On the recent improvements in the art of distinguishing the various diseases of the heart, being the Lumleyan Lectures delivered before the Royal College of Physicians in the year 1829 / By John Elliotson.

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The Recent Improvements

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THE VARIOUS DISEASES

OF

THE HEART,

BEING THE

LUMLEYAN LECTURES

DELIVERED BEFORE THE ROYAL COLLEGE OF PHYSICIANS IN THE YEAR 1829.

BY JOHN ELLIOTSON, M.D. CANTAB. F.R.S.

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&c. &c. &c.

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It was at the particular request with which I was unexpectedly honoured by the President, that I engaged to deliver the Lumleyan Lectures.

When they were composed, I had no idea of printing them. After the delivery, however, of those upon the heart, in the first year of my office, some of my friends who had favoured me with their attendance urged me to the measure. Yet I do not know that I should have followed their advice, but for the singularly handsome offer of one of them,—Mr. Alcock, to whom I am under many obligations, to make for me drawings of any of the morbid specimens which I had exhibited, if I conceived that the work would be more acceptable to the profession with illustrations.

To resist under these circumstances was impossible; and, whatever are the defects of my own portion of the work, I trust that they will be atoned for by the extreme accuracy and general excellence of the drawings, to which I endeavoured to render justice by engaging the talent of Mr. Skelton, who also executed the engravings of Dr. Baillie's work on Morbid Anatomy.

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LECTURE I.

The art of medicine is to be perfected, I conceive, by improvements in our knowledge of the nature of diseases—by improvements in diagnosis—and by improvements in our acquaintance with remedies and their application.

I. Improvements in our knowledge of the nature of diseases must be obtained through the cultivation of anatomy and physiology, and of morbid anatomy and morbid physiology—or, in other words, of the derangements of structure and function that take place.

It is self-evident, that no one can be acquainted with a disease unless he is acquainted, more or less, with the part diseased, its situation, form, and structure; and, the more accurate and minute his acquaintance with these, the greater, *cæteris paribus*, will generally be his knowledge of the nature of its lesions. I say *cæteris paribus*, because a knowledge of mere anatomy, however accurate and minute, does not imply a knowledge of disease, its symptoms, history, and causes, nor skill in treating it, any more than a knowledge of the alphabet, and the ability to read, imply a literary character: and nothing can be more absurd than for the public to presume that a man is a good practitioner *merely* because he is a good anatomist. An anatomist is not necessarily even a physiologist: and Mery was accustomed to say, "We anatomists are like the porters of Paris, who are all well acquainted with all its streets, as well as all its lanes and alleys, but know nothing of what passes within the houses."* The most assiduous examination of only the dead body can disclose but little of the functions and properties of the living. The structure of the brain would never teach that it is the organ of our feelings and thought, or of the kidney, that it produces a fluid containing lithic acid and urea; the sympathy of the nasal membrane and diaphragm, of the kidneys and surface, the curious phenomena resulting from contagions and malaria, the various morbid actions to which various parts are liable, for instance, the innumerable diseases of the nervous system; the susceptibility of various parts to the operation of various agents during health,—of the mouth, to the operation of mercury,—of the stomach, to that of ipecacuana; the peculiar power of certain substances over certain diseases, as of quinina over intermittent fever.—would never be suspected at the dissecting-table. And I cannot refrain from remarking, that, for any one to pride himself upon his knowledge of established anatomy, would be exceedingly weak, as it requires no preparatory philosophical education, and no intellectual exertion, but the bare possession of eyes and memory, and a willingness to employ them. Dr. M'Culloch apologises in his recent powerful, though, I must be pardoned in saying, occasionally extravagant, work, for not arranging his cases anatomically, on the ground, that it would have savoured of pedantry,—"a small pedantry," he says, "far too common; as if any man could not make himself master of the human anatomy in a few weeks, as well as of any other tangible and demonstrable substances."* But, if it would be laughable for any one to pride himself on his knowledge of anatomy, it is culpable in a physician not to be a good anatomist. He otherwise cannot comprehend the phenomena of many diseases; cannot, for example, understand why, in partial paralysis of the head, sometimes certain muscles only cease to obey the will;—why loss of sensation sometimes occurs alone, and why to only a certain extent;—why the pain of neuralgia takes a particular course;—or why, in disease of the heart, unusual varieties of sound and impulse are observable in particular portions of the cardiac region. He cannot otherwise possess any but the most superficial knowledge of morbid anatomy, the cultivation of the far greater and more important part of which is peculiarly the *duty* of the physician, who treats the chief morbid states of the most important organs of the body, and not of the surgeon, who does not even witness their symptoms; and he will, therefore, either neglect to complete the investigation of his unsuccessful cases, by examination *post mortem*, or be unable to appreciate what presents itself, and perhaps be indebted to an active surgeon for information. He cannot otherwise be a good physiologist; for, although anatomy alone will seldom teach the operations of an organ, these can manifestly not be known, unless the organ itself is understood.

The importance of physiology requires no argument, as, except in obvious structural or mechanical changes, the symptoms of disease are chiefly morbid physiology, and therefore, to quote the familiar passage of Galen, "The magnitude of a disease is proportionate to its deviation from the natural state; and he only knows the extent of the deviation who knows exactly what is the natural state." *εἰς ὅσον γὰρ ἐξίστανται τῆς Φύσεως ἕκαστον, εἰς τοσοῦτο καὶ μεγέθος ἥκει. Τὸ δ' ὅσον ἐξίστανται, γνῶναι δυνατὸν μόνῳ τῳ τὸ κατὰ Φύσιν, ἀκριβῶς ἐπισταμένῳ.*† And again, *μὴ δύνασθαι τίνα καλῶς ἰᾶσασθαι τὰ νοσήματα, πρὶν ἂν τὸ σῶμα τὸ ὑγιεινὸν ἐπισκέψασθαι τὴν Φύσιν.*‡ Without a thorough acquaintance with both the natural structure and the functions, a thousand highly-interesting deviations will never be recognised in the cases which come daily before us.

If such is the importance of anatomy and physiology to every physician, the importance of perfecting these sciences, to the progress of our knowledge of the nature of diseases, will not be disputed.

* Rees's Cyclopædia.—Art. Mery.

* On Marsh Fever and Neuralgia, vol. ii. page 101.

† Methodus Medendi ad Glauconem, lib. i. cap. 1.

‡ Methodus Medendi, lib. i. cap. 2.

But, however necessary these foundations of anatomy and physiology, the grand source of this knowledge is the observation of the phenomena of diseases, their symptoms, history, and causes,—in other words, pathology, and of their structural lesions—in other words, morbid anatomy.

No one expresses a doubt respecting the importance of pathology,—the importance of observing the symptoms and tracing the history of diseases, and investigating their peculiarities, analogies, and causes. Yet, in all this, how liable are we to error! How patient and searching an eye is required to note all the phenomena of a disease, to perceive what is essential to its existence—what incidental! How profound a judgment to reason upon these phenomena, and to investigate their causes!—to discern the analogies between affections, at first sight perfectly distinct! and, at the same time, how cool should be the judgment to appreciate all fanciful analogies, all hypothetical suggestions! Exactly the same difficulties surround morbid anatomy, but in its case are alleged by some as objections to its prosecution. Yet, how could any affection under the surface of the body have been understood without an ocular investigation of the parts affected? How could pain of the chest, with dyspnœa, cough, and pyrexia, have been known as signs of inflammation of the lungs or their membranes, unless the examination of persons, who died under these symptoms, had proved such a lesion to be frequently their cause? If knowledge can be thus obtained, why not obtain the utmost possible? True it is, that incidental morbid appearances have often been mistaken as necessary and constant, and that some even pretty constant appearances have often been absurdly announced as the essence of the disease, when they were merely its effect, or, at the utmost, only among the number of its phenomena. Equally true it is, that changes after death have been mistaken for morbid appearances, as pointed out by Dr. John Davy in the case of redness from imbibition of blood.* But such errors are surely no reason for neglecting careful and extensive examinations of diseased parts, and drawing just inferences as to the connexion of the change of colour or structure with the disease—no reason for not cultivating so ample a field of knowledge scientifically. If a disease is accompanied by a change of structure or appearance *within* the body, surely this change, as a fact in the disease, is worthy of notice,—as worthy as visible changes in the skin, the mouth, or the eyes, that are always carefully described by these objectors, even when merely secondary effects, but differ from the facts of morbid anatomy, in the accident only of being cognisable without dissection, are not a whit more necessary to a perfect history of a disease, and are of infinitely smaller number, from the circumstance of nearly all our organs being concealed from view. After some diseases, indeed, no change of structure or appearance is discernible. But even here, extensive anatomical investigation is important, for it often prevents us from forming groundless hypotheses as to the seat and nature of such affections. Hydrophobia might be referred to the stomach, were not the red patches, sometimes seen in this organ after the disease, frequently not to be detected. Tetanus might be thought always to arise from an inflammation of the spinal marrow, were not this part frequently found free from inflammation in tetanic patients. It discloses to us a fact which we might otherwise have doubted,—that diseases may be functional only as well as structural; that, in the words of one of the most intelligent and industrious cultivators of pathology and morbid anatomy,—Dr. Andral, "it is one of the most serious errors to which the ill-directed study of morbid anatomy can lead, to admit no other alteration in the economy than those which are discoverable by the scalpel."* We learn, in short, to form a just estimate of morbid anatomy,—that it is an important part of the basis, but by no means the "main basis" of pathology.

II. But, if our art is to be perfected by a better acquaintance with the nature of diseases, it is not less to be perfected by improvements in distinguishing them—in diagnosis. The diseases of the lungs and their membranes are as well understood as any of the body; yet the best practitioners continually fail in distinguishing them,—for instance, one form of chronic bronchitis from hydrothorax, the treatment of which two may be totally different. So important is diagnosis, that it has become proverbial to say, "the knowledge of a disease is half the cure."

It also is to be improved, not only by a better acquaintance with the symptoms and history of diseases, but by a better acquaintance with morbid anatomy; so that the correspondence of symptoms and local lesions may be established, and the affection thus clearly ascertained: and, as healthy anatomy is the foundation of morbid, and physiology of pathology, the importance of these also to improvements in diagnosis is apparent.

I purpose the subject of these lectures, during the two years that I have the honour of delivering them, to be illustrative of some modern, and for the most part recent, improvements in diagnosis, and to speak chiefly in this point of view at present of diseases of the heart—next year of those of the lungs.

The discoveries made by Laennec in the symptoms of these disorders are great enough to entitle him to all the honours which have ever been acquired in our profession. He has enabled us to judge of diseases, often not otherwise with certainty distinguishable or not at all, and this with an accuracy inconceivable to those who are unacquainted with his investigations:—to distinguish diseases of the heart, which were formerly, and are still, too often all either expressed by the easy term, disease of the heart, without a specification of the part affected in this complicated organ, or as often passed over entirely, while the case is mistaken for hydrothorax or some pulmonary affection; and to distinguish diseases of the lungs which in many cases could not be pronounced upon with accuracy, in others of which the diagnosis was always uncertain; and moreover to point out the very part affected.

But the very accuracy of Laennec's discoveries is objected to. We are asked *cui bono?* The answer is plain. It is universally allowed that every disease should be described and its nature ascertained as accurately as

* Transactions of the Med. and Chir. Society of London, vol. x.

* Clinique Médicale, vol. iii. p. 310.

possible. Now, with every advance in accuracy of description, and in knowledge of the source of symptoms, diagnosis imperceptibly and inevitably becomes more accurate. To condemn accurate diagnosis is therefore to condemn accurate knowledge,—to rest satisfied with imperfect information when industry would give us more,—is to admire ignorance when knowledge is within our reach.

Besides, diagnosis ought to be universally cultivated without reference to its utility in particular instances. It is a part of our science: every part must be cultivated for the perfection of the whole, and what may not be practically useful to-day may become so to-morrow. How many discoveries in chemistry and physics appeared at first objects of mere curiosity, and have afterwards been applied to the most important purposes! Plato possessed so exalted a feeling for science on its own account, that he considered the applications of geometry to practical purposes, as far inferior to its philosophy;* and those who may see no reason for being so enamoured of science, must allow that there is every reason to remember the words of Jesus, the son of Sirach:—"None may say, what is this? Wherefore is that? for at time convenient shall they be all sought out."†

In improving diagnosis, it is impossible to discover only what is obviously useful. The research must be made generally, and what is at once useful and what is not, must turn up together.

In the diseases of other organs, we always aim at accuracy of diagnosis without any hope of utility. When a solid tumor exists in the abdomen, we endeavour to ascertain whether it is the liver, the spleen, the pylorus, an ovarium, a new formation, or whatever else, although the treatment would probably be the same in all.

But there *is* immediate utility in the discoveries of Avenbrugger and Laennec. No one will pretend that the diagnosis in chronic diseases of the chest is, with perhaps the exception of phthisis, generally satisfactory. Before I adopted auscultation, I know that I frequently discovered disease of the heart after death, where I had not previously suspected it; and frequently found the organ sound when I had supposed it diseased. When I was correct in expecting to see organic affection of the heart, I was often wrong as to the precise nature of the lesion. Too often has auscultation at once revealed disease of the heart to me, when by good practitioners no affection of the heart or even of the chest had been suspected, or the case had been named nervous palpitation or asthma; when the lungs had been regarded as the seat of the malady, or the case been treated with the more violent remedies of hydrothorax. Repeatedly have I seen chronic bronchitis with extreme congestion in the lungs mistaken for hydrothorax, and unavoidably so from the omission of percussion and auscultation, because the symptoms were precisely the same, with the exception of those which percussion and auscultation only could disclose. Inflammation of the substance of the lungs takes place continually during other diseases without being obvious before death to any but the auscultator and percussor. Without the aid of the ear, who can ever distinguish emphysema of the lungs, or in every case pneumato-thorax.* Both may be readily mistaken for hydrothorax. The symptoms may be pallid face, with purple lips, orthopnœa, sudden starting from sleep to the waking state, a small and intermitting pulse, cold extremities, and swollen feet. The remedies of hydrothorax may appear indicated; but the ear will show the chest to sound hollow, and far too hollow, at its very lowest parts, while there is in the first case little, and in the second no, respiratory murmur at the very place where the hollow sound is heard. Nothing but the ear can show the nature of these cases; nothing but the ear could distinguish them from each other,—without the ear, no case can be known with certainty as hydrothorax, however marked the symptoms.

It has more than once happened to me, to be unable to form *any* opinion as to the nature of a disease without auricular examination. Patients have complained of mere debility and loss of flesh, with slight general ailment, and declared themselves free from all local symptoms, so that nothing but the most random guess could be made at their disease. A minute examination of them has discovered nothing wrong, or materially wrong, in the execution of the functions of the head, chest, or abdomen: when, on percussing the chest and applying the stethoscope, the sound proved as dead in some part as if the thigh had been struck, and no respiration could be heard, or the voice has rushed through the instrument, or an unnatural sound was heard in the heart, and the whole mystery at once cleared up. In truth, the exact state of the functions of the lungs and heart cannot be ascertained except by the ear; and without an examination by its aid, no one is warranted in declaring these functions healthy.

Only a few months ago, I admitted a man into St. Thomas's Hospital, without any friend to give an account of him, and so deaf and stupid, that he could scarcely give any himself. He complained of merely occasional coldness, heat and sweating, with debility; declared he had been ill but two or three weeks, and ascribed his complaint to sleeping in a damp bed at Gravesend. The case resembled remittent fever more than any thing else, and I treated it with sulphate of quinine. The symptoms of remittent fever yielded, but the debility remained, and increased. I investigated the case minutely; there were no symptoms of phthisis or any local disease, except convexity of the nails. But, on striking the chest, I found the right superior part give a dead sound, and in the centre of this I heard pectoriloquism. The case was then regarded as one of abundant tubercular deposition in the right lung, with an excavation in its centre, and the autopsy showed that the diag-

* Ὅλως δὲ μοι τοῦτο δοκεῖ διαφεύγειν, περιττόν, εἰ δὴ γίνεται, οἱ πρῶτοι. ὡς γὰρ πρόχειρόν τι καὶ σμίκρας ἕνεκα φάσκει τοὺς λόγους ποιήσασθαι λόγους τοιούτους τοῦ καὶ πυρετοῦδεσι καὶ πρωτοδίναις, καὶ πάσαν ἄλλην φλυαρίαν τὰ Ἥβης καὶ ὧν τὸ μάθημα γοάσας ἕνεκα ἐπιτηδεύομεν.—ΠΟΛΙΤΕΙΑ. Lib. vii.

† Ecclesiasticus, chap. 39.

* The name pneumo-thorax, adopted from Itard by Laennec, is evidently improper. It should be pneumato-thorax. Such compound words are always made from the dative singular, the final letter being changed into *o*, if it is any other vowel. We thus have utero-gestation, cerebro-spinal, hemato-cele. The genitive and dative of πῦον are πύονος, πύωνι. The genitive and dative of πνῦμα are πνεύμονος, πνεύμονι: and the compound word should be pneumato-thorax. In truth, we already have pneumatomphalos, to signify a person with an umbilical hernia; and, what is still closer, we have the word pneumato-cele.

nosis was correct. The diagnosis, it is true, did not lead to a cure; but it prevented me from plaguing the patient with medicines on an erroneous idea of the nature and seat of the disease; and it enabled me to give a correct prognosis.

When even there can exist no doubt in the mind of an able practitioner as to the seat and nature of the disease, auscultation may prove an useful aid. Another practitioner in consultation may, from a peculiar bias towards the heart, consider the symptoms, though evidently pulmonic, perhaps even phthisical, to arise from that organ, and *vice versa;* or perhaps refer unquestionable symptoms of organic pectoral disease in general to the liver or the digestive organs, according to the reigning folly of the day, as is done continually with affections of the head and spine. It may be impossible clearly to refute him by the ordinary means of diagnosis, and yet auscultation may furnish some symptoms so decisive as to silence him.

Auscultation, however, can never justify us in the least neglect of the general symptoms and history of a disease. This would indeed be unphilosophical; for the symptoms of auscultation are but one set among a number of others. But if to neglect the general symptoms were unphilosophical, it would be equally so to despise those which present themselves to the ear. If the functions of the heart and lungs are naturally performed with peculiar sounds, and in diseases the sounds are altered, these deviations surely demand equal attention with those which are discernible by the other senses. Surely the physician requires all his senses for the acquisition of knowledge, as much as other prosecutors of natural science. We employ our eyes to discern the countenance and general aspect of our patients, the changes of the pectoral, intestinal, and renal secretions; the alterations of the colour, size, and figure of various parts. We employ our touch to examine the pulse, to ascertain the preternatural presence of fluid, preternatural enlargement, diminution, and induration. Our smell gives us information as to the depraved secretions of fever, as to suppuration, and gangrene; even some have recourse to the sense of taste in diabetes. Nay, certain symptoms observable by the ear only, are always carefully dwelt upon. Borborygmi enter into the definition of hysteria; all the varieties of cough and wheezing are described. Why then should such sounds as are elicited by striking the chest, or require the ear to be brought either in contact with it or in connexion by a solid medium, be despised?

The celebrated Hook not only did not despise the ear as an inlet of knowledge, but looked forward to the invention of acoustic instruments which would enable it to make important discoveries, and almost prophesied the stethoscope. "There may be a possibility," says he, "of discovering the internal motions and actions of bodies by the sound they make; who knows but that as in a watch we may hear the beating of the balance, and the running of the wheels, and the striking of the hammers, and the grating of the teeth, and multitudes of other noises; who knows, I say, but that it may be possible to discover the motions of the internal parts of bodies, whether animal, vegetable, or mineral, by the sound they make; that one may discover the works performed in the several offices and shops of a man's body, and thereby discover what engine is out of order, what works are going on at several times, and lie still at others, and the like." "I could proceed further, but methinks I could hardly forbear to blush, when I consider how the most part of men will look upon this. But yet again, I have this encouragement, not to think all these things utterly impossible, though never so much derided by the generality of men, and never so seemingly mad, foolish, and fantastic, that as the thinking them impossible cannot much improve my knowledge, so the believing them possible may perhaps be an occasion for taking notice of such things as another would pass by without regard as useless. And somewhat more of encouragement I have also from experience, that I have been able to hear very plainly the beating of a man's heart, and 'tis common to hear the motion of the wind to and fro in the guts and other small vessels; the stopping in the lungs is easily discovered by the wheezing." "As to the motion of the parts one amongst another," "to their becoming sensible, they require either that their motions be increased, or that the organ be made more nice and powerful to sensate and distinguish them as they are, for the doing of both which, I think it not impossible but that in many cases there may be helps found."*

Far be it from the defenders of auscultation and percussion to assert that the diagnosis of thoracic diseases can never be doubtful. Skill in auscultation requires much application, and, with the greatest, doubt will frequently exist. The stethoscope does not render the parietes of the chest transparent. Percussion and auscultation merely open a new set of symptoms to our notice, and, as diagnosis is certain in proportion to the number and nature of the facts on which it is founded, and the percussor and auscultator with all the same means of judging as his opponents possesses others in addition, he is better qualified to form an opinion, and, though he still may sometimes regret his want of certainty, he knows that by shutting his ears,—by levelling himself with his opponents, he augments his uncertainty a hundredfold.†

The alleged errors of those who practice auscultation are no arguments against it. Many tales of this description, like those of the errors of phrenologists, have proved inaccurate, or even altogether destitute of truth, when traced to their origin: and eagerly to catch at them would show a mind hoping that no fresh knowledge is to be attained. Persons, it must be remembered, will pretend to skill who have none, and the skilful will sometimes

* Method of improving Natural Philosophy.—Posthumous Works, p. 39, sq.

† Dr. Andral, who no where shows a disposition to overrate the value of auscultation, and is a highly-informed practical physician of the soundest judgment, says, in the preface to the second part of his *Clinique Médicale*, "Thanks especially to the wonderful discovery of professor Laennec, the diagnosis of a great number of thoracic affections may be frequently established with as much accuracy as that of the least complicated luxation, or the simplest fracture.

"There is a certain number of pneumonic inflammations in which we are able to follow the different phases of the alteration of the lungs and their return to the healthy state, with as strict precision, as the eye externally follows the different periods of the cicatrization of a wound. There are affections of the heart, in which the nature of the organic lesion may be determined by the sense of hearing, almost as accurately as the state of a cutaneous tumour may be ascertained by the eye, or of the neck of the womb by the touch. Clinical observation, however, meets with many cases in which diagnosis is still very obscure; and others, in which the very nature of the affection is still a matter of dispute."

give a hasty judgment. But, as in the case of phrenology, nature is open to us all. Let us examine for ourselves—examine carefully and patiently: not anxious to find auscultation a deception, but hoping to find the promise of new information fulfilled; not unwilling to learn because we are no longer *in statu pupillari;* not so high in our own estimation as to feel indisposed to be taught by others; not unphilosophical enough to have a hostile opinion upon a matter which observation must decide; not guilty of the inconsistency of lamenting the imperfection of our art, of whining about its sad claim to the title of *ars conjecturalis*, and yet too indolent to investigate a method which professes to remove much of its uncertainty, is recommended by men of the greatest talent and the most intense application to the study of their profession, bears upon itself the stamp of probability, and the results of which are indeed capable of being proved physically necessary.*

III. With respect to the third mode in which I conceive that our art must be perfected,—improvements in our knowledge of remedies and their application, I must be brief. Much remains to be accomplished in the discovery both of the virtues of medicines already in use, and of new medicines or such modifications of old ones as almost entitle them to the epithet new. Every advance in our knowledge of the essential nature of diseases will no doubt enable us to improve our application of remedies upon general principles,—to improve our general indications. But without any additional knowledge of the nature of diseases, cautious trial, guided by the best analogy we may discern, or by some fortuitous occurrence, will enable us, if we are disposed to labour, to effect much in extending our knowledge of the powers of particular remedies over particular diseases. Lord Bacon regrets that physicians apply themselves so exclusively to general indications, neglecting the peculiar

* I said upon another occasion, "that the greatest discoveries have generally been at first ridiculed, and their authors, no less than all the truest benefactors of the human race, despised and rejected of men.

'Romulus, et Liber Pater, et cum Castore Pollux,
Dum terras hominumque colunt genus, aspera bella
Componunt, agros assignant, oppida condunt,
Plorarere suis non respondere favorem,
Speratum meritis.'——Horace, Epist. lib. ii. ep. 2.

"Let us remember that Harvey, whose memory we honour, was dishonoured at first by his contemporaries, for the discovery which immortalised his name,—that he lost his practice, and, so far from finding comfort among his brethren, left the country, and was lampooned from one end of Europe to the other, and that no English physician who had attained the age of forty at the time, ever to the end of life, acknowledged the circulation of the blood. Let us remember that Sydenham, whose memory we also honour, was, by many of his contemporaries, whose names, whatever bustle they made during their existence, have never once been mentioned since their death, called a quack and a murderer. That the discovery of the lacteals was at first rejected with contempt,—that Bartholin, in a letter, says, 'There is not one among the doctors of Montpellier who acknowledges the lacteal vessels, so wedded are they to the authority of Galen, for which they contend as though *pro aris et focis*, and disregard the experiments of the moderns.' That even old Harvey, when the thoracic duct was afterwards discovered, could not at once loosen himself from the bonds of early prejudice, and give up the prevailing belief that the lacteals all terminated in the liver: and that the very Bartholin, who saw the folly of the doctors of Montpellier, never believed exclusively in the office of the thoracic duct.

"Let us remember, that, if our illustrious father of modern philosophy was not vilified and imprisoned, like Galileo, for announcing truth, he was represented by Cecil to Elizabeth, when she thought of making him her solicitor-general, 'as a man of mere speculation—as one wholly given up to philosophical enquiries, *new indeed and amusing*, but *fanciful and unsound*, and therefore more likely to distract her affairs, than to serve her carefully and with proper judgment.'

"In ancient times, Horace saw his odes despised, because they were *new*. The public, he said,

——— 'Nisi quæ terris semota, suisque
Temporibus defuncta vidêt, fastidit et odit.'
'Est vetus atque probus, centum qui perficit annos.'

"But, like the illustrious Gall, Lavater is no more,

'Extinctus amabitur idem.'"

I cannot forbear from making the following extract from the first volume of Gall's work *Sur les Fonctions du Cerveau*.

"The followers of the different schools of philosophy among the Greeks accused each other of impiety and perjury. The people, in their turn, detested the philosophers, and accused those who investigated principles with presumptuously encroaching upon the rights of the deity. The novelty of the opinions of Pythagoras caused his banishment from Athens; those of Anaxagoras threw him into prison; the Abderites treated Democritus as a madman, because he dissected dead bodies to discover the cause of insanity; and Socrates, for demonstrating the unity of God, was condemned to drink hemlock.

"The same scandal has been renewed at all times and in all nations. Many of those who distinguished themselves in the fourteenth century by their knowledge of natural things were put to death as magicians. Galileo, for proving the earth's motion, was imprisoned at the age of seventy. Those who first maintained the influence of climate upon the intellectual character of nations were suspected of materialism.

"Universally, nature treats new truths and their discoverers in a singular but uniform manner. With what indignation and animosity have not the greatest benefits been rejected? For instance, potatoes, Peruvian bark, vaccination, &c. As soon as Varolius made his anatomical discoveries, he was decried by Sylvius as the most infamous and ignorant madman. *Verecundum, litterarum imperitissimum, arrogantissimum, calumniatorem maledicentissimum, rerum omnium ignarissimum, transfugam, impium, ingratum, monstrum ignorantiæ, impietatis exemplar perniciosissimum, quod pestilentiali halitu Europam vexaret*, &c. Varolius was reproached with dazzling his auditors by a seductive eloquence, and artificially effecting the prolongation of the optic nerves as far as the thalami. Harvey, for maintaining the circulation of the blood, was treated as a visionary; and depravity went so far as to attempt his ruin with James and Charles the First. When it was no longer possible to shorten the optic nerve, or arrest the course of the blood in its vessels, the honour of these discoveries was all at once given to Hippocrates. The physical truths announced by Linnæus, Buffon, the pious philosopher Bonnet, by George Le Roy, were represented as impieties likely to ruin religion and morality. Even the virtuous and generous Lavater was treated as a fatalist and materialist. Every where do fatalism and materialism, placed before the sanctuary of truth, make the world retire. Every where do those, upon whose judgment the public relies, not merely ascribe to the author of a discovery the absurdities of their own prejudices, but even renounce established truths if contrary to their purposes, and revive ancient errors, if calculated to ruin the man who is in their way.

"This is a faithful picture of what has happened to me. I have, therefore, some reason to be proud of having experienced the same lot as men to whom the world is indebted for so great a mass of knowledge. It seems that nature has subjected all truths to persecution, in order to establish them the more firmly; for he who can snatch one from her always presents a front of brass to the darts hurled against him, and has always force enough to defend and establish it. History shows us that all the efforts and sophisms which are directed against a truth once drawn from darkness, fall like dust blown by the winds against a rock.

"The instance of Aristotle and Descartes should particularly be quoted, when we wish to display the influence of prejudice upon the good or bad fortune of new doctrines. The opponents of Aristotle burnt his books: afterwards, the books of Ramus, who had written against Aristotle, were burnt, and the opponents of the philosopher of Stagira declared heretics; and it was even forbidden by law to dispute his doctrines, under pain of being sent to the galleys. Now there is no longer any discussion about the philosophy of Aristotle. Descartes was persecuted because he taught the innateness of ideas, and the University of Paris burnt his books. He had written the most sublime thoughts upon the existence of God; Voët, his enemy, accused him of atheism. Afterwards, this same university declares itself in favour of innate ideas; and when Locke and Condillac

properties of remedies in particular diseases. "Medici hujusce ætatis," he says, "licet generales intentiones curationum non male persequantur, particulares tamen medicinas quæ ad curationes morborum singulorum, proprietate quadam spectant, aut non bene norunt, aut non religiose observant." He remarks that they merely go on in their prescriptions, "addendo, et demendo, et mutando, circa medicinas, pro ut iis libitum fuerit, et fere pharmacopœorum more, quid pro quo substituendo;" and he advises that some physicians "et eruditione et practica insignes, opus aliquod conficiant de medicinis probatis et experimentalibus ad morbos particulares."*

Such experimental facts, however insulated they may at first appear, gradually arrange themselves with others into general principles, and thus, what is at first little better than empiricism becomes science. I confess that I look with more hope to this source of improvement than to any other.†

I now proceed to the consideration of the recent improvements in the diagnosis of the diseases of the heart.

attacked innate ideas, the cry of materialism and fatalism resounded on all sides.

"Thus, the same opinions have at one time been regarded as dangerous because they were new, and at another as useful because they were ancient. We must, therefore, pity mankind, and conclude that the opinions of contemporaries as to the truth or error, and dangerous or innocent tendencies of a doctrine, are very suspicious, and that the author of a discovery should be anxious only to ascertain whether he has really discovered a truth or not." p. 221. sq.

Gall might have added, in the words of Professor Playfair, that, notwithstanding "the splendour of Newton's discoveries, the beauty, the simplicity, and grandeur of the system they unfolded, and the demonstrative evidence by which that system was supported," "the Cartesian system of Vortices kept its ground for *more than thirty years* after the publication of those discoveries," and that actually "the Newtonian philosophy first entered the University of *Cambridge* under the protection of the Cartesian," by a stratagem of Dr. Samuel Clark, who quietly explained the views of Newton, without any appearance of argument or controversy, in the form of notes to a new translation which he published of the French Cartesian work long established as a text-book by the tutors of the University.

Dr. Chalmers, speaking of the first reception of the Newtonian philosophy, says, "authority scowled upon it, and taste was disgusted by it, and fashion was ashamed of it."

* Instauratio Magna.—First part.

† To such investigations I have therefore sedulously applied myself, and those of my results which were successful are before the profession:—

Cases illustrative of the efficacy of the Hydrocyanic Acid in affections of the stomach, with a general report upon its medical powers—some facts respecting the inertness of ordinary antimonial powder—the use of Opium in diabetes, and the necessity of varying the doses of medicines under various circumstances, 8vo. 1820.—On the medical properties of Quinine,—On the use of the Subcarbonate of Iron in chorea, and its general properties,—Ditto in tetanus,—On the use of the Sulphate of Copper in chronic diarrhœa,—Papers all four published, together with three of a pathological nature, in the 12th, 13th, 15th and 16th volumes of the Medico-Chirurgical Transactions. The pathological papers are upon Rupture of the Stomach,—Fallopian tube pregnancy,—and the Glanders communicated by the horse to the human subject.

I make this statement for the purpose of easy reference, as some of my friends wish me to collect these,—the whole of my professional attempts, besides the English edition of Blumenbach's Physiology and an Introductory Lecture upon State-Medicine, into one volume, and I feel disinclined to follow their advice.

DISEASES OF THE PERICARDIUM.

Pericarditis, the first disease of which I purpose speaking, would never be selected to show the advantages of auricular examination; in the acute form at least this is for the most part of only negative utility. But the consideration of it will prove the injustice of those who assert that auscultators both regard auscultation as an universal light, and neglect the general investigation of symptoms.

The acute inflammation which occurs in the region of the heart is usually situated in the pericardium, and pericarditis is a very common disease.

The anatomical characters are little different from those of the inflammation of other serous membranes. There is either a partial redness,—patches, sometimes as if the membrane were injected, at others as if dyed red,—or groups of red points. The redness is seldom deep, and, in the most violent cases, often very faint. The membrane was never in a single instance observed by Laennec thickened, though Dr. Baillie declares this to be frequently the case; but upon it lies a quantity of fibrine, thicker and more consistent than in pleurisy, and differing from the fibrine of pleurisy also in being generally irregular on its surface, sometimes with minute pores, sometimes with depressions so large as to give it the appearance of the second stomach of the calf, sometimes knobbed like butter spread upon two slabs, to use Laennec's comparison, first approximated and then suddenly separated from each other. Dr. Baillie says that the fibrine never adheres firmly; Laennec that it adheres more firmly than in pleurisy. Although the redness is partial, this exudation is most frequently general, and often very abundant when the redness is slight. It is of the ordinary pale colour.

The serum effused is in far less proportion to the fibrine than in pleurisy, seldom amounting to a pint, though it has amounted to four; and sometimes scarcely any is found. It is of the common whitish lemon colour; rarely limpid; sometimes very turbid, containing larger or smaller flocculi of lymph, or absolutely curdled, as if only one kind of effusion had taken place. Sometimes it is bloody, sometimes puriform: Dr. Baillie once saw a quart of pus in a pericardium violently inflamed, but free from ulceration.

In the chronic disease, the redness is more intense and more diffuse, and the inflammation is almost always general. If any fibrine exist, and it seldom does, it is thinner and softer. There is always the turbid serous effusion.

As time elapses after the acute attack, the liquid effused is absorbed, the fibrine grows to the cardiac and parietal portions of the pericardium, and adhesions more or less partial or general of cellular or serous membrane are produced, thinner usually and stronger, like those of other serous sacs, the older their date. The adhesions are sometimes very thick and fibrous, as it were fleshy, and cartilaginous or bony. I have frequently seen the whole cardiac and parietal pericardium coherent, (and even the proper auricles concreted to the ventricles) so that no pericardial cavity existed, the serum being entirely absorbed, and the fibrine nearly so:

and such cases have occasionally been mistaken for instances of the absence of the pericardium.

Both when the pericardium is very coherent, and when it is only thickened, the morbid action may be more intense in particular spots; for we often find knobs of cartilage at different parts, some of which dip deep into the substance of the heart.

Sometimes the fibrine effused becomes cellular, and, contracting no adhesions, lies pale, like lace, upon the surface of the heart; sometimes merely an opaque white patch remains, which can be peeled off; and sometimes, instead of smooth patches, we have opaque white granulations.

If the inflammation has been severe, lymph is often found in more or less quantity on even the external surface of the pericardium, uniting it by bands to the pleura.

The reason is not obvious why the fibrine within the pericardium sometimes adheres, and sometimes contracts no adhesions. The degree of serous effusion and consequent proportionate separation of parts affords no explanation, because, first, we often see one portion of lymph adherent, while another by its side is not; and secondly, there is often a total absence of adhesion without sufficient serous effusion to account for it.

The substance of the heart after pericarditis may be unchanged, or redder or paler than usual, yellowish or brown, hardened or softened. After the chronic disease it has been found hypertrophied. When the organ is softened it usually is that we observe the effused serum to be bloody. In the disease of softening of the heart I have almost always found bloody serum in the pericardium.

Not only the substance of the heart, but its lining membrane, especially at the valves, is also frequently affected, sometimes in the acute form,* but generally in the chronic if very long continued.

We shall see in the two following lectures, that the majority of cases of disease of both the substance of the heart and the valves, arise from, or at least are coetaneous with, or spring up during, inflammation of the pericardium.

Pericarditis is occasioned by all the causes of the inflammation of serous membranes in general. But the most frequent is either exposure to cold, especially after a warm temperature and if rheumatism is also induced; or sympathy with the fibrous membranes of joints attacked by rheumatism. It will occur simultaneously with the rheumatism; or not till the rheumatism has existed for a longer or shorter period, has even gradually declined, or altogether ceased for some time; and, though the metastasis is comparatively rare, when the rheumatism suddenly disappears.

If pericarditis becomes chronic, and it is usually not very violent but really disposed to assume the chronic form, and frequently steals on as a chronic disease from the abuse of fermented liquors, the valves and finally the substance of the heart, as I have mentioned, become diseased. From these circumstances, the connexion between rheumatism and affection of the heart was first noticed in the stage of organic disease, and rheumatism said to produce not inflammation but disease of the heart. Occasionally the pericardium may not be affected, and occasionally but in a secondary manner: yet of this I am certain, that nearly all the cases of affections of the heart, after rheumatism, are originally pericarditis, and that, when the inner membrane is thus affected from the first, so also is the pericardium. Among the cases of organic disease of the heart connected with rheumatism, published by Dr. Wells nearly twenty years ago, in the Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, those which proved fatal displayed a complete abolition of the pericardial cavity, or strong or abundant partial adhesions, and those which did not prove fatal were marked by decided symptoms of pericarditis. In nearly all these mentioned by Sir David Dundas, in the first volume of the Medico-Chirurgical Transactions of London, the pericardium was adherent. Every dissection that I have made after death, during the early period of the disease, has proved the case to be violent pericarditis; the history of every chronic case that I have witnessed could be clearly traced back to pericarditis; and every the least affection of the heart that I have seen take place during rheumatism has been marked pericarditis. The pleura, particularly of the left side, is occasionally inflamed at the same time, and the subsequent chronic organic disease of the heart is of every possible variety. Dr. Pitcairn, of St. Bartholomew's Hospital, was the first who noticed, in about 1788, the connexion of rheumatism with disease of the heart; and Dr. Baillie, in 1797, was the first who published on the subject. They considered the disease to be a morbid growth of the heart. Sir David Dundas, who published many years afterwards,—in 1808, upon the subject, without reference to the observations of these physicians, and asserting his belief that no account of the matter was to be found in any medical writer, (as though, remarks Dr. Wells, it was easy to suppose him ignorant of what had been published twelve years before in so popular a work as Dr. Baillie's morbid anatomy,) mentions the disease as dilatation of the heart, and chiefly of the left ventricle, with paleness and softness of its substance, and adherence of the pericardium. But from the imperfection of morbid anatomy in this country twenty years ago, his description is very loose. However, in one of Dr. Wells's cases, which proved fatal early, and was opened by Mr. Brodie, nothing but pericarditis was discoverable; and Dr. Wells, no less distinguished for his sagacity than his independence, evidently regarded the rheumatic affection of the heart as inflammatory, by advising copious bleeding in the outset.

The disease would appear sometimes to remain very long mere pericarditis, or at least merely an inflammatory affection; for it is sometimes cured after a lapse of time, and sometimes continues for many years with no signs of organic disease, and proving troublesome only when cold is accidentally caught, and a fresh attack of rheumatism in the joints induced.

Most instances of rheumatic pericarditis commence in

* A case of pericarditis, that occurred with pain of an extremity, evidently rheumatic, the pericardium both containing several ounces of turbid fluid with flakes of lymph and covered in various situations with a reticulated layer of lymph, is described by Mr. Stanley, in which the substance of the heart was almost black with congested blood, very soft, and studded with little collections of dark pus.——Medico-Chirurgical Transactions, vol. vii.

persons from about the age of puberty to near thirty. We occasionally see it in the younger; rarely for the first time in the older. I once saw it in an infant. With neither of Dr. Baillie's remarks,—that pericarditis is not very common, and that it chiefly attacks persons who have been some time adults, does my experience at all agree.

The French do not appear aware of the connexion of pericarditis with rheumatism, except as an ordinary instance of internal inflammation upon the sudden retrocession of an external disease.

Acute pericarditis is of course attended by more or less pyrexia. There is a pain in the region of the heart, sometimes severe and lancinating: generally darting through to the left scapula, upwards to the left clavicle and shoulder, and down the arm a certain way, and, what is remarkable, rarely extending quite so far as the elbow. I lately had a case in which the pain extended down the fore arm, but it did not quite reach the wrist. The pain is increased by pressing forcibly upon or between the ribs and cartilages over the heart, and by pressing with the points of the fingers upwards against the diaphragm, under the cartilages of the left false ribs, frequently even by pressing the epigastrium and left hypochondrium in the usual manner. The pain is often increased on inspiration, and by lying on the left side. I think patients are usually easiest upon their back. The respiration is rapid, but less so than in affections of the lungs. There is sometimes a cough, which is dry. Nearly always palpitation, frequently violent, at least upon exertion. Sometimes, though more rarely, a disposition to syncope. The pulse varies exceedingly. It is necessarily quick; and often, but not always, small, in proportion to the heart's action; and only sometimes intermittent and irregular; neither is it always hard or even very full. The countenance is described as anxious, and the features contracted: but this I imagine happens only when the pain is acute, and is equally the case in pleuritis.

On examination by the ear, the *whole* heart is found acting more forcibly, and with a clearer sound, than in health. But this is all. Auscultation appears to me, however, of negative use. We do not discover the loud murmur nor the sonorous or sibilous rattle of bronchitis, the crepitous rattle or obscure respiratory murmur of pneumonia, nor the ægophony of pleuritic effusion, unless these diseases are combined with pericarditis. Neither have we the partially excessive or defective impulse or sound, or preternatural sounds, of organic diseases of the heart. In all uncombined cases, therefore, light is thrown on the disease. I remember once having found auscultation of great use in the diagnosis of a disease which might have been considered clearly pericarditis. The patient was a poor Irishman, and the Irish are by no means happy in their attempts at lucid history and description of their diseases. He complained of pain in the region of the heart, increased on pressure, palpitation, dyspnœa, and declared he had been ill but a few days. The case appeared pericarditis. The pulse was full, and the constitution good. There appeared every reason to bleed him freely and put the whole antiphlogistic plan in force. But on listening to the heart's action, the left ventricle gave a violent dead noiseless blow against the chest, and the case was evidently one of hypertrophy of the left ventricle. I insisted to the man that he had long been ill, and it was ascertained from his own mouth and from his wife, that he had suffered palpitation and dyspnœa for a great length of time, and that the error of his history arose from his having been compelled to leave off work for a few days only before. He died in a fortnight, and great hypertrophy of the left ventricle was discovered.

M. Collier says that the action of the heart is accompanied by a sound resembling that of new leather. Laennec does not mention it, but remarks the occasional occurrence of a sort of click, which some persons mistake for a *bruit de soufflet*.

The diagnosis of pericarditis is thought by many to be extremely difficult. Laennec declares that he has frequently suspected it where it was not found, and found it where he had not suspected it. By close inquiry into the existence of all the marks just mentioned, I confess the diagnosis has never proved difficult to me. I would particularly lay stress upon the extension of the pain from the region of the heart to the scapula, shoulder, and a certain way down the arm—symptoms which patients will not always mention unless questioned respecting them: and its increase on strong pressure upon or between the ribs and cartilages over the heart, and upwards under the cartilages of the left false ribs. These two points I do not remember to have seen mentioned any where, and the others are not dwelt upon in some of the best books. In Andral's *Clinique Médicale*, pain of the epigastrium on pressure is said to have occurred in some cases, but the point is not spoken of as if inquired into: in one case only is the extension of pain to the arm mentioned: and its extension even to the shoulder does not seem to have formed an object of inquiry.

I am certain that, by a scrutinizing examination, the existence of pericarditis will very rarely be mistaken: and from this conviction, and the frequency of its occurrence during acute rheumatism, I make it as invariable a rule to examine the cardiac region by the touch and hearing in every case of acute rheumatism as the usual seats of hernia are examined by us all in cases of colic and intestinal inflammation. Were this rule universally observed, practitioners would not be occasionally surprised by the death of patients in what had been considered merely acute rheumatism.

Although the consideration of treatment forms no part of my purpose, I may be permitted to remark, that I think I have observed free local bleeding more serviceable than general; and that mercury is of equal efficacy in acute pericarditis as in other acute inflammations, over which, wherever they may be situated, a very extensive experience of many years has fully satisfied me, conformably with the observations of so many able physicians, that it possesses far, very far, more power than any other medicine. Bleeding and other ordinary measures cure cases of severe inflammation every day, and, in cases of little danger, may be relied upon. But they frequently fail in cases of intensity; and I know that if, in addition to suitable bleeding, mercurial ptyalism is quickly induced, active inflammation will very rarely destroy, and that, not only is fatality almost always prevented, but far less bleeding is required. This has been my practice from the commencement of my professional life, and I have

never met with a necessity for those frightful bleedings of quart after quart, recorded from time to time in our publications, where I also employed mercury with freedom. I have given the antimonium tartarisatum in quantities of a scruple and half a dram every twenty-four hours, hydrocyanic acid, and other medicines recommended by the Italians, but found them all greatly inferior to mercury. Among the best unquestionably is colchicum, and its power over active gout and rheumatism of the extremities is universally acknowledged to be very great. After the violence of acute pericarditis is subdued, it appears of use in restraining the morbid irritability which sometimes still continues in the heart; and several chronic cases, of which I had despaired, have gradually recovered under perseverance in its use for many months.

The quantity of fluid at a certain period of acute pericarditis, and in chronic pericarditis, is occasionally, but not often, so considerable that hydrops pericardii exists. The quantity should certainly be half a pint for us to expect inconvenience. Unless it is considerable, it is indicated with no more certainty by percussion and auscultation than by the ordinary symptoms. But if the quantity is large, there is a dull sound to a great extent on striking the cardiac region; the heart's action may be perceived very faintly, and perhaps in a diffused manner, so that the epigastrium pulsates or vibrates and may appear fuller than in health; patients have experienced a sense of weight in the cardiac region, and even fluctuation has been detected. In cases of copious effusion of blood, pus, or serum, into the pericardium, these symptoms have suddenly appeared, and good examples of the occurrence of some of them may be found in Andral.

A fluid occasionally collects in the pericardium, as in the pleura and peritoneum, arachnoid and tunica vaginalis, by a slow process, not amounting to inflammation. The membrane is not red, but perhaps opake, and even thickened and of a satin whiteness. This condition is, I believe, where no redness of inflammation is visible, the common cause of ascites, chronic hydrocephalus, hydrocele, and idiopathic hydrothorax; and though, like the state which gives birth, as I shall presently mention, to one kind of adhesions in serous membranes, it may be the result of a change allied to inflammation, it hardly merits the title of inflammation, from the absence of inflammatory symptoms, the absence of redness in the membrane, the pellucidity of the fluid, and the inutility of anti-inflammatory measures.

The adhesions within the pericardium left after pericarditis are almost the only instances that occur in this membrane. I have never seen adhesions except with redness of the membrane, or the presence of turbid fluid, or after the existence of decided symptoms of pericarditis. In the pleura they are continually found, without the least previous symptoms of inflammation, and without redness or turbid effusion; and though, like chronic dropsy of the membranes, they may result from what cannot be proved to be an inflammatory state, they certainly, like it, are no proofs of any thing deserving the decided name of inflammation.

In the case neither of the pleura nor pericardium, do they in general produce the slightest inconvenience. I have seen the whole pericardium so coherent that its cavity was entirely abolished, and yet the symptoms which had been present were exactly commensurate with the organic disease of the heart which existed at the same time, and had certainly no relation to the adhesion. I cannot say I ever observed a symptom produced, except in one case, and there a single thick adhesion extended along the front of the heart. In the supine posture this must have been dragged down by the subjacent heart, and must have tended to drag the pericardium of the front of the chest with it, and to suspend the heart, so that the parietal and cardiac pericardium at their points of union with it must have put upon the stretch. The patient accordingly had been unable to lie on her back, on account of a smarting pain produced in this posture at the front of the cardiac region. Bertin,* in his excellent work upon diseases of the heart, states that adhesions often produce no symptoms, but gives one case † in illustration that inconvenience sometimes is felt: yet in this case, adduced singularly enough, the substance of the heart, in addition to the adhesions, was found very soft—a change quite sufficient to explain every symptom that occurred.

The cellular side of the pericardium is, like that of other serous membranes, sometimes, though very rarely, the seat of hydatids and cysts, scrofulous and other tubercles, and of ossification. The diagnosis must be impossible, and indeed no symptoms have in some cases been observable.

It is the seat of sudden and fatal hemorrhage without previous indisposition; sometimes, like the arachnoid, perfectly dry; sometimes it contains air, either alone or with a preternatural quantity of fluid, in the latter of which cases fluctuation or undulation has occurred. Sometimes the pericardium is absent, and at least five unquestionable cases are on record of this singularity.

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* Traité des Maladies du Cœur et des Gros Vaisseaux, par R. J. Bertin. Paris. 1824, p. 254.

† See PLATE III. B. and PLATE IV. A.

LECTURE II.

AFFECTIONS OF THE LINING MEMBRANE OF THE HEART.

The lining membrane of the heart's cavities and valves, on one or both sides, is occasionally found intensely red, that of the aorta or pulmonary artery or of both generally showing the same appearance: and the redness, which is of necessity most striking in the valves, cannot be washed away without maceration for some hours or even days. It cannot always be ascribed to the imbibition of blood, because frequently no blood is found in contact with the reddened part, and the artificial application of blood to the interior of an artery during forty-eight hours has failed to redden it to the same degree. I have seen the heart and aorta quite empty where this redness existed. Neither can it be ascribed to congestion from dyspnœa, for I have seen it where death had taken place in a moment in the midst of perfect general health; nor to decomposition, for I have witnessed it on the day following death in cold weather. I have seen it intense, even when all these conditions were united—fixedness of colour, freedom from the contact of blood, sudden death, perfect general health, and absence of decomposition. Of course, mechanical obstruction to the passage of the blood from the vascular system of the heart, or a softened state of the organ either by disease or by incipient decomposition, will cause the blood in the substance or the cavities of the heart to redden the lining membrane deeply.

I am not aware of any cardiac symptoms to which this inflammation could give rise, except rapidity of pulse; increased force and sound of the heart's action, exactly as occurs in pericarditis; and, when the portion lining the valves and their immediate vicinity is not only inflamed, but thickened, covered or bound down by an effusion of fibrine, or constricted, that preternatural sound which the narrowing of a cardiac orifice, or of a large artery, produces, denominated the bellows or file-sound. Andral has seen the membrane thickened, and easily peel off in large portions; and Baillie, Bertin, and others, have found fibrine lying upon it after acute inflammation. If this sound is not produced, I presume the acute inflammation of the lining membrane can be distinguished from pericarditis by only the absence of pain in the particular directions mentioned in the last lecture, and of tenderness on pressure applied in the manner which I pointed out.

Acute inflammation of the lining membrane now and then occurs alone, but far more frequently in those who have already some chronic disease of the heart; or it accompanies acute pericarditis.

I have never opened a person who died with this acute affection; but four times I have suspected its existence when acute pericarditis was present. The only ground of my suspicions was the occurrence in these cases of a sound like that of a bellows with the contraction of the heart,—a symptom which the most assiduous French auscultators, Laennec, Bertin, Andral, Collin, do not consider as belonging to pericarditis, and which the experience of all my friends, accustomed, like myself, to employ the stethoscope in every case of pectoral disease, as well as my own, shows to be no symptom of mere pericarditis. Indeed there is an impossibility in imagining how it should, for we hear it every day, where no pericarditis exists, from any mechanical disturbance to the course of the blood in any point of its progress through the heart or even through the arteries. In two of these four cases of acute pericarditis, in which I heard it, the symptoms of pericarditis were very mild; yet the sound was considerable, and it ceased after antiphlogistic measures had been employed. On the other hand, I have attended numerous cases of very violent and well-marked cases of acute pericarditis, and not heard it, though in none did I ever omit daily to employ the stethoscope, and, as well as some of my friends, have made this a point of careful investigation. In the two other cases, the symptoms of pericarditis were certainly violent, but, after they were entirely subdued, the bellows-soundcontinued as loud as before: evidently therefore not the result of the presence of pericarditis, but of those organic changes that every day give rise to the bellows-sound, and are often preceded by pericarditis, as I mentioned in the last lecture. For the same reason I have known it not begin till all the symptoms of the pericarditis had actually subsided.

In acuto-chronic and chronic pericarditis this sound is not uncommon; and, when once it has begun, it may subside after some weeks, or continue till death, lasting perhaps for years; and depends not upon the pericarditis, for this may at length cease and possibly the whole membrane concrete, but almost always upon chronic disease of the lining membrane about the valves and openings, or some induration or enlargement external to the openings or passages from the heart and compressing them, or upon dilation of a cavity behind an opening.

I have never opened a person whom I had seen labouring under chronic pericarditis and affording the bellows-sound *constantly*, in whom a diseased condition of an opening or passage from the heart did not present itself—in whom the opening or passage was not below its natural proportion to the cavity behind it, being itself lessened or compressed, or the cavity behind it increased so that it was become virtually too small. The occasional simultaneous occurrence of acute inflammation of the lining membrane or substance of the heart, with *acute* inflammation of the pericardium, effusing lymph about the

openings, inducing spasmodic constriction of them, or turgescence around them; and the tendency of the lining membrane and substance of the heart to become diseased, and of morbid depositions to take place externally to the roots of the two great arteries, when the pericardium is the seat of *chronic* inflammation,—are the reasons, I am satisfied, that the bellows-sound is ever heard in conjunction with the symptoms of pericarditis.

Just as is observed with respect to the tissues of all other cavities, and of all canals, the portions of the lining membrane about the boundaries of the cardiac cavities are the spots most liable to be affected. Scirrhus and stricture of the alimentary canal affect chiefly the cardia, pylorus, and rectum, and the termination of the ilium is the most frequent seat of intestinal ulceration in fever. Ulceration of the air tubes is most frequent originally in the larynx and the air cells. The lips are continually affected with cancer, and the neck and mouth of the bladder and womb are commonly the original seat of the organic diseases of those organs. So inflammatory thickening, and all other diseases of the lining membrane of the heart, far most frequently occupy that portion which invests the openings and assists to form the valves; and if it affect the rest also, this is in a much slighter manner, although occasionally the rest of the membrane is equally thickened, and I have seen the valves and openings free from disease while the rest was so thickened that, on cutting the ventricles through, the red incised surface presented a thick white inner edge.

Mere thickening and all other diseases are seen much more frequently in the left than the right half of the heart; for which circumstance no other reason can be given than that assigned by M. Bertin, viz. that the left is stimulated by arterial blood, the right by only venous. The difference between arterial and venous blood, as agents on living parts, is demonstrated by the experiment of injecting venous blood into the carotids, when stupor and death ensue. If irritation occur in the heart, it is more likely to be maintained and pushed on to serious disease in the left side by the stimulating arterial blood from the lungs, than by the inert venous blood returned to the right side after having served its purposes in the body. The difference cannot be attributed to degree of function, because the right side performs as much function as the left; nor to obstruction to the course of the blood, for this happens oftener in the right side, from the frequency of pulmonic affections.

In the natural state, the valves are translucent, fine, and flexible; when the subject of chronic inflammation, they become opake and yellowish, thick and rigid. These changes are seen in dead subjects in various degrees, and may be considerable without reaching such a point as sensibly to disturb function: their progress also advances with various degrees of celerity. The surface of the valves may retain its smoothness, though frequently we observe asperities from excrescence or deposition. The induration varies in different points, so that one portion is partly translucent, while another is not only opake and rigid, but even bony. The induration at length amounts to cartilage, and the part creaks when cut. The last stage is complete ossification.

As the thickening and induration proceed, the opening becomes narrow both from the thickening of the edges and from the approach of the portions of the valves towards each other. The several portions of the tricuspid and bicuspid valves grow up completely into a membrane with an aperture in its centre, and this aperture is sometimes, as seen from the ventricle, and generally when viewed from the auricle, not circular, but longitudinal,—a mere slit, usually, Mr. Adams* remarks, of a crescent form, with the concavity towards the root of the aorta, the convexity backwards;† and the extension of the valvular membrane is sometimes so considerable, that it appears to project into the ventricle in the form of a pouch or funnel.‡ The semilunar valves of the pulmonary artery stand firm and convex, as if distended by repletion of their sacs, and grow up so as to leave only a small round or triangular opening in their middle.§ Sometimes, according to Bertin and Laennec, the margin of the aortic valves is folded *in*, and sometimes folded *back*.‖ Sometimes only one set of valves is affected: more frequently, if one set is severely affected, another is at least opake and thickened to a certain degree.

When the pericarditis has been intense and general, the inner membrane has also in many instances suffered so much, that two sets of valves, and even three, are seriously altered.¶ I have seen the base or zone only of the valves thickened and contracted, so that a real stricture impeded the progress of the blood into the artery.

When the impediment to the progress of the blood is considerable, the auricle behind is usually dilated; and sometimes attenuated, sometimes of its natural thickness, sometimes, though rarely, thickened. Whether it be an auriculo-ventricular opening, or a ventriculo-arterial, this effect is the same. Occasionally when a ventriculo-arterial opening is narrowed, the ventricle behind is dilated, or thickened, or both; but frequently this is not the case. The auricles suffer from being muscular to only a certain extent, and throughout of insignificant thickness compared with the ventricles.

I have never, except in one, and that a most extraordinary, case, seen the opening leading from an auricle or ventricle materially narrowed, without having heard a preternatural sound at the moment of the contraction of the auricle or ventricle behind it. The sound is sometimes protracted, and sometimes, while one portion of it resembles the blowing of a bellows, I have heard another resemble the filing of

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* Dublin Hospital Reports, Vol. iv.

† See PLATE II. C.

‡ See PLATE IV. C. and PLATE VII. B.

§ See PLATE II. D.

‖ Dr. Hodgkin has lately described the latter state under the name of retroversion, and said it had not been noticed by others. But I readily convinced him that it had been already mentioned. Bertin says, p. 216,—"Nous avons vu les sigmoïdes déjetées et en quelque sorte renversées vers *les parois* de l'aorte. Cependant, nous avons observé aussi *une disposition inverse*, comme si, pendant la systole de l'aorte, le sang les avait *refoulées vers la cavité ventriculaire*." This mention is certainly not *incidental*; neither does it appear to me too *short* for the subject.

Laennec, while he makes the same remark, confines it indeed to their ossified state. "When the ossification is extensive, the valves grow together and become incurvated, either towards their concave or convex side, so as to acquire the appearance of certain shells."

¶ See PLATE II. A. C. D.

wood, or the action of a fine saw, though this compound sound is not mentioned by authors. Once, where the pulsations of the heart varied in force, the sound which occurred at the auricular contraction, and in the right side of the heart, was loud, rough, and sawing, at the strong pulsations; and small and shrill at the weaker. In another case in which the force of the pulse varied, the bellows-sound (ventricular and at the right side of the cardiac region) was perceptible at the strong pulsations only.* In both cases, immediately after the preternatural sounds, a faint sucking or aspiring sound was heard. In one case, apparently of constriction of the opening of the mitral valve, the sound was small and shrill *(bruit de râpe)* at the centre of the sternum, but full and base at the cartilages to the left, and of this nature, though fainter, all over the rest of the front of the chest and all over the left half of the back.† Sometimes it altogether resembles the sound of a file or saw: and at times I have heard it exactly resembling the cooing of a dove—a variety not mentioned, I believe, by authors; in one case it was so loud that I heard it when standing nearly a foot from the patient. Three times have I heard this cooing sound. ‡

When the preternatural sounds are not very intense, the ear must be brought in contact with the chest, or some solid medium employed: but when intense, they may be heard at a little distance. Some have conjectured that when the narrowed opening exists in a valve become of no more than cartilaginous hardness, the bellows-sound is heard: and when of osseous, the file-sound. I believe that degree of obstruction is the great cause of the varieties of sound: but the diversity that I have noticed of the same sound in listening at different spots, shows the power of distance or variety of media to modify it.

Perhaps I may be permitted to say a few words on the natural sounds of the heart's action. Besides the impulse which is given by the heart to the left side of the chest, its action affords a distinct sound in health on applying the ear, either immediately to the parietes or with the intervention of a solid medium. This sound is double, and indeed in many persons perceptibly so to themselves on lying upon the left side. The first part is heard at the moment the pulse is felt in the wrist or after the smaller possible interval: the second, immediately afterwards. The first, according to Laennec, arises from the ventricular action; the second from the auricular. The first is rather dull and long; the second short and clear—a kind of smack. After the second, a short pause ensues, before the dull sound of the ventricles, the stroke of the heart's apex, and the pulse at the wrist, recur. The whole period is estimated by Laennec at about one-half for the ventricular contraction, one-quarter for the auricular, and one-quarter for the pause. The sound of the auricles is heard best at the upper part; of the ventricles, at the lower part, of the cardiac region. The sounds of the left auricle and ventricle are heard best at the cartilages of the fifth, sixth, and seventh left ribs; those of the right auricle and ventricle, at the sternum.

When the passage of the blood from either ventricle is materially impeded, the sound which is synchronous with the pulse, and loudest at the lower part of the cardiac region, is changed to the blowing, whizzing, shrill, or cooing character just mentioned: if the impediment is in the left ventricle—at the mouth of the aorta, it is loudest at the cartilages of the ribs to the left of the sternum; if in the right ventricle—at the mouth of the pulmonary artery, it is loudest at the sternum and to the right. The sound is often so loud, that it prevents the natural sound of the auricles from being distinctly perceptible till the ear or stethoscope is removed from the region of the ventricles higher,—to the region of the auricles.

When the impediment is at either of the auriculo-ventricular openings, the morbid sound is heard at the moment of the auricular contraction,—not synchronously with the radial pulse and the stroke of the heart's apex; and is generally loudest at the superior part of the cardiac region. It is loudest at the cartilages of the left ribs, when the left auriculo-ventricular opening is narrowed; loudest at the sternum and to the right, when the narrowing is at the right auriculo-ventricular opening. When an auriculo-ventricular opening is narrowed, and the morbid sound is heard at the auricular contraction, the action of the auricle is not instantaneous as in health, but rather slower, so that we may fancy we hear the cavity gradually empty itself. I do not think this slowness so observable in cases of narrowing of the mouth of the pulmonary artery or aorta.

Laennec's correctness in ascribing the first of the two sounds of the heart's action in health to the ventricle and the second to the auricle, has been called in question; some asserting that the first sound is the result of the auricular contraction, and the second of the ventricular; some that they occur at the moment of the dilatation, not at the moment of the contraction of the cavities; and some that Laennec was right in regard to the ventricular sound, but that the second sound cannot arise from the contraction of the auricle, as Harvey, Haller, Senac, all declare that the auricle may be seen to contract immediately before the ventricular action, and they consider, therefore, the sound which follows the ventricular to be produced by some unknown cause, and the auricular contraction to be without sound,—two very singular and very considerable suppositions. The alteration of the sound in narrowing of the respective openings proves, I think, that Laennec is right. For if the opening from a ventricle is narrowed, the healthy sound ascribed by Laennec to

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* I have since made the same remark in many other cases. Obstruction necessarily has the greater effect, the greater the quantity of blood forced by the heart against the spot, provided the obstruction is not of a nature to be partly overcome by an increase of force. At the moments that the heart acts moderately, the small quantity of blood may pretty readily find its way through the opening, so that no preternatural sound of resistance is audible; but, when the heart makes a fuller contraction, the resistance is virtually greater, and a preternatural sound takes place, or, if previously audible, becomes more intense. Perfectly analogous to these varieties of the preternatural sound in cases of irregularity in force of the heart's action, is the common circumstance of the diminution of the preternatural sound after venesection and other means of lessening the quantity of blood and the force of the heart.

† The same variety of the sound in different situations has occurred to me in another case—*file*-sound at the sternum, and bellows-sound every where else.

‡ A fourth instance of this has lately fallen under my notice. The cooing occurred in all at the auricular action, *i.e.* after the pulse and the stroke of the heart, and was referrible in situation to the mitral valve.

the ventricles is altered; and if the opening from an auricle is narrowed, the healthy sound ascribed by Laennec to the auricle is altered. An argument in favour of the priority of the auricular contraction has been deduced from the veins of the neck in some cases regularly swelling immediately before the pulse is felt. But the obstruction in the auricles, causing this swelling, does not, I apprehend, occur during the contraction of the auricles; for at that moment there is a free space in the ventricles to receive the auricular blood, and it is only a part of the auricle that has the power of contraction. The obstruction which produces the swelling must take place as the ventricle becomes filled and the auricular blood consequently accumulates; and therefore the swelling of the veins must be expected when the ventricles will receive no more, viz. immediately before they contract, or while they are contracting. There is no wonder therefore that the arteries according to this account beat first: then a second sound of the heart is heard, I presume the auricular action; and then a short interval occurs before the veins pulsate,—before the blood accumulates in the auricles previously to their contraction. The jugular veins are said by some, always to be dilated quite synchronously with the pulse of the arteries.*

From the occasional loudness of the morbid sound, wherever situated, (and I have sometimes heard it in various intensity at every part of the chest,) a difficulty sometimes occurs in deciding whether it originates on the left or right side. But a very careful examination of both halves of the cardiac region enables us in general to say distinctly that it is loudest on one side: and there we may always presume to be its source. Sometimes, but less frequently, a difficulty exists, from the extreme rapidity of the heart's action, as to whether the morbid sound is heard at the ventricular or auricular contraction—as to whether the sound is heard at the moment of the arterial pulse or not. But by listening for a length of time and repeatedly during even only one visit, the difficulty generally vanishes; the confusion which at first prevailed declines; and the coincidence and succession of the phenomena become evident: exactly as happens, when, on first surveying a large collection of visible objects, all are confused, and at length every object is perceived distinctly, or when a person listens for the first time to the healthy sounds of the lungs or heart, and finds all confusion, but by perseverance gradually distinguishes each with perfect accuracy.

Besides the preternatural sound, there is sometimes a thrill perceptible on applying the hand upon the heart,—a tremulous motion resembling the purring of a cat. This was stated by Corvisart, and afterwards by Laennec, to distinguish narrowing of the left auriculo-ventricular opening. But the latter, in his second edition, mentioned that he had found reason not to think it peculiar to the narrowing of that orifice. It results from the same causes as the preternatural sound. I believe that it occurs more frequently when that orifice is narrowed than when any other.

I believe also that, when this opening is narrowed, the pulse is generally irregular in both force and frequency,—a peculiar combination well known to practitioners, in which several beats succeed each other in rapid succession and with tolerable force, while others again occur slowly, and with little force, perhaps so weakly that they can scarcely or not at all be perceived, although at the heart the pulsation is evident enough.* This most irregular pulse is thought by Mr. Adams† to be pathognomonic of narrowing of the left auriculo-ventricular opening. Corvisart thought extreme irregularity of pulse in both force and frequency to characterise narrowing of the aortic opening. I do not happen to recollect a pulse irregularin force and frequency in a single case of narrowing

* Mr. Adams, Dublin Hospital Reports, vol. iv. p. 426, 436.

Since the delivery of these lectures, Laennec's accuracy has been called in question by others; and the stroke of the heart's apex, and the first sound of the heart declared to happen before the pulse, and to be produced by the dilatation and repletion of the ventricle, and the second sound to occur at the moment of the contraction of the ventricles, and to arise from the flapping of the parietes of the emptied ventricles together.

I would reply in the first place, as before, that when an obstruction exists at the mouth of the aorta or pulmonary artery, a morbid sound occurs at the moment Laennec supposes the ventricles to contract; and when at either auriculo-ventricular opening, at the moment he supposes the auricles to contract. This could not happen had he mistaken the periods of the ventricular and the auricular contractions.

Secondly, when the pulse at the wrist follows the stroke of the heart, it does so after only a very minute interval—such as may be explained by the distance of the radial artery from the heart, and actually occurs decidedly *before* the auricular sound—that which is now declared to be the ventricular. Moreover, when the pulse at the wrist is observed to follow the stroke of the heart, the pulse at the innominata (so much nearer the heart) may be found to precede that at the wrist, and to occur all but simultaneously with the heart's stroke, so that the relative distance of the parts explains the whole difference, and the pulsation of the arteries in all cases clearly arises from the stroke of the heart. If an artery is observed still nearer the heart than the innominata, no interval between its pulse and the stroke of the heart is perceptible. In four cases of aneurysm of the ascending aorta, producing a strongly pulsating tumour to the right of the sternum, this and the heart, when the fore-fingers were placed upon both, were felt, and by all seen, to pulsate quite synchronously. When the obstruction is at the mouth of the aorta or pulmonary artery, the preternatural sound I have always noticed synchronously with the pulse. When at an auriculo-ventricular opening, in the intervals of the pulse,—after or before the pulse. It sometimes in the latter case is so prolonged as to last till the pulse is again felt, so that there is no interval, but merely an equal alternation of the ventricular and the preternatural auricular sound: or even an interval occurs after the ventricular stroke, probably from the auricle not being disposed for contraction at the usual time, on account of its contraction having been so lengthened by the difficult escape of its blood that a longer repose is required than just during the ventricular contraction—here the auricular sound occurs first, then the ventricular, and then the interval.

Thirdly,—the sounds considered by Laennec to be auricular and ventricular, are heard loudest, both in health and when morbid, at the seat of the auricles and ventricles respectively.

* In cases of any disease, if the pulse is too rapid to be counted at the wrist, it may almost always be counted at the heart. I have easily counted two hundred pulsations at the heart, when it was impossible to count the pulse at the wrist. Ossification of the radial arteries causes the pulse to be feeble, while perhaps the action of the heart is natural, or even very strong; and in cases of this condition of the vessels, and in many others, the action of the heart should always be examined at the chest.

Laennec employed the stethoscope in its entire state, to examine the heart; and the presence of the plug is certainly advantageous in ascertaining the impulse. But, for observing the sounds of the heart, the instrument is much better without the plug. The excavation renders the sounds far more audible.

After trying an infinite variety of stethoscopes, I am satisfied that a stethoscope in one piece, of the most simple form and of cedar-wood, is inferior to none and superior to many.

It is often very useful to make the patient suspend his breath for a few moments while we are listening to the sounds of the heart. The murmur of respiration is sometimes mistaken for a cardiac bellows-sound, and in dyspnœa the sounds of the lungs sometimes completely overpower those of the heart.

† Dublin Hospital Reports, vol. iv. p. 424.

of the aortic opening solely, while I know that it is very common in the narrowing of the left auriculo-ventricular opening, though possibly not peculiar to it, nor indeed to narrowing of any opening.* Mr. Hodgson also mentions, that, in narrowing of the left auriculo-ventricular opening, there is often a double pulsation of the heart, *i.e.* two beats of the heart to one of the wrist—a pulsation of the heart from the action of the ventricle, and another from the action of the auricle. He appears to attempt to explain the fact, but this able surgeon expresses himself in rather an obscure manner. "The auricle," he says, "first acts, and propels its contents into the ventricle; but, from the contraction of the communication the blood is not, as in the natural state, poured at once into that cavity. The ventricle, though imperfectly filled, contracts, and forces the blood into the aorta. Thus there is a pulse caused by the action of the auricle, and another by that of the ventricle, so that for every pulsation at the wrist, two are perceptible at the heart." This does not appear to me a satisfactory explanation. The truth is, that in health there is a double action of the heart—one of the auricles and another of the ventricles—perceptible to the ear; though this was not generally noticed at the time Mr. Hodgson wrote. When the left auriculo-ventricular opening is narrowed, so that the blood can be only squirted into the ventricle, this auricular action is sometimes very distinct to the hand, in the condition of a thrill or purring, which is what Mr. Hodgson had remarked and called "an irregular thrill (I use his own words), or *bruissement*, as Corvisart terms it, rather than a distinct pulsation." Sometimes it is a distinct shock, and in another sentence Mr. Hodgson speaks of it as such, saying, "Thus there is a pulse caused by the action of the auricles, and another by that of the ventricles;" "nor is the auricular pulse trifling."† This happens only, I believe, when the walls of an auricle are increased in substance—are in a state of hypertrophy, so that they act with a force approaching to that of the ventricles, and a double stroke of the heart may be felt by the hand. That this, and not the imperfect repletion of the left ventricle by which it acts twice, is the reason of the double stroke, appears to me shown by the fact that, when it has been observed, the auricle or auricles have always been hypertrophied, and in some cases the auriculo-ventricular opening not at all narrowed; and, secondly, that it is not observed, however narrow the auriculo-ventricular opening, if the auricle is not hypertrophied,—and, indeed, this hypertrophy is rare, as the obstruction usually produces dilatation and thinning.‡

Corvisart remarks that obstruction at either aperture on the left side causes more irregularity than obstruction on the right. Even the thrill is frequently absent when the narrowing is considerable, and I am ignorant upon what exact conditions it depends, whether upon the degree of the narrowing, or the shape of the diseased opening, or what.

A third peculiarity has been remarked in the narrowing of the left auriculo-ventricular opening, viz. smallness of the pulse: and a good example of this is given by Mr. Abernethy,* and another by Mr. Adams.† The small quantity of blood poured into the left ventricle at each auricular contraction is insufficient to enable this cavity to project a due portion into the arteries, whence the smallness of the pulse. But the same smallness of pulse results from a narrowing of the aortic opening, and nothing but the observation whether the preternatural sound which may exist occurs at the auricular or ventricular action, can determine whether the narrowing is at the auriculo-ventricular, or at the ventriculo-aortic opening. It may also result from a general diminution of the cavity of the left ventricle, accompanied by no narrowness of opening: for this must obviously occasion a small projection of blood into the arteries equally with a diminution of aperture. The importance of this symptom alone, therefore, is absolutely nothing. It does not necessarily indicate narrowing of the openings in the left side of the heart. If, indeed, the preternatural sound is heard at the ventricular contraction, this smallness of pulse may assist in leading to the idea that the narrowing is on the left side of the heart; but the greater loudness of the sound on the left side will sufficiently declare it. The inferiority of this symptom in the pulse to the observation of the preternatural sound is shown by the preternatural sound occurring long before the pulse grows small. I have often noticed no smallness of pulse up to the time of death, when an auricular or ventricular preternatural sound, loudest on the left half of the cardiac region, showed the left auriculo-ventricular or ventriculo-aortic opening to be diminished, and after death this state of parts was discovered.

When the narrowness is at the mouth of the aorta, the action of the left ventricle, notwithstanding the pulse is small, is sometimes very strong, from its walls being hypertrophied.

Interesting as is the presence or absence of these symptoms of the thrill, the irregularity of the pulse in force and frequency, and the smallness of the pulse, which are chiefly relied upon in common to determine the existence and seat of a narrowing of a cardiac opening, and useful as they are in many cases to assist the diagnosis, they are all far inferior to the observation of the existence or non-existence, and of the seat, of the preternatural sound. Yet they should be looked for and investigated in every case; they may confirm the inferences drawn from the morbid sounds; and cases may happen in which the observation of them may be necessary to deducing the source of the sound.

When Laennec published his first edition, he believed that a bellows-sound never occurred in the heart but

* Laennec considers irregularity in frequency to arise generally from dilatation: and this is a common consequence of narrowing of an opening.

† A Treatise on the Diseases of Arteries and Veins. Dr. Parry, in his work upon the pulse, adopts Mr. Hodgson's explanation without any reference.

‡ Dublin Hospital Reports, vol. iv. p. 416, 1829.

* Medico-Chirurgical Transactions, vol. i.

† Mr. Adams, (Dublin Hospital Reports, vol. iv. p. 435,) refers the double pulse to hypertrophy and dilatation of the right ventricle, which acts strongly, while the left has too little blood to discharge into the arteries to give a pulse regularly. But, as the left ventricle acts and empties itself every time the right ventricle does so, there is no reason that it should not accumulate blood enough for it to occasion a perceptible pulse. Disproportionate pulsation of the heart and of the arteries is, of course, owing to a strong pulsation of the right ventricle and often also of the left, both or either of which are often hypertrophied, and the small quantity discharged from the left. A regularly double pulsation at the heart appears very explicable in the mode mentioned in the text. When the pulse varies in force at different moments, I have always observed the strokes of the heart proportionally to vary.

when a cardiac opening was narrowed by change of structure. In his second edition, he states that he had frequently since heard it when no narrowness or any organic change existed, and had not heard it occasionally when the valves were ossified; but does not say whether when the openings were also narrowed—and mere ossification could not be expected to produce it. Andral, in his *Clinique*, mentions the results of his experience to be the same. Laennec witnessed it in merely hysterical and nervous persons, and in the plethoric, and often found it temporary. He makes the same remark in regard to the purring thrill; and as both the bellows-sound and the thrill occur occasionally in the arteries as well as in the heart, he applies the same observation to both seats of these phenomena,—that in both the heart and arteries they may arise from organic changes or merely temporary causes. The temporary causes are supposed to be plethora—the existence of more blood than the ordinary size of the passage will allow to proceed freely, and spasm. Yet when other signs of diseased heart are present, and the preternatural sound is permanent, Laennec considered it a sure sign of a narrowed opening. In regard to spasm, he supposed that the bellows-sound was the sound of the inordinate contraction: I should ascribe it to the narrowness induced by the spasm.

I once witnessed a remarkable instance of the temporary occurrence of this sound. In this case there was ascites, and the bellows-sound, which was in the region of the left ventricle and took place at the ventricular action, instantly ceased on the removal of the fluid from the abdomen, and was not heard for several weeks, when the fluid again accumulated, and it again became audible. Whether the heart lay so that the elevation of the diaphragm by the abdominal fluid tilted it to an angle with the commencement of the aorta, I cannot say, not having been present at the inspection; nor can I say whether any little organic narrowness existed at the mouth of the aorta, or this vessel was compressed by the dilated right auricle sufficiently, with the addition of a little unusual position, to obstruct the blood to the degree of the bellows-sound.

A patient was some months ago in St. Thomas's Hospital, in whom the recumbent posture produced it. She was a young woman with chronic bronchitis, dyspnœa, livid lips, and œdematous legs, and afforded no bellows-sound while erect; but it became audible the moment she lay down. By a daily emetic for some time, her lungs were so relieved that she left the house.

I have since noticed the same fact in other cases of dyspnœa: and it shows the necessity of carefully examining patients in both postures. By continuing the investigation of this point, I have ascertained that the preternatural sound heard with the pulse,—the ventricular, is generally louder, and often very much louder, in the recumbent posture: while the preternatural sound, when auricular, is louder, if any thing, in the erect.

The cause of the ventricular bellows-sound being less loud in the erect posture is, perhaps, that the ventricle is then drawn down more into a straight line with the aorta by the gravitation of the heart, and an easier exit given to the blood. If the preternatural sound is ever produced by the dilatation of the right auricle causing a pressure upon the rising aorta, this pressure would necessarily be greater in the supine posture, and the difference might be explained in this way, if it never occurs but when this is its cause: and though I have now very frequently noticed the difference, I have not opened a case after such an observation where the obstruction was from disease of the aortic valves, and am therefore unable to say whether, in every cause of ventricular bellows-sound, the difference of posture has this effect.

Perhaps in some cases the bellows-sound has been heard at one time and not at another, from the mere circumstance of the patient having been examined in different postures.

In several cases I have found no narrowing of the aorta or its mouth after death, in which a bellows-sound had been invariably heard at the ventricular contraction; but in them all the right auricle was greatly dilated. When in this state I think it must press against the rising aorta, and perhaps sufficiently to cause the preternatural sound. If this is the case, and if dilatation is sometimes a temporary disease, as many assert, we have thus one cause of the temporary bellows-sound.

I lately, through the kindness of Mr. Hensleigh, examined the heart of a poor man who died near the New Road. He had laboured a year before under symptoms of violent pericarditis in which I saw him, of hypertrophy and dilatation of the left ventricle, and narrowing of the the left auriculo-ventricular opening. The pericardium was so coherent that no pericardial cavity existed, the auricles were bound down upon the ventricles, and the left ventricle was hypertrophied and dilated. The lining membrane of the left ventricle was thickened about the valves, and at them was thick and opake, without the play of the valves, however, or the aperture, being in consequence of this diminished. But a quantity of fibrine lay in the large opening of the mitral valve, firmly growing to it, and the diminution of space thus produced had occasioned the auricular bellows-sound. Had this fibrine not been firmly attached, it might at an early period have been washed away, and the bellows-sound proved temporary.

Bertin conjectures that the temporary presence of lymph in the cardiac cavities or at the orifices, is the cause of this sound when temporary.

If inflammation, acute or chronic, occur about the openings, the part may perhaps be temporarily constricted by spasm, exactly as we see happen in the urethra when it is more or less inflamed.

Great turgescence also of the substance of the heart near an opening might also cause more or less impediment.

The temporary bellows-sound has always, in my experience, been at the contraction of the ventricles: and as a very slight impediment is sufficient to occasion the sound, I have no doubt that a degree of contraction at the mouth of the aorta frequently exists without being recognised.

How slight an impediment is enough, is demonstrated by the effect of posture just mentioned: and that the bellows-sound in the heart and arteries is really produced by impediment, appears from our being able to produce it in the abdomen by compressing the abdominal aorta with a stethoscope, and regulate its intensity by varying the degree of pressure.

I, myself, have never but once seen the openings narrowed, unless this sound had previously been heard

whenever the action of the heart was listened to. In M. Bertin's valuable book upon diseases of the heart and aorta,—one of the best which we possess, a large collection of diseased valves is detailed, and he says "we have so often had occasion to verify the certainty of the signs of unnatural sounds, they have so often enabled us to recognise the narrowing of the orifices of the heart with great facility, that we do not hesitate to repeat that the diagnostic of this disease may be established in the most positive manner. The preternatural sound has never failed us, has never deceived us." M. Bertin means a permanent preternatural sound, because he allows a temporary one from other causes than organic lesion.

In my own experience, not only has but one instance occurred of narrowing of a cardiac orifice, without preternatural sound, but no instance in which this sound, from the moment of its occurrence and its situation, had not been evidently referrible to the narrowed spot. No disease of the valves, not even a deposit of bone, can be expected to produce it, unless attended by narrowness of the opening.

Twice only have I heard the preternatural sound from an obstruction to the entrance of the blood into the pulmonary artery, visible after death. In each case, the pericardial cavity was abolished by complete cohesion of the parietal and cardiac portions of the pericardium; in some spots, the membrane was cartilaginous, and in each case a knob of cartilage dipped so deep from the pericardium into the substance of the heart, as to narrow the right ventricle considerably just at the origin of the pulmonary artery. In one of the cases, the pulmonary artery was contracted to the dimensions of the brachial. Unfortunately, I have not both specimens, for one body was opened, after its removal from St. Thomas's hospital, in an alley of a miserable back-street in the Borough, while three Irishmen stood at my side looking so determined, that I did not venture to attempt to gain possession of the parts; the other specimen was allowed to macerate in water till it was nearly spoiled, but the knob of cartilage remains.* A bellows-sound had been heard constantly in each patient, at the ventricular action, synchronously with the pulse, and loudest at the lower part of the sternum—the region of the right ventricle. As may be imagined, the general venous system suffered an accumulation of blood,—the eyes were suffused, the face of a leaden hue, and the lips purple; the external jugulars and superficial veins about the angles of the jaws and clavicles exceedingly distended, and the legs anasarcous. The pulse was quick and irregular, but, from the obstruction existing *before* the lungs, the dyspnœa was inconsiderable. The diagnosis of the cases was so evident, that it was pronounced long before death took place, and the two cases stand recorded in the public books of the hospital. There was no symptom, nor intensity of symptom, referrible to the adhesion of the pericardium: the obstruction explained every symptom.

Instances of obstruction at the mouth of the aorta are very common; indeed I am rarely without two or three such cases among my hospital patients, and I have never found this morbid appearance, where auscultation had not clearly shown its existence during life, by the constant preternatural sound at the moment of the ventricular action, and solely or most loudly in the region of the left ventricle.

Obstruction at the opening of the bicuspid or mitral valve is next in frequency, and I have never seen it, excepting once, where it had not during life produced some of these preternatural sounds constantly at the moment of the auricular contraction—in the intervals of the stroke of the heart, and solely or most loudly in the left half of the cardiac region—and at the cartilages of the left ribs, unless the left auricle and perhaps ventricle were dilated, when the upper part of the left half of the heart extends so much to the right, that the sound of the left auricle is often heard at the sternum or even still more to the right.

The right auriculo-ventricular opening I have never seen narrowed alone,* and of the six instances of decided bellows-sound in the region of the right ventricle, and at the moment of the ventricular action, investigated by me after death, although two disclosed obstruction of the mouth of the pulmonary artery, as I have already stated, three occurred in the opposite state of the opposite opening in the ventricle—there was a permanent patency of the right auriculo-ventricular opening. The first instance occurred in a female twenty-seven years of age, who had suffered several attacks of acute rheumatism, the first of them eleven years previously, and for eight years had been subject to violent palpitation, dyspnœa, and pain in the region of the heart, with a sense of stricture and smarting in the front of the chest when supine, and of suffocation on exertion or mental emotion. The bellows-sound was heard in two parts of the cardiac region, and at the two periods of the heart's action. It was heard in the region of the left auricle, in the intervals of the stroke of the heart; and in the region of the right ventricle at the period of the ventricular action—at the moment of the pulse; and this constantly, for I examined her more than once after a long interval. The sound in the left and upper part of the cardiac region, at the moment of the auricular action, showed that the mitral or bicuspid valve was diseased and the left auriculo-ventricular opening narrowed. There was a further confirmation of this opinion, if confirmation were necessary, in the circumstance of the pulse being small, though the heart acted violently and irregularly in strength and frequency. The bellows-sound in the right half of the cardiac region, and at the moment of the ventricular action, showed affection of one of the openings of the right ventricle. Never having read of a permanent patency of a cardiac opening and its effects, nor met with an example of it, I hastily pronounced that, besides the narrowness of the mitral opening on the left side, there was an obstruction in the right ventricle at the mouth of the pulmonary artery. If permanent patency is a case of bellows-sound, I ought to have only said affection of the right ventricle at one of its openings. For, on inspection, the course into the pulmonary artery was apparently free, but the tricuspid valve was bound down on one side, and therefore half useless, leaving a cer-

* See PLATE I. FIG. I. A.

* See PLATE II. A.

tain degree of passage to the blood of the right ventricle back into the right auricle when the ventricle contracted.* The left ventricle was greatly hypertrophied and dilated, and the right auricle greatly dilated,—the former of which states had been indicated by the great force of the left ventricle, and the latter by the loud clear sound of the right auricle.—Very soon afterwards, I was desired to see a patient belonging to one of my colleagues, labouring under disease of the heart. Auscultation instantly showed hypertrophy of the left ventricle, and dilatation of the right auricle, and there was the bellows-sound in the right ventricle at the moment of the ventricular action. This last symptom caused me to expect disease at one of the openings of the right ventricle. The patient died the same day. The left ventricle was found hypertrophied, the right auricle dilated, and the tricuspid valve partially bound down, and therefore partly useless.—I witnessed a third instance of the bellows-sound in the right ventricle at the time of its action, in a negro, under the care of another of my colleagues; but the specimen, I believe, was not preserved. The left ventricle was hypertrophied, and the right auricle dilated. In these cases, the opening was not organically narrowed, nor the valve thickened, but simply bound down in half its extent. Had the valve been completely bound down, regurgitation would have been too free, I conceive, for the bellows-sound to have been produced. Playing partially, it left a narrow passage only back into the auricle.

A permanent patency of the tricuspid or mitral valves when these are thickened and their opening narrowed, is not uncommon. I doubt whether the semilunar valves of the aorta or pulmonary artery could be much bound down: they may be rendered partly useless, but are then always thickened, and ruptured, or their opening diminished. Neither, indeed, have I ever noticed the mitral valve to be bound down: though the bellows-sound in the left half of the heart, and disease of the mitral as well as of the semilunar valves, is of every day occurrence.

I do not recollect any allusion to this morbid state of the valves, except in the Annals of Medicine and Surgery, for 1816, in which a dissection is mentioned, and, among various morbid appearances, it is said that the tricuspid valve was partially bound down. Neither have I discovered in Laennec, Andral, Collin, or Bertin, any account of permanent patency from inutility of valves as a cause of the bellows-sound, except that Bertin describes a case of constricted mitral opening with great dilatation of the left auricle, in which there was a loud bellows-sound at the *auricular* action, and loudest in the region of the left auricle, as inevitably must have happened, but perceptible also in the region of the right auricle. The circumstance of the sound being perceptible in the region of the right auricle, he ascribes partly to the right auriculo-ventricular opening being so large that the tricuspid valve, which was diseased, was insufficient to close it. But he appears to me in error. It is very common to hear the bellows-sound, whether auricular or ventricular, in *both* halves of the cardiac region, when its source is in one only, at least in the left only. The sound, however, is always loudest in the half which is its source. And this extension of the sound is most remarkable when the cavity is dilated, the opening of which is diseased: for the cavity, at least the left, then encroaches upon the region of the other half of the heart. Now this actually was the fact in Dr. Bertin's case. The auricles were both dilated, but the left,—the seat of the bellows-sound, was dilated one-third more than the right. Besides, that he was wrong is farther shown by the bellows-sound occurring at the *auricular* contraction on the right side no less than on the left where its source was the narrowness of the left auriculo-ventricular opening. Had the permanent patency of the right auriculo-ventricular opening caused the extension of the sound to the right side, it would have been heard at the *ventricular* contraction, for the inutility of the valve would have operated at no other time—could have made no difference to the course of the blood from the auricle.—The opinion of the permanent patency of a cardiac opening from any cause, as a source of the bellows-sound, I heard first from Dr. James Johnson. Who originally suspected it, I cannot say. Dr. Johnson imagined he had learnt it from Laennec and other writers upon auscultation; but, as I have already stated, I have found no other notice of it than the erroneous view of Bertin. Preternatural patency sometimes arises from dilatation of the cavity on either side, and enlargement of the opening, so that the valve though healthy, has become insufficient to close it entirely, leaving a narrow passage for regurgitation.*—I may mention that a relative narrowness of an opening occasions the *bruit de soufflet* as well as an absolute narrowness—*i.e.* the size of the opening remaining the same, but the cavity behind it becoming dilated, and its walls perhaps thickened, the natural proportion between the two is lost, and the effects of real and absolute constriction are produced. This I think I have seen in more than one case of dilatation and hypertrophy of the left ventricle.—The silence of authors upon the morbid patency of the cardiac openings from the adhesion of the valves, except in the one case in the London Annals of Medicine and Surgery by Dr. Carbut of Manchester, inclines me to believe that many cases in which the bellows-sound had been heard, and yet no morbid appearance was discovered to explain it, were probably cases of morbid patency which was entirely overlooked; more especially when I reflect that no fewer than three cases of this kind have occurred to me during the last few months.

Still in all the three cases in which the tricuspid was bound down, and the bellows-sound had been heard, there was hypertrophy or dilatation, or both, in some compartment of the heart, and this might probably have so affected the opening of the cavity at which the sound was heard, as to contribute to the production of the sound:—in all three the left ventricle was hypertrophied and dilated, and the right auricle greatly dilated. This is further probable from the fact, that, when the tricuspid has not been bound down, and there was hypertrophy or dila-

* See PLATE III. D.

* See, for instance, Dr. Abercrombie's Paper on the Pathology of the Heart, in the Edinburgh Medico-Chirurgical Transactions, Vol I. Case 16 and 17.

In Case 17, corrugation of the valve and morbid enlargement of the opening conspired.

In all three the auricle was greatly dilated, and in one the ventricle also.

tation or both, in the left side of the heart, or dilatation of the right auricle, I have frequently heard the bellows-sound, auricular or ventricular: and yet, although I cannot imagine the bellows-sound to have any other than a mechanical cause, the relaxed state of the parts after death allowed no affection of the opening of the auricle or ventricle to be discoverable. And further, to prove that the cause was mechanical, a purring thrill was *felt* by the hands, in some of these very instances, at the moment of the *sound*.

Another source of the many instances of declared absence of morbid appearance to explain previous bellows-sound is, I am convinced, the custom of slitting up the openings, especially the ventriculo-arterial, without previously passing the fingers through to ascertain whether any constriction exists. For this sometimes occurs at the root of the valves, though their appearance is perfectly healthy; and the slightest diminution of an opening, whether from internal causes or external pressure, is sufficient to induce a degree of bellows-sound, such as may readily escape detection and not have produced any marked derangement of circulation or respiration.

It is also to be remembered, that those who are not familiar with the diseases of the heart, very easily pass over a morbid appearance, just as those who have not spent some time upon auscultation, pass over the most morbid sounds during life, although they listen.

I should be inclined to consider this morbid patency of the tricuspid valve, or some change of the opening of the right ventricle by the hypertrophy or dilatation of some part of the heart, the most frequent cause of the bellows-sound in the right ventricle. For thickening and narrowing of the valves on the right side of the heart are comparatively so rare that Bichat declared he never saw disease in them. Bertin, in the course of twenty years met with important induration in the tricuspid, even of a cartilaginous character, but four times. Disease of the mouth of the pulmonary artery is still rarer. A case is mentioned by Bertin where a sort of hymen existed at the mouth of the pulmonary artery; but it was probably congenital, and this is the only instance of obstruction that he ever saw at that spot. Dr. Hue has just presented to the College an extraordinary heart, taken from a patient in St. Bartholomew's Hospital. The walls of the right ventricle appear grown up around the mouth of the pulmonary artery, so that the opening from the ventricle is no larger than the circumference of a goose-quill;* and a short canal of this dimension had to be traversed by the blood before it reached the mouth of the pulmonary artery, which is of the usual size. This state was probably, like Bertin's case, congenital, for two additional and evidently congenital cavities exist in the substance of the heart—two supplementary little right ventricles,† one leading from the pulmonary artery, and the second from the first. A bellows-sound occurred in the heart, with venous congestion and dropsy. I have never seen obstruction from disease of the pulmonary semilunar valves. Bertin refers to two, one in Morgagni, and one seen by M. Louis at la Charité. But in both, as well as in that which he himself saw and which was just alluded to, both halves of the heart communicated, so that the right was in the condition of the left—washed by a portion of arterial blood, and it is under such circumstances that ossification or extensive cartilagination of the valves of the right half takes place. I have but once seen material induration of the tricuspid valve and narrowing of its opening; three times only impediment, visible after death, to the entrance of the blood into the pulmonary artery, and then, as I have said, not from any disease of the valves, but in two of them from the accidental situation of a piece of cartilage in the substance of the heart near the commencement of the artery,* and in the third, Dr. Hue's case, from the right ventricle being grown together just before the origin of the artery. Yet I have three times seen the tricuspid partially bound down, without being thickened or otherwise diseased; the right auricle however being dilated. I have heard a bellows-sound at both sides, and at the ventricular action, from a piece of bone lying between the pulmonary artery and aorta, and very slightly compressing both; and several times I have heard it constantly at the ventricular action, in patients who died of disease of the left side of the heart, with enormous *dilatation of the right auricle which appeared necessarily to have compressed the aorta*, and in some even the pulmonary artery, especially in the supine posture. An increased thickness of the muscular substance, near an opening, without any disease of the valves, will cause impediment enough for a degree of the preternatural sound, though the diminution of the opening is not appreciable to any but an experienced eye.

As the openings of the veins into the auricles are unprovided with valves, no morbid patency of them can give rise to an auricular bellows-sound: and of the auriculo-ventricular openings, I have observed the right only to occasion it by being bound down. The sound takes place at the same time as the sound from constriction of the arterial opening leading from the ventricle, viz. at the ventricular contraction; and while, in the latter case, it is produced by the difficulty opposed to the blood's natural course, it arises in the former from the blood streaming back into the auricle, but with some difficulty as part of the valve still plays.

If, instead of being adherent, the tricuspid or mitral valve is thickened and grown together, so as to leave a small opening only in its centre, this frequently cannot be closed,† and the blood partially retrogades at one action, and passes on with difficulty at the other, and both an auricular and ventricular preternatural sound are heard.

Any change which impedes the blood from a ventricle, and allows a partial return of it into the ventricle, will also cause a double bellows-sound in the ventricular region.

To indicate permanent affection of one of the cardiac outlets, therefore, the bellows-sound must be permanent in the spot where it is heard. When perceived in a ventricle, and at the ventricular action, it may indicate affection only of one of the openings of the particular ven-

* See PLATE I. Fig. II. A.

† On Supernumerary Parts of the Heart, see Andral, Précis d'Anatomie Pathologique. T. II. p. 343, sq.

* See PLATE I. Fig. I. A.

† See PLATE II. A.

tricle without determining which; but I believe that it very rarely occurs in the left ventricle except where there is obstruction to the blood leaving the heart. The uncertainty in the case of the right ventricle, I conceive, may be generally cleared up, if the sound is at all strong, by observing the degree of fulness of the jugular and other veins of the general venous system; for where the sound arises from organic obstruction at the mouth of the pulmonary artery, the face is livid and the jugulars distended, and there is little dyspnœa: while in the three cases of bellows-sound from mere partial patency of the right auriculo-ventricular opening, which I saw, there was very little fulness of the external veins. If the bellows-sound in the right side is double, *i.e.* occurs at both the auricular and ventricular contraction, there can be little doubt that its source is the tricuspid valve diseased so as to both give difficult passage to the blood and offer *imperfect* opposition to its regress. If the preternatural sound, wherever its source, arise from no absolute narrowing of a cardiac outlet, but from the cavity before it being so dilated that the orifice is become relatively too small, there will be evident signs, hereafter to be mentioned, of this dilatation.

I believe that the latter is the cause of the bellows-sound in dilatation of an artery:—the natural dimensions of the vessel beyond the dilated portion are too small for the ready escape of the blood from this, and a relative constriction therefore exists. The bellows-sound is heard certainly in the dilated portion itself, but then in cases of absolute constriction of the mouth of the aorta, the chief seat of the bellows-sound is the left ventricle—the part behind the constriction.

And this leads me to remark that the proper expression for narrowness of a cardiac outlet, as a cause of these preternatural sounds, is not an absolute narrowness, but a relative narrowness—a diminution of the natural proportion of an outlet to the cavity behind it, as the preternatural sound will arise if the opening is unchanged, but the cavity behind it enlarged, so that the opening is proportionately become too small: and as I once witnessed extreme narrowness of the left auriculo-ventricular opening, from disease of the mitral valve, and yet no preternatural sound was heard, because the cavity of the left auricle—the cavity from which the opening led, was proportionally reduced in its dimensions by disease.

We thus perceive that the existence of these preternatural sounds is not to be considered exclusively, but that their history demands enquiry, and that all other symptoms should be viewed in conjunction with them. And in this, the preternatural sound differs not from every sign ordinarily examined by physicians, whether relating to the pulse, temperature, pain, or whatever else. In many cases, what inference can be drawn from the pulse alone, although a physician would be most culpable to neglect it? In a plethoric female, strong enough to go about as usual, but with a pain in the head and left side sufficiently severe to require venesection, it is frequently so small and weak, that were general signs of debility present, it would put the loss of blood quite out of the question. Yet, from the aspect of the patient and her general muscular strength, we do not hesitate to bleed freely, and the loss is borne well. In acute inflammation of the abdomen with a similar pulse, the age, aspect and flesh of the patient we consider sufficient to justify us in bleeding, and the pulse enlarges with the progress of the amendment. The occasional slowness of the pulse in fever, if the head is not oppressed, does not indicate the loss of blood; but, coupled with signs of cerebral disturbance, we often consider it a sign of such affection of the brain as requires the removal of blood. Great fulness and force of the pulse in fever are no indication for bleeding if no sign of local inflammation exist, and actually subside under a cool temperature and mild antiphlogistic measures, and health returns much sooner than if venesection is employed. In acute rheumatism, the temperature will ascend to 107° without the the least danger, or necessity for strong antiphlogistic measures.

The *general* symptoms of obstruction within the heart are well known, but usually insufficient to determine not only the seat of the obstruction but even its existence.

Of the occasional smallness of the pulse in obstruction on the left side, I have spoken, and considered its value in the diagnosis. Its irregularity in strength and frequency, perhaps oftenest observed in constriction of the mitral opening, has also been examined with the same view. Besides these, the general symptoms of obstruction in the heart are dyspnœa, perhaps amounting to orthopnœa, palpitation, quickness, and intermittence, of the heart's action, starting up from sleep, paleness and leaden hue of the countenance, blueness of the lips and tongue, suffusion of the eyes, fulness of the under eyelid, anasarcous swelling of the face, and indeed of the whole body, generally commencing in the feet, paucity of urine, distension and pulsation of the jugular veins, flatulence, &c. The dyspnœa is usually greater when the disease is upon the left side, but chronic inflammation of the lungs, *i. e.* chronic bronchitis, so generally accompanies disease of every portion of the heart, and indeed is so common a cause of death in all cardiac diseases, that the dyspnœa is sometimes intense in obstruction on the right side. The distension of the veins is usually more considerable when the obstruction is on the right side; great obstruction, however, on the left side has the same effect, and so likewise has mere congestion or chronic inflammation of the lungs.

But these general signs are insufficient to point out the seat of the obstruction, and often indeed its existence, for they accompany all other kinds of diseases of the heart, and even many affections of the lungs, and the collection of fluid in the pleuræ; and I know that without the aid of the peculiar sounds which have been discussed, the most erroneous diagnoses are every day made. Long before any other symptom arises from the obstructing cause, these preternatural sounds indicate its existence, and point out cardiac affection which might not have been suspected till irremediable.

Disease of the valves generally produces or is occasioned by disease of the substance of the heart itself, so that other cardiac symptoms, as well as the preternatural sound, present themselves.

Sometimes the obstruction arises from excrescences of the valves, very much resembling warts upon the

genitals, and erroneously ascribed by Corvisart to the syphilitic poison. Some consist of round, others of elongated, portions;* some adhere firmly, others not. Being soft, they may, till not very large or numerous, cause no inconvenience, and create much surprise after death. Still I should think that they occasion a bellows-sound.

Like induration and ossification, they are frequently the result of inflammation, as the ordinary proofs of it are seen simultaneously in the pericardium: but, like those changes, they sometimes exist solitarily in a valve, and no sign of inflammation is any where discernible.

This kind of ossification—unaccompanied by marks of inflammation, generally occurs in persons advanced in life, is very partial, and begins either on the surface or in the substance of the valve, may be merely at the base and interior, or merely at the edge; while the inflammatory is rather the disease of the young, is rather general in the valve, and succeeds cartilaginous induration. It sometimes assumes the form of an excrescence, and one is almost surprised to find the vegetation, as it is termed, in some degree bony. Whether the bone is deposited under or upon the membrane of the valve, though probably it is always originally under, it comes equally into contact with the blood, as in the former case the membrane cracks and exposes it: and the various portions of the deposit readily detach themselves on the least friction by the finger. It is said sometimes to collect in a projecting form, like stalactites; but this appearance, I imagine, occasionally at least, to arise from the valves cracking and their extremities becoming detached,* and Dr. Baillie published an engraving of valves so split. The membrane, when so diseased in arteries, is well known to crack, and thus frequently to give rise to aneurysm.

This kind of ossification—not preceded by inflammation, is observed not only oftener on the left side of the heart, but oftener in the aortic than in the mitral valve.

* See PLATE V. Fig. II. A.

* See PLATE V. Fig. I. A. Bertin saw one of the aortic valves almost entirely detached and floating loose.

LECTURE III.

OF THE DISEASES OF THE SUBSTANCE OF THE HEART.

With the anatomical marks of previous pericarditis or inflammatory change of the lining membrane of the heart, or after pain in the cardiac region and palpitation, perhaps occurring during or subsequently to rheumatism, we frequently observe the heart thickened or dilated, or both.*

The increase of the heart's substance, is, no less than the diseases of the valves, I am convinced, with Bouillaud, Bertin, Andral, and others, generally inflammatory. I have witnessed, after acute rheumatism, a constant and severe pain in the region of the heart, palpitation, and at length death; and found the left ventricle thickened, without any other morbid appearance in the organ, and here, no less than when the ordinary anatomical results of inflammation were visible, it was impossible not to consider the change inflammatory. On comparing an hypertrophied left ventricle with a healthy specimen, M. Chevalier, a pupil of Vauquelin's, found, under the microscope, that its fibres were redder; and, a portion of each being steeped in a separate quantity of distilled water, the hypertrophied portion reddened the water more than the other, and when taken out was still the redder of the two. On being put into boiling alcohol, it proved to contain less fatty matter.† Indeed an hypertrophied heart, if undilated, is always in the affected portions redder and firmer than usual, and its coronary arteries are enlarged, sometimes enormously. Besides, as hypertrophy is a common accompaniment of chronic inflammation of the outer or inner membrane of the heart, no doubt can exist upon the subject. Indeed its essence, being excessive nutritive action, cannot but be in some measure inflammatory. It is unquestionably produced in some cases by obstruction in the opening leading from the cavity whose walls are thickened, the difficulty giving rise to evident great muscular effects, and consequently to augmented circulation, of the organ. But even here it may be to some degree absolutely inflammatory, because the lining membrane of the cavity has generally been in an inflamed state, which in truth was the cause of the valvular obstruction.

Hypertrophy of the left ventricle is often found with disease of the lining membrane of the aorta; sometimes coexistent with the true and false aneurysm of the aorta, but not unfrequently is the sole diseased appearance.

Hypertrophy is frequently attended with dilatation, and more so perhaps when an obstruction to the egress of the blood from the diseased compartment exists. Dilatation often occurs alone, especially in the auricles, from this cause. But, like hypertrophy, it is sometimes the only morbid circumstance discernible, and therefore not so easily to be explained. The dilated portion, we shall find, is occasionally thin and soft, and the reason of the dilatation is then evident.

Hypertrophy is considered by Bertin, accordingly as the compartment of the heart is simply thickened, without any change in the dimensions of the cavity; as it retains its natural thickness, but is dilated, in which case there must be an hypertrophy or preternatural quantity of substance, or it would have become thinner; and thirdly, as it is not merely thickened, but its cavity diminished. He designates these three forms simple hypertrophy, eccentric hypertrophy, and concentric hypertrophy.

The second variety, eccentric hypertrophy, or increase of substance and dilatation united, was described by Senac, Morgagni and Lancisi, and denominated by Corvisart, active aneurysm of the heart. It is the most common of the three, and the excessive deposition must have taken place in the direction of the surface. The first variety, simple hypertrophy, in which the dimensions of the cavity are unchanged, and the deposition takes place also in the direction of the surface; and the third, the concentric, in which the cavity is diminished, and the deposition must have occurred in a vertical direction—at a right angle with the surface, were first described in 1811, by Bertin. In the concentric, the cavity is sometimes so small that it will scarcely contain the shell of an almond.

Every heart with thick parietes and a small cavity, however, is not perhaps an example of concentric hypertrophy. A violent contraction at death might probably produce these effects. But in such a case, the bulk of the organ would be proportionately lessened. To be justified, therefore, in declaring the existence of concentric hypertrophy, not only the parietes should be thick and the cavity small, but the bulk natural.

In the simple and concentric hypertrophy of the left ventricle, the thickness is sometimes double, or even triple, what is natural: the natural thickness of the walls of the left ventricle are about half an inch.

The thickening of the left ventricle is generally greatest at the base, in the first and second varieties, and lessens towards the apex. In the concentric, there is usually as much thickening at the apex as at the base.

* It is in general said that the heart is naturally about the size of the fist of the individual: that the walls of the left ventricle are twice as thick as those of the right, and in infancy and old age are four times as thick; but that the columnæ carneæ of the left are less voluminous than those of the right, though the surface of the left presents a more delicate and intricate reticulation; that when the two ventricles are cut into, the left should remain open, but the right fall together; and that the capacity of the two ventricles is equal.

† Bertin.

The septum of the ventricles, and even the columnæ carneæ, participate in the increase of substance.

The thickening is sometimes unequal in different parts, both in the case of the left ventricle and of any other part that may be hypertrophied.

The right ventricle, when not participating in the disease, is comparatively so small, and reaches so short a way down, that it looks like a mere appendage, or as if included in the walls of the heart.

The left ventricle is the most usual seat of hypertrophy. When the disease occurs in the right, the thickening is seldom, if ever, so great, and is generally more uniform: but the columnæ carneæ, it is said, are generally more enlarged in proportion.

Sometimes both ventricles are hypertrophied; sometimes one is hypertrophied, in one or other of the three varieties of the affection, while its fellow is only dilated.

Hypertrophy rarely affects the auricles; and still more rarely unless other disease exists in the heart. It is generally united with dilatation of the auricle. Laennec and many others never witnessed an instance of pure hypertrophy of an auricle.

If the walls of all the cavities of the heart are affected with hypertrophy and dilatation, or even both ventricles only, the heart may acquire an enormous size. Under these circumstances its form usually becomes rounded, its apex being effaced, and it lies almost transversely in the chest.

The thickening is sometimes partial only in the walls of a cavity, and even thickening and dilatation may exist separately in different parts of the walls of the same cavity.

The columnæ carneæ are in some instances more thickened; in others less, proportionally than the walls.

In *dilatation* of the heart, as we have seen, the natural thickness of the dilated parietes may be retained, or their thickness may be augmented: but there is a third variety of dilatation—the thickness may be diminished; and this was denominated passive aneurysm. The first of these varieties,—that in which the dilated parietes retain their natural thickness, appears to me, I confess, as true an hypertrophy as the second in which the thickness is increased, because dilatation would inevitably occasion attenuation, were not an addition of substance made.

Two or even three of these varieties may exist in the parietes of the same cavity.

Laennec regards original disproportion of the cavities as the most powerful cause of dilatation. But, certainly a very common cause is obstruction to the progress of the blood from the cavity, and the source of this obstruction may be situated in another cavity—in one farther forwards relatively to the blood's course. The auricle is frequently dilated and not the ventricle, when there is an impediment at the opening of the aortic or pulmonary artery: and when the difficulty is at the aortic opening, it is sometimes not the left auricle, but the right, which becomes dilated.

The obstacle may arise from a diminution of an opening, or from diminution of another cavity, as of the left ventricle. A permanent patency of the auriculo-ventricular opening, by which too much blood attempts to rush into the auricle, will create marked dilatation of it.

The auricles, from their thinness, are more subject to dilatation than the ventricles; and the right than the left, from the frequency of obstruction in the lungs. But both ventricles are often dilated simultaneously.

Dilatation would appear sometimes to be of only temporary duration: and the right auricle often becomes dilated in the dying state, especially when this is lingering, from the impediment to the blood's passage through the lungs.

While, in pure hypertrophy, the substance of the affected portion is usually very firm and red, it is usually soft and pale in dilatation with thinness: and when hypertrophy and dilatation exist together, the substance is generally firm or soft, accordingly as the hypertrophy or the dilatation is the greater.

In dilatation of the ventricles, the septum suffers least, and, contrarily to what happens in hypertrophy, the expansion takes place chiefly in the direction of the breadth, so that when both ventricles are dilated, the heart becomes usually almost round.

Dilatation occurs oftener in women than in men: and probably, it is supposed, from the female heart being naturally thinner.

Hypertrophy and dilatation frequently coexist in the walls of different cavities of the same heart.

Let us now enquire into the signs of hypertrophy and dilatation.

When the heart is hypertrophied, an unusually strong impulse is given in the situation of the part affected, and the sound usually heard there is diminished,—becomes a sort of murmur, and in severe cases it is not heard at all. The contraction takes place more slowly than in the healthy state, and, in the hypertrophy of the ventricles, little or no interval of repose occurs after the auricular action. When the heart is dilated, the reverse happens:—there is far less than the usual impulse in the situation of the part affected, and the sound usually heard there is augmented and is not merely louder but clearer than natural. In dilatation of the ventricles, their action takes place more rapidly than in the healthy state, and little or no interval of repose occurs equally as in hypertrophy.

In hypertrophy of the left ventricle,—its most common seat, a strong impulse is felt between the cartilages of the fifth and sixth left ribs, and the action of the auricles is very short. In hypertrophy of the right ventricle, this strong impulse is felt at the lower part of the sternum.

If the difference is considerable, it is easily discovered by the greater force with which the stethoscope is repelled in the affected side, when applied to the cartilages and the sternum in succession. Where the difference is less, it may, I think, be more easily ascertained, perhaps, by examining both sides at once in placing the hand longitudinally over the cardiac region, when the stronger impulse against the fingers lying over the left or the right half of the region will presently be noticed. In health, the impulse in both halves is equal. Should hypertrophy affect both ventricles at once, the excess of impulse in both halves will determine its existence in both, and the equality or difference of the morbid impulse will demonstrate its equality or difference in the two ventricles.

Hypertrophy of the auricles must be very considerable to afford an impulse. This, however, will be felt on the right or left superior half of the cardiac region, according to the situation of the hypertrophy.

The situation of the loud and clear sound of dilatation equally agrees with the seat of the dilatation.

It is wonderful how accurately we can determine the seat and nature of these diseases. If due attention is given and the symptoms carefully investigated, a physician may pronounce with certainty, frequently even at the first visit, that such a ventricle or both are hypertrophied or dilated, or the two in opposite states; that such an auricle or both are hypertrophied or dilated, or the two in opposite states,—no less than that an opening in a particular cavity is deranged: and an examination after death will verify his assertions. Laennec considers these results of auscultation, when well marked, infallible, and so I believe them. A good auscultator will never object, after making a full investigation, to write down his opinion and deliver it to another for the purpose of being read at the autopsy.

When hypertrophy and dilatation coexist in the walls of a cavity, the two sets of auscultatory signs are blended, and those of hypertrophy or of dilatation predominate accordingly as either state predominates.

In general the hypertrophy exceeds the dilatation; for, not only do we continually see an increase of thickness with dilatation, but, however extensive the dilatation, if the natural thickness is undiminished, nay, even if it is diminished but not in proportion to the dilatation, hypertrophy must still exist.

In these compound cases, therefore, the sign of hypertrophy,—the preternatural impulse, is generally the more prominent phenomenon, and I own myself to have repeatedly pronounced a case to be one of hypertrophy, when the cavity was likewise to a certain degree dilated; the dilatation, however, being much inferior to the hypertrophy, and the injury to the system arising not from the dilatation but from the hypertrophy.

This combination is every day seen in the left ventricle, the great disease of which is hypertrophy, but with its hypertrophy there is generally more or less dilatation.

When the left ventricle is severely affected in this twofold manner, its violent pulsations are felt not merely in the left lower half of the cardiac region, but also under the sternum, and even to the right of this bone. For the growth of the diseased ventricle pushes the right outwards and backwards, and occupies its place as well as the left side. But there is violent impulse equally in the left half of the cardiac region, proving the hypertrophy of the left ventricle, and there is a dull sound on striking the sternum, from the presence there of the enlarged left ventricle.

The cardiac region of the front of the chest corresponds with the lower third of the sternum, and the cartilages of the fourth, fifth, sixth and seventh ribs, thus having a right and a left half. The right or sternal half naturally sounds clear on percussion, and often even under dilatation of the right cavities: but enlargement of the heart from hypertrophy and dilatation, or the deposition of solid or fluid upon or around the organ, makes it sound dull or dead. The left or costal half of the cardiac region naturally sounds rather dull in most persons, and even dead in fat, anasarcous, and muscular persons, except at the highest—the auricular part, where some hollowness of sound is almost always heard, unless in enormous dilatation of the auricles, such as exists only with constriction, Laennec says, of the left auriculo-ventricular opening.

It is in some of these instances of combination of the two affections in the left ventricle,* that we frequently see those dreadful cases of violent palpitation and of throbbings of the arteries: and for no other reason, I presume, than that, in these, hypertrophy is carried to the highest pitch; for when, notwithstanding extensive dilatation, the walls are thickened, the quantity of additional substance must be enormous.

Towards the close of even this variety of hypertrophy, the impulse is often much reduced, and the heart sometimes grows soft, so that the pulse is weak, and the morbid action of the heart recognised only in the cardiac region. The occurrence of pneumonia may also obscure the stethoscopic signs while it lasts.

A considerable dilatation of the heart necessarily causes a dead sound to be heard more extensively than usual on striking the cardiac region with the ends of the fingers, and M. Piorry assures us, that, if a hard elastic substance is interposed at the time between the chest and the fingers, such a distinctness of sound is produced, that the size of the portions of the heart immediately under the sternum and ribs may be ascertained with the greatest nicety.†

The auscultatory signs are the only means of accurately ascertaining the existence and seat of these affections.

The pulse, the respiration, the state of the veins, the secretion of the cellular and serous membranes, the countenance, the state of mind, may all suffer, but the changes induced are too varied for any reliance, and may owe their origin to a thousand other circumstances.

In hypertrophy, especially with dilatation, the pulse is frequently full, causing head-ache, and even apoplexy, if the vessels of the brain are weak or diseased: but, when the opening of the mitral or aortic valves is narrowed, it may be very small while the left ventricle is hypertrophied and beats violently. In mere hypertrophy too, it is small, if the variety is the concentric—if the addition of thickness is attended by diminution of cavity. Irregularity of pulse is natural to some persons, so that regularity occurs only in disease. Irregularity in others depends upon disease of the head, stomach, or intestines, or of the lungs. Frequent faintness may be a purely nervous or sympathetic affection. Violence of arterial pulse may be purely functional, and, although the action of the heart be also violent and particularly on lying down, we generally determine with ease that the violence is independent of hypertrophy: but only by noticing that the violence is general—is of both

* See PLATE IV. A. B.

† *Sur la Percussion Médiate*, Journal Hebdomadaire, No. 36, page 137, "C'est à une ligne près que cette mensuration est précise." See also his work on the same subject, 8vo., 1828.

ventricles and both auricles; whereas in hypertrophy, it is nearly always confined to, or is much greater in, one cavity of the heart than another, the rhythm is altered, and often some sound preternatural in quality or morbidly intense is constantly heard in some one cavity, indicating organic disease. It might be suggested, that assistance, in many cases, would be given us in discriminating organic disease by the presence of anasarca, lividity, and tumefaction of the countenance. But palpitation may be violent and these symptoms present, without organic affection of the heart:—a chronic bronchitis, an original dropsy of the pleura may exist, and produce these symptoms; and here nothing but auscultation can determine that the heart is sound or not, and the anasarca referrible or not merely to the lungs or pleura. In all three cases, the anasarca usually commences in the feet.

Again the symptoms produced by a diseased heart will sometimes so remit, either from a decline of the ordinary irritation of the heart, or the cessation of some temporary irritation of another organ, as to create a doubt in the mind of any but an auscultator, that organic disease of the heart had really existed. Even the dropsy, frequently attendant upon organic disease of the heart, subsides and returns, without evident reason, or accordingly as the patient is quiet in body and in mind, and careful with respect to diet and vicissitudes of temperature, or the reverse.

Frequently, too, auscultation will disclose cardiac disease, and the symptoms may not increase for many years, so that the auscultator may be ridiculed, and no organic affection be admitted; when, from unfavourable circumstances or the progress of life, the disease may suddenly begin to augment, and dissection disclose some organic affection. Many persons die of organic cardiac disease after forty, who, for many years of their lives, had merely a little short breath with occasional palpitation, and swelling of the feet, and were told that they were free from all disease of the heart. Indeed Laennec was convinced, that congenital disproportion of the cavities of the organ was one of the great predisposing causes of its dilatation. In slight cases of the blue disease, where a small direct communication existed between the right and left sides of the heart, I have seen the symptoms, after being stationary during the whole of infancy, adolescence, and the earlier part of manhood, at once augment; from the sudden enlargement, I presume, of the preternatural opening, either through the enlargement of one of the cavities between which it formed a communication, or the occurrence of narrowness of one of the natural openings of the heart farther on.

The general symptoms may each, however, be highly useful when viewed by the side of the symptoms discovered by auscultation: they may confirm the diagnosis, or rather they may unite with these into a satisfactory theory of the nature of the case. They should never be neglected, because all the phenomena of every disease deserve the attention of a good practitioner.

The dilatation of the heart is sometimes partial. Dr. Bertin says that he has frequently found a cavity dilated in one point, while in every other it preserved its natural state, or was even narrowed or hypertrophied. The right ventricle, for example, he adds, is often considerably dilated near the pulmonary artery, while the rest of the chamber preserves its ordinary dimensions.

I have not yet met with this. But an example is now before me of partial aneurysm of the heart—of aneurysm, such as occurs in arteries and therefore necessarily partial.

Corvisart found upon the superior and lateral part of the heart of a young negro who had died in a state of asphyxia, a tumour nearly as large as the heart itself. Its interior contained several dense layers of coagula, perfectly similar to those which fill the cavities of arterial aneurysms, and communicated with the cavity of the ventricle by a narrow opening, the margin of which was smooth and polished.

The German anatomist, Walter the elder, had previously described a case of this kind. Drs. Baillie, Zannini, James Johnson, Cruveilhier, Rostan, Breschet, each mention one; Dr. Berard, two; and Talma's heart proved to be in this state.* Two aneurysms are mentioned by Dr. Reynaud as occurring in the same heart.† There are two specimens in the museum of St. Thomas's Hospital; in one the aneurysm is nearly as large as the heart, and in the other the aneurysm is pyramidal and projects into the left auricle.

One lately occurred at St. George's Hospital, and, like one of those at St. Thomas's, projected into the left auricle.‡ Two are mentioned by Mr. Adams, one of which was, like the other at St. Thomas's, nearly as large as the heart.§

In all these cases, the aneurysm existed in the left ventricle: in some, at the apex; in others, almost equally numerous, at the base, as in the case before me, in which there are two aneurysms; in others, between the base and apex, and in Corvisart's at the side, in others, at the front.

Aneurysm is a disease of arteries, never of veins, and it is remarkable that the disease was never detected but in the left—the arterial side of the heart; and indeed never but in the ventricle, with which the general arterial system is directly continuous.

This circumstance accords both with the general observation of the greater frequency of all diseases on the left than the right side of the organ, and in the ventricle than the auricle; and with the other fact of the individual disease—aneurysm, being an arterial disease, or rather, I would say, a disease of parts containing decarbonised blood, for the pulmonary artery, containing black blood, has not, I believe, yet been seen the seat of aneurysm.

As far as appears known, all the instances, but one, have occurred in adult males, and *arterial* aneurysm occurs eight times more frequently in males than in females.

This cardiac affection is the first of those in which auscultation renders no assistance. All the cardiac diseases in which it is useful have been considered. The general symptoms which occur may well therefore be

* Répertoire Général d'Anatomie et de Physiologie, t. ii. part. 1 et 2.
† Journal Hebdomadaire, Fev. 28, 1829.
‡ Dr. James Johnson's Medico-Chirurgical Review, July, 1829.
§ Dublin Hospital Reports, vol. iv.

supposed, by those who know the value of auscultation, to leave the nature of the disease in doubt.

Dr. Baillie says the symptoms "are similar to those which belong to aneurysm of the arch of the aorta." And what does Dr. Baillie enumerate as the symptoms of aneurysm of the arch of the aorta? First, difficulty of breathing. But that may arise from a thousand causes in the heart, lungs, or other parts, and has been absent in this disease. Secondly, more or less of pain in the aneurysmal tumour, or some other part of the chest. But here is no tumour, and pain in some other part of the chest would certainly never lead us to a knowledge of the disease, but rather to a misconception of its seat and nature. The pulse, he says, is sometimes irregular; but immediately subjoins, that "often no irregularity can be felt in it." The chief symptoms he pronounces to be "a strong pulsation in the chest, commonly visible to the eye, when the chest is exposed to view." But, again immediately subjoins, that he has felt the same kind of pulsation in other cases: for example, in adhesion of the pericardium, slight pericarditis with slight hydro-pericardium, and in ordinary morbid enlargement of the heart. Indeed no strong pulsation, except palpitation of the heart, and in most cases not even that, has occurred in this affection. The most decided characteristic of the disease, however, belonging only to aneurysm, he regards as a strong pulsating external tumour when the aneurysm has attained a large size. But aneurysm of the heart rarely attains a large size, and I do not know that it ever produced an external tumour. And after all, a diagnosis would be required between aneurysm of the heart and of the arch of the aorta.

It therefore really appears to me, and I say it with all the respect due to an amiable and industrious man, that Dr. Baillie would have done better in saying, that there were no particular symptoms of the disease, especially as he never met with more than one example of it.

In Talma, who died of strangely neglected stricture of the rectum, no symptoms had led to a suspicion of cardiac disease. In a patient of Dr. Johnson's,—General Kidd, death took place suddenly from rupture of the aneurysm, without any previous symptom of its existence. The same happened in Dr. Reynaud's case. In a patient of Cruveilhier's, severe asthmatic paroxysms took place, with a sense of constriction, particularly about the heart, and a peculiar sensation in the armpits. These symptoms, together with hardness, fulness, and occasional intermittence, of the pulse, and suffusion of the face, led to the suspicion of organic disease in the heart. But auscultation at that time was not yet cultivated. The hardness and fulness of the pulse arose from hypertrophy of the left ventricle.

In the case which supplied this preparation, the patient, a man aged thirty-two, was admitted into St. Thomas's Hospital on March 2, 1826, on account of palpitation of the heart, especially on moving or lying down; inability to lie in any other position than on his back; sudden starting up during sleep; constant dyspnœa, and cough, with a little mucous expectoration. The pulse was regular, not much quicker than natural, but exceedingly weak.

He had discharged large quantities of tape-worm by means of oil of turpentine,* and suffered severely from rheumatism the preceding winter and was still complaining of it. These symptoms gave no information as to the nature of his disease; they led to a suspicion only of some affection of the heart.

I was not at that time well practised in auscultation, but found the ventricular impulse of the heart very strong all over the right half of the cardiac region; and therefore concluded that the disease existed in the right ventricle.

In two months, he became much better under rest and moderate antiphlogistic treatment, experienced less palpitation and dyspnœa, could lie on both sides, and was stronger. The ventricular action was no longer strong on the right side, but was now both loud and strong in the lower part of the left. I could thus form no opinion as to the seat or nature of the disease.

The dyspnœa after this time gradually increased for a fortnight, and he then died.

On opening the body, two aneurysms were found at the upper part of the left ventricle;† but on the right ventricle was a tumour or large tubercle, the size of a pigeon's egg, with several smaller ones.‡

The force originally observed in the right half of the cardiac region was now explicable, although the aneurysms sprang from the left ventricle. The aneurysms, when I first saw him, were probably not large enough to occasion so considerable symptoms as the tumour on the right ventricle; but, as they increased, decided symptoms necessarily arose in the left half of the cardiac region, much exceeding those produced in the right by the tumour.

I have very lately met with a case of aneurysm of an auricle,—a part which has never, I believe, been recorded to have laboured under this disease.

There was hypertrophy and dilatation of the left ventricle, with extreme ossification and cohesion of the mitral valve, the auriculo-ventricular opening being proportionally reduced.§

The sinus of the left auricle formed an aneurysm of large size with very dense and thick layers of fibrine for its walls, and these had reduced its cavity to a very small capacity.‖ The action of the ventricles had been

* It is singular, that, after the publication of a paper in 1811, in the second volume of the Medico-Chirurgical Transactions, upon the use of the oil of turpentine in cases of tape-worm, as discovered by a sea-faring man, who, finding portions discharged by taking gin, hoped by taking something stronger of the same nature to cure himself and actually succeeded by swallowing a wine-glassful of oil of turpentine, the council of the London Medical Society should publish, in a paper in 1817, in the seventh volume of their works, a private letter from a Dr. Walker, to Dr. Lettsom, dated 1812, in which a claim was made to the first use of the oil of turpentine against tape-worm in 1790: when, in the fourth volume of the Memoirs of the very same society, published in 1792, there is an account by a general practitioner, named Malden, of a case in which tape-worm had been passed for thirteen years, till the person, in consequence of happening to meet with a fall, was advised by some friend to take oil of turpentine, and accordingly took two tea-spoonfuls at once, with the unexpected effect of discharging five yards of the worm besides small pieces, and had remained free from further signs of the worm for three years and a half,—up to the period of the communication.

† See PLATE VIII. Fig. 2. A.

‡ See PLATE VIII. Fig. 2. B.

§ See PLATE VII. B.

‖ See PLATE VI. C. and PLATE VII. C. In PLATE VI. is seen the rounded form acquired in dilatation of both ventricles, and mentioned at p. 26.

strong, loud, and extended, and a dull sound had been given on percussion of the cardiac region more extensively than natural. The hypertrophy and dilatation of these parts were pronounced during life. The pulse had been feeble and the breathing very difficult, and the legs had swelled. The feebleness of the pulse, notwithstanding the strong action of the left ventricle, arose from the small quantity of blood discharged into the left ventricle to be propelled into the aorta, but had not been ascribed to this cause as there was *no bellows-sound nor thrill:*—neither the aneurysm nor the constriction of the left auriculo-ventricular opening had been suspected. The absence of bellows-sound arose from the opening, though constricted, being still perfectly commensurate with the reduced capacity of the auricle,—retaining its natural proportion to the auricle,—affording a sufficient outlet to the small quantity of blood which was to be discharged.

The fact is as interesting as the situation of the aneurysm is extraordinary.

The case proves, for the first time, that cardiac aneurysm is not peculiar to the left ventricle, nor even to the ventricles: and I may remark, that my case of ventricular aneurysm is an additional argument to those already on record and adduced by Dr. Reynaud, of the error of Breschet in supposing them generally situated towards the apex of the ventricle. The two aneurysms in this case were lined by a smooth membrane, continuous with that of the ventricles, and thus afforded also an additional proof that, in these cases, the internal membrane is not necessarily injured, as Breschet must also imagine, when he calls these false consecutive aneurysms; though it must be allowed that he did not consider the ten cases with which he was acquainted, sufficient to afford a perfect history of the disease.

Hypertrophy of the heart, I have stated, appears of an inflammatory nature. With it is generally united some degree of induration. Sometimes induration exists alone, or in great proportion to the hypertrophy. I believe it is attended by palpitation, a full and rather hard pulse, and frequently by pain in the heart. One must suppose it inflammatory. On the other hand, the substance of the heart is sometimes softened, and the pulse and action of the heart are then feeble and frequent, dropsy takes place, and a disposition to fainting, and the heart is generally found also dilated, and of a deeper or paler colour than usual. This state also may be the result of inflammation, as softening of other organs beyond all question frequently is. Yet softening of the heart and all other parts, and even gangrene, probably may occur without inflammation; and sometimes when it occurs with inflammation, the inflammation may be not the cause, but only one of the circumstances of a peculiar condition.

Very acute inflammation of every part generally, I believe, induces a softened state: and, although a softened state may also result from a chronic inflammation, chronic inflammation generally causes induration. This is seen in regard to the various muscles of the body, as well as to the various internal organs.

Great as is the modern improvement in pathology by the knowledge that many diseases are essentially, or to a degree, inflammatory, which were formerly not regarded so, and great as is the improvement in medical practice by the administration of antiphlogistic measures in such cases, I am satisfied that we are now rather too prone to believe affections nothing more than inflammations, and to treat them only as such,—that many so regarded are not at all inflammatory, or have inflammation, not as a fundamental state, but merely as one circumstance among the morbid actions, or really have inflammation as a consequence, and that the hope of curing them by only antiphlogistic measures is vain, whatever relief may be effected by lessening the inflammation which accompanies them. *

The deep-coloured and the pale softening of the heart, distinguished by Laennec, occur, according to Bertin, the former as an acute, the latter as a chronic, affection. The chronic is often an attendant upon general cachexy; the acute, on pericarditis.

But, besides these chronic changes, true acute inflammation of the substance does occasionally occur.†

Abscess and circumscribed ulceration are more frequently found.

The latter may commence in the lining membrane or pericardium. But, whether the ulceration be the result of an abscess of the heart, or originate in one of these membranes, it may proceed to perforation; or to such attenuation that rupture ensues, perhaps on some effort.

Harvey is said by Morgagni to have first noticed the rupture of the heart.

Abundant cases are on record of rupture of the heart independently of ulceration, and are compared to the rupture of the arteries arising from violent muscular effort, though generally there is also a want of firmness in the organ. They may occur in every part, but usually happen in the left ventricle, where the most forcible muscular contraction takes place, and a spot too thin or soft or ulcerated is most likely to occur and is most exposed to violence if the heart is made to act forcibly by mental or muscular causes. It is the apex or its vicinity,—naturally the thinnest part of the ventricle, that usually gives way in general softness or thinness of the organ. Death is usually instantaneous, but sometimes does not happen for several hours,—differences also observed when the heart is wounded.‡

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* This I stated in my work on Hydrocyanic Acid, p. 105. sq. 1820. Andral has many excellent remarks to the same purpose, in his work on morbid anatomy, just published.

† A case of acute inflammation of the substance of the heart is recorded by Meckel, Mémoires de l'Académie de Berlin, 1756; and another by Mr. Stanley, Medico-Chirurgical Transactions, vol. vii. p. 323, where pus was found diffused through the substance of the organ. The latter case has been already quoted, and in it pericarditis also occurred.

‡ Before committing these lectures to the press, the first instance of rupture of the heart has been witnessed by me, in company with my friends Dr. Roe and Mr. Alcock. The rupture was a zigzag fissure in the front of the left ventricle, not at once discerned on bringing the heart into view, but which had filled the pericardium with blood. The patient, Mr. Hayes, a highly respectable general practitioner, in Charlotte Street, Fitzroy Square, corpulent and about sixty years of age, had suffered three attacks of pain about the præcordia with dyspepsia and vomiting, during six days, but gone out as usual in the intervals. On the morning of his decease, a fourth attack of pain, referred by him to the heart, took place before he rose in the morning, and he gave his assistant directions for preparing him a fomentation. Presently his bell rang violently, and was instantly answered; but he was found dead. The heart was very soft: the fat external to the abdomen excessive; and considerable adhesions existed among the abdominal viscera.

While numerous instances of rupture of the left ventricle are on record, we have very few of the rupture of the right. Yet George the Second perished suddenly of this accident in 1760: and, what is very remarkable, the princess of Brunswick in 1730, whose case, no less than the celebrated one of George the Second, is referred to by Morgagni.*

The valves alone sometimes suddenly give way, and I believe that immediate extreme dyspnœa and rapidity of pulse are the usual effects of an extensive injury of this kind. They split either from intensity of disease—from mere fragility, or from some violent effort,—exactly the circumstances in which the inner, or inner and middle, coats of an artery frequently crack and give rise to aneurysm. An engraving of a split aortic valve is given in Dr. Baillie's work. I saw an instance in which the same valves were beset with grains of earth and obstructed the course of the blood, when suddenly, without obvious cause, all the symptoms were aggravated, and the patient died in a few days, and two of the aortic valves were found rent.* I have already referred to these two cases. In the Medical Gazette for the 20th of last June, an instance of rupture of the tricuspid is described. The heart was variously diseased, but not particularly the tricuspid; and, under an exertion, a snap had been felt in the heart, immediate rapidity and irregularity of pulse had occurred, with syncope, and, I presume, dyspnœa, and the patient had died in six days.

If the rupture is not extensive, chronic disease results from the irritation of the laceration and the imperfect function of the valve, such as hypertrophy of the substance of the heart, dilatation, and structural change of the valves themselves; and death does not occur for some time. Dr. Abercrombie mentions an instance, in which, after a severe fall on the left side of the chest, death took place in five months, and an aortic valve was found torn at its base, so as to give the appearance of a ring, and the left ventricle hypertrophied and dilated. Morgagni found an aortic valve ruptured.†

Sometimes the chordæ tendineæ of the valves are ruptured.‡

In all these instances of rupture of the valves and their attachments, there has generally existed some disease of the heart, and most frequently even of the valve itself. But occasionally, just as in rupture of the substance of the heart, and of the inner and middle coats of the aorta, no diseased appearance is discernible; although one must suppose a morbid friability at least in those cases where no external force, no effort of voluntary muscles, nor mental excitement, some one of which is commonly the cause of rupture, took place.

I met with an instance of a circular hole in two aortic valves on either side of their septum, from original defective formation. Morgagni once found a hole in one of the leaves of the mitral.§

I have not read of gangrene of the heart: but it has been seen soft and black, without any gangrenous smell, from excessive inflammatory congestion of blood, and Cruveilhier gives a view of a heart beset with black patches of congested blood, similar to those observed in what is absurdly called apoplexy of the lungs.

The induration of the heart occasionally amounts to a cartilaginous or osseous state. But these changes are almost always originally seated in the lining membrane or pericardium, or the subjacent cellular membrane. A

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* De Sedibus et Causis Morborum, ep. xxviii. 7.

Histoire de l'Académie des Sciences, 1732. In which an instance also is recorded of rupture of the left ventricle.

Smollet, in his History of England, vol. v. page 418, sq., makes two egregious blunders in his account of the king's death. "On the twenty-fifth day of October," he says, "1760, George, King of Great Britain, *without any previous disorder*, was in the morning early seized with the agony of death, at the palace of Kensington.

"He had risen at his usual hour, drank his chocolate, and enquired about the wind, as anxious for the arrival of the foreign mails; then he opened a window of his apartment, and, perceiving the weather was serene, declared he would walk in the garden. In a few minutes after this declaration, while he remained alone in his chamber, he fell down upon the floor; the noise of his fall brought his attendants into the room, who lifted him on the bed, when he desired, in a faint voice, that the Princess Amelia might be called; but before she could reach the apartment, he had expired. An attempt was made to bleed him, but without effect, and indeed his malady was far beyond the reach of art; for when the cavity of the thorax was opened, and inspected by the serjeant surgeons, they found the right ventricle of the heart actually ruptured, and a great quantity of blood discharged into the pericardium; so that he must have died instantaneously in consequence of this effusion. The case, however, was so extraordinary, that *we question whether there is such another instance upon record*. A rupture of this nature appears the more remarkable, as it happened to a prince of healthy constitution—unaddicted to excess, and far advanced beyond that period of life when the blood might be supposed to flow with a dangerous impetuosity."

Now we have seen, that a member of the very same family,—the princess of Brunswick, died not only of a rupture of the heart, but of a rupture of the very same ventricle of the heart, in 1730; and Dr. Smollet's reflections upon the improbability of rupture from the moderate impulse of the blood in the king are groundless, as ruptures of the heart and aorta rarely occur under the most violent impulse, unless there be disease of substance, and, when the latter exists, may occur under the most feeble impulse of the blood. Rupture of the blood vessels of the head is most common in the aged, as their coats are most frequently diseased in the decline of life.

So far is it from being correct that his Majesty had experienced no particular disorder, that Dr. Nicholls, the king's physician, in his account of the dissection, in the Philosophical Transactions, 1762, informs us, that "His Majesty had for many years complained of frequent distresses and sinkings about the region of the heart; and his pulse was of late years observed to fall very much upon bleeding."

As if errors were destined on this point, Dr. Forbes, in his translation of Laennec, states, that "George the Second of England is often said to have fallen a victim to the same accident as Philip the Fifth of Spain, (rupture of the heart,) but his death was occasioned by rupture of the aorta."—The words of Dr. Nicholls, however, are the following. "The pericardium was found distended, with a quantity of coagulated blood, nearly sufficient to fill a pint cup; and upon removing this blood, a round orifice appeared in the middle of the upper side of the right ventricle of the heart, large enough to admit the extremity of the little finger. The ventricles were found absolutely devoid of blood, either in a fluid or coagulated state."

Aneurysm of the aorta existed, but was not ruptured. The middle and interior coats were split, but the external was entire, as in the first stage of false aneurysm, and merely an elevation was produced. Of this I shall hereafter speak.

It is at this time amusing to read Junius calculating on hereditary tendency and hinting in 1770 to George the Third, who died in 1820, the possibility of a long minority, as "every true friend of the House of Brunswick sees with affliction, how rapidly some of the principal branches of the family had dropped off." Letter xxxvii.—To the printer of the Public Advertiser.

* See PLATE V. Fig. 1.

† Epist. xxiv. 10.

‡ See a case by Mr. Adams in the Dublin Hospital Reports, vol. iv. p. 404. The patient lived about a month. Corvisart mentions three instances of their laceration during violent efforts. Laennec found a tendon of the mitral valve ruptured in eccentric hypertrophy of both ventricles. M. Bouillaud found a columna carnea of the tricuspid valve torn through.

§ Epist. xxiii. 6.

spot of the heart or its membranes is sometimes so changed; sometimes nearly a whole cavity becomes a a bony case. Mr. Burns declares that he once saw not only complete ossification of the pericardium, but also the ventricles ossified as firmly as the scull, except for about an inch at their apex. The chordæ tendineæ are occasionally ossified.

The coronary arteries are sometimes ossified, and not unfrequently the kind of suffering denominated angina pectoris is the result. But they may be ossified without such a result, and angina pectoris may exist with various structural diseases of the heart, or without any.

I once saw the muscular substance of the heart completely changed, except at the surface, to fat. A mere layer of red muscular structure covered the internal and external parts of the heart and the columnæ carneæ: within, every spot was fatty matter. The patient had been subject to frequent attacks of syncope, palpitation, irregular and small pulse, with dyspnœa, and anasarca.*

There were five pulmonary veins.

Sometimes the heart wastes—is atrophied, becoming small and wrinkled. This is often, though not always, observed after chronic diseases, and especially after phthisis. Pressure by a pericardial effusion or any other cause has the same effect. The walls of an atrophied heart, it is said by Dr. Bertin, may be thinner or thicker than usual, or of their usual dimensions, their thinness being occasioned by dilatation, their thickness by narrowing, of the cavities. But it appears to me, that, if the walls are thickened, we are not justified in pronouncing the smallness of the heart an atrophy, as the external smallness of dimension may arise from violent contraction at death; and, if the walls are dilated, that we are not justified in calling the thinness atrophy, because the original quantity of substance may be in them, and only spread out. If the whole heart weighs less than is natural, then only, I think, we ought to say that the organ is atrophied; and even then, the smallness of the organ may be an original defect, unless indeed it appears wrinkled, like a shrivelled apple, to use Laennec's comparison.

The heart has been seen cancerous; it has contained, in its substance and in its cavities, cysts, and true hydatids;† and, in its substance, scrofulous tubercles, and scirrhus,‡ bone, &c. and encephaloid deposit.

I once opened a person who died of repeated hæmoptysis, in the substance of whose lungs were hard patches of the deepest red; and in the ventricles of whose heart, innumerable thin globular cysts, containing bloody fluid, and attached by a peduncle, could be squeezed out from among the columnæ carneæ.*

* A case will be found in the Dublin Hospital Reports, vol. ii. The symptoms were the same as in my patient. A case was previously given by Dr. Duncan, jun. Edinburgh Medical and Surgical Journal, January, 1816.

† In the Medico-Chirurgical Transactions, vol. xi. is a case of cysts or hydatids in the substance of the heart. Three apparently true animal hydatids were found in a heart by Dr. Andral, Précis d'Anatomie Pathologique, t. ii. p. 332. Dr. Abercrombie, in the Edinburgh Medico-Chirurgical Transactions, vol. i. page 55, mentions having found a cyst in the left auricle, apparently containing others collapsed in a dark thick fluid. I may mention, that, at page 58, he gives a curious case of partial cohesion of the sides of the right ventricle, an inch and a half from the bottom, producing a small cavity.

‡ A heart has been just placed in the museum of St. Thomas's Hospital from a male adult patient of one of my colleagues, in which the walls of the left ventricle contained many deposits of scrofulous matter, surrounded by white and almost cartilaginous induration.

* I gave the dissection in the Annals of Medicine and Surgery, 1816. Laennec therefore erroneously considered himself the first who described what he terms the globular excrescence; and indeed he refers to numerous authors for what appear to have been analogous formations.

My readers will pardon me for copying an account of the case, as it contains a correct description of another disease afterwards pourtrayed by Laennec in 1819, under the title of pulmonary apoplexy. The following is my printed account. "J. G. aged thirty-five years, by business a gardener, a mild and extremely steady man, laboured for two years under dyspnœa, pyrexia, cough, pain of the chest, bloody expectoration, and at length profuse hæmoptysis. Sulphuric acid with sulphate of magnesia, subcarbonate of lead with opium, blisters innumerable, were prescribed in vain. The hæmoptysis recurred with increased frequency and violence, and he was ultimately exhausted.

"Four days previously to his death, icterus began in his face and neck, and at the period of his dissolution it was deep and considerable, the right hypochondrium too had become tender, and the lower extremities œdematous.

"On opening the body, the surface of the lungs presented numerous hard, circumscribed, very dark patches of various sizes, from that of a sixpence to the size of a crown. A person not of the profession would have supposed them so many mortifications. Blood, however, when abundantly accumulated in the small vessels, often causes a counterfeit appearance of mortification in the stomach and intestines, as Dr. Baillie has pointed out, and in many other parts. Such was the nature of these patches. On cutting perpendicularly through them, the hardness and dark colour were found extending inwardly, an inch or less, equally circumscribed as on the surface.

"The intervening spaces were perfectly healthy. Nearly the whole of the inferior lobe, on the right side, had undergone the same change as the circumscribed portions in the other lobes. This change consisted in a prodigious congestion of blood, which gave the dark colour and hardness, but which could not be squeezed out at all. The slices were quite diaphanous, and of a beautiful red. No other change, no disorganisation, was in any part discernible. It seemed as if the most minute vessels, in various parts, had become dilated, as in navi maternal, and thus allowed the escape of the blood. Had the symptoms been those of acute inflammation, and the blackness not been in detached portions, there would have been nothing singular: and had the disease been simply chronic inflammation, which a frequent pain at the anterior and lower part of the chest, always yielding to blisters, and a large quantity of bloody fluid in the cavities of both pleuræ, after death, argues, yet it is surprising that this should occur in patches, and should have induced no suppuration, no disorganisation, but merely hæmoptysis and pain."

This state of the lungs has been termed by Laennec, and I must think very absurdly, pulmonary apoplexy. "As this lesion," he says, "evidently results from a sanguineous exhalation into the air-cells,—as it perfectly resembles the cerebral sanguineous exhalation which produces apoplexy, I have thought it right to designate it pulmonary apoplexy."

As far as there is a great local congestion of blood and an effusion of it, the phenomena are indeed the same as those observed occasionally after apoplexy. But apoplexy is no state of parts; it is a general loss of sense and motion, occurring in most instances suddenly,—a stroke that causes the person to fall down senseless and motionless;—"Motus voluntarii (in the words of Cullen) fere omnes insolenti, cum sopore, plus minus profundo, superstite motu cordis et arteriarum." The morbid state of the brain is not apoplexy, but the symptoms induced.

Nothing of the kind occurs here: and the symptoms which constitute apoplexy do by no means necessarily arise from a congestion or effusion of blood. Pressure of the brain from any cause produces the disease—a depression of bone, an effusion of serum, a secretion of pus, an effusion of blood from no congestion but the splitting of the diseased coats of an artery, &c.

Dr. Forbes mentions that Dr. Lerellié read a memoir on the subject to the Academy of Sciences at Paris in 1816, and that Dr. Hohnbaum of Hildburghausen published, at Erlangen, in 1817, three cases of sudden and fatal effusion into the substance of the lungs. The lungs were distended with dark coloured blood, partly fluid and partly solid, and were almost too large for the chest; in one case blood was also in the bronchiæ, in another in the pleuræ. These cases appear to have been nothing more than a laceration of blood vessels in the very substance of the lungs; and the

Like various parts of the body, the heart is subject to neuralgia. I had a case of this kind, where the pain was intense, affecting not only the region of the heart, but darting at the shoulders and back, sometimes dull and aching, at others, stabbing: not increased by motion or posture; unaccompanied by any stethoscopic signs.

It occurred in a middle-aged woman, at the hospital; and the symptoms were removed by iron, but afterwards, I believe, returned.*

Upon the state of the heart which gives rise to a mixture of venous and arterial blood,—the state termed Cyanosis, I have little to say. It is usually congenital malformation, upon which the works of Dr. Farre and Mr. Burns together leave nothing to be desired.† I have already remarked that I have seen the admixture rather suddenly begin to increase in adult age. Bertin believes that the admixture has occasionally commenced after birth from an ulcer in the auricular or ventricular septum throwing the two corresponding cavities into one.

In most cases, the right auriculo-ventricular or ventriculo-arterial opening becomes narrowed, and the right auricle or ventricle or both are dilated and hypertrophied, and the usual ill consequences of that affection sooner or later are experienced.‡

Preternatural situation of the heart occasionally occurs; sometimes congenitally but oftener in consequence of the morbid presence of solid, fluid, or acriform substances in the left cavity of the thorax, pushing the heart to the right: and the circumstance is by no means uncommon. Dr. Abercrombie mentions a case in which the right lung had become solid, and the left, dilated extensively to perform the function of both, had pushed the heart to the right.* Increased bulk of the heart itself or pressure from other parts, either above, as from aortic aneurysm, or from abdominal enlargement below, will likewise occasion other changes in the situation or the direction of the heart.

These may of course be recognised by the touch.

Although the greater part of the fibrinous coagula observed in the heart and large vessels are produced after death, some are unquestionably produced during life; for they are occasionally organic, and adhere by vessels to the substance of the heart, and symptoms appear during life evidently arising from obstruction to the course of the blood, exactly as we find to be the case from the existence of organised coagula in arteries and veins at a distance from the heart. Sudden paralysis of an extremity, attended by loss of pulse in it, and sometimes at length even mortification, has frequently occurred from the production of coagula in arteries.†

I formerly mentioned that the lining membrane of the heart and aorta was subject to inflammation, and sometimes simultaneously with the pericardium. In the case of the heart, I believe that the symptoms are increased general sound, force and frequency of action, with more or less pain or uneasiness: and, when the former continue for a length of time, without the peculiar auscultatory signs of organic disease, or proportionate pain on pressure as observed in pericarditis, we certainly may infer the existence of this inflammation.

The lining membrane of the aorta is generally inflamed at the same time, and, when the affection extends along the descending portion, there is frequently a sense of smarting in the direction of the spine, and a violent pulsation in the abdomen not only of the aorta, but even of the iliacs, without any perceptible enlargement of the vessels, the existence of any tumour in its neighbourhood, or such a smallness of any of the arteries as might render it probable that the aorta was narrowed in any part and thus forced into violent pulsation.

Aortitis seems caused by all the circumstances which produce inflammatory affections of the heart, and perhaps by disease of the heart itself. Either hypertrophy of the left ventricle gives rise to inflammation of the aorta, or the converse happens, or they spring up together, for they are frequently conjoined.

Of the intensely bright redness of the inner surface of the inflamed aorta, and the impossibility of ascribing it to any thing but inflammation, I formerly spoke, as well as of the occasional effusion of fibrine. It appears as a red stain, and sometimes the middle coat appears more loaded with blood than usual.

But we far more frequently discover the chronic change of structure in this vessel. Yellow spots are seen every day: often a yellow curdy substance can be squeezed through the inner membrane under which it is de-

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patients died between the effects of internal hemorrhage and oppression of the lungs,—of syncope and asphyxia. Corvisart had described such a case formerly in his translation of Avenbrugger. From the suddenness of the event and the congested and lacerated state of parts, Dr. Hohnbaum had given the name of pulmonary apoplexy to these cases,—Lungenschlagfluss. But neither sudden death on the one hand, nor congestion and effusion of blood on the other, constitute apoplexy. In apoplexy, respiration and the action of the heart may continue, but volition and sensation have ceased totally or partially in the brain.

* A second case has occurred to me since the delivery of these lectures, in the person of a lady, who appears to have laboured under the disease very many years. Besides a constant aching in the lower part of the cardiac region near the sternum, are frequent stabbing pains, plunging, (to use the expression of most persons afflicted with neuralgia,) so that she is compelled to rise and walk the room almost every night. These occur during motion and rest, but most severely during motion. They shoot in all directions, and occur occasionally in distant nerves. As soon as they are over, she is apparently well, and, when they are not very troublesome, sings, dances, or takes horse exercise. In the first case, the ear discovered nothing morbid in the heart: in this, a slight ventricular bellows-sound is heard. Andral mentions a dreadful case of this kind, which proved fatal, without leaving any trace of disease in the heart, or its dependencies. Précis d'Anatomie Pathologique, t. ii. page 344. sq.

† The malformations referred to in Dr. Farre's work, together with my own morbid specimens of disease referred to in these lectures, are all deposited in the Museum of St. Thomas's Hospital, and, with numerous others, constitute, perhaps, an unrivalled collection of cardiac lesions.

‡ Bertin, p. 436. He ascribes the circumstance to the excitement of the right half of the heart by the admission of a portion of arterial blood into it.

A high degree of obstruction in the right auricular or ventricular opening, or in the lungs, will, without any malformation, produce a blueness, approaching to blackness, in the countenance, long before death.

* Edinburgh Medico-Chirurgical Transactions, vol. i. page 65.

† See Bertin, page 447. sqq.; Mr. Adams, Dublin Hospital Reports, vol. iv. page 432; Edinburgh Medico-Chirurgical Transactions, vol. iii. page 1; and compare Transactions of a Society for the Improvement of Medical and Surgical Knowledge, vol. iii.

posited, the membrane having become friable and under distension giving it issue.

Sometimes the deposition projects into the canal of the artery, like a tubercle. Frequently spots and patches of bone are seen bare and in contact with the blood: originally deposited below the inner membrane, I believe, and exposed by it cracking and becoming destroyed.

Sometimes all the coats are thickened and indurated.

Ulceration is occasionally seen, and fatal hemorrhage has been thus produced, the extenuated outer coat,—the only one perhaps remaining, giving way under some exertion or strong action of the heart.

More commonly the aorta, like other arteries, dilates.

Either all the coats dilate together throughout the circumference of the vessel, or in one spot so that a pouch is formed: or the inner or middle coat cracking, or ulcerating, but more frequently cracking, the blood distends the external into a pouch, and this gradually gives way also and hemorrhage occurs, or the surrounding parts adhere to the vessel, and thus hemorrhage is prevented till these likewise ulcerate or burst.

Occasionally the three coats first dilate generally or partially, and then the internal and middle give way, and the external continues to dilate alone.

The middle coat often cracks at the same time as the internal.

Both the simultaneous dilatation of the three coats, and the rupture of the internal, nearly always arise from far more than mere debility of structure, generally from some disorganisation; at least some change of colour, some deposition, or unusual appearance, is nearly always observed at the same time.

The partial dilatation of the three coats of the aorta and other arteries is by some termed true aneurysm; while others restrict the term to the dilatation of the middle and external or of the external, the internal or the internal and middle being ulcerated or ruptured.

Those who apply the term to the partial dilatation, call the instances, in which one or more coats are ruptured,—false aneurysms.

Yet all allow that, whether the three coats dilate together or only the middle and external, the internal being cracked or destroyed, the morbid condition of the vessel giving rise to the change is much the same. If partial dilatation of all the coats occurs first, and then rupture of the inner coat in one spot of the dilatation, both kinds of aneurysm exist.

This disease most commonly takes place in the ascending portion or the arch of the aorta, the extension usually occurring at the anterior or lateral portions of the vessels and inclining to the right side: and dilatation, general or partial, usually precedes the ulceration or rupture of the inner and middle coats.

Now aneurysm frequently exists without giving rise to any symptoms: and as the aorta within the pericardium is detached,—is without the possibility of surrounding parts becoming adherent to it and preventing the escape of blood when its coats entirely give way, sudden death from this cause frequently surprises persons apparently in good health. The rupture is usually transverse, and has been seen throughout the circumference of the vessel, though limited rupture is much more common, and when confined to the internal and middle coats it is almost universally transverse.

If the inner and middle coats only are ruptured, blood escapes under the external, and sometimes separates it to a greater or less distance. Laennec saw it separated from the commencement of the aorta to the iliacs, giving the appearance, at first sight, of a septum in the middle of the vessel. When the external at length ruptures, (and the interval is various) the opening may be in a different direction from the fissure in the internal and middle coats.

A woman was admitted by me into St. Thomas's Hospital, on account of severe pain of the left half of the head, face, and neck, and of the left shoulder. I ordered thirty leeches to be applied, and during their application she suddenly screamed with pain in the region of the heart, fell back and expired. On opening her, the pericardium was found distended with clear serum and a very large coagulum of blood which had escaped through a small longitudinal rent* in the outer coat and pericardial covering of the aorta. The outer coat was separated from the internal and middle into a pouch† which contained a portion of adherent fibrine precisely similar to the fibrine found in aneurysms, and a quantity of ordinary coagulum, without any morbid appearance of structure. In the internal and middle was a transverse slit.‡ The latter had no doubt taken place some time before death; the longitudinal fissure at the moment of decease.

In George the Second, the aorta had undergone the first half of this process—the internal and middle coats of the aorta presented a transverse fissure, around which was a coagulum under the external coat, which would soon likewise have burst, perhaps longitudinally, exactly as in this case of mine; and, had no rupture of the right ventricle occurred, as I formerly described, sudden death would ultimately have taken place from the rupture of the aorta. §

In two instances, an aneurysm of the pericardial aorta burst into the pulmonary artery.

When the disease is situated in the arch of the aorta, the rupture may take place into the trachæa, the œsophagus, the pericardium, or the pleura. The descending thoracic aorta usually bursts into the pleura, œsophagus, or posterior mediastinum, or even into the lungs.

Aneurysms of the pectoral aorta most frequently burst into the left pleura.

But aneurysms of the arch and descending aorta sometimes destroy life by compressing the organs of respiration or the œsophagus.

When a certain size is attained by an aneurysm of the

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* See PLATE VIII. Fig. 1. B.

† See PLATE VIII. Fig. 1. A.

‡ See PLATE VIII. Fig. 1. D.

§ "In the track of the aorta, we found a transverse fissure on its inner side, about an inch and a half long, through which some blood had recently passed under its external coat, and formed an elevated ecchymosis. This appearance showed the true state of an incipient aneurysm of the aorta, and confirmed a doctrine which I had the honour to illustrate by an experiment, to the satisfaction of the society in the year 1728, viz. that the external coat of the aorta may (and does) often controul an impetuosity of the blood, capable of breaking the internal or ligamentous coat."

Frank Nicholls, M. D. F. R. S. Physician to his Majesty. Read to the Royal Society, Nov. 26, 1761.

ascending aorta, a tumour is usually formed at the fifth and sixth ribs of the right side: when at the anterior part of the arch, the tumour is at the third and fourth of the right side: when at the superior part of the arch, it is above the sternum and clavicles. The strongly pulsating character of the tumour shows its nature, even should the tumefaction subside considerably for a time, as happened by repeated venesection in three cases of this disease that I treated, and in one of which the tumour once actually pointed.

There is frequently cough, mucous and bloody expectoration; dysphagia; dyspnœa, even orthopnœa; attacks of spasmodic suffocation; pain in the right shoulder, axilla, inner side of the arm in the course of the nerves, which may be tender; and up the right side of the neck and head. Pricking pains may be felt in the tumour.

Previously to the appearance of any tumour, there may be no sign of disease, or the signs which present themselves may be very uncertain: and persons continually perish of aneurysmal rupture of the aorta, apparently in perfect health. Laennec declares the diagnosis to be difficult, and confesses that he had frequently not suspected the disease when it existed, and suspected it when it did not exist.

Violent pulsation of the carotids has created a suspicion of the disease, but may arise from mere excitement of the heart, hypertrophy of the left ventricle, from dilatation of them, or from any obstruction to the course of the blood in other directions, as in the descending aorta or the sub-clavians. Dulness of sound on percussion of the superior sternal portion of the chest, and to the right of this, smallness and irregularity of pulse, arise from many causes. A bellows-sound or a thrilling sensation given to the hand only or chiefly when applied *above* or to the right of the cardiac region, may justly give a strong suspicion of the disease. But neither the bellows-sound nor the thrill always occurs. In four cases out of seven that I have seen of the disease, as well as in cases of aneurysm of other arteries, neither occurred.* Laennec never observed the thrill before the tumour had become visible externally.

Laennec, however, considers that the chief diagnostic sign of an aortic aneurysm is a strong and *single* pulsation, discernible by the ear in the region of the aneurysm, synchronous with the pulse at the wrist, stronger and louder than the action of the ventricles, and unaccompanied by the sound of the auricles. In three instances of aneurysm of the aorta under the sternum, he was, according to Bertin, mistaken: but would not have been, Bertin contends, had he applied the stethoscope over the sternum. Bertin asserts, that, whenever an aneurysm of the aorta exists, as well as of any other artery, a strong single sound may be perceived in it, distinguishable also from the beating of the heart by its greater intensity: and he maintains that, if the stethoscope is applied *upon the sternum*, in aneurysm of the substernal aorta, the disease may be recognised with facility before it is visible, and that Laennec does not appear to have applied the instrument in this situation. Bertin discovered the disease in two cases in which there was no tumour. Aneurysm of the descending aorta, he considers, may be recognised by the same phenomenon at the pectoral spine.

The aneurysmatic pulsations, Bertin adds, are so peculiar, intense and sharp, that they cannot be described, and a person who has once heard them can never mistake them.

I once discovered aneurysm of the ascending aorta and of its arch before any pulsating tumour appeared, by this strong pulsation to the right of the sternum and at its upper part, synchronous with the pulse, stronger and louder than the ventricular action of the heart. But then the aneurysm was very large though it formed no external tumour,—having extended chiefly backwards and to the right.*

Yet neither in that case, nor in those in which a pulsating tumour existed, can I say the pulsations appeared peculiar. The pulsations, as heard, were double—the sound of the aneurysm was of course heard with the action of the ventricles, but the sound of the auricles was also distinctly heard in the region of the aneurysm, and the frequent occurrence of this circumstance is mentioned by Laennec. The same was the fact in the cases with tumour when the stethoscope was applied to this, although the impulse was of course single. In that case a bellows-sound was heard, and in it, and also in all the cases with tumour where the bellows-sound was heard, the sound was double—occurred both at the moment of the pulse and afterwards, and that which was heard after the pulse was much louder in the aneurysm than in the heart.

I presume that a bellows-sound is heard *with* the pulse, if the mechanical state of parts produces any difficulty to the course of the blood, or if there is general dilatation of the vessel as well as aneurysm so that the blood is checked when flowing on into the narrower healthy portions. The second bellows-sound possibly arises from the elasticity of the parts impelling some of the blood from the dilated portion after the action of the left ventricle.

* Laennec states, that a bellows-sound occurs frequently in aneurysms of the aorta and other arteries, but as it is not constant, and may be heard sometimes when no aneurysm exists, that it cannot be considered among the signs of aneurysm.

* I lately had a patient with enormous aneurysm of the ascending aorta that extended to the left upwards and backwards, so that its summit adhered to the highest rib under the left scapula, and a pulsation, with a double sound, existed many months before death at the lower right anterior part of the chest, corresponding with the situation of the apex of the heart on the left. No aneurysm nor any thing but the healthy lungs existed at the seat of pulsation: and this must have been produced by the re-action of the aneurysm from the upper posterior left ribs upon the lower anterior right part of the chest. No one suspected aneurysm.

K

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PLATES.

PLATE I.

FIG. 1.

Pulmonary artery compressed by a mass of cartilage.

A portion of the right ventricle of the heart of a middle aged man, in which a mass of cartilage compressed the pulmonary artery at its origin.

Through an oversight, the specimen was allowed to putrefy, and the whole was destroyed except fortunately the portion of the right ventricle at which the artery arises, the semilunar valves, the commencement of the artery, and the cartilaginous mass.

A. A. The mass of cartilage which extended from the pericardium deep into the substance of the heart. The surrounding muscular fibres having putrefied away, it is seen nearly detached, and is turned up to be better observed.

B. B. The inner surface of the right ventricle.

C. The semilunar valves at the mouth of the pulmonary artery, extended by means of wool.

Besides various symptoms from pulmonary and other cardiac disease, there had been a bellows-sound at the lower part of the sternum and to the right, at the moment of the pulse.

The production of cartilage originated in pericarditis: the pericardium was throughout coherent and thickened, and cartilaginous in several other points than where the great mass existed.—See p. 19.

FIG. 2.

Obstruction at the mouth of the pulmonary artery.

Part of the interior of the right auricle and ventricle of a heart in which the substance was grown together around the mouth of the pulmonary artery, leaving a very small opening, beyond which was the real mouth of the artery, of its natural size, with its valves.

A. The interior of the right ventricle.

B. The tricuspid valve.

C. The opening which leads to the mouth of the pulmonary artery.

I fancy that the state was congenital: for there were no other marks of disease, whereas there was an evident malformation in the existence of two little supernumerary right ventricles, one leading from the pulmonary artery just beyond its valves, and a second from the first. Besides this,

The patient, a very young woman, had *always* suffered from dyspnœa. She died in St. Bartholomew's Hospital with great dyspnœa, venous congestion, and dropsy. A strong bellows-sound was heard. I did not see her, but the specimen is deposited by Dr. Hue in the museum of the College of Physicians.—See p. 21.

Fig. 1.

Fig. 2.

W. Shelton, sculp.

PLATE II.

Disease of all the valves of the heart.

The base of a heart cut off by a transverse incision, so as to show the two auriculo-ventricular openings and the mouth of the aorta, all which are exceedingly narrowed by valvular disease.

A. The tricuspid valve, grown up so as to have only a small and nearly circular opening in its centre.

C. The mitral valve, still more grown up, leaving only a fissure.

D. The semilunar valves of the aorta, thickened and projecting, so as to leave only a small triangular opening for the passage of the blood into the aorta.

B. A bougie passed from the right ventricle into the pulmonary artery, the valves of which were thickned, though the opening was of its natural dimensions.

Both auricles and the left ventricle were greatly dilated, and the whole heart slightly thickened.

The patient, a male adult, was brought into St. Thomas's but five days before his death: there were dyspnœa, dropsy, and frequent syncope.

The action of the heart and the pulse were scarcely to be felt. But a loud bellows-sound was heard all over the cardiac region. From the rapidity and extreme feebleness of the heart's action, I cannot say whether it was at the moment of the auricular or of the ventricular action, or at both.

The mischief had originated in rheumatic pericarditis fifteen years before.

The pericardium was perfectly coherent.

Altogether it is the greatest instance of valvular disease that I am acquainted with, rather surpassing one related by Dr. Forbes in his Translation of Laennec, and another by Dr. Bertin, (LIVth observation) as in these the valves of the pulmonary artery were healthy.—See p. 14.

W. Sheldon fecit.

PLATE III.

Bulky solitary adhesion at the front of the heart with one half of the tricuspid valve completely bound down.

A view of part of the exterior and part of the interior of the right ventricle. The figure of the heart it altered, being lengthened by hypertrophy and dilatation of the left ventricle; (see Plate IV.) while the right ventricle, remaining healthy, and therefore reaching but a short way down, looks like an appendix to the left.—See p. 26.

A. The exterior of the right ventricle.

B. A strong adhesion at its lower and anterior part.

The portion which adhered to the parietal pericardium at the front of the chest is of course detached. The adhesion extends to the front of the left ventricle also.—See p. 11.

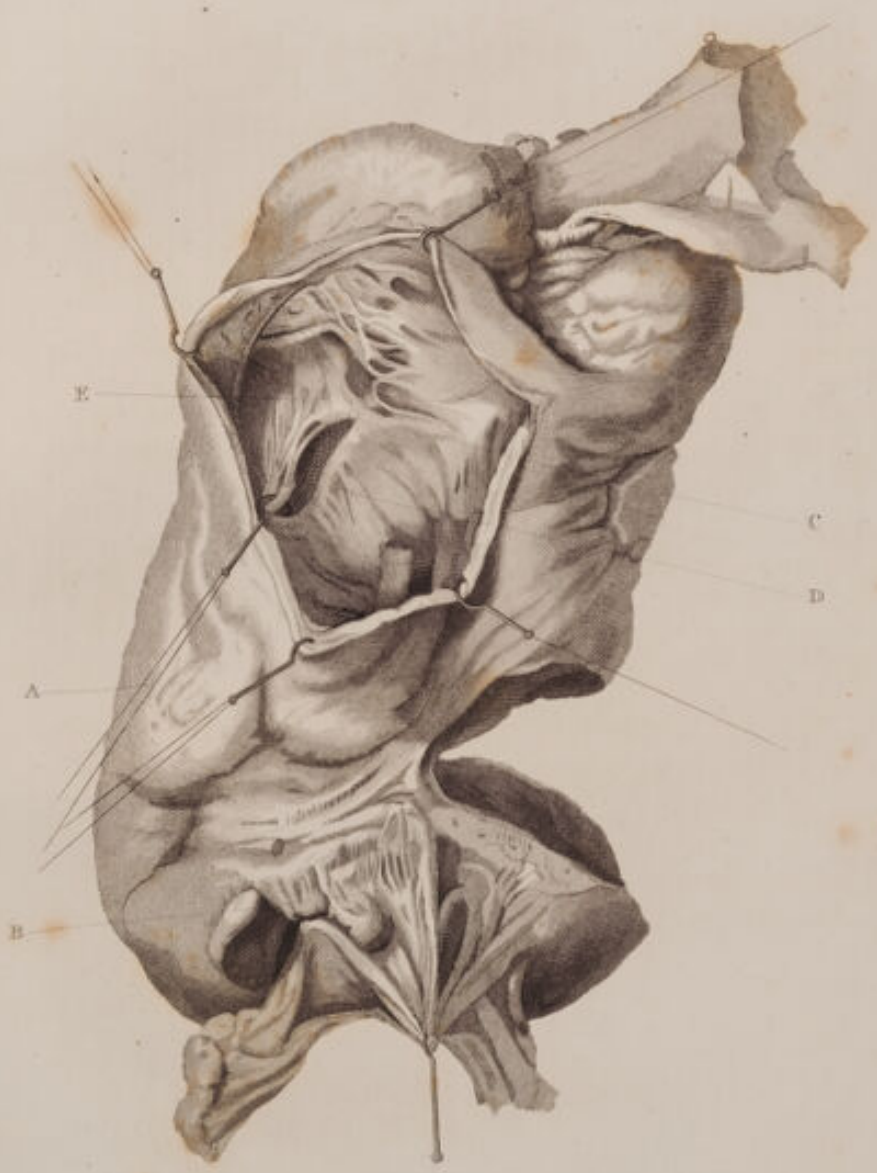
C. The interior of the right ventricle.

D. and E. The tricuspid valve thickened throughout.

D. One half grown up and completely adherent to the inner surface of the ventricle, with a hard rounded edge.—See pp. 19, 20.

E. The other half loose, and put upon the stretch to show its extent, and the dimensions of the opening left during the play of the valve.

The symptoms will be mentioned in the explanation of the next Plate.



W. Skelton, sculp.

PLATE IV.

The left half of the same heart as in the last engraving.

Hypertrophy and dilatation of the left ventricle: great disease of the mitral valve: some thickening of the aortic valves: adhesion at the anterior and lower part of the left ventricle.

A. The adhesion at the outer part of the left ventricle, and seen in the last plate at the front of the right.

B. B. B. The hypertrophied substance and dilated cavity of the left ventricle.

C. C. The mitral valve, grown together so as to have somewhat the appearance of a tube projecting into the cavity of the left ventricle; and its opening greatly reduced.—See p. 14.

D. The aortic valves thickened.

All these changes arose from rheumatic pericarditis, many years before.—See p. 19.

The patient,—a young woman, invariably complained of a dragging smarting pain at the front of the chest in the supine posture.—See p. 11.

There was violent impulse of the left ventricle, with irregularity in force and frequency.

A bellows-sound in the region of the left auricle between the pulses.

A bellows-sound in the region of the right ventricle synchronous with the pulse.

A loud clear sound in the region of the right auricle, between the pulses.

Dyspnœa, anasarca.

The right auricle is partly seen in Plate IV., and was greatly dilated.

I am indebted to my friend Mr. Holberton for having been allowed to see the patient, and for the specimen.

W. Skelton fecit.

PLATE V.

FIG. 1.

Thickening, ossification, excrescences, and rupture of the aortic valves.

A. The aortic valves thickened, corrugated, and beset with minute excrescences and innumerable granules of bone very easily detached.

One of the valves was much shortened, and the union and attachment of it and another lacerated, so that a pointed process directed upwards is seen.

The patient, a middle-aged woman, had dyspnœa, very rapid pulse, and a bellows-sound in the region of the left ventricle, synchronous with the pulse.

The symptoms all became suddenly aggravated, and she died in a few days.—See p. 31.

The valves were intensely red.

For having been allowed to see this patient and for the specimen, I am also indebted to my friend Mr. Holberton.

See pp. 22, 23.

FIG. 2.

Excrescences of one of the aortic valves.

A. The central valve only diseased:—covered by large round excrescences easily detached.—See p. 23.

The man was admitted into St. Thomas's on account of ague, and made no complaint of any pectoral symptoms: when he was suddenly seized with dyspnœa, and died before I saw him.

There probably would have been heard a ventricular bellows-sound, had there been any reason for examining the state of the chest.—See p. 23.

Fig. 1.

Fig. 2.

W. Skelton fecit

PLATE VI.

Aneurysm of the left auricle; hypertrophy and dilatation of both ventricles.

A. A. The posterior surface of the two ventricles, greatly dilated, so that the form of the heart has become round.—See p. 26.

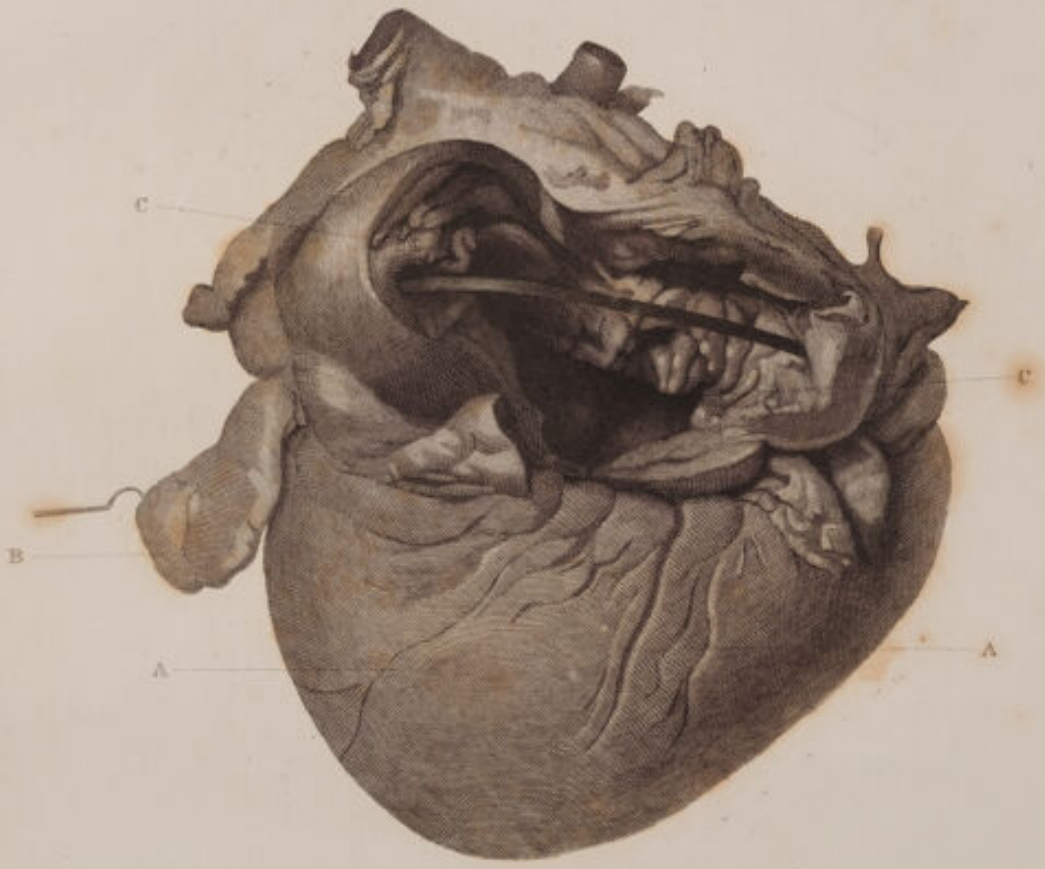
B. The left auricle proper.

C. C. A large aneurysm of the sinus of the left auricle cut open: the parietes are of great thickness, through the deposition of layers of fibrine, which have also reduced the cavity.—See pp. 29, 30.

The man suffered dyspnœa, debility, œdema of the legs.

The action of both ventricles was strong and loud.

Another view of this heart is given in Plate VII.



W. Skelton fculp.

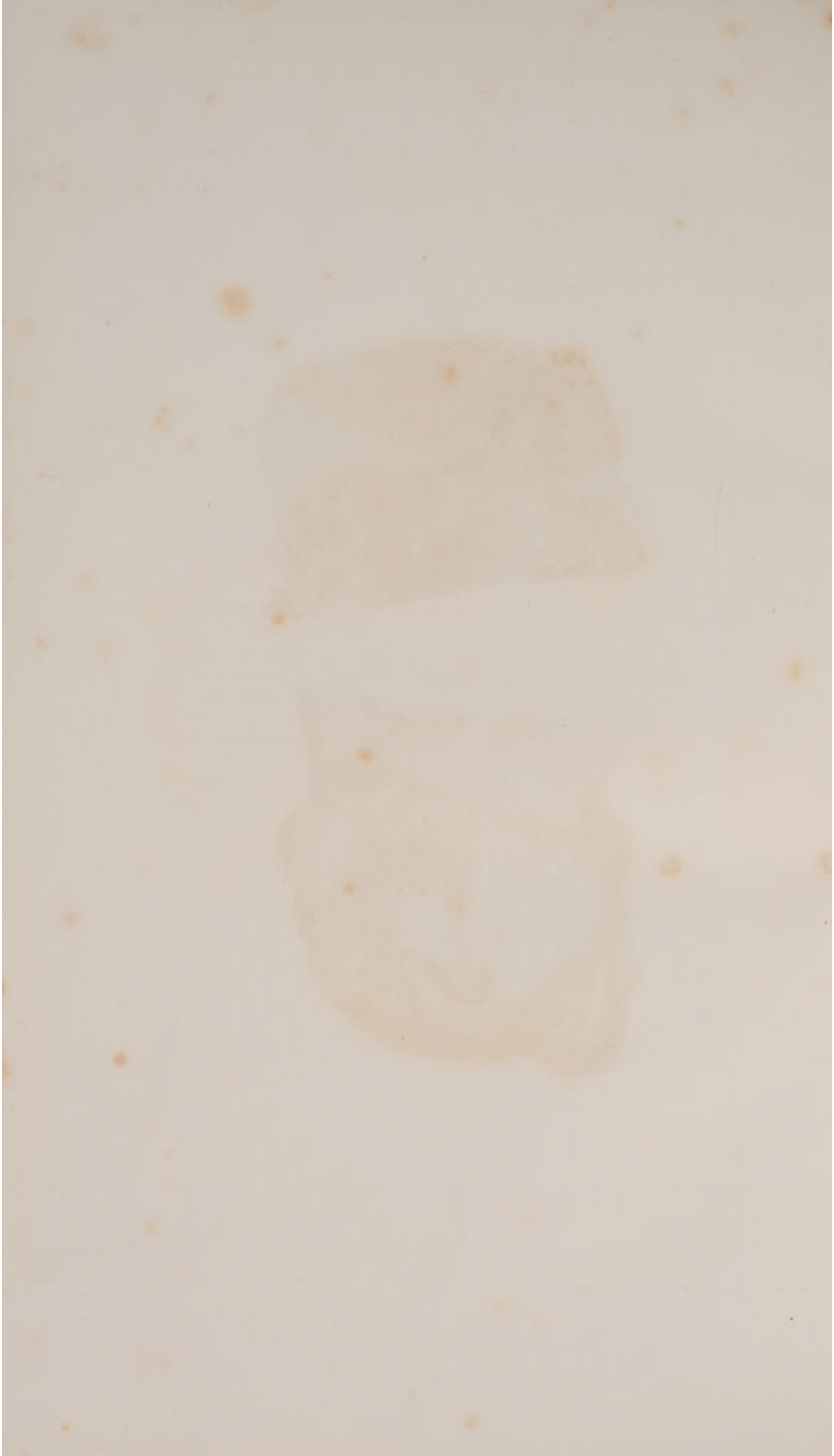


PLATE VII.

A front view of the same heart as in Engraving VI.

A bougie is passed into the aneurysmal left auricle, and through the left auriculo-ventricular opening into the left ventricle, which is laid open.

A. The left ventricle, hypertrophied and dilated.

B. The mitral valve grown up, and leaving but a small opening, exactly as in Plate IV. A large quantity of bone was deposited in its interior.

C. The aneurysmal sinus of the left auricle, laid open.

D. The left auricle proper.

Notwithstanding the small size of the left auriculo-ventricular opening, there had been no bellows-sound—the cavity of the auricle being so reduced that the opening still bore the natural proportion to it.—See p. 30.

For seeing this patient and for the specimen, I am again indebted to my friend Mr. Holberton.

W. Skelton pinxt.

PLATE VIII.

FIG. 2.

Aneurysm of the left ventricle, with lardaceous tumours on the surface of the heart.

The view is of the posterior part of the heart.

The shape of the organ is altogether changed by the deposits and the aneurysm.

A. The aneurysm at the upper and back part of the left ventricle, and laid open.

Another existed in the substance of the heart, close to it, and communicating with it, but cannot be seen: a bougie, however, is passed through the aneurysm which is seen, into the second.—See pp. 28, 29.

B. B. B. Some of the deposits on the surface of the heart.—See p. 11.

FIG. 1.

Aneurysm of the ascending aorta.

A. The external coat of the aorta detached by blood effused under it from a rupture of the middle and internal coats. It is much more detached than when the inspection was made, and, as the blood is removed, the lower part does not bulge out as it then did.

It is thickened by layers of organised fibrine, at the smaller curvature of the vessel.

B. A longitudinal rent in the outer coat, that caused instant death, by allowing the escape of the blood effused within it into the pericardium.

C. The aorta, its tube consisting of only the middle and internal coats.

D. A transverse rent in the middle and internal coats, that probably took place long before death, as layers of organised fibrine existed between them and the external coat.—See p. 34.

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Fig I

Fig II

W. Skelton, finlp