris*, 1818. t. vi. p. 55. Testa, *delle malattie del Cuore*, Libro ii. Capo v. § 7. Ed. Sormani, Milano, 1831. Vol. ii. p. 85.

origin to some congenital fault is usually limited in size by the boundaries of the undefended space itself; that is, it is formed upon the same anatomical lines. Thus its size rarely exceeds half a walnut, the sac is commonly thin, translucent, and smooth, though occasionally the inner surface shows irregularities; in my own case, and in one of Zahn's, there were lines crossing the sac, arranged very much like the *musculi pectinati* of the right auricle; and in one of Rokitansky's cases, these were more pronounced, and were like septa, incompletely dividing the sac.

As a rule the sac has no fibrinous contents, unlike the acute aneurysm. The shape of the mouth of the sac is commonly rounded, sometimes it is triangular, thus preserving the rough outline of the undefended space. The whole of this space need not form part of the aneurysm. In two of Rokitansky's (3. and 4.) only the anterior half was involved; and in a third (5.) only the anterior two thirds.

On the right side of the heart, the undefended space is usually divided into two by the ring of the insertion of the tricuspid valve, so that the upper part is in the right auricle, the lower in the right ventricle: or it may point above or below the tricuspid ring, so that it may be wholly in the auricle, or wholly in the ventricle. The same rules govern the disposition of the right side of the aneurysm. The sac may be wholly above or wholly below the ring; or the ring may divide the aneurysm into two sacs, a point which is particularly described in the late Dr. Pearson Irvine's case; or it may be divided still more, into three, as in Rokitansky's second case; or four, as in Rokitansky's first case, Thurnam's and Pereira's, and in Reinhard's two cases there were also signs on the sacs of further secondary dilatations.

Pereira's case is indeed so curious that an account of it had better be given in his own words: "The sac or cavity of the aneurism was about the size of a small hazel-nut; it was lined by a thin smooth membrane continuous with

the internal membrane of the ventricle. At the bottom of it were four pouches (one of which had burst) protruding into the right cavities of the heart. One of these pouches projected into that portion of the right ventricle from which the pulmonary artery springs, and to which some anatomists apply the name of infundibulum or infundibuliform cavity. The pouch was connected with the anterior or larger fold of the tricuspid valve; being adherent to the surface of the fold which faces the pulmonary artery. A second pouch formed a very slight bulging into the right auriculo-ventricular opening at the tendinous margin or ring. The third pouch was situated a little below the second one, and involved the base of the anterior or larger fold of the tricuspid valve. The fourth pouch, that which had burst, had made its way through this fold, and will be described presently.

“Of the three divisions or folds of the tricuspid valve, two (viz. the right or posterior fold, or “curtain” and the left or internal fold or “fixed curtain”) were quite healthy. The anterior and larger fold or “curtain,” that which prevents the escape of blood into the pulmonary artery during the diastole of the ventricle, was, however, in a morbid state. Nearly the whole of its auricular surface was covered with firm lymph, [? what we should now call thrombus] and a portion of the fold, about the size of a sixpence, was pouched or dilated, and protruded like a truncated cone. In the centre of the pouch or truncated portion was the aneurismal aperture, the diameter of which was about equal to that of a large quill. Part of the fold (viz. the portion immediately around the pouch, as well as a portion of the free or floating margin) was adherent to the wall of the ventricle; so that a part only of the fold could act as a valve during the systole of the ventricle.”

Opposite to the mouth of the aneurysm in the left ventricle there was a patch of “lymph” on the aortic face of the mitral valve.

I have lately come across a very interesting case, taken from a patient of Dr. Dickinson's, by whose courtesy I am

allowed to show it here. A child, five years old, said to be an idiot, who had never walked or talked, died this summer in the Children's Hospital, Great Ormond St. A large tumour the size of an hen's egg, doubtful if syphilitic or tubercular in nature, was found in the right parietal convolution. The heart, small in size, showed distinct opacity in the endocardium around the attachments of the pulmonary valves: the lamina of the tricuspid valve attached to the undefended space was opened up, and was perforated at the end by a small hole which, as to size, might have been made by a pin or a needle. The outside of the aneurysmal sac showed the appearance which the French compare to the surface of a raspberry; the sac was much thicker and firmer at its posterior half. On opening the left side, the aortic valves showed the same opacity at their attachment as the pulmonary, and in the undefended space was an opening, leading into an empty sac, conical in shape, the inside of the lamina of the tricuspid valve described above. The endocardium around and below the opening was opaque and white. The mitral valve and aorta were quite healthy and free from any trace of atheroma.

Very often the endocardium both of the right and left sides is free from any appearance of inflammation dating from either foetal or extra-uterine life. It is clear, transparent, and smooth. Sometimes, however, from its whiteness, thickening, and opacity, it gives signs of having long ago suffered. There may also be appearances of degenerative disease in the aortic and mitral valves, but as a rule in the congenital aneurysms, there is nothing to lead to the belief that an active endocarditis has been in progress shortly before death, though of course an acute endocarditis may take place in a heart affected with a congenital aneurysm, as in any other. An instance of this may be seen in Dr. Peacock's second case.

There is nothing remarkable about the age or sex of those subject to congenital aneurysms. Out of 21. cases which I have collected 10 were in men and 11 in women.

As to age, they varied from 9 months to 79 years : 3 being seen under 10, 3 between 10 and 20, 2 between 20 and 30, 5 between 30 and 40, 2 between 40 and 50, 4 between 50 and 60, and 2 between 70 and 80. The causes of death were very various : Three were cases of phthisis and three of bronchitis ; one each of diphtheria, cerebral hæmorrhage, carcinoma of pylorus, pneumonia, decay of nature, encephalitis and syphilis.

I will now give side by side in parallel columns the antagonistic characters of congenital and acute aneurysms of the undefended space.

Congenital.

The endocardium around the aneurysm smooth and transparent or merely showing signs of obsolescent endocarditis.

Aneurysm empty.

Aneurysm bounded by the lines of the undefended space.

Sac smooth and transparent.

Cause of death indifferent.

Acute.

The endocardium below aortic orifice covered with vegetations, the aortic valves much diseased, sometimes destroyed, aortic orifice filled with vegetations.

Aneurysm lined with thrombi.

Aneurysm finding its way in all directions.

Sac opaque and rough.

Cause of death endocarditis and allied diseases.

The acute aneurysm which arises from endocarditis is often concealed when first the heart is opened by the vegetations which fill the mouth of the aorta. The aortic valves are covered with these growths ; having been much injured by the violence of the endocarditis, they are often separated from their attachment to the aorta, and long bridles hang down into the ventricle, to the friction of which against the wall, or the undefended space, it is thought that aneurysm may in some cases be due.

The opening into the aneurysm is irregular and ragged, (though in Rokitansky's 6th case the lower border was remarkably rounded and smooth,) its shape and size uncertain, its contents are clots, stratified or half fluid, though in one or two cases they have undergone the puriform change. The walls of the aneurysm are ragged, and the muscular part of the septum is involved in the destructive inflammation. The process which forms the aneurysm undermines the tissues of the heart, and at each contraction of the ventricle the blood is thus forced further into the septum.

It is true that the acute aneurysm often does project upon the tricuspid valve, just where the congenital aneurysm does, yet the acute aneurysm may burrow amongst the structures of the heart in other directions than this. In Peyrot's case the aneurysm burrowed in two directions, one opening into the right auricle through the auricular septum, the other into the left auricle; in Peacock's last case, in Lombard's and in Shillito's cases there was also an opening into the left auricle. The same thing happened in Barbeau-Dubourg's case (spoken of by Pelvet as Hérard's) but here there was also a second tunnel opening between the aorta and the pulmonary artery, as in Dittrich's third case where there was also another tunnel into the aorta; in Jaccoud's case the opening was between the two auricles and the aorta, or in Dr. Coupland's case at the upper margin of the left auricular appendix when this crosses the aorta. In these last it will be noted that the aneurysm had reached the surface of the pericardium. In others, as in those of Holl, and of Paris, the infundibulum or conus arteriosus was encroached on.

Pelvet has enunciated a law which he thinks governs the mode of perforation of these acute aneurysms. It is this: that the prolongation or opening of the aneurysm into the right cavities corresponds to the orifice in the left ventricle, and is dependent on the point at which the orifice is placed. I am inclined to accept this as

true of the congenital aneurysms, because I know of no facts to the contrary ; but of the acute aneurysms there are many observations which contradict it. The aneurysm may tunnel in the heart structures and open at almost any point, or at all events one far removed from the original orifice.

In the acute aneurysms the orifice may be single, or multiple. Of this last an admirable example is figured by Rokitansky. (6th case.) Or the orifice may be divided into two or three spaces by the bands of remaining tissue which cross the mouth of the aneurysm.

These acute aneurysms have been attributed to the effects of friction, as well as to those of endocarditis. So long ago as 1868. Dr. Moxon drew the attention of the Pathological Society to the erosions which might be caused by the constant friction of long vegetations hanging to the valves of the aorta.¹ Ponfick, without being aware of Dr. Moxon's communication, (for he says he had found nothing in books bearing on the point) took up the same idea ;² but Ponfick limited his thesis to the endocardium, just below the aortic valves, and the erosion thus caused might lead to a perforation of the wall and a fistulous opening into the neighbouring cavities.

Since the publication of Pelvet's monograph there has been much activity in the Anatomical Society at Paris in recording cases of acute aneurysms, many of which have given support to the theory of friction from extensive disease of the aortic valves, often ending in aneurysms of these very valves themselves. This will lead us on to the consideration of valvular aneurysms, to which I shall next ask your attention.

¹ Moxon, *Transactions of the Pathological Society of London*, 1868. Vol. xix. p. 148.

² Ponfick, *Arch. f. path. Anat.* 1873. Bd. lviii. p. 557.

ANEURYSMS OF THE VALVES OF THE HEART.

As far as can be judged at this distance of time, Morand in 1729. described a case of aneurysm of the mitral valve. I will give the account in his own words ; the patient was a Paris tradesman : au coté gauche du cœur une des deux valvules mitrales du sac pulmonaire (? left auricle) étoit changée en une espece de poche, dont le fond regardoit le sac, et l'ouverture regardoit le ventricule. Cette poche étoit la valvule même, dilatée jusqu'à pouvoir contenir le pouce, épaissie, et ayant des petits os en plusieurs endroits.

So also Morgagni in 1741. in a passage which I have not seen quoted elsewhere noticed "in valvula maiori mitrali qua facie alteram spectabat, mediocre semilunare orificium per quod specillum inter valvulae membranas ad lineam circiter secundum longitudinem ascendebat."

There is then a long interval until the time of Laennec. In 1805. he and Fizeau accurately described an aneurysm of the mitral valve ; they called the morbid appearance an aneurysmal pouch and gave an account of the pathogeny of the appearance which remains good to this day. In 1829. Cruveilhier described very shortly another specimen, and in 1838. Thurnam gave details of a case from a soldier who had died suddenly at Fort Pitt in 1812.

Aneurysms of the aortic valves would seem to have been described first by Thurnam, and a few months afterwards by Sir Dominic Corrigan, followed closely by Bouillaud.

Few writers have dealt at length with valvular aneurysms. In 1843. Löbel devoted a few pages to the examination of the six or eight cases on record. In 1873. Jaster, and in 1881. Laurand wrote their inaugural theses on this subject ; but even remembering Pelvet's work, Biach may be said to have been the first who attempted a serious study of the lesion. To his essay, which

appeared in 1878, I am much indebted. It contains full details of many cases on record which either cannot be seen in this country or are only to be read in meagre abstracts.

Biach was able to collect 46 cases, and by adding those which have been published since or which were unknown to him, a sum of ninety cases has been collected of which 44 were cases of aortic, and 43 of mitral aneurysm, while in 3 cases there was aneurysm both of the aortic and mitral valves. These numbers are in marked contrast to those of earlier observers who have nearly all found that mitral aneurysms were more common than aortic. Pelvet gives 16 as the number of cases for the mitral, 7 only for the aortic; and Biach 24 for the mitral, 18 for the aortic valves. If we may trust the outcome of a larger number of cases, it would seem that the aortic and mitral valves are about the same in their disposition to aneurysmal dilatations.

It is quite otherwise when the right and left sides of the heart are compared. The right side rarely, if ever, shows any aneurysms of the valves. It has been often said that instances are known of tricuspid valvular aneurysm. There can be little doubt that this is due to a misunderstanding of Thurnam's Case x. This heart, still preserved in the Museum of the College of Surgeons, (Teratological, No. 385.) is undoubtedly a specimen of aneurysm of the undefended space which has opened up the lamellæ of the tricuspid valve, and in this way there have been formed four distinct aneurysmal swellings in the valve. This specimen, thanks to the courtesy of Mr. F. S. Eve, Curator of the Museum of the Royal College of Surgeons, I have now, Sir, the opportunity of submitting to your judgement, and to that of the College, that you may perceive how little akin the specimen is to the disease which is called aneurysm of the valve. The same kind of appearance has been recorded by Biach in his thirty-eighth and thirty-ninth cases, with, I think, the same explanation.

It is somewhat different, however, with the pulmonary valves. Buhl has very lately described a case in which aneurysms were found in every sigmoid valve of the heart, whether pulmonary or aortic, as well as early aneurysms in the aorta. In Biach's nineteenth case, the appearance of the pulmonary valves is described as four sided with rounded angles, instead of the usual semilunar shape; and from the posterior valve were seen small sacs, projecting in the direction of the ventricle. Rokitansky thinks that such small partial dilatations of the pulmonary valves towards the ventricle, and of the tricuspid valves towards the auricle are not uncommon,¹ and that they are seen without any indication of a *laesio continui* in the valve. I must own that I have never seen such appearances, and if they be common they have wholly escaped my observation. Pelvet speaks of a dilatation of the pulmonary valves *en masse*, corresponding exactly, I take it, to the general dilatation of the walls of the heart, as contrasted with partial aneurysm of the walls. But this dilatation *en masse* would hardly come under the same heading as the disease which we are now considering.

An excellent reason for the rarity of aneurysms on the right side of the heart is given when it is said that valvular aneurysms are almost invariably due to endocarditis. It is one of the common places of pathology that in extra-uterine life endocarditis is confined to the left side of the heart. So that valvular aneurysms will in like manner be confined to the same side.

It may be disputed whether there be anything *sui generis* in the endocarditis which is followed by the formation of aneurysms, but it seems hardly possible to decide from the materials now before us. Those who have recorded instances of these valvular aneurysms have not often thought it worth their while to go into many details of ætiology. For instance, out of the ninety cases which

¹ Rokitansky, *Lehrb. d. path. Anat.* Wien 1856, 3te Auf. Bd. ii. p. 292.

I have collected, no information, negative or positive, as to rheumatism is given in 47: in 15. (two of whom had a rheumatic parent) rheumatism is denied at any time in the history of the patient, while in the remaining 18. rheumatic fever is spoken of either before the patient came under observation or at the moment when he was seen. If these small numbers may be trusted, the rheumatic inflammation of the valves would seem to be followed by aneurysm in a higher proportion than where the patient was free from rheumatism.

Of syphilis we have less information than of rheumatism. In only three of the cases is syphilis affirmed; (2 of my own and one of Dr. Osler's) in five others, the occupation (soldier or sailor) may lead some to assert that syphilis must have been contracted, while in two, scars in the liver are described, attributed in one instance with great likelihood to emboli. Other signs of syphilis are not spoken of. It seems somewhat strange, considering the great authorities that have set down syphilis as the cause of all vegetations and ulcerations of the valves of the heart, that so little heed should have been given to syphilis as a possible cause of aneurysm.

So long ago as 1862. Heschl pointed out the coincidence of disease of the aortic orifice with pneumonia, especially of a suppurative pneumonia; and quite lately Dr. Osler has published a series of five cases in which infectious or malignant endocarditis was associated in every case with pneumonia. Dr. Osler has further collected 21. cases of primary infectious endocarditis, and finds that in 10 of these hepatization of the lung was also present. Pneumonia was also present in Peacock's first case, one of Dr. John W. Ogle's, Dr. Coupland's, and Darolles'.

In the puerperal state it is not uncommon to meet with a severe endocarditis, and there are recorded about half a dozen cases in which aneurysms have been found on the valves. Taking into account the comparative rarity with which aneurysms form in women this is a high proportion.

With Heschl I feel inclined to divide valvular aneurysms into the true and the false: into the acute and the chronic. I do not think that a peculiarly virulent or malignant endocarditis is in all cases needed for the production of valvular aneurysms. They may be seen in chronic endocarditis: a specimen of true aneurysm of the aortic valve was seen in the following case, where all the tissues of the valve were involved.

A woman, aged 32, applied at St. Bartholomew's Hospital on June 19, 1883. I noted that she had a cardiac murmur, a water hammer pulse, and swollen feet, with great dyspnœa; but recommending her to enter the hospital, I took no further observations, thinking that such could be better made after admission. Unhappily, within ten minutes of her entrance into the ward, the poor woman suddenly died. The cause of her death lay in the aortic valves, as the examination clearly showed. There was much dilatation and hypertrophy of the left ventricle. The traces of endocarditis were but few. Two of the chordæ tendineæ of the mitral valve were slightly thickened, and the mitral valve itself at one small spot was a little puckered. But the stress of the disease had fallen on the aorta and the aortic valves. The aorta was a good specimen of *aortite en plaques*. The valves were incompetent and were all much thickened. The anterior was shortened and everted; the posterior showed a small aneurysm, the size of a small haricot bean, of which the long axis was in the same direction as that of the valve. The bulging of the aneurysm was towards the ventricle. There were no vegetations; and no loss of continuity of the lining membrane on the ventricular or aortic side of the aneurysm. The whole process, judged by the naked eye, appeared to be chronic, not acute, in its course. The specimen was put aside, but was destroyed by a museum attendant before the aneurysm could be examined with the microscope; otherwise much information would doubtless have been gained as to the changes in the valve which determined the bulging into the ventricle.

The mode of formation of valvular aneurysms was very clearly pointed out by Laennec who was at the same time one of the very first to describe them : " Cette dilatation paraît avoir été l'effet de l'obstacle que le rétrécissement de l'orifice de l'aorte opposait au cours du sang. On conçoit, en effet, que la lame inférieure de la valvule mitrale a pu se rompre par l'effort du sang qui, poussé par le ventricule gauche, avec une force nécessairement plus considérable que dans l'état naturel, vu l'épaississement des fibres de ce ventricule, ne pouvait cependant passer avec facilité dans l'aorte."

Of the formation of the acute or false aneurysm of the valve the best explanation seems to be as follows : The endocardium on one side of the valve gives way either from ulceration, friction, or some other cause. At this point the valve is of course weakened and unable to resist the force of the blood. It follows that the valve at the weakened spot bulges, and bulges in a direction which is the same as the direction of the pressure of the blood. For example if the aneurysm be on the mitral valve, the convexity or bulged part is on the auricular surface of the valve ; if the aneurysm be on the aortic valves, the aneurysm points into the ventricle. Thus far all are agreed ; but the question now arises whether it be the endocardium on one particular side of the valve which must be ulcerated to form the aneurysm. Dr. Joseph Coats has lately insisted that it is one side of the valve only which is at fault.¹ He gives some excellent diagrams to illustrate his view, which is this : endocarditis is more common on the ventricular side of the aortic flap, and it is this side which is weakened. The fall of the blood therefore against the aortic valve tends to push the fibrous or elastic middle tissue of the valve, followed by the endocardium lining the aortic side, out through the weakened spot into the ventricle, and thus to form the aneurysmal sac. I do not know if Dr. Coats intend his proposition to be a general one ; but while gladly admit-

¹ Joseph Coats, *Manual of Pathology*, London, 1883. p. 336.

ting that it is an explanation of certain cases of aneurysm (especially on the aortic valves) I do not myself think that it applies in all cases. I have seen specimens in which the absence of all signs of endocarditis on the bulged side, and the smooth continuous covering of endocardium over the aneurysm forbid the notion that the process had begun on the bulged side. In support of this statement, besides my own cases, I may refer to those of Dr. Andrew, Dr. Walter Smith, and Dr. Wilks, where the endocardium on the ventricular side of the mitral valve was sharply cut, or a smooth and continuous endocardium covered the sac on the auricular surface of the valve.

I am thus inclined to think that destruction of the endocardium on either side of the valve may lead to the formation of valvular aneurysm, and that Dr. Coats' explanation may often apply to the aortic valves; the other, to the mitral valve.

Endocarditis, acute or chronic, is the chief, I had almost said the sole, cause of valvular aneurysms. I will now allude to a cause which is not immediately endocarditis, but is one of the consequences of endocarditis, that is the friction of long vegetations dependent from other parts of the heart. I have already spoken of friction as causing aneurysm of the undefended space; and it seems that it may now and then cause aneurysms of the mitral valve. Long vegetations from the aortic valves may rub against the ventricular surface of the large flap of the mitral valve, and of this process Dr. Sidney Coupland thinks that there is evidence in his case.

If the aneurysm last long enough, it usually becomes perforated, and the seat of the perforation is usually at the apex of the aneurysm. This last phenomenon in the history of the aneurysm is no doubt due to the continuation of the same destructive pressure of the blood that first caused the dilatation. Not unfrequently the valve becomes perforated in two places, or there may even be three openings, as in Homolle's case, or several as in Dr. Laurence Humphry's.

There are some cases in which the disposition of the sac on the valve has not corresponded with the law that the sac must project in the same direction as the blood-pressure, and it is desirable to examine these cases a little further. Dr. Cayley has recorded an instance of what he calls a hernia-like protrusion on the mitral valve, thus reviving the use of a name for valvular aneurysms which was suggested some twenty years ago by Cruveilhier;¹ the woman had suffered repeated attacks of rheumatic fever, the heart was hypertrophied, and the aortic and mitral valves much thickened and studded with fibrinous vegetations. "Projecting into the cavity of the ventricle from the middle of the anterior segment of the mitral valve was a tumour the size of a large pea; its base was surrounded by a fibrous ring, and it appeared as if there was here a hole in the valve, through which the tumour had been pushed. On looking at the posterior aspect of the valve, it was seen that the tumour was formed by a hernia-like protrusion of the endocardium covering this surface through a circular opening in the fibrous structure of the valve, which was most thickened. The tumour could be, as it were, reduced by pushing it back through the circular opening and inverting it, and it thus formed a baggy protuberance on the auricular aspect of the valve."

Had the sac been on the auricular, instead of the ventricular, surface, it would have formed an excellent example of Dr. Coats' theory of the formation of valvular aneurysms. Upon this specimen even so accomplished a morbid anatomist as Dr. Cayley does not give any decided opinion, but remains doubtful if there were a congenital defect in the valve, or whether the fibrous substance had given way from the effects of inflammation.

An instance of the bulging of the sac in the same direction as in Dr. Cayley's is recorded by Marchant. On the auricular surface of the mitral there was irregular ulceration, the size of a 20 centime piece, with anfractuous

¹ Cruveilhier, *Bulletins de la Société anat. de Paris*, 25e année (1850.) p. 239.

edges, which led into the substance of the valve and around which the tissue was much thickened. Marchant is doubtful whether the ulcer were due to an old atheromatous patch which had burst, or whether it were a healing aneurysm, with a deposit of lime salts in the walls.

Dr. Walshe has also shortly described a specimen of sacculation of the long tongue of the mitral valve in which the sac bulged in the direction of the ventricle. The sac itself might have lodged a small pea, and was thinned, well nigh perforated, at its apex.¹ Dr. Walshe adds that it is difficult enough to understand how undue strain could be exercised on the mitral valve in this direction, in which proposition all will agree. It seems possible, however, even in the face of Dr. Coats' theory, that an ulcer or some other deep loss of substance on the auricular surface of the mitral might lead to a sac such as Dr. Walshe speaks of. A hæmorrhage such as Mr. Gibson has described on the auricular surface of the tricuspid valve of the sheep's heart² might lay the foundation of an aneurysmal sac bulging towards the ventricle.

The shape of these valvular aneurysms tends to the round; after they have lasted some time the shape becomes longer. On the aortic valves, they have been compared by Bouillaud to swallows' nests; but the aortic valves themselves are of this shape, so that the comparison seems superfluous. When prolonged, they resemble the end of a finger of a glove, or a sugar loaf. I have never seen them as pouches with narrow necks at their place of attachment, though such have been described by Pelvet and Dr. Joseph Coats. These remarks apply exclusively to the aortic valves. On the mitral valve, the aneurysms are elevations, raised, rounded, or slightly prolonged, swellings, and I do not know of an example in

¹ W. H. Walshe, *Practical Treatise on the Diseases of the Heart*, London, 1862. 3rd. ed. p. 400.

² George A. Gibson, *Journal of Anatomy and Physiology*, 1879. Vol. xiv. p. 413.

which they have become like the finger of a glove or pedunculated.

As to the size of these aneurysms, they vary from being just large enough to be perceptible eminences on the valve to the size of a large walnut, as in Thurnam's and Dr. Wilks' cases, which were on the mitral valve; or a large marble, as in one of Dr. Osler's cases, which was on the aortic valve.

One sigmoid or one flap of the mitral may not uncommonly show two aneurysms at the same time. In one of my own cases there were two aneurysms on one flap of the mitral. Cruveilhier speaks of three or four on the same valve.

Is any one flap of the mitral or aortic valves more prone to aneurysms than its fellows? As to the mitral, it might be looked for that the large flap, against which all the pressure of the blood is directed, should be aneurysmal oftener than the small; and this is really the case. Out of the 43 cases on record, the valves have been distinguished in 32. In 28 of these the aneurysm has been seated on the large, aortic, or anterior flap of the mitral, if we take all these three adjectives as meaning the same. There are then two other cases in which the aneurysm was on the "inner" flap, and on the "Septum-gipfels" of the mitral, (Biach's Cases xxvii. & xxx.) which I judge from the context in the latter case to have been the large flap. There remain two cases in which the small flap showed an aneurysm: one of my own (St. Bartholomew's Museum No. 1360.), and Dr. Wilks' case; in which latter the swelling was on the "posterior" curtain of the mitral and was the size of a walnut.

Though not so marked as in the case of the mitral, yet with the aortic orifice there appears to be a predilection for one valve out of the three; there are 35 cases in which the name of the valve is given, and in 25. the aneurysm has been seated on the posterior valve (the right posterior of Dr. Sibson) and in 13. of these (more than one half) it was seated on this valve only. Aneurysms were seen on

the right valve, (or right anterior of Dr. Sibson) three times; the left (or left posterior) twice, without aneurysms on the other valves. The posterior and right both showed aneurysms together in eight cases; all three valves were aneurysmal in four cases. (Buhl, Jaster (iii.) Hermann Weber, Picard.)

The mitral valve has been aneurysmal at the same time as the aortic in three cases. (Lancereaux, Lepine, Jaster iii.) In Mr. Coulson's case I do not feel certain that the appearance on the mitral valve was really an aneurysm.

In Jaster's third case there was a multiplicity of aneurysms; all three aortic and the mitral valves showing these dilatations. In Buhl's case the pulmonary and aortic sigmoids were all aneurysmal.

The observation of aneurysm in two fused valves of the aortic orifice goes back as far as the one case of aortic valvular aneurysm of Thurnam, but apparently no other case was recorded until about 10 years ago, and since that date Homolle, Laurand and Dr. Lawrence Humphry have recorded cases; Dr. Osler two cases. In Thurnam's case, he was of opinion that the fusion was congenital: there were no scars or traces of the process of fusion in Laurand's; in one of Dr. Osler's cases there were the remains of a bridle passing from the aortic wall to the valves, incompletely dividing them, and in Dr. Lawrence Humphry's case there was a seam at the line where the valves should have been divided.

As to the sex of the patients with valvular aneurysms, men show a marked preponderance over women: 30 men with mitral aneurysms against 8 women; and 29 men with aortic aneurysms against 11 women. This agrees closely with the relation of the sexes in aneurysm of the muscular walls.

As to the age the following table will show the difference:

	Under 10.	11—20.	21—30.	31—40.	41—50.	51—60.	60 and upwards
Aortic . . .	2	5	15	5	6	3	1
Mitral . . .		3	8	11	2	7	1

ANEURYSM OF THE CARDIAC CORONARY ARTERIES.

IN conclusion I will devote a few words to the consideration of aneurysms of the cardiac coronary arteries. In 1870. while I was examining the body of a boy, about 7 years of age, who had died in St. Bartholomew's Hospital of meningitis, I came across three small bodies on the surface of the heart, which on further examination proved to be aneurysms of the coronary arteries. I pointed them out to Dr. Gee, by whom an account was afterwards published in a report on Morbid Anatomy for the year 1871.

It would almost seem that the first case on record of dilatation of the coronary artery of the heart was described by Morgagni. In his 27th. letter art. 28. he speaks of the examination of a body of a nobleman, who had committed great excesses, and who died suddenly when 59. years old. The aorta had ruptured into the pericardium; the coronary arteries were found much dilated, one especially which was almost as large as the left carotid.

About 1813 Mérat published a case which he describes as follows: une érosion des tuniques de l'artère coronaire avait donné lieu à une poche formée dans l'épaisseur des parois de l'oreillette gauche, qui étaient augmentées de volume laquelle poche pouvait contenir une petite noix.

Thomas Hedlund communicated to the Swedish Medical Society at Stockholm on April 30. 1816. a case of rupture of an aneurysm of the left coronary artery in a man of 40, and Peste in 1843 published a case of rupture both of the heart and artery. In 1848 Dr. Peacock published an account of a case, the first in this country, and the preparation is now in the Museum of the Royal College of Surgeons.

Of the cases recorded as aneurysm of the coronary artery it may be necessary to exclude some from con-

sideration. For example, the enlargement of a branch of the left coronary artery in the Museum at St. Bartholomew's, (No. 1249.) cannot be looked upon as an aneurysm. In fact it was not described as such by Baly himself.

Then three cases of dilatation of the origin of the arteries, as they arise out of the sinus of Valsalva, recorded by Bougon, Dr. Ogier Ward and Dr. Crisp, cannot be placed in the same class with distinct aneurysms of the coronary artery. Of this class there is a specimen in St. Bartholomew's Hospital (No. 1254.) in which the artery is dilated for about an inch from the aorta, but it maintains much the same diameter as far as it shows any dilatation.

Excluding these, and those aneurysms of the coronary artery which are part of the multiple aneurysms of the body, there appear to be on record 13 cases of aneurysm of the coronary artery. The sex is recorded in twelve, and in eleven it was male. The same predominance of the male sex may be noticed both in the multiple aneurysms and in the dilatations of the origin of the coronary artery.

Then as to age; my own case was the youngest on record, the boy being 7 years old. Five, that is nearly one half of all the cases whose age is known, were between 20 and 30. The age of the remainder was 40, 51, 59, 60, 63, and 77, in one case each.

In six out of thirteen the cause of death was rupture of the aneurysm.

In Peste's case the aneurysm at the base of the heart, near the origin of the left coronary artery, ruptured at the same time as the left ventricle, *à la partie antérieure et moyenne*. I cannot decide from Peste's description whether there were two openings into the pericardium, or whether the blood from the ruptured aneurysm burrowed in the wall of the ventricle till it burst into the pericardium at a spot away from the aneurysm.

In Baly's specimen, the heart was ruptured at some

distance from the thickened artery, which was filled with clot, but its coats were intact.

In four out of the thirteen cases the aneurysms were multiple, that is, not less than 3. In my own case and Dr. Ogle's there were three, in Heuse's five, (rupture in these last two cases) while in Dr. Bristowe's the aneurysms were numerous, nodules being seen on the coronary arteries in size from a pea to a tare. This case brings to mind the multiple aneurysms, not only of the coronary arteries, but of the arteries of the body at large, which have been described of late years, and of which there has been a case just published in the current number of the *Archives de Physiologie*. In all of these the patients have been men; and, with the exception of the last case, young, under 30. In all, also with one exception, constitutional syphilis was known to be present; but it would be rash to attribute this "aneurysmal diathesis", as the old writers call it, to a manifestation of syphilis. Pelletan long ago, without the evidence that we now have, thought the multiple aneurysms might be due to syphilis.¹ In the cases of multiple aneurysms of the coronary arteries only, one is inclined to compare the state to the miliary aneurysms described by Charcot and Bouchard, in which the aneurysms were confined to one organ only, the brain, and were likewise prone to rupture. Here, no one has yet, so far as I am aware, set down these miliary aneurysms to syphilis. In my own case the age (7 years) would be against the view that the aneurysms were the result of acquired syphilis.

Nearly twenty years ago Dr. John W. Ogle attributed his case of aneurysms of the coronary arteries to embolism, following out a theory which he had first set forth in 1857. He had supported this view by the experiment of introducing fibrin into the aorta of a living ass, and on the death of the brute an aneurysmal dilatation in one of the mesenteric arteries was found.² The same idea that

¹ Ph. J. Pelletan, *Clinique chirurgicale*, Paris, 1810. t. ii. p. 1.

² John W. Ogle, *Transactions of the Pathological Society of London*,

aneurysm could be caused by emboli had occurred to Mr. Jolliffe Tufnell¹ in 1853, and Mr. Holmes² speaks of it as an acknowledged fact in 1862. Dr. Church³ and Panum⁴ also give reasons for believing that emboli caused aneurysm, and this some time before Ponfick's paper in Virchow's *Archives*.

As to Dr. Ogle's experiments upon the ass it may be noted that strongyli were present in the mesenteric artery. Rayer many years ago pointed out that aneurysm caused by worms is common in the horse, ass, and mule, the aneurysms being seated on the anterior mesenteric artery.⁵

Last of all, Buhl has described a curious case of aneurysm per anastomosin of the left ventricle. On dividing the trabeculæ of the heart it was noticed that they bled, and it was then seen that the arteries were dilated and winding, especially in the hinder sulcus of the coronary artery. This coronary artery opened out of the sinus of Valsalva with a large mouth. After injecting this artery it was found that the trabeculæ of the left ventricle, especially those near the apex and septum, were hollow and could easily be injected. The arteries in them were of a diameter of about 4 millimeters. The great papillary muscles were converted into masses of vessels.

1857. Vol. viii. p. 168. See also *Medical Times and Gazette*, 1866. vol. i. p. 196.

¹ Jolliffe Tufnell, *Dublin Quarterly Journal of Medical Science*, 1853. Vol. xv. p. 371.

² T. Holmes, *System of Surgery*, London, 1862. Vol. iii. p. 353.

³ W. S. Church, *S. Bartholomew's Hospital Reports*, 1870. Vol. vi. p. 99.

⁴ Panum, *Arch. f. path. Anat.* 1862. Bd. xxv. p. 529.

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Harrison, reported by Robert Adams, *Dublin Hospital Reports*, 1827. vol. iv. p. 408. Specimen now in Museum of Royal College of Surgeons of Ireland. See also *Houston's *Descriptive Catalogue of the Preparations in the Museum of the Royal College of Surgeons in Ireland*, Dublin, 1840. Vol. ii. p. 163.

Herpin, *Bulletins de la Société anatomique de Paris*, xii^e année (1837.) p. 49.

Herzfelder, Heinrich, *Zeitschrift der k.k. Gesellschaft der Aerzte zu Wien*, 1860. p. 468. Called by Rokitansky acute aneurysm.

Hodgson, Joseph, *A treatise on the Diseases of Arteries and Veins*, London, 1815, p. 84. Case xiii. The evidence that the morbid appearance was an aneurysm does not seem very convincing.

Hortolès, *Lyon méd.* 1879. t. xxx p. 124.

Huber, Karl, *Arch. f. path. Anat.*, 1882. Bd. lxxxix. p. 241.

Imlin, *Bulletins de la Société anatomique de Paris*, xi^e année (1836.) p. 298. Preparation from a cow, (p. 370.) doubtful if an aneurysm.

Jenner, Sir William, *Transactions of the Pathological Society of London*, 1850. Vol. ii. p. 39.

Jeoffroy, *Bulletins de la Société anatomique de Paris*, xlv^e année (1869.) pp. 314 and 516.

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Lancereaux, E. *Archives générales de Méd.* 1881. Vol. cxlvii. p. 389.

Landouzy, *Bulletins de la Société anat. de Paris* xlviii^e. Année (1873.) p. 484.

Latham, Peter Mere, *Lectures on Clinical Medicine*, London 1846. Vol. ii. p. 149. Lecture xxvi. Two cases.

Legg, J. Wickham, *Transactions of the Pathological Society of London*, 1878. Vol. xxix. p. 54.

Leudet, E. *Gazette méd. de Paris*, 1853. t. viii. p. 382.

Leyden, E. *Berlin. klin. Wochenschrift*, 1878. p. 237.

Little, *Transactions of the Pathological Society of London*, 1848. Vol. i. p. 225.

Lobstein, *Traité d'Anatomie pathologique*, Paris, 1833. t. ii. p. 501.

Maisonneuve, *Bulletins de la Société anatomique de Paris*, 8^e année, (1833.) p. 4.

Meade, R. H. *London Medical Gazette*, 1846. new series. Vol. ii.

p. 1054. It seems doubtful if the bulging spoken of were not caused by the rupture of the heart.

Mercier, *Gazette médicale de Paris*, 1857. t. xii. p. 506. obs. i. also *Bulletins de la Société anatomique de Paris*, 10^e année (1835.) p. 19. p. 507. obs. ii. and p. 519. obs. vi.

Netter, *Bulletins de la Société anat. de Paris*, liv^e année (1879.) p. 449. also in *Progrès méd.* 1880. p. 153.

Neumann, Eugen, *Charité-Annalen*, viii. Jahrgang, Berlin 1883. p. 246. Cardiac aneurysm complicated with embolism of aorta.

Ogle, John W. *Trans. of the Pathological Society of London*, 1856. Vol. viii. p. 118.

Owen, Isambard, *Lancet*, 1882. Vol. ii. p. 777. Both cases were in men. Read before the Medical Society on Oct. 30.

Peabody, George L. *Medical Record*, New York, 1882. vol. xxi. p. 552. Doubtful if aneurysm: it is so headed by author.

Peacock, Thomas Bevill, *Transactions of the Pathological Society of London*, 1852. Vol. iii. p. 285. "Small aneurysm of left ventricle and mitral valve." Specimen sent to Dr. Peacock by Dr. Thurnam.

————— *Transactions of the Pathological Society of London*, 1854. Vol. v. p. 96.

————— *Edinburgh Medical and Surgical Journal*, 1846. Vol. lxvi. p. 263.

Perroud, *Lyon méd.* 1874. t. xvi. p. 102. Two cases.

Petigny, *Journal universel et hebdomadaire de méd. et de chir.* 1833. t. xiii. p. 311.

Potain, *Bulletins de la Société anatomique de Paris*, xxxvi^e année. 1861. p. 135.

———— *ibid.* xxxvii^e année, 1862. p. 120.

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Prus, *Revue méd.* 1835. t. iv. p. 35. See also Meroier obs. i.

———— *ibid.* 1836. t. iii. p. 344.

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Reid, James, *British Medical Journal*, 1873. Vol. ii. p. 540.

Renaud, Frank, *London Medical Gazette*, 1851. N.S. Vol. xiii. p. 748.

Reynaud, *Journal hebd. de Medecine*, 1829. t. ii. p. 363.

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Sainton, Henri, *Bulletins de la Société anatomique de Paris*, LIV^e année (1879.) p. 409.

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Statz, A. J. **Zwei Fälle von chronischem partiellem Herzaneurysma*, Diss. Inaug. Berlin. 1875. also in Virchow and Hirsch's *Jahresbericht f.* 1875. Bd. ii. p. 170. From Frerichs' Wards.

Stocks, *British Medical Journal*, 1880. Vol. ii. p. 1018.

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Thompson, E. S. *Lancet*, 1861. Vol. ii. p. 401.

Townsend, T. Sutton, *Transactions of the Pathological Society of London*, 1872. Vol. xxiii. p. 96.

Tufnell, J. *Dublin Medical Press*, 1850. vol. xxiii. p. 321.

Turnbull, *Edinburgh Medical and Surgical Journal*, 1848. Vol. lxx. p. 84.

Virchow, *Archiv f. path. Anat.* 1859. Bd. xv. p. 283. VIIth case in the large article on the Nature of Constitutional Syphilis.

Walford, T. L. *Transactions of the Pathological Society of London*, 1870. Vol. xxi. p. 118. Exhibited by Dr. Peacock.

Walford, T. L. *British Medical Journal*, 1869. Vol. ii. p. 6.

Walter, *Nouveaux Mémoires de l'Académie royale des Sciences et Belles-Lettres*, Année 1785. Berlin 1787. p. 64. § xviii.

Wardell, J. R. *British Medical Journal*, 1880. Vol. i. p. 617.

Watson, W. Spenoer, *Med. Times and Gazette*, 1867. Vol. ii. p. 32.

Wiart, *Gaz. méd. de Paris*, 1874. p. 152.

——— **Année méd. de Caen*, Nov. 1879.

Wilks, Samuel, *Transactions of the Pathological Society of London*, 1857. Vol. viii. p. 103.

——— *ibid.* 1859. Vol. x. p. 111.

Willigk, Artur, *Prag. Vierteljahrsschrift f. d. prak. Heilkunde*, 1853. Bd. ii. p. 18.

Zannini, *Italian translation of Matthew Baillie's *Pathological Anatomy*, Venice, 1819. Vol. i. p. 27. Given at length by Breschet.

ANEURYSMS OF THE RIGHT VENTRICLE.

Canella, F. **Giornale dei progressi di medicina* 1844. marzo; also in *Arch. gén. de méd.* 1844. 4e série, t. vi. p. 220.

Mühlig, G. H. **Gazette méd. d'Orient*, 1860. iv. Sept. 6. also **Gaz. de Strasbourg* 1862. and Schmidt's *Jahrb.* 1861. Bd. cx. p. 213. *Prag. Vierteljahrs.* 1862. Bd. lxxiii. Heft ii. p. 40. Aneurysm from punctured wound of ventricles.

Vidal, *Bulletins de la Société anatomique de Paris*, 5me année (1830.) p. 125.

ANEURYSMS OF THE LEFT AURICLE.

Chassaignac (au nom de M. Michon), *Bulletins de la Société anatomique de Paris*, 11e année (1836.) p. 11. See also Cruveilhier, *Traité d'anatomie path.* Paris, 1852. t. ii. p. 682. and *Anat. path.* Paris, 1835-42. livr. xxii. p. 4.

Cooper, Sir Astley, *Lectures on the Principles and Practice of Surgery*, London, 1824. ed. Tyrrell. Vol. ii. p. 28. Thurnam, however, pronounces this specimen to be an aneurysm of the mitral valve.

Dionis, *l'Anatomie de l'Homme*, Paris, 1716. 5e éd. p. 721.

Fenwick, Samuel, *Lancet*, 1846. vol. i. p. 94.

Hewett, Prescott G. *Transactions of the Pathological Society of London*, 1850. Vol. ii. p. 193. Apparently not a local aneurysm, only a great dilatation of the left auricle in a case of mitral stenosis.

Jasinsky, **Wien. med. Halle*, 1861. ii. 2. Also in Schmidt's *Jahrb.* 1861. Bd. cxii. p. 181. Rupture of left auricle into substance of left ventricle.

Peacock, Thomas Bevil, *Edinburgh Medical and Surgical Journal*, 1846. Vol. lxvi. p. 278. Case of mitral constriction with dilatation of the auricle. He gives old bibliography.

Supposed cases of aneurysm are also recorded by Aran, *Arch. gén. de méd.* 1846. 4e série, t. xi. p. 175. Charcot, *Mém. de la Société de Biologie*, 1851. t. iii. p. 189. Hipp. Cloquet, *Bull. de la Faculté de Méd. de Paris*, 1814. t. iii. p. 219. Elliotson, *Lumleyan Lectures, On the recent improvements in the art of distinguishing the various diseases of the Heart*, 1829. p. 29.

ANEURYSMS OF THE RIGHT AURICLE.

Berthold, Fr. X. *Merkwürdiger Fall eines von der rechten Vorkammer ausgehenden Herzaneurysma*, Teplitz, 1859. A copy is in the British Museum. See also Canstatt's *Jahresb. f.* 1859. Bd. iii. p. 231. and Schmidt's *Jahrb.* 1861. Bd. cx. p. 238.

Déville, *Bulletins de la Société anatomique*, 24e année (1849.) p. 363.

Howitt, T. *Lancet*, 1846. Vol. i. p. 684.

Legg, J. Wickham, *Transactions of the Pathological Society of London*, 1878. Vol. xxix. p. 57.

ANEURYSM OF THE SEPTUM OF THE AURICLES.

Peacock, T. B. *Transactions of the Pathological Society of London*, 1851. Vol. iii. p. 80. Specimen in Museum of the Royal College of Surgeons of England.

ANEURYSMS OF THE INTERVENTRICULAR
MUSCULAR SEPTUM.

Debove, *Bulletins de la Société anat. de Paris*, année xlviii. (1873.) p. 351. Probably of muscular septum, but a very meagre account.

Ogle, John William, *Transactions of the Pathological Society of London*, 1856. Vol. vii. p. 104. An aneurysm of the septum with an aneurysm of aorta tunnelling into the right ventricle.

Ibid. 1857. Vol. viii. p. 118. See Wilks p. 151.

Rogers, G. Goddard, *British Medical Journal*, 1858. p. 43. Plainly the same case as Dr. Ogle's.

Quain, Richard, *Transactions of the Pathological Society of London*, 1856. Vol. vii. p. 96.

Wilks, *ibid.* 1857. Vol. viii. p. 157. Fibrous growth in septum projecting into right ventricle.

ANEURYSMS OF THE UNDEFENDED SPACE OF
PEACOCK.

Abbot, S. L. *Boston Med. and Surg. Journal*, 1872. Vol. x. p. 418.

Avery, *Transactions of the Pathological Society of London*, 1848. Vol. i. p. 72.

Barbeau-Dubourg, *Bulletins de la Société anatomique*, X^e année (1865.) p. 379.

Bennett, J. Risdon, *Transactions of the Pathological Society of London*, 1848. Vol. i. p. 59.

Biach, Alois, *Medizinische Jahrb. herausgegeben von der k. k. Gesellschaft der A. A.* Wien, 1878. p. 240. Cases xxxviii and xxxix.

*Bond, Johnson's *Medico-Chirurgical Review*, 1833. Quoted by Pereira, but I have not been able to verify the case.

Bouillaud, *Union méd.* 1852. p. 589.

Bristowe, J. S. *Transactions of the Pathological Society of London*,

1853. Vol. iv. p. 108. Aneurysm of Aorta, not of undefended space.

— *ibid.* 1854. Vol. v. p. 93. Muscular Septum?

von Buhl, *Zeitschrift f. Biologie*, 1880 Bd. xvi. 253.

Burci, **Gazz. di Milano*, 1843. No. 6. from Canstatt's *Jahresbericht f.* 1843. Bd. ii. p. 307.

Caron, *Comptes rendus de la Société de Biologie*, année 1853. p. 7.

Caubet, *Bulletins de la Société anatomique de Paris*, xlvii^e année (1872.) p. 144: see also **Sur les affections ulcéreuses du cœur*, Thèse de Paris, 1872.

Corvisart, *Essai sur les maladies et les lésions organiques du cœur*, Paris 1806. p. 270. IV Classe, III Art. § ii. Apparently not an aneurysm, but a perforation in the usual place.

Coupland, Sidney, *Medical Times and Gazette*. 1882. Vol. i. p. 329.

Craigie, David, *Edinburgh Medical and Surgical Journal*, 1843, Vol. lix. p. 383.

Dianoux, *Bull. de la Soc. anat. de Paris*, xlix^e année (1874.) p. 199.

Dittrich, *Vierteljahrschrift f. d. prakt. Heilkunde*, Prag, 1852. p. 58.

Féréol, *Union méd.* 1879. t. xxvii. p. 37.

Griesinger, W. *Arch. d. Heilkunde*, 1864. Bd. v. p. 473. Aneurysm of the sinus of Valsalva, not of the undefended space.

Hare, C. J. *Trans. of the Pathological Society of London*, 1865. vol. xvi. p. 80.

Hermann, **Thèse de Strasbourg*, 1864. No. 749. (Extrait de la Clinique méd. de Berlin, du Prof. Frerichs.) Quoted by Pelvet, p. 168.

Holl, Harvey B. *Med. Times and Gazette*, 1852. April, p. 369.

Hope, J. *Treatise on the Diseases of Heart and Great Vessels*, London, 1839. 3rd ed. p. 606. A case of ossified aneurysm at p. 622.

Jaccoud, *Union méd.* 1866. t. xxx. p. 308. Same case as in Pelvet, *Des Anévrysmes du Cœur*, Paris, 1867, p. 73.

Irvine, J. Pearson, *Trans. of the Path. Society*, 1878, Vol. xxix. p. 47.

Laennec, *Traité de l'Auscultation méd.* Paris, 1826, 2e éd. t. ii. p. 547.

Legg, J. Wickham, *Trans. of the Path. Society*, 1876. Vol. xxvii. p. 104.

Leudet, E. *Comptes rendus de la Société de Biologie*, année 1853. p. 105.

Lombard, H. C. *Gazette méd. de Paris*. 1835. p. 645.

Löschner, *Vierteljahrschrift f. d. prak. Heilkunde*, Prag, 1856. Bd. lii. p. 1. Apparently two cases of perforation, not of aneurysm.

Löschner und Lambl, *Aus dem Franz Josef-Kinder-Spitale in Prag*, Prag, 1860. I. Theil, pp. 101 and 110.

Mader: see Biach's xxxviiith case.

Monczewsky, **Gazeta lekarska*, 1882. No. 1. Also in *Centralblatt f. klinische Med.* 1882. Bd. iii. p. 240.

Moxon, W. *Transactions of the Pathological Society of London*, 1869. Vol. xx. p. 113. Dr. Moxon thinks that an abscess in the septum had burst into the cavity of the ventricle. I would rather read the events in another way, and think that the disease had begun in the left endocardium and penetrated to the right side.

Müller, Wilh. **Jenaische Zeitschrift*, Bd. v. Heft ii. also in Virchow's *Jahresbericht f.* 1869. Bd. i. p. 156.

Murchison, Charles, *Trans. of the Pathological Society of London*, 1865. Vol. xvi. p. 121.

Peacock, Thomas Bevil, *Edinburgh Medical and Surgical Journal*, 1846. Vol. lxvi. p. 276.

Peacock, T. B. *Transactions of the Pathological Society of London*, 1848. Vol. i. p. 61.

— *ibid.* 1851 Vol. iii. p. 287.

— *ibid.* 1858 Vol. ix. p. 80, Peacock's description of Buxton Shillito's case.

— *ibid.* 1868. Vol. xix. p. 161.

Pelvet, *Des Anévrysmes du Cœur*, Paris 1867. p. 69. also aneurysm of aortic valve.

Pereira, Jonathan, *London Med. Gazette*, 1845 Vol. i. N.S. p. 1035.

Peyrot, *Bull. de la Soc. anatomique de Paris*, 1874. p. 262.

Pick, Thomas P. *Transactions of the Pathological Society of London*, 1868. Vol. xix. p. 156. The title is aneurysm in the right ventricle; it may be an aneurysm of the undefended space, with a sac dissecting up the septum, which communicated with the aorta behind the valves, and the right auricle.

Quain, Richard, *Transactions of the Pathological Society of London*, 1856. Vol. vii. p. 87.

Rokitansky, Carl, *Die Defecte der Scheidewände des Herzens*, Wien, 1875. pp. 133—144. Six cases.

Reinhard, Hans, *Arch. f. path. Anat.* 1857. Bd. xii. pp. 139.—141. Three Cases.

Shillito, Buxton, *Trans. of the Pathological Society of London*, 1858. Vol. ix. p. 79.

Talamon, Ch. *Bulletins de la Société anatomique de Paris*, LIV^e année (1879.) p. 289.

Testa, *Delle malattie del Cuore*, Libro ii. Capo v. § 7. Dei pericarditici, e carditici anginosi. Ed. Sormani, Milano, 1831. Vol. ii.

p. 85. Apparently not so much an aneurysm of the undefended space, as an ulceration of the tissues about the aortic valves and a perforation into the right ventricle.

Thibert, *Bulletins de la Faculté de Médecine de Paris*, 1818. t. vi. p. 355. Apparently not an aneurysm but an opening at the base of the ventricles, so that all four cavities of the heart communicated.

Thielmann, **Med. Zeit. Russland*, 1845. Nr. 122. also in Schmidt's *Jahrbb.* 1845. Bd. xlv. p. 175. An aneurysm of the aorta, not of the undefended space.

Thurnam, *Medico-Chirurgical Transactions*, 1838. Vol. xxi. p. 253. Case x. The specimen is still in the Museum of the Royal College of Surgeons of England, and is now No. 325 (Teratological) and is described at p. 88 of the Catalogue.

Todd, *London Medical Gazette*, 1846. Vol. iii. N.S. p. 358.

Tripe, John W. *Lancet*, 1844. Vol. ii. p. 221. Apparently an aneurysm of the aorta burrowing into right auricle.

Weiss, N. *Wiener med. Wochenschrift*, 1880. p. 918. Aneurysms of the aortic valves as well.

Wilks, *Trans. of the Pathological Society of London*, 1855. Vol. vi. p. 143.

Zahn, Fr. Wilh. *Arch. f. path. Anat.* 1878. Bd. lxxii. p. 206. 3 cases.

ANEURYSMS OF THE MITRAL VALVE.

Andrew, James, *Trans. of the Pathological Society of London*, 1865. Vol. xvi. p. 91.

Biach, Alois, *Medizinische Jahrbücher herausgegeben von der k. k. Gesellschaft der AA. zu Wien*, 1878. Cases xiv. xxv. xxvii. xxx. are from the Hospitals in Vienna, which may not have been published before.

Bouilly, *Bulletins de la Société anat. de Paris*, xlvii^e (1872.) p. 287.

Cayley, W. *Trans. of the Path. Soc. of London*, 1866. Vol. xvii. p. 86.

Coupland, Sydney, *Transactions of the Pathological Society*, 1876. Vol. xxvii. p. 73.

Cruveilhier, *Bulletins de la Société anatomique de Paris*, iv^e année (1829) p. 169.

Ecker, **Heidelberger-medicinische Annalen aus dem Jahre* 1842, Bd. viii. p. 152. Biach's vii. Case. Also in Schmidt's *Jahrbb.* 1845. Supplementband iv. p. 193.

Engel, Josef, **Medizinische Jahrbücher*, Wien, 1841. Biach's vi. Case. Also in Schmidt's *Jahrbb.* 1842. Bd. xxxiii. p. 302.

Habershon, *Trans. of the Pathological Society of London*, 1855. Vol. vi. p. 156.

Hérard, *Bulletins de la Société anat. de Paris*, 25e année (1850.) p. 239.

Hewett, Prescott G. *Trans. of the Path. Society*, 1850. Vol. iii. p. 78.

Jansen, J. H. *Nederlandsch Lancet* 1854. p. 34. with lithographs. Biach's xii. Case, also in Schmidt's *Jahrb. 1854. Bd. lxxxii. p.*

Jaster, Heinrich, *Ueber Aneurysmen der Herzklappen*, Inaug. Diss. Berlin, 1873. Case III. Biach's xxxvii. Case.

Laennec and Fizeau, *Bulletins de la Faculté de méd. de Paris*, 1812. Première Série de l'an xiii. (1804.) t. i p. 207. in the first pagination. See also Laennec, *de l'auscultation méd.* Paris, 1819. t. ii, p. 284. or of second ed. t. ii. p. 529. Section ii. Chap. vii.

Lancereaux, *Atlas d'Anatomie pathologique*, Paris, 1871. pp. 225, 124, 226 with chromo-lithographs.

Laurand, Georges, *Les anévrysmes valvulaires du Cœur*, Thèse de Paris, 1881. p. 40. Obs. xxxv.

Legg, J. Wickham, *St. Bartholomew's Hospital Reports*, 1875, Vol. xi. p. 78. Two cases. They have also been recorded in the *Transactions of the Pathological Society of London*, 1875. Vol. xxvi. p. 47.

— *Transactions of the Pathological Society of London*, 1876. Vol. xxvii. p. 108. Also reported in *St. Bartholomew's Hospital Reports*, 1876. Vol. xii, p. 243.

Lépine, *Bulletins de la Société anatomique de Paris*, xlviii^e année (1873) p. 411. Also an aneurysm on one of the aortic valves.

Löbel, Gustav, *Medicinische Jahrbücher*, Wien, 1843. Bd. xxxiii. p. 1. The two new cases are described at p. 5. Biach's viii. and ix. Cases.

Löschner und Lambl, *Aus dem Franz Josef-Kinder-Spitale in Prag*, 1860. p. 113. A very interesting case, not an ordinary aneurysm of the mitral.

Marcé, *Bulletins de la Société anatomique de Paris*, xlvii^e année (1872) p. 25.

Marchant, Gérard, *Bull. de la Soc. anatom. de Paris*, LIII^e année (1878.) p. 151.

Martineau, *Des Endocardites*, Thèse d'agregation, Paris, 1866. p. 39. Two excellent drawings by Charcot of aneurysms of the aortic and mitral valves are to be found at the end of the volume.

Mayet, *Lyon méd.* 1872. t. x. p. 91. The case is also published more at length in *Gazette hebdm.* 1880. t. xvii. p. 35.

Moore, Norman, *Trans. of the Path. Soc. of London*, 1880, Vol.

xxxi. p. 96. Two specimens in St. Bartholomew's Hospital Museum.

Morand, *Histoire de l'Academie royale des Sciences*, Année 1729. Paris 1731. p. 14. Obs. vii.

Morgagni, *de sedibus etc.* xxiii. 6.

Ogle, John W. *Trans. of the Pathological Society*, 1858. Vol. ix. pp. 117 and 131.

Peacock, T. B. *Trans. of the Pathological Society*, 1852. Vol. iii. p. 285, and a second case at p. 71. which is also more fully related in *Monthly Journal of Medical Science*, 1852. Vol. xv, p. 5.

Pelvet, N. *Des anévrysmes du cœur*, Paris, 1867. p. 40 Two cases.

Peyrot, *Bull. de la Société anat. de Paris*, xlix^e année (1874.) p. 260.

Schneckenendorf, T. L. *Diss. Inaug. Marburg. 1876. Aneurysma Valvulæ mitralis.

Simon, Theodor, *Berlin. klin. Wochenschrift*, 1871. p. 437. Biach's xxxi case.

Smith, Walter, *Dublin Journal of Medical Science*, 1882. Vol. lxxiii, p. 153.

Thurnam, *Medico-Chirurgical Transactions*, 1838. Vol. xxi. p. 251. No. 1444 in the Museum of St. Thomas Hospital: described by Sir Astley Cooper as a specimen of aneurysm of the left auricle.

Wilks, Samuel, W. W. Gull, and J. M. Bright, *British Med. Journal*, 1868. Vol. i. p. 221. Also in Virchow and Hirsch's *Jahresb. f.* 1868. Bd. ii. p. 68.

Williams, C. Theodore, *Trans. of the Path. Soc. of London*, 1870. Vol. xxi. p. 113.

Zemann, **Wien. med. Presse*, 1880. xxi. 1634.

ANEURYSMS OF THE AORTIC VALVES.

Biach, Alois, *Medizinische Jahrbücher herausgegeben von der kk. Gesellschaft der AA. zu Wien*, 1878. p. 181. Two unpublished cases are given first of all; Cases xxiii. xxviii. and xlii. are from the "Jahresberichte des kk. allg. Krankenhauses" at Vienna for 1867 and 1876.

Bouillaud, J. *Traité clinique des Maladies du Cœur*, Paris, 1841, 2e éd. t. ii. p. 29.

Buhl, *Zeitschrift f. Biologie*, 1880. Bd. xvi. p. 266.

Caubet, *Bulletins de la Société anatomique de Paris*, xlvii^e année (1872) p. 144. Also an aneurysm of septum.

Colson, *Bull. de la Soc. anat. de Paris*, LI^e année (1876.) p. 156.

Corazza, Luigi, **Intorno a due casi di malattia del centro circolatorio*, Bologna, 1868. Also in Virchow and Hirsch's *Jahresbericht f.* 1869. Bd. ii. p. 78.

Corrigan, Sir Dominic, *Dublin Journal of Medical Science*, 1838. Vol. xii. p. 245. Case II.

Coulson, *Trans. of the Pathological Society*, 1850. Vol. iii. p. 77.

Coupland, Sidney, *Medical Times and Gazette*, 1882. Vol. i. p. 329. Case 3.

Darolles, *Bull. de la Soc. anat. de Paris*. xlix^e année (1874.) p. 376.

Dianoux, *Bull. de la Société anat. de Paris*, xlix^e année (1874.) 199.

Also an aneurysm of the septum.

von Dusch, Th. *Zeitschrift f. rationelle Medizin*, 1851. Bd. x. p. 220. Biach's x. Case.

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