Clinical Research
with the
Sphygmograph.

By Albert Wilson MB, ChM. 1882
Worthy of congraturing for a Medal
The object of this paper is to demonstrate the practical uses which the physician in his daily routine can make of the Sphygmograph.

In the wards or in the laboratory, there are great facilities for research, both as regards material and instruments. But when one quits the sacred precincts, and engages in the routine of general or special practice, it is seldom that one can be provided with sufficient apparatus, nor have sufficient time, to enable an exhaustive investigation in any special branch of medicine.

With a small, portable Sphygmograph, I have made a number of tracings of different diseases in their different stages, illustrating also the action of various drugs.

I have also taken tracings of people in health, showing the effect of attitude on the actions of drugs in the healthy organism.

These tracings are often difficult to interpret, and it is only by collecting a great number and by falling back
upon the researches of various physiologists, that one is able to understand them.

There is always great room for error in this kind of research as, time of day, food, fatigue, rest, attitude and other circumstances affect the pulse, and therefore I have carefully endeavoured, when taking daily tracings of a particular case, to visit the patient at the same time and choose the same attitude.

It is not necessary to describe the discovery of various forms of sphygmographs, I should only render this thesis unnecessarily wearisome. Like all inventions its evolution and perfection were gradual and even now it cannot be considered a perfect instrument. In pulse tracings it would be of undoubted benefit if one could have a scale showing the amount of pressure in m. m. of mercury which raises the needle at each
stroke. Instead of that however, the spring of the sphygmograph which I used (Juglows) can be made to exert pressure from 0 to 5 ounces in each case. My object has been to obtain the best possible tracing. Usually this can be done when the spring exerts about 3.03 oz. of pressure on a adult, but in some cases where the pulse is weak, one has to use a lower pressure. One can only feel the pulse or take a tracing where the artery lies on bone.

Launere was perhaps the first to announce this fact. In his "Recherches sur la cause de la pulsation des arteres. M. Montpellier 1469" he discrèted how, feeling the aorta in the abdomen of a live, he felt the pulse on the anterior surface of the vessel but not on the posterior surface. If he slipped his finger between the vessel & the vertebral column...
Whence he concluded that the pulse was a sudden elevation on the ventral surface of the aorta. Where an artery lies on soft parts it is well known no pulse can be felt, so to estimate the pulse it is necessary to compress it with the finger over a bone, depriving it of its cylindrical form. By means of obtaining the fullest tracing in each case one can make an approximate estimate of the strength of the pulse. The use of the sphygmograph is to show any abnormal variation of the curve and the force of the heart beat, and during the treatment of the case is often a guide in the use of drugs. The finger, however sensitive, is unable to detect the changes in the pulse unless they be very marked and in many cases they convey quite an opposite impression of the real state of the pulse. Thus dirofism occurs frequently.
in a pulse tracing when it cannot in the least be detected by the finger and experience will show that one can often foretell approaching convalescence by this instrument.

To understand the pulse increase one must first study

The normal pulse in health.

In the ordinary tracing there is a vertical line of ascent followed by a gradual descent with 2 or more waves on it. The pulse tracing is a modification of the heart tracing and therefore it will be easier to understand the former if I first briefly give a sketch of the cardiac tracings.

It is to Marey that we owe most of our knowledge on this subject! Marey found that the systole of the heart of a dog gave a simple curve like that of an ordinary muscle when it contracts.
Reflecting a movement from one point to another, through tubes full of air. These two casethoric ampullae are connected by a tube filled with air. By compressing one the other distends & would thus raise a lever resting upon it. On this principle a manometer was constructed. Three systems of ampullae are so arranged that one goes into the right auricle, another into the right ventricle, and a third in front of the left ventricle to receive its impulse. The terminal ampullae are connected with writing levers, which form tracings showing the intensity, succession and duration of the pressure exerted upon the opposite ampullae. Marie improved upon this mechanism and constructed a cardiograph which he used on horses and to him we are indebted for tracings which show the exact way in which the heart works.
Fig. 1.

This diagram, taken from Marey's work on the circulation, represents the tracing of the right auricle, right ventricle & apex beat of a horse.

The auricular systole (line A.) is felt in the interior of the ventricle, causing a slight rise in the ventricular curve. There is also a small beat of the heart at the same moment.

The ventricular systole causes a marked up-stroke (B) with a longer duration than the auricular, the pressure remaining raised a long time.

The ampulla in front of the heart shows a strong pressure at the ventricular systole which lasts during it & ceases with it at the relaxation of the ventricle (C). The impulse of the heart is thus
Shown to occur at the precise moment of the ventricular systole.

Every muscle proportion its effort according to the resistance it has to overcome. Fig. 1. Marcy & Chauveau demonstrated this in the living frog. They compressed the great venous trunks so as to empty the heart. When they obtained the simple curve of an ordinary muscle; as soon as they allowed the blood to re-enter the heart, its curve altered.

The depletion of this ventricle causes a slight ascent with a wave which marks the auricular systole; then a vertical line for its systole and a descent at the end of this period. The plateau marking the duration of the systole.

The frog's heart being slow the tracings are simpler.

Fig. 2.
The systole of the heart causes the ascent of the liver whilst the descent corresponds to the diastole.

The auricular systole is short, the ventricular systole is long.

The apex beat ascends & descends almost with the ventricular systole but has a gradual fall between these two points. The space between being called the systolic plateau. During the diastole there is a gradual ascent of the apex curve which shows that the heart is increasing in volume. The filling of each cavity commences immediately after each systole. This gradual filling is explained by the continuous arrival of blood from the veins.

At the ventricular systole the auriculo-ventricular valves form a dome with multiple convexities inside the auricles. This has been felt by Marey in the horse. The capacity is diminished
in the auricles & consequently the pressure rises and causes waves in the auricular tracing.

Now the ventricle relaxes a wave occurs in each tracing. At this period the sigmoid valves are suddenly lowered and pushed lightly towards the ventricle, producing in it a slight rise of pressure and a wave in the tracing. This wave occurs also in the auricular tracing, because at the moment the closed valves are open & the auricles & ventricles are one cavity.

Marey in 1874 took tracings from a case of elongation of the heart, & found that it corresponded with that of a horse. The only difference was the short interval between the auricular & ventricular systole. Fig. 3.

[See Trav. lab. T III p. 311].

Fig. 3.
The blood moves from a point where the pressure is strong to one where it is weak, and the rate of flow is proportionate to the difference in pressure between these two points. During the systolic period the pressure is equal in the left ventricle and the aorta provided the mitral are competent as they are then one cavity.

In the diagram, copied from Marey, it is seen that where the sigmoid values close to the aortic curve descends slowly because the blood flows gradually into the capillaries. The ventricular desents abruptly (c) as the pressure falls suddenly in the empty and

+ (loc. cit. p[117])
relaxed ventricle.
The maximum pressure is less in the aorta than in the ventricle.
If the pressure falls in the aorta the blood flows quicker from the ventricle & with greater force. This will be referred to later on when I am describing the pulse in fever.
The great obstacle to the flow of blood is the resistance which the small vessels offer. This resistance varies according to the degree of contraction which depends on their elasticity. The elasticity of the arteries transforms the intermittent into a continuous stream. This can be demonstrated on an elastic tube. In the arterial system it is a gradual transition.

Marey in his "Researches sur la circulation," "Le Med. de Paris" 1858 showed that the elasticity of the arteries diminished the resistance which the blood meets on.
main entering the artery. The heart has less difficulty in propelling the blood when the arteries are very extensible.

It will be seen later that in the feverish state where there is relaxation of the small vessels, there being less resistance to the entrance of blood, the upstroke is higher, indicating more ventricular force.

The elastic force which comes into play to prevent the overdistension of the vessels & keep up the continuous flow of blood into the capillaries during the diastole of the heart is called

The Arterial tension.

Arterial tension is generally considered to have a constant and a variable element. The variable element corresponds to the amplitude of the pulsations.

If the small vessels contract the arterial tension rises, as it has to force the blood into the
capillaries during the diastole of the heart, when the small vessels release the arterial tension falls.

Marey (in his Trav. lab. T IV, p. 28) found that if the ventricle meets a growing resistance, it sends waves of small volume, and as the tension rises, the fulness of the variations decreases. This decrease of the variable element of tension implies diminished volume of the waves.

The heart preserving its force of impulse, whatever raises the arterial tension diminishes the fulness of its variation and vice versa; whatever lowers the arterial tension increases the fulness of its variation.

If the systole diminishes in frequency the heart has more time to fill and the blood has more time to pass into the capillaries, therefore the arterial tension rises and the fulness of the waves diminishes.
The Pulse

consists of a distension with hardening of an artery. It is caused by a wave of blood which is projected by each systole of the heart. The pulse varies according to the strength of the heart's action, the amount of blood it sends. It also depends on the elasticity of the arterial walls and the amount of resistance which the blood meets in the capillary circulation.

Now the Sphygmograph does indicate how far these various influences affect the pulse. Before examining the pulse in disease, one must first study it in health. I have therefore selected pulses from people in health of different ages and both sexes with normal hearts.

The radial is the pulse usually examined. Fig. 5.

In the normal tracing there is a line of ascent corresponding to that seen in
The heart tracing which is caused by the ventricular systole. A more or less gradual descent follows marked by at least 2 waves. The first wave is called the _precordium_ and the second the _dicrotic_ wave.

The ascent ought to be vertical if this is due to the suddenness and force of the cardiac pulsation. A weak or slow pulsation causes a more slanting upstroke. This can be demonstrated on an elastic tube with an enema as the following tracings show.

Fig 6

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In these tracings the descent is as sudden as the ascent forming an acute angle at the apex. This is because there is free outlet to the flow of blood. These show some resemblance to the pulse wave in the febrile state (see figure). When the small blood vessels being relaxed there is comparatively free outlet to the wave of blood passing along the artery.

Fig. 11

There are in the tracings numerous waves. They are undoubtedly waves of oscillation due to the vibrations of the indiarubber tube. Most physiologists consider the prodromic wave to be a wave of oscillation due to the vibration of the arterial walls.

Poulée Nawens (the Poulée curve by den 1878) holds
This opinion, so do Mosso & others. Marcy thinks it is the remains of what de Catta calls the systolic plateau, as it corresponds to an elevation in this plateau before the abrupt descent which indicates the close of the systolic period. (loc. cit. p. 272)

Fig 13: He shows the above diagram in proof of this. The tracing of the pulse and heart being taken simultaneously. Again in old people, with thickened more rigid arteries where the cardiac waves are less altered, the diastolic wave is more marked.

The diastolic wave is proved by comparing simultaneous cardiographic & sphygmographic tracings to occur
At the moment of the closure of the Sigmoid Values. (loc. cit. p. 257) Fig 14.

![Diagram of cardiac cycle](image)

Fig 14

Many theories were held about diastolic. Buisson said it was caused by the shock of the retrograde aortic waves against the closed sigmoidals (These Thèses inaugurale, Paris 1882). Many after destroying one sigmoid valve found that diastolic immediately disappeared. The diastolic wave also is absent in aortic incompetence. Some have considered the diastolic wave as one of reflection from the periphery. If so it would disappear.
On compressing the artery below, where the sphygmograph is applied, this however does not occur. This opinion has been quite disapproved. Fig. 15 illustrates this.

Radial artery after digital compression

Fig. 15.

The diastolic have than is a centripetal wave and corresponds to the closure of the sigmoides.

The conditions which favour diastolic waves are:
1) Sudden penetration of the blood into the arteries
2) Small volume of the pulse
3) Low arterial tension

The latter acts by allowing the ventricle to empty quickly.

With a view to testing if the diastolic wave occurred as the second sound I auscultated...
A patient whilst I took a tracing of the radial pulse & gave his hand a jerk when I heard his 2nd sound so as to produce an exaggerated wave in the tracing.

Fig 16

There being a slight delay in the radial pulse, I found that if I jerked the hand at the beginning of the 2nd sound I caused an exaggeration of the systolic wave. Fig 16. Jerking the hand toward the olecranon during the 2nd sound caused an exaggeration of the diastolic wave. Fig 17. This is demonstrated by the fact that the diastolic wave is synchronous with the 2nd aortic sound.
The following tracings are taken from different people in health.

25 18
19
20
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Fig. 18. From a young lady, lying down in the morning.

Fig. 19. Is taken from a young lady sitting.

Fig. 20. Is from the same lady at night, two hours after dinner.

Fig. 21. Another lady.

Fig. 22. A young girl, Oct. 9.

Fig. 23. A man of medium height, not very robust, but about 30.

Fig. 24. A strong muscular man.

Fig. 25-26. Both from ladies.

Fig. 27. From a robust muscular man, about 50, large arteries.

Fig. 28. The pulse of a very old gentleman, Oct. 8.
These are tracings from a person in health with normal heart.

Fig. 29. Taken in the day time sitting.
Fig. 30. At 9 p.m. after dinner.
Fig. 31. Another day when very tired after a hard day's work and after a light supper.
Fig. 32. Another day when very fatigued at midnight.

The 2 latter tracings where there is great bodily and mental weakness show depression of the systolic force of the ventricle.

Fig. 33. At 4 a.m., after studying all night.
Attitude
has a marked effect on the pulse.
Gravity increases the arterial
tension in all dependent parts,
but diminishes it where the
blood flow is opposed to it.

Dr. Grendel (in his Arch. de Müller 894)
states that gravity more than
compensates the decrease of
pressure which results from the
resistance to overcome, and on account
of which the tension becomes lower
as one gets further from the heart.

The following 2 series of
tracings show how gravity affects
the pulse wave in a limb when
raised and when hanging d. c.

The series is taken from
a healthy young man of rather
peaceful occupation, coachman, which
probably accounts for the rather
even end diastolic in his pulse
tracing.

The other series is from M. from a
very active robust man.

The W. series are taken standing high
is with its wrist on a level with its shoulder.

Fig. 35. with its arm raised above its head.

Fig. 36. with its arm hanging down by its side.

In series (m) the gentleman was sitting on a sofa.

Fig. 37. The arm was straight out on the sofa not.

Fig. 38. The arm hanging down.

Fig. 39. The arm raised above its head.
The ventricular systole is in each case the same during the experiment. The difference in pulse force is due to variation in arterial tension. Elevating the arm the pulse becomes stronger. The wave travels with more force because the artery is less stretched. Gravity has lowered the arterial pressure. Lowering the limb the pulse becomes weaker. Gravity favours the blood by which the arterial tension is increased and the artery is stretched.

When the arm is bent at right angles the pulse is weaker. Than when it is straight out. Due of course to the slight obstruction which the bend causes to the blood stream.

Fig 40 demonstrates this. Taken from Fig 41 is the cardiac tracing.
In modern surgery it is the custom before applying the tourniquet to drain the limb by elevating it as recommended by Prof. Lister. After the tourniquet is applied the limb is quite blanched. Immediately it is removed the limb becomes dry and slightly pallid. Prof. Lister says that when the limb is pressed the veins empty & the arteries contract & when the limb afterwards becomes congested it is due to vasomotor paralysis.

This vasomotor paralysis is probably due to the fact that the nerves have been for a time deprived of their vascular supply.

I practised this operation on a muscular subject, Mr. I held the arm erect for some time. The pulse did not disappear through the limb became pale, & then I applied the tourniquet to see if strange that the tracing of the pulse would...
be so much fuller. When there is so much less blood in the limb. It illustrates forcibly how the waves are exaggerated when the vessel is less stretched or relaxed. Then and the arterial tension lowered.

Fig. 35. in this case shows that the line of ascent is steeper and rounded showing feebleness of the blood wave to overcome gravity.

M. relaxed. The Bournequist after it had been applied. Some minutes of the whole limb felt numb. I had the sphygmograph applied and at a given signal M. relaxed the instrument of and set the tracing paper in motion. Thus I got the 1st wave.

It is to be seen in Fig. 42.
Fig 43 was taken immediately after a few minutes later Fig 44.

The waves show growing dullness in increasing duration with diminishing preciscion. Preciscion thus diminishes in a relaxed vessel.

Fig 45 shows the radial of the opposite or right side. As the waves get fuller, the pulse itself felt larger and bounding.

The blood vessels large and small in the left side were at that moment relaxed. His relaxation diminishes the arterial tension and intensifies the vibrations of the blood waves. Whilst it makes their penetration easier.
The result is a higher upstroke and pointed apex with increased distension & diminished precipitation. The former indicates increase of the variable element of the pulse wave. Note that the waves get fuller as time goes on. Why is this? Is there an early contraction of the vessels followed by relaxation? Probably not. The early blood waves escape easily into the relaxed capillaries & so the artery is not distended to its fullest until the capillaries are distended & filled.

It has been stated by many physiologists that relaxation of the blood vessels in one part causes contraction with higher arterial tension in another.

I therefore took the tracing Fig. 45 just after taking Fig. 44. It certainly shows less force & less diastolic than at the commencement of the experiments. See Fig. 37.
The above phenomena were entirely local and due to local causes also, namely, the vasomotor paralysis in the armpit. Dilatation of the blood vessels in another part of the body will cause lowered tension in the radial pulse. Thus I made Mr. Male amyl and then the full effects were produced. I took a tracing of the right radial artery. There is the pointed apex and increased diastolism, which shows a state of low arterial tension due here to a distinct cause, namely relaxation of the blood vessels of the head. (p. 524) The same process will be seen to occur in inflammation of different organs. Many healthy individuals show an apparently abnormal diastolism. This is seen in W's case. Also in the case of a healthy robust youth of 20. Fig 47 also in another robust young
This is due to a general state of slight relaxation of the vessels. Some slight loss of vascular tone. It is a marked feature in cases of nervous debility. There is a great difference in the tracings according as a person is standing or lying. The pulse also varies in frequency. In this case, it was 66 standing and 56 while lying. Fig. 34 shows the pulse in the erect position. The annexed figure 48 shows the tracing when patient was lying down with the limbs raised. Pulse is slower and arterial tension is increased. Fig. 49 shows the dorsalis pedis when patient was erect, and Fig. 50 when lying down. To what is
At difference in pulse frequency & arterial tension arise?

It is held by Marcey and others (see La Circulation du Sang p. 371. 442) that gravity in the erect position favours the flow of blood over the greater part of the body & diminishes the tension. Whereas sitting or lying are unfavourable to the action of gravity on the blood current.

Von Bezold & Moscoen maintain views which appear to explain more intelligibly the mode in which attitude affects the pulse.

Von Bezold demonstrated that elevation of pressure in the carotid arteries made the heart beat slower. He attributed
it to pressure on the vasa. Lowering the pressure in the carotids produced acceleration of the heart.

Francis Turner Verney, thus by submitting the brain to an artificial circulation independent of the cardiac circulation, produced an arrest or slackening of the heart. (J. Phil. Lab. T. 111 [273], 1873.)

Moxon, in his able Croonian lectures reported 13. M. T. April 1887, describes most graphically the relation of the brain to the circulation. He says that in the erect position the venous blood escapes more easily from the cranial cavity. This causes a suction upwards of arterial blood or eutrophic spinal fluid.

The 4th ventricle contains a mass of choroid plexus which stretches down to the lateral v.c. called by Moxon the 'cornu'. The 'cornu' presses on the roots of
The vagus v. unites with them.

This is the seat of a mechanism which regulates the heart by the blood pressure in the skull.

The vagus runs a direct & short course from its origin to its exit from the skull, and being tense, any pressure from the distended choroid plexus tells on its roots. No other cranial nerve is so exposed to pressure at its origin.

Egermahe was able to stop his heart beating by pressing his vagus against a small aortic tumour in the neck.

The more blood in the choroid plexus the more pressure on the vagus, causing a check on the heart's action.

This prevents excessive inflow to the brain like the ball tap of a fistula.

P. They found the average pulse in the erect position to be 81, whilst in the horizontal
posture it is by.
Muscular effort was counteracted by strapping people on boards.
In the erect position the blood drains away & the choroid plexus is less distended therefore there is less pressure on the vagus. In the horizontal position the blood goes more easily to the brain, the choroid plexus gets distended & exerts pressure on its roots of the vagus.
Any cause which produces too great a flow to the brain reduces the pulse.
Thus going into compression air reduces it, also in general inflammation of the brain & meningitis. In the later stages of meningitis when there is a great flood of blood to the brain the pulse is quick. Now is this. It is due to paralysis of the vagi.
Moxon had a case where the pulse rose to 180 in
tubercular meningitis. He gave digitalis & it had no effect in slowing the pulse. It was as though the vagus were paralyzed by atropin. Rarefied air quickens the pulse. Chauveau found when ascending Mt. Blanc the pulse became diastolic like the typhoid pulse. This really means that arterial tension diminished.

The Respiratory Movements are found to have an effect upon the pulse. In some cases, Ludwig found at each inspiration the arterial tension falls as the blood is aspirated toward the thorax. During expiration it rises as the blood is pushed toward the periphery.

Ich Beträge zur Kenntniss des Einflusses der Respirationen Bewegungen auf der Blutbahn.
in Aortensystem. Müllers Arch 1874 [2* 242].

Verordt: Obtained exactly the opposite results. (See Circulation of the lung.)

(See Die Lehre von arterienpuls.)

Marey investigated his subject and found both were right.

(See Circulation of Lung Chap 28.) It depends on whether the circulation is thoracic or abdominal.

The variations in arterial pressure are due to the changes of pressure which the intra thoracic and intra abdominal parts of the aorta undergo. The effects of respiration are opposite in the thorae and abdomen.

Thoracic Respiration - the enlargement of the chest during inspiration tends to cause a vacuum towards which the air rushes. If this occurs easily it fills the chest. Should there be any difficulty the chest walls are fluffed in the aspiration is
The blood flows back to the thorax. The aorta is dilated and arterial tension falls in the lungs.

The pulse tracing therefore falls with inspiration. In normal expiration the muscles come into play and the aorta is compressed, driving the blood on. Therefore the pulse tracing and arterial pressure rise with inspiration. This is Ludwig's Respiration Curve.

Abdominal Respiration

During inspiration the diaphragm descends which enlarges the chest, but diminishes the size of the abdominal cavity and compresses its contents. During expiration the opposite occurs and the abdominal walls are less tense. During ordinary respiration these effects are counteracted by the thoracic variations, but in diseases with distension of the abdomen, while the respiratory passages are free, then
How the abdominal influences prevail. The compression of the aorta during inspiration drives the blood on and causes ascent of the pulse curve. On the other hand during expiration the arterial tension falls and the pulse curve descends. This is the Renil described by Virchow.

The following case illustrates the influence of abdominal respiration in a case of dyspnoea. The patient suffered from ovarian tumour.

Fig. 57

Fig. 52

Fig. 57 was taken whilst the patient was being treated with nuse vomica. The pulse was too weak to count accurately (90 ?), and
The wave in tracing very falls. It rises during inspiration and falls during expiration.

Fig 52 shows the same rise and fall. The case was being treated with bromide. The pulse was 120 and weak.

Thoracic Hypopnoea

Fig 53 was taken from a robust man with pleurisy and congestion of the lungs (see Case L p. 213) There was great dyspnoea.

Fig 54 was taken from a child with catarrhal pneumonia very severe.

These curves are not well developed as far from the heart. But the line declines slightly with inspiration.
A cough is a sudden expiration with the glottis closed. It compresses the thoracic and abdominal portions. This elevates arterial pressure suddenly forces the wave of blood to the periphery. Fig. 55

illustrates the effect of a cough in a patient suffering from whooping cough. Each cough is followed by a succession of 6 or 6 heart beats followed more rapid than the ordinary ones. The tracing ascends for more number of beats. The pulse wave is smaller.

The effects of its cough on the particular wave with which it is synchronous is to cause an elevation of the line during the early part of the diastolic period followed by a sudden abrupt descent. This abnormal elevation is caused by the wave of blood being projected suddenly from the
Compressed corte through its arteries, as soon as this wave has passed along, the vessel collapses, being empty, until its next cardiac systole occurs.

The Pulse in Disease

Having studied the pulse in health and the causes which influence it, one is better prepared for the difficult subject of the pulse in disease.

I propose, first to describe lesions of the valves, bringing forward well-marked cases.

I also have the advantage of showing one case of fatty heart which terminated fatally.

Then I shall describe functional diseases of the heart and afterwards pass on to the pulse in inflammatory arrangements.
The Pulse

in Diseases of the Heart

Mitrval Incompetence

M. Tridon of Paris (Essai sur les Signes du Diagnostic de l'insuffisance Mitrval These Paris 1895) was the first to demonstrate the graphic characters of the cardiac tracing in mitral disease. He describes the ventricular wave as having a round apex with diminished fullness of the wave. The pulse tracing parallels the same character.

If there be great reflex fear, is marked diastolic on account of the smallness of the bloodwave vent into the arteries.

Case  J. G. male. vet 11

Pulse small and uncompressible. Apex beat visible. A soft murmur systolic murmur replaces the 1st sound at the apex. Aorta is not accentuated. The radial tracing
Fig. 56. Shows marked distortion. No precocritism. Apex pointed. All indications of low arterial tension.

The cardiac tracing shows pointed & slanting apex. This indicated rapid emptying of the ventricle during the systolic period. The rapid emptying is by regurgitation into the atrioventricle. Fig. 57.

In the normal heart tracings (see Fig. 14 p. 257) the systolic plateau is marked by several waves. These are due to the vibration of the two auriculo-ventricular valves. In mitral incompetence the absence of these oscillations is what one would expect. If, as in some of the waves of the ventricle, on the line of descent there is a small wave it can
reasonably be inferred that the capacity of the ventricle, having been so much less, the previously incompetent valves had come closer together to become competent; or, if they have not actually become competent, they may now form an obstacle to the regurgitating blood.

The patient was treated with

x min. tr. digitális T. S.

Four days later I examined him. He felt much better. P 84, 75/58 small but stronger. The 1st mitral sound is faintly audible and accompanied by a soft blowing murmur.

No aortic 1st audible. 2nd aortic still accentuated & reduplicated.

Fig. 58
Vertical ascent, floating systolic plateau, descent vertical. Diastolic wave marked sometimes double.

This shows that the regurgitation is less and the appearance of the last wave of the systolic plateau shows that the valves are acting. This wave produces in the pulse, the presystolic wave. For the sake of a name, I shall call this wave in the cardiac tracing, "pre-systolic," or I should prefer to call it the "terminal systolic wave."

Digitalis strengthens and slows the heart's action. Brunton & Aster found that it increased arterial tension. The former observed that the arterial tension is increased by the contraction of the arterioles.

Boehm found that after dividing the cervical spinal cord, stimulation of the vasomotor centre, there was no rise in arterial pressure.

In this case the slanting ascent becomes vertical. Showing more systolic
The acute apex becomes more obtuse and not so high showing increased arterial tension. This latter is brought about by the larger volume of blood sent at each systole into the arteries.

More digitalis is administered to keep it causes irregularity and a feeble pulse. It is supposed by Brunton to be feeble because the arteries are paralyzed so that no blood passes more quickly to the veins. This patient took digitalis for too long a time or in too large doses.

The following tracings were taken 3 days later. The patient does not feel worse; the pulse is reduced to be very small incompressible. The mitral murmur is much less distinct.
Fig. 60 & 61 show the radial pulse. The systolic impulse is strong. Diastolic is marked, which occurs generally in high arterial tension. Diastolic is absent. The diastolic period is prolonged but irregular. The heart tracing Fig. 62 shows great irregularity. The apex is pointed in some cases. The terminal systolic wave is absent. In some well-marked cases there are also some apparent abortive systolic contractions.

Fig. 62
Case N. S. Oct 19

This was a case of mitral incompetence with hemorrhagic diathesis. The patient was very subject to epistaxis, which began a year ago to come on at intervals of a few days, lasting several hours each time. When I first saw her, she presented a corpse-like aspect; lips and nails of gums blanched. Pupils widely dilated. I had little hope of her living. She had been bleeding 6 hours, a steady dripping, and there had been daily droppings. Bleeding for three weeks. The patient was too ill to be examined for 2 or 3 days.

I prescribed 5 m. dig. ferri. Tar. 1 m. ac nitrici dil. in glycerin of water every two hours. This mixture never caused constipation though it was used for many weeks and even months.

Examen of heart. A precocious trouble between 6 & 7 ribs. Thumping impulse no thrill. Right border 1 1/2 he pitch of stethoscope. Breath 5 1/2 inches. Loud, harsh blowing murmur at the
Apxx replaces the 1st sound. 2nd sound milder in the tricuspid area. The murmur is heard less loud. The 2nd is accentuated in the aortic area. Loud venous hum at the root of the neck. Pulse small and weak. Fig 63.

A drip of blood under the microscope shows marked relative increase of white corpuscles. About 40,000 in each field. The coloured corpuscles form rouleaux very badly.

Menstruation has been deficient and irregular for 12 months. Absent for 9 weeks.

The pulse tracing Fig 64 a week later was taken. It shows feeble systolic impulse. This however was probably due to the fact that the patient had just dined.

Ten min. of lig. Arsen. was now combined with the previous mixture.

There has been no hemorrhage since she began the iron preparation. A week later Fig 65 was taken. 19112. Patient is now able to stand but too weak to walk.
A month later the patient had so far recovered as to be able to go out of doors. There is slight color in the lips and nails. The cardiac murmur is much as before. P1 & P2 very small. Fig. 66 shows a much smaller systolic wave with diastolic about.

About a fortnight later she had a few slight bleedings from the nose with pain in left iliac region probably vicarious menstruation.

Fig. 67 was taken a month after the last nearly 3 months after the first tracing. The anemia was decidedly less, but the state of the heart unchanged. Pulse still keeps about 100 or 108. At present shows an improvement. For the 1st time there is a tendency to precordialism and the upstroke is more vertical. The apex is still pointed & the diastolic wave very large.

Auscultating very carefully I heard a faint systolic sound in the aortic area. There would seem
here to be some connection between
No simultaneous appearance of a
Slipping prediscstion and a faint
Systolic sound.

The patient was low & weak, I
therefore prescribed X min in digitalis
ta to die. After the patient had taken
it for 1 deep I took fig 68. It
shows a vertical ascent, not so high
as in those tracings where the later
arterial tension was so marked.
present.

Predominantly the arterial wave smaller. 1084 hours compressible.

The mitral murmur louder. The beat is stronger & there is an approach to a 1st sound in the mitral area. Four days later.

fig 69 was taken. pulse 648 stronger.

Five days after this the pulse was reduced to 52 & the patient was much worse. The pulse is weak, jerky & irregular, incompressible.

The mitral murmur is not so loud & follows a faint 1st sound. fig 70 shows a small upstroke.

Systolic & diastolic phases, both prolonged. Atrial systole present.

The digitales was stopped and the patient treated with a mixture of dialyzed iron and glycerine. One of the former & two of the latter. This I found a good way of administering dialyzed iron as it does not change. The teaspoonful was taken three daily.

In one week she had taken 1 oz of dialyzed iron with marked benefit.
Her lips & conjunctivæ are already showing an improvement in color.
The pupils are not so dilated as they dilate more when she sits up than when she lies down.

Dilation of the pupils is considered by psychologists to be connected with brain anemia.
This patient has an anemic train & always had dilated pupils.
Sitting up the blood flows more easily from the brain & the anemia is more than when she lies down, consequently the pupil dilates more sitting up than lying down. I took care to guard against the influence of light, but even when her eyes met the light sitting up the pupils still dilated.

Fig. 71 shows the effects of the digitalis to have passed off. It had resumed its character due to it on account of the mitral lesion. There is however this improvement that the pulse of descent does not fall again to the
line of the tracing as before. The digits. Predicterism is absent.

It is very fuller & strong.

Fig. 72. Taken a week later shows
much the same character. P. 797.

The line ascends with deep in-
spiration. The waves becoming
less. Showing abdominal respiration
to prevail. There is a slight return
to prediesterism.

The lips are now quite red.

The patient sleeps. He
has benefited more from the dilute
iron than from any other drug.

The cardiac murmur a month later
altered from harsh to a
sharper Whistling character. Low
arterial tension though not less than
before. There is slight prediesteric

Fig. 73. The apex pointed.

The open tracing, which reveals the typical
character of mitral incompetence,
showing apex with systolic accent
in which is a small terminal Systolic
wave, diastolic wave marked.

A tracing taken at the interspace above the apex beat shows all the character of a normal heart. Fig. 75
This I cannot explain.

Two weeks later the patient menstruated. Her first time since 7-8 months.
A week later she had an attack of Epistaxis a steady continuous drip.
I was sent for 12 hours after it and checked it by plugging the anterior nares. She was very weak, pale and palpitation so bad, that one could hear her heart knocking against the chest wall 2 feet off.

The fig. 76 however shows that the heart's impulse was very feeble. It shows a tracing at the apex, one at the interspace above, the fig. 77 has taken at the interspace above the apex beat. The apex line descends with expiration.
Fig. 78 of the radial & Fig. 79 of the apex & interspace were taken \( \frac{1}{2} \) an hour after 30 min. of digITALIS. The excitement of plugging may mask the effect of the drug. Patient was treated with \( \times \) in. digit. tic ale. Which removed the palpitation & reduced the pulse & to patient felt stronger.

Fig. 50 was taken the following day, Fig. 87 still 2 days later.

The pulse in each case was slow & small in the latter the precordial trace occurs, & the first mitral which had disappeared is faintly audible again. After continuing
The digitalis was given daily. The pulse fell to 72 and became less compressible. Fig. 82 shows the radial tracing. The systolic wave is pointed but the diastolic is less.

Fig. 83 shows the apex tracing at the interspace above. The latter shows normal character. The former shows mitral incompetence. Where is greater irregularity in the force of its different contractions.

The patient resumed his dialysis.
Iron and improved rapidly, soon being able to go out of doors.

This case shows the typical character of mitral regurgitation both in the radial & cardiac tracings. The diastolic wave is exaggerated in the pulse, but not in the heart tracing due to the low arterial tension. As the case improves, precordial murmurs appear which shows that mitral incompetence benefits by treatment. The incompetence can get less just as it can get more. An incompetent valve is therefore not always equally incompetent but nearly 50% more incompetence appears or is more marked; then
The presystolic wave appears whilst under opposite conditions these waves disappear.

Case J. D. Oct 21.

This is a case of functional mitral incompetence. The patient had had rheumatic fever but without heart complication. He is a heavy smoker & has gone in for violent exercise. He complains of nervousness & palpitation & his health generally was much impaired. P130. Full, weak, compressible, apex beat 6-7 interspace. Mitr. a soft blowing systolic murmur accompanies 1st sound. 2nd is accentuated.
The radial tracing Fig 86 is diastolic with a pointed apex. Predominantly is present. The indication is low arterial tension. Fig 87 is taken whilst excited & shows irregular action with a well marked terminal wave to the systolic plateau. The diastolic wave is very marked. Fig 88 was taken when the patient was quieter.

It shows a slanting apex more marked in some ways than others. The patient was treated with X.M. Jn. digit. ter. die. Treatment was discontinued & quiet, regular habits were insisted upon.

Four days later I examined the patient. The pulse was soft & full, hard incompressible. The murmur had disappeared, but the first sound was impure & dull. The second sound accentuated & wide. The radial tracing Fig 89 is normal & also the car diast Fig 90. In the latter the terminal systolic wave is well
The systolic plateau is broad & concave in the radial tracing. The systolic plateau is also concave between the upstroke and the presystolic wave, which latter corresponds to the terminal systolic.

The sigmoid wave is marked and double pointed. Which if it is to be associated with re-uspiration is a double oscillation of the tense sigmoid. The auricular wave is also well marked.

He digitalis was continued. Four days later the following 4 tracings were taken. The pulse was 84, hard & incompressible. The mitral sound was weak but no murmur. Fig. 91 is normal. No
line falls with inspiration.

Fig 91

Fig 92

Fig 93

Fig 94

Fig 92 is the heart tracing which is weaker than before. The patient was now permitted to inhale amyl to see if lowering the arterial tension would have any effect on the heart tracing. The pulse rose to 100 because dull & compressible. Fig 93 shows signs of low arterial tension but the precordial have remained. Fig 94 shows the heart tracing unaffected. On auscultation...
Sounds are as before. These are slight
palpitation. In the tracing the
diastolic & auricular waves are
more marked & the systolic im-
pulse is greater. The patient
said the digitalis acted like
magic & also increased his appetite.
His heart was weak and being
strengthened set the whole machinery
in working order again.

Case. C. S. Mitral incompetence. 18-18
brother to N. S.
Suffers from breathlessness after exertion.
Apical 5-6 riders down, loudly mitral systolic murmur.

Fig. 95

Fig. 96

Figures were taken at the apex & radial.
When patient was feverish from tonsillitis
Fig. 97 taken later when patient was well.
PPG. Tracing 97 shows low tension. The ventricular wave is pointed & slanting & of irregular impulse. X M. R. Leg, t.d was prescribed. Fig 98 w. b taken at 4th interspace.

Figs 99 & 100 show the heart & pulse tracing after four on digifitalis. The precordial wave which was absent is now well marked. The aortic wave which was in excess is now normal. The septal & imp. are greater & arterial tension increased.

The previously slanting apex is flatter. Although this is marked change in the pulse tracings & the pulse reduced to 60 the physical signs remain unaltered.
I have another case of mitral incompetence to describe, but shall place it under the heading of aortic incompetence, with which it was complicated. These cases demonstrate in the pulse tracing low arterial tension by the tall pointed apex, the increased diastolic tension in bad cases absence of pre-diastronic.

A similar tracing will be shown to occur in the paroxysmal state. Hence one must always be aided by the stethoscope. The heart tracings show in the ventricular wave a pointed apex with a slanting descent during the systole, which leads to the absence, more or less complete, of the terminal wave of the systolic plateau. The sigmoid wave may or may not be marked. In the pulse tracing, the diastolic tension is due to the low arterial tension in the imperfectly filled vessels.
Aortic Stenosis

The graphic characters of this disease are not always well marked.

If the obstruction be great, the line of ascent is gradual, showing that the ventricle empties slowly, but this would not occur where there was a hypertrophied ventricle able to overcome the resistance.

Many say the absence of diastolic is a marked feature, or is also a proof of slow penetration. But if the sigmoid valves are competent, why should diastolic be absent? When the tracing I show, diastolic is less marked when the haustral posture is assumed, whereby the arterial tension is increased, but it does occur in the erect attitude.

By lowering the arterial pressure, the slow penetration of blood into the aorta, which as Marcy says, diminishes clicks
tion, is obviated.

Reyn in an article (The phonographic indications of heart disease. Cincinnati Dental and Clinic 19 April 1879) says, one of the marked characters in aortic stenosis is the long duration of the ventricular septal. He also found a greater delay in the radial pulse. He also found that the atrial produces a marked effect in the cardiac pulsation. And a slighter effect on the radial pulse. The following diagram is copied from his article and illustrates these points. Fig 102.

Fig 102
Case E.J. Male oct 11.

Suffered from heart disease all his life. He is very delicate and poorly developed, he has had rheumatic fever.

Exam of heart: Apex beat, visible & thumping between the 6th & 7th rib. Apical impulse: Marked, i.e. No thrill.

Auscultation: Mitral area: Soft blowing systolic murmur. Heard faintly in the axillary line along the 2nd rib. Markedly holosystolic.

Aortic area: A loud systolic murmur which is heard in the arteries of the neck. The murmur is loudest about the level of the 3rd or 4th costal cartilages. The repudication of the second is also heard. It dies out when the patient lies down. P. 80 small, no visible pulsation. He has constant pain in the left shoulder.

Diagnosis: Aortic stenosis with mitral regurgitation. The latter probably due to the backward
Fig. 103 shows the radial pulsation.

The former recumbent, the latter standing. In this, where the arterial tension is lowered, the ventricular wave is more sudden & diastolic more marked. In some of the waves there is a slight oscillation before the upstroke which is due to the auricular systole. In the first, where the horizontal posture raises the arterial tension & thus intensifies the effects of the disease, the upstroke is feeble, and standing the diastolic wave is just sufficiently perceptible to demonstrate the prolongation of the systole.

A few months latter I took
The following series of tracings show the patient being horizontal.

Fig 105

Fig 106

Fig 107

Fig 105 shows the radial pulse, which was 87. The line descends with inspiration and ascends with expiration. Fig 106 is a heart tracing taken while the patient was excited. It demonstrates great irregularity. Fig 107 was taken when the patient was quieter and here the marked character is the great exaggeration of the auricular wave. In both the ventricular systole is of long duration but this is better shown in the previous tracing, where the heart
beat was rapid & excited, & one would expect narrow, sharper waves. A few of the waves show a slight slapping where the terminal systolic wave ought to come. This may be produced by slight \underline{regurgitation} but in most cases \underline{the terminal systolic wave is well marked} & even produces \underline{plication in the radial tracing}. Mitral regurgitation, therefore, is not in this case, an important feature even though there is a very distinct murmur in that area. I treated the patient with X m. Dr. ; and after four days took his next series of tracings. Fig 108 shows the radial pulse when horizontal. It was reduced to 72. The more pointed apex than in Fig 103 demonstrates a stronger ventricular impulse, almost resembling Fig 104 where the ventricle had less resistance to overcome. Plication is absent,
Arterial tension being increased by Digitals. The physical signs are unaltered.

Fig 108

Fig 109

Fig 110

Fig 111

Fig 112

Fig 109 taken at the apex when the patient was quiet. Shows the exaggerated auricular wave and the strong ventricular impulse. The apex is pointed and streaking which indicates an increase of the precipitation. This is probably
due to the increased arterial tension. Fig 110+111 were taken when the patient was excited. Fig 112 represents the pulsation felt at the 4th inter space. Here the auricular wave is also marked.

Aortic incompetence

Chauveau & Marcy perforated the sigmoid valves in a horse, taking a tracing with a cardiac sound of the left ventricle both before and after the operation. Fig 113 is copied from Marcy's work p. 674 showing as result.

The diagram shows that as soon as diastole commences the blood flows back into the ventricle causing a gradual or jerky ascent until its next ventricular systole. The summit & descent are unaffected. There is no sigmoid
wave. These characters are very marked; the same type occurs in the human subject in this disease.

The water-hammer, or Corrigan's pulse, caused by the sudden filling & emptying of the artery is not due, as generally thought to hypertrophy of the left ventricle. The same observer found the pulse of the facial artery of a horse, changed its characters at once when the lesion was produced artificially, as the diagram from Mellery's work page 677 shows.

The speciality of the pulse have in the enormous fulness of the Systolic wave and its sudden ascent. The true cause, as Mallery

\[\text{Fig. 114}\]

The speciality of the pulse have in the enormous fulness of the Systolic wave and its sudden ascent. The true cause, as Mallery
Chauveau considers it the lowering of the arterial pressure to the minimum by the reflex into the aorta. The greater the incompetence the less the diastolic.

An example is given below of coronary pulse with aortic incompetence but it is complicated with aneurism of the innominate artery. Case R. P. male aged 34.

Case R. P. male aged 34.

Examination of heart. Apex beat by interspace immediately outside the mammary line. Right thrill.

Pericardium reveals abnormal dullness over 4 to the right of the manubrium sterni.

Auscultation. Initial 1st clear. Soft diastolic murmur at the apex. Tricuspid area. 2nd sound muddling loud diastolic murmur.

Aortic area. 2nd sound audible. A blowing murmur accompanies it follows the second sound. The murmur gets louder as one listens
lower down the sternum.
Palp. area 2nd sound distinct.
Behind the right sterno-clavicular joint is a large pulsating tumour. The heart sounds are audible over it & there is a brisk P 108 irregular. The pulsation of all the arteries is visible. The right radial pulse is slightly delayed after the left.

Diagnosis: Aneurism of the innominate artery, dilatation of the aorta producing incompetence of the sigmoid valves.

Treatment: Patient was treated for flatulence which caused palpitation, and cautioned against over fatigue or exertion.
As soon as the flatulence was cured, the pulse fell to 80 & became regular. Examining now in the aortic area a sharp tingling 2 nd is distinctly heard to precede the diastolic murmur. Which, as before, is heard lower lower down the sternum. There was also a distinct
tendit over the aneurism. The delay in the pulse was as before. This delay is considered by Weber (Cissert, many) as due to the clot in the sack forming an obstacle to the flow of blood. Mason (in the circulation of the blood p. 82) thinks it is due to the elasticity & expansion of the sac. Which Borel pointed out was the cause of the weak pulse.

François Franch in the journal of anatomy & physiology for 1878 attaches great importance to this delay of the pulse, as of great value in the diagnosis of aneurism. He found the delay was 7/10 of a second. This delay he considers of more value than the change in fulness of the pulse wave.

Fig. 115 to 118 were taken when the patient was relieved of the palpitation. The 10th to the right radial pulse. There is great fullness of the wave due to the very low arterial pressure. The apex is pointed and the descent
is very abrupt especially during the systolic period. This is due to the sudden emptying or reflux, which, as it occurs during the systolic period, must be into the auricular sac itself. This is of great importance. If the sudden decline came after the diastolic wave then the reflux would be into the ventricle from incompetent venous. This in itself ought to be valuable in the water-hammer pulse as it indicates whether the reflux is principally into the ventricle or into an aneurism or dilated aorta. The diastolic wave in this case occurs after this marked and rapid decline. Which however still continues showing the incompetence of the aortic valves. Figs. 116-118 are taken over the aneurism itself. The ascent is sometimes marked with a jerk before it reaches its height; or it is vertical with a flat apex. These would indicate that the dilatation continues after the first systolic impulse. The
Pulsation was so violent that the paper could not always include it.

Fig. 115

Fig. 116

Subclavian middle

Fig. 117

a

Fig. 118

Fig. 117 b is taken over the middle third of the subclavian. The ascent is in some cases abrupt in others gradual from slow filling of the vessel. The apex is flat which indicates that the vessel is distended for a short time and then suddenly emptying. The descent is abrupt. Peristalsis is absent.

The patient lived very quietly and his general health was good. He died
not suffer from palpitation unless he had flatulence. Four months
later I again examined him. When
he felt quite well. The physical
signs were No Sound, but the murmur
did not seem so loud & the
aneurism was not so pulsatile.
I thought it Smaller.

Fig. 119

Fig. 120

Fig. 121

Fig. 122

Fig. 123

Figs. 119, 120 show the right and left
radial arteries. The former was
Fig. 121 taken at the apex does not show signs of mitral incompetence.

Fig. 122 taken over middle 3/4 left subclavian shows the same features as already described.

Fig. 123 taken over the first portion of right axillary.

This patient always found alcohol did him harm. Stimulation was bad for the heart. Caused more forceful contractions, increased the tension in the sac. For a similar reason digitalis is contraindicated in these diseases.

**Mitral Stenosis**

The physical signs of this disease are a thrill at the precordium and a presystolic murmur, or sometimes, a hard grating or reduplication mitral. But as the physical signs are in many cases not well defined, there is much difference of opinion about the lesion.

The effects of mitral stenosis is to cause a delay & deficiency in the reflection.
of the ventricle. The former lengthens as diastole, the latter reduces the volume of the ventricular chamber. This does not reduce the arterial pressure, as in cases of mitral incompetence, because the diastole being prolonged, the rate of the pulse is decreased. This increases arterial tension.

The auricular systole is affected with difficulty.

The character of the pulse tracing will be considered as cases are described.

E. J., male, Oct 10. [Brother of E. J.].


Pq 6 small & compressible.

Fig. 124 and 125 represent br. radial pulsation at 2 different times.
They show full systolic wave, but pointed. Prolongation about 0.4 second not marked. Diastolic period in the former prolonged.

Fig 124

Fig 125

4-5 minispace Fig 126 5-6 minispace

Fig 127

Fig 126 & 127 show the cardiacographic character. Resembles wave of incompetence in having pointed apex. Shows blood wave to be of small volume & its emptying of the ventricle to be sudden & easy. This is due to ventricle being imperfectly filled. It is possible that there may be occasion at regurgitation as some of the higher
upstroke have been standing descent during the systole.

In the posterior tracing when the patient was seated there were certain sounds in the heart sounds which were in the posterior tracing. The aortic and mitral valves are present but the auricular valve is absent. This may be that the slowness and difficulty of the aortic valve produces this effect on the blood column in front of the tricuspid valve. The chief characters in this tracing are:
1) Weak radial pulse
2) Small volume of venous return in both tracings
3) Lengthened diastole
4) Absence of auricular wave.

Case W. E. Oct 35.
The patient has suffered for years from angina, sometimes assuming an alarming character.
He is constantly subject to a slight pain at the precordia and down the left arm. The attacks yield to rest and sometimes the constant pain...
disappears for a time also after the inhalations of the drug. Auscultation reveals only a grating mitral. Some whom he consulted considered his a case of Stenosis P 92 small & hard.

Fig 128

- 129

- 130

- 131

Fig 128 taken when patient suffering from his continual ache at heart. Shows small sudden ventricular septal, prolonged diastole, neither pre-dominant nor diastolic product. Patient inhaled arsene till the pain was almost gone & the flushing effects
were produced. Pulse rose to 96, became fuller & softer.

Fig. 129 shows small diastolic wave. Fig. 130, taken a little later, shows still being inhaled.

Fig. 131 shows the pulse when effects of amyl had lessened & pain had slightly returned. Distension has disappeared. The tracing is resuming its early character but the pulse is more rapid than usual.

Four months later the patient came to me about midday. Had had a very bad attack the previous night. The pain & palpitation had continued through next day but at the time I saw him it was not quite so severe. Pulse 84, small, hard almost thready.

Fig. 132

Fig. 133

Fig. 134
Fig. 132 shows the radial pulse. The presystolic & diastolic waves occur, diastole is prolonged. (In the early part of the paper moved very slowly through the graph).

Fig. 133 shows a trace tracing. It very much resembles the radial tracing Fig. 128 and that of S. T. (page 87).

Apex is much smaller & pointed. Diastole markedly prolonged. No auricular wave is marked. (possibly some increased spontaneous contractions).

Patient inhaled amyl till no pain entirely left.

Fig. 134 shows a completely different pulse wave, fuller ventricular systole & increased diastole.

Pulse rose to 120, became fuller and softer. I was unable to get a heart tracing after the inhalation of amyl.

Patient treated with atropine, but produced great dryness of the mouth & increased the pain & palpitation. The effects of amyl are too well known to require a description.
The tracings show how, by the appearance of diastolic and increased fullness of the ventricular wave, arterial tension is lowered by its inhalation.

Fig. 135

The patient continued the atropin but took only 1/2 a dose, that is 1/2 of a grain; even this made him much worse increasing the Cardialgia. It was therefore discontinued. Lowering the arterial pressure did not in this case relieve the Angina Pectoris. As the pain and faintness was so much worse.

Lying up 065  Fig. 137

Fig. 137 a  sitting up

Fig. 137 b  sitting after lunch
Now tried X m. Sr. Digest t.d. which relieved the pain, though it did not disappear. It was found that the right ventricle was stopped the first sitting. It shows strong impulse. In normal tension, the pulse was taken after four days on digitalis. The patient horizontal. It shows strong impulse. In normal tension, the pulse was taken after four days on digitalis. The patient horizontal. It shows strong impulse.


Suffers from pain at heart.

Pulse 60 per min. Blood rather soft and compressible.


Mitral 1st. ejection, marked.

Auscultation: The 1st. being soft. It might be a presystolic murmur.

Auscultation normal.

Fig. 138 of the pulse shows slanting rather pointed apex, feeble impulse.

For 50 muscular a man and slight diastolic. Pseude protoed.
Fig. 138 shows heart tracing. A distinctly prolonged diastole, also a well-marked auricular wave.

Fig. 139

Fig. 140

Fig. 141

Fig. 140 is another tracing of the radial. After patient had taken Dr. Belladonna. Pulse was 72 compressible irregular. This tracing resembles previous one but shows more irregularity. Fig. 141 is the heart tracing.

Case No. C. Oct 48

Complains of palpitation, pain at the precordia & down the left arm & shoulder. Apex beats middle between 5th & 6th ribs. Right border 2 inches from the middle line.
Mitrail sound harsh grating and palpilicate. P. q. 2. Small and compressible.

Treatment 10 m. Th. Digit. t. d.

Four days later 6 one hour after a
dose. Pulse was 87 less compressible
Mitrail sound not so grating. Patient
felt better.

Fig 142

Fig 143

Fig 144

Fig 145

Figs 142, 143 taken before treatment.
Apex in pulse curve is flat, due
of Pericard changes. Heart tracing
shows rather prolonged diastole.
After Digitalis the pulse curve
In fuller & higher, the heart tracing had a slanting apex, almost suspicious of regurgitation. Figs. 144, 145.

Fig. 146

Fig. 147

Fig. 148

Fig. 149

Cases

Figs. 146, 147 taken from same patient, a boy aged 10. His first erect at second horizontal. A marked thrill at apex with a presystolic murmur. P 90. Fig. 148 from a girl aged 10 with marked thrill & grating peduplicate mitral.

Fig. 149 from a young woman, with exophthalmos & mitral stenosis.

Another case I have not yet
describe it under the clap irritable heart. Which was also a prominent feature in her case.

Fatty Heart

Case. Mr. No. 50.

The patient. She was suffering from acute eczema which spread from the legs & arms all over the body & head. She had for a long. long time been unable to obtain sufficient food. Cod liver oil afforded temporary relief but wet boric acid was more effectual. It however yielded to no treatment. The urine thick & albuminous. There was a large deposit made up entirely of fat globules and granular debris. 1900. 7/102

Heart sounds very weak. A faint musical murmur heard at apex which was about sometimes.

Fig. 150 shows a very feeble systolic impulse. Ascend low & starting.
Apex round. Pierotism absent.

The indication is that of a weak, exhausted organ. Diagnosis has been of fatty kidney & fatty heart. Prognosis very unfavourable. Doubtless the state of the kidney was the reason why the skin complaint made no progress.

I prescribed 10 m. dig. arsen. td.

About a week later I took the second tracing. Fig. 151. The patient felt a little better. P 1100 T 101.4. Mitral 1st louder. The tracing shows a stronger impulse. Patient was subject to attacks of dizziness with a tendency to syncope. A fortnight later the patient died. Suddenly no autopsy could be obtained.
Pericarditis

Case C. N. Female Oct 20.

Patient complained of pain at the heart, palpitation & breathlessness. Pulse 56 weak intermittent. A marked thrill from friction is felt over the heart. Dullness of right border 2" to the right of sternum.

Cause: Loud, harsh murmer like a coarse saw is heard all over the chest back & front. The maximum intensity is over the 4th left costal cartilage. The murmer does not vary much with change of posture. No valveular sounds are audible.

Fig 152 taken whilst sitting shows a very feeble ventricular impulse, with great irregularity. Irregularity is absent.

The patient refused to remain in bed. She was ordered Sinapisms & 20 m. Hydro-Aromatic acid t.d. This relieved the palpitation but the physical signs were unaltered.

Fig 153 was taken when patient felt
4th & 2nd half when recovered. The former shows weak impulse & pointed apex. Denotes loss tension. In the latter, upstroke is higher and also shows signs of loss tension. She was now obliged to keep in bed.

![Fig 152](image)

![Fig 153](image)

![Fig 154](image)

7th day. 3 days after last tracing. Fig 154 was taken. No small weak compressible, very irregular. Physical signs unaltered but patient is much easier in bed.

12th day. R. 2nd irregular in time & duration. Murmur is single over 4th rib, triple or double below this level. The last tracing shows this
Irregularity. The Systole is stronger, with a tendency to a flat apex. Diastole is slight. The Systolic period varies very much in duration. The Diastole, as a rule, is prolonged. The external friction resembles the expansion of the Ventricle. The heart, in consequence, is not so well filled, and the Blood Vessels are small and feebly projected on account of the Atrocity which the friction presents. I changed the treatment & gave 10 m. of Belac. My object was to lower the arterial pressure & thus relieve the heart. I also hoped to lessen the pain which, though relieved at first by the hydrobromic acid, returned. The fact of pain occurring at the heart proves the existence of a sensory nerve.

Ludwig & Lyon discovered a depressor nerve in the Rabbit. Stimulation of the peripheral end gives pain, lowers the arterial pressure & retards the heart.
De Zur Action.

Many depressor fibres are contained in the vagus. Krehlmann has described (Arch. f. Anat. Entwick. of Nos & Braun) in 1878 a depressor nerve in dogs & mice. Hinkelstein in 1896 described a depressor nerve in man, rabbit, cat, & horse. (loc. cit. 22. 8. 1896)

In this case, probably the pain acting on the sensory & depressing nerve caused the slow pulse. Belladonna at once relieved the pain; when it was discontinued the pain returned but was again relieved by Belladonna.

Atropin paralyses the terminal ramifications of the vagus so that stimulation of it has no effect in inhibiting the heart.

I took Fig 155 before the patient began Belladonna. P. was 60. The position of the murmur at times double & triple & still loudest over the 3rd & 4th costal cartilages. The tracing shows feeble impulse, flat apex, & diminished diastole.
The patient began with X m doses
Three daily. Often took extra doses as it relieved her so much.

27th day. I took Fig. 156. There is greater regularity. The pulse is small but there is a slight appearance of diastolic. P. 72 compressible. The murmur is no longer double or triple but single & sometimes heard a faint aortic 2nd.

Four days later. Patient not at all well. P. 71 intermittent. The murmur is single. No aortic 2nd is faint but more audible when the breath is held.

Fig. 157 shows great irregularity & increased fullness of pulse wave. The duration of the systole is very short. The apex is flat.

The dose was increased to 15. M. though no dry mouth & dilated pupil. Show that the smaller dose produced physiological effect.

4-5th day or 6th week. P. 72 small & compressible. The murmur is as harsh & grating as before & is to be felt like a rasp. It is systolic &
to 2nd is audible at apex but not at the base where the murmur is louder. Fig. 158 indicates lowered arterial tension. The apex becomes pointed & diastole appears.

53rd day. 1st June intermittent. Fig. 159.

55th day. Patient took 5 or 6 doses instead of three. The result was

Spasm of the sphincter of the vesical organ with difficult micturition. P. 100 soft compresses.

Physical signs as last described but the 2nd is much more distinct & is also heard in the aortic area. The amplitude of the ventricular & diastolic waves is much increased. Fig. 160. Belladonna has accelerated the heart & lowered arterial pressure, so the ventricle forces rapidly small waves of blood into the arteries. It is reduced to 10 m.

57th day. P. 78 compresses. Patient anxious to get up.

Fig. 161. P. 78.

63rd day. P. 76 compresses.
Bellad stopped two days ago. To begin Ac. Hydros. Brom. Fig 162.
6th day. 1st week. Patient worse. Murmur septice & prolonged 2nd sound audible. Fig. 163 shows diminished diastole & increased tension. No relief to symptoms is afforded by Hydros-Bromic acid. The effects of Belladonna having passed of, the pain returned with indications of the heart.

![Fig 163](image1)

![Fig 164](image2)

![Fig 165](image3)

![Fig 166](image4)

8th day. Patient obliged to resort to
Imp. Bellad. Which gave immediate relief. Pulse rose to 84
murmer Septile Fig. 164
98th day. Pulse Q 6. Septile friction
murmer loud & harsh. But softer
then at its early stage. It is loudest
& Septile over the 4th left costal
cartilage. and prolonged during
its diastolic period. It is only
heard over the heart not all over
the chest as formerly. The thrill
is less marked. 2nd Sound audible.
The patient has taken 10 m. Fr.
Bellad. t.d. Fig. 166. This & the pre-
vious tracing. Shows very weak
Septile impulse, with a rounded
apex. The muscle of the heart may
be affected & slightly degenerated.
Fig. 165 shows the cardiac tracing. The
apex beat was feeble. No diastolic
line assumes. The tracing of both
heart & pulse fell with inspiration
the patient was able to get up
and walk about though weak.
This patient occurs again as a bad case of scarlet fever + nephritis. He had pericarditis with a loud harsh systolic murmur heard all over the heart but loudest at the 4th left costal cartilage. No thrill. Pulse 76 small. The friction murmur disappeared as soon as the patient took Belladonna. During the time he had scarlet fever the murmur returning when the Belladonna was stopped. The pericarditis was of old standing.

Fig. 167 taken 30 days after the scarlet fever appeared when Belading was
almost finished. It resembles slightly some of the tracings in its last case in having a flat apex, a short systolic period, a prolonged diastole, and absence of diastolic friction. Fig. 168, 169 taken 2 months later. P. 96 is incompressible. Predominant wave in marked leading to a flat apex at times, in other waves the apex is more pointed. The systole is short. While the diastole is prolonged. The latter is better seen in the heart tracing where the systolic plateau presents a very slanting character but with three oscillations. This shows that the ventricle empties easily, probably due to imperfect respiration. The three oscillations during the systole would indicate competence of the mitral valve.

The phonographic characters of pericarditis are irregularity of the duration of the individual waves. The systolic
Period is short whereas the diastolic is long due to the external friction. The diastolic pulse is absent. Mediation is present and there is a dull, thudike leads to a flat apex. The arterial tension rises where the heart beat is slow. In E. C.'s case the arterial tension was not high, the heart beat being rapid. Her case demanded no treatment.

Belladonna brought good cases & is indicated in this disease. It lowers the arterial pressure whilst accelerating the heart. Thus the work of the ventricle is made easier.
Tricuspid Incompetence

Potions has taken tracings of the peculiar pulsation & gets two waves, a small one, due to the auricular septum which precedes the radial pulse, and a larger one due to the septum of the right ventricle, which occurs about the same time as the radial pulse.

Fig 170 is copied from his work.

The radial pulse is small in tricuspid disease, because, through the reflux from the right ventricle, the blood does not pass with sufficient pressure through the lungs. And, consequently, the ventricle does not get properly filled.

In the above diagram, the radial pulse is weak and quirked of the regular curve.

I have had one case of tricuspid
In competence of which I have
taken precautions but they seem so
dread of special characters that
I almost refrain from putting
it.

Case No. 9. Oct 45.

Complains of pain at the root of the
neck most set on his left side. 4 at the precordia, breathlessness,
palpitation & swelling of the feet.

Exam. of heart. Apex beat
thumping but diffuse. Rights border
extends to about 1½ or 2" to right
of sternum.

Epigastric pulsation. Venous pulsation
in the neck on the right side.

A soft blowing systole murmer is
heard just at the apex but
much louder at the tricuspid area.
No aortic. Systolic sound. 2nd aortic
accentuated. Diagnosis. Tricuspid
incompetence with dilatation of
right ventricle (mitral incompetence?)
Pulse 100 Small, weak & compressible.

His 171 shows the radial pulsation
the 1st part while lying to the 2nd while
Standing. The ascult is standing showing well impulses. The precordial wave is well marked, possibly on account of thickening of the arteries. The tracing removes any doubt about the mitral disease for no precordial would not be so marked if it existed.

Fig 171

Fig 172

Fig 173

Fig 174

The patient was prescribed X m. Indigo t.d. Three days later I took Fig 172. At 1st part lying at 2nd setting, P. still 80 small. No cardialgia unaffected, the murmer more distinct.
In the tracing the impulse is more feeble above than diastole begins. Digitalis is considered by experience to be useless in stimulating the right ventricle. This certainly supports that idea as the pulse rate is not strengthened or improved. As the cardialgia persisted the patient was permitted to inhale enough until the pain quite left. The pulse rose to 720 and there was a flushing of the face. The tracing Fig. 173 did not undergo any alteration which I suppose, due to the action of the digitalis in keeping the arterial pressure high. The patient continued with digitalis for about 10 days.

Fig. 174 shows the same small pulse, but the apex is more pointed. Two months later the patient returned troubled with palpitation. Cardialgia & breathlessness. No Physical signs were as first described.
Fig. 175 shows a fuller pulse than before it resembles that of asthma. It was soft and full but compressible. The patient lying down. The apnea beat was dispensed. I succeeded however in procuring a tracing. Fig. 176 it does not show much that is special.
The patient resumed Digitalis & 5 days later I took Fig 177 which shows the same form as the earlier tracing, although the pulse, which was 80, felt stronger to the finger.

Fig. 178 shows aposie beat. It is feeble & resembles the pulse curve.

Two days later another tracing was taken. Fig 179. Pulse 84, small & incompressible. Pulse wave very feeble.

As the cardiaalgia was bad the patient was caused to inhale Anust which gave great relief. The pulse rose to 120 & the pulse wave at once became feeble. The portable cause of alteration in this case was not the former time but because the patient had not taken Digitalis during the last 2 or 3 days.

A month later Anust was again administered. Pulse from 92 to 100 becoming fuller & softer but again very little effect was produced on the pulse curve.

See Fig 180.
Hales in 1774, in his work on Homostatic (p. 15), describes how that bleeding a horse caused the column of the manometer to fall, indicating a lower arterial pressure while the amplitude and frequency of the pulse oscillation increase.

Lorain found that after serious hemorrhage the pulse very increase in fullness as a result of a lower arterial pressure.

Hahné in his work on Inflammation (chap. 2) states that in animals killed by sudden hemorrhage, the vessels are contracted. The vessels contract after hemorrhage, or when the exsanguination of the pulse meniscus disappears.

Viala found (Thése d'Aggregation Paris 1869) that when an animal is killed and large hemorrhages, it is the early hemorrhagia which produces the marked fall in arterial pressure. The arterial system seems to accommodate itself to the quantity of blood it has to contain.

Tappeiner in the rabbit (Abkürzung of
M. A. (29, Leipzig, BW 17, 173) & S. (30, Leipzig, BV 173). They have established the fact of the adaptation of the vessels to their contents when they are increased, without a notable increase of arterial pressure.

I will now describe 2 cases of severe athermic hemorrhage. The first from medullary carcinoma of the cervix, the latter from retained partially adherent placenta.

Case 6. L. aged 50.

There had been marked symptoms of repeated attacks for 6 months. When first seen the case there had been slight hemorrhage for some days. The patient was much exhausted. The pulse was 80. Hard, hoarse, muffled murmurs at the apex & base of the heart. Fig. 181. Shows a full heart, diastolic thrill marked, which may be due to thinning of the vessels.

Treatment. 1/2 in the litre of 10% ethyl alcohol.

Ten days later. Steel fig. 182. P 80-100 small. Now had been no more hemorrhage. The pulse now is small & weak. The patient is very exhausted.
The patient was now treated with increased homoeopathy. But about a month later an attack occurred which lasted 2 days.

The symptoms being unresponsive to gallic acid or iron.

The pulse was barely felt. 68. T 97.8 under the tongue. The patient was cold. The internal temperature lowered 1 degree.

Homoeopathic measures at once. 

Fig. 183 shows great fullness of the pulse wave. The rounded upstrokes and flat impulse indicates that the resistance increases.
during thisystole, the tricusium increased
fig. 184 of the aorta. The ventricular
waves are sope. The aortie plate is
flat & anesmched by the oscillation which
are caused by the motion of the mitral valve.
This is because the ventricle being his jelled
the valves are not stretched.

This aortie tracing illustrates how deceptively
it is totrust to the juge.

A month later there was a sudden
attack & found the patient within an
hour of its commencement. She was pulse 110-
per small & compassless, &pbeat felt
very muffled & weak.

"Fig. 185"

"Fig. 186"

"Fig. 187"

"Fig. 185 of the aortie resembles the previous
"Fig. 186 in the cardiac. The impulse is feeble"
The symptom was well marked.
Two tablets of Camphor were administered at about 20 minutes later when the effect was felt. I took 1 lb. of fulminating peroral. The pulse and general symptoms were marked. The lesion resembles that of acute encephalitis.

A week later there was slight but continuous hemorrhage. Pain was more, 0.120
Until fig. 188

It shows reddening of the lesion.

Fig. 188

Case 10, Oct 40

This patient had a severe attack of acute hemorrhage, following an ornamental procedure. The patient was faint 6 hours after I took fig. 189. The pulse was 120 small and weak.

Temp. 96.8 under the tongue, two degrees below normal. The tongue shows very good

Fig. 189

It hour later 2 hours after 3 gr. of ergotin
I noted fig. 190. The patient had had a small quantity of brandy & hot water bottle applied & qrs. under it longer P102 small.

![Fig 190]

![Fig 191]

![Fig 192]

There is increased arterial pressure or a return to normal contour.

Three days later I took fig. 191 which shows low tension. P120 full compensable. QRS general improvement.

Fig. 192 is the cardiac tracing.

**Menorrhagia**

The following tracings have been taken from patients while the above condition existed.

Fig. 193 from a strong healthy young woman age 19 on the 3rd day. Instructions forthcoming.
P193. Drawing of a pulse. After pointed comparison with
P194. From a patient (51) with 31 weeks
P195. From excessive childbearing + menorrhagia.

Every 3 weeks. This was taken on 15 th of

P197. On the following day. Mesmer
P198. Excessive P80 small compressible. Heat

P199. Bound, weak.

P200. On the 3 rd day after P193, Ed. Eyed

P201. Leg in 3 days, during the past 24 hours.

Anemia

Case 25, S. W. b. 97.5. ab 10

Anemia, subject to fainting. There is a soft blowing systolic murmur at the mitral. It is not constant. The murmur is audible accompanied by a murmur. These murmurs are variable, more distinct when the sit up. They are not heard when lying day. They are Anemic. There are a venous hum at the root of the neck. 1200 small spots.

Fig. 198

Fig. 199

Figs. 198, 199 were taken when the murmurs were audible at the mitral cardiac area. The mitral systolic murmur also heard.
in the entubalism. The 1st was small, incubated, the 2nd whilst standing
They show signs of very low arterial tension.

Figures taken when no murmur
was audible (both fig. 200
The venous hum was audible on 2nd figure
murmur in the entubalism.
The character of the trum can be before

Fig. 200

Fig. 201

The patient was treated with 20 ccq.
Arson of 20 ccq. by Mr. Pullard Ltd.
She improved rapidly.
Another figure taken by Dr. 201 was taken.
The trum is normal, was weak and not
clear. resembled "thump", atraumatic.
Another bassum is increased.
The trum is not unlike that of normal
anemia.
The anemia is cured, the was discharged.
Atheroma

In old people the arteries become less elastic and their walls thickened. In many cases atheroma or calcarious degeneration occurs. The vessels also become more voluminous on account of the constant increased pressure in them. In these cases the artery pulse under the influence becomes hard and incompressible. In elderly people with atheroma there is always hypertrophy of the left ventricle which has more work to do in overcoming the resistance of its inelastic tubes. The force and suddenness of the pulse plays a large role in the diagnosis of hypertrophied arteries. The arteries in health by their elasticity modify the pulse tracing as one gets further from the heart. See figs. 48, 50, 51, 52, 54. But when the arteries are atheromatous they do not modify to oscillations of the blood wave, so that the pulse tracing resembles that of the heart. The pulse tracing
Therefore shows, suddeness & force of impulse & an exaggerated precipitation. That is, it presents the form of the terminal systolic wave which gives it a flat apex like that of the ventricular systole. The diastolic wave is diminished or absent & the descent gradual. As the arterial tension is high, the resistance of the blood-wave is great.

Case 4. Male aged 44.
Marked atheroma & hypertrophy of the left ventricle. Aplastic beat at 6th interspace & thumpily. The mitral 2nd sound is loud, clear & thumpily. Pulmonary & bruit sounds also loud.

Figs 202, 203 show the character described. Fig 204 is a very poor open tracing. It
was difficult to take as it was so difused.

Case No. 14. age 70

Well marked athrorna atri hypertrophy
of the left ventricle & being thin showed
visible pulsation. Heart sounds clear
and loud.

*Fig. 205*

*Fig. 206*

*Fig. 207*

*Fig. 208*

*Fig. 205* taken when patient was not very
well & the mitral was weak. Aortic 2nd
clear & ringing.

*Fig. 206* when patient was strong and
well. Mitral 1st loud & thudding. Pyo
hard & incompressible. These are exact
types of cardiology.
Fig 207 was taken when convalescent
from an attack of pleurisy. Pq 2
Fig 208 shows the heart tracing at the
same time.
There is a marked resemblance
between the two. Later on I shall
describe this pulse v heart in the
feverish state. See p 229

The above two figures (207, 210 show the
pulse v heart tracing of a lady
aged 60. P 24 small v compressible.
Apex beat visible. Mitral valve leak.

Case Mrs. C. aged 60

This patient 2 years ago had severe
epistaxis for which the posterior
nasal space had to be plugged.
The vessels are thickened v the left
Ventricle is hypertrophied. Fig. 211 was taken when patient was very weak & unable to stop, without blood rushing to the head & palpitation. P. q6 small, hard & compressible. Heart sounds normal. Cut weak.

Patient treated with X. M. T. Ferri Perchlor acet X. M. Ac. Hydro bromi ed. This always did her good.

Two days later Fig. 212 was taken. The pulse was q6 with missed or abortive beats. On auscultating the abortive pulsation was heard thus: dupp dupp dupp — dupp dupp. This irregularity is well shown on the 2nd q 5 & 12th week.

Figs. 213, 214, 215, 216, 217, were taken at different intervals during the following month. The patient steadily improving. Pulse came down steadily from 96 to 72. The latter pulse waves are typically atheromatous. The early ones show how the atheroma modifies the weak pulse. It becomes feeble in weak pulse, flat apex & absence of diastole.
Three weeks after the last tracing, the patient had slight epistaxes with threatening of its return. There was also "blood rushing in the head and ears."
And a sense of dullness or oppression in the head with buzzing in the ears. Flesching of the face, tenderness of scalp. Pulse 84 small regular. Heart Sounded normal. Extreme tenderness at the precordia. Fig. 218 is a Kmarkale tracing yet no finger detected nothing. The pulse tracing being atherosomatic fairly reproduces this heart tracing which here I could not obtain. These symptoms indicate the so-called congestion of the brain which nature would fail to relieve by epistaxis or the physician by a stroke of the lancet.

But in congestion of so important an organ the arterial tension would be lowered whereas here the arterial pressure is extremely high. So great is the resistance which the ventricle meets that the systole is considerably prolonged to overcome it. This is shown by the horizontal line which remains raised during the systole.
To clinch the case showed its commencement very short period of its diastole. It is an established fact that the arterial pressure is reflected to the intra-ventricular pressure. Therefore in this case, the pressure in the ventricle is increased.

The arterial pressure was lowered by a strong plunge.

![Graphs](image)

Figs. 218, 219 were taken the two following days. They resemble the normal form, but the third day the pulse head symptoms returned. The pulse was 90 & the tracing Fig. 220 resembled in a lesser degree that of Fig. 218.
Having studied Moschei's lectures
loc. cit. I was sceptical of the so-called "brain congestion". This was confirmed by the increase of
arterial tension in this case.
Whisk, as I have pointed out, ought not to occur as is explained later on when speaking of
acute fevers. (p. 229)

Moschei (B.M.J. Apr. 16, 87) proves
that the brain is paler when the
face is congested. That there is no
clinical evidence to support the
theory of brain congestion in a
case like this. That great in-
crease of blood pressure in the
brain produces no symptoms
whilst giddiness occurs in a pale
brain, that apoplexy occurs only
in anemia of the brain as the result of high arterial tension.

The argument is sound.

These tracings, which I refer to, support his theory of increased arterial tension. Increased arterial tension is caused by contractions of the arterioles which means anemia.

Acting on this theory I permitted the patient to inhale enemol. 

Now the pulse rose to 100 % because fuller and softer to 1 1/2 of

Fig 222 was taken. Later the 2nd half. The pulse 108. Head symptoms quite relieved with a sense of comfort almost excitemint.

Comparing the two tracings in Fig 222 the systole is prolonged & difficult. the blood pressure is very high.

While in Fig 222 the systole of the ventricle is sudden, rapid, short; the arterial pressure is low because aneml has relaxed the arterioles of the brain affording an easy outlet for the blood & diminishing peripheral resistance.
Met its physician accomplishes what he cannot. What nature effects by spasmatic, what was obtained by an aperient I now obtained by the inhalation of amyl – no lowering of arterial pressure.

Hemiplegia

No. H. Oct. 60.

Two years ago had an attack of left hemiplegia. His arm is contracted, his left powerless. Heart sounds normal, left ventricle hypertrophied.

**Fig. 223**

**Fig. 224**

**Fig. 225**

Fig. 223 represents the right radial artery which is full and hard 72 beats per minute. Fig. 224 shows the left radial which
feels soft & small, easily compressed. The characters are rather different. The left arm thin & flabby; minute processes go on slowly & the vessels spare. No scene deficiency.

A heart tracing could not be obtained one of the right cardiac by 225, which closely resembles that of the heart was however taken. The elevated systolic plateau shows that arterial tension increases during its systole thereon in account of it the ventricle meets a strong resistance during that period. The descent in the more regular waves is sudden & the sigmoid wave is almost absent.

The left radial tracing resembles that cardiac more than the right radial does.

Case Mr. C. about 65.

Had an attack of left hemiplegia 21/2 years ago. He can walk with assistance & can use the left arm slightly. There is aortic stenosis, mitral regurgitation.
Pulse 64-68. Intermittent about every 4.5 sec. On auscultation in costo-
area the systolic bruit is absent at
the intermittent but the 2nd sound
is loud & clear as usual. At the
gap there is great tenderness.

Fig 228 shows the right radial. Fig 227 the
left radial. When patient was
calmer. He slightest excitement
increasing the pulse & obscuring
the intermittent. The patient
suffered from headache which
is often attended with sickness.

Fig 226

Fig 227

Fig 228

Fig 229
Amyl was tried, it relieved the headache but did not affect the intermittent. Fig. 28 was taken with a pulse 76; Fig. 29, when pulse was 84 full and soft. The auricular wave is well marked in some of the tracings due to the aortic stenosis.

Emphysema.
Shorn the tracing from two cases, Mrs. J. Mrs. R. Both over 50, and both suffering from emphysema of the lungs. They were both treated both 20 m. ac. hydrobrom. & x m. dig. ferri perchlor. with benefit. Fig. 230 of Mrs. J. before treatment. Fig. 231 after treatment. Heart sounds very feeble.

Mrs. R. had loud, clear heart sounds.
Fig. 232 before treatment when patient was weak. Fig. 233 after treatment. Figs. 234, 235 of the heart & pulse. When the patient was able to go out 3 months later, the line descends with inspiration. The hypopnoea being thoracic.

Asthma.
No. 2, Oct. 50.
Heart sounds weak. Arteries thickened. Fig. 236 before treatment.
Pulse 108 Fig 237 after four days treatment with bromide acid 8 mm. Pulse 87.

Fig 236
Fig 237
Fig 238
Fig 239
Fig 240

Fig 238 a month later but Asthma worse. Pulse 96 very weak & patient exhausted. X ray & ECG t arcade has given Fig 239, 240 show no cardiac & Electrical tracings after four days Pulse 90 Patient stronger. The pulse descends with inspiration.
Functional Palpitation
or Irritable Heart of de Cote

The chief symptom is palpitation. The apex beat is thumping. Mitral sound weak or thudding & loud. Sometimes grating. There is no organic disease. Pulse up to 100 or more. It occurs in nervous subjects as the result of overwork, worry or hypochondria.

Case. Mr I. Oct 60.

1st found harsh, grating & reduplicated. I diagnosed Mitral Stenosis & 2nd accentuated. Pulse small & compressible. Her chief trouble was nervous palpitation.

Fig 241

Fig 242

Fig 241 taken during an attack.

P. 170. Matinee & M. Mr. Belloch t.d.
Fig 243 after four days, 1900 impulses in both tracings is very weak. Anile thickening modifies the pulse wave.

The night at 11:30 patient had one of her blood "heart attacks." Palpitation, cold perspiration, extreme nervousness. There was no dyspnoea, no pleurisial Pulse 88 Smaller & weak.

Fig 2 4 3

Fig 2 4 4

Fig 2 4 5

Fig 243 taken during the attack. Shows signs of atheroma with feeble impulse. Mitral grating loud & reduplicate. Patient took 25 m. Tr. Dig. 20 minutes later Fig 244 was taken. After 15 minutes Fig 245 pulse rose to 80 & became stronger. The reduplicate was less. The tracing shows a much stronger impulse.
The apex becomes pointed instead of flat. The disturbing symptoms were
relieved. Treatment X m. Jr. Digita t.d.

Fig 246

Fig 247

Fig 248

Fig 249

Fig 246 taken two days later: Pulse 87
Fig 247 on fifth day: Pulse 72. Stronger
Heart sounds louder. Grating of mitral
les. On ninth day Fig 248 on tenth
day Fig 249: Pulse 68. 1st Mitral Friction
Rattle: Grating not Reduplicate.
Fig 250: 16 days later when the Mitral
Sound was quite normal: Pulse 72.
Digit stopped. Patient felt quite
well.
Fig 250

Fig 251

Fig 252

Fig 253

Fig 251 the patient was taking Nitric Acid, Paraxadum for biliousness. Figs 252, 253 show the pulse & heart tracings when the patient felt well.

Case Mr. A. age 30. Suffering from gonorrheal Rheumatism. Is subject to palpitation has a pain at the precordia P. so full, compressible. Mitral Sound weak & grating. Is heard louder when the breath is held up. 2nd sortie is accentuated. Fig 254 shows a strong pulse modified however by Semile thickening.
Treatment. X. M. Digit t.d. Fig 255—taker. Four days later shows more systolic force. Pulse 64 as the Cardiogia was not improved he was permitted to inhale amyl till relief was obtained. Pulse rose to 70. Fig 256 shows a more pointed apex & an increase of the diastole. Digit continued four days longer. Pulse fell to 60 as the patient felt better Digit was stopped. Fig 257

Case C. servant, oct 35. Pulsitation. Heart Sounds normal. P. 100
Figs. 257, 258 show radial & heart tracings.
Treatment | M. J. B. | t.d. | Four days later | Pulse 84 | Palpitating 25 bettter.
The systoles have increased & the systolic plateau marked with oscillations.
See Fig. 160, 261.

Fig. 258

Fig. 259

Fig. 260

Fig. 261

Fig. 262

Fifteen grs. of Brom t.d. was given with greater benefit. Six days later pulse Fig. 262 and still later Figs. 263, 264. Pulse and heart when patient felt quite relieved.
Nervous Debility

is somewhat akin to previous cases of
diseases. Here is no heart lesion but the
sounds are very weak & the patients com-
plain of great heart, faintness & breath-
lessness. This complaint is very common
in women after the climacteric period
& in both sexes, though more in youth
during adolescence. In the former
clasp the tracing indicates weak
systolic impulse which means car-
diaic depression. In the latter there
is low arterial tension from impaired vasculature.
Fig 268, from two ladies, both over 50.
Fig 269, from two gentlemen, both over 70, suffering from nervous debility.

Fig 271, from a lady aged 50. Fig 272 before and Fig 273 after treatment with Hydrobromic Acid.
Fig 274
Fig 275
Fig 276
Fig 277
Fig 278
Fig 279

Fig 279a & b. Taken at different periods as patient improved during next two months. The last is a heart tracing from another youth. Fig from third
The Pulse in Acute and Specific Inflammatory Disease.

In diseases of this class the pulse is affected by no relaxation or contraction of the capillaries. Men the capillaries are relaxed, more blood flows to the part, the peripheral resistance, which the heart has to overcome, is diminished, consequently, the heart beats more rapidly and suddenly which causes a higher upstroke.

But as the arterial tension is low the line of descent is abrupt. The relaxed condition of the arteries favour the formation of waves and exaggerate the sigmoid or diastolic wave. The heart beating more rapidly is less filled and the waves are consequent of smaller volume.

One of the objects of my thesis is to show the importance of the pre-diastolic wave as an indicator of the state of the heart and the circulation.
Fig. 280 One of the earliest tracings taken by me from a case of typhoid, 2 weeks previous to a hemorrhage of left femoral vein with an accompanying white leg which is, I believe, rare in the male. Pulse had feeble & diastolic. Fig. 281 from a young man suffering from typhoid 6 weeks after discharge. Has in addition a mitral murmur. Fig. 282 taken 6 weeks later when patient was convalescent. Diastole continues. Due probably to a mitral insufficiency.

In the next case of typhoid almost daily tracings were taken. As there are many such cases to describe they are concluded as much as possible.
they made almost entirely to what affects to pulse.

Case N. Oct 10 Typhoid

General malaise & diarrhea commenced Oct 25. Typical evacuation. Tongue dry, red & raw. Pulses T. 105 hard, bounding. Heart sounds normal Oct 24. Feb 28 shows very feeble arterial tension. Deceleration is very slight. The pointed aortic & great amplitude of the systolic wave denotes easy penetration of a small wave of blood. An abrupt & complete descent proves how little peripheral resistance to wave meets. This is due partly to smallness of its volume, also to its relaxed state of the artery & the easy outlet through the dilated capillaries. The diastolic wave is greatly exaggerated due to sudden entrance of the small blood wave & low arterial tension.

Treatment: 15 yrs. Soda & Sal. T.D.

12 24. 1103. Re Ly 285. I proceeded
5 m. 6. Dips. t.d.  
Jan 3 1103. Pivo
Patient
drowsy & irritable. Has taken 20 m. 6. big.
without improvement in heart sounds
of force of the pulse. On the contrary
the pulse is more diastole. The diastole
main advancing to next pace. See fig 285.
The Syst. Syst in 10.30. A.F. was therefore
continued.

Jan 4 1104 1100 12 24
Jan 5 1102 1108. Weak R 24. Still dizzy
Delirious. Difficulty to speak. Mitral
13 muffled & weak. Fig 286 shows weak
Systolic Impulse & low tension. Possibly
the systolic in depressing. The patient was

Jan 6 1102. R 24. P 24. 1109. Stronger but
Fibrillation. Heart sounds stronger.
Patient has had 31 of Rect Jpt. in 74 hrs. &
31 half an hour before fig 287 which shows
Mitral force & diminished diastole.

Jan 7 1101. Pivo. No progress
Jan 9 1101. P 92. Patient has had
31 of Rect Jpt. in 48 hours & no other
medicine.
Fig 288 shows an improvement
Jan 10. Temp '5. P 102 fully compromised. Patient has had 31 of Pect. Sip in last 24 hours. Fig 287 Shows diminished amplitude of pulse wave and duration less marked, but pulse weaker. Brandly has in this case been of decided benefit. It removed the drowsiness & muttering delirium & gave quiet sleep. Patient eats better and perspires freely. The temp has fallen from 102 to 101 '5 & pulse has become stronger to the touch. Whilst the tracing shows an increase of arterial tension at the same time the heart sounds have become stronger.

No medicine nor spirit was given for the next 24 hrs as there seemed to be a little depression.

Jan 11. T 98. P 96 stronger less compromised. Evidently there is a time when alcohol completes its work & as soon as it ceases, the T falls still lower & the pulse becomes less frequent & the tracing fig 290 shows increased arterial tension. The descent is not great as before.

Jan 12. In the last 24 hrs Patient has had 5 doses of J. Fig. Heart sounds clearer.
Jan 8. 8 p.m. An compressible Fig 291 was not show much change. I n 30 mg. Feen
Phenobarbitone I t has therefore prescribed every
four hours Sec if its asthmatic would
improve the pulse.
Jan 14. T q g. 8 1900. Patient has had
30 m. in the last 24 hours. Fig 292 shows
a slight return of predicism.

Jan 16. T q g. 8 1900. CompressiblePatient
sat up yesterday against orders & eat
some meat. Not so well today the tracing
Fig 293 shows a decided relapse.
To have X m. In Nae im every four hours
the general symptoms of the case do not
indicate such a pulse.
Jan 18. During last 48 hours patient
Has had zip to no vom. But this is a decided \_\_\_\_\_\_. Try P172 small & compressible. Reckoner returned. Heart sounds weak Fig. 294 resembles the pulse at the onset of the fever.

As the patient seemed very weak & high temperature I tried the effect of rapid sponge with quite cold water covering skin after with a blanket.

Immediately after Fig 295 1/4 part was taken. Pulse had fallen to 70. Irregular & thready & P197 was 173.4 10 minutes later when the 2nd part of Fig 295 was taken. The tracing shows that the shock of the cold water was very depressing on the heart. In 10 minutes the pulse rose to 120 & the tracing still indicated low arterial pressure. The patient was sponged about every two hours with tepid water & no narcotics given. At 9 p.m. after three sponging the temperature remedied at 103.4 P130 less compressible. Heart sounds weak & muffled. Fig 296 shows a decided improvement in the return of the pericardic wave.
Jan 19, 1 p.m. Patient had three sponging today. Was very delirious last night. But great improvement today. Fever has stopped. T. 100.5 F. R. 26. PB. 108 very soft & Impressive. Heart Sounds stronger. Fig. 297 still shows no predictive. Jan 20 a.m. Patient has been sponged twice today with cold water. Temp. 99.5 F. P. 116. Small. Fig. 298 still improves. Cold sponging to be stopped tonight.
Having succeeded in reducing the temperature & pulse, in lowering the arterial pressure, & reproducing the precordial wave, and this in three days. Jan 21. 108° 8. P 108. As no material o

bliss weak & muffled I ordered X in the digits. Jan 23° Temp. 99. P 110

fig 298A shows increasing tension by the decrease of diastolic & the diminished fulness of the systolic wave. This is more marked in fig 298B taken two days later when the pulse had fallen to 60 & was less compressible.

Jan 27° Pm. 98° 8. P 62. Intermediate

& incompressible. Heart sounds clear & loud. Fig 298C shows a return to the normal type & the upstroke is high & pointed due to the increased ventricular force. The result of digitale in the tracing after a strong systolic follows a weaker one.

Feb 1° P 62. Irregular intermittent

& incompressible. Heart sounds loud & resounding. Fig 298D indicates increased arterial tension. Digitalis having been pushed faster to expected res
Fig. 298a
Fig. 298b
Fig. 298c
Fig. 298d
Fig. 298e
July 4th, 1888. Strong remission not possible. Fig. 2982 is normal.

Remarks: Digitalis during the feverish stage was useless as a cardiac stimulant to improve the pulse. At this period alcohol was of great benefit both to the pulse & heart, Streptotonig the Sounds & developing the precordial trace. But when continued too long, it caused slight depression of the pulse force. When it was discontinued the pump fell & the pulse improved. In convalescence Digitalis was very beneficial for the heart & pulse. Cold water sponging was very effective in reducing the temperature & improving the pulse & reproducing the precordial trace. It was, in this case, a shock to the heart at first but being in the depth of winter the water was very cold. It would be advisable to use water warmer at first, or, if cold, to administer previously a little alcohol.
Case Miss J. Oct 18 Typhoid.

Rectus, Saw patient diarrhoea had continued for 14 days & was ceasing.

Dizziness in right ear, pain in nose was very marked. T 102. P 180. Heart sounds weak.

Mittal muffled. Fig 299 treated. Xn. Fig 299.

Next day T 100. P 188. Fig 300 shows improvement.

The following day T 99. P 160. Less complainible. Heart sounds stronger. Fig 301 shows increased arterial tension & force. Figs stripped.

Next day T 80. P 160. Fig 302 shows normal characters.

Fig 299

Fig 300

Fig 301

Fig 302

Three days later had an attack of sickness.
P. G. weak. Fig. 303 shows increased vibration.

Fig. 303

Fig. 304

Fig. 305

Fig. 306

15 mtr. N. N. W. M. T. d. was prescribed. Patient recovered rapidly. Fig. 304

The following tracings were taken during succeeding three weeks. Fig. 305 taken when patient was palp. worse. Fig. 306 when patient was quite well.

Remarks. In his case Digitalis was beneficial when the heart was weak as fever was subsiding.
Diphtheria

Case R.M. aged 6. Boy

Sore throat, swollen & congested
Fauces, glands enlarged & tender.
T 102. P 140 weak. Fig 307 shows increased arteriosclerosis.

Treatment 5 m. Fr. Belladonna three hours.

2nd day, after 25 m. Belladona 8 hours, throat easier but swelling increased & diphtheria patches on each tonsil.
T 102. P 120 less compressible. Fig 308 shows increased arterial tension.

Belladonna in inflammations of the throat reduces the frequency & arteriosclerosis of the pulse.

Treatment 5 gr. soda salic. every hour, 3 to paint the tonsils every two hours with glyce of boracic acid.
3rd day. After one drachm soda salic which makes patient sick. General state worse. Patched larger.

4th Day. 40 gr. Sod. Salie in last 24 hours. Vomiting, delirium, prostration. R. 32. T. 101. P. 108. Small, compressible. Heart Sounds loud and clear. Fig. 310

5th Day. 31/2 Sod. Salie & 20 m. Carbol. in last 24 hours. Patches less. Resp. easier, 48. T. 100 P. 120. Full bounding. Heart Sounds Strong. Fig. 311. Pain in epigastrium. Vomiting of bile & mucus. Dark urine urine, Eversines & delirium indicate carbolic poisoning.

7th Day. 10 a.m. Had 40 gr. Sod. Salie twice yesterday, and about 10-12. m. Carbol in the paint. The carbolic acid was stopped & the previous paint continued.
The carbolie poisoning worse. Heart sounds today are weak & muffled. T10, P114. Weak Compriennelle. Fig 312 shows depression thus differing from the previous tracing which suggested stimulation.

Fig 310

Fig 311

Fig 312

Left wrist is clean. No right improving. 10 p.m. more protrusion today. Pain previously. So patient has had 3 oz. brandy in the last 12 hours administered.

Heart sounds stronger. P120 T1313 Aces not yet show improvement. But no carbolie poisoning has not yet passed off.

8th day 2 p.m. "had a bit of brandy since last night." Visit P132 p.m. Fig 314 T107 8 p.m. had a bit of brandy at 20 p.m. No Fig 3
In four doses. Fig. 315 shows great increase of systolic force with normal precordial. Alcohol reproduced the precordial wave which had disappeared after the carbolic poisoning. General symptoms were improved.

The substution which commenced yesterday continues. P120. strong T100'5.

Fig. 313

[diagram]

Fig. 314

[diagram]

Fig. 315

[diagram]

9th Day. No brandy. 30 m. 4 p.m. in 3 doses B 24. quieter. Tqq'8. P120. Fig. 454.

Patient being unmanageable patches are much worse. The patient was consequently changed. 60 m. 4th saline & 3 p. Stye.

70 m. p.m. Hatt had Zips. B 24. Tqq'8. P120.

There is an marked diminution of the patches. Fig. 316

10th Day. Had Zips. Brande. Throat almost
Clean. Heart sounds louder but not clear. Fig 317 shows low tension but there is still great prostration.

Fig 316

Fig 317

11th Day. Throat still clean. Has had 3½ oz. brandy. ½ oz. liquor ferri perchlor. 7½g. Smaller less compressible T ag.

Fig 318 shows increased tension. Probably due to the astringent action of iron on the small vessels. Predicution is returned.

12th Day. Throat keeps clean. Patient has had 3½ oz. brandy & 25 m. liquor ferri P.s. 170 small. Heart sounds much stronger. Fig 319 shows low tension.

13th Day. Has 3½ oz. brandy. 15 m. liqu. ferri P.s.

Still prostrate. Fig 318. Fig 320 shows lower arterial tension due to epistaxis last night.

14th Day. No brandy since last night. 20 m. liquor ferri P.s. 7 g. small. T 98° F. Fig 321.
There is no regression in heart of the
brandy. In fact in next 24 hours Pulse
did it 84.

Fig 318

Fig 319

Fig 320

Fig 321

Fig 322

16th Day. 12.34 Heart sounds stronger.
Fig 322 shows increased tension. Though
there has been occasional epistaxis.
Treated 5 m. Liqueur Verri Perkhofs
Patient improved but was affected
with slight paralysis of the lower extremities
being unable to stand or walk for a few days.
He was treated with Nux vom. & galvanism which latter was most beneficial. At first the strongest current produced no effect. Later on each application was followed by a marked improvement in walking.

A fortnight later when patient was convalescent I took the following three tracings: Fig. 323 of the radial; Fig. 324 of the femoral, paresis of the limbs remaining; Fig. 325 at the apex the heart still irregular. It shows strong systole followed by weak apex. The radial tracing also shows irregularity which was perceptible to the fingers.

Fig. 323

Fig. 324

Fig. 325

Remarks. New tonsillitis has recur, symptom Belladonna diminished & pervasines diroston & frequency of the ease.
Relieving the pain. This is the opposite of the effect of Belladonna in health as may be seen by an experiment on myself. See page 238.

Salicylate of Soda produced in this, as in some cases, vomiting & depression which is confirmed by the tracing. See Fig. 309, 310. More carbonic acid was locally applied. The first effect on the pulse was stimulation resembling that of alcohol as may be seen by comparing Fig. 312, 315. Its secondary effect was great depression. See Fig. 313. Where in addition, the precipitatory trace disappears. Initially increases the pulse force & reproduces its pulse wave. The local applications of Salicylate of Soda was much more effective in clearing the throat than Uricacidic acid or even Carbonic acid which latter is too irritating.

Perchloride of Iron in large & frequent doses is very beneficial as a tonic & through its astringency in the small vessels, in raising blood pressure. It is to be noted that predirection bears no relation to the severity of this disease.
Case E. H. A six year girl.

Mild diptheria. yielded an area to

Prot. Sal. locally & internally administered

The temperature never rose above 100.7

No tae pulse above 120.

Nourishment has taken every two

hours day & night.
Figs. 326, 327, & Figs. 328, 329, taken on the morning of the 17th of October. Fig. 329 taken after 10 m. Dr. Bellad. Figs. 330, 331 taken the following morning & evening. Figs. 332, 333 taken after 20 m. Dr. Bellad. The latter after 25 m. in 5 m. Cloths. Pulse did not rise above 100 whilst taking Belladine.

Figs. 332, 333 taken the two following days when the Tarvat was clean & the patient much better. The Tarvat painting in this case had been hourly in the day time, every two hours at night.

Mild diphtheria yielded soon to hourly painting with Glyco. Ind. Sul. in five days. These five tracings were taken on the 1st

Figs. 332
Fig 334. 1/20. Small compressible.
Fig 335. Ti11. Pq6. after 12 the minute doses of 30 Aconite. Fig 336 Tqq9.8
Pq6. Stronger after the same amount of Aconite. Tracing shows increased
arterial tension. Thus small doses of Aconite reduces the temperature & rapidity
of the pulse without depression.
No medicine given in next 24
hours & printing less frequent. Ke
Patch has almost gone, increased.

T. 110. P. 120. Fig. 337. Shows ulceration.

Zinc oint. Sal was given in 10 gr. doses 4 times hourly.

Next day: T 99. P 108. Fig 338

Case C.P. vet. H. Coy.

Back case of Affluvia. 1st day T 100. P 130. Yellow patch on right tonsil & small spot on left. Palatine gland much swollen & tender on right side. Fig. 339 shows small wave not altered from normal force.


He is to take Xygo Tod: Salic Acid 3 hours.

3rd day: T 99. P 122. Slight composite

Patient has had 40 grs. Tod. Sal. which has reduced the temp 2°. The pulse is however more frequent & weaker. No trouble.

Fig. 341 shows rather diminished force.
4th Day. Had 40 sq. ft. Salicy. Tqg's P 116 Stronger. Heart sounds normal but weak. The right tonsil is clear. No left Adams. Clear. Fig 342 shows increased systolic force. The foot Salicy stepped to front of chair. But continued for 2 hours. The Salicy of today has had little if any depressing effect on the pulse.

5th Day. Room T 71°. P 140. bounding & full but very compressible. Fig 343 shows lowered arterial tension. Heart sounds weak. R 30. nasal & difficult. No patent
have returned on both sides. Painting has practiced every 2 or 3 hours instead of hourly as ordered. The sal. soda being stopped may have favoured the return of the fever.

6 p.m. 7/12. P. 135 full bounding. R. 30. Heart sounds muffled. Fig. 344 of the radial pulse. Shows diastole ascending the following wave. 1st precordial is present & very marked. Apode is not felt. Fig. 345 is a tracing of it. It is not very distinct but corresponds in the form of the pulse wave in having a pointed apex. At some the terminal systolic wave is marked while the sigmoid wave is occasionally on the succeeding up-stroke.

Painting hourly. 2 yrs. sod. sal every two hours.

6th Day 11 a.m. Had 80 yrs. sod. sal.

Tq. 5". P. 108 stronger & lip compressible. Left pulse worse.

Fig. 346 shows no depression in the ventricular force. This supports the idea that sal. soda does not depress the pulse.

The cardiogram in Fig. 347 resembles it.
Radial tracing it does not show the terminal systolic wave well, as no respiration interfered with the taking of the tracing, but the diastolic wave is exaggerated.

Fig 3.4.3
Fig 3.4.4
Fig 3.4.5
Fig 3.4.6
Fig 3.4.7

1st Day Patient had 3i of fluid. Full v. painting. P120 Small v. Les compresses. Tg q: B 38 nasal mucus being in excess. Fig 3.4.8 resembles normal form and indicates increased arterial tension.
8th day P.130. Tq 9.2 Throat almost clean. General improvement. Had 40 grs Soo. Sal. Fig 349

Fig 348

Fig 349

Fig 350

Fig 351

9th day. Patient has had no cold saline internally for 24 hours. The right tonsil is clean. Pain on tonsil however continued. Tq 9.2 P.10.8 Fig 350

The following tracings were taken on the 11th, 12th, 13th days of the last stage a fortnight later. The patient
has been quite convalescent. Recovery appears about 16 or on the following day. He was to begin a voyage across the Atlantic.

Remarks: It is of importance to note that the palmar wave is generally present even where there are signs of low arterial tension. It also occurs during the administration of large doses of digitalis or toxins.
Scarlatina

Case C.C. Female Oct 28.

Complicated with nephritis.

1st Day. Incubation uncontrollable vomiting.

2nd Day. Scarlatalinal sore throat & white patches on tonsils. T 105. P 130. Pericardial Systolic Friction Sound. Fig. 357 shows weak impulse & low tension. Patient much exhausted.

Treated: 1 m. In. Aconit. hourly.


Rut dry T 104. P 108. Fig. 357.

Treated: Boracic Acid gargle v painting with styr. Ac. Boracic. Bogus Inod. Salicy at once v 30 at 4 a.m.

3rd Day. q. a.m. T 103. P 28. P 126. hard pulse. Restlessness. Eruption faded. Fig. 358 resembles that of last night. Therefore injected 15 m. of 2% Sol. Melo-Catrin in the atua. In a 64h hour when the pulse became
After full 120. Whist freely perspiring. Took 6th. Sig: 359. Pulse rate was unaltered. Vomiting now occurred & copious salivation.

Fig. 356

Fig. 357

Fig. 358

Fig. 359

Fig. 360

Fig. 361

Prescribed 25 grs Laud. to be given every two hours.

At 2 p.m. great depression. The rash had come out but was dull. The face Hind
Micturition suppressed, therefore a wet lumbar pack was employed.
11:20 a.m. ceftriaxone 2 g. 360. Shows great depression.
8:30 p.m. after 34.8 d. 
T 104. P 94. 1940: Sudden but uncomplicated.
Fig. 36.1. There is general depression, signs of respiratory distress, micturition difficulty.
Subcutanea: No urine for 14 hours.
4:45 a.m. Half a pint of urine passed.
From 7 p.m. night it contains albumen and a large deposit consisting of the epithelial tube casts well marked. The liquid is teeming with small glittering microcosm which also have found their way into the epithelial scales. I am not aware that these microcosms have been seen before.
10 a.m. T 104. P 81. 1924. Patient has had 30 m. To Bellad. Since 10 p.m. it was given to relieve the throat and mouth which was fiery red and dry. Being covered with epithelial casts Fig. 36.2.
Shows very weak impulse wmarked microcosms. The systolic friction murmur has entirely disappeared. Since casts
10 p.m. 1/4 oz. 30 m. in Belladonna in 6 m. doses
P. 187. 7/01/4. Fig 363 still shows suppression
Norval improving. White patches also
appearing. Great prostration. Body
warmer. Christmas cold. No sleep
in, sick urine at 2 p.m.
Being so weak patient had 4 tablespoon doses of Brandy after each of which he fell into a quiet sleep. It also stopped the vomiting which up to this time had continued occasionally. The rash has also come out more scarlet. 


P. 108 V Stronger. Fig 364 shows a slight improvement in pulse. 

9 a.m. 5th Day has had 1½ Brandy no Belladona. Patient much better has slept & the delirium is less. 


2nd accentuated. At 8 a.m. passed ½ pint urine which is still albuminious. Eruption is fading. Tongue & mucus still flabby. Bed Brandy stopped. 5 m. Mr. Bellad as before. 

The Brandy has lowered the temperature reduced. The frequency of the pulse & the diuretic have disappeared. The delirium & prostration has been relieved. 

3 p.m.  After 30 m. Mr. Bellad R 24. Took
Pgo. 4 Stronger Fig 366 10.30 p.m. after
3½ m. B Bellad T20. Pgo. still very strong.
Fig 367 shows a return of the predecistic
wave. Urine about a pint & a half per diem.
There being marked general improve-
ment the Belladonna was stopped.
The fiery pictures & dryness of the
mouth was not relieved by Belladonna
but it is note worthy that the large
classes did not dilate. The pupil was
well born, nor did it accelerate.
6th Day 10 a.m. R 20. T 100. P 87. Lax
compressible. Heart sounds stronger
Pericardial friction returned.
Scanty Small doses of liquid ammonia
Acet. 8 p.m. T 100.5. P 87. Fig 369.
Tonsils almost clean.
7th Day 3 p.m. T 100.5. R 20. P 88.
Stomach Fig 370 Flexus ut Throat gone.
Tongue moist. 2 pints urine today which
is an increase.
8th Day 4 p.m. T 100. P 80. Fig 371 is
almost normal. As no urine since
early morning I prescribed 3i of decon.
Lavorandfort. At 6 p.m. by at 8 p.m.
The first dose caused vomiting slight delirium. He was drowsy, affrighted by symptoms. Then called short afterwards patient was perspiring freely. P.S.S. soft. Pulm. Tqg'8. Fig 372 shows very little alteration.

9th Day 6 p.m. Tqg'8. P88. Soft, small.
Incomparible. Need for acet. jabor-andi. today. Urine deficient. Perspiration (diseased). Fig. 373. Shows a lowering of tension but well marked prediabetes.

10th Day 8 p.m. Tqg. 1°68 3084; full. Has had since last visit. Perspiration free. Urine increased to 3½ pts. Contains no albumen nor deposits. Menstruation first ceased. Scaling commenced on chest & arms. Fig. 374 differs from any other tracing in showing a curve of 0°.

Arterial tension is high. Acet. heating slowly is more perfectly filled vessels a wave of larger volume into the arteries at each systole. The blood wave meeting a resistance penetrates more slowly. This causes a slow descent in the tracing.

11th Day. Tqg. 1°70. No medicine been given.

12th Day Tqg. 1°67. Pericardial friction well marked over the 4th left costal cartilage (see hemicarditis poliomyelitis). Fig. 375.
19th Day P.G. 716 Fig 376. Carbotic baths were employed. Scaling went on from 4 to 6 weeks very free. It was altogether out of proportion to the amount of the eruption.

**Remarks.** Aconite at the commencement of this case was without effect. Pilocarpine produced great depression. After a few hours, Mr. Wilson commenced to use it and it did not alter his pulse tracing. At 90 degrees, the rest. pulse felt larger & softer. No effect on salicylate of soda did not depress the pulse nor did it affect the temperature.

Belladonna given on the 2nd of the exception when the decrease was at its height & complicated with nephritis did reduce the temperature...
2 degrees in 12 hours. The pulse also fell. There was extreme tolerance of Belladonna without any physiological effect. About 311 was given in 48 hours during 12 of which none was administered. It did not diminish the dryness of the mouth or tongue. It may have increased it. The tongue became moist and plump. A half hour after the Belladonna was stopped, the Belladonna did not increase the pulse rate.

Brandy was very useful at a time of great exhaustion in preparing sleep, checking vomiting, developing the rash making the pulse slower and stronger. Sweating also increased slightly.

Pilocarpine like its alkaloid produced diaphoresis but was very depressing causing vomiting and delirium. The urine also decreased. After continued use perspiration diminished whilst urine increased. The pulse became slow and the arterial tension rose.
Case. H. E. male. Oct 10. lived in same house as E. C. left the day E. C. was taken ill.

1st. Day 2 p.m. Two days ago complained of headache. Yesterday off

\[ \text{Sore throat.} \]

Last night at 11 p.m. Scarlet fever developed. Today the rash is very full all over the body. Throat inflamed & spotted. Mite patch on tongue. Urine clear no albumen. T. 103. R. 220. P. 144. Full bounding pulse compressible. Fig. 377.

Slight low tension but no precordial

\[ \text{Rutle is present.} \]

\[ \text{Treatment to paint the throat with Blyc. Ac. Borac.} \]

30 yrs soda. dal at once @ 10 at 4 & 6 p.m.

1 p.m. 9/18. P. 128 Shows slight

\[ \text{Depression} \]

\[ \text{& absence of precordial.} \]

Fig. 378

2 1/2. Day. noon after 70 yrs. sod. dal in 10 yrs. close. Pretends been hot.

\[ \text{Less delirious all night. Strawberry tongue well marked. Very deaf,} \]

probably due to its. sod. sod. T. 100. Rept.

P 128 weak & compressible Fig. 397. Heart sounds

\[ \text{Muffled & weak.} \]

\[ \text{Subcutaneous.} \]

\[ \text{Tracing} \]
Shows that his depression due to the drug is passing off. 10 p.m. Has had 30 ccs Lsd. Sed. Tior. P.I. 16. 12. 30. Heavy. Heart sounds clearer. Fig 380 indicates higher tension & shows no predictive trace. Abd. relief stopped.

10 p.m. No improvement, though 2 1/2 grs Pot. Brom were given at 3, 5, 7, 8 p.m.
 Ice wet cloths applied to the head.
 Too. P. 120. Lip 381 shows low tension
 but precordial.

The patient has had no sleep since commen-
cement of disease & was now very
exhausted. One tablespoonful of
brandy was ordered at once. 1/2 tablespoon
at midnight to be repeated at 2 a.m.

4th day. 11 a.m. The brandy last
taken procured a restless sleep all
after the last dose patient slept for
8 hours. The delirium is quite gone.
Tongue moist & clear. Tqq's. Poor small & less compressible. Fig 383 shows exaggerated precordial & apical 
the pulse is stronger. The telecscope is 
higher.

8 p.m. Tqq's & Pros weak slight delirium 
Fig 384 not so good. But patient has had no 
stimulant. A warm Carbolic bath 
has ordered & if necessary, half a table 
spoonful Brandy.

Fig 385

Fig 386

Fig 387

5th day noon. Had to have Brandy. Slept 
Pq6. Fig 385 10 p.m. 1847 Tqq's Fig 386. 
Fig 387 was taken 3 weeks later.

Remarks Note marked benefit from Brandy at 
the period of incubation.
Temperature in Fevers.

Marey concludes the ordinary method of taking the temperature in the axilla. That it does not truly represent the central temperature. He insists on the importance of taking the central temperature under the tongue and the peripheral in the hand (La circulation du sang, chap. 36).

Doraraux (de Cholera, observe à l'hôpital Paris 1er Antoines. Paris 1868 et de la Température humaine. Oeuvre posthume publiée par T. Pouardalet 1879) has shown by curves on charts the central vs peripheral temperatures in cholera. In the hot stage the curves approach. That is T. C. falls while T. P. rises. Ordinary observers have been guided by the peripheral temperature only, while the nomenclature of cold vs hot stages. In the cold stage the reverse occurs. In afebrile state the curves (T. C. vs T. P.) follow parallel oscillations.

From these facts Marey enunciated the following principles: (Loccit, 31):

a) Variations of the two temperatures in the same
May indicate a change in the production of heat.
Variations inversely indicate vasomotor influences.
In the cases of scarlet fever, measles, and acute inflammations which I have investigated the temperatures have both been increased. The central is a rule a degree or two higher than the peripheral showing increased heat production. But in the case of peripheral temperature was ½ a degree higher than the central due to a strong purge. See page 218.

Case E. M. Female 19. Scarlet fever.
2nd Day of Eruption. P 120. Grounding.
4th Day after 70 yrs. abs. Tel. TC 101. T.P. 9 6/6. P: 120 less compressible. Fig. 390 shows increased force & descent of heart rhythm.

5th Day after 60 yrs. abs. Tel. TC 99. T.P. 95/5 R: 28. P: 120. Fig. 390a approaches the normal type. Patient rallying.

6th Day. Cold 60 yrs. abs. Tel. TC 99. T.P. 99. P: 120. Heart sounds clear. 2nd Reduplicate. Fig. 390b shows first appearance of peculiar wave.

7th Day had one drachm abs. Tel. Thor. T.P. 98/6. R: 24. P: 120. Fig. 390c was taken two following day, patient being convalescent. In the former T.C. 99. T.P. 96 P: 6. In the latter T.C. 98 & T.P. 95, P: 92. 16.
Remarks. The prodromal fever was about 2 days before the eruption faded. This was a severe case. In this case, the fever did not properly appear till the 6th or 7th day.

In the case of H. E., the fever was present on the morning of the first day, even though arterial tension was low. It then disappeared till the following night. On the morning of the third day it was absent; on the morning of the 4th day it was well marked. After the administration of brandy, it again disappeared till the eruption faded.

Measles

Case. Mrs. P., Oct. 11.

2nd day of eruption. P. 130 full bounding
T. 101.5. Fig. 391

3rd day. P. 108. T. 100. Fig. 392

4th day. P. 120 T. 100. Fig. 393. Marking clearance without inspiration showing thoracic influences. There was very little
Bronchitis, sharp dry cough.

Fig 391

Fig 392

Fig 393

Fig 394

Fig 395

In the last 24 hours patient has had 37°9 F. temp. which did not relieve the cough but depressed the pulse.

5th day. Eruption gone. Teg. Pros bound.

Fig 394 shows low tension but no depression even though 24 oz of kelsol had been taken in the last 24 hours.

Fig 395 taken 9 days later. Patient up but cough troublesome.
Case

4. P. side by side to last case.

Fig. 396 taken on 2nd of the Coryza.

Fig. 397 hard.

Fig. 397 the following day. Hard dry cough. P120. No constitutional disturbance. The following day to eruption developed P130. T.C. 103. Thro.

Fig. 398

This patient was treated with 10 grs. soda. every three hours. Whilst his brother who had it milder was described as not being treated with Fig. Am. Act. in two doses. The bronchitis was most acute in these three cases. His patient lost her
Cough almost at once after taking the iod sal. The tracing did not show any signs of depression, although cyanosis of the skin followed its use. I would therefore advise from its use in measles in children.

3rd day of eruption after for iod sal.
P126. T.C. 10°6. T.P. 10°2. Fig. 399

T. P q q. R. 46. Fig. 400

4th day after 40 grs iod sal th was now stopped. P108. T.C. 99°. T.P. 98. P40.

Eruption lasting Fig. 401 shows return of dehydration.

5th day. Eruption gone. Pulse 90. T.C. 95°.
T. P q q. R. 30. Patien got bronchitis.
Fig. 402 shows a relapse.
Case. P. P. Brother to last aged 4.

Fig. 403 was taken on 2nd day Coryza.
Fig. 404 on the following day P. 46. Both show diminished vibration. Here is no eruption.
Next day the eruption appeared. P. 30 P. 190. Full & hard. T.C. 103 T.P. 101.4
Bronchitis & incessant cough. Bronchial respiration, no moist sounds. Fig. 405 shows precordial wave. Which does not appear in H. P. (See Fig. 393) Although their two temperatures are no Same. P. P. has it milder.
2nd Day P. 32. T.C. 107. T.P. 100. P. 28. Fig. 406

3rd Day. Prof. irregular T.C. 102. T.P. 102. Fig. 407
5th Day. Pros. T.C. Q.8½. T.P. Q.8½. Eruption quite gone. T.G. 408 is normal. This case was treated throughout with Dip. Ammon. Asc. & Dr. Seidlitz. It did much better than the last case.

Case J. Boy. Oct 14th.
1st Day of eruption. T.C. 102. T.P. 90. 19.30
Hard & bounding. Cough. Bronchial Flutation
No moist sounds. T.G. 409,410, show to heart & pulses tracings.

The case was mild. The partial tracing shows by the pointed apex & diastolic wave early entrance of the blood wave but there is a marked precordial thr.
corresponds to a marked terminal systolic wave in the cardiac tracing.
The Systolic wave is not in excess in the heart tracing showing that alteration is due to the relaxation of the vessels.

Case N. J. act of sister of last.
Had a much worse attack.
2nd Day. Eruption full out. P.144.
T.C. 104°. T.P. 103°. R. 67. Fig. 413. Shows
The radial tracing. Arterial tension low
but the prediastolic wave is present. It
Corresponds to an exaggerated terminal
Systolic wave in the heart tracing. Fig. 414
The hurried respiration interferes with
The heart tracing. In the radial a cough
Causes an elevation of the tracing.
3rd Day. After 5 xaphic doses intr. sub
Whch relieved the cough. P.132. jerky
T.C. 102°. T.P. 1012°. R. 48. Fig. 415-

5th Day Catarhal Pneumonia having set in. The patient being very exhausted she has 6 teaspoonful doses of branley Muslin has quite gone. P 128. R 52. T C. 107 T P 101. Fig 417 Medication has continued till now.

7th Day. Broncho-pneumonia worse. Patient unconscious. P 144. R 88. T C. 102 Fig 418 Shows feebleness & absence of respiration. The heart tracing is curved as respiratory tracing with respiration. The face being red. & suppression imminent as death seemed approaching. The patient had cold water dashed upon her followed by cold wet pack. This forced the patient & caused deeper respiration. 3 or 4 minutes after Fig 419 was taken. It does not show depression.
Fig 410 was taken 5 mins later at its apex P. had fallen to 72.8 the Temp 1.5 degree.

Fig 419

Fig 420

Fig 421

2 Hours later I took Fig 421 of the pulse v. apex. The radial is very weak v. tension low. The exhaustion being great brandy was ordered in a teaspoonful doses every hour. As the result of this cold bath the air enters more freely into the lungs. 10 m. Dr. Still v. 31.11 Lq. Com. act.

8th Day. Zief Brandly in 18 hrs. 71oz. 21 oz.

Child R. 72. 1155. Respiration and deeper prediction Semi conscious Fig 422 Slight
9th Day.
After 31 brandy in 24 hrs, last dose six hours ago. P 144. R 80, CRT easier.
T C 101's, lungs improving. Moist sounds less.
Bronchial resp. louder, clearer. Fig. 423.
Shows increased force. Fig. 424 Cardiac tracing affected by the respiration.
Brandy stopped as it did not do good.

10th Day. Patient conscious.
Pneumonia improving. R 60. T 100.
10/120. Fig. 425 Shows increased arterial tension. As soon as brandy was stopped.
Patient improved.

11th Day. R 60. P 120. T 99.5. Fig. 426.
13th Day. Great improvement in physical signs. 
R 40. P 120. T 94. 
Fig. 1427 approaches to normal. 
Medicine given about every 3 hours. The 
Improvement with these simple drugs 
has been rapid. 
Fig. 1428 shows the normal tracing taken a 
week later when the patient was convalescent.

Fig. 1429, 1430 represents radial or heart tracing.
The prodromic trace is absent in the former.
Because the terminal trace is slight, the affect being blunting in the latter.
3rd Day. P 132. R 20. T 107.5. P 107. Fig. 1431
Eruption gone. Fig 432 shows normal contour, but a series of coughs affect the respiration by elevating the curve. Red heart tracing 433 shows increased systolic force.


2nd day. T. P. 102. T.C. 102. R. 22. P. 120. Fig 434 Heart tracing falls with inspiration.

3rd day. Eruption faded entirely. Typhus troublesome. Fig 435.
TC 99. 2° T 99. 5° P 96. 12° 16°
Case 8, Act 8, Boy.
Measures taken, but one day only. TC 99. 2° T 99. 5° P 96. 12° 16°. P 13. 2°. Fig 436 shows contusion. Systolic apex pointed & Slanting in heart tracing. Patient had however a mitral impurity. Fig 437 following day.

Fig 436

Fig 437

When emulsion quite passed, P 88. 7° 9°. Mitral impurity persists.
Predominant terminal waves marked. Patient been in bed 2 days. Heart working easily.
Remarks. Predomination absent in sever cases.
Curet in case of P. J. treated with ed. sal. but had it disappeared when pneumonia began, to relapse at convalescence.
Inflammatory
nonspecific diseases

Acute congestion of the lungs

Case No. 2. Oct 22.

Acute congestion of the lungs. This was more
than Bronchitis. It spread to lung tissue
and rapidly wrote it was so severe that on the
4th day it threatened to be fatal.

It was one of those cases one rarely meets
with & which too often prove fatal most
unexpectedly.

Two days before Fig 438 has taken the
patient for a chill. Complained yesterday
of pain in his left side & had refused
the pain continued & these are signs of
pleurisy.

On 3rd day had a cough. Respiration
was impaired. Bronchial Inspiration &


4th Day. Very bad night. At 11 a.m. appeared
the mouth. Blushing face. livid & dusky
Great dyspnea, Great pallor in the Vocal.
Spumum thick. Frothy mucus. It was more
There must have been bright red blood in it. This is inferred to be from a deeply congested surface. There was also hemoptysis in the morning. Percussion dull over left back and angle of the Scapula, 1/2 to axillary line in front. Vocal resonance altered & pneumonia absent. Friction Sounds masked by hoarse Bronchial Respiration & coarse moist Sounds which were heard all over the chest. No Bronchial Rales. Percussion note was impaired slightly over the right base.

The shallow, vocal resonance was increased, except on left side. Weak T.C. 1.07 T.P. 103. Sy 439 shows very low arterial tension. Being very urgent & unaffected by mustard & linseed poultices I performed dry cupping with wine glasses, putting on 16 over both bases. Each of which caused powerful suction & were well filled. This gave remarkable & speedy relief to his breathing. Respiration became deeper & the patient expressed himself as much easier. I omitted to say that the pain of the pleurisy which did not yield to mustard was relieved by strong A.B.C. Infusion.
Cushing in about 2o minutes caused a
marked change in the physical signs. The
bronchial respiration became less loud
and softer. The moist sounds almost disap-
peared. While vocal resonance was not
much increased. P132. R740. Fig 4.40
taken immediately after the cupping. Shows
more feeble impulse. As patient was lying
on his face this may account for it. Fig 4.41
20 mnts after cupping. Prescription to take
1m. Thallium half hours.

6 p.m. has taken 8 m. aconite. Perspired freely.
Sweat came. Diviniti has gone also. 

Some from the heart. Blood spuleum is much less
more rusty. P24 deeper. Tact is half the number.
P130 T. C. 173. TP 102½

Loose pleural friction heard on left side.
Respiration bronchial but soft. Moist
sounds almost absent. Sometimes expecta-
tion on deep inspiration. Percussion
normal except on left side. Fig 4.42 Shows
no radial pulse. Venous low blood have
entering easily & suddenly. No Depression
from m. aconite. Fig 4.43. Shows Cardiac
Tracing. Being a muscular man that may
affect the size of no tracing. It shows pulse.
Impulse. Systolic plateau is rounded or sloping. Terminal Systolic noise is
rounded or abrupt for which reason the premature pulse is also abrupt from the
radial tracing.
5th Day. R. 96. P. 120. T. C. 102.4. T.P. 92.
Heart sounds weak. 20 m. Indigit prescribed.

Fig 4.38
Fig 4.39
Fig 4.40
Fig 4.41
Fig 4.42
Fig 4.43
Fig. 444 before the digitalis. Fig. 445 20 mints after the line descends with inspiration.

Plurisy is complicated with effusion. Bronchial respiration, moist rales.
Percussion clear except over left base. Sputum rusty & bloody.
Figur repeated at 9, 30, & 11, 30.
12.30 a.m. after 24 hours. P. 112. R. 28. T. C. 105. T.P. 103.4. Fig. 446 shows radial
heart tracing. In the latter 2 terminal
systolic wave is more marked. 
6 a.m. P. 90. R. 36. T. C. 100. T.P. 100.4
Patient is weak from a powerful purging
with castor oil. It has lowered central
temperature 5 degrees & has fallen
more rapidly than the peripheral.
Figure 446-6 shows an improvement in both
heart & pulse. The arterial tension
is increased.
6th Day. Pulse 96 soft weak. T.C.
107.4. T.P. 90. Heart sounds
muffled continual cough. Patient
worse. Fig. 450 shows very low tension
& increased diastolic. Fig. 457 shows a
flat or rounded systolic plateau on rest.
Of the imperfect reflection of ventricle.
This in turn is caused by the low
arterial tension. Treatment 5 grs. am. &
5 M. Bm. Spec. every two hours.
Heart sounds weak.
50 m Fr. Camp. Co. added to former
course. Fig. 452, 453 show heart & pulse.
The latter is altered by the cough.

Tracing: Fig 450

Fig 451

Fig 452

Fig 453

9th day 10 a.m. After eight doses of castor medicine which caused great abdominal distress. There is more dyspnoea and vividity. The effect of the opium.

P 48. P 120. T C 104. T P 98. Heart sounds ruffled. Fig 454 is the radial and 455 the apex tracing. Arterial tension is low & the patient is exhausted.

I prescribed 31 of chl. Bect every 1/2 hour.

10 p.m. After 11 doses since 2-36 patient feels stronger, cough less, perspires.

Dyspnoea relieved. P 36. P 1108 less

Heart Sounds Strong & Bronchitis less.

Fig 6. Shows a return of predictably normal for the first time. Unable to hear tracing 454. Pneumonic triple oscillation of systolic pulsations.

After 730 of Rect Sph. Fig 458 shows increasing arterial tension Fig 459 is at heart, tracing. Bronchitis disappearing. Pleural effusion disappeared. Area of dullness diminishing. The alcohol was stopped v 5 grs Am. Carb. with X m. H. Dilute was given every 2 or 3 hours.

From now patient continued to improve rapidly. Fig 460 shows heart & pulse tracing on 9th day. Arterial tension is lower.
10 Day. 10.5. R 28. T C 98 F T P 96. F 46.1
12 Day. Fig 62. Patient Convalescent
Pulse 60.
14 Day. Fig 463 + 4. Show the pulse & heart
tracing. P 60. Apex beat barely felt.

Remarks.
I consider this case was saved by dry
cupping of patient would have died
on 11th day. The arterial tension
was low predilection absent.
Systolic plateau flat & rounded.
Digitalis given at the 12th stage,
when the symptoms were acute, was
of no service. A purge of castor oil
lowered the temperature considerably
which increased the arterial tension.
But it was very depressing.
Alcohol administered as a period of
exhaustion in small frequent doses
restored the patient's strength. It reduced
the temperature & frequency of the pulse.
It brought back the predilection trace
& the oscillations of the systolic plateau
increasing the arterial tension, the
physical signs of the disease also im-
proved. After it was stopped there was a
slight temporary fall of arterial pressure.
Bronchitis

Case. T. H. Male 15.
3rd Day of disease which was acute.
T102. P120. Fig 465 1m. Fr. Aconit every hour.

Fig 465

Fig 466

Fig 467

Fig 468

Fig 469

Fig 466 taken following day. It shows great depression of systolic force. Diastolic trace according on the following upstroke. P120. Small weak T. Tro. Palpatory feels weak but bronchitis improves 5th Day. After 24 grs. Am. Carb & Frib.
168. P. 120 Stronger Pulse better. Fig 467
Shows stronger impulse + slight precordialism.
2 Days later I took Fig 468 Pulse 120.
4th day after Fig 469 patient almost well. Treatment Ven Ammon v Jps.

Acute tonsillitis

Case 12 Male vet 30.
Rigors, headache, sore throat. T103. P. 108
Full bounding, but Compensated.
Fig 470 Shows low tension but slight precordialism.
Treatment 2 m. Fr Aconit every 2 hours.
2nd day after 2 1/2 m. Fr Aconit. Throat
not better. Patient very weak. Tqq '6. 192
2nd day after Fig 471 Shows diminished systolic force + absence of precordialism.
Described 5 m. Fr Bellad. every two hrs
3rd day after 50 m. Fr Bellad. Throat much better. He derived more benefit
For this than for the Aconit. Throat dry
Pupils dilated. Tqq. Pqb. Fig 472.
4th day after 30 m. Fr Bellad. Tqq 8
P 68. Throat feels well. Fig 473 indicates low tension but precordialism has returned.
Fig 470

Fig 471

Fig 472

Fig 473

Fig 474

Treatment: 5 m. Sig. Perri per chlor. f. t. int. 20 m. ac. Hydromion, every four hours.
First day after 8 doses. Fig 474

Case of Acute Cataract

F. Strong, nurse, Oct 25.

Suffers from Cataract and rheumatic pains in Ricciulo. T 118. 356 full hard & Stiff. Fig 475 shows exaggerated precocious. No cataract. Cipius.
perspiration. Km. Ir aconite every 2 hours.

Fig 475.

Fig 476.

Fig 477.

Fig 478.

Tqg'8. P h8 much softer & compressible. Fig 476 shows great depression of aortic impulse.

Km. Bellad. t. d to relieve throat.

& compressible. Fig 477.

Km. Liguor ferris p.s. + a. 
4th Day after 3 doses P h8 Strong. Fig 478.
Remarks. These three cases illustrate the depressing effect of aconite on the pulse-shearthe lowered upstroke of a wound apex indicate diminished septal force. It does not exert much effect on the diastolic wave. The pulse temperature are reduced. The arterial tension is unaffected by it. Which supports the view that it does not affect the vasomotor centre or nerves. The action is on the muscle of the heart. It does not relieve some degree as effectively as Belladonna. The temperature & pulse fall during the administration of Belladonna whilst the arterial tension rises.

Acute Parotid Abscess

Mr. T., Oct. 30th

3 days ago gland inflamed. 10/120 small fig. 479 after 2½ sod. sal in last 24 hours. The following day fig. 480 after the same amount. Similarly fig. 481 & 2 in 4½ next 24 hours. The salicylates of soda has not exerted any depression on the pulse.
The patient was treated with 20 gms.
Pyr. t.d. Aft 3 doses fever was severe.
Coryza: 19/10, full bounding. Fig. 483
Shake depression. Low tension. Dose was reduced to 5 gr. & 5th story
less. 19/10, Fig. 484, taken 2 days later
Fig. 485 the following day. Upon iodism
had almost disappeared. Dose was opened & treated antiseptically
Fig. 486, taken 2 months later when
the patient was quite well.

Pleurisy.

On 1st. Oct. the patient had an attack of pleurisy with
bronchitis.

Fig. 487

Fig. 488

Fig. 489

Fig. 487. Shows a new feature.
absence of diastole. This is caused by its inelasticity of the arteries. He notes indication of low tension is present. Hence he pointed to high area in the ventricular septum which shows the sudden entrance of small blood waves. Fig. 488. Fig. 489 is in health.

Case Mr. B. 64. Bronchitis

well marked atheroma. Fig. 490 shows normal pulse.

Fig. 491 shows pulse heart tracing during an attack of acute bronchitis. Patient was the subject of phthisis.

Fig. 493: taken from a patient far advanced in phthisis (female 81, 32)
Case 15. Acute Peritonitis.

Subject to attacks of supposed acute illness. Fig. 494 shows radial and heart tracings on 30th day of illness.

Fig. 494

Fig. 495

Fig. 496

In two previous days there had been inflammation with extreme tenderness over the gall bladder. During last night peritoneal occurs. There has since been uncontrollable vomiting of thick green bile. Patient is in extreme agony even in bed clothes touching his abdomen causing excruciating torture. Inspection of abdomen shows tympanitic. Pulse 130 small and rapid. Diaphragm ascends with inspiration. This also occurs in the heart.
Tracing which is affected by the respiratory curves. T.C. 103. R 50 Shallow & Painful. Hot baths & sun baths were applied to relieve pain. Fig. 497 was taken same evening at 9 p.m. Patient died the following night.

Diarrhoea & vomiting have a marked effect on the pulse in lowering arterial pressure. The following tracings are from a patient described under mitral stenosis at HB page 93. Fig. 497 was taken in health. Very slight under the influence of Belladonna.

P. 60.

Fig. 497

Fig. 498

Fig. 499

Fig. 498 during an attack of diarrhoea.
P30. Fig. 499 shows the heart tracing.

The next two tracings were taken (Fig. 500) during a bad attack of diarrhoea.

The other, when recovered from a state of debility,

Fig. 500

From this large collection of tracings during different fevers and inflammatory diseases, important facts are to be ascertained.

Mild cases, producing no constitutional disturbance, do not affect the tracing. 4 to 5 have not been shown.

In severer cases the arterial tension is lowered. Diuresis is increased.

In many such cases there is no increase of sigmoid wave. Here this is the case. The diuretic wave depends entirely on changes in the arterial system for its exaggeration. This is demonstrated.
In the case of T. S., page 163, where, by the inhalation of amyl nitrite, the diastolic was increased without affecting the heart tracing, it may happen that while the sigmoid wave is exaggerated, the diastolic is not. As in the case M. H. page 20, where sudden changes affected the elasticity of the arteries.

Mitra: The diastolic wave indicates the state of the arterial system. The precordial wave bears special relation to the state of the ventricle.

The precordial wave is present in some severe cases absent in others equally severe.

Mitr: Fen is precordialism. It has been stated that the precordial wave represents valve caused by the terminal wave of the systolic plateau of the left ventricle.

As mitral incompetence the diastolic wave disappears, so in mitral incompetence the precordial wave is absent. In the latter the mitral oscillations of the systolic plateau cannot occur.
is starting. The terminal wave about
or incomplete.

In cases where cardiac and radial
tracings have been taken, attention
has been called to the fact that, while
pre dilation is absent in the latter
the terminal wave has disappeared
from the former. The systolic plateau
is flat, rounded, or sloping with
an almost more or less complete of
the mitral oscillations.

This condition of the ventricular
wave indicates that the mitral valve
is not sufficiently stretched to cause the
oscillations which normally appear.

The cause of its diminished tension
might be that the ventricle is not
contracting with sufficient force
or that its relaxation is imperfect.
It is not the former, because were
the heart has been strengthened by
digitalis. During the acuter stage
of the disease, pre dilation has
not resulted.

It is therefore due to imperfect
relaxation of the ventricle.
This explains why precloricism does not always appear, or, at the same time, the theory is supported by this fact—precloricism disappears in some diseases where, by the congestion of large areas, much blood is drawn from the general circulation. Thus, in severe diphtheria the precloricotic wave is maximal, while in scarlet fever, bronchitis, or the severer cases of measles it disappears. This condition is favoured by the low arterial tension which accompanies it, where the imperfectly filled ventricle empties itself more easily.

In old age the inelastic arteries increase the arterial tension, this resistance causes increased tension of the mitral valves, magnified more by the hypertrophied ventricle. Consequently the precloricotic wave is much exaggerated, but even here the precloricism diminishes while the terminal systolic wave disappears.
Therapeutics

As the action of the various drugs has been described as they have been employed I will not prolong the text by needless repetition.

The sphygmograph faithfully interprets the action on the human body. Sometimes confirming, sometimes refuting, its conclusions which the symptoms have led one to infer.

Thus the sphygmograph shows the depressing effect of Atropine more clearly than the finger, easily misled, depicts.

Again, although under the influence of Digitalis the pulse remains small and weak to the finger, yet, the tracing shows, by the return of the precordial wave, an approach to the normal.

By the sphygmograph we learn that Aconite might well be used in atonic cases or if arterial tension be low the tracing indicates the period of depression where it must be stopped.
Belladonna, as will be seen, in an experiment on myself, lowers the arterial tension in health; given in dose, it does not lower, & sometimes raises the arterial tension. Nor does it quicken to pulse, it may retard it.

Belladonna in health.

Fig. 507 shows my pulse before the moring bath. Fig. 503 was taken after the bath & indicates increased tension. Fig. 504 is a tracing taken after breakfast on a previous day.

At nine a.m. I took 20 mg. of Belladonna 1/80. At nine 9:30 Fig. 505 was taken 1/80. Slightly increased diuresis. No effects felt yet. A light breakfast of coffee & bread & butter was taken.

At 10 a.m. The Throat mount & now felt as dry as a board. There was now ache over the frontal sinuses, dimness of vision, slight dilatation of the pupils Prov. & Acreti.

Fig. 506 shows my low arterial tension. During the next half hour I felt much
worse, I went out but could not walk feeling stupid from this catarrh. Believed by Vincent. The cold air caused a sudden stoppage of the nose.

At 10-15 I took 3 of hydrobromic acid freely diluted. Repeated at 10-40 & 11 a.m. It gave me great relief, relieving the thirst & dryness of the mucous membrane but producing tinnitus aurium.
At 10:40 I took a tracing, Fig 507, again at 11:20, Fig 508, the latter being standing up while he often were sitting. The arterial tension is increased in both. The symptoms having partly subsided, at 3 p.m. the effects had passed off, and felt first as if I had recovered from a severe cold. 1284, 7589.

This tracing shows that Belladonna lowers the blood pressure, which is contrary to Harley's opinion (see Ringer), he considers it a powerful heart tonic, but Strenghen to lead to it, however does not, only by diminishing the pulse without Belladonna paralyses the terminal
Filaments of vagus or inhibitory nerves. It also paralyses the cord, or, in mild doses stimulates it (Sauer).

Harley believes that it stimulates the sympathetic of the neck & thus accelerates the heart. When the vagi are divided the heart beats quicker but the arterial tension rises. Mereas after Belladonna the arterial tension falls. This occurs if the sympathetic is accelerated. Stimulation of the accelerators increases the cardiac rhythm which gives the heart less time to fill it consequently fluids smaller tracts & the pressure falls.

Tonder (Nederl. Arch. Vol. 11. p. 1) considers that the acceleration of the heart is associated with a shortening of the diastolic period. Pusat (Arch. für Anat. & Phys. 1878) maintains the same view.

Another fact to support the theory that Belladonna stimulates the sympathetic is that stimulation of the cervical sympathetic accelerates the
pupil. Belladonna given internally dilates the pupil. This, though not generally maintained, might be through its action on the sympathetic.

The value of Belladonna in pericarditis has been referred to. By lowering the arterial pressure it diminishes the peripheral resistance so the ventricle can do its work easier.

**Digitalis** has been referred to as a cardiac stimulant, increasing the systolic force, retarding the heart's rhythm. Blood pressure rises. It is of value during convalescence, but no good during acute processes. At this period of disease, the proper cardiac stimulant is **Alcohol**.

**Alcohol** has found useless in the early stage of a case of Broncho-pneumonia (see p 208). Mon at home, if inhaled by the patient arrives, during acute disease
Ten alcohol improves the pulse, bringing back the proclivistic force, besides lowering the temperature & strengthening the heart. When this has been obtained alcohol should be at once stopped if administered too long it keeps up the temperature & pulse, as is shown by the fall in T P which occurred after alcohol was stopped in cases which had benefited by it.

To dicile of potassium lowers the arterial tension & depresses the heart slightly. The former is due to the corypza, the latter is the effect of the potassium. The action of this drug is demonstrated in tracing 483 p. 226. Fig 510 also illustrates its action. Fig 510 has taken two days previously.

It was a case of mixture headache treated with 10 grs of to dicile t.d. There was slight corypza. Fig 512 taken the following day when
account for the disappearance of pain & the apparent contraction of the Sæc which is supposed to follow the continued use of this drug.

Bromides contract all blood vessels, producing anemia of the brain & cord, acting thru the vasomotor centre. They lessen the frequency & force of the heart, shortening the Septile & prolonging the heart into diastole (see Ringer). These facts are confirmed by the tracings of the last case. It is 57 in the latter & patient took 0 or 2 or 4 Ammon. Brom. four times a day, producing slight bromism. The patient sleeping all day. No arterial turbulence is heard. Tg 514 shows his pulse in health.

Chloroform

It was found by the Scientific Grants Committee. (B.M. Dec 18th 1880)
that if chloroform be administered in excess, artificial respiration being kept up, the heart ceases to beat, with engorgement of the right ventricle & large veins. The pulse rate falls, whilst that of the respiration increases. There is origin a transverse rise & then a fall in the arterial tension & the pulse becomes diastolic. When the respiration was checked, the pulse fell but not so much, nor so quickly, as when the chloroform was stopped. The fullest the pressure did not fall to the lowest, whence it is of atropine in surgical practice. In the frog chloroform affects the heart by retarding the pulmonary circulation 1st in the arterioles, then in the larger vessels. The heart's impulse becomes weaker & its back pressure causes distention of the right ventricle. I show six cases. Since those three cases under its influence of chloroform. In its early stages
Case T. Male, 25.

Fig. 515 shows normal pulse in health.

Fig. 516 shows the early excitable stage.

In the second division, the patient held his breath for some time. The impulse of the heart immediately becomes weaker. The while tracing shows lowered arterial tension.

Fig. 517 was taken where the patient was more deeply under chloroform. In the second division when he stopped breathing, from an overdose.

The fourth division when complete under...
This shows feeble impulse & the diastolic indicates low tension.

Case No. D, Sex M.

Fig. 518 shows a normal tracing.

Fig. 519

Fig. 520

Fig. 519 was taken during the early stage of excruciating. It shows lowered tension & feeble impulse. Fig. 520 1st part when patient was near death. 2nd part when she recovered slightly & was excitable. 3rd part when she was completely under anaesthesia. It resembles very closely the tracing of a very sick heart.

Case 4, Age 37, Male

Fig. 521 shows normal pulse in health. He was a very heavy drinker.
which probably affected the arteries as they are thinned. The tracing is that of atheroma.

Fig 5.21. Taken when patient was fully awake. Chloroform. 1958. 10 character Face of case. 11. Fig 5.22 was taken early one morning after a night's heavy drinking, with dilution of the tumescence. Prog. compressible & weak. At some what resembles that taken under chloroform. But shows a stronger influence.
Netriles of Amphetamine

This drug, by its effect on the capillary circulation of the head, lowers the blood pressure.

Fig. 524

Fig. 524 is a typical example of a pulse influenced by Amphetamine. It is taken from a healthy subject. W. This normal tracing may be seen in Fig. 527. Similar tracings may be seen referring to the case of W. C. Figs 137 b, 134.
As I have taken tracings in cases of Epileptic Coma, paroxysm, & one or two pathological conditions which are interest- ing, I should like to show here before concluding.

Epileptic Coma

Case 1: Male, 75 years.

When the tracing was taken, the patient had fallen into a coma after an epileptic attack. The temperature was not too convulsive, nor was it tachycardia. Pupil constricted, conjunctiva injected. The pulse could not be counted as rapid & so small. The pulse curve did not display any ordinary characteristics. Fig. 2 shows the heart tracing which has a pointed apex & marked sigmoidal curve. It was taken when patient was quiet & indicated a low blood pressure. Fig. 3 shows taken during excitement. Respiration hurried when another convolution was
Anticipated.

Aneurism of the Aorta ?
Case 7. Ref 60.

This patient complained of weakness on exertion, palpitation, and flatulence. The heart sounds were weak and audible in the aortic area. There is slight dulness to the right of the non dulcicm sternum. There is marked visible pulsation of all the arteries even to ulnar. There is no appreciable delay in the different pulsals though the symptoms are vague. Suspected innominat ane.
Aneurism. The pulse was irregular, intermittent, of the Corriveau type. I treated him for flatulence only. He improved, breast tumor is evident. This occurs in acute aneurism where the aorta is intact. The blood recording for closed aorta delates the aneurism whose audible systolic thrill reaches 20 to the intensity of the sigmoid wave (Marky).
Fig. 53.4 was after a cessation of walking on different days. Fig. 53.1 was after a short rest. Fig. 53.2 shows the pulse taken at the same time as Fig. 53.3 of the radial. Fig. 53.4 when he was better, and Fig. 53.6 when he discharges himself. The pulse varied from 70 to 90.

Gout (Suppressed) Chronic Prostatitis
Case No. 14, Oct 60.

Fig. 53.5 shows the pulse when first seen.
Arteries thickened. P. 98. Fig. 53.6
When treated with atropine.
Fig. 53.7 when under the influence of iodide.

Fig. 53.8 after continued use of hydromine acid. Patient in good health.
Parturition

This subject is too vast to be dealt with fully in the present thesis. I shall only show tracings from a few cases. The character of the tracing during or just after labour is that of exhaustion. Arterial tension is normal or perhaps increased. Pulse slow & weak. This is nature's safeguard against haemorrhage. The impulse of the blood wave is too feeble to dislodge the clots in the contracted uterine vessels. Hence the custom of giving stimulants after labour is bad, it increases the risk of haemorrhage, by making the pulse stronger. If the frequency of the pulse be increased to 100 or more, the blood pressure falls. The rapid, sudden, more forcible penetration of the blood wave dislodges the clots from the orifices of the relaxed uterine vessels, so haemorrhage results.

Besides local treatment for closing the mouth of the bleeding vessels, means are employed for reducing the frequency of the pulse. Whilst this occurs, arterial tension increases & the arteries contract. This object may be obtained by
Covering the head, the digits are in large doses, 30-40, not too large doses at such times. Probably best by contracting the uterine, utero.

uterine tension retractor, the heart. If there be great prostration alcohol is then indicated. To reduce the pulse and increase the uterine tension about this time. (See figs. 135 and 137, page 170.)

Case Mrs. B. Oct. 40

Fig. 539 was taken 5 minutes after the expulsion of the placenta, half an hour after the birth of the child. 9 9.6 full.

Case Mrs. E. Oct. 38

Fig. 540 was when labour was commencing 12 hours before the child was born. P. 74, initial sound weak, 2nd accentuated.

Fig. 541 was taken 5 minutes after the child was born. The placenta accretion wound after denoted cardiac after trauma. P. 88, small sounds compressible. Fig. 542 was taken 10 minutes later after the removal of the placenta.

Fig. 542 (2nd half) was taken half an hour later.
and after 2\textsuperscript{nd} Expt.1st lig. has been taken. Then nice after pains & no hemorrhage P84 strong.

Fig. 540

Fig. 541

Fig. 542

Fig. 543

Fig. 544

Fig. 546

Fig. 548

Fig. 543 at 1pm 8 hours after the child was born P84

Fig. 544 next day P84 no comparable Heart sounds

Fig. 545 on the 3\textsuperscript{rd} day P80, Fig. 546 on the 5\textsuperscript{th} day P80

The patient progressed favourably the whole time.
Case
Mrs S, oct 38

Fig 547 was taken during labour, 2 minutes after a pain. P84, compressed. The tracing descends with inspiration, showing thoracic influence. Fig 548 5 minutes after an easy labour, P72. Fig 549 half an hour later, 8 after 480. Ejection P72. Fig 550 a week after.

Case Mrs H, oct 27

Fig 551 is an hour after labour, slight hoop, P64. Fig 552 taken after 30 systolic, P64 lessomp. Fig 553 a week later, P72.

Case Mrs T, oct 38

Trains delivering, 1st partiaT labour, Fig 554. P96. Fig 555 P78 lessomp. after 3 systolic, Fig 556 heavy. after 3 systolic, 7 P78. Fig 557 after unconscious, Fig 558 shows The normal.