ON THE

PATHOLOGICAL CHANGES IN THE BLOOD PRESSURE

IN

SENILE AND MENTAL CASES

BY

NEILSON DAVIE, M.B., CH.B., (GLASGOW), L.M. (DUBLIN).

ASSISTANT MEDICAL OFFICER,

BRECON AND RADNOR ASYLUM.

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 – 1346

ON THE

PATHOLOGICAL CHANGES IN THE BLOOD PRESSURE IN SENILE AND MENTAL CASES.

BY

NEILSON DAVIE, M.B.,Ch.B.,(Glasgow), L.M.,(Dublin).,
Assistant Medical Officer,
Brecon and Radnor Asylum.

The idea of investigating the pathological states of the blood pressure in the Psychoses suggested itself to me on account of the frequent occurence of vasomotor disturbances in the general circulation which are so often observable in the insane. Thus, coldness of the extremities associated with palor or lividity of the skin denotes some disturbance of the vasomotor apparatus; hyperidrosis is also of frequent occurence. These symptoms are all outward manifestations of vasomotor involvement, and, knowing the important part the vasomotor system plays in the physiological maintenance of the blood pressure, it was natural to assume that, if the vasomotor system was involved in in a pathological way, there would also be pathological variations in the blood pressure in the different forms of insanity. All the observations which are recorded in this paper and those upon which the conclusions are based, were made on patients in the Brecon and Radnor Asylum. I wish here to express my indebtedness to Dr. Robert Pugh for his kindness in granting me permission and every facility in the use of the clinical material available in the Asylum.

Series of observations have been taken from typical

cases, as far as material was available, from the following types of mental disease, Melancholia, Mania, Epilepsy, General Paralysis of the Insane, Dementia Praecox, Secondary Dementia and Senile Dementia.

The paper starts with a synopsis of previous work on the subject; this is followed by a description of the instrument and the precautions adopted in order to obtain uniform and reliable results in the blood pressure readings; tabulated readings in the various forms of insanity with an analysis of them and general observations deduced therefrom are next introduced; then follows a discussion as to the etiology of the altered states of the blood pressure and the coincident mental disease, and to the part played by the blood pressure in this etiology; the next part of the paper is devoted to the results obtainable by endeavouring to treat insanity with drugs which act on the blood pressure: the paper then concludes with a short summary of the conclusions arrived at as a result of the observations.

HISTORICAL.

This is a subject upon which up till recent times very few investigations have been carried out. As far as can be ascertained the first important publication on the subject is that of Craig's (1). His general conclusions on the subject were (a) That the blood pressure is raised in persons suffering from Melancholia. (b) That the blood pressure was lowered in persons suffering from acute excitement or Mania. (c) That the blood pressure is probably raised in Stupor. (d) That the blood pressure is raised in General

Paralysis when there is depression, but that in the excited types it is low as it is also in the later stages of all types. (e) That there is evidence to prove that altered blood pressure may in certain individuals induce mental aberration, but that it is not complete enough to prove definitely that mental disease is usually caused by altered blood pressure. (f) That certain depressed patients improve on Nitroglycerine. (g) That Erythrol Tetranitrate is not so transient in its action as Nitroglycerine.

In 1902 Alexander (2) published an article in which he he states that in Melancholia the readings were highest in the acute passive forms, and that the demonstrative and chronic forms were associated with low tension. He also stated that he believed that hypertension was a manifestation of toxaemia from retained waste products. Dunton (3) in 1903 stated generally that the blood pressure was increased in states of mental depression and that it was sub-normal in states of excitement. However, beyond the few general facts quoted above there appears to be very little definite information on the subject.

METHOD.

The instrument used in taking the following blood pressure readings is that of Dr. Gibson (4) of Edinburgh. It has a circular armlet of about 15 cm., which contains a rubber bag. This bag is brought into direct communication with the mercurial manometer by means of a rubber tube. This tube has a small tube fixed into it about midway

between the manometer and the armlet. At its distal end it is connected with a syringe which is used for raising the pressure in the armlet, and it is provided with a valve by means of which the pressure can be reduced in the armlet at any desired rate.

All the observations were made between 11 a.m. and 12 noon, so as to avoid the influence of the meals on the blood pressure. No reading was taken from a patient who had not rested for two hours before the observation as any variety of physical work, i.e., muscular work, tends to raise the blood pressure. Except in a few special instances, the bowels had moved on the morning on which the reading was taken. All the patients from which readings were taken in the Functional Types, i.e., Melancholia and Mania, had no organic vascular disease as far as could be ascertained.

In every case the armlet was placed round the right arm, and the tube leading to the manometer was always opposite the brachial artery so as to get uniform readings in each case. In every case the systolic pressure was taken by reading off on the scale the height in millimetres immediately the pulse wave returned in the radial artery. These observations were made at the level of the heart.

PHYSIOLOGICAL.

From a series of observations taken from normal healthy individuals under the above conditions the blood pressure was found to vary from 118 to 126 mm. However, temperament, according to Janeway (5), has a real influence on the blood pressure. He states that "the more excitable

and neurotic individuals show a greater rise in blood pressure than the phlegmatic, from the same psychical cause.

OBSERVATIONS.

MELANCHOLIA.

In acute Melancholia 16 cases were examined, and of these 7 were males and 9 were females. In the males the blood pressure ranged from 140 mm. to 194 mm. Hg., the average being 168 mm. Hg. In the females the readings ranged from 140 mm. to 190 mm. Hg., the average being 160 mm. Hg.

In Chronic Melancholia 20 cases were examined. Of 9 males the readings varied from 100 to 130 mm. Hg., the average being 119 mm. Hg. In the 11 females the readings ranged from 110 mm. to 126 mm. Hg., the average being 115 mm. Hg.

The following tables show the individual readings in various cases of Acute and Chronic Melancholia which were examined. For statistical purposes the average of three or four readings in each individual case is taken so as to ensure a more accurate result. The pulse rate was also observed prior to taking the blood pressure:-

TABLE 1.

ACUTE MELANCHOLIA.				
	Case. No.	Pulse.	B. P.	Average.
Males :	1	72	194 mm.	
	2	68	160	
	3	64	180	
	4	76	176	
	5	72	160	
	6	60	164	
	7	72	140	168 mm.
Females:	8	64	190	
	9	72	140	
	10	72	144	
	11	120	180	
	12	84	160	
	13	72	160	
	14	76	140	
	15	68	180	
	16	72	160	160 mm.
Average of 16 Cases: 164 mm.				

TABLE 2.

CHRONIC MELANCHOLIA.				
	Case No.	PULSE.	B. P.	Average.
MALES:	1	64	124 mm.	
	2	72	118	
	3	72	100	
	4	68	140	
	5	64	125	
	6	64	130	
	7	72	110	
	8	68	116	
	9	84	110	119 mm.
Females:	10	76	110	
	11	64	126	
	12	72	110	
	13	84	110	
	14	100	120	
	15	84	110	
	16	84	120	
	17	72	114	
	18	68	112	
	19	84	120	
	20	72	116	115 mm.
Average of 20 Cases: 117 mm.				

From the observations tabulated above it will be seen that in the acute types of Melancholia the blood pressure is considerably above the normal. There appears to be a direct relation between the height of the blood pressure and the severity of the symptoms. Thus, the hypertension seems to vary directly with the intensity of the mental anguish. In several cases of extreme mental suffering a rise of 20 to 30 mm. in the blood pressure was noticed, above that usually exhibited by the patient before the onset of the attack. The majority of the acute cases registered a blood pressure above 160 mm. Hg. Like other observers, I have noticed how in Melancholics that towards evening they became much quieter and more contented, and that their mental suffering appeared to be less intense. Thus in a series of readings taken in the morning and in the evening from several patients a fall of from 15 to 20 mm. Hg. was observable:

Case No.	B. P.	Period.	Remarks on Mental State.
1	180 mm	Morning	Very depressed. Wringing her hands and saying she wishes to die.
	165 mm	Evening	Not so depressed. Reading a paper.
2	160 mm	Morning	Very depressed. Actively suicidal. Refused food.
	140 mm	Evening	More contented. Has taken her tea after a little persuasion.
3	160 mm	Morning	Very depressed. Has no desire to live because she has committed the unpardonable sin. Refuses food.
	145 mm	Evening	Much quieter. Says that she feels much better and does not wish to die. Has taken her food.

In one case from which blood pressure readings were obtained, the patient was always most depressed early in the morning, but about 10 a.m. she would quieten down and remain fairly contented until about 3 p.m. when she again became very depressed but not to the same extent as in the morning. In the evenings she was fairly quiet and contented. During the period of depression in the morning she made attempts to choke herself by compressing her throat with her hands and by tying her hair tightly round her neck. One morning she seized a knife out of a nurse's hand and made desperate attempts to cut her throat. In her case there was a gradual fall in the blood pressure as the day advanced, and, although in several instances, I took readings in the afternoon when the depressed fit was again at its height, a rise in the blood pressure was never recorded. But, generally speaking, depressed patients have their worst bout of depression in the early part of the day and improve slowly as the day advances.

Constipation is an almost constant feature in these cases, and is a definite factor in the production of hypertension. In several instances morning readings were taken from patients who were constipated, and invariably it was ascertained that their blood pressure was considerably higher than it was before the onset of the constipation or after it had been relieved. In addition their mental suffering had increased. When these patients were put on saline cathartics or laxatives their blood pressure fell immediately the constipation was relieved, and their mental symptoms were considerably improved. These points are well

illustrated in the following cases:-

Case No.	Date.	B. P.	Pulse.	Remarks.
1	15'11'08	184	68	Bowels open. Slightly depressed.
	22'11'08	208	72	Constipated. Very depressed. Wishes to die.
	23'11'08	208	76	Still constipated. Very depressed. Cathartic administered.
	24'11'08	190	64	Bowels open. Not nearly so depressed. Takes her food with little persuasion.
	25'11'08	186	68	Bowels open. Brighter than previously.
2	20'10'08	120	68	Bowels open. Bright and cheerful.
	24'10'08	136	72	Constipated. Very depressed, will not interest herself in anything. Cathartic administered.
	25'10'08	122	64	Bowels open. Quite bright and cheerful.
3	10' 4'09	160	72	Very constipated. Extremely depressed. Wishes to die. Cathartic administered.
	11' 4'09	156	72	Bowels open. Not so depressed as on the 10th. Cathartic repeated.
	12' 4'09	150	68	Bowels open. Less depressed than on the 11th. Cathartic repeated.
	13' 4'09	140	72	Bowels open. Still less depressed than on the 12th.
	15' 4'09	158	76	Constipated. Very depressed.

Case 3 illustrates the beneficial effect of giving saline purgatives in cases of Acute Melancholia associated with chronic constipation. Previous to administering the saline, her blood pressure was 160 mm. and she was very depressed. The saline was given on three consecutive nights and the blood pressure slowly fell until on the fourth morning it had fallen to 140 mm. The mental symptoms had also improved pari passu with the fall in the blood pressure, but

on the sixth morning the patient was again constipated and there was a recrudescence in the severity of the mental symptoms with a corresponding rise in the blood pressure to 158 mm.

CHRONIC MELANCHOLIA.

In Chronic Melancholia the blood pressure as a general rule is much lower than it is in the acute forms. In this type the mental depression is not so marked, but here again the height of the blood pressure appears to vary with the intensity of the mental suffering. It is also observable that the more physical unrest there is the lower is the blood pressure. Thus in the agitated forms of Chronic Melancholia where the amount of physical unrest exhibited is out of all proportion to the mental suffering, the blood pressure may vary from 100 to 120 mm. Hg. In the ordinary chronic types of a passive nature the blood pressure varies between 120 and 130 mm. Hg. Although many exceptions to the above general classification are to be found, yet the axiom " the more physical excitement the lower the blood pressure", holds good in the greater bulk of the cases. The observations have not been carried out for a sufficiently lengthy period to enable one to ascertain if in the transition of the acute cases into the chronic phases of the disease there is a gradual diminution of the blood pressure, but if it is probable, judging from the relationship already established between the mental symptoms and the height of the blood pressure, that evidence will subsequently be obtained that

such a fall does actually take place. Such a possibility is suggested by what occurs in the converse condition, namely, a rise of blood pressure associated with the acute exacerbations occurring in the chronic forms. Thus it was observed that in several instances a rise of 20 to 30 mm. took place at the onset of an acute attack.

MANIA.

In the acute forms of Mania 12 cases were examined. The readings ranged from 86 to 96 mm., the average being 90 mm. Thus in every case observed there was well marked hypotension of the blood pressure. Those cases with the lowest pressure, were generally the most maniacal. Also in individual instances it was noted, that the more restless and excitable a patient became the lower the pressure fell, and conversely that the quieter a patient became the nearer the pressure rose to the normal. The following table gives the readings in each of the above cases:-

ACUTE MANIA.

Case No.	Pulse.	B. P.	Average.
1	60	90 mm.	
2	72	88	
3	84	88	
4	72	96	
5	64	86	
6	68	88	
7	84	94	
8	96	86	
9	72	92	
10	88	98	
11	80	88	
12	72	94	90 mm.

In cases of Chronic Mania I found that hypotension

was almost invariably a constant feature, but that it was not so extreme as in the acute cases tabulated above. Of 20 patients with chronic excitement, who were examined, the blood pressure varied from 94 to 130 mm., the average being 110 mm. The following table shows the readings in the individual cases:-

CHRONIC MANIA.

Case No.	Pulse.	B.P.	Average.
1	84	100 mm.	
2	72	110	
3	68	110	
4	72	106	
5	60	112	
6	72	110	
7	96	94	
8	72	116	
9	90	110	
10	72	100	
11	64	110	
12	72	112	
13	76	110	
14	96	130	
15	80	120	
16	84	100	
17	72	100	
18	84	116	
19	88	114	
20	72	120	110 mm.

From the observation of the above cases, it was noticed that generally the most excited patients exhibited the lowest blood pressure, and in individual instances where increase in the severity of the motor excitement ensued a fall in the pressure was found. Thus it will be seen that there is a direct relation between the amount of the motor excitement and the blood pressure. The greater the motor unrest the more marked the hypotension. I have noticed this particularly in chronic cases when an acute exacerbation in

the symptoms supervened. A fall occurred in every instance, and a difference of 10 to 30 mm. between the two readings was ascertainable, the more acute the attack the greater the difference. When the acute attack had subsided the blood pressure returned gradually to the height it had exhibited previously. Although this is what generally happens I found that after a very severe acute attack a further fall in the pressure sometimes occurs. The probability is that this further fall was due to the physical exhaustion, which was very marked in several cases.

The diurnal variation noted in cases of Melancholia was also found in cases of Mania. In this class of case a gradual fall was also noticeable as the day advanced. From this one would expect that maniacal patients would become worse in the evenings. This I have found to be the case, and in a great many instances very marked increase in the severity of the symptoms ensued. In one particular instance from 2 p.m. till about 6 p.m. the patient was always at her worst, but after that she became much quieter. In another case the patient usually remained fairly quiet until about 6 p.m. and about two hours afterwards she became quite unmanageable.

RECURRENT MANIA.

In the intervals between the attacks the patients show a blood pressure within normal limits, but on the onset of an attack the pressure begins to fall, and as a rule falls pari passu with the increase in the severity of the symptoms. In one instance, I noticed a fall in the

pressure prior to the onset of the attack. This patient had several attacks during the time I was taking observations and from the fall in the pressure I was able to tell when the attack was coming on. As the attacks pass off the blood pressure returns gradually to its normal level.

FOLIE CIRCULAIRE.

Observations were made in two cases of Circular Insanity, and in each instance it was found that in the depressed stage there was well marked hypertension. In the excited stage there was a fall in the blood pressure of 30 - 40 mm. below that registered in the depressed stage:

Case.	Melancholic Stage.	Maniacal Stage.
1	166 mm.	128-136 mm.
2	160 mm.	120-130 mm.

INFLUENCE OF MENSTRUATION ON THE BLOOD PRESSURE IN THE FUNCTIONAL PSYCHOSES.

With regard to the influence of menstruation on the blood pressure in cases of Melancholia observations were made in three instances only. The patients each menstruated so irregularly that I was unable to take readings at the pre-menstrual period, but with the onset of menstruation the blood pressure began to rise and exhibited readings from 15 to 20 mm. higher than those during the intermenstrual period. Associated with this rise there was a simultaneous

increase in the severity of the mental symptoms, and suicidal tendencies were shown at this time which were not evident previously.

In one case of Acute Mania in a girl aged 26 I was fortunate in obtaining a reading during the premenstrual period. It had been observed that just before menstruation commenced the patient became more restless and excitable; she would rush about the Ward and Dormitory, two nurses being required to control her. At this period her blood pressure showed a fall of 10 to 15 mm. below the average intermenstrual reading. As soon as the flow commenced she became gradually quieter and used to express the desire that she might remain in bed. At this time her blood pressure registered a rise of 10 to 20 mm. above the intermenstrual reading. The blood pressure fell gradually to the usual level after the flow had ceased.

Some observers have noted a fall during the flow, but their experience was based on readings taken in normal health. Federn (6) noticed a fall shortly before, at, or after the beginning of the flow, the pressure rising gradually through the intermenstrual period.

EPILEPSY.

Observations were made in 15 cases of Epilepsy. The blood pressure average of the 15 was 117 mm. Of 7 males examined the average was 111 mm., the readings ranging from 90 mm. to 160 mm. In the 8 female cases the readings varied from 106-140 mm., the average being 122 mm. The

following table gives the readings recorded in each individual case:

MALES

Case No.	Pulse.	B. P.	Average.
1	72	125 mm.	
2	64	160	
3	80	90	
4	60	116	
5	84	90	
6	60	106	
7	80	90	111 mm.

FEMALES.

Case No.	Pulse.	B. P.	Average.
1	72	106 mm.	
2	84	140	
3	80	112	
4	80	120	
5	72	124	
6	96	128	
7	60	128	
8	84	120	122 mm.
Total Average 117 mm.			

The blood pressure appeared to be such a variable quantity in the cases examined that definite conclusions as to whether a pathological state of the pressure pathognomonic of Epilepsy exists, cannot be formulated. In two cases the observations were made just prior to the onset of a fit and the blood pressure showed a rise of 10 mm. above the usual pressure exhibited by the patients. It was impossible to obtain accurate readings whilst the convulsive stages lasted, but on several occasions a rise in the pressure of 15 to 25 mm. was found immediately after the muscular contractions ceased. This rise was of short duration and the pressure fell gradually until on an average it had

reached the normal within half an hour.

The probability is that the blood pressure shows a gradual rise before the onset of the fit, and that while the fit lasts the pressure is above normal. Then there is a gradual fall towards the normal beginning immediately after the fit ceases.

Pilcz (7) in two cases found a rapid fall as soon as the muscular relaxation was established, reaching the normal within a few minutes. Féré (8) obtained similar results although the subsidence of the blood pressure in his cases was not so rapid as in those recorded by Pilcz.

DEMENTIA PRAECOX.

With regard to cases of Dementia Praecox I may say that seven patients in all were examined. In one only was a moderately high pressure found, e.g., 140 mm. The first reading was taken from this patient on the 28th October, 1908, and his blood pressure was 140 mm., but one month later it had fallen to 118 mm. At the end of December, 1908, it had fallen as low as 108 mm. This was undoubtedly due to Phthisis Pulmonalis which made rapid progress in the two months, having been in the incipient stage previously. Of the other six cases the readings varied from 100 to 110 mm., the average being 104 mm. Four of these six cases had Phthisis Pulmonalis, one being in the incipient stage, but the other three showed evidence of advanced cavity formation. All of these seven cases were well marked examples of Dementia Praecox. Craig (1) in his investigations

reports two cases of stupor in which there was hypertension, the readings being in one case 150-160 mm., and in the other 150 mm. Probably his two cases were uncomplicated by any cachetic condition which tended to lower the blood pressure. Janeway (5) states that hypotension is commonly associated with wasting diseases and cachetic states such as Advanced Phthisis, Carcinoma of the Stomach, and General Paralysis of the Insane. Thus the Phthisis Pulmonalis in my cases was responsible for the low blood pressure. It is quite possible that if readings had been taken in my cases at the onset of the stuporose state, hypertension might have been found, provided the Phthisis had not been present, or present only in the very early stages. In the first case quoted hypertension was found soon after the onset of the mental disease, but as soon as the Phthisis made rapid progress the blood pressure fell. The association of Phthisis Pulmonalis with this type of mental disease is very insteresting from the standpoints of etiology, prognosis and treatment.

GENERAL PARALYSIS OF THE INSANE.

Observations were made in 31 cases of General Paralysis, all of them males, in various stages of the disease. The readings ranged from 84 mm. to 124 mm., the average being 105 mm. The following table shows the pulse rate and the blood pressure in each of the cases. Also for the sake of comparison the stage of the disease reached in each individual case is noted. Instead of the usual nomenclature

of first, second and third stages I have substituted the terms "Paretic" and "Paralytic" for second and third stages, as being more descriptive:-

Case No.	Age.	Pulse.	B. P.	Stage of Disease.
1	39	80	114	In the "Paretic" Stage
2	43	72	108	Do.
3	50	72	108	Do.
4	50	96	114	Do.
5	40	76	106	Do.
6	46	80	110	Do.
7	59	76	104	Do.
8	47	92	110	Do.
9	35	88	108	Do.
10	54	76	100	Do.
11	53	92	100	Do.
12	29	72	104	Do.
13	42	96	124	Do.
14	48	68	120	Do.
15	48	64	110	Do.
16	55	68	110	Do.
17	34	102	124	Do.
18	26	72	110	Do.
19	48	64	110	Do.
20	39	64	98	End of the "Paretic" Stage
21	48	72	84	Do.
22	48	96	96	Do.
23	36	76	88	Do.
24	37	102	86	Do.
25	57	84	120	Do. ✲
26	36	68	90	Do.
27	43	96	96	Do.
28	28	84	92	Do.
29	36	96	95	In the "Paralytic" Stage
30	62	76	90	Do.
31	32	76	90	Do.

✲ Arterial Sclerosis.

From the above table it will be evident that in the earlier stages of the disease the blood pressure is higher than in the later stages. Thus in the paretic stage the blood pressure ranged from 100 to 124 mm. Leaving out case No. 25 it will be seen that the readings at the "end" of the paretic stage were much lower than those "in" the

paretic stage. In the paralytic stage well marked hypotension is observable, which increases as the disease advances. There appears to be a gradual fall in the blood pressure from the onset of the disease to the terminal stages in which I have observed the hypotension to be as low as even 80 mm. In one patient who died in the paralytic stage, the blood pressure fell to 80 mm. two days before death. In this case I was able to take readings in the paretic stage. When admitted he was in this stage and his blood pressure was 110 mm., pulse 72. Towards the end of this stage the pressure had fallen to 100 mm., pulse 76, and in the terminal stage a month before death it was down to 90 mm.

Here again as in the functional psychoses the influence of excitement and depression is reflected in the blood pressure, but not to the same extent. In one case, a fall of 10 - 15 mm. was noted on the onset of a fit of excitement, and in another who had occasional fits of depression there was with each attack a rise of 15 to 20 mm.

DEMENTIA.

In all 30 cases of Senile Dementia and 30 cases of Secondary Dementia have been examined. Generally speaking the blood pressure is much higher in the Senile forms than it is in the Secondary kinds. The readings in the Senile cases ranged from 130 to 202 mm., the average being 165 mm. In the Secondary cases, leaving out a case of Advanced Phthisis, the readings varied from 100 to 150 mm., the

average being only 116. This hypertension which is so marked a feature in the Senile Dementia, is of a permanent nature. Although the blood pressure is not very high in the Secondary types, yet it will be evident that a rise has taken place as the disease has advanced from its initial to its final form. In the majority of the Secondary cases examined, the original form of the disease was Mania, and it has been shown that the blood pressure is subnormal in this form of mental disease. Therefore there undoubtedly appears to be a gradual rise in the pressure as the disease passes through the acute and chronic stages towards the Secondary Dementia.

The blood pressure in the Dementias is subject to the usual diurnal variations, but not to the same extent as in the functional insanities. Vascular changes of an organic nature, chiefly Arterio-sclerosis, are present in the great majority of the cases of Senile Dementia, and degenerative processes are likewise at work in the nervous system. In fully 75% of the cases of both types of dementia quoted below gastro-intestinal disturbances and constipation were present. Observations have not been carried out for a sufficiently lengthy period in individual cases, to enable it to be stated definitely that in cases of dementia the blood pressure rises as the dementia increases, but judging from the mental states of those patients on whom observations were made, I have noticed that the hypertension was most marked in the most demented cases.

The following tables give the readings in the two types of dementia observed:-

TABLE 1.

SENILE DEMENTIA.

Case No.	Age.	Pulse.	B. P.	Average.
1	81	88	170	
2	58	72	200	
3	56	64	180	
4	65	96	150	
5	73	72	160	
6	82	72	140	
7	78	64	202	
8	58	84	194	
9	71	60	140	
10	69	96	180	
11	76	84	200	
12	63	90	160	
13	70	84	142	
14	76	96	166	
15	82	76	140	
16	58	72	140	
17	68	84	140	
18	69	96	168	
19	71	96	180	
20	71	88	150	
21	64	80	130	
22	75	120	166	
23	75	84	190	
24	81	72	150	
25	66	68	146	
26	68	96	190	
27	73	88	160	
28	72	88	170	
29	74	84	180	
30	69	72	160	165 mm.

TABLE 2.

SECONDARY DEMENTIA.

Case No.	Age.	Pulse.	B. P.	Average.	Original Type
1	64	72	132		Ch. Mania
2	59	68	100		Do.
3	48	96	116		Do.
4	73	64	108		Do.
5	58	72	150		Do.
6	65	72	116		Do.
7	44	96	110		Do.
8	65	100	120		Do.
9	62	76	126		Do.
10	41	84	108		Do.
11	65	76	125		Do
12	57	84	120		Do.
13	61	72	120		Do.
14	53	84	126		Do.
15	68	72	110		Do.
16	49	76	110		Do.
17	48	90	80		Do. x
18	36	72	100		Do.
19	47	72	106		Do.
20	52	80	112		Do.
21	67	80	130		Do.
22	54	60	130		Do.
23	48	72	130		Do.
24	47	96	100		Do.
25	49	96	136		Do.
26	38	68	138		Do.
27	58	64	126		Ch. Melancholia
28	40	110	110		Do.
29	58	72	120		Do.
30	50	64	110	116 mm.	Do.

x Phthisis.

GENERAL CONSIDERATIONS.

Before entering into a discussion on the etiology of the various pathological states of the blood pressure which are found in the Psychoses, and their relation to Mental Disease, it will be advantageous to consider a few details of the factors determining the blood pressure. Janeway (5) in his book on "The Clinical Study of Blood Pressure", describes four chief factors, (1) The energy of the heart. (2) Peripheral resistance. (3) Elasticity of the arterial wall, and (4) Volume of the circulating blood.

No. 1. The Energy of the Heart:-

(a). Increase in the rate of the heart beat raises the blood pressure, the other factors remaining constant.

(b). Decrease in the rate of the heart beat causes a fall in the pressure, other factors remaining constant.

(c). Increase in the volume of blood discharged from the ventricles at each systole increases the blood pressure, other factors remaining constant.

(d). Decrease in the volume of blood discharged from the ventricles causes a diminution in the blood pressure, other factors remaining constant.

No. 2. Peripheral Resistance:-

(a) Increase in the peripheral resistance, the other factors remaining constant, causes a

rise in the blood pressure.

(b) Decrease in the peripheral resistance, the other factors remaining constant, causes a fall in the blood pressure.

All blood vessels with any muscle fibres in their walls possess a certain amount of tonus. This tone of the vessels depends on the balance between the vaso-constrictor and the vaso-dilator nerves. Some anatomists give evidence of the existence of a vasomotor system for the cerebral vessels, which is derived from the cervical sympathetic, but physiological evidence of its existence is as yet quite inconclusive. Probably before long, a method will be discovered whereby experimental proof of the existence of such a system will be forthcoming. Still, it seems quite reasonable to believe in its existence when every other system in the body is endowed with a vasomotor apparatus; and, it is difficult to conceive how the cerebral vessels are able to adapt themselves to every alteration in the general blood pressure by virtue of the elasticity of their walls alone, without a controlling nervous mechanism. According to Leonard Hill (9) the volume of the blood in the cerebral cavity is practically constant on account of the incompressibility of the brain substance, and any little variation that does take place is due to the displacement of the cerebro-spinal fluid, which, he says, is insignificant in amount. Ford Robertson (10) states that the "Monro-Kellie" doctrine is erroneous, and that the quantity of the blood in the brain is capable of varying to an important extent,

but not precisely as in other organs. He bases these conclusions on the grounds that Hill (a) failed to take into account the variability of the quantity of the fluid in the lymph spaces of the brain, and (b) that because he accepted as an axiom what can be shown to be really one of the most transparent fallacies, namely, the doctrine of the incompressibility of the brain. He maintains, that a further expansion of the arterioles and capillaries can take place without a corresponding diminution of the amount of the blood in the veins, hence there must be an increase in the total quantity of blood in the brain, on account of the displacement of the fluid from the lymph spaces of the cerebral substance, and conversely, when the blood pressure falls again the walls of the arterioles and capillaries contract and the amount of blood in the brain is diminished and the fluid in the cerebral lymph spaces is correspondingly increased.

I am inclined to favour Ford Robertson's view, that the quantity of the blood in the brain varies with the general blood pressure, nevertheless, I do not think that the alterations in the calibre of the vessels are entirely of a mechanical nature due to the perfect elasticity of their walls, but I am of the opinion that the nervous system exercises a certain amount of control by means of a vasomotor apparatus.

The effect of stimulating any vasomotor nerve is to diminish the calibre of the vessels supplied by it, and the other factors remaining constant, there is in consequence

a rise in the blood pressure. If the vaso-dilator nerve fibres are stimulated, there is a fall in the blood pressure. Local alterations of the blood pressure of a reflex nature are of common occurrence, without any alteration in the general blood pressure.

No. 3. Elasticity of the Arterial Walls:-

Normally the arterial walls are perfectly elastic, in virtue of this property the work of the heart never becomes excessive, and the blood pressure is thus prevented from rising to an extreme height. With a high blood pressure the distensibility of the arteries is lessened and any increase in the output of the heart must raise the blood pressure far more than a corresponding increase at a lower pressure would.

No. 4. Volume of the Circulating Blood:-

The maximum cubic capacity of the blood vessels is far in excess of the normal cubic capacity of the blood, but the vessels adapt themselves in calibre to the blood stream by means of their vasomotor tone, and thus prevent the blood pressure from becoming too low. However, within certain wide limits, the quantity of the blood has only a minor influence on the blood pressure, and if the quantity should vary very much from any cause, the influence is only temporary.

Before considering the special etiology of pathological states of the blood pressure in the various types of mental disease, it is probably just as well to keep in mind that the same factors in the production of disease operate

throughout the various systems of the body, not even excepting the nervous system. In individual cases, however, the nervous system is particularly prone to disease on account of an inherited weakness or predisposition whereby it is less able to withstand these factors. It also appears in a favourable position for the access of toxins carried to it by the blood stream.

From the foregoing observations it will be evident that in the majority of the cases of functional disturbance of the cortical centres, there is a distinct relationship between the mental symptoms and the blood pressure. Thus it was noted in cases of functional depression that the blood pressure was high, and that the hypertension varied directly with the profoundness of the depression. In cases of functional motor excitement hypotension was observed, which varied with the severity of the case.

Now the questions that naturally arise from this intimate relationship between the mental symptoms in functional insanity and the blood pressure are:-

(1). What is the nature of the operating cause which produces the pathological alterations in the blood pressure and the definite mental disease? Is it intrinsic or extrinsic in character?

(2). Is the cause a common factor in the production of both?

(3). If so, which pathological condition is produced first of all?

(4). If one pathological condition is produced first of all, is it the cause of the other?

(5). What is the mechanism in the production of the altered states of the blood pressure ?

No. 1. Although Melancholia and Mania may initially be purely functional diseases in so far as that, when the operating cause of the mental symptoms has ceased, the cortical neurones are not sufficiently disintegrated to prevent a return to their normal state when health is restored, yet all the evidence points to the etiology being due to some toxic material circulating in the blood. Of what the exact nature of this toxin or exciting material is, we have as yet no absolute proof.

It is well known that in cases of Chronic Constipation ~~that~~ certain patients suffers from a series of symptoms of a very complex nature. These undoubtedly arise from the decomposition of the accumulated effete matter in the bowels producing toxins, ptomaines and other deleterious substances which circulate in the blood stream and generally disturb the tissue nutrition in the various systems of the body. This condition is called "Auto-Intoxication".

Now in Melancholia especially, Chronic Constipation is an almost constant feature, and in the other types of the psychoses disturbances in the digestive and other alimentary processes are very commonly present. As a natural result of these disturbances various pathological changes must take place in the tissue nutrition of the body, and further poisons or toxins inimicable to health be evolved.

From the above facts there can be no doubt

that toxins of an intrinsic source are an important factor in the production of the functional psychoses, but it is quite feasible that toxins arising from microbic origin may also operate in the etiology. The latter or extrinsic toxins may more readily exert their deleterious influence on account of the tissue elements having a diminished resisting power from the operation of the intrinsic toxins.

No. 2. As will be seen in the answer to question 3 the blood pressure appears to be primarily affected and the mental symptoms apparently are secondary to the altered blood pressure, but the toxic material which is circulating in the blood, and reduces the resistance of the tissues generally, probably acts directly on the cortical elements and further predisposes the already inherently weak nerve cells to react in a pathological manner to the abnormal states of the blood pressure. In spite of the fact that the increased blood pressure frequently appears first of all, a common cause probably operates in the production of both, but as stated above once the pathological state of the blood pressure is established it acts as a further factor in the accentuation of the mental symptoms. Heredity seems to play an important role in the predisposition of the nervous system to react abnormally to pathological changes in the blood pressure, for mental and physical health are quite compatible with marked hypertension or hypotension.

Nos. (3) and (4). If one were able to take a series of observations from the early stages of functional insanity until it had fully developed, it might be possible to prove conclusively that the pathological condition of the blood

pressure makes its appearance before the altered mental state. Still with the evidence at present available I think it is quite justifiable to conclude that the altered blood pressure appears first of all, and that the mental state is secondary to it in point of time. These conclusions are based on the following facts:-

(1). In several cases of Chronic Melancholia I have observed a rise in the blood pressure immediately before the onset of an acute exacerbation.

(2). In three cases of Mania a fall in the pressure of 15 to 25 mm. occurred just prior to an attack of acute excitement. Also in one case of Recurrent Mania I noticed a fall in the pressure before an attack.

(3). In several cases with marked hypertension associated with profound depression the administration of ½ gr. Erythrol Tetranitrate caused a fall in the blood pressure of 30 to 35 mm., with relief in the mental symptoms. In an hour's time the effect of the drug would begin to pass off, and by the end of two to three hours the blood pressure would be back to its previous height. Towards the end of the second hour the patient again became depressed and between the third and fourth hours the mental symptoms were present in their previous severity.

If we accept the view of some observers that the mental state is produced solely by the direct action of toxic material which is circulating in the blood, on the nerve cells, how is it that the mental state improves as soon as the blood pressure is lowered by

the vaso-dilators? This toxic material must still be exerting its malign influence on the cortical cells, although the blood pressure has been lowered.

I think that this shows fairly conclusively that the blood pressure is an important factor in the aggravation if not in the production of the mental symptoms in the functional insanities.

In a case of Acute Melancholia in a woman of 56 years, I put the patient on Erythrol Tetranitrate and kept her under its influence for nearly four weeks. During this period there was a marked improvement in her mental condition but still she was not nearly well. She remained dull and suspicious and retained her delusions of persecution. She was also very constipated during this time. At the end of the period the Erythrol Tetranitrate was stopped, and there was an immediate return of the acute depression, and she became suicidal. I then started treating the chronic constipation with saline cathartics, and also gave her tonics of Strychnine and Iron. In combination with this treatment she had ½ gr. Erythrol Tetranitrate thrice daily for one month, and then it was increased to 1 gr. thrice daily for the second month. She rapidly improved under this treatment and was quite well at the end of the second month. She remained well and was discharged cured. This case is very instructive and the following points are ascertainable from it, (a) Improvement of the mental symptoms on the fall in the blood pressure, (b) Return

in the severity of the symptoms when the pressure rose again, (c) Patient did not get quite well mentally when the blood pressure was kept down by the vaso-dilators alone. This shows that the source of the toxins was still intact and was manufacturing toxins which by operating directly on the cerebral cortex were not sufficient to produce acute depression, but were just sufficient to prevent a return to the normal state of health, (d) Return to normal mental health when the source of the poisons was destroyed by curing the constipation, associated with vaso-dilators.

No. (5). In the functional insanities the altered states of the blood pressure may be produced in two different ways, (a) mechanically, (b) by reflex vaso-constriction due to nervous stimulation.

(a). Cases which are associated with Chronic Constipation must have increased blood pressure from the increased inter-abdominal pressure. Distension of the bowels with an accumulation of faecal matter, besides causing an increase in the inter-abdominal pressure, would act directly in raising the blood pressure in the splanchnic area because the blood vessels in the walls of the bowels would be stretched on account of the distension, and consequently their lumen would be narrowed, and there would be a certain amount of loss in the elasticity of their walls. As a result of this diminution in the elasticity of the walls of the blood vessels and the increase in the peripheral resistance,

the blood pressure will be increased in the splanchnic area and thus lead to a rise in the general blood pressure.

(b). Reflex stimulation of the splanchnic nerves may arise from the increase in the inter-abdominal pressure in cases of Chronic Constipation and a rise in the general blood pressure result.

The toxins produced in the gastro-intestinal tract in cases where there is gastro-intestinal disturbance are absorbed into the blood stream and while circulating there may act locally as an irritant on the vasomotor nerves in the vessel walls or centrally on the vasomotor centre in the medulla, and in consequence a rise in the blood pressure ensues.

The toxins elaborated in cases of acute excitement probably act on the vasomotor nerves in a different manner. We know that hypotension can be produced experimentally by vasomotor paralysis. So it is quite feasible to suppose that the toxins produced in these cases of Mania, act by paralysing the vasomotor apparatus, thus bringing about hypotension.

WHAT IS THE CAUSE OF THE ALTERED BLOOD PRESSURE IN GENERAL PARALYSIS?

As already shown the blood pressure in General Paralysis becomes progressively lower as the disease advances. Conclusive proof of the etiology of this disease has not yet been found, although various theories have been advanced from

time to time concerning its causation. Ford Robertson (11) has traced the invasion of a specific diptheroid organism from the mucous membrane of the throat and nose through the lymph channels to the base of the brain. He also states that he has demonstrated by microscopical sections the presence of this same organism throughout the brain. He maintains, that the probability is that General Paralysis is due to this specific organism acting on the nerve tissues already debilitated by the ravages of Syphilis and Alcohol. He has been able to cause an abatement in the symptoms in a few well marked cases, by aiming at the destruction of the source of the organism, by means of oral antisepsis. He also isolated the organism and made a serum from it, which he injected into several patients and produced an amelioration of the symptoms thereby. If General Paralysis is due to the operation of a specific microbe, how does it act in causing progressive hypotension of the blood pressure? General Paralysis is a progressive nervous disease of an organic - nature. Pathologically it is a degeneration of the nerve elements, the nerve cells and their axis cylinders becoming gradually destroyed and their place being taken by connective tissue. Whether it is due to a specific organism (which is the most likely), or not, the cause is undoubtedly of toxic origin. I am also inclined to think that the pathological fall in the blood pressure is due to the same cause. The fact that as the disease progresses, the blood pressure falls progressively also, points, I think, to a common source. This progressive fall in the blood pressure must be due to

vasomotor paralysis. The probability is, that as the general involvement of the various nerve elements proceeds, the vasomotor centres and nerves are slowly implicated and degeneration of their cells and fibres results, and consequently vasomotor paresis ensues first of all and then vasomotor paralysis. Thus the fall in the blood pressure is secondary to the implication of the nervous tissues. That the vasomotor system is invloved there can be no doubt for local disturbances in the circulation are relatively common in this disease. This is evidenced by the fact that cyanosis of the hands, feet and face, with oedema of the tissues are of frequent occurrence. Hyperidrosis which is due to vasomotor paralysis is also a common symptom.

HYPERTENSION IN SENILE DEMENTIA.

A certain amount of hypertension appears to be physiological to old age, various reasons being ascribed as to its causation. Some observers state that it is due to a narrowing of the arteries which occurs as age advances. Others say that it is due to an increased viscosity of the blood. Degenerations of the coats of the blood vessels of a granular and fibroid character are of frequent occurrence in senility, and these degenerations all tend to increase the peripheral resistance, and consequently raise the blood pressure. Fully 75% of the cases of senile dementia which I examined had changes in the arterial coats as far as I was able to ascertain by palpation of the blood vessels. Also in

about 50% of the cases cardiac hypertrophy was present. This would also account for a rise in the blood pressure. These physical factors are quite sufficient in themselves to produce hypertension, but probably toxic material also operates in producing an aggravation of the hypertension, as gastro-intestinal disturbances are exceedingly common in this type of mental disease. Unfortunately experimental evidence of the effects of high pressure on the nervous tissues is not forthcoming, but probably in the organic forms of mental disease the high blood pressure is only of secondary importance to the deleterious influence of subacute intoxication in the production of pathological changes in the nerve cells.

TREATMENT.

From the observations made above, it must be evident that although the pathological states of the blood pressure may be in themselves productive in the functional insanities of acute mental symptoms, yet they are not the primary cause, and as is stated above a common source of toxic origin, is probably the remote but nevertheless the most important cause. This theory is borne out when one attempts to cure the acute mental depressions, which are associated with marked hypertension, with vaso-dilators alone. I have almost invariably found that during a course of treatment with drugs which cause a lowering of the blood pressure only, that whilst the patients are under the influence of the drug their mental state has improved considerably, but when the

administration of the drug ceases, the blood pressure rises again and there is a recrudescence in the severity of the symptoms. The reduction in the blood pressure was decidedly of a temporary nature in these cases; but better success was met with in making the reduction of a more permanent character by treating the gastro-intestinal disturbances present in these patients in addition to the use of vaso-dilators. The improvement in the mental symptoms when these lines were followed, I found to be more marked and not so evanescent in character.

The drug which I have found to be of most service amongst the vaso-dilators in reducing the blood pressure is Erythrol Tetranitrate, for although its action is slower than that of Nitroglycerine yet, its effect does not pass off nearly so quickly. Thus from a series of observations, I found that $\frac{1}{100}$ gr. Nitroglycerine produced a fall of 25-40 mm. in the blood pressure in about one minute and a half, but that the effect had passed off in from 10 to 15 minutes. Erythrol Tetranitrate $\frac{1}{2}$ gr. produced its maximum effect on the average in from 10 to 15 minutes, and would cause a fall in the pressure of 20-35 mm. Its depressent effect on the vascular system had not wholly passed off by the end of two hours. After using Nitroglycerine in several cases, I abandoned its use because the action of the drug was so evanescent that patients could not be kept under its influence for a sufficient length of time to be of any real use therapeutically, although in several instances as much as $\frac{3}{100}$ gr. thrice daily was given.

In many cases I have noticed a remarkable relief in the symptoms from the use of Erythrol Tetranitrate. Thus I have noticed cases of most intense mental suffering being relieved in the course of a few hours. Apart from this rapid relief, gradual improvement is observed from a course of the drug, but the mental symptoms return again in their previous severity when the drug is stopped. The following case shows (1) the effect of treating the symptoms and leaving the cause alone, (2) the result of removing the cause as well as treating the symptoms.

Mrs. A. aged 56, was very acutely depressed. She had many delusions of persecution, was actively suicidal and moaned continually. She was put on ½ gr. Erythrol Tetranitrate thrice daily for four weeks. After she had been under the drug for a day or two she showed considerable improvement, ceased moaning and appeared a little more contented. At the end of the first week, she commenced reading the papers and did a little ward work. Before and during the time she was under the Erythrol Tetranitrate, she was suffering from gastric catarrh and chronic constipation. At the end of the four weeks all her acute symptoms had disappeared, but she remained rather emotional and suspicious. She had a few vague delusions of persecutions but they were slowly disappearing. At the end of this period the Erythrol Tetranitrate was stopped, and in two days time acute symptoms again showed themselves and at the end of a week her mental condition was as bad as it was before treatment

commenced. I then started treating her gastric catarrh and chronic constipation dietetically and medicinally and also gave her ½ gr. Erythrol Tetranitrate thrice daily. At the end of four weeks she had improved considerably. Her gastric catarrh was quite relieved and her bowels were very regular. Her mental state also showed great improvement. She was bright and cheerful and took a much greater interest in sewing and ward work. She lost all her delusions, but still remained a little emotional. Her blood pressure which was 180 mm. before treatment commenced was now reduced to 138 mm. For the next four weeks she was put on 1 gr. Erythrol Tetranitrate thrice daily, and at the end of that period the drug was stopped altogether, the patient being quite well mentally. Her blood pressure was then down to 130 mm. The patient remained well and was discharged cured two months later. On the day of her discharge her blood pressure was 128 mm.

In several cases I have obtained gratifying results from the use of Erythrol Tetranitrate as an aid in the general treatment of the functional insanities.

Magnesium Sulphate is a very valuable drug in treating these conditions of high blood pressure. It is not so quick in its action as the Erythrol Tetranitrate, but the reduction arising from it is of a more permanent nature. Its mode of action on the blood pressure is of a duplex nature. It not only influences the blood pressure by diminishing the quantity of fluid in the tissues, but also by sweeping away the source of the toxins which act on the vasomotor centres and nerves.

In the treatment of maniacal patients with low blood pressure, with vaso-constrictors, I have obtained no results of a conclusive nature. In only one case did the blood pressure rise to any appreciable extent and undoubtedly there was an abatement of the severity of the symptoms. In this case the patient had 1 dr. doses of the Extract of Suprarenal Gland, thrice daily. The blood pressure before the drug was administered was 80 mm. and the patient was acutely maniacal. In the course of 24 hours, the blood pressure had risen to 88 mm., and the patient was not so acutely excited. I never managed to get the pressure above 90 mm. and on several occasions it fell to 82 mm. whilst the patient was still on the drug. Continuous hot baths have been recommended in acutely maniacal attacks as a means of cutting short an attack. Personally, I have only observed the effect of a continuous hot bath in one instance of acute mania. The temperature of the bath was from 90 to 95 F. and the patient remained in it for three hours. The bath had certainly a quietening effect, and the blood pressure had risen a few millimetres. Purgation in these cases also appears to cut short an acute attack, probably by clearing out the toxins which operate in the production of the vasomotor paralysis.

In senile cases I have been able to reduce the blood pressure by the use of Magnesium Sulphate, but only a transient improvement in the mental symptoms resulted. In several instances I put patients on Potassium Iodide for lengthy periods with the idea of treating the Arterio-sclerosis and thus reducing the peripheral resistance. In two patients a

gradual fall in the blood pressure ensued with a slight improvement in the mental condition, but I have not been able to carry on observations for a sufficiently long period to state definitely that reduction in the blood pressure results from the prolonged use of Potassium Iodide.

CONCLUSIONS.

(1). That the blood pressure varies in different forms of insanity.

(2). That in the functional insanities there is a direct relationship between the height of the blood pressure and the mental state.

(3). That in states of acute depression the blood pressure is invariably high.

(4). That the blood pressure is sub-normal in the mental states known as Acute Mania where the amount of physical excitement is very marked.

(5). That the hypertension in the depressed states varies directly with the severity of the mental symptoms, the more intense the mental anguish the higher the blood pressure.

(6). That the hypotension in the states where physical unrest is excessive varies directly with the amount of the motor excitement.

(7). That in General Paralysis of the Insane the blood pressure becomes progressively lower as the disease advances.

(8). That the blood pressure is almost invariably high in the cases of Senile Dementia. Generally speaking the hypertension becomes progressively higher in the individual cases as the Dementia increases.

(9). That in Epilepsy the probability is that the blood pressure rises before the onset of a fit and falls gradually to the normal after the fit.

(10). That in the functional insanities the pathological state of the blood pressure is a great factor in the production of the mental symptoms.

(11). That it is not the only factor in the etiology of the mental disease.

(12). That the primary source common to both is probably of toxic origin.

(13). That this toxin is most likely of intrinsic source in the functional insanities, and of extrinsic or specific source in the organic forms of mental disease.

(14). That in conditions of high blood pressure associated with mental depression of a functional type:-

(a). The drugs which act on the blood pressure alone are only palliative in their therapeutic effects.

(b). The drugs which act in removing the gastro-intestinal disturbances such as, Magnesium Sulphate etc., tend to lower the blood pressure in a more gradual but also more permanent way.

(c). If vaso-dilators are given in combination

with such drugs the lowering of the blood pressure is more rapid in character and equally permanent.

(d). The relief in the mental symptoms varies directly with the reduction in the pressure.

(e). The permanency of the cure depends on the permanency of the reduction of the blood pressure, or more strictly speaking on the absence of the toxic causes.

(15). That abatement of symptoms of only a transient nature may follow the above treatment in well marked cases of Senile Dementia, but in incipient cases there lies the possibility of cure.

REFERENCES.

(1). CRAIG.- Blood Pressure in the Insane. Lancet, 1898, vol. 1, p. 1742.

(2). ALEXANDER.- A few Observations on the Blood Pressure in Mental Disease. Lancet, 1902, vol. 2, p. 18.

(3). DUNTON.- Some Observations upon Blood Pressure in the Insane. Boston Med. & Surg. Jour., 1903, vol. 149, p. 422.

(4). GIBSON.- Quarterly Journal of Medicine. Oct. 1907, vol. 1, No. 1.

(5). JANEWAY.- The Clinical Study of Blood Pressure. New York & London, 1907.

(6). FEDERN.- Ueber Blutdruckmessung am Menschen. Wien. klin. Wochenschr., 1902, vol. 15, p. 835.

(7). PILCZ.- Ueber einige Ergebnisse von Blutdruck-messungen bei Geisteskranken. Wien. klin. Wochenschr., 1900, vol. 13, p. 276.

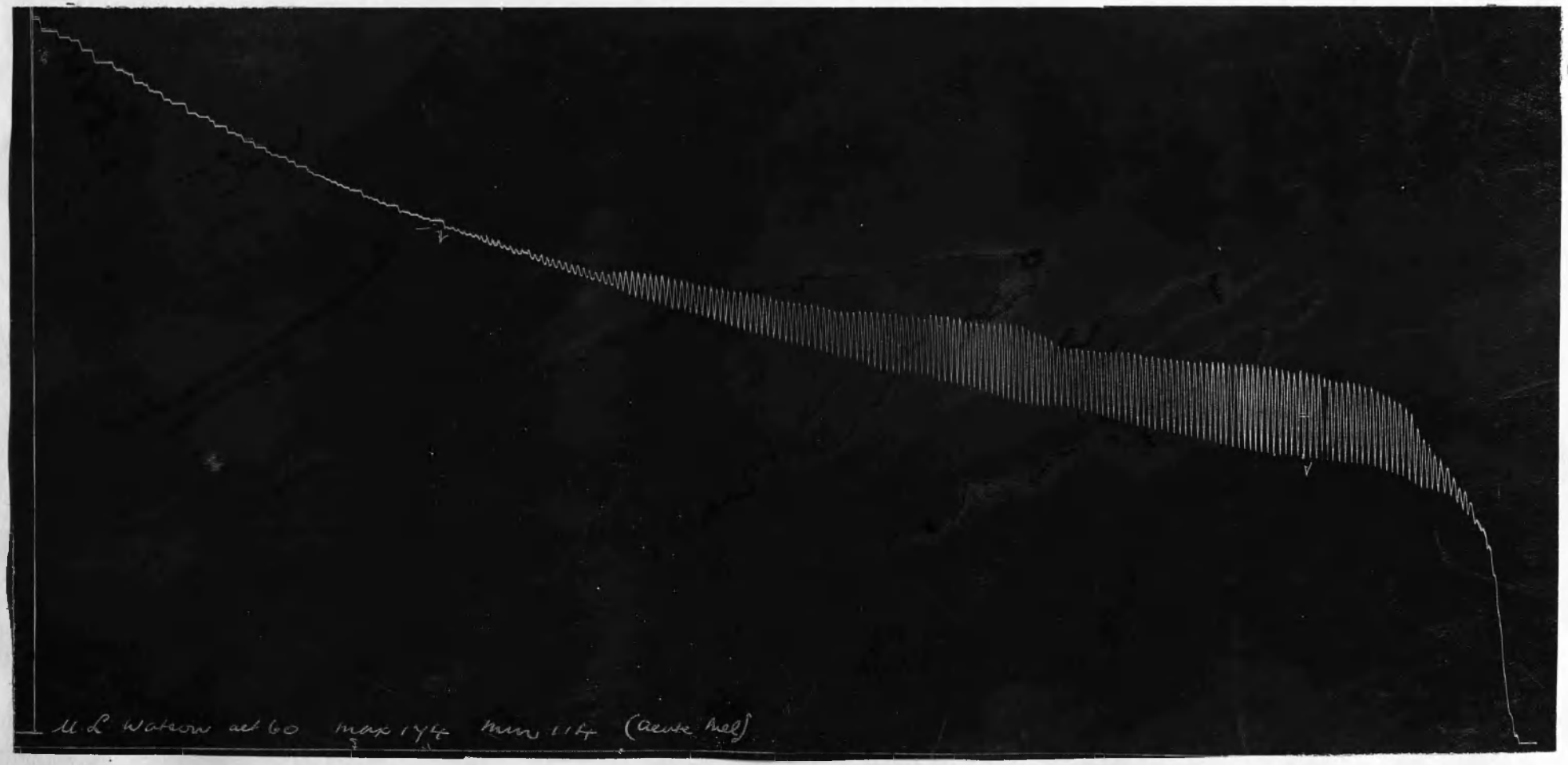
(8). FÉRÉ.- La Pression Artérielle dans les Paroxysmes Epileptiques et dans le colère. Compt. rend de la Soc. de Biol, 1889, vol. 1, p. 368.

(9). HILL.- The Physiology & Pathology of the Cerebral Circulation. London, 1896.

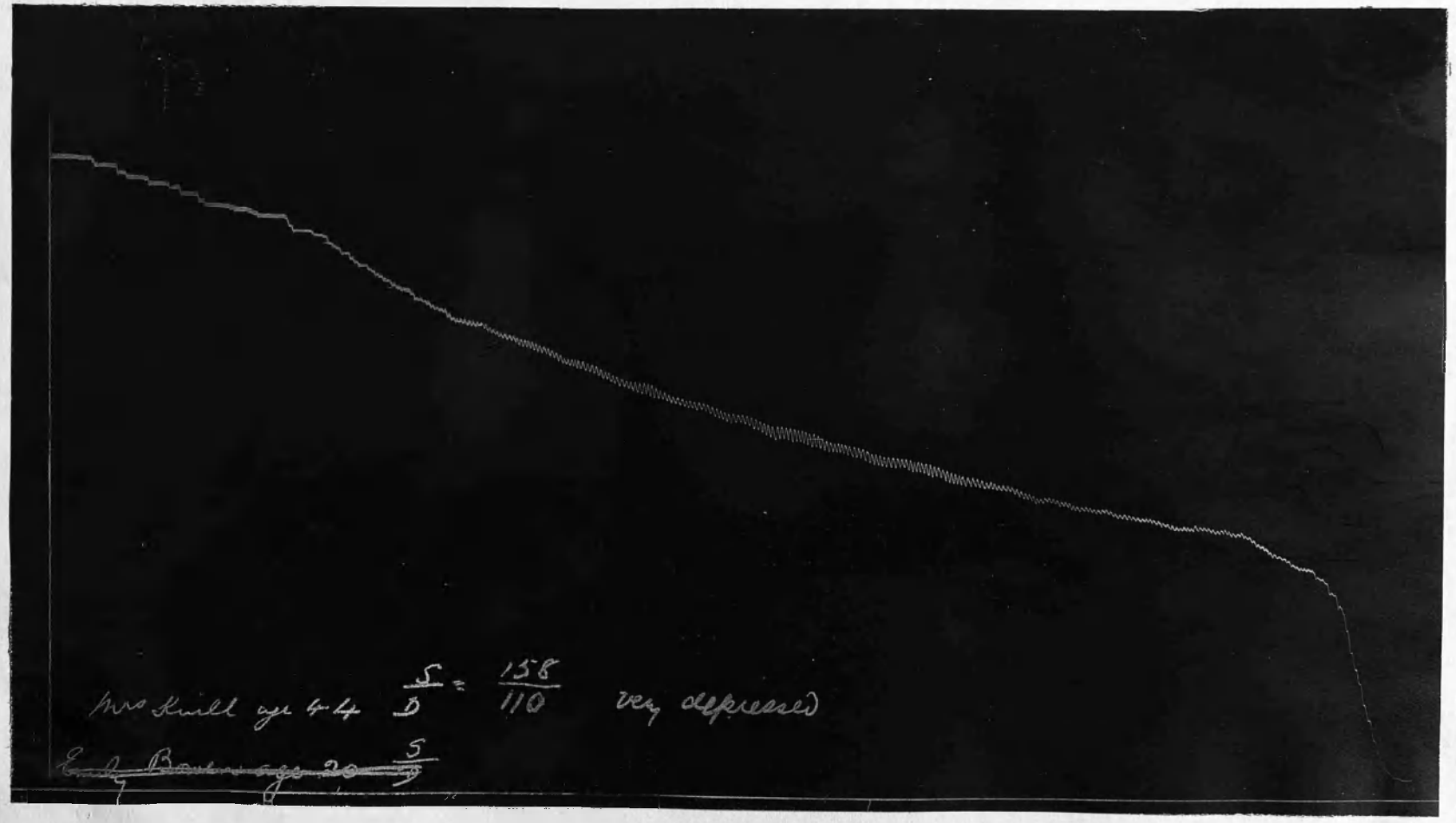
(10). ROBERTSON.- Pathology of Mental Diseases. Edinburgh, 1900.

(11). ROBERTSON.- Lancet, 1908.

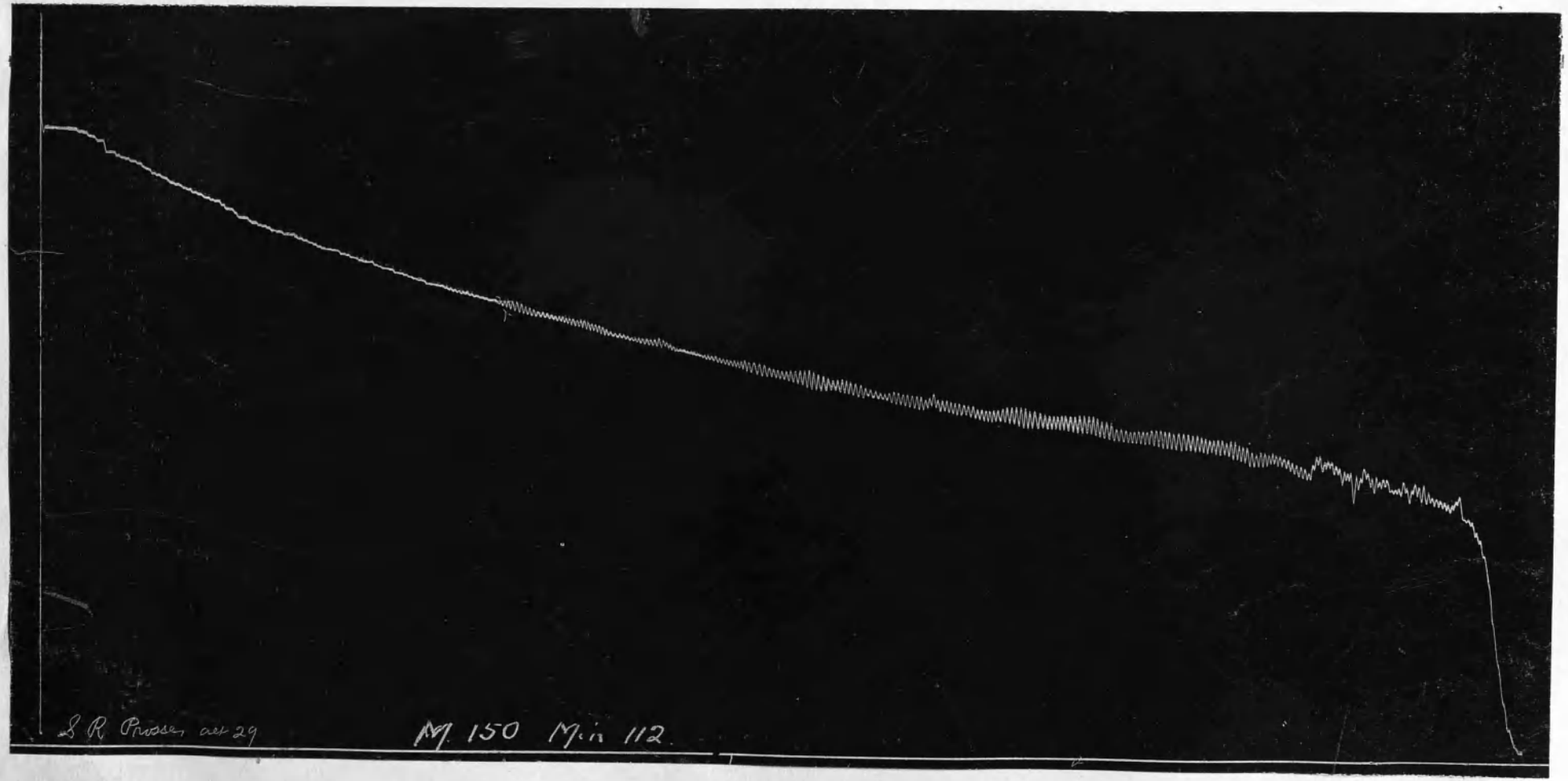
1.



Acute Melancholia B.P. 174 mm.

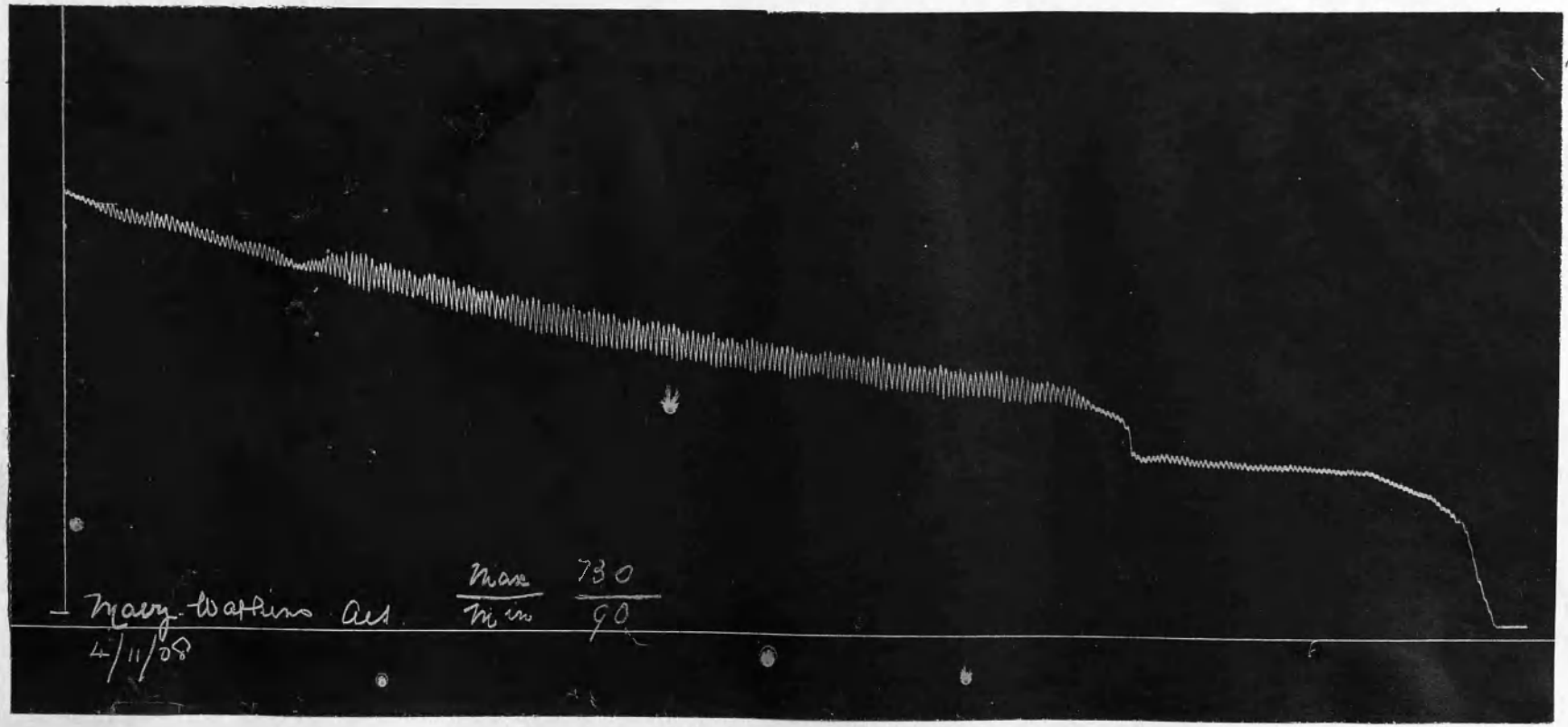


Acute Melancholia. B.P. 158mm.



Acute Melancholia. B.P. 150. mm.

Acute Melancholia. B.P. 130mm. with some Dementia.



Melancholia Chronic passing into Secondary Dementia. B. P. 130 m. m.

APPENDIX.

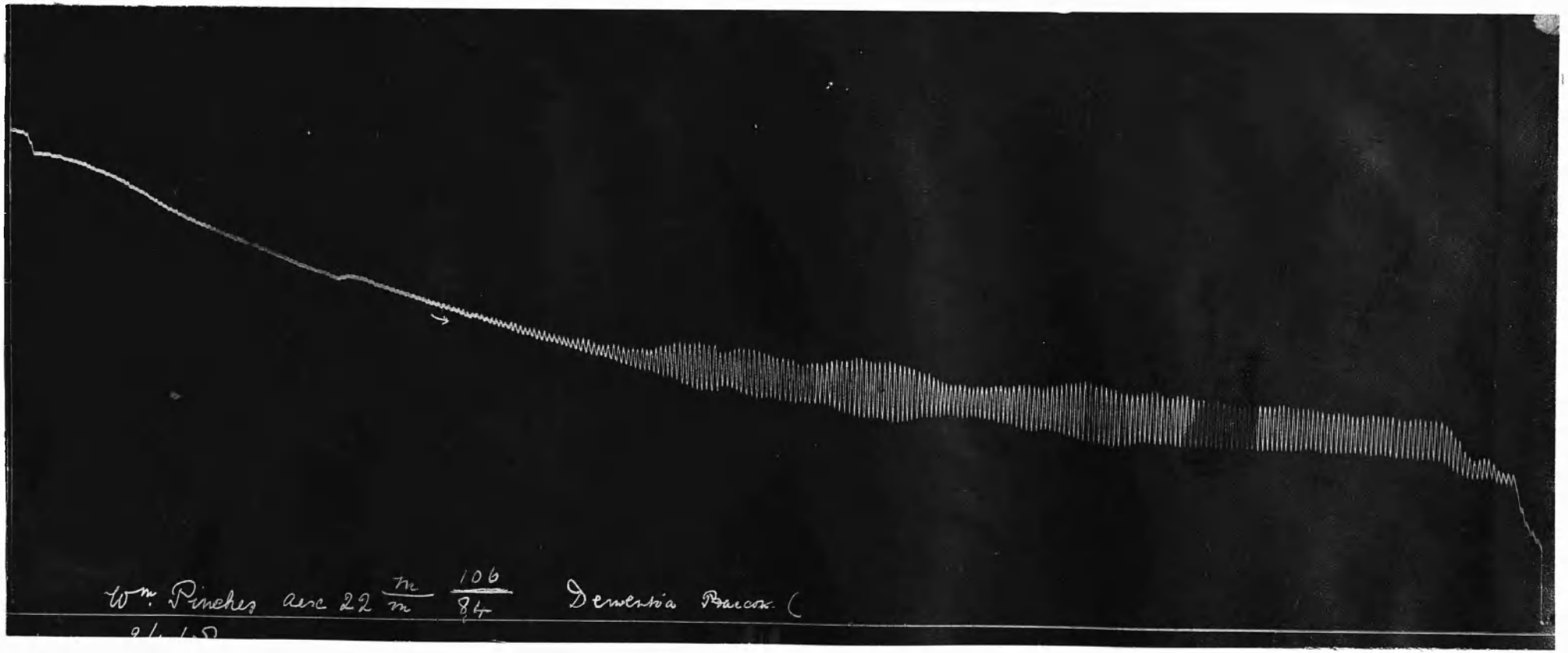
BLOOD PRESSURE TRACINGS

TAKEN FROM

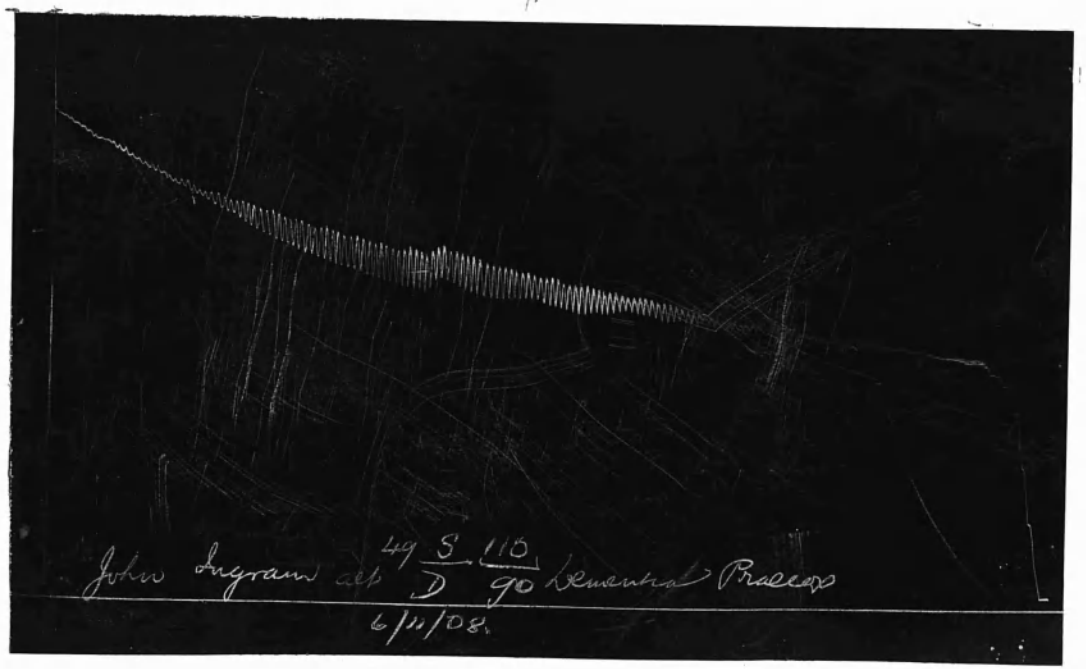
TYPES OF MENTAL DISEASE,

BY

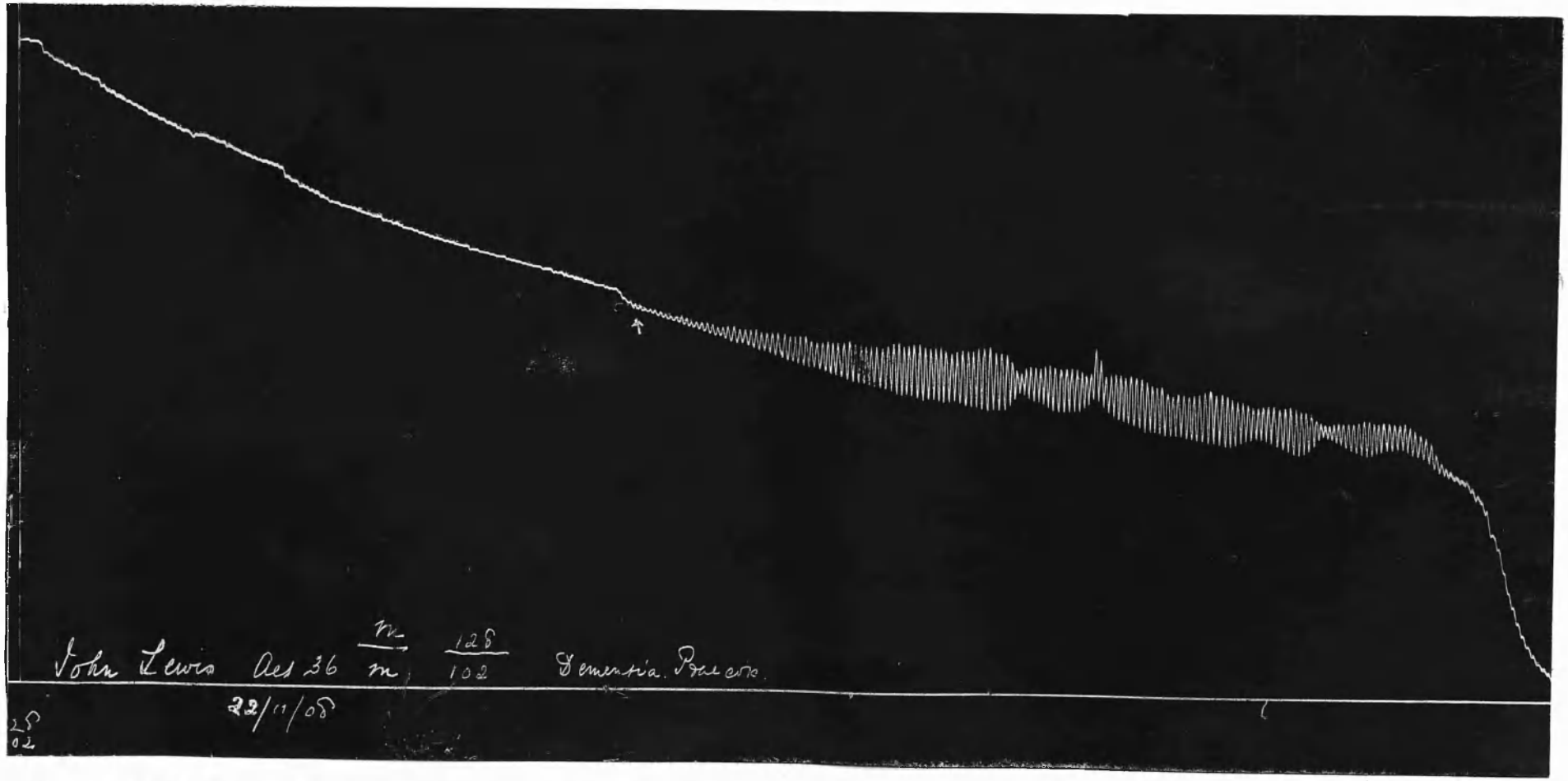
NEILSON DAVIE.



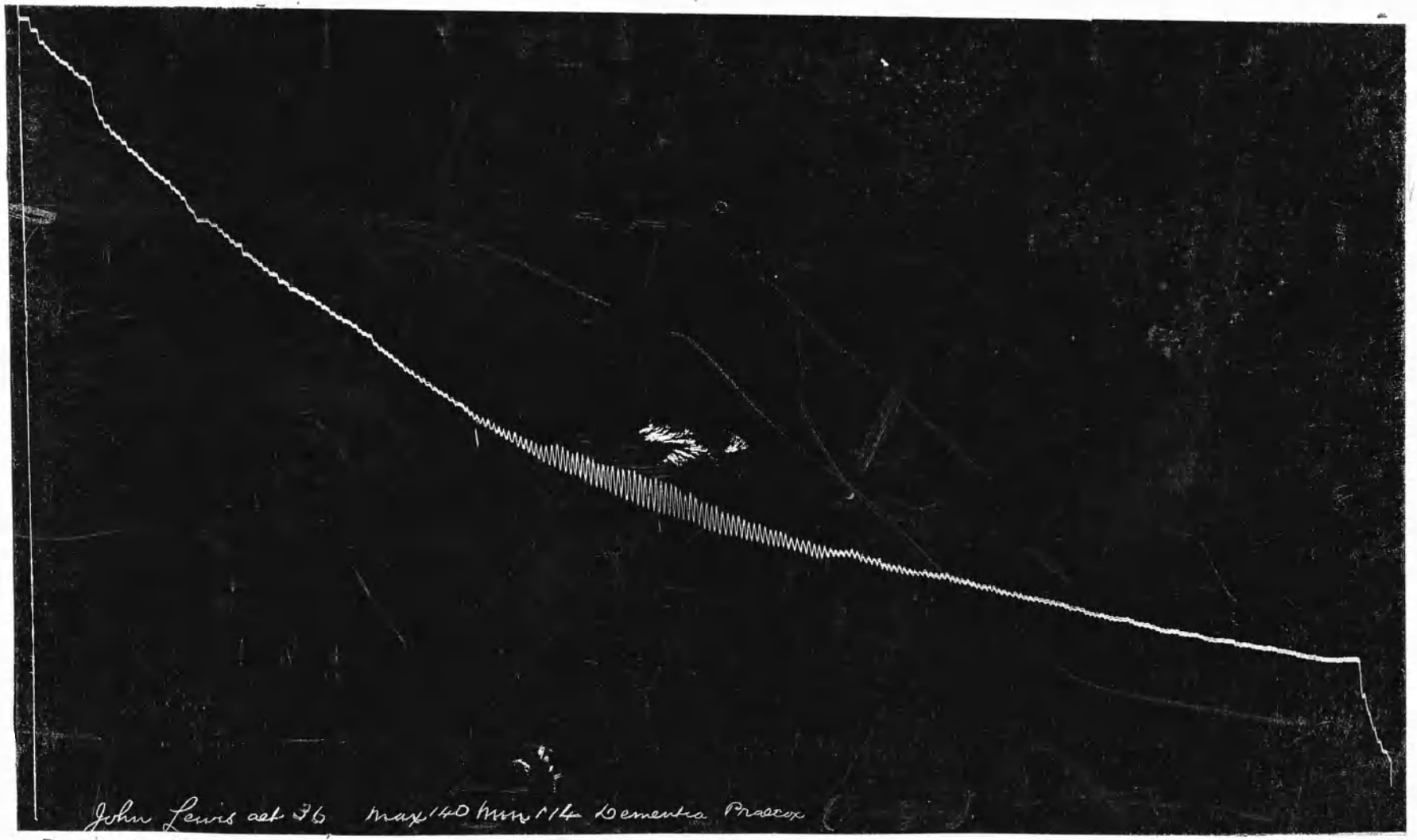
Dementia Praecox. complicated by Phthisis. B.P. 106 mm.



Dementia Praecox complicated by Phthisis. B.P. 110 mm.



Dementia Praecox. Phthisis more advanced. taken 22/11/08 B.P. 128 m.m.



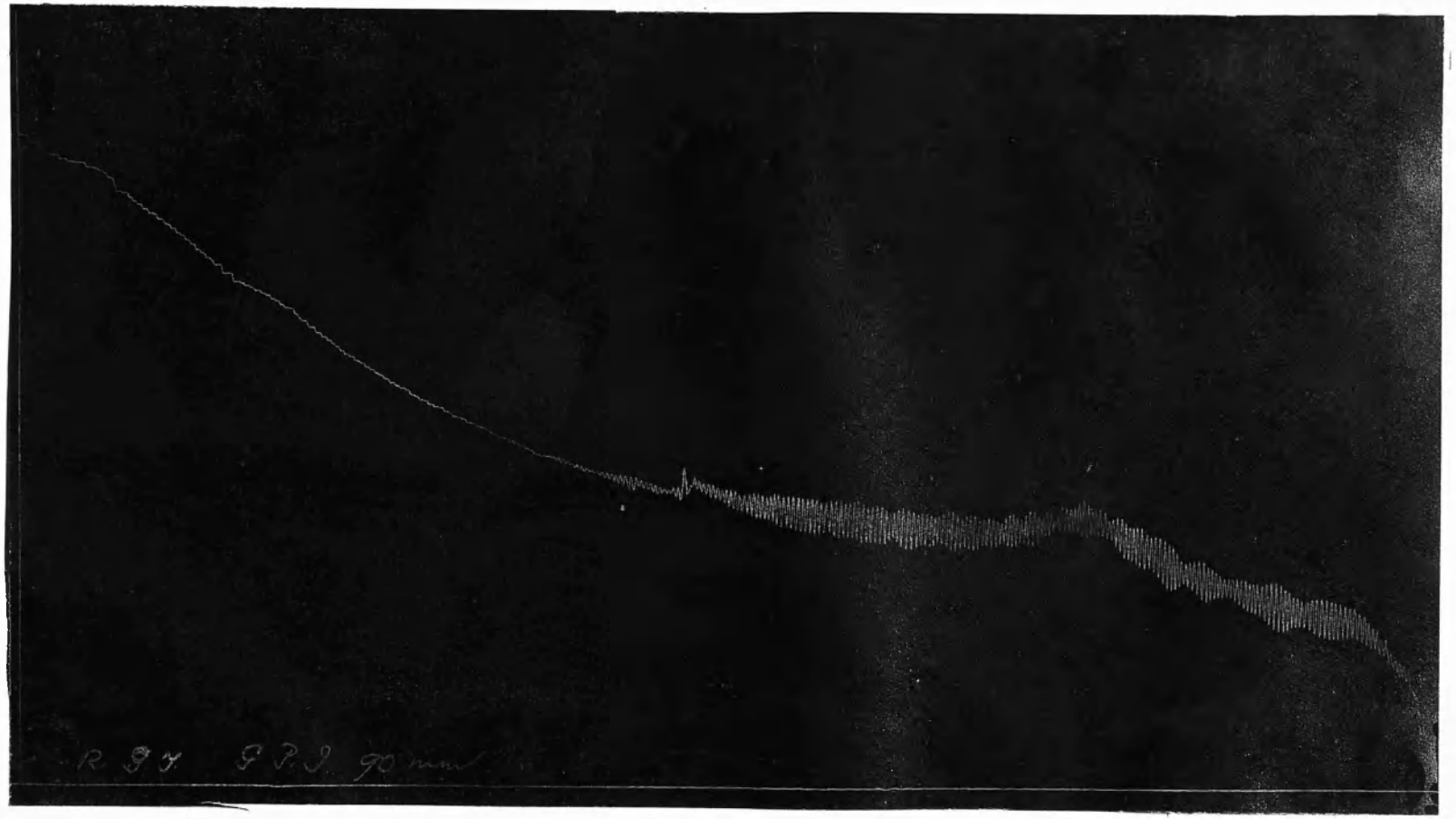
Dementia Praecox with Incipient Phthisis taken 28/10/08. B.P 140 m.m.

General Paralysis of the Insane. BP 110mm.

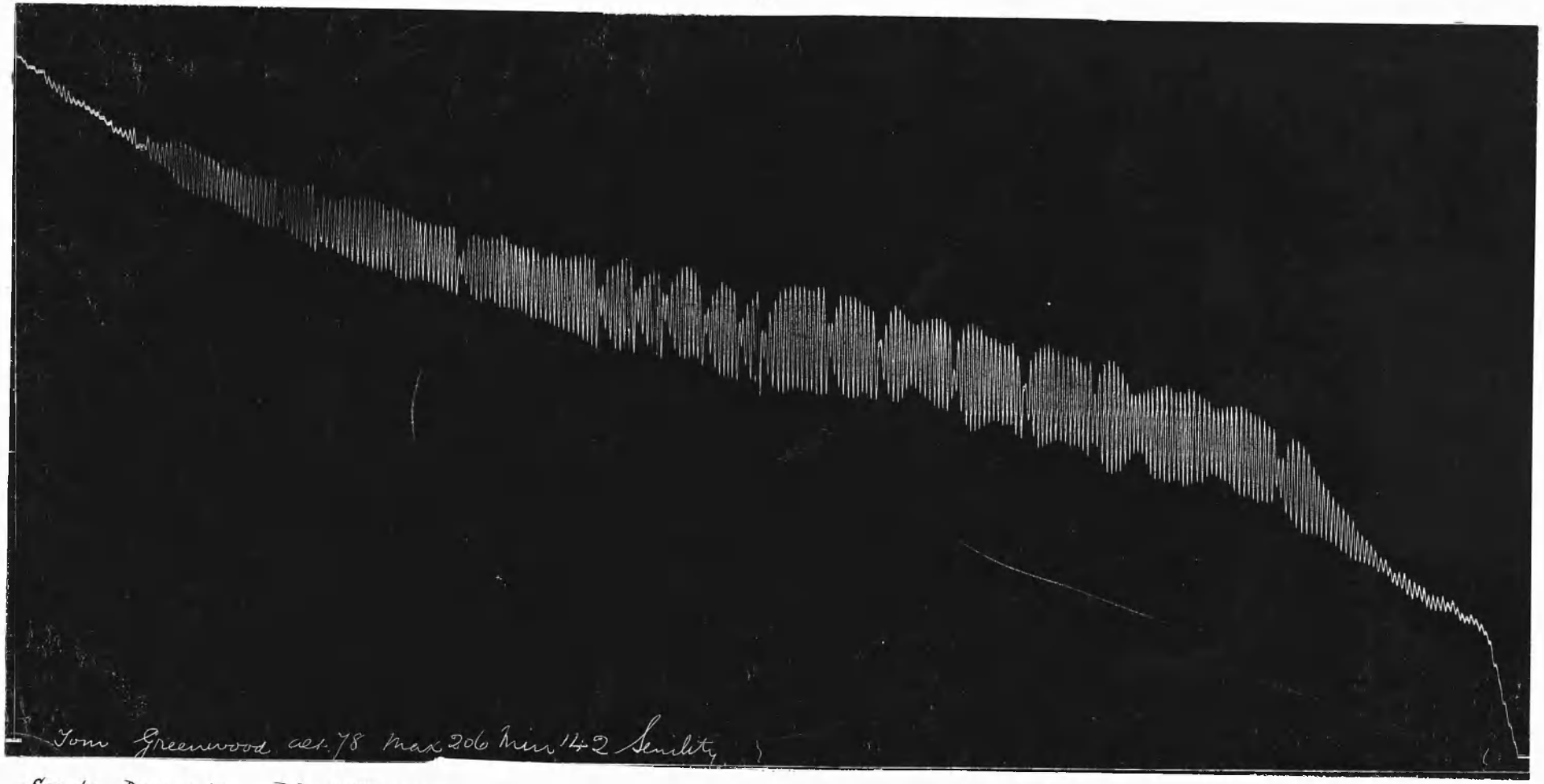
General Paralysis of the Insane. B.P. 110 mm.

General Paralysis of the Insane. B.P. 100 mm.

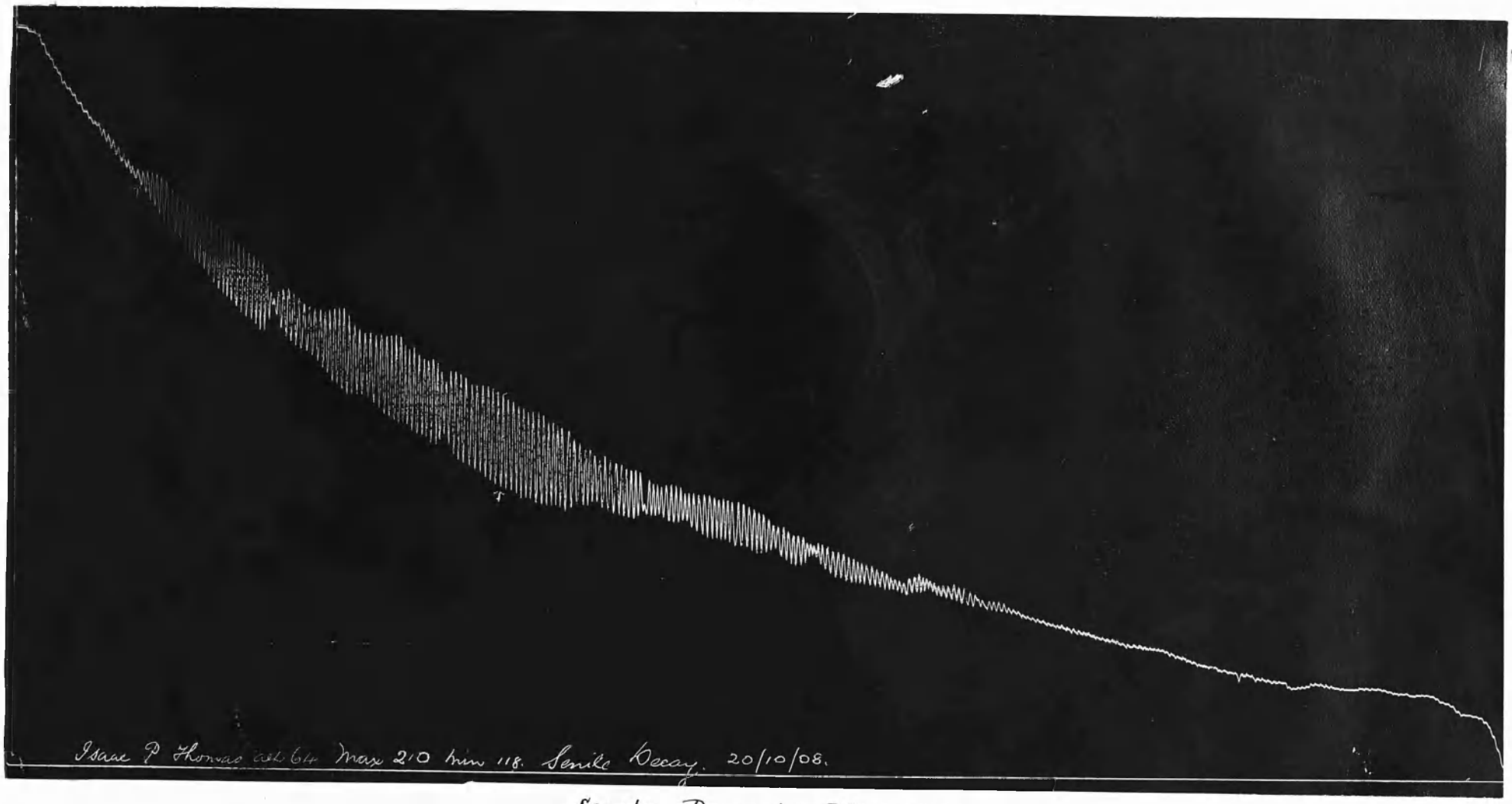
General Paralysis of the Insane. B.P. 98 mm.



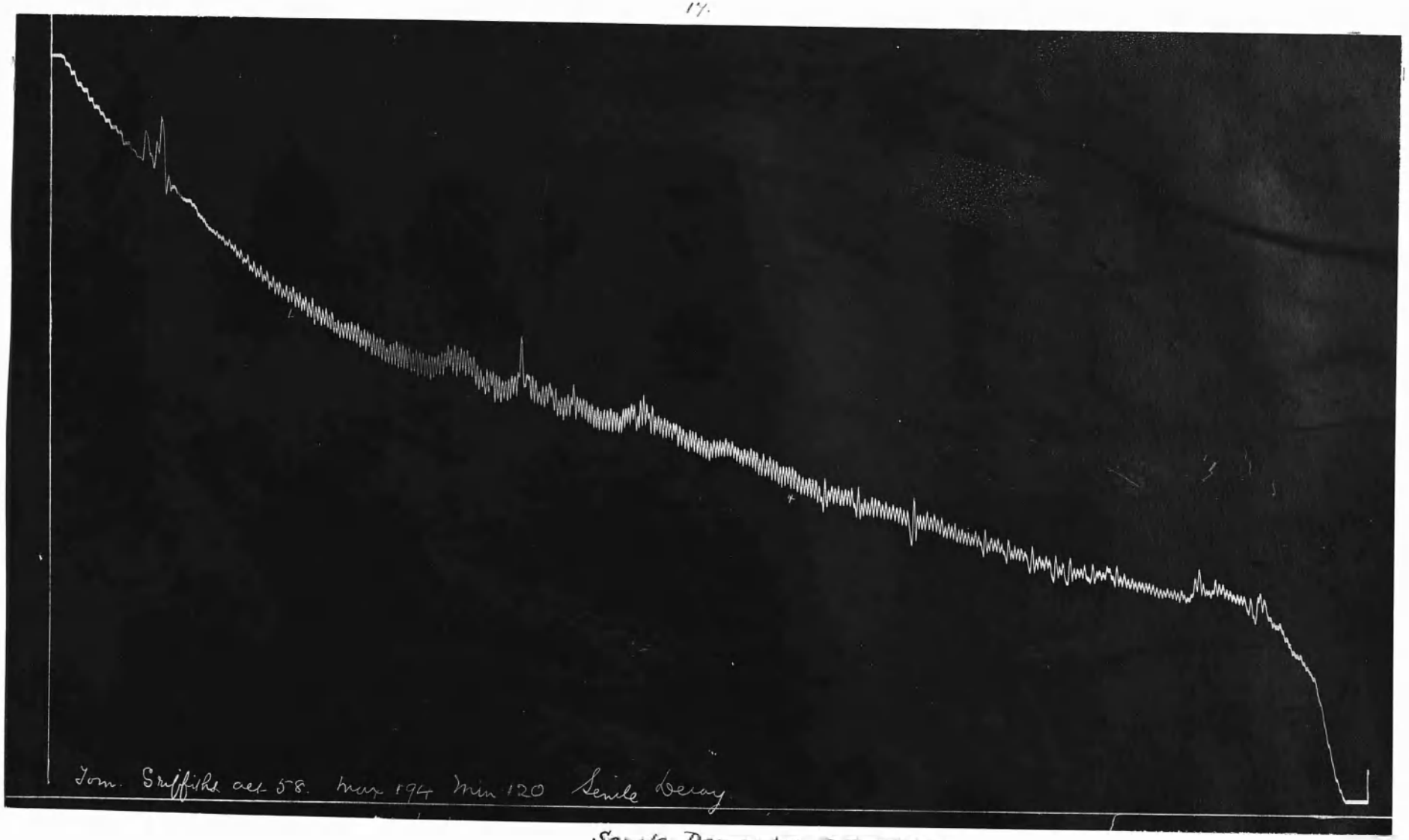
General Paralysis of the Insane. B.P. 90 mm.



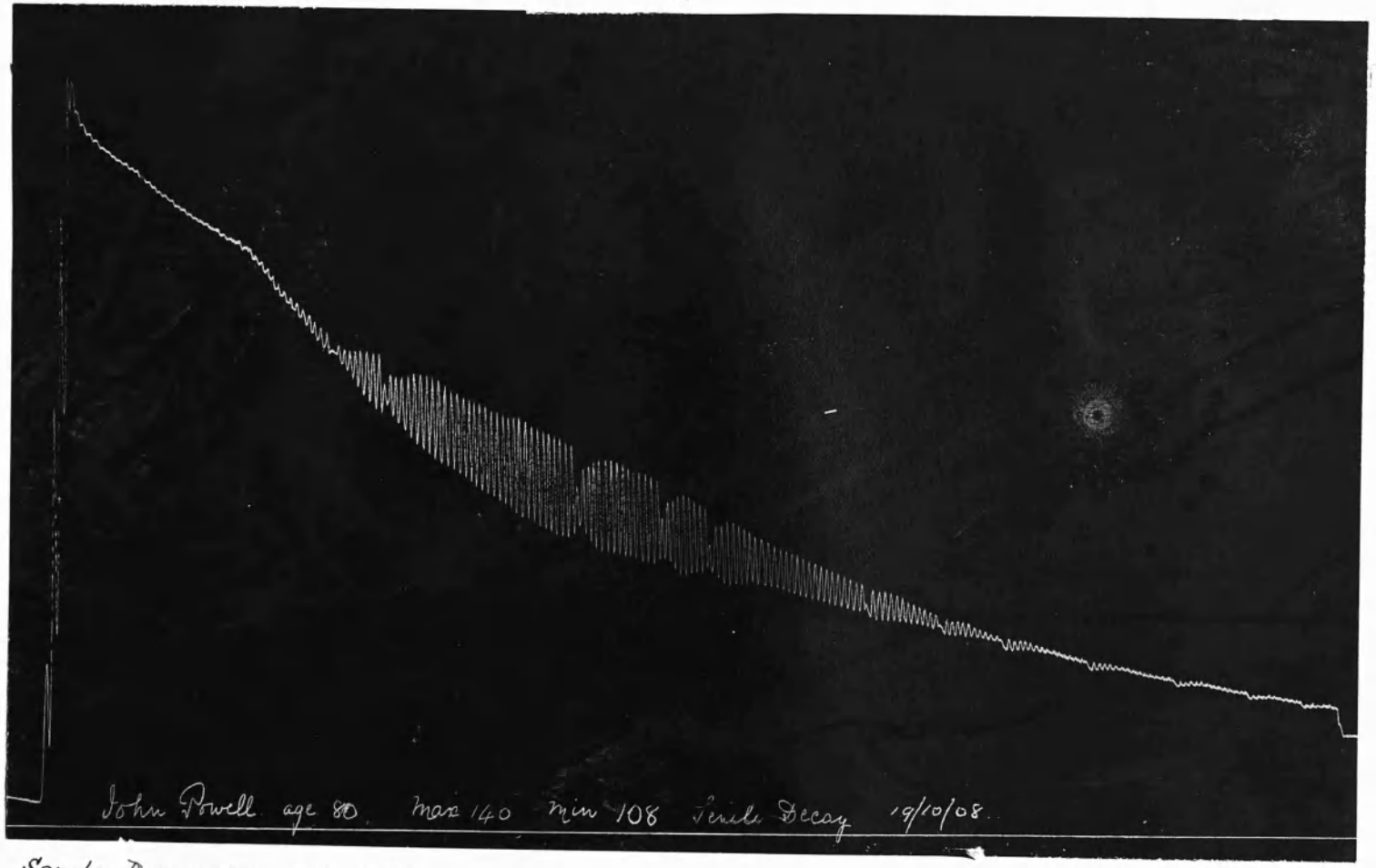
Senile Dementia. B.P. 206 mm.



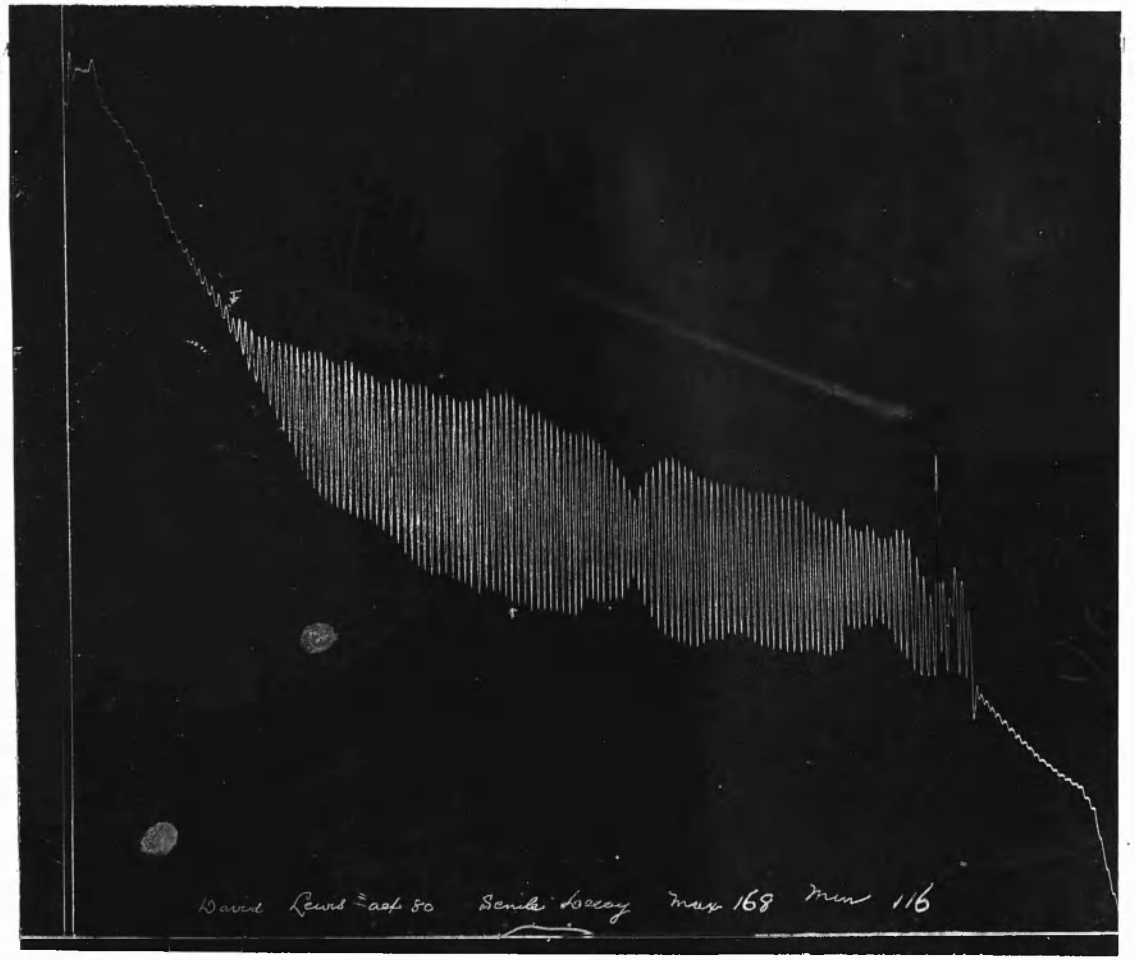
Senile Dementia. B.P. 210mm.



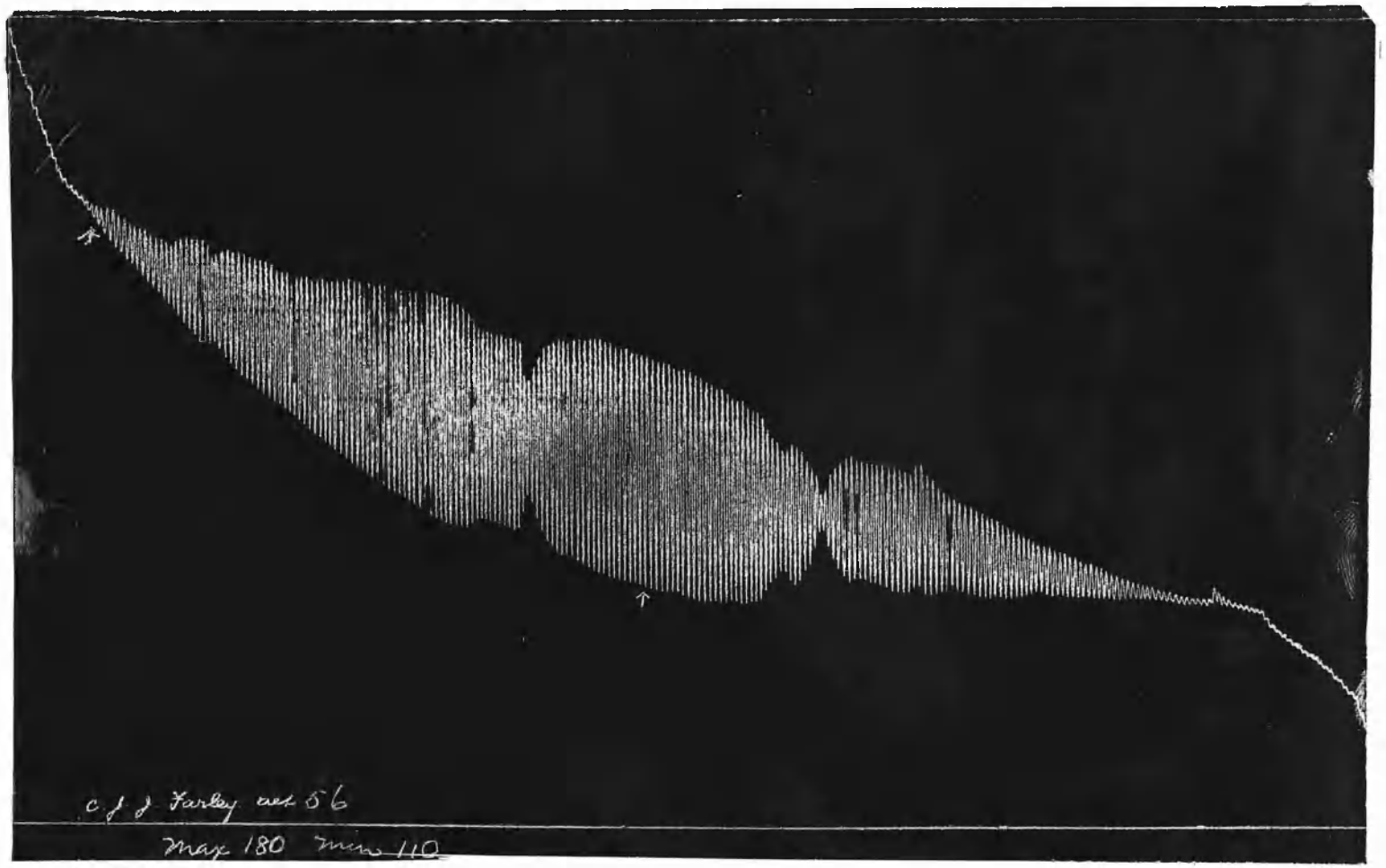
Senile Dementia. B.P. 194 max.



Senile Dementia. B.P. 140mm.



Senile Dementia complicated by Aortic Disease. B. P. 168mm.



Senile Dementia complicated by Aortic Disease. B.P. 180mm.