middle parts of eye. Imperfect sight or blindness from disease of brain, optic nerves, or retina; dimness of sight, limitation of the field of vision, loss of colour sense, blindness of one half of each retina, patches of blindness in the field, spectra (such as dark spots, sparks or flashes of light, coloured spectra). Results of ophthalmoscopic examination.

Hearing.—Defect of hearing on one or both sides. Tinnitus aurium. Examination with watch or tuning fork. Results of examination with otoscope.

Taste.—Test each side of the tongue with sweet and bitter, also with acid and salt substances, the tongue being protruded during the examination.

Smell.—Test each nostril separately with various odours, as those of strong-scented flowers.

(c) *Cutaneous Sensibility.*—Test the *tactile* sensibility of the skin by touch with finger. If an exact estimate is required use Weber's test, the compasses, and note at each spot examined the shortest distance between the points that permits of the patient's recognition of their separate impact. Test sensibility to *pain* with the point of a pin. Test sensibility to *heat* and *cold* with two test tubes, one filled with cold and the other with hot water; or with hot and cold sponges. Note all abnormalities, such as anæsthesia, or hyperæsthesia, or creeping feeling (formication), or feeling of "needles and pins" (prickling).

Note.—In describing a case of paralysis, it is best not to take the sensory functions in the above order, but to begin with "cutaneous sensibility" immediately after having described the motor and trophic conditions of the part paralysed.

4. THE INTELLECTUAL FUNCTIONS.

How is the general consciousness or intelligence affected? Is it well retained, or is it obscured or perverted? Note the condition of the memory, and of the power of sustained attention. Note how the emotional nature is affected, particularly if *self-control* is maintained or impaired.

Loss of Language.—Distinguish between the loss of the power of calling up words in the memory (amnesic aphasia) and the difficulty of articulating words which may have been rightly enough chosen (ataxia aphasia). In the former case note in what degree the memory for words is obliterated or confused; and in the latter case note what consonants the patient has most difficulty in articulating. In both varieties of aphasia cause the patient to write to dictation, and preserve a specimen of what he has written.

5. THE SLEEP FUNCTION.

Character and amount of sleep at night, dreams, somnambulism, &c. Sleepiness during day, &c.

VIII. Treatment of the Case, and Notes from time to time of its Progress.

N.B.—The Clinical Clerk will be careful, in taking a report, not to exhaust the patient by too prolonged conversation or examination, caution in this respect being especially needed when the

patient is feverish or very ill. In cases of very severe illness, the Physician or Resident Physician will furnish what facts may be required as to the physical examination, and a history of the case may sometimes be obtained from the patient's friends.

The Clinical Clerk need not burden his report by using all the headings of the above programme. He is at liberty to select only such headings as he may think required for the particular case he may be describing, and to arrange them as may best conduce to clearness and consecutiveness.

When a patient is discharged, the Clinical Clerk will finish his notes, and report the case as finished to the Resident Physician. In the event of a patient's death, an abstract of the pathological report should be added to the notes of the case.

P.S.—In drawing up the above programme, I have in some particulars followed the "Method of Case-taking" used by the late Professor Sanders, as given in Finlayson's Clinical Manual p. 37.

CHAPTER II.

DISEASES OF THE CIRCULATORY SYSTEM, &c.

Contents.—*Medical anatomy.* The chronic valvular diseases of the heart; *Method of auscultation of the valves*—Dilatation, hypertrophy, and fatty disease of the heart—Endocarditis, ulcerative endocarditis, and pericarditis—Functional diseases of the heart, *viz., palpitation, irregularity and intermittency, tachycardia, irritable heart, syncope, angina pectoris*—Exophthalmic goitre—Rarer conditions—Diseases of the blood-vessels, *viz., thrombosis and embolism, endarteritis, and aneurism*—**Mediastinal tumours.**

Medical Anatomy (see Fig. 2).—The heart lies obliquely between the lungs—the base upwards to the right, and the apex downwards and forwards to the left. It extends, vertically, from the level of the second intercostal spaces to the lower part of the body of the sternum. The apex *beat* is found in healthy persons in the fifth intercostal space of the left side, between the parasternal and mammary lines—*i.e., about three inches from the middle line of the sternum.* In children, it is often felt as high as the fourth intercostal space, and in aged persons it may occasionally be found as low as the sixth. If the patient be turned upon the left side it extends slightly beyond the mammary line. The *true* apex is about three quarters of an inch nearer the mammary line, at the level of the sixth costal cartilage, but here it is overlapped by the left lung. On the right side, at the level of the fourth costal cartilage, the heart—chiefly right auricle—extends about half an inch beyond the right edge of the sternum.

From these points—*viz.,* the apex, the lower part of the body of the sternum, the point half an inch from the right edge of the sternum, and the second intercostal spaces—curved lines may be drawn upon the anterior wall of the chest, indicating the area occupied by the heart. In percussion of the heart, this will be the area of *relative* dulness; but, practically, it is only necessary to percuss in the vertical and transverse diameters. The superficial, or *absolute* dulness, indicates that small portion of the heart—right ventricle—uncovered by lung, and its area forms an irregular four-sided figure having the following boundary lines—*viz., the left,* from the apex beat to the lower border of the fourth left costal cartilage, about midway between the parasternal and mammary lines; *the upper,* from this latter point, runs along about the level of the fourth left costal cartilage to meet *the right* at the middle line of the sternum, extending from the fourth to the sixth costal cartilage; *the lower,*
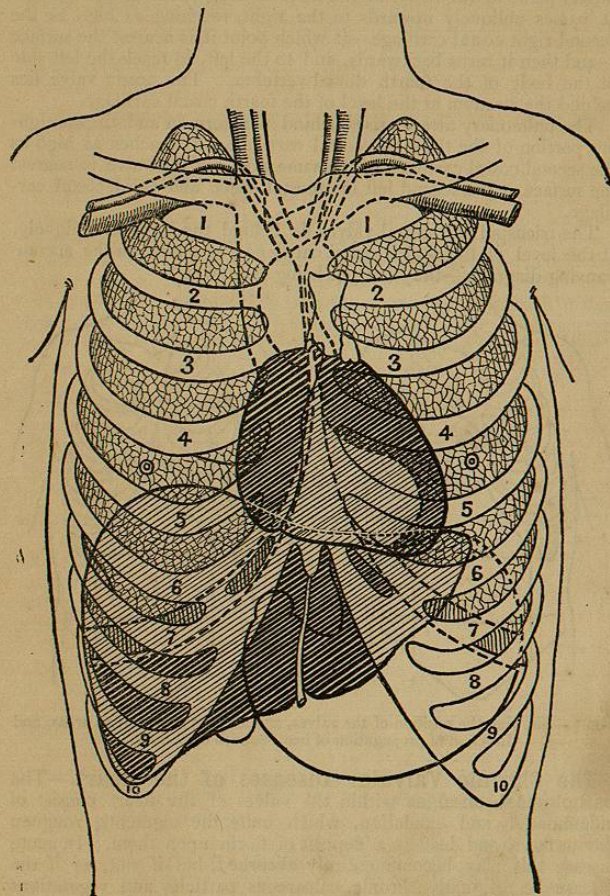
Fig. 2.—(Based upon Joessel), see Text.

from this point to the apex beat—an imaginary line, as the liver dulness does not allow of its being defined by percussion.

The aorta arises behind the sternum, immediately to the left of the mesial plane of the body, at the level of the fourth costal cartilage. It passes obliquely upwards to the right, reaching as high as the second right costal cartilage—at which point it is nearest the surface—and then it turns backwards, and to the left, to reach the left side of the body of the fourth dorsal vertebra. The aortic valve lies behind the sternum at the level of the fourth costal cartilage.

The pulmonary artery arises behind the sternum and the contiguous portion of the third left costal cartilage. It reaches as high as the second costal cartilage of the same side, but the valve is nearest the surface at the second left intercostal space and third costal cartilage.

The tricuspid and mitral valves lie behind the sternum obliquely, at the level of the fourth costal cartilages, as shown in the accompanying diagrams—the tricuspid being the lower.*
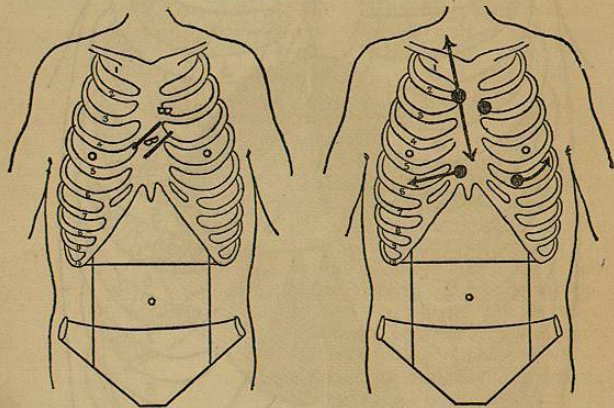

Fig. 3.—Showing the position of the valves, and also the auscultation areas, and direction of propagation of heart-sounds or murmurs.

The Chronic Valvular Diseases of the Heart.—The pathological changes within the valves of the heart consist of inflammation and exudation, which unite the segments, roughen the surfaces, and lead to a deposit of fibrin upon them. In acute disease this may become entirely absorbed, but if not, or if the disease be originally chronic, calcareous particles and vegetations

* The anatomical relations of the heart and valves to the anterior wall of the chest, may be tested in the *cadaver*, by thrusting three or four long knitting wires between the ribs, close to the sternum, before opening into the chest. As the shape of the chest varies in individuals, there is no *absolute* precision possible in the relations of the heart and valves to the anterior wall.

are deposited within the valves, and connective tissue is developed, leading to subsequent shrinking. The shape of the valve is altered. The mitral may become a mere slit, admitting only the tip of the finger, instead of three fingers as in the healthy valve. This gives rise to the condition of mitral *stenosis*. But inflammation of the mitral with shrinking of the segments of the valve may leave a condition quite the opposite, allowing of *regurgitation* of the blood, instead of obstructing its flow. This latter condition can also arise from a dilated left ventricle without valvular change. A *papilliform* endocarditis is sometimes found, chiefly in cases of chorea and alcoholism.

The aortic valve, by similar inflammatory changes—and also by the extention of atheromatous disease from the aorta—may become thickened and the segments united, the edges being sometimes ragged and shapeless, and sometimes a segment may be entirely gone. Small valvular "aneurisms" are sometimes formed, or the segments of the valve may be much thinned, and they may have slits in their substance giving them a fenestrated appearance. The result of these conditions is that the valve becomes permanently impaired, and hence aortic stenosis and incompetence. Aneurismal dilatation of the aorta may, however, give rise to incompetence without structural changes in the valve.

The tricuspid valve may be affected along with the mitral in acute disease, but this rarely occurs, and seldom leaves *chronic* valvular disease. A dilated right ventricle, secondary to obstruction of the circulation in the pulmonary vessels, or at the left side of the heart, frequently gives rise to tricuspid regurgitation, but stenosis is very rare. Pulmonary stenosis and incompetence are rare and usually congenital.

The secondary changes following the chronic valvular lesions are—the dilatation of the heart from the overfilling of its cavities, the hypertrophy of the heart caused by the increased work necessary to carry on the circulation, and, in the later stages, degenerative changes within the muscular fibres.

The secondary effects upon the other organs are due to the altered tension within the blood-vessels in front, and engorgement of them behind, the obstruction; and these effects occur either during the early stage of dilatation of the heart, or later, when the compensatory hypertrophy begins to fail.

If there be stenosis of the aortic valve, incompetence, or both conditions present, the result is dilatation of the left ventricle, which soon becomes hypertrophied. When this compensatory hypertrophy fails, and dilatation of the left ventricle again begins, the mitral becomes incompetent and allows of regurgitation into the left auricle, which soon becomes dilated, and thus the pulmonary veins are engorged, producing congestion of the lungs. The pulmonary arteries also become engorged, and then follow in the same way dilatation of the right ventricle, right auricle, and systemic veins, producing ultimately dropsy of the cellular tissues and serous cavities. Death may then result from gradual and sometimes sudden failure of the heart.

If the mitral valve be the seat of the disease, and *stenosis* the result,

the left ventricle does not become dilated as it is now in front of the obstruction, but the left auricle may be enormously so, the pulmonary vessels, right side of the heart, and systemic veins becoming engorged as before. In *mitral insufficiency*, the left ventricle becomes dilated and hypertrophied; and so do ultimately all the heart cavities.

The accompanying scheme of the circulation shows how congestion of the other organs takes place wherever the obstruction exists; and explains the apparent irrelevancy of the symptoms of patients
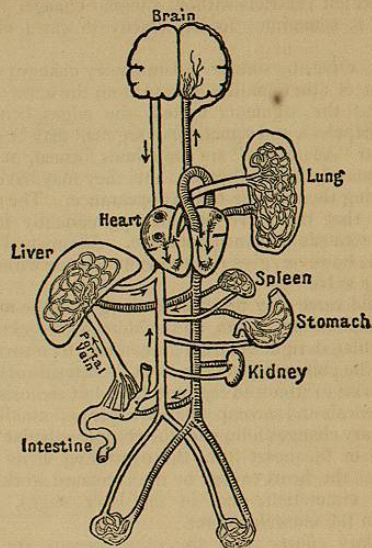
Fig. 4.—Scheme of the Circulation.

suffering from heart disease. The conditions produced in the lung are congestion, brown induration, and œdema. Hæmorrhages (pulmonary apoplexy) often occur within the lung tissues, and small patches of pneumonia may develop, either the result of inflammation around infarctions, or the effects of cold upon the congested lung. Bronchitis is very commonly combined with heart disease, and the two affections re-act upon each other, the heart disease producing congestion of the lung and bronchi, while bronchitis (especially when associated with emphysema) produces an obstruction to the circulation within the pulmonary vessels, and hence dilatation of the right heart and systemic veins, with the resulting dropsy, as in valvular lesions. Congestion and enlargement of the liver (nutmeg liver) giving rise to hepatic symptoms, and congestion of the stomach, spleen, kidneys, uterus, &c., with hyperplasia of these organs, are

all consequences of the heart's failure to maintain the circulation. Thrombi may form in the stagnated blood, and emboli from them or from the diseased valves may pass into the circulation, producing infarctions in other organs. An embolus in the middle cerebral artery is a frequent cause of hemiplegia, often with aphasia; but it should be noted that atheromatous disease of the cerebral vessels often co-exists with the aortic disease, and hence hemiplegia may be due to cerebral hæmorrhage and not to embolism.

The **causes** of chronic valvular disease of the heart are endocarditis, whether rheumatic, simple, or choreic in origin—the rheumatic being the commonest; scarlatina, diphtheria, and pyæmia; and atheromatous disease of the aorta—which may appear early in gouty and rheumatic subjects, and in cases of lead poisoning, syphilis, and chronic alcoholism; as also laborious occupations.

The **symptoms** and **physical signs** vary with the condition of the heart. Should the extent of the valvular disease and the amount of compensatory hypertrophy be nearly balanced, there may be no symptoms complained of by the patient, and the lesion is then said to be *mute*. But when the heart fails to respond to the extra call that is made upon it, the symptoms present will depend upon the extent, seat, and stage of the disease. The patient may complain of *palpitation*, directly due to the valvular lesion, or to the secondary consequence of a congested stomach, giving rise to dyspepsia with flatulence, and thus interfering with the heart's regular action. It is common for patients suffering from heart disease to refer their symptoms to the stomach, and *vice versâ*. *Pain* is often complained of, from dull stretching pain or uneasiness in the precordial region or left side, to the agonising pain of angina pectoris. The latter usually indicates degenerative change (fatty disease) of the heart. *Breathlessness* is marked in all stages of valvular disease when compensation is incomplete. It is most obvious upon making exertion of any kind, and thus differs from the dyspnœa of lung disease, which may be apparent while the patient is at rest. It may be a mere "sense of oppression," but should there be pressure on the trachea (dilated aorta), the breathing is rough and noisy. A noisy cough may be due to the same cause. *Cheyne-Stokes'* breathing is a peculiar form of respiration, beginning with shallow breaths, gradually increasing in depth and rapidity, and as gradually fading until the patient seems to have ceased to breathe; but in a few seconds the cycle is repeated. It may indicate fatty degeneration of the heart; but it occurs also in cerebral hæmorrhage and other brain diseases. *Syncope, headache, giddiness,* and *tinnitus aurium* are frequent symptoms of valvular disease, all due to disturbance or failure of the circulation. *Sleeplessness* is also a common symptom. *Cyanosis* and *dropsy* are marked signs in mitral disease, and in the later stages of aortic disease when the ventricles become dilated. The cyanosis may exist from the faint blueness of the lips and dusky look of the lower eyelids, to the blue-black appearance noticed in extreme cases. The tip of the nose, the ears, and finger nails are the special sites, and often the superficial veins are

prominent. The dropsy generally begins on the dorsum of the foot, and extends upwards. Dropsical patients have frequently attacks of *diarrhœa*. The characteristic *facies* of mitral or aortic disease may be present—a flushed look over the malar bones in the former, and a pale anæmic condition in the latter. There is *mental weakness* in advanced and long-continued valvular disease, the brain being poorly nourished. This symptom is more obvious when emboli pass into the circulation and block the cerebral arteries. *Hemiplegia* is then usually present, and if the clot (as is most usual) be on the left side, and cut off the blood supply from Broca's convolution, *aphasia* also results. Emboli may be the cause of *epileptiform convulsions*, but this symptom may also arise from simple and sudden disturbance of the circulation.

The congestion of the lungs with *cough*, and often *hæmoptysis*—the expectoration being usually pink in colour—and the symptoms and physical signs of *œdema* of the lungs, and of *bronchitis*, are described under diseases of the respiratory system. Should a large *hæmorrhagic infarction* be produced in the lung, there will be hæmoptysis and dyspnœa, perhaps produced suddenly, and if large and superficial, the physical signs of consolidation—as bronchial breathing, increased vocal resonance, and dulness on percussion—may be made out. Sudden death may take place from these large infarctions; or they may end in gangrene of the lung, and subsequent *pneumothorax*. Smaller infarctions may heal, leaving cicatrices, and, if superficial, they may light up *pleurisy* with pain and fever.

Should the liver be deeply congested, slight *jaundice* may be present, and percussion may reveal the liver to be enlarged.

The presence of *albuminuria* and tube casts, with diminution in the quantity of urine, will indicate congestion of the kidneys; while *hæmaturia*, if present, may be due to the congestion, or be the result of embolic infarction. It may be sometimes difficult to say in a case of albuminuria, with bronchitis and a dilated heart, whether the disease is originally one of heart disease or Bright; but an enlarged liver, in this respect, points to heart disease. In the female the uterus may be congested, and *menorrhagia* may be present as a symptom.

To explain the *murmurs* heard in valvular disease of the heart, and to locate their seat of origin, the normal sounds must be understood. The heart may be looked upon as a specially altered blood-vessel, dilated and surrounded by muscular fibres, to form the propelling organ. It is a hollow muscle, with four chambers and four valves. The right auricle, receiving the blood from the venæ cavæ, communicates with the right ventricle through the *tricuspid* valve; and the right ventricle sends on the blood through the *pulmonary* valve into the pulmonary arteries. The left auricle, receiving the blood from the pulmonary veins—having circulated through the lungs—communicates with the left ventricle through tbe *mitral* valve; and the left ventricle propels the blood into the aorta through the *aortic* valve.

The contraction of the heart is called the systole, and it begins

with the silent contraction of the auricles, and is immediately followed by the contraction of the ventricles, corresponding with the first sound—the mitral and tricuspid valves being closed, the aortic and pulmonary valves being open. The first sound is longer and duller than the second, which is sharp and short. The sounds are represented by the syllables *lubb'*—*tup.* The second sound indicates the closure of the sigmoid valves in the aortic and pulmonary arteries. It marks the end of the systole, and the beginning of the diastole—*i.e.*, the dilatation of the heart—the aortic and pulmonary valves being now closed, the mitral and tricuspid valves beginning to open.
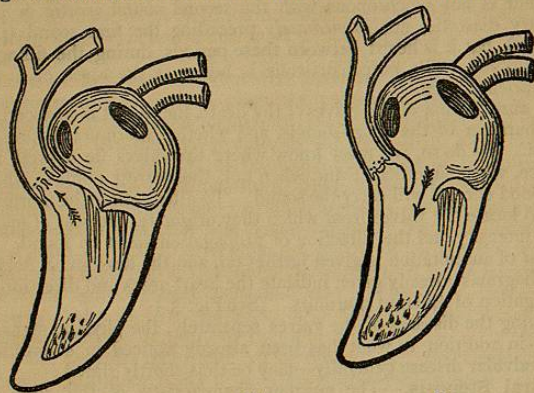

A.   Fig. 5.   B.
Contraction of the Heart (systole), the mitral valve being closed, and the aortic valve open.   Dilatation of the Heart (diastole), the mitral valve being open, and the aortic valve closed.

The following are the areas at which these sounds (or murmurs in relation to them) are best heard, viz. :—The *mitral area* at the apex beat; the *tricuspid area* at the foot of the body of the sternum, about the level of the fifth costal cartilage; the *aortic area* at the second right costal cartilage, at its junction with the sternum; the *pulmonary area* at the sternal end of the third left costal cartilage and second intercostal space (see Fig. 3). The *left auricular area* lies just outside the pulmonary area, in the second intercostal space. If the auricle be dilated it may extend a little lower. It is about an inch to an inch and a half from the left edge of the sternum.

Murmurs are due to oscillations of the blood in passing through vessels of different calibre, and not due to friction in passing over roughened and diseased valves. They are described as being harsh, grating, soft, and musical.

Any murmur heard *immediately* before the first sound would be auricular-systolic in rhythm; but clinically—taking the first sound as the starting point—this murmur is called *presystolic*, and it originates at the mitral or (very rarely) at the tricuspid valve. The cause of

the murmur is stenosis of the valve; and it is the only murmur which alone indicates with certainty the presence of valvular disease. Any murmur heard during or through the first sound is *systolic* in rhythm, and its origin may be at any of the four valves. It is caused by mitral or tricuspid regurgitation, and by stenosis at the aortic or (rarely) at the pulmonary valve.* A murmur heard immediately after or replacing the second sound is *diastolic* in rhythm, and it originates at the aortic or (very rarely) at the pulmonary valve. The cause is aortic incompetence or, possibly, the rare condition of pulmonary incompetence. The *mitral diastolic* or post-diastolic murmur is not synchronous with the second sound (aortic or pulmonary diastolic) nor *immediately* preceding the first sound (presystolic), but it is heard between these periods, during the filling of the auricles. The mitral diastolic is heard at the apex, or at the left auricular area.

In auscultation of the valves of the heart, the object is to ascertain the character of the heart-sounds, and whether murmurs be present or not. To do so, we must know where the valves lie nearest the surface, when superficial; and when not, the nearest point to which the blood current will carry the sound. To differentiate the murmurs and to locate the valves from which they originate, the seat of maximum intensity and the direction of propagation must be found. A *method* of auscultation is given further on, and the anatomical details and diagrams already given indicate the heart areas and direction of propagation of different murmurs. (See Fig. 3.)

Taking the diseases of the valves separately, the physical signs of each—in addition to what has been already noticed in connection with valvular disease generally—may be thus shortly stated :—

Mitral Stenosis.—The murmur characteristic of this form of valvular disease is generally *presystolic;* but there may be also a diastolic (mitral) present, and it is sometimes combined with the presystolic murmur. If there be regurgitation through the stenosed valve, a *systolic* murmur may also be heard ("double mitral" murmur). The presystolic is best heard at the apex; the mitral diastolic is usually loudest at the left auricular area. The first sound is peculiarly altered and "thumping" in character; and it cuts short the murmur with a sudden snap. Sometimes no murmur is heard, or some exertion requires to be made by the patient in order to develop it. Very frequently there is accentuation of the second sound in the pulmonary area, caused by the over-pressure in the pulmonary artery; and often there is reduplication of the second sound, which may be audible at the base or apex. This "double-shock" sound is not due to asynchronous action of the aortic and pulmonary valves, but (when heard at the apex) is mitral in origin, and it indicates an early stage of mitral stenosis (*Sansom*, *Potain*, *Boyd*, and others). The second sound is sometimes inaudible at the apex. The apex beat is in its normal position, and a second impulse or undulation may generally be

* Aortic systolic murmurs are frequent, without organic disease. They may be due to a narrow orifice with slight relative aortic dilatation. The murmur is often heard in the auscultation of an excited heart.

noticed just above the fourth left rib. A presystolic *thrill* (*frémissement cataire*) may be felt upon placing the hand over the precordial region. Dulness is increased in the transverse diameter. The pulse is small and low in tension, and in extreme stenosis it may be very irregular.

Tricuspid stenosis is a very rare condition, but when present, the presystolic murmur would be loudest in the tricuspid area, and the superficial veins would be dilated. It is almost always congenital.

Mitral Regurgitation.—The murmur is systolic in rhythm, occurring with the first sound and heard in the mitral area over the apex beat. It may be propagated towards the left axillary line, and, if loud, may be heard at the angle of the left scapula. Sometimes it is best heard at the left auricular area, and sometimes to the left of the sternum, just above the ensiform cartilage. The variations are said to depend upon the particular flaps of the valve involved. It is generally blowing or soft in character, and it fades gradually. Frequently *no* murmur can be heard. The heart is irregular in its action, and the systole may require to be timed with a finger upon the carotid artery. There may be accentuation and reduplication of the second sound. Inspection may reveal a diffuse impulse; and a systolic *thrill* may sometimes be felt. Percussion may show that the heart is enlarged, chiefly in the transverse direction. In the later stages when the right heart becomes dilated, the apex beat is pushed back and may not be felt. There is distension of the veins of the neck, epigastric and sometimes hepatic pulsation, with other signs of tricuspid regurgitation. The pulse is irregular, small, and rapid. The other signs, as enlarged liver, dropsy, albuminuria, &c., have been described with the general symptoms and signs of valvular disease.

Tricuspid regurgitation may be due to congenital conditions, but it is usually a result of dilatation of the right ventricle, and caused by valvular lesions of the left side of the heart; or by obstructions in the pulmonary system, as chronic bronchitis and emphysema. The murmur is loudest in the tricuspid area, and it is propagated over the liver, and systolic in rhythm. The pulmonary second sound is generally weak, except when there is co-existing mitral disease. The apex of the heart is pushed back by the dilated right ventricle, but a diffuse impulse is seen, and felt, extending upwards and to the right. There is also epigastric and sometimes hepatic pulsation, and true venous pulsation at the neck. By compressing the jugular vein about the middle the following should be made out :—If the venous pulsation continue above the finger it is due to the carotid pulsation, if below, it is due to the heart movements, and on emptying the vein by pressure from below upwards it will refill (regurgitation), and the pulsation continues when the patient holds his breath. There will be no true venous pulsation unless the regurgitation is sufficient to dilate the jugular veins so as to render their valves incompetent. Percussion reveals dulness in the transverse diameter and to the right of the sternum. Venous stasis, with dropsy, albuminuria, &c., occurs early.

Aortic Stenosis.—The murmur is systolic in rhythm, and is best heard at the junction of the second right costal cartilage with the sternum, and propagated according to the stage of the disease—

No 1

A NORMAL PULSE

No 2

AORTIC REGURGITATION

No 3

PULSE IN AORTIC STENOSIS

No 4

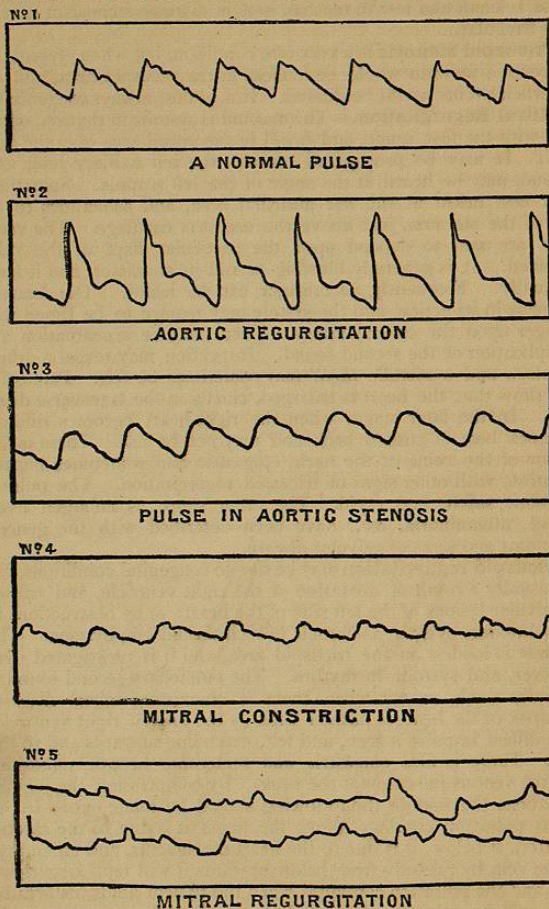MITRAL CONSTRICTION

No 5

MITRAL REGURGITATION

Fig. 6.—Sphygmographic Tracings (Broadbent).

rasping, musical, or soft. It is often combined with the diastolic ("see-saw" murmur). The second sound may be sharp, or inaudible. The apex beat is lower and nearer the mammary line,

percussion revealing enlargement of the heart in its vertical diameter. A *thrill* may be felt. The pulse is small, slow, regular, and "sustained," and often is anacrotic. The condition of stenosis seldom exists alone, but is almost always associated with incompetence, although the latter may be slight, and the diastolic murmur more difficult to hear.

Aortic Incompetence.—The diastolic murmur which characterises this form of valvular disease is heard at the aortic area, or down the left edge of the sternum as low as the ensiform cartilage, and it is sometimes heard at the apex. If the incompetence be great it is also heard in the carotid artery when pressure is made with the stethoscope upon it, and then it is accompanied by a systolic murmur, artificially produced by the pressure. The apex beat may be as low as the sixth or seventh left interspace, and it is forcible if the heart be much hypertrophied. Percussion reveals enlargement, chiefly in the vertical line. Sometimes a diastolic thrill is felt. The pulse (known as the "water-hammer" or Corrigan's pulse) rises to the finger sharply, and as suddenly collapses. It is more markedly jerky on raising the arm, and it may be felt and seen to pulsate in the smaller arteries if the incompetence be great. It is regular so long as the cardiac compensation is maintained. A *capillary pulse* can often be made out.

The two conditions—aortic stenosis and incompetence—almost invariably exist together, but often they differ in degree. A "see-saw" murmur at the aortic area is not always heard, although stenosis and incompetence be present. If the stenosis be greater than the incompetence, the systolic murmur is loud in the aortic area because directly conducted to the stethoscope, and it is heard well in the carotid artery because propagated in that direction, while it becomes
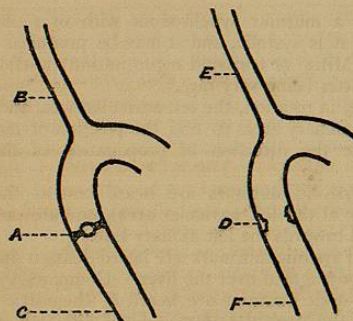
Fig. 7.—A represents a calcified aortic valve, at which there is great obstruction, but trifling incompetence. In such a case there is a loud systolic murmur at A; a systolic murmur, but no diastolic, at B; and at C a slight diastolic may be heard. D represents the aortic valve almost gone, and there is no obstruction, but great incompetence. There is a diastolic murmur usually heard at D, but no systolic; at E there is both a systolic and a diastolic; and at F there is a loud diastolic murmur (see Text).