

**A CLINICAL STUDY ON THE RELATION OF CARDIAC TO  
MENTAL DISEASE IN WOMEN.**

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The scientific study of disease in all its manifold and widely differing aspects is beset by countless difficulties, but the study of alienation presents to the student problems which are perhaps the most intricate and complex of medical science. Among the Ancients there was no recognition of the fact that mental disturbance was due to disease, all persons suffering from its various forms being held to be possessed by devils. After recognition of the fact that insanity was the same thing as some form of mental disease, the early observers upon this subject were slow to realise that the essential cause of these conditions was a pathological change in the tissues of the brain, Pinel and Esquirol with other older writers upon this subject stating their belief that functional disturbances of the higher nerve centres were the chief factors in nervous disease. In the course of time it became recognised that in cases of mental derangement the abnormal mental processes were in many cases directly referable to an altered condition of the nerve cells and fibres of the cerebral tissue; in many cases even at the

the present day the pathological changes in the central nervous system are not found to be proportionate to the degree of mental disturbance manifested clinically, but some pathological basis - however slight - for the affection is found in an increasing number of cases of mental disease.

Clinical investigation has within recent years shown the close relationship which exists between mind and body, the mental depending in great part upon the physical state, and the physical being strongly influenced by the mental condition. Such being the case in regard to physiological conditions - or conditions which deviate only slightly from the strictly physiological - it seems reasonable to assume that the same interdependence of mind and body exists in pathological conditions, and in them may be of much more serious import. It is a matter of primary importance therefore to estimate as far as possible to what extent disturbances of the bodily functions may be responsible in inducing conditions of disordered mental activity

This subject has received much attention from Head who has made an exhaustive study of the mental changes which may accompany conditions of visceral disturbance in the sane<sup>1</sup>. While stating that such mental changes may be produced in

<sup>1</sup>Mental symptoms associated with visceral diseases in the sane. Goulstonian Lecture 1901.

various ways, he makes it the main object of his research to ascertain the changes in consciousness which are mainly associated with the reflected pain of visceral disease.

Reflected visceral pain is produced according to this authority by impulses passing from the affected organ up the fibres of the sympathetic, through the ganglion of the posterior roots into the central nervous system and setting up a disturbance in those segments that are in relation to the affected organ and also modifying other sensory impressions which enter the same segments. This visceral reflected pain must be of some duration and considerable intensity before mental symptoms are found to accompany it. As a result of his investigation Head found certain definite mental changes to occur with considerable frequency in patients who were suffering from visceral affections, mainly cardiac and pulmonary in type. Hallucinations were of common occurrence and were invariably found to be associated with scalp tenderness of the reflected visceral type, in the majority of cases headache of similar type being also present. Such patients exhibited moods characterised by intense depression and a sense of impending ill, with which was frequently associated an abnormal state of suspicion which differed from a similar state in an insane patient, in that the patient

recognised that his suspicious had no basis of logical truth. States of exaltation were also seen and changes of memory and attention, the latter changes being according to Head not induced by reflex pain alone, but also by the changes in feeling-tone with which such pain is associated and by the central field of consciousness being dominated by the sensations produced by abnormal activity of the viscera.

These observations and conclusions are of great interest and importance and furnish additional proof - if such be needed - of the close and intimate relation which exists between the mental and bodily functions.

The circulatory system being intimately related to all the organs and tissues of the body and influencing their functional activity by regulation of their blood-supply, it follows that any vascular disturbance, due to whatever cause, will react in some degree upon the other systems of the body, causing in them a secondary functional disturbance.

The following clinical study was therefore undertaken in order to ascertain as far as might be, the frequency with which cardiac disturbance co-existed with mental disease, and the influence which such disturbance exerted upon the mental condition. This subject has up till now received but scant

attention from clinicians, but when one considers the minute structure of the cerebral cortex with its layers of delicate nerve cells with their projection, association and commissural fibres, and when one realises that upon the normal and healthy action of these cells the mental activity depends, some conception may be had of the important part played by the circulation in maintaining the nutrition of these tissues by means of an adequate, well-regulated and pure supply of blood.

Sir William Broadbent<sup>1</sup> asserts that the functional activity and efficiency of the brain are even more dependent upon its blood supply than is its nutrition, hence blood which would maintain the structural integrity of the brain might be altogether unfit to minister to its functions.

Physiological examples of the relationship between circulatory and mental processes may be seen in conditions such as anger, shame, fear etc. in which a mental emotion is accompanied by transient circulatory disturbance as evidenced by pallor, flushing, and lividity.

It was speculated many years ago by Mandsley<sup>2</sup> that if the heart of one man were placed on the body of another, the

<sup>1</sup>Croonian Lectures on the Pulse

<sup>2</sup>Pathology of mind.

circulation of their blood might not be seriously affected, but a marked difference in the temper of their minds might be seen. While it is universally admitted that cardiac disturbance may be an important factor in inducing a condition of disordered mental activity, it has not yet been definitely settled by what exact means this is effected. Head<sup>1</sup> states that a disturbed activity of the heart may alter the circulation to the brain, or may change the character of the blood with which it is supplied, the delirium accompanying a failing heart or profound vascular degeneration being an example of a mental change dependent directly upon an altered vascular condition.

According to Stewart Paton<sup>2</sup> the mental disturbance may be the immediate result of the anomalies in circulation, or may develop secondarily by lowering the resistance of the organism so that the effects of such toxic substances as alcohol or the products of auto-intoxication are less easily combated. Mickle<sup>3</sup> suggests the following possible modes of action of a disordered vascular system in inducing mental disturbance:-

(1) Heart disease may act by disturbing the balance of the

<sup>1</sup>Goulstonian Lecture 1901.

<sup>2</sup>Psychiatry, 1905.

<sup>3</sup>Insanity in relation to cardiac and aortic disease. Goulstonian Lecture 1888.



general circulation. (2) It may cause a disordered condition of the intra-cranial circulation, also affecting the vaso-motor mechanism. (3) It may lead to alteration in the composition of blood in the cranium, or of the blood as a whole. (4) Pulmonary disorder may be induced, and morbid impressions and sensations resulting from that may cause a mental effect. (5) It may become a source of peripheral irritation thro' the nerves and influence cerebral functions reflexly by sympathy, inhibiting some forms of activity and deranging others.

It seems probable that the mental effects are due chiefly to a disturbance of the cerebral circulation, either in the direction of causing an inadequate supply of blood, or inducing a condition of venous engorgment, and to the effects resulting from the reflected pain of visceral origin. Among patients suffering from mental disturbances it is in most cases quite impossible to determine the existence or non-existence of this reflex pain, but from the observations made by Head upon sane patients it is probable that in the mentally affected as in the sane, the reflex effect of the cardiac condition may be considerable.

Conversely it is also found that mental disturbance may be instrumental in causing an altered condition of the

circulatory system. This is especially seen in mental states which are associated with great psycho-motor excitement, such as is present in conditions of acute mania; in such cases according to Edgerley<sup>1</sup> the increased activity of the cortical cells produces a rapid flow of blood through the brain, and where this activity is prolonged beyond normal limits, a pathological condition of the general circulation may ultimately be established. Statistics relating to this subject prove that the association of cardiac with mental disease is frequent, a high percentage of cases of mental disease being found to present evidences of cardiac disturbance.

In my own series of 174 cases, 84 (or 48%) were found to present some abnormal cardiac condition. Greenlees<sup>2</sup> out of a total of 672 patients found 57% to suffer from some cardiac disorder, while Penfold<sup>3</sup> on examination of the hearts of 148 new patients found some cardiac disturbance to exist in 51%.

In his Asylum Report of 1901 Clouston remarked that an unusually large number of cases had been treated during that year in which the mental disease had been directly caused by advanced cardiac disease. Asylum mortality statistics show also

<sup>1</sup>Certain conditions of the circulatory system in the *Insane Journal of mental Science*. Vol. XLII. 1896.

<sup>2</sup>*Journal of mental Science*. October 1885.

<sup>3</sup>*Journal of mental Science*. January 1901.

that heart disease occupies there a prominent place. Greenlees<sup>1</sup> states that some pathological cardiac change is found to be present in 68% of asylum patients when examined post-mortem, the mortality from cardiac disease being 14%, while in the sane population the mortality from the same cause is 8%. Edgerley<sup>2</sup> found that 91% of patients suffering from mental disease showed post-mortem some structural disease of the valves or of the muscular substance of the heart. According to the statistics of the Commissioners in Lunacy in 1902, 10% of all the deaths in asylums were directly caused by cardiac disease.

It has long been remarked by observers on the subject that an abnormal condition of the vascular system is frequently to be found among the subjects of mental derangement, this condition being manifested most often by coldness, lividity and oedema of the extremities. This condition, which is stated to be most frequently present in old and demented patients, is in some cases found to be associated with an organic cardiac change, in many cases however it appears to be due to a functional disturbance of the vaso-motor mechanism, without the production of any physical signs. Mandsley<sup>3</sup> remarks that if this sluggishness

<sup>1</sup>Journal of mental Science. October 1885.

<sup>2</sup>Journal of mental Science. Vol. XLII 1896.

<sup>3</sup>Pathology of mind.

of circulation in the extremities of asylum patients - especially demented - is any criterion of the condition of the cerebral circulation, there is little difficulty in accounting for the mental symptoms. Another vaso-motor disturbance which is occasionally seen in the inmates of asylums is Raynaud's disease, slight forms of this disease being met with not infrequently.

It has long been recognised that in certain disorders of the cardio-vascular system mental symptoms are of frequent occurrence; in the paroxysm of angina pectoris for example the mental state of the patient is markedly affected, and the fear of impending death and 'angor animi' have come to be regarded as characteristic features of the condition. In the later stages of mitral disease also, when compensation fails, the mental state of the patient has been found to undergo considerable change and a state of delirium to occur which is fairly typical of the cardiac condition.

The relation of cardiac to mental disease has within the last half century received much attention from observers. Burrows<sup>1</sup> expresses himself as being so assured regarding the influence of cardiac upon mental disease, that were auscultation

<sup>1</sup>On the connection between affections of the brain and diseases of the heart. 1846.

more generally employed among insane patients, he is convinced that numbers would be found to suffer from some cardiac lesion which by disturbing the cerebral circulation would tend to keep up a disordered condition of the brain.

Kiernan<sup>1</sup> is of opinion that the types of insanity arising from cardiac disease are characterised by suspicion and emotional activity; and according to Edgerley<sup>2</sup> sane persons suffering from cardiac disease frequently show a certain amount of irritable despondency and lack of spontaneity with hypochondriacal ideas, and these features are found to be exaggerated in the insane who are similarly affected.

Corner<sup>3</sup> makes the assertion that in heart disease associated with insanity the mental symptoms are usually those of melancholia, unless the disease is due to an atheromatous condition, when it generally occurs in people of sanguine temperament who are predisposed to mania with expansive delusions rather than to melancholia. In a section upon this subject in the Dictionary of Psychological Medicine<sup>4</sup> it is stated that impairment of the circulation frequently exists without evidence

<sup>1</sup>Journal of mental Science. Vol XXXVI. 1890.

<sup>2</sup>Journal of mental Science. Vol. XLII. 1896.

<sup>3</sup>British Medical Journal. Sept. 22nd. 1900.

<sup>4</sup>Hack Tuke.

of cardiac disease, the pulse being slow, feeble and compressible and the extremities and ears being cold, livid and swollen, two types of patients in particular exhibiting this condition - recent cases of acute melancholia and chronic dementis. In the latter group of patients the slow process of evolving nerve impulses from the dormant and sluggish brain produces vaso-motor inhibition and interference with the proper circulation of the blood in the peripheral organs. Bristowe<sup>1</sup> observed in some cases of purely functional affections which were incidentally complicated by the presence of cardiac disease, that the patients became irritable and restless and complained of a feeling of ill-being and of faintness and weariness co-incidentally with paroxysms of palpitation.

Such observations coming from observers who have made this subject one of special study carry considerable weight and prove that cardiac disturbance is to be regarded as a factor of primary importance in many cases of mental disease, and conversely that conditions of mental disorder may not infrequently occur in cardiac disease.

The chief difficulty with which one is confronted in an attempt to estimate the exact degree of inter-dependence of these two conditions, is the impossibility in the majority of

<sup>1</sup>

Brain. July 1887.

cases of ascertaining to which condition priority of origin belongs. In only five of my series of cases was I able to decide this point; in these cases - all of whom suffered recurrently from acutely maniacal attacks - the cardiac condition on admission was normal, but after a period of residence in the Institution a mitral systolic murmur was detected accompanied in some of the cases by other evidences of cardiac derangement. In none of these patients I may add was the prognosis favourable in regard to the mental condition.

The other patients were admitted into the Institution suffering from some form of mental affection and on examination were found also to present evidences of cardiac disturbance, it being therefore impossible to determine the primary and secondary nature of these disorders.

Mental disease has been found to bear a definite relation to many varieties of cardio-vascular disturbance, pericarditis, endocarditis, arterio-sclerosis, in addition to many slighter forms of cardiac disturbance, being found in some cases to induce certain definite mental conditions. Pericarditis was not present in any of my cases, its association however with mental symptoms has been noted by several observers. Burrows<sup>1</sup> states that acute pericarditis may cause symptoms pointing to

<sup>1</sup> On the connection between affections of the brain and diseases of the heart. 1846.

inflammation of the brain or its membranes, or insanity of such intensity that the real cause of the condition is frequently overlooked. Some pathologists are of opinion that this only occurs in connection with rheumatism, but this appears to be erroneous, as in many cases no rheumatic history can be obtained. The mental condition is held by some authorities to arise from embolic infarction, while others maintain that it is due to disturbance of the cerebral circulation resulting from the cardiac embarrassment which accompanies all acute inflammatory conditions of the pericardium. Greenlees<sup>1</sup> states that pericardial changes are frequent in mental disease, evidences of old inflammatory patches being found in 30% of cases. Mickle<sup>2</sup> asserts that acute affections of the heart may be the cause of mental disorder, and instances the insanity of rheumatic endocarditis and the occurrence of puerperal mania the result of ulcerative endocarditis. According to Weber<sup>3</sup> the connection between heart disease and mental disease is well seen in young children. Chorea in childhood he states is in many cases connected with endocarditis, and hysteria and epilepsy not infrequently appear at puberty, their onset being masked by an attack of chorea; in

<sup>1</sup>Dictionary of Psychological Medicine

<sup>2</sup>Goulstonian Lecture. 1888.

<sup>3</sup>Die Beziehungen Zwischen Körperlichen Erkrankungen und Geistesstörungen



other cases an acute adolescent insanity leading to dementia sets in in which the symptoms of chorea can be clearly distinguished. Edgerly<sup>1</sup> remarks that in conditions of acute excitement in patients at or beyond middle age, sudden dilatation of the heart may occur and a condition of great gravity be caused.

Hypertrophy and dilatation of the heart are found in many cases of mental disease associated as a rule with valvular lesions. Greenlees<sup>2</sup> asserts that the hearts of insane patients are heavier than those of normal persons and is of opinion that the cardiac condition most frequently associated with mental disease is mitral regurgitation with left sided hypertrophy. Mickle and Greenlees are unanimous in the opinion that the mental symptoms which are found to accompany hypertrophy and dilatation of the heart approximate more closely to the type of those found in mitral rather than in aortic disease. The more chronic forms of cardiac disease and functional cardiac conditions are discussed in greater detail in connection with the special mental features presented by patients belonging to the several clinical groups.

Recent investigations have shown that a close relationship exists between vascular sclerosis and mental disease.

<sup>1</sup>Journal of Mental Science. Vol. XLII. 1896.

<sup>2</sup>Journal of Mental Science. October 1885.

Meyer<sup>1</sup> suggests that the nervous system may suffer in three different ways as the result of arterio sclerosis, (1) the arterio-sclerotic disease may cause a reduction or change of metabolism in one or more organs. (2) the vascular disturbance may cause direct change in the nervous system (3) there may be a lowered metabolism due to a state of exhaustion caused by the action of toxic substances. The definite psychical features which appear to accompany such cases, are dwelt upon in more detail in the discussion of cases which presented evidences of this condition. Weber<sup>2</sup> states that in middle life or at the beginning of old age it is not uncommon to meet with slight forms of melancholy, which indicate their connection with some circulatory disturbance by such signs as slight arterio-sclerosis irregular heart, and small, feeble, irregular pulse. In the opinion of Griesinger<sup>3</sup> many patients of Asylums die from anaemia and marasmus without presenting evidences of any local affection except a slight degree of atheroma of the blood-vessels.

Other observers are likewise agreed that arterio-sclerosis and atheromatous changes of the blood-vessels play a

<sup>1</sup>

Albany Medical Annals. Vol. XXIV No. 3.1903.

<sup>2</sup>

Die Beziehungen Zwischen Körperlichen Erkrankungen und Geistesstörungen, 1902.

<sup>3</sup>

Mental Diseases New Sydenham Society. (translation)

by no means insignificant part in the production of some varieties of mental disorder. In this connection mention must be made of the Stokes-Adams syndrome which is a condition associated with an extreme degree of arterio-sclerosis and a permanently slow pulse, presenting also cerebral features of a distinctive character. According to Oster<sup>1</sup> attacks of vertigo which may recur several times in the day, attacks of syncope in which the patient is insensible for four or five minutes, or epileptiform attacks, are the most pronounced cerebral symptoms, the condition being regarded by some authorities as the result of changes in the pneumogastric centres due to disease of the arteries of the medulla.

Snyers<sup>2</sup> classifies the nervous symptoms met with in this condition as vertigo, syncope, epileptiform attacks and pseudo-apoplectic coma. The following hypotheses in regard to the causation of the condition are quoted by him:- (1) The cardiac theory which was evolved by Stokes and Adams who correlated all the symptoms of the condition with a pathological condition of the heart, such as fatty degeneration, myocardial changes, or atheroma of the aorta. (2) Charcot held that the

<sup>1</sup>Principles and Practice of Medicine.

<sup>2</sup>Un cas de pouls lent permanent. Revue de Médecine. Oct. 10. 1903.

lesion concerned the pneumo-gastric centres alone. (3) The majority of observers agree that the essential change in such cases is in the bulbar arteries which secondarily affect the vagi centres. In reference to the effect of congenital heart disease upon mental activity, Garrod<sup>1</sup> has drawn attention to the association of this condition with idiocy of the Mongol type, and Jones<sup>2</sup> in writing upon this subject refers to the frequency with which conditions of congenital cardiac disease are associated with dull, listless and torpid mental conditions.

The following clinical analysis of 174 cases of mental affection in women shows that in 84 cases, or 48%, some cardiac abnormality was found to exist. The cardiac disturbances of which clinical evidences were found were as follows:-

Mitral incompetence	48 cases
Mitral stenosis	12 "
Aortic regurgitation	4 "
Aortic dilatation and sclerosis	4 "
Irregularity, reduplicated sounds etc.	16 "

The various forms of mental disorder were represented in the following proportions.

<sup>1</sup>British Medical Journal May 7, Oct. 22, 1898.

<sup>2</sup>British Medical Journal Sept. 22, 1900.

	Total Analysis	Associated with cardiac affection.	
Manic-depressive group	67	29	or 43%
Defective development of the central nervous system.	30	19	" 63%
Paranoic group	27	11	" 40%
Senile Psychosts	28	14	" 52%
Epileptic	1		
Alcoholic	2	1	" 50%
Dementia Praecox	15	8	" 53%
General Paralysis	1	1	" 100%
Psychasthenic state	3	1	" 33%

I shall now discuss these clinical groups in detail and endeavour as far as possible to indicate the influence which the cardiac condition appeared to exert upon the psychical state.

#### CLINICAL GROUPS OF CARDIAC DISEASE

##### A. Mitral Regurgitation.

This variety of cardiac lesion was found to exist with the greatest frequency, 48 cases presenting the physical signs of that condition, in 31 cases the condition was due to an

organic lesion, while in the remaining 17 cases the disturbance was of a functional nature.

The ages of the patients examined varied from 25 - 81 years, 26 out of the total 48 patients were examined on admission to the asylum, the remaining 22 having resided there for a period of time varying from 3 months - 32 years.

Penfold<sup>1</sup> examined the hearts of 148 patients suffering from mental disease on their admission into an asylum and found a mitral systolic murmur to be present in 59 cases. The conclusions arrived at by Greenlees<sup>2</sup> differ somewhat however as regards the frequency of this murmur, as out of a total of 672 patients only 32 were found by him to possess it.

The feature common to all the cases being the presence of a systolic murmur heard with greatest intensity at the apex, it may not be out of place before proceeding farther, to briefly indicate the conditions with which a mitral systolic murmur may be associated.

The presence of valvular disease affecting the mitral segments brings about in many cases a condition known as a fluid vein, the murmur being caused by the sonorous vibration of the blood passing through this fluid vein. These murmurs if due to organic disease are frequently harsh in character and

<sup>1</sup>Journal of Mental Science Jan. 1901.

<sup>2</sup>Journal of Mental Science Oct. 1885.

their line of conduction is invariably towards the axilla. The condition known as relative insufficiency of the mitral valve may also cause a systolic murmur of a softer more blowing character as a rule than that due to organic disease of the valve. Leube<sup>1</sup> is of opinion however that accidental murmurs are louder than organic murmurs.

Relative insufficiency of the valve is caused by dilatation of the left ventricular cavity; it is not entirely dependent upon dilatation of the mitral orifice and consequent inability of the mitral valves to adequately close it, but is also due to the fact that the insertions of the chordae tendineae into the papillary muscle are set so wide apart and so far from the centre of the ventricle, that the trifling pressure of the auricular blood is unable to bring the valve segments into apposition just before the commencement of the ventricular systole, hence the resulting regurgitation which may be greater or less in degree.<sup>2</sup> Functional mitral systolic murmurs are of frequent occurrence in cases of interference with the general metabolism, as in anaemia and asthenic and cachectic conditions. In the opinion of many observers these murmurs owe their existence either to the abnormal blood condition, the heart being normal, and discharging its functions adequately, or to the perturbed

<sup>1</sup>Babcock. Diseases of the Heart.

<sup>2</sup>Balfour. Diseases of the Heart and the Aorta.

and irregular action of the cardiac muscle. Balfour<sup>1</sup> maintains that there is associated with all such constitutional conditions some degree of cardiac involvement, some impairment of muscular contractility which results in the residual accumulation of blood in the ventricles with dilatation of their cavities. Colbeck<sup>2</sup> is also of opinion that mitral regurgitation is the essential cause of these functional or haemic murmurs. Due to whatever cause, it is an incontestable fact that such murmurs may disappear entirely with the improvements in general metabolism. Systolic murmurs originating from aneurismal dilatation of the aorta may occasionally be heard with great clearness at the apex. An exo-cardiac mitral systolic murmur may also be heard in cases of pericarditis, but is as a rule more superficial and creaking in character and is rarely confused with the murmur of endocardiac origin.

And lastly a cardio-respiratory murmur may be heard at the apex, this is caused by the propulsion of air out of the tubes by the impulse of the heart, is systolic in rhythm, and best heard in the mitral area and during inspiration, being most commonly met with in cases of phthisis.

Such are the conditions under which a mitral systolic

<sup>1</sup>Diseases of the Heart and the Aorta.

<sup>2</sup>Diseases of the Heart.



murmur may be met. Of the 48 cases of cardiac disturbance in which the essential feature was the presence of a systolic murmur heard with greatest intensity in the mitral area, 31 cases presented the symptoms of organic disease, the remainder suffering from a functional form of cardiac derangement.

The physical signs which characterised these cases may be found in detail in the addendum, the main features differed in no way from those commonly presented by such cases, namely - the presence of a mitral systolic murmur of varying intensity and character and conducted in most cases into the axilla, an accentuated second pulmonic sound and in some cases evidence of cardiac enlargement, the latter condition however is one regarding which it is difficult to make positive assertion in all cases, owing to the mental state of the patient rendering difficult the accurate delineation of the cardiac area of dulness. Evidences of circulatory disturbance were present in the majority of cases, abnormal vascular conditions being frequently found and indicated by the following signs:- coldness and lividity of the extremities with in many cases oedematous swelling, this condition of oedema being very marked in 11 of the patients suffering from organic disease of the valves, clubbing of the fingers, (present in two cases) a varicose

condition of the veins, pulsation of the veins in the neck, capillary distention and lowered tension of the radial pulse. According to Greenlees<sup>1</sup> few of the cases which present marked evidences of a sluggish condition of the circulatory system suffer from organic cardiac disease, such vascular conditions as those above-mentioned being frequently found he states in recent acute melancholics and in chronic dementals apart from cardiac lesion of any kind.

My conclusions however do not corroborate this assertion except as regards the frequent occurrence of such vascular phenomena in the senile psychotics. The average pulse rate was 82, the pulse in the majority of cases being regular. This number is stated by Leuret and Mitivie<sup>2</sup> to be the average pulse rate in alienation. Clouston<sup>3</sup> considers a morning pulse of 84 and an evening pulse of 74 to be the average pulse rates in mental disease. Comparison with these statistics indicates that the circulatory disturbance does not vitally affect or alter the pulse rate. In six of the patients belonging to this group evidences of other disease existed, four of the patients suffering from phthisis, one from chronic bronchitis, and one from splenic anaemia.

<sup>1</sup>Journal of Mental Science, Oct. 1885

<sup>2</sup>Le pouls chez les aliénés.

<sup>3</sup>Mental Diseases.

On turning to the mental aspect of the question, the subjects of this cardiac lesion exhibited the symptoms of varying types of mental derangement. The following table indicates the forms of mental disease which were found to be represented in the 48 patients examined, with the relative number of patients belonging to each.

Manic-depressive group	15 cases
Mental enfeeblement	11 "
Imbecile	1 "
Paranoia	6 "
Senile Psychoses	10 "
Dementia Praecox	3 "
Dementia Paralytica	1 "
Alcoholic	1 "

The largest number are therefore seen to belong to the manic-depressive group, 8 of the patients in this group evincing the symptoms of motor restlessness and exaltation, the distinguishing characteristics of the remaining 7 cases being mental depression with psycho-motor inhibition. The senile psychoses and states of mental enfeeblement were also present in a considerable proportion of cases, the remaining types of alienation being not so largely represented. A minute analysis of the

mental features presented by these patients showed the great prevalence of insane ideas, 19 of the patients having delusions and hallucinations. The nature and character of these insane ideas varied, the majority being those of persecution and suspicion, having reference to enemies, poisoned food, Hell, imaginary grievances and insults, etc. In a limited number of cases the delusions were those of grandeur - the condition of megalomania - or had reference to events, or resulted from a condition of disturbed orientation. The insane ideas were in all cases fixed. The hallucinations were principally auditory, in one case only were anomalous taste and smell sensations present, the hallucinations were likewise all stabile in character.

Depression combined with marked psycho-motor retardation and diminution in ideo-motor activity were the characteristic features in a large group of cases. Patients belonging to this group were also morose and sullen and frequently exhibited the condition of negativism. In a smaller group of cases the chief features were an impairment of the higher cortical functions, disturbances of association as evidenced by defects of judgment and intellect, anomalies of memory, and interference with the expression of connected thought. Psycho-motor excitement, inco-ordination of movement, speech compulsion and

flight of ideas were leading features in those cases in which was seen the maniacal phase of the manic-depressive type of insanity. In isolated cases the patients were querulous, peevish, hypochondriacal, impulsive and lacking in inhibitory power.

Mickle<sup>1</sup> as the result of his investigation on this subject states that where mitral regurgitation co-exists with mental disease, either influencing its production or modifying its clinical aspect, the mental state is sombre and emotional, dejection or melancholic dread with hallucinations or illusions and hypochondriacal symptoms are found. In other cases he states that morose, sullen, taciturn exist with a mental attitude as of one subject to annoyance and persecution. In cases where a slighter mitral change was found the characteristic features were an inclination to depression, irritability, delusions of annoyance, danger, ill-treatment, persecution or a tendency towards a state of dementia.

Depression, delusions of suspicion and persecution, gnawing sensations in the head, sullenness and moroseness, were considered by Greenlees<sup>2</sup> to be the mental symptoms which most frequently co-existed with mitral regurgitation. Broadbent<sup>3</sup> states that where the cardiac lesion is not very marked and there

<sup>1</sup>Goulstonian Lecture 1888.

<sup>2</sup>Dictionary of Psychological Medicine. Hack Tuke.

<sup>3</sup>Croonian Lecture on the Pulse.

are no symptoms of failing compensation, the mental symptoms are such as one would expect to find in connection with an anaemic and badly-nourished brain, a certain amount of depression, accompanied by general irritability, sullenness and suspiciousness. In more serious forms of mitral disease where compensation is failing and the physical condition less good, similar mental symptoms are found, but the delusions of suspicion are less likely to lead to outbursts of anger than to a general feeling of resentment against everyone. The mental symptoms which appear most frequently to accompany mitral regurgitation may therefore be summarised as - depression, psycho-motor retardation, the presence of insane ideas - mainly of persecution - moroseness and sullenness.

#### B. Mitral Stenosis.

The group of cases which presented evidences of the condition was a much smaller one than that already discussed, only 12 patients belonging to this class.

The ages of the patients varied from 26-75 years, five of the number being examined on admission and the remainder after a residence in the Institution of from 1 month-25 years. Out of his total of 672 cases Greenlees<sup>1</sup> found only 15

<sup>1</sup>Journal of Mental Science Oct. 1885.

who presented evidences of this lesion.

The cases in this class all showed the typical signs and symptoms of mitral obstruction - a presystolic murmur at the apex of the heart, associated in all but three cases with a presystolic thrill. Obstructive murmurs heard at the mitral orifice during ventricular diastole are unanimously held to be of organic origin, a murmur of such character and rhythm being incontestable evidence of organic change in the mitral valve, and never occurring apart from such a condition; the murmur described by Austin Flint as of frequent occurrence in cases of aortic regurgitation, though presystolic in rhythm differs in character from that due to mitral stenosis.

A mitral systolic murmur was found to accompany the presystolic in almost all cases, a systolic murmur in the tricuspid area being occasionally present, as was also cardiac enlargement. Other physical signs which were present in certain cases were great oedema and lividity of the extremities - especially the lower - a varicose condition of the veins and dilatation of the capillaries of the face. The pulse was as a rule of low tension but regular in force and rhythm, the average rate being 83, and as in the former case no definite alteration of the pulse rate is to be noted.

The following types of mental disease were exemplified

by the patients suffering from mitral stenosis.

Manic-depressive group	4 cases
Imbecile	1 "
Mental enfeeblement	3 "
Paranoic group	2 "
Senile Psychoses	1 "
Psychasthenic state	1 "

In this group as in the former, a considerable number of patients belong to the manic-depressive group, an equal number showing symptoms of defective mental development. The fact that only one patient suffered from senile dementia is in contrast with the relatively large number of patients suffering from mitral regurgitation who presented the features of the various forms of the senile psychoses. On consideration of the mental features of these cases in detail the prevalence of insane ideas was again noticeable, 7 of the patients possessing these in some form. With the exception of one patient who showed typically the condition of megalomania and imagined she was Queen Victoria and lived in Heaven etc., all the patients possessed delusions of an unpleasant nature, in two cases the ideas had reference to religion and in the remaining cases to poisoned food, ill-usage and enemies. Among other mental characteristics presented by these patients were the following -



peevishness, querulousness, a tendency to be emotional and excitable, talkativeness, a defective power of inhibition evidenced by outbursts of passion and impulsivity - the impulses in one case belonging to the organic class. The association of obstructive mitral disease with chronic insanity is characterised according to Mickle<sup>1</sup> by delusions of persecution, annoyance, injury and hypochondria and expansive ideas of a religious order may, he states precede the former. In addition may be found querulousness, irritability, ill-temper, discontent, grumbling, moroseness, and peevish, cross-grained cantankerousness. The latter group of symptoms grows worse according to this authority as the vital forces and functions of the brain become more impaired by the cardiac disease. Greenlees<sup>2</sup> enumerates the following as the most frequent mental symptoms in such cases - excitability, impulsivity and discontent, delusions of ill-usage and poisoning of food and querulousness. Characteristic mental features associated with this cardiac group appear therefore to be impulsivity, defective inhibitions, excitability, talkativeness and peevishness.

#### C. Aortic Regurgitation.

Only four patients out of the total 174 showed evidences of this lesion, their ages varying from 45-76 years and

<sup>1</sup>Goulstonian Lecture 1888.

<sup>2</sup>Dictionary of Psychological Medicine. Hack Tuke.

all having resided in the asylum for a period of time varying from 4-18 years. In Greenlees'<sup>1</sup> series of cases 11 patients or rather less than 2% possessed this condition.

A double aortic murmur was found to be present in each case, this auscultatory sign being indicative of aortic regurgitation, this latter condition being dependent upon changes in the aortic valves, in many cases a slow progressive sclerosis of its segments, and a condition of arterio-sclerosis or atheroma of the arch of the aorta is frequently found to co-exist.

The physical signs in all the cases showed great similarity and aortic murmurs, systolic and diastolic in rhythm were invariably present, in 3 cases the sounds were pure at the apex of the heart and in one case cardiac irregularity was noted. The average pulse rate was approximately 88, and it presented in all cases the 'water-hammer' character, arterial pulsation was a noticeable feature in all cases, capillary pulsation being present in 2 cases. Other vascular symptoms found in these cases were clubbing of the terminal phalanges with oedema of the hands, capillary dilatation, and in 2 cases marked atheroma of the arteries.

The types of mental derangement present in these

<sup>1</sup>Journal of Mental Science Oct. 1885.

cases were as follows:-

Manic-depressive group	1 case
Mental enfeeblement	1 "
Paranoic group	1 "
Senile Psychoses	1 "

The mental symptoms characterising these patients did not present much uniformity, this fact added to that of the small number of cases, makes it impossible to generalise regarding the mental characteristics of this group. In only one case were insane ideas present and these were of persecution, injury by enemies etc., and were combined with hallucinations of hearing. This patient likewise exhibited negativism and was restless, suspicious and resentful. The patient suffering from mental enfeeblement presented typical evidences of that mental state - defects of judgment and intellect, disturbance of the function of association, memory, expression of connected thought, etc. Symptoms of some similarity were present in the remaining two cases, both being talkative, loquacious and cheerful as a rule, one of the patients at times exhibiting the symptoms of mental depression, and the other patient having slight attacks of psycho-motor excitement and becoming peevish, interfering and very loquacious.

Mickle<sup>1</sup> regarded the following mental symptoms as those most frequently present in this cardiac group:- delusions of persecution, of personal injury and restraint, hallucinations

<sup>1</sup>Goulstonian Lecture 1888.

of hearing, nocturnal restlessness, anxiousness and fear, and by other observers the most frequent mental manifestations are held to be delusions of grandeur, excitement and emotional exaltation.

Somewhat similar symptoms are named by Greenlees<sup>1</sup> as of frequent occurrence in aortic regurgitation if associated with mental disease, the patient being frequently sleepless, restless, loquacious, excitable, and possessing delusions of exaltation, of internal sensations, and of electrical and magnetic influences, hallucinations of the senses often occurring in connection with these. Broadbent<sup>2</sup> states that in the earliest stages of failure of compensation in aortic valvular disease - that form of cardiac disorder in which the blood-supply of the brain most soon becomes defective - we have mental symptoms similar to those produced by a diminished supply of blood resulting from other causes, in which the brain cells for a time exhibit excitability of function and the patient shows great restlessness and is interfering and lacking in self-control, in advanced cases losing all sense of his surroundings and becoming delirious. Jones<sup>3</sup> considers that the most frequent mental conditions associated with aortic regurgitation are excitability, irritability,

<sup>1</sup>Dictionary of Psychological Medicine.  
Hack Tuke.

<sup>2</sup>Croonian Lectures on the Pulse.

<sup>3</sup>British Medical Journal, Sept. 22 1900.

suspicion and emotional states. The psychic symptoms which appear to be most often associated with aortic incompetence may therefore be enumerated as insane ideas and hallucinations, restlessness, suspiciousness, loquacity and attacks of psychomotor excitement.

#### D. Aortic Dilatation and Sclerosis

This condition was found to be present in 4 patients whose ages varied from 40-63 years, two of these patients being examined on admission to the Institution, the other two having been resident there for 4 months and 2 years respectively. Greenlees<sup>1</sup> found 8 cases presenting signs of atheroma in his series of 672 cases. The principal clinical cardiac sign in each case was an aortic murmur, systolic in rhythm, and accompanied by a ringing, accentuated, second aortic sound. According to Osler<sup>2</sup> an aortic systolic murmur is only in rare cases produced by decided narrowing of the aortic orifice, roughening of the valves or of the intima of the aorta and haemic states being much more frequent causes of the condition. In the cases under consideration the condition of true aortic sclerosis was excluded by the character of the pulse, the absence of a diastolic murmur in the aortic area and the presence of a ringing, accentuated,

<sup>1</sup> Journal of Mental Science, Oct. 1885.

<sup>2</sup> Principles and Practice of Medicine.

second aortic sound, and in two cases marked evidence of a sclerotic change in the superficial arteries. In differentiating these conditions of aortic stenosis and atheroma Broadbent<sup>1</sup> states that an aortic systolic murmur appearing after middle life is seldom due to narrowing of the aortic orifice, but to roughness and rigidity of the valves or dilatation of the aorta; he also names as an important point in the differential diagnosis of the two conditions the fact that while in atheroma the second aortic sound is accentuated and unduly loud, in stenosis it is diminished in intensity.

The physical signs have already been indicated and in addition to an aortic systolic murmur and accentuated second aortic sound, reduplication of the first cardiac sound was heard at the apex in two cases. The average pulse rate was approximately 95, the pulse being small and of moderately high tension. There was no evidence of vascular disturbance of marked degree in three of these patients, but in one case there was lividity, oedema and coldness of the extremities and slight cyanosis of the face.

Mentally these cases showed widely different features and as in the case of the previous group it appears impossible to form definite conclusions from a study of the outstanding

<sup>1</sup> Diseases of the Heart.

psychical features. The following types of psychical disturbance were represented:-

Manic-depressive group	1 case
Dementia Praecox	1 "
Mental Enfeeblement	1 "
Paranoic Group	1 "

In one case there was marked inhibition of the psychic faculties, slow reaction and a condition of stupor with negativism, automatism, and at times a slightly catatonic condition. The leading features in another patient belonging to this class, were the existence of insane ideas which had reference to abstract forces, the patient believing that electricity, magnetism and hydraulic force were in some way practised upon her by enemies with evil intent, this patient had also at times outbursts of psycho-motor excitement, and became very loquacious and abusive. Of the remaining two cases, one exhibited the signs of mental enfeeblement and in addition to defects of judgment, intellect and memory, possessed delusions regarding individuality and orientation; the other patient was in a condition of extreme psycho-motor restlessness, being suspicious, violent, and talkative and possessing insane ideas of persecution etc.

Mickle<sup>1</sup> considers that the mental features most

<sup>1</sup> Goulstonian Lecture 1888.

prevalent in patients with dilatation and atheromatous changes in the aorta are excitability, with the presence of an expansive mental element in the early stages, the condition changing as the vascular lesion becomes more marked, and a painful or worried state with hallucinations and delusions of imaginary persecution replaces the former more happy psychical condition. Many such cases according to this observer end in dementia or if the aortic condition is one manifestation of general atheroma, melancholia and delusions of persecution and annoyance are frequently to be found.

In cases of atheromatous and dilated aorta associated with mental disease Greenlees<sup>1</sup> suggests that the lesion may have resulted from the abnormal activity of the heart putting a strain upon the blood-vessels during the early stage of the psychic disturbance, when conditions of restlessness and excitement are frequently present. He also considers it possible that in some cases there may have been an undue tax on the circulatory organs before definite symptoms of alienation were manifest, but while the patient was acting under somewhat abnormal psychic influences and evincing abnormal physical activity and strenuous effort and not infrequently over-indulging in food and drink.

<sup>1</sup> Dictionary of Psychological Medicine.  
Hack Tuke.



Stewart Paton<sup>1</sup> in discussing the relation of arterio-sclerosis to mental disturbance groups those patients who present this dual condition into two classes. In the first class he places those patients who present a mild degree of arterio-sclerosis with slight mental changes, the so-called 'nervous' forms of arterio-sclerosis. Such patients suffer from mental and physical fatigue, neuralgias, defects of memory, irritability, over-sensitiveness and a tendency to be markedly egotistical. The second class includes all those cases in whom there is present a more advanced degree of arterio-sclerosis, the accompanying mental features being emotional disturbances, positive defects in memory, intensification of subjective sensations, impairment of attention, motor restlessness and in some cases insane ideas and hallucinations. The most prominent mental symptoms associated with this group may be stated to be - a condition of negativism and stupor, delusions of persecution and insane ideas regarding abstract forces, suspiciousness and psycho-motor restlessness.

E. Slighter Cardiac Abnormalities.

These forms of slight cardiac disturbance have all been classed together as one group of 16 patients, whose <sup>ages</sup> varied in ~~age~~ from 23-74 years, 7 of these patients being examined upon

<sup>1</sup> Psychiatry, 1905.

admission and the remaining 9 having been in the Institution for a considerable period, the longest being 21 years. Greenlees<sup>1</sup> found these slight forms of cardiac disturbance to exist in 43% of the patients he examined. These forms of cardiac disturbance are slight at the onset but according to Broadbent<sup>2</sup> are liable to lead in course of time to organic changes in the heart. The varieties of cardiac derangement which were found to be present in these cases and the number of patients of each class were as follows:-

Cardiac Irregularity	5 cases
Reduplication of the 1st sound	3 "
Accentuation of 1st or 2nd sound	4 "
Pulmonary systolic murmur	3 "
Tricuspid systolic murmur	1 "

I Simple cardiac irregularity is divided by Gibson<sup>3</sup> into two forms - a rhythmic and an arrhythmic form, by these terms meaning that in the former case the irregularity is of a constant and regularly recurring type, whereas in the latter case there is no definite periodicity that can be recognised, but on auscultation in such cases the heart is found to be acting in a

<sup>1</sup> Journal of Mental Science Oct. 1885.

<sup>2</sup> Croonian Lectures on the Pulse.

<sup>3</sup> Arrhythmia. British Medical Journal April 18, 1903.

completely irregular and erratic manner. The five cases presenting evidences of arrhythmia belonged entirely to the class of arrhythmic irregularity.

Cardiac irregularity is of somewhat obscure etiology the conditions causing it being classified by Baumgarten<sup>1</sup> as follows:- (1) Those due to central-cerebral-causes e.g. organic disease or psychical influences, (2) Reflex influences. (3) Toxic influences. (4) changes in the heart itself, these changes affecting the cardiac ganglia or being mural in character. According to Gibson<sup>2</sup> the arrhythmic irregularity is most frequently dependent upon some nervous influence. Wenckelbach<sup>3</sup> considers arterio-sclerosis a strong predisposing factor in cases of cardiac irregularity, this element however was not present in any of the cases at present under discussion.

Edgerley<sup>4</sup> from a consideration of Asylum statistics upon this subject concludes that a considerable number of patients are found to present such modifications of the heart sounds as impurities, alterations in tone or pitch, accentuation and re-duplication, which may be referred to such dynamical causes as erratic or deficient cardiac innervation, want of muscular tone,

<sup>1</sup>Principles and Practice of Medicine. Osler.

<sup>2</sup>Arrhythmic. British Medical Journal April 18 1903.

<sup>3</sup>Arrhythmia of the Heart. 1904.

<sup>4</sup>Certain conditions of the circulatory system in the Insane. Journal of Mental Science Vol. XLIII, 1896.

and alteration in the blood pressure in the vascular system.

## II Reduplication of the first sound.

A physiological doubling of the 1st sound occurs at the end of expiration or beginning of inspiration. Phear<sup>1</sup> is of opinion that a true doubling of the first sound does not occur, the apparent doubling being due to two points of emphasis in the course of the normal first sound and caused probably by a want of synchronism in the mitral and tricuspid valves, such a condition occurring in cardiac and arterial disease, emphysema, anaemia and dyspepsia. Gibson<sup>2</sup> and other authorities also take this view and consider the prognostic significance of such a cardiac condition slight.

## III Accentuation of the second sound.

In 3 cases the second sound was heard to be accentuated at the apex, in the other case at the base of the heart in the aortic and pulmonic areas.

Accentuation of the cardiac sounds is due to some abnormality of blood-pressure, which is raised in one set of vessels, while remaining normal in the rest of the vascular system or becoming lowered there.

An accentuated second sound in the mitral area is

<sup>1</sup>Clinical Association of a reduplicated first sound.  
British Medical Journal Nov. 15 1902.

<sup>2</sup>Diseases of the Heart and the Aorta.

caused in many cases by an increase in the arterial blood pressure, in other cases the accentuation is only relative in character and is dependent in reality upon a weakening of the first sound; accentuation of the second aortic and second pulmonic sounds depend respectively upon increased tension in the arterial vessels and in the pulmonary circulation.

#### IV Pulmonary Systolic Murmur.

This condition was present in 3 cases.

As much controversy has taken place regarding the causation of this murmur it will only be possible to briefly indicate some of the views which have received the greatest support from observers.

It is stated by many authorities that this murmur is caused by dilatation of the pulmonary artery beyond the valve ring, this dilatation being dependent upon a hypertrophied right ventricle and the formation of a fluid vein in the majority of cases.

Duroziez<sup>1</sup> considers that the heart and its cavities diminish in size in anaemic conditions hence the pulmonary orifice is relatively dilated. Naunyn's view is that the murmur is an indication of mitral regurgitation, the abnormal sound

<sup>1</sup> Diseases of the Heart. Colbeck.

thereby caused reaching the ear by way of the left auricular appendix which is closely approximated to the chest wall in that area; the supporters of this theory point out that the murmur attains its maximum intensity not over the pulmonary artery but farther to the left i.e., the area of the left auricular appendix.

Sansom<sup>1</sup> holds that the vibrations causing the murmur arise in the conus arteriosus and possibly also in the semi-lunar valves and are due to a fibrillary tremor of the over-restrained muscular fibres. Such are a few of the theories regarding the means by which this murmur is produced; with the exception of the cases of congenital heart disease, this murmur is considered to be a functional or haemic one.

#### V Tricuspid systolic murmur.

This murmur was present in one case and was not secondary to disease of the left heart or to a pulmonary condition such as frequently induces such a murmur. The obviously anaemic condition of the patient in this case suggested that the murmur was probably a haemic one and functional not organic in character. These slighter forms of cardiac disturbance were found to occur in the various types of mental disease as follows:-

<sup>1</sup> Diagnosis of Diseases of the Heart.

Manic-depressive group	8 cases
Imbecile	1 "
Paranoic group	1 "
Senile Psychoses	2 "
Dementia Praecox	4 "

On examining the psychical features of these cases in detail, a considerable proportion were found to exhibit in a marked degree a condition of slow psychic reaction, with negativism, automatism and insane ideas and hallucinations. These patients were silent, rarely speaking and if so answering irrelevantly and incoherently. The insane ideas in most cases were of persecution, ill-usage etc., and the hallucinations were those of hearing, it was noteworthy however that in this group of cases the relative frequency of insane ideas was considerably less than in some of the other groups, only four patients possessing this special feature. In three cases the mental features were those of general mental enfeeblement with marked impairment of all the higher functions, in one case of the three there was a condition of motor restlessness, the patient being very destructive. Psycho-motor excitement was a marked feature in two cases, speech compulsion being also present, and one other patient presented a typical example of the condition known as 'flight of

ideas' - the most utter incoherence characterising her talk at all times. Two of the patients showed marked depression, mainly emotional in character, psycho-motor retardation being only present in a slight degree. Impulsivity was a noticeable feature in one and suicidal tendency in another patient. Those patients who belonged to this cardiac group i.e. slight cardiac derangement, present mental features which showed considerable uniformity, the most characteristic symptoms being the following:- slowness of psychic reaction, disinclination to speak, negativism, automatism, irrelevance and incoherence of speech.

### CLINICAL GROUPS OF MENTAL DISEASE

#### A. Manic-depressive Group.

Of the total number of patients examined 67 were found to belong to this group and of these 29 (43%) possessed some cardiac abnormality, 15 suffering from mitral regurgitation, 4 from mitral stenosis, 1 from aortic regurgitation, 1 from aortic dilatation, 1 from sclerosis, and 8 from the slighter forms of cardiac disturbance. On analysis of the special psychological features presented by the patients suffering from some cardiac disorder in sixteen cases the dominant features were found to be mental depression with marked psycho-motor retardation, five of these



patients also exhibiting some degree of motor restlessness. Insane ideas were present in only five of these cases, in four patients the delusions being of persecution, poisoning of food, etc. The most prominent feature in all these cases of the melancholic type was the inhibition of the psychical faculties as evidenced by retardation of thought and action and lengthening of the reaction time. Emotional depression was a noticeable feature in several cases and two patients showed a stuporous condition.

Three patients presented all the features of psychomotor excitement with exhilaration and restlessness, speech compulsion was present in these cases, as was also the 'flight of ideas' and a general condition of mental confusion.

In nine of these patients the condition was that in which the symptoms of depression and excitement occur with some degree of regularity and with an inclination to alternate - the variety sometimes known as circular insanity. Of these cases none conformed to the classic type in which the regular alternation of the two mental states is a constant feature, the continuous type in which no lucid interval elapses between the attacks was also not found in any of the cases, the majority being of the type with irregular intervals, each successive attack showing a primary stage in which the psychical symptoms were those

of motor restlessness with excitement, and a secondary stage in which mental depression was the dominant feature. Of the patients belonging to this group and presenting evidence of cardiac disturbance, the majority (55%) therefore presented the features of mental depression with psycho-motor retardation.

B. Defective Mental Development.

A high percentage (63%) of patients belonging to this class were found to possess some cardiac abnormality, 12 patients suffering from mitral regurgitation, 4 from mitral stenosis, and 1 from each of the two aortic conditions. Sixteen of these cases exhibited the symptoms of mental enfeeblement, three being congenital imbeciles. The psychical symptoms of these cases presented no unusual features, deficient mentality being indicated by the impairment of the powers of judgment and intellect, also defects of memory and associative thought. In one case marked impulsivity existed, the result of imperative processes. The three cases of congenital imbecility were characterised by marked mental deficiency, inability to make prolonged mental effort, impairment of memory, with a merely elementary power of differentiating between right and wrong. In two of these cases there was marked defect in articulation, the type of speech known as 'lalling' or baby speech being present.

### C. Senile Psychoses.

This group of mental diseases holds the second place as regards the frequency of association with cardiac disease, 52% of the patients presenting some variety of cardiac lesion. Mitral regurgitation was present in 10 cases, mitral stenosis in 1, aortic regurgitation in 1, and the slighter cardiac disturbances in 2 cases.

In the majority of cases the features were those of senile dementia, the patients were markedly egocentric and speech compulsion was present, the patients talking freely and continuously and relating accounts of their imaginary doings. There was great impairment of the faculty of attention and of the recording faculty, the memory being very defective. Disorientation in time and space was present in some degree in nearly all cases and emotional instability was a marked feature, intense irritation and dislike of disturbance being manifested by several of these patients.

Insane ideas of persecution and hallucinations of hearing were present in one case, and in four cases the patients lived a purely vegetative existence, the mental functions being all in abeyance, and a deficiency in the appreciation of organic sensations being manifested. One patient exhibited in a marked

degree the condition of senile melancholia, characterised by a condition of great anxiety and apprehensiveness - the "Angst" of the Germans - and possessing insane ideas regarding the tragic fate of her son.

D. Paranoia.

The leading authorities in Psychiatry differ somewhat in their exact interpretation of this term. It was formerly used to designate all those cases of alienation in which there was present a certain degree of systematisation of the insane ideas which were possessed by the patient, these ideas being developed apparently with some logical sequence and marked by stability. On further consideration and study of the subject however, it became evident that such features did not in reality constitute a primary mental affection, but were present and formed a transitory phase in a certain proportion of cases which belonged to other clinical groups of mental disease, such for example as the manic-depressive group and dementia praecox. These having therefore been eliminated, the cases included in this group were such as presented systematisation of insane ideas, these ideas being also characterised by stability and having formed the predominating feature during the entire period of the psychic disturbance.

Of the twenty seven patients of this class who were examined, some cardiac disturbance was found to be present in eleven cases, this giving a percentage of 40. Six of these patients suffered from mitral regurgitation, two from mitral stenosis, one from aortic regurgitation, one from aortic dilatation, and one from slight cardiac disorder.

The psychic features presented by these patients showed a considerable similarity and might be briefly summed up in the words of Wernicke<sup>1</sup> who defined the characteristics of this group as consisting in "a falsification of the content, in conjunction with a normal activity of consciousness." The character of the false belief varied in four cases, the patients having delusions regarding persecution, ill-usage, evil associates, illegal imprisonment of relatives etc. One patient possessed insane ideas which were combined with auditory hallucinations regarding electricity, magnetism and hydraulic force, and in another case the insane ideas were religious in nature, the patient imagining that all those around her were spiritually lost and quite unfit to associate with her. In other cases the delusions had reference to the personality of the patient or of those around her, one patient imagining that she was Queen Victoria while another believed that some of the patients around

<sup>1</sup>Psychiatry. Stewart Paton, 1905.

her were her near relatives. A noticeable feature in all these cases was one to which Specht<sup>1</sup> draws attention, namely the markedly egocentric character of the insane idea in by far the majority of cases. This observer affirms that the psycho-genic factor of greatest importance in such cases is the direction or trend given to the idea as determined by the individuality of the patient so that "the ego becomes the centre of a false system of thought." The other psychic features observed in these cases were of minor importance, some degree of affective, in conjunction with intellectual disturbance being present.

#### E. Dementia Praecox.

This clinical type of mental disease was present in 15 of the total number of cases examined and was found in 8 cases to be associated with cardiac disease, this giving a percentage of 53.

Three patients presented evidence of mitral regurgitation, one of aortic dilatation and four of the slighter cardiac disturbances. The psychological state of these patients was that of terminal dementia, more or less advanced in degree, but present in every case.

Four cases presented a marked degree of negativism,

<sup>1</sup>Ueber den Pathologischen Effekt in der chronischen Paranoia. Erlangen and Leipzig, 1901.

being resistive and antagonistic if in any way interfered with or touched, these patients sat absolutely silent, refusing to answer when addressed, and taking no interest in their surroundings, two of these cases also showing stereotypies of attitude and action. A slighter degree of negativism was present in three cases, the most marked features in these cases being the slow psychological reaction and apathy, they seldom voluntarily conversed, but if addressed they answered in monosyllables and after the lapse of some time; hallucinations of hearing were also present in one of these cases, the patient imagining that she was constantly being addressed and tormented by devils inside her. In one case only was the patient very talkative, her conversation being a typical example of utter foolishness and incoherence, a senseless string of words, or as Forel<sup>1</sup> aptly terms it a 'word salad', this patient also exhibited a grotesque irrelevance in replying to questions. In the majority of patients in this group therefore the predominating features were apathy, negativism, disinclination to speak and slow psychological reaction.

#### F. Dementia Paralytica.

Owing to the fact that one patient alone in this group presented the associated mental and cardiac symptoms, and also to the fact that this patient was the only one presenting the

<sup>1</sup>Psychiatry. Stewart Paton, 1905.

symptoms of general paralysis out of the total number of cases, it is impossible to draw any inferences or generalise in any way from the case. The patient was in the second stage of the disease, which appeared to be following a normal course, uninfluenced by the presence of the cardiac lesion.

G. Alcoholic.

The patient who suffered from this variety of mental affection also presented no abnormal features, the symptoms which were present being those most usually associated with this form of psychic disturbance. General psycho-motor restlessness, speech compulsion with tremor and the existence of false beliefs and hallucinations of hearing formed the chief symptoms in this case.

H. Psychasthenic.

Only one patient presented the characteristics of this clinical group and the most prominent mental feature in the case was the presence of obsessional ideas and impulses, these mental traits only being evident on occasions and being apparently induced by slight external stimuli, such as the contradiction of some assertion made by the patient, vindictiveness and desire for revenge being the ideas which dominated these abnormal impulses.



No decrease in the intellectual functions was observed, but the patient was markedly self-centred and hypochondriacal.

### CONCLUSIONS

A brief review of the results obtained on the clinical study of these cases of associated mental and cardiac disease, points I think, to the existence of a closer relationship between mental and cardiac action than has hitherto been recognised.

A high percentage of patients suffering from mental derangement were found to present evidences of cardiac disturbance, and the psychological features in these cases tended to approximate to certain definite types, and to exhibit less variety of symptomatology than was found in those cases in which no cardiac disorder was present.

On taking a general survey of the various cardiac lesions and the accompanying mental features found in these groups of patients, it is found that the psychic features which most frequently accompanied mitral regurgitation were depression, psycho-motor retardation, diminution in ideo-motor activity, the presence of insane ideas, chiefly of persecution and suspicion, moroseness and sullenness. This cardiac condition was

found also to occur with the greatest frequency, 64% of the total cardiac affections being cases of mitral regurgitation.

Greenlees<sup>1</sup> also remarks on the great frequency of this form of cardiac disease in association with mental disease. Where mitral stenosis co-existed with alienation the patients were found most frequently to possess a defective power of inhibition and marked impulsivity, they were as a rule emotional, excitable and talkative, often peevish and querulous. Aortic lesions were found to be associated with a very limited number of cases of mental disturbance, hence it is not possible to generalise regarding the psychical symptomatology of this group. Without attempting to do so, I may however indicate a few of the leading mental features which were present in these cases of aortic disease, such were:- insane ideas of persecution, hallucinations, restlessness and suspiciousness, loquacity, talkativeness and attacks of psycho-motor excitement. In those cases presenting evidences of aortic dilatation and sclerosis some of the outstanding psychic manifestations were the following:- a condition of negativism and stupor, the existence of insane ideas regarding electricity, magnetism and hydraulic force etc., also delusions of persecution, psycho-motor restlessness and suspiciousness. The slighter forms of cardiac disturbance were characterised by a more uniform group of psychical symptoms, slowness of psychic reaction,

<sup>1</sup>Journal of Mental Science Oct. 1885.

marked disinclination to speak, negativism and automatism were characteristic features in the majority of cases, irrelevance and incoherence of speech being also present. Insane ideas were found to be of infrequent occurrence in this group of cases, a small percentage of patients alone showing this feature.

On turning to the other aspect of the question namely the clinical groups of mental disease with which these cardiac disturbances were associated, it is found that patients suffering from some degree of defective mental development were most liable to possess a cardiac lesion, 63% being found to present this association of conditions. The Senile Psychoses and Dementia Praecox groups were found to rank next in this regard, circulatory disorders occurring in 52% and 53% of these cases respectively.

Cardiac disturbance was found to exist in 43% of those patients who belonged to the Manic-Depressive group and in 40% of those who presented the clinical psychical features of the Paranoid group.

Greenlees<sup>1</sup> states that cardiac disturbance is found most frequently in conditions of mania if the patients are examined on admission, but in those who have resided for some time in Asylums, it is found to be present in cases of Secondary

<sup>1</sup>Journal of Mental Science, Oct. 1885.

dementia and melancholia more frequently than in any other type of mental disorder. It seems evident therefore that cardiac disturbance bears a certain definite relation to mental disease, being possibly in some cases the exciting - or predisposing - cause of its production, and in other cases exerting a modifying influence upon the type of alienation and upon the special symptoms characterising that type.

Conversely also it is found that mental disease may be the exciting cause of cardiac disturbance, most frequently at first of the functional variety. The determination of the exact relation which exists between these two conditions as regards cause and effect is of necessity a matter of great difficulty and regarding which it is impossible in the majority of cases to obtain accurate information.

Were a careful and thorough cardiac examination at once undertaken in every case which presented symptoms - however slight - of alienation, and frequent cardiac examinations made during the course of the disease much valuable and useful information on this point might be obtained. Greenlees<sup>1</sup> as the result of his investigation states that heart disease alters the type and delusions of insanity and is the predisposing cause of it in some cases. From the point of view of prognosis the

<sup>1</sup>Dictionary of Psychological Medicine.  
Hack Tuke.

associated cardiac condition is of great importance, as according to Edgerley<sup>1</sup> these altered conditions of the circulatory system form an unfavourable element in the prognosis of the mental disease, and whereas the percentage of recoveries among those patients with healthy hearts was 44, only 27% of those suffering from organic heart lesions were found to show complete mental recovery.

Taylor and Pearce<sup>2</sup> are also of the same opinion regarding the grave prognostic significance of organic cardiac lesions and they state also that organic heart disease is a large etiological factor in continuing the downward course of imbeciles.

In whatever manner the vascular disturbance reacts upon the brain, it apparently exercises a considerable influence upon the etiology, symptomatology and prognosis of mental disease, and when fuller and more adequate investigation has been made on this subject, and more exact knowledge gained of the inter-action of the pathological conditions of brain and heart, it may be possible to successfully combat many forms of mental disorder by treatment directed to the cardio-vascular system.

The imperfect results which I have brought forward as the result of a clinical study of these cases are not in any way

<sup>1</sup>Journal of Mental Science. Vol. XLII 1896.

<sup>2</sup>American Journal of Medical Science, Jan. 1902.

definite or final, but merely in an uncertain manner touch the fringe of a subject which offers wide scope for scientific research which may ultimately be successful in opening up new paths in the prophylaxis and treatment of alienation.



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## A D D E N D U M

### Table of Cases

No	Age	Period of Residence	Form of Mental Disease	Cardio - Vascular System		
				Heart	Pulse	External Signs
D. 73	11 months		Senile psychosis	Loud systolic murmur at apex, accentuated 2nd sound at apex. No cardiac enlargement. Conduction of murmur into axilla.	Small, regular, fair tension, numbers 88.	Slight lividity of face.
H. 40	2 months		General paralysis	Systolic murmur heard all over cardiac area, loudest in mitral area, conducted into the axilla.	Fair tension, regular. Numbers 82.	
M. 74	8 months		Senile psychosis	Blowing systolic murmur at apex and conducted into axilla, accentuated, 2nd pulmonic sound.	Small, low tension, regular, numbers 84.	Atheroma of arteries. Pulsation of veins in the neck. Great oedema of lower limbs.
P. 62	2 years		Senile psychosis	Systolic murmur at apex and all over cardiac area conducted into axilla. Accentuated 2nd sound at apex.	Regular, high tension, bounding, numbers 72.	Atheroma of arteries.

Name	Age	Period of Residence	Form of Mental Disease	Cardio - Vascular System		
				Heart	Pulse	External Signs
B.H.	24	3 months	Manic-depressive	Systolic murmur at apex conducted into axilla, accentuated 2nd sound at apex. Some cardiac enlargement. Irregularity of action.	Small, irregular in rhythm, fair tension numbers 72	
A.M.	57	1 year	Manic-depressive	Soft mitral systolic murmur heard all over cardiac area and conducted into axilla. Irregularity of action.	High tension, regular, bounding, numbers 84.	
E.I.	62	4 years	Senile psychosis	Loud blowing systolic murmur heard all over but most audible at apex. Conducted into axilla. Irregularity of action.	Small, low tension, irregularity of rhythm. Numbers 92	Oedema of lower limbs.
M.M.	58	Admission	Paranoia	Blowing systolic murmur heard all over cardiac area most loud at apex. Conducted into axilla. Irregularity of action.	Small, high tension, irregular in rhythm. numbers 74.	Atheroma of arteries. Dilatation of capillaries of face.



Name	Age	Period of Residence	Form of Mental Disease	Cardio - Vascular System		
				Heart	Pulse	External Signs
E.T.	52	1 year	Manic-depressive	Loud blowing systolic murmur heard all over but loudest at apex. Slight cardiac engorgement.	Small, rather high tension, regular. Numbers 72.	Oedema of feet. Slight enlargement of veins.
M.P.	58	15 years	Mental enfeeblement	Systolic murmur heard all over cardiac area, loudest at apex and conducted into axilla.	Fair tension, regular. Numbers 84	Pulsation of Veins in the neck.
C.S.	81	32 years	Senile psychosis	Systolic murmur heard all over, loudest at apex and conducted into axilla. Accentuated 2nd pulmonic sound.	Small in volume, fair tension, regular. Numbers 84	Atheroma of arteries. Oedema of feet.
A.S.	69	11 years	Manic-depressive	Systolic murmur heard at apex and also in tricuspid and aortic areas, conducted into axilla.	Regular, high tension. Numbers 108.	Pulsation of the veins in the neck.
A.P.	17	Admission	Imbecile	Systolic murmur heard at apex, conducted into axilla. Accentuation of 2nd pulmonic sound.	Small in volume, low tension, regular. Numbers 72.	Slight lividity of face and extremities occasionally.

Name	Age	Period of Residence	Form of Mental Disease	<u>Cardio - Vascular System</u>		
				Heart	Pulse	External Signs
D.R.	77	Admission	Senile psychosis	Systolic murmur heard all over cardiac area, loudest at apex and conducted into axilla. Accentuated 2nd pulmonic sound.	Small in volume, low tension, regular Numbers 88.	Distended veins in lower extremities.
A.H.	40	2 years	Dementia praecox	Systolic murmur heard all over cardiac area especially loud in mitral area. Accentuated 2nd sound at apex. Irregularity of action.	Regular, fair tension. Numbers 92.	
M.McF.	51	8 years	Manic-depressive	Systolic murmur at apex conducted into axilla. Accentuation of 2nd pulmonic sound.	Small in volume, low tension, regular Numbers 96.	Pulsation of veins in the neck.
C.B.	60	28 years	Senile psychosis	Systolic murmur heard all over cardiac area, loudest at apex and conducted into axilla. Accentuation of 2nd sound at apex.	Small in volume, low tension regular, Numbers 84.	Oedema of feet.
M.L.W.	52	3 years	Mental enfeeblement	Systolic murmur heard all over cardiac area, loudest at apex and conducted into axilla.	Small in volume, low tension, regular Numbers 96.	Pulsation of veins in neck.

Name	Age	Period of Residence	Form of Mental Disease	Cardio - Vascular System		
				Heart	Pulse	External Signs
S.K.	61	25 years	Senile psychosis	Systolic murmur heard all over cardiac area, loudest at apex and conducted into axilla.	Fair tension, irregular in force and rhythm, Numbers 60.	
M.A.R.	64	Admission	Manic-depressive	Systolic murmur heard all over but loudest at apex, harsh and blowing in character and conducted into the axilla.	Small in volume, irregular in force, low tension, numbers 88	
M.K.R.	31	Admission	Paranoia	Systolic murmur harsh and loud in character heard at apex and conducted into axilla.	Fair tension, regular, numbers 84.	
I.E.	44	Admission	Paranoia	Blowing systolic murmur heard at apex and conducted into axilla. Accentuated 2nd pulmonic sound.	Regular, good tension, numbers 84.	Slight dilatation of facial capillaries.
B.G.	55	Admission	Manic-depressive	Systolic murmur heard at the apex and conducted into the axilla.	Fair tension, regular, numbers 72.	
E.G.	81	Admission	Manic-depressive	Metallic murmur heard in mitral area and also in the other valvular areas.	Low tension regular, numbers 68.	Oedema of feet.

Name	Age	Period of Residence	Form of Mental Disease	Cardio - Vascular System		
				Heart	Pulse	External Signs
M.A.J.54		Admission	Manic-depressive	Slight metallic murmur heard at apex, systolic in rhythm and conducted into axilla.	Small in volume, low tension, regular numbers 68.	
M.A. 57		Admission	Mental enfeeblement	Systolic murmur heard at apex, irregularity of action.	Small in volume, low tension, irregular in force and rhythm, numbers 64.	
M.McM.57		Admission	Manic-depressive	Loud systolic murmur heard all over, loudest at apex. Tricuspid systolic murmur also.	Low tension, regular numbers 78.	Distended capillaries in face.
M.G.G.71		Admission	Mental enfeeblement	Systolic murmur heard at apex, also tricuspid systolic murmur, irregularity of action.	Low tension, irregular in force and rhythm, numbers 82.	Lividity of face and extremities. Oedema of feet.
E.G. 35		Admission	Manic-depressive	Systolic murmur at apex conducted into axilla. Accentuation of 2nd pulmonic sound.	Fair tension, regular numbers 88.	
M.W. 49		Admission	Alcoholic	Systolic murmur at apex, hypertrophy of left ventricle. Irregularity of action.	Weak, low tension irregular in force and rhythm, numbers 60.	

Name	Age	Period of Residence	Form of Mental Disease	Cardio - Vascular System		
				Heart	Pulse	External Signs
M.F.G.54		Admission	Paranoia	Loud systolic murmur heard all over cardiac area, loudest at apex and conducted into axilla, slight cardiac enlargement.	Fair tension, regular, numbers 84.	
E.H.	44	Admission	Manic-depressive	Slight systolic murmur at apex Reduplication of 2nd sound in the tricuspid area.	Low tension irregular in rhythm, numbers 80.	
A.B.	27	Admission	Mental enfeeblement	Soft murmur at the apex, systolic in rhythm also heard in pulmonic area.	Fair tension, regular, numbers 80.	
N.M.	25	Admission	Mental enfeeblement	Soft systolic murmur at the apex and conducted into the axilla.	Good tension, regular, numbers 80.	
H.W.	77	Admission	Senile psychosis	Systolic murmur heard all over cardiac area, loudest at apex. Heart sounds feeble.	Low tension regular, numbers 80.	Oedema of feet
A.McC. H.	79	Admission	Manic-depressive	Systolic murmur heard at apex.	Good tension, regular, numbers 72.	

Name	Age	Period of Residence	Form of Mental Disease	<u>Cardio - Vascular System</u>		
				Heart	Pulse	External Signs
J.H.	53	15 years	Mental en- feeblement	Systolic murmur heard all over cardiac area, loudest at apex.	Fair tension regular numbers 68.	Great oedema of feet.
E.M.	61	14 years	Mental en- feeblement	Slight systolic murmur heard at the apex.	Good tension, regular, numbers 64.	
J.A.	38	1 year	Mental en- feeblement	Systolic murmur heard all over cardiac area, loudest at apex.	High tension, regular, numbers 100.	
W.B.	40	12 years	Dementia Praëcox	Slight systolic murmur heard at apex, pulmonic systolic murmur also.	Good tension regular numbers 72	Lividity of face and ex- tremities. Oedema of feet.
J.H.B.	30	Admission	Manic-de- pressive	Soft systolic murmur heard at apex.	Fair tension regular, numbers 100.	Slight oedema of ankles.
J.B.	65	Admission	Senile psychosis	Systolic murmur heard all over cardiac area, loudest at apex.	Low tension, regular, numbers 84.	
M.C.	42	Admission	Mental en- feeblement	Systolic murmur heard all over cardiac area, loudest in mit- ral area.	Fair tension regular, numbers 84.	
H.M.B.	59	15 years	Dementia Praëcox	Soft systolic murmur heard at the apex.	Good tension regular, numbers 80.	Lividity of face at times.

Name	Age	Period of Residence	Form of Mental Disease	Cardio - Vascular System		
				Heart	Pulse	External Signs
M.B.	43	8 months	Manic-depressive	Slight systolic murmur at the apex and accentuation of the 2nd sound.	Fair tension regular, numbers 72.	Varicose veins of lower limbs and great oedema of feet and ankles.
M.N.	56	2 years	Manic-depressive	Slight systolic murmur at the apex.	Low tension, regular, numbers 68.	
M.O'N.	60	13 years	Paranoia	Slight systolic murmur heard at apex.	Small in volume, low tension, regular numbers 80.	
J.S.	67	4 years	Senile psychosis	Slight systolic murmur heard all over cardiac area, loudest at apex. Irregularity of action.	Fair tension, bounding in character, regular, numbers 76.	
M.S.	32	Admission	Mental enfeeblement	Slight presystolic murmur heard at apex. No thrill.	Fair tension, regular, numbers 84.	
C.M.	75	Admission	Paranoia	Presystolic murmur heard at apex, no cardiac enlargement and no thrill.	Good tension regular, numbers 68.	Distended capillaries of face.
M.W.	74	Admission	Mental enfeeblement	Presystolic and systolic murmurs heard at apex.	Low tension, irregular in force and rhythm, numbers 80.	

Name	Age	Period of Residence	Form of Mental Disease	Cardio - Vascular System		
				Heart	Pulse	External Signs
J.K.	37	Admission	Manic-depressive	Presystolic and systolic murmurs heard at apex. No thrill.	Low tension regular numbers 72.	
C.S.	26	5 years	Imbecile	Presystolic and systolic murmurs at apex. No cardiac enlargement or thrill.	Small in volume, low tension, regular, numbers 92.	Pulsation of veins in neck.
M.D.	75	2 years	Senile psychosis	Presystolic and systolic murmurs heard at apex, slight presystolic thrill.	Low tension intermittent numbers 86.	Atheroma of arteries.
J.R.	34	1 month	Psychasthenic	Presystolic and systolic murmurs at apex. Heart sounds increased in intensity.	Fair tension, regular, numbers 84.	
M.H.	32	9 months	Paranoia	Presystolic and systolic murmurs heard at apex. Tricuspid systolic murmur cardiac enlargement. Presystolic thrill and diffuse apex beat.	Good tension, regular, numbers 72.	Dilatation of capillaries of face. Oedema of feet.
N.C.	49	32 years	Manic-depressive	Slight presystolic and loud systolic murmur heard at apex. Cardiac enlargement and apex beat displaced downwards and to the left.	Fair tension regular, numbers 80.	Pulsation of veins of neck. Injection of capillaries of face. Oedema of feet.



Name	Age	Period of Residence	Form of Mental Disease	Cardio - Vascular System		
				Heart	Pulse	External Signs
B.H.	49	14 years	Mental enfeeblement	Presystolic and slight systolic murmur at apex. Tricuspid systolic murmur. Slight thrill, presystolic in rhythm.	Small in volume, low tension, regular numbers 76.	Injection of capillaries in face.
J.T.	50	Admission	Manic-depressive	Presystolic and systolic murmur at apex. Presystolic thrill.	Fair tension full in volume, regular numbers 78.	Marked atheroma of temporal arteries - varicose veins of legs.
M.S.	33	3 years	Mental enfeeblement	Rough, loud presystolic murmur & slight systolic murmur at apex. Presystolic thrill.	Good tension regular, numbers 92.	Great oedema and lividity of upper and lower extremities.
J.W.	76	6 years	Senile psychosis	Systolic and diastolic murmurs heard in aortic area.	Water-hammer in character, regular, numbers 96.	Pulsation of arteries. Capillary pulsation.
R.M.	73	4 years	Manic-depressive	Slight systolic and diastolic murmurs at aortic area.	Slightly water hammer in character. Regular numbers 84.	Arterial pulsation. Injection of capillaries in face.
B.F.	45	18 years	Mental enfeeblement	Loud systolic & diastolic murmurs heard all over cardiac area, loudest in aortic area. Irregularity of action.	Water-hammer in character, regular, numbers 88.	Arterial and capillary pulsation. Clubbing terminal phalanges. Oedema of feet.

Name	Age	Period of Residence	Form of Mental Disease	<u>Cardio - Vascular System</u>		
				Heart	Pulse	External Signs
M.S.	57	6 years	Paranoia	Loud systolic and diastolic murmurs heard at aortic area and conducted down sternum. Slight cardiac enlargement.	Water hammer in character regular, numbers 88.	Arterial pulsation and atheroma. Clubbing of terminal phalanges.
N.L.	63	4 months	Paranoia	Loud systolic murmur heard in aortic area, loud & accentuated 2nd aortic sound. Slight mitral systolic and reduplication of 1st sound at apex.	High tension regular, numbers 72.	Atheroma of arteries.
J.S.	60	Admission	Mental enfeeblement	Systolic murmur heard in aortic area, accentuated 2nd aortic sound. Reduplication of 2nd sound at apex.	Fair tension, regular, numbers 78.	
A.G.	37	2 years	Dementia-Præcox	Loud systolic murmur at aortic area. Ringing & accentuated 2nd aortic sound, no enlargement of heart.	Small in volume, low tension, numbers 84.	Atheroma of arteries. great oedema and lividity of lower extremities.
A.D.	57	Admission	Manic-depressive	Systolic murmur in the aortic area, accentuated 2nd aortic sound.	Low tension, regular, numbers 108.	

Name	Age	Period of Residence	Form of Mental Disease	<u>Cardio - Vascular System</u>		
				Heart	Pulse	External Signs
J.K.	30	4 years	Paranoia	Accentuation of the 2nd sound heard at the apex. Cardiac sounds pure.	Small in volume, low tension, numbers 80.	Varicose veins of the lower limbs. Oedema and lividity.
M.F.	69	8 years	Senile psychosis	Cardiac sounds pure, great irregularity of action.	High tension, irregular, numbers 100.	
G.P.	43	21 years	Dementia-Præcox	Cardiac sounds pure, 2nd sound accentuated at the apex.	Fair tension regular numbers 84.	Great oedema of lower limbs.
A.McM.	42	2 months	Manic-depressive	Systolic murmur heard in pulmonary area, cardiac sounds pure in other areas.	Good tension, regular, numbers 80.	
M.R.	74	6 years	Senile psychosis	Reduplication of the 1st sound at the apex. Heart sounds pure.	Good tension regular, numbers 80.	Great oedema and lividity of limbs.
S.M.	26	3 years	Manic-depressive	Cardiac sounds pure, 2nd sound accentuated at the apex.	Good tension, regular, numbers 64.	
J.G.	50	9 years	Dementia-Præcox	Cardiac sounds pure. Reduplication of 1st sound at the apex.	Low tension, regular, numbers 100.	
J.C.	48	11 years	Dementia-Præcox	Cardiac sounds pure. Irregularity of action.	Low tension, Small in volume, regular, numbers 60.	Oedema of ankles.

Name	Age	Period of Residence	Form of Mental Disease	<u>Cardio - Vascular System</u>		
				Heart	Pulse	External Signs
A.D.	41	8 years	Dementia Praecox	Systolic murmur heard in the pulmonic area, cardiac sounds pure in other areas.	Fair tension regular numbers 84.	Great oedema and lividity of the extremities.
M.McK.	67	5 years	Manic-depressive	Cardiac sounds pure, reduplication of 1st sound at apex.	Good tension, regular, numbers 80.	Slight oedema of ankles.
M.S.	49	Admission	Manic-depressive	Cardiac sounds pure. Irregularity of action.	Low tension, irregular in force and rhythm, numbers 84.	
A.N.	23	Admission	Manic-depressive	Cardiac sounds pure. Irregularity of action.	Good tension, regular, numbers 54.	
E.H.	29	Admission	Manic-depressive	Cardiac sounds pure. Accentuation of 2nd sound in aortic and pulmonic areas.	Small in volume, low tension, numbers 88.	
C.A.W.	23	Admission	Imbecile	Cardiac sounds pure. Irregularity of action.	Fair tension, regular, numbers 84.	
W.D.	30	Admission	Manic-depressive	Slight systolic murmur heard in pulmonic area. Cardiac sounds pure in other areas.	Good tension, regular, numbers 92.	

Name	Age	Period of Residence	Form of Mental Disease	<u>Cardio - Vascular System</u>		
				Heart	Pulse	External Signs
F.H.	34	Admission	Manic-de- pressive	Systolic murmur heard in tricus- pid area. 1st sound at apex somewhat metal- lic in quality but pure.	Good tension, regular, numbers 94.	