Thesis for M. D. degree.

The leucocytes in acute mania.

I certify that the work for this Thesis has been done, & the Thesis composed, by myself.

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L.C. Asylum,
Bexley. Kent.
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INTRODUCTORY.

In recent years, the opinion has been gaining ground that mental affections, particularly the acute insanities, like so many of the ordinary physical diseases, are of toxic origin. Macpherson (1) points out that there is no great difference, either in their clinical or pathological aspects, between the delirium so often met with in the acute febrile diseases and the post-febrile insanities which occur occasionally as sequelae to those diseases. The mental state in both these conditions is characterised by confusion, and this is also a prominent feature of that form of acute mania which is called "Confusional Insanity".

In the Morrison lectures of 1905 (2), in classifying insanities, he groups together under the heading of toxic or confusional insanities

(1) The delirium of the fevers
(2) Alcoholism
(3) Puerperal insanities
(4) Dementia praecox
(5) General Paralysis

Dr.T.Claye Shaw (3) includes folie circulaire, or manic depressive insanity, as also of toxic origin.

On the Continent, similar views are held: D'Abundo and Agostini state (4) that "in the pathogenesis of nervous diseases, "in general, infections and intoxications are the most "frequent conspicuous and active elements; and this at all "periods of life, both intra- and extra-uterine

"Infections and intoxications of the nervous system "favour the development of secondary intoxications, which "feed, reinforce and complicate the clinical phenomena, and "altogether produce the forms of disease due to poly-intox-"ication.

(5)
Lugardo says "The causes of mental diseases do not differ in

"any particular from the causes of other diseases; their "action, however, is much more complicated. The connection "between the morbid cause & the cerebral lesion is very dif- "ficult to trace because of the complexity of the mechanism "by which it reaches the brain. Popular ideas on this "subject, and these have been more or less reflected in "scientific opinion for a long time, have gone too far, in "two opposite directions; in the first place by attaching too "much importance to the so-called phychic cause, which, as "a matter of fact, is the most insignificant, and in the "second place, by exaggerating the value of the internal "factor, they have made it appear as though the external "cause was simply an incident which revealed a fatal pre- "destination.

As to the toxic agents which have been held responsible for the insanities of toxic origin, Ford Robertson (6) divides them into five groups -

(1) Those introduced from without, such as alcohol, morphia, etc.
(2) Those that form within the body in the course of various infective and non-infective diseases, such as the poisons of influenza, syphilis, and rheumatism.
(3) Those due to disorders of metabolism, producing auto-intoxication, such as are found in the body in Bright's disease, myxoedema, etc.
(4) Auto-intoxication from the intestinal canal caused by poisons generated there during functional derangements.
(5) Auto-infections due to micro-organisms entering the blood stream from the intestinal canal.

The fact that so many physical diseases have now been shown to be of bacterial origin has stimulated alienists to endeavour to bring some, at least, of the forms of mental disease into line with general disease by proving that mental diseases, also, are of bacterial origin; and numerous attempts have been made to isolate organisms from cases of insanity, and thus definitely prove the bacterial origin of certain forms of mental disease.

Bianchi (7) discovered a special bacillus in the blood and meninges of several cases of acute delirium which he thought was the causative agent. Ceni, however, regards it as a secondary infection which he thinks may be accountable for some of the symptoms.

Dr.Ford Robertson (8) has isolated a diphtheroid bacillus in the cerebro-spinal fluid of General Paralysis of the Insane, which he regards as specific for the disease.

Dr.Lewis Bruce (9) has found a short streptococus in the blood of several cases of acute mania, and, using the agglutination test, he finds that in 70% of his cases of acute mania the organism was agglutinated by the blood serum. He also finds that the bacteriological flora of the intestine in cases of acute mania is unusually numerous, and particularly is this the case with the coccal organisms.

Though none of these observations can be said to be the last word on the subject, yet they point strongly in the direction of certain of the insanities being of bacterial origin.

Bruce has come to the conclusion that the acute insanities, at least, are somatic diseases, due to infection by an organism, just as the bodily diseases such as pneumonia are.

Dr.F.W.Andrews (10) has suggested that the cocci in the intestine, though usually saprophytic,may take on a more virulent character and become parasitic, giving rise to certain chronic forms of infection, such as sub-acute infective endocarditis. Bruce suggests that a similar change occurs in the acute insanities, but he thinks that the toxins only are absorbed. His explanation of the disease process is that certain strains of cocci become increased in the intestine owing to the lowering of the resistance of the patient, and the toxins pass into the blood stream and, having a selective affinity for the highly developed nervous structure, an attack of mania is the result.. He says

> "There are many links in the chain of evidence wanting, but "such evidence as is in my possession is sufficient to

"warrant the general conclusion being drawn that the dis-
"eases known as mania are due to bacterial toxaemias which
"are in many ways comparable to the bacterial toxaemias
"of acute rheumatism".

If, then, many of the acute insanities are the result of bacterial toxaemias, one would expect to find that some, at least, of the physical signs present in most of the physical diseases of bacterial origin would be present in the acute insanities. In the ordinary infective physical diseases there is usually an alteration in the leucocytes, and, arguing from analogy, one would expect this symptom to be present in the acute insanities.

Bruce has made a number of observations on this point, and he found in all the cases of mania examined by him a more or less marked hyperleucocytosis. The perusal of his published papers on the subject suggested to me that further observations on the blood in cases of acute insanity would be of interest. I have made a number of observations during the last eighteen months on the blood of cases of acute mania admitted to Bexley Asylum, and the results of these I have recorded below together with the conclusions I have come to and the conclusions of others who have worked at the same subject.

THE LEUCOCYTES IN HEALTH AND DISEASE.

I shall first of all give a brief account of the leucocytes and their alterations in infective diseases.

I have used Ehrlich's classification, except that I have not differentiated between the lymphocytes and the transitional cells, as the personal element largely enters into their differentiation, and they were not important from the point of view of this in-

vestigation.

The following cells were differentiated:-

(1) Polymorphonuclear

The ordinary type of cell which always goes by this name The protoplasm takes a faint acid stain, and the nucleus is deeply stained by the basic stain, and in shape is polymorphous.

(2) Lymphocyte

Under this heading I have grouped all the mononuclear elements other than the large mononuclear cells.

(3) Large mononuclear

Under this heading I have included mononuclear cells larger than polynuclear cells with a frequently eccentric and often crescentic nucleus.

(4) Eosinophiles

Cells about the same size as the polymorphs, but with a less darkly stained nucleus and with numerous granules with protoplasm which take the acid stain.

(5) Basophiles

These are sometimes called mast-cells, but are probably not the true mastzellen of the connective tissue. They are as a rule somewhat smaller than the polymorphs and have a lobed nucleus and a clear protoplasm in which are granules which stain with difficulty, but the space they occupy are seen as vacuoles in the protoplasm.

Number of cells in normal blood.

The number of leucocytes found in normal blood varies considerably, and may be from 5,000 to 10,000 per c.m.m.; anything below 5,000 is usually reckoned as a leucopenia, and anything above 10,000 as a leucocytosis.

There are, however, exceptions to this, and some persons habitually have a count above 10,000 (11)

Each individual would appear to have a number which is normal to himself, and any great variation from this number would be abnormal for him. It is not possible, as a rule, however, to determine this, as one does not make the count until the disease process has begun.

In typhoid, for example (12), where a leucopenia is the rule, a rise from 1,600 to 3,200 cells on the onset of an inflammatory complication is a true leucocytosis for the individual though the count still remains very low.

Normal percentage of varieties.

Emerson (13) gives the normal percentage as

Polymorphs	70 - 72 %
Lymphocytes (including intermediates)	23 - 28 %
Large mononuclears	1 %
Eosinophiles	2 - 4 %
Basophiles	.5 %

The physiological range in the percentage is considerable: certainly much greater than is represented by the above figures.

Lewis Bruce states that anything over 300 eosinophiles may be regarded as abnormal.

There appears to be a fairly constant type for any given individual, e.g. - Case V Manic Depressive Insanity of my cases

Functions of the leucocytes.

The different functions which the various cells perform hawe not yet been determined. The polymorphonuclear cells play the most important part in resisting bacterial invasion, and Metchnikoff showed that they had a phagocytic action. It is now

known, by the researches of Wright, Bulloch and others, that there are also bacteriocidal properties in the serum itself, such as agglutinins and opsonins; but as it is considered probable that the polymorphs are intimately connected with the formation of these substances, the polymorph cell still remains of paramount importance in resisting bacterial infection. The mononuclear cells are increased when dead non-toxic material is injected into the blood, and they probably serve the purpose of removing it (14)

Durham concludes that the eosinophile cells take a minimal share in the process of bacterial destruction (15). The function of the basophiles is unknown.

Leucocytosis.

A leucocytosis may arise from physiological causes. A large proteid meal is followed by a digestion leucocytosis: the leucocytes may increase by one third their usual number. Emerson lays stress on the fact that it requires a large proteid meal to cause the reaction (16). It has not been possible in the following blood counts to avoid the possibility of a digestion leucocytosis, but as the dinner of the patients can scarcely be called a large proteid meal, digestion leucocytosis has probably not appreciably affected the results.

Violent exercise may cause a leucocytosis, and after running a race the count has been found to be 14,000 or even 20,000 (17) This condition is simulated by the constant psychomotor activity of cases of acute mania, and may probably account, in part at least, for the leucocytosis found in these cases.

Certain drugs affect the leucocyte count; but the drugs

which the patients were having when the counts were made were chiefly sedatives, such as chloral hydrate, the bromides, and Paraldehyde, and I have not been able to find any statement that they affect the leucocyte count to any appreciable extent.

Pathological leucocytosis.

A hyperleucocytosis is a more or less constant accompaniment of the various infective diseases. The leucocytosis varies considerably with the different diseases, and in a few, e.g., typhoid, it is absent. Its degree signifies roughly in any particular disease the virulence of the infection. It is to be regarded as an indication of the reaction of the individual to the disease, and as a rule it roughly corresponds to the fever and other toxic symptoms. As a rule, a high leucocytosis means a severe infection, and a low count either a slight infection or a very poor reaction on the part of the individual. This, however, does not always hold good, and an insignificant infection not impairing the health of the individual may cause a high leucocytosis, e.g., a small fissure on the tongue of an apparently healthy individual in one of Lewis Bruce's controls caused a leucocytosis of over 16,000. As regards the course of the leucocytosis, it runs a course which, while not corresponding with the temperature chart, usually terminates at the same time. Scarlet fever is an exception to this where after the temperature falls to normal, the leucocytosis may persist for twelve days.

In infective diseases the chief increase occurs in the polymorphs, the percentage of these cells consequently rising. An increase in the eosinophile percentage occurs in a variety of diseases, e.g., various parasites such as tapeworm, asthma, and in the early stages of scarlet fever. It occurs also occasionally in septic infections. In Case I of my Manic Depressive cases

with a quinsy developing while the counts were being made, the eosinophile percentage rose to 8.

The literature on the subject of the blood changes in the acute insanities.

Several previous observers had made observations on the blood of insane patients, but they had not found any striking departure from the normal. Elsholtz (19) stated that at the height of delirium tremens the proportion of leucocytes was increased and that there was a relative increase in the polymorphonuclear cells. Dide did not find any marked abnormality in the leucocytes. Mackie records a case where he found the leucocytes rose to 10,000, which can scarcely be regarded as exceeding by much the limits of the normal.

Dr.C.Lewis Bruce (20) was the first to publish a large number of cases in which he had made observations on the leucocytes. His results are striking and interesting. He has found a more or less marked hyperleucocytosis in almost every case of mania which he examined. In his later papers he gives his results in terms of the polymorphonuclear leucocytosis per c.m.m. as he regards the number of polymorph cells present in the blood as the most important indication of the defensive powers of the body against the toxaemia which is present in those cases. In the confusional types of acute mania he states the leucocytosis is always high, and the higher the leucocytosis the better he thinks the prognosis is. In this type of cases he describes a leucocytosis of 18,000 - - 20,000 at the commencement of the attack, with a polymorphonuclear percentage of 70 or over. This gradually falls with the improvement in the mental symptoms till it reaches 12,000 - 16,000, subsequently rising again as the patient continues to improve.

improve, and remaining high during convalescence. He writes in 1903 that all the cases of mania which he has examined and which have recovered have been discharged with a high leucocytosis. In one case which he had the opportunity of examining, hyperleucocytosis was present years after the attack, when the patient was in good physical health. He concludes from this that in confusional insanity one had a prolonged infection present in the individual, and that the mental symptoms are an accidental symptom of the disease.

In those cases which do not recover, he describes a leucocytosis of 14,000 to 18,000 persisting for months with a gradual drop in the polymorph.percentage till it ranges between 30 % and 50 %. Finally, dementia supervenes and the leucocyte count drops to normal.

As to the extent of the leucocytes present in confusional insanity, his charts show a polymorphonuclear leucocytosis ranging from 10,000 to 30,000 or slightly over.

In the manic depressive type of acute mania, he finds that the symptom of hyperleucocytosis is often present during the attack; thereafter it falls to normal and, with the exception of an occasional rise, remains at normal until another attack of mania or excitement supervenes. The leucocytosis is more moderate in these cases.

He has also found a leucocytosis present in katatonia ranging from 12,000 to 20,000 and even rising as high as 68,000.

Working in the same Asylum, Dr.Carlisle Howard (21) examined the blood of a number of cases of acute insanity, and his results do not differ in their main features from those of Lewis Bruce.

In confusional insanity he finds a more or less sustained leucocytosis with frequently a polynuclear leucocytosis of over 20,000.

In manic depressive insanity he finds an irregular leucocytosis with counts ranging to 20,000.

He concludes from his observations that acute mania is a bacterial disease; that for the purpose of diagnosis the systematic estimation of the leucocytes is of value in differentiating certain diseases. (Thus he found leucocytosis in a supposed alcoholic mania. He concludes from this fact that it was a case of confusional insanity occurring in a person addicted to alcoholic excess. Bruce has described similar cases); that,as regards prognosis,the estimation of the leucocytes is of value as it has been shown in those cases where the leucocytosis is not marked that there is a tendency to chronicity and, conversely, where the leucocyte reaction is high,that recovery is the rule.

Dr.Colin McDowall has also published papers (22), stating the result of blood examinations of the acutely insane. He has made observations in two types of cases, viz., - Excitement with confusion;
Depression with excitement.

From his description, excitement with confusion would appear to be what is usually termed confusional insanity. He finds that hyperleucocytosis is of invariable occurrence in every recent primary case of excitement with confusion. In secondary or recurrent attacks his results are not so uniform.

He finds the usual count between 10,000 and 16,000, but has found it as high as 24,000.

As regards the course of the leucocytosis, his results do not differ from those of Bruce, save that he does not find a persist-

ent leucocytosis after the attack. At the termination of the attack he states the leucocyte count is about 10,000.

He thinks that if the count falls and the polymorph.percentage falls below 50 % the prognosis is bad. He lays great stress on the eosinophilia: he finds an eosinophilia of 3 to 10 % of invariable occurrence at the commencement of the disease in cases which recover, and that it is present throughout the disease in cases which do well. He has found the percentage of eosinophiles to be 10 to 20 in some cases.

In depression with excitement the eosinophiles are rarely present, but otherwise the blood changes are similar to those described above.

To sum up the changes which have been found in the blood in acute mania:-

Confusional Insanity.

At the commencement a leucocytosis of 10,000 to 20,000 is present, remaining more or less constant and then falling with the improvement in the mental state to a certain extent only, to be followed later by a further rise, after which it subsides to slightly over normal.

It frequently remains at a high figure for years (Bruce)

A marked eosinophilia - 3 to 10 % at beginning, and frequently persisting throughout the attack (McDowall).

The main points of prognostic value are stated to be -

A high leucocytosis if of good prognosis;

A high eosinophilia, even with low count, is favourable (McDowall)

A drop in the leucocytosis after the acute stage of the disease is a bad prognostic sign;

A leucocytosis of about 18,000 for over a month is unfavourable

A marked hyperleucocytosis unaccompanied by eosinophilia is of bad prognostic significance.

In secondary attacks the leucocytosis is seldom high, but eosinophilia, if present, is of good prognosis, and more especially if the polymorphonuclear percentage is raised. (McDowall)

In the recurrent manias (manic depressive) leucocytosis is usually present but is somewhat variable and ranges from 10,000 to 20,000 or over.(Bruce, Howard)

Leucocytosis is the exception, and when seen is of limited nature, and transient in character. (McDowall)

C A S E S.

I have made about 200 counts in cases of acute mania, and in each case a differential count has been made. I have used the following methods.

METHODS.

A Thoma-Zeiss haemocytometer was used to estimate the total number of leucocytes present. In every case, four sets of 256 squares, and frequently more, were counted. For the differential count, films were made on slides. These were fixed by immersion in alcohol and ether for twenty-four hours. They were stained with Delafield's haematoxylin and Aqueous Eosine.

About half of them were counted with a 1-12th inch oil immersion objective, the remainder with a 1-6th inch objective, which was quite sufficient magnification to make differentiation easy.

In every case 200 cells were counted, and in all cases where the accuracy of the result appeared doubtful, 400 cells were counted.

Many control counts were made on a second film taken from the patient at the same time, and the difference between the two counts were as a rule trivial, thus showing that the constant error in the result is not great.

EXPLANATION OF CASES.

In cases where the number of counts were sufficiently numerous I have made charts which show at a glance the number of leucocytes present.

As the polymorphonuclear and eosinophile cells have been regarded as of special interest by previous observers, I have made charts showing the number of polynuclear and eosinophile cells present per c.m.m. at each count.

In those cases where there are no charts, I have given the total leucocyte count and the percentage of the various

types of cells present.

I have used the following contractions for the types of leucocytes:-

P.	Polymorphonuclear	L.	Lymphocyte.
L.M.	Large Mononuclear	E.	Eosinophile.
B.	Basophile.		

I have stated the time at which the blood was taken from the patient, so that the variations due to a digestion leucocytosis could be discounted, if necessary.

The patients' dinner hour is 12-15 p.m.

CASES OF CONFUSIONAL INSANITY.

I.

F. F., female, aged 33, married, admitted 26th November, 1908. There was no hereditary taint, but she was of a neurotic type. For the three weeks prior to admission she had shown mental symptoms. She began to worry about religious matters, and gradually became more and more restless, and had required seclusion in a padded room while in the Infirmary.

On admission:-

Physically she had a toxic appearance: her mouth and throat were dry, her tongue furred, and her gums were very foul.

Mentally. Consciousness was completely clouded. She was restless, sleepless, constantly chattering, and trying to get out of bed. She was elated with religious fervour, but was at times depressed and apprehensive. Aural and visual hallucinations were very vivid: she heard God's voice speaking to her; has seen the Holy Ghost, and flashes of light passing from Heaven to Hell; thought there was treachery on the telephone between Heaven and Earth. Made gross errors of identity. Her nature was tampered with and her feet made to draw up. She had innumerable fleeting delusions dependent upon her hallucinations.

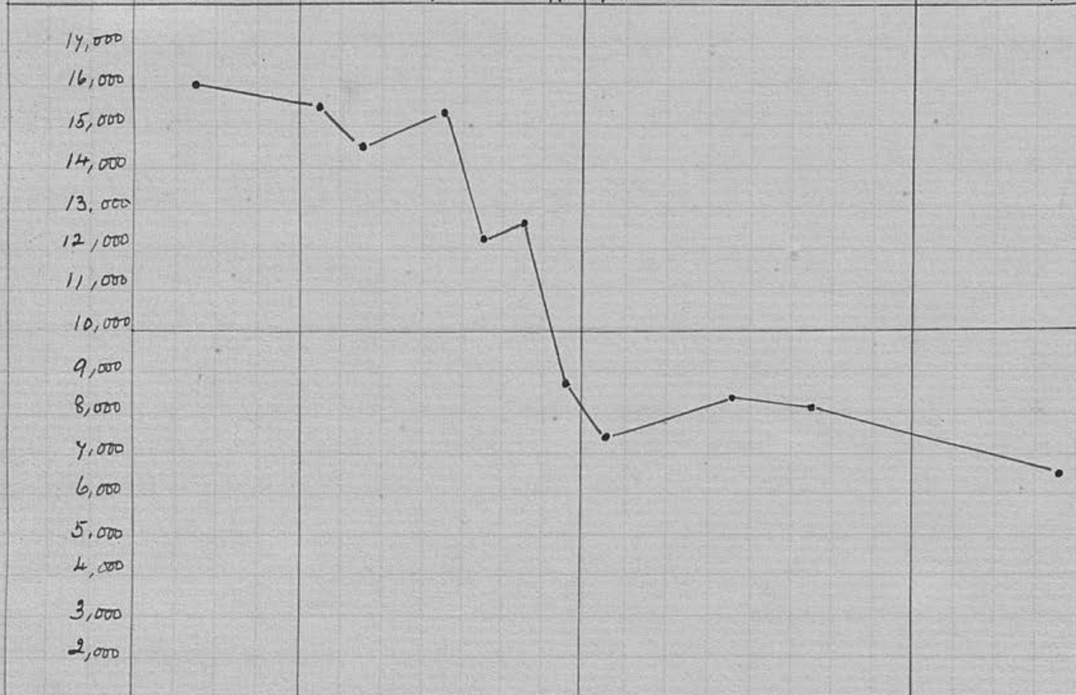
Progress.

She continued in this state till December 10th, and after that she gradually improved, but remained nervous, constantly worrying about queer feelings in her legs, head, etc.

C I (a.)

7.7.

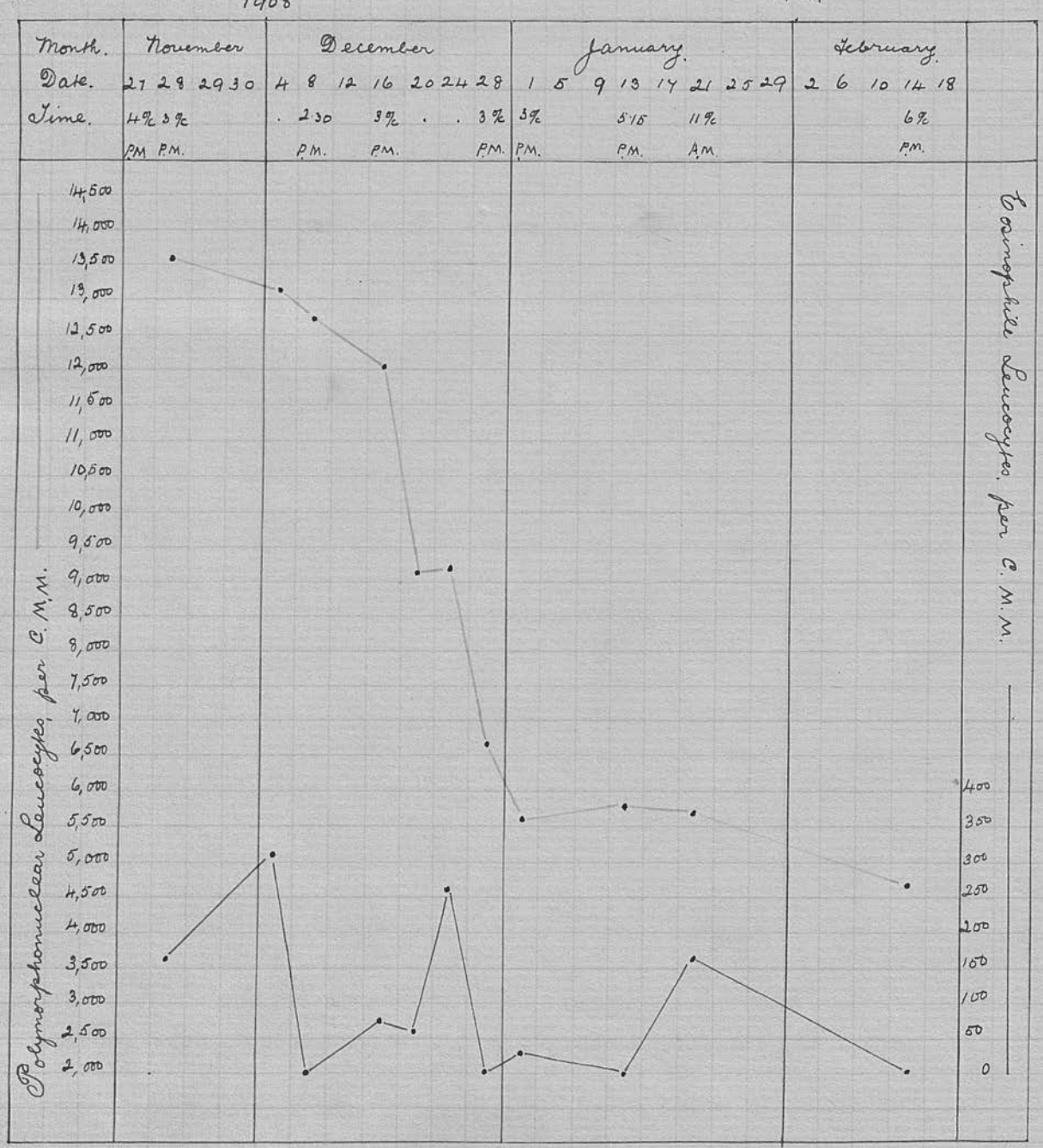
Month.	November				December							January								February			
	1908											1909											
Date.	27	28	29	30	4	8	12	16	20	24	28	1	5	9	13	17	21	25	29	2	6	10	14
Time	4 o'c P.M.	3 o'c A.M.			·	2.30 P.M.		3 o'c P.M.	·	·	3 o'c P.M.	3 o'c P.M.			5.15 P.M.		11 o'c A.M.						6 o'c P.M.



	Nov 27	Nov 28	Nov 29	Nov 30	Dec 4	Dec 8	Dec 12	Dec 16	Dec 20	Dec 24	Dec 28	Jan 1	Jan 5	Jan 9	Jan 13	Jan 17	Jan 21	Jan 25	Jan 29	Feb 2	Feb 6	Feb 10	Feb 14
P.	83.6	84.			84.	87.		78.5	76.	72.5	77.	74.5			70.		71.						71.
L.	9.3	10.3			10.3	10.		16.	19.	18.	17.	23.			25.5		25.5						27.
L.M.	4.6	4.6			3.6	3.		5.	4.5	7.5	4.5	2.			4.		.5						2.
E.	.3	1.			2.	—		.5	.5	2.	—	.5			—		2.						—
B.	—	—			—	—		—	—	—	1.5	—			.5		1.						—

C I (b)

47


1908
1909.
Month.
November
December
January.
February.
Date.
27 28 29 30 4 8 12 16 20 24 28 1 5 9 13 17 21 25 29 2 6 10 14 18
Time.
4% 3% . 2.30 3% . . 3% 3% 5.15 11% 6%
P.M. P.M. P.M. P.M. P.M. P.M. P.M. A.M. P.M.
Polymorphonuclear Leucocytes, per c. m.m.
14,500
14,000
13,500
13,000
12,500
12,000
11,500
11,000
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
6,000
5,500
5,000
4,500
4,000
3,500
3,000
2,500
2,000
Eosinophile Leucocytes, per c. m.m.
400
350
300
250
200
150
100
50
0

Concurrently with the improvement in her mental state her physical health improved. By the middle of January she was much better and able to work in the laundry, and on the 18th January was sent to the Convalescent Villa. She continued to keep well, though apparently somewhat weak-minded, and was discharged recovered on March 25th, 1909.

Remarks.

During the acute stages of her mental illness she had a sustained leucocytosis, the highest count being 16,000. The polymorphonuclear percentage was between 83 and 87 at the height of the disease, subsequently falling to 70 as the total count reached normal. The polymorphonuclear chart shows well the fall

in their numbers with the subsidence of the mental symptoms. There was never any marked increase in the eosinophile count, the highest recorded being slightly over 300 per c.m.m.

II.

N. L., female, aged 27, married, admitted 5th June, 1909.

She had been in a state of acute mania for a fortnight prior to admission. The mental symptoms began a fortnight after child-birth.

On admission.

She was noisy, excited and confused, with active hallucinations. She made a rapis recovery and was discharged recovered on August 12th, 1909.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
7:6:09.	3 p.m.	9,700	62·5	31·5	4·5	-	1·5
14:6:09.	3 p.m.	5,900	49·0	49.0	-	·5	1·5

Remarks.

Though this was a case of confusional insanity, the counts do not show any hyperleucocytosis. The attack was almost over on admission, and when the first count was done she was much quieter. The polymorphonuclear percentage was unusually low. No eosinophiles were met with in the counts.

III.

E.B.B., female, aged 30, married, admitted 13th July, 1909.

She had no insane heredity, and had not been previously insane, but was of a neurotic type. There was a suspicion that she may have procured abortion on herself, as she was anxious not to have children. She had shown mental symptoms for six days prior to admission, and at the Infirmary had been noisy, excited and confused; stripping herself and wandering about, nude.

On admission:-

Consciousness was completely clouded. She was unable to recognise those around her. She chattered continuously and incoherently of "Lloyd George", "woman suffrage," sexual matters - preventatives, etc. She had aural hallucinations. She was wet and dirty in her habits, refused her food and required nasal feeding. She was a typical case of confusional insanity of the acute delirium type.

Progress:-

Unfortunately, she developed the physical signs of pneumonia on the 19th July, and this continued until the 8th August, when temperature dropped to normal. She had some irregular pyrexia after this, but it finally ceased on the 22nd August, and she rapidly improved, physically and mentally, and was discharged on November 18th, as recovered.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
17:7:09.	5:30 p.m.	14,000	73·5	22·5	3·0	-	1
20:7:09.	6:0 p.m.	16,800	73·5	24·0	2·5	-	-
24:7:09.	3:30 p.m.	14,000	75·5	21·0	2·5	-	1

Remarks:-

The first count was probably a hyperleucocytosis in association with the mental disease, but the next two were complicated by the pneumonic condition; and further, blood counts would have been of little interest.

The polymorphonuclear percentage was only slightly raised. The eosinophiles were only noteworthy by their absence.

IV. A .E.C., female, aged 41, married, admitted 22nd March, 1910

This is her first attack.

For a month she has shown mental symptoms.

Her child was found dead in bed six weeks before admission. She worried a great deal about this, brooding over it; and at length developed delusions that people said she had killed it. She became gradually worse, constantly talked of her childs death, and became very melancholy and depressed, and later, restless and sleepless.

On admission:-

She looked toxic, and her mouth was very foul. Consciousness was completely clouded: she was very confused and bewildered. She frequently spoke of being in a prison. Hallucinations of all the special senses were very active and led to many delusions of a fleeting nature: she thought that the doctor and nurses were animals; that her husband was outside the window; that anyone who approached her was going to kill her; that I was poisoning her blood (when taking blood for examination).

Affectively she was in a state of terror and apprehension. She was violent, noisy, and very resistive when attended to. At times she was rude and abusive, using obscene language. She refused her food because she thought it was dead men's flesh, and required nasal feeding. She required paraldehyde to make her sleep.

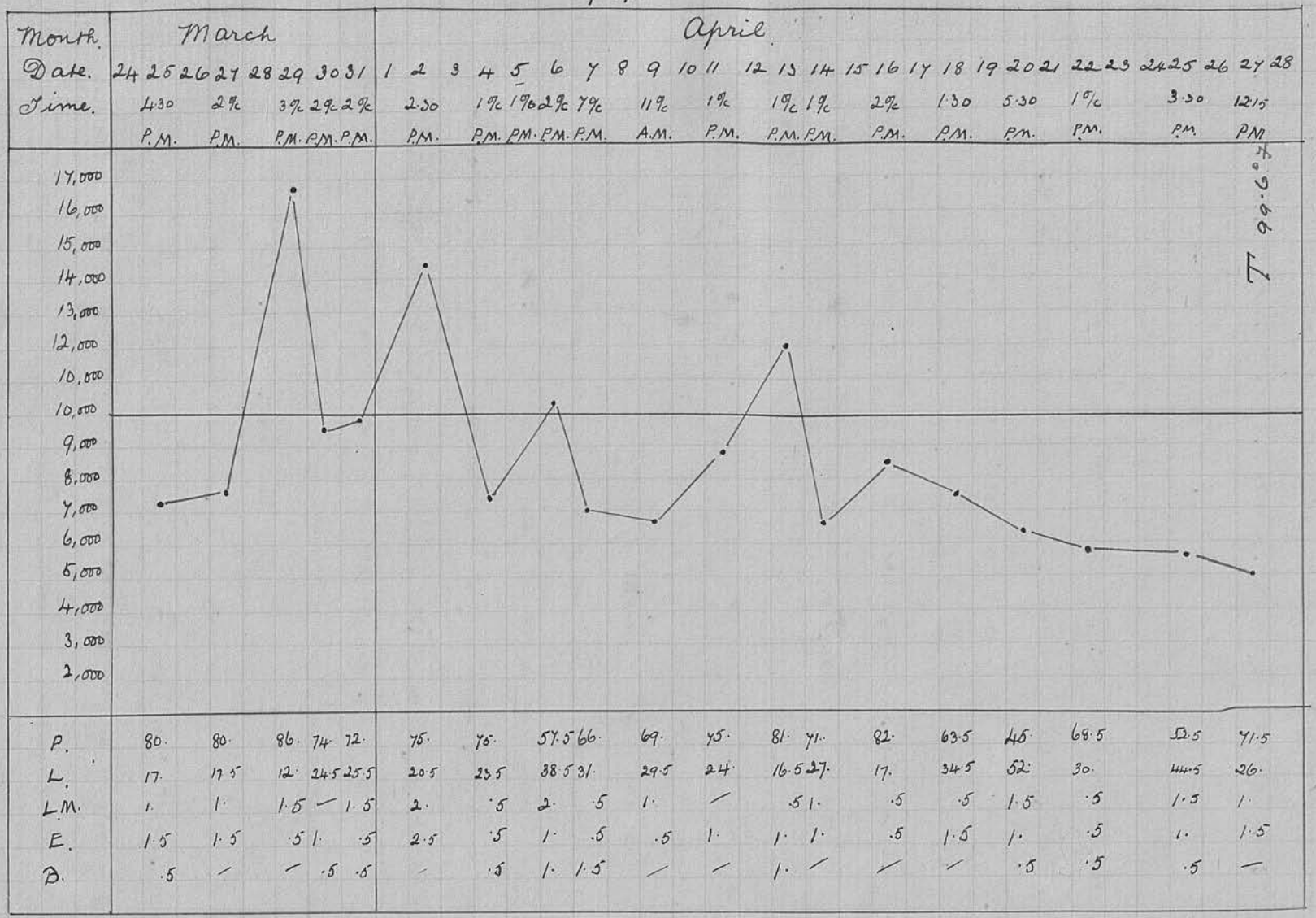
Progress:-

Her condition remains as on admission. She has had occasional slight remissions and has been able occasionally to recognise the doctors as such, but the general mental state remains (March 23rd) the same. She is now constantly under the influence of paraldehyde to keep her noisiness and restlessness within limits

C IV (a)

a. & b.

1910

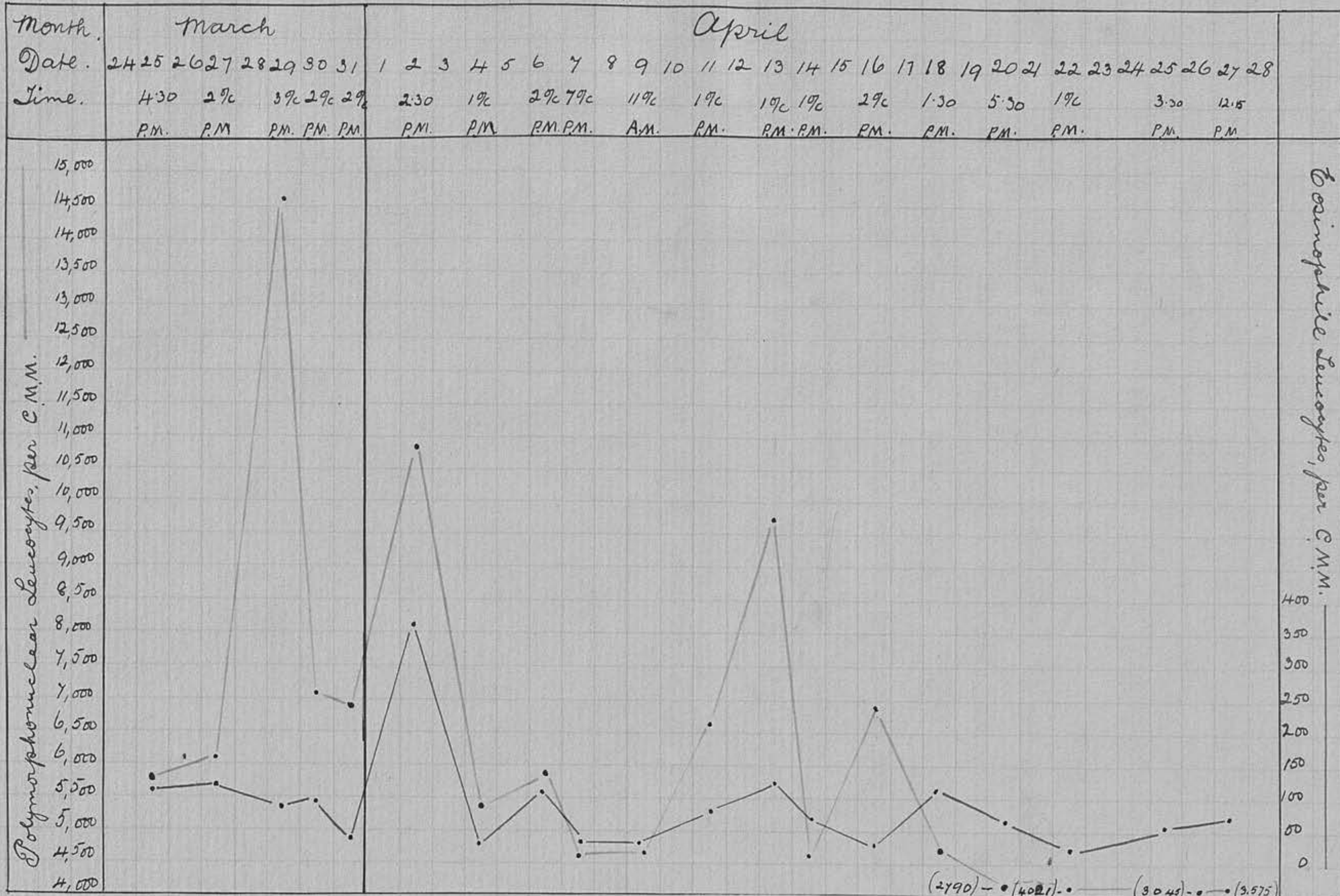


C. IV (a.) a. & b. 1910.

C IV. (l.)

A. E. C.

1910



C IV (l.)

A. E. C.
1910.

To follow p. 21

Remarks:-

The chart shows an irregular leucocytosis. The highest count was 16,800, and on several occasions the count has been above 10,000. The polymorph. percentage has been high in most of the counts, though it was several times below 70, and on occasion as low as 45. The polymorph chart shows even greater fluctuations than the total leucocyte chart.

The later counts have been rather low, while her mental condition has shown no improvement.

She would appear to be showing a very ineffectual resistance to a severe toxaemia.

The eosinophiles rose on one occasion to over 350 per c.m.m., but in the other counts they were seldom above 100 per c.m.m.

CASES OF MANIC DEPRESSIVE INSANITY.

I.

M.S., female, aged 21, single, Mental Nurse. Admitted 13th November, 1908.

She had an insane heredity: her uncle and her father were both insane.

This was her second attack: she had been in Bexley when she was 17. Since her discharge she had been a nurse in both mental and general hospitals.

For five months before admission she had been sleepless with a gradually increasing restlessness. She became more excited, and finally was constantly screaming and talking.

On admission:-

Consciousness was quite clear: she fully realised that she had returned to Bexley. She chattered continually and more or less incoherently, constantly changing from one subject to another.

She was happy and elated; gesticulated and posed. She was aurally hallucinated and her sense of propriety was lost.

Progress:-

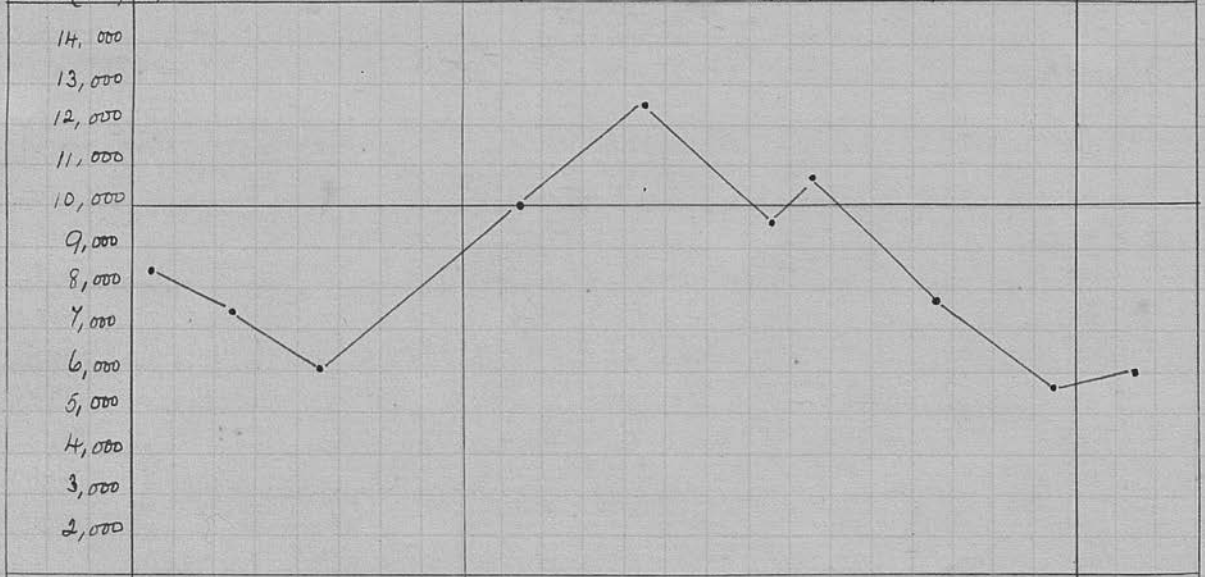
She remained in this excited state till the end of November, when she began to get a little quieter. She improved gradually and by the beginning of January was able to work in the needle-room. By the beginning of April she was able to go to the Convalescent Villa. She was discharged, recovered, in the

M.S.

M.D. I (a)

1908. 1909

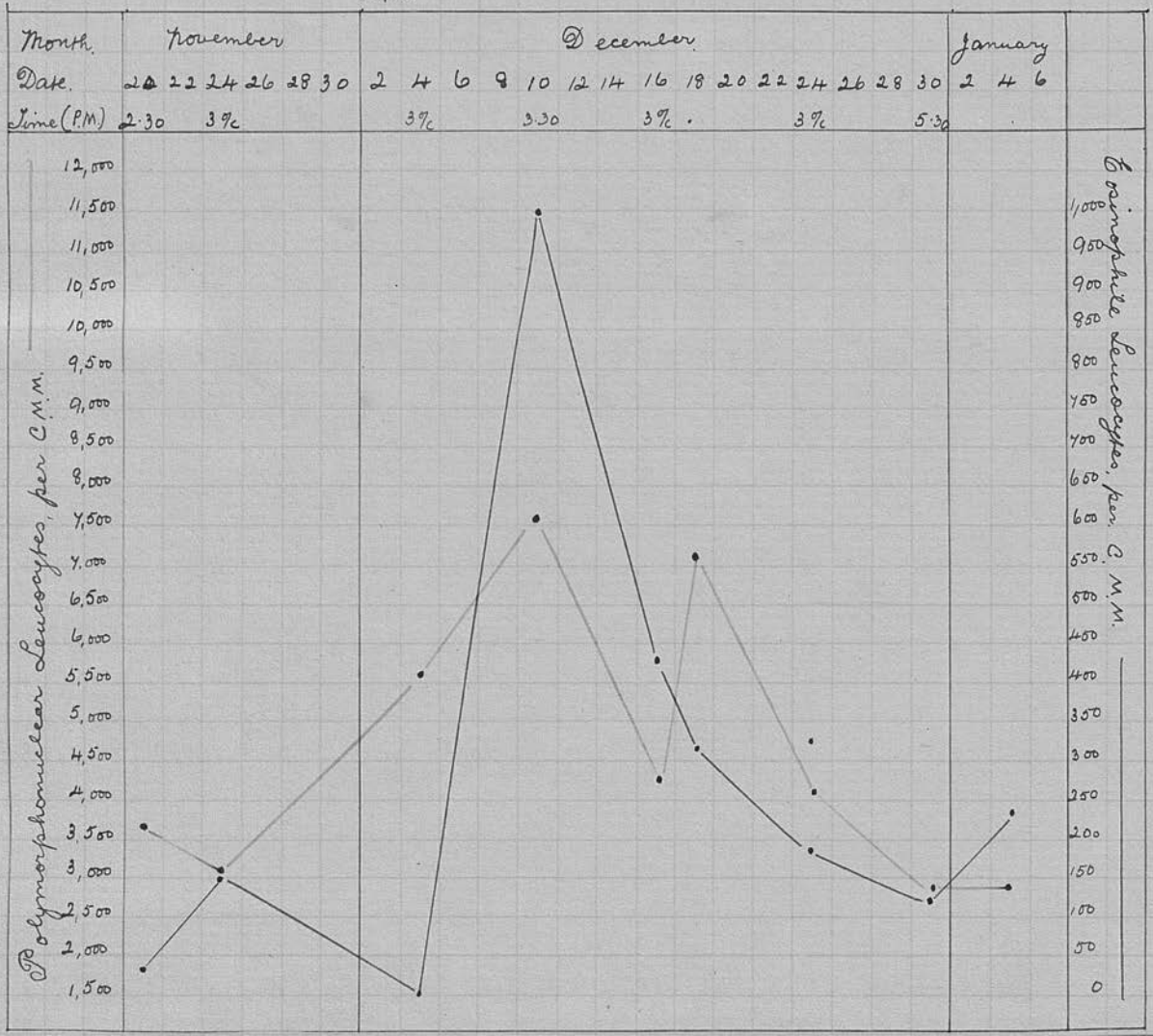
Month.	November								December														January		
Date.	16	18	20	22	24	26	28	30	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	2	4	6
Time (P.M.)	3%		2.30		3%				3%				3.30			3%				3%			5.30			



P.	/		48.		50.6				56.5				60.5			45.5	64.5			52.			53.		48.5
L.	/		40.		31.7				33.				24.			39.	39.5			41.			42.		44.5
L.M.	/		6.8		16.4				5.				7.5			11.	3.			4.			8.5		3.
E.	/		.4		2.				1.				8.			4.5	3			2.5			1.5		4.
B.	/		/		/				/				/			/	/			.5			/		/

M. D. I (a)

M. S.


1908
1909
Month.
November
December
January
Date.
20 22 24 26 28 30 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 2 4 6
Time (P.M.)
2.30 3 pc 3 pc 3.30 3 pc 3 pc 5.30
Polymorphonuclear Leucocytes, per C.M.M.
12,000
11,500
11,000
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
6,000
5,500
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
Eosinophile Leucocytes, per C.M.M.
1,000
950
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0

beginning of May, 1909.

On December 5th she was developing a quinsy and was put to bed. It was opened on the 9th and a quantity of pus was evacuated.

Remarks:-

There was nothing of note about the leucocyte curve except when the quinsy occurred, when the count rose to 12,500. At this period the polymorphonuclear percentage rose to 60 and subsequently to 64. The most marked increase occurred in the connophiles, which rose to 1,000 per c.m.m. and then gradually subsided.

II.

H.L., female, aged 33, single, general servant. Admitted 8th January, 1909.

She had an insane heredity, a maternal aunt having been insane. This was her third attack: she had previously been in Bexley Asylum.

For a week prior to admission she had been becoming excited, had left her situation, and on one occasion rang up the Medical Superintendent from a public call office in London.

On admission:-

Consciousness was quite clear: she realised her surroundings and recognised the officials whom she knew when she was here before. She was very noisy and restless; talked incessantly, laughed, and indulged in strange antics. Her habits were defective: she was filthy in the disposal of her excreta.

Progress:-

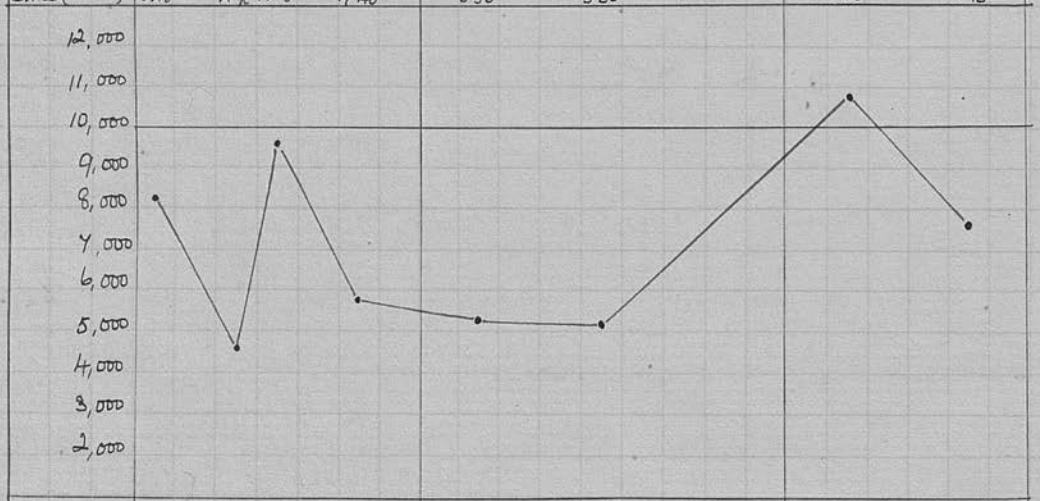
She continued in this acutely maniacal state and had to be kept constantly under the influence of Chloral and Paraldehyde, and was for the most part in the padded room till the end of January. She improved slightly after this, but again relapsed toward the end of February, and in the beginning of March she was very restless and noisy, but quite lost: could not recognise people and was very confused. At this period she lost weight rapidly, but no bodily disease could be detected. Shortly after this she began to improve again, and became much better, both

M.D. II (a)

H.L.

1909

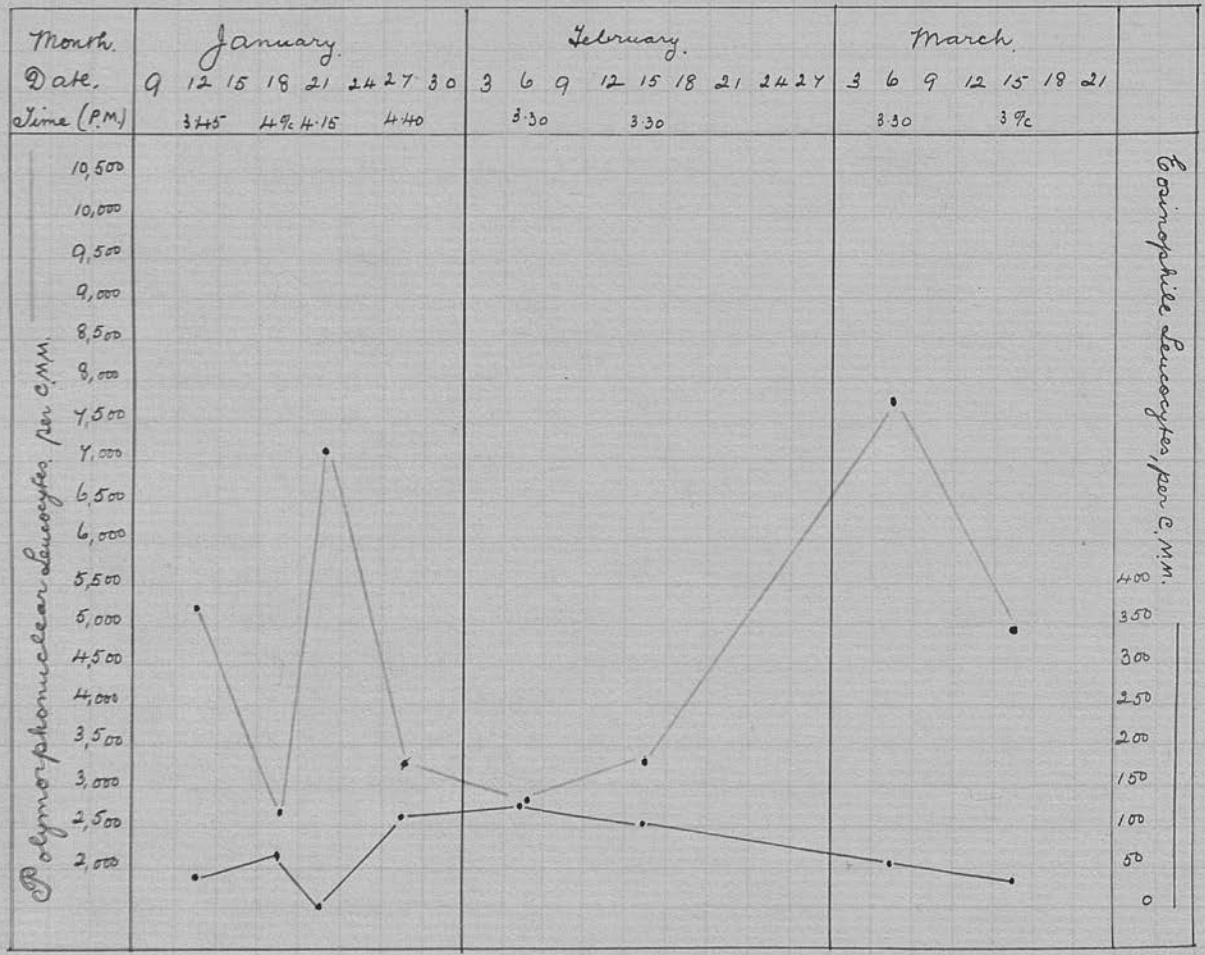
Month.	January							February								March					
Date.	12	15	18	21	24	27	30	3	6	9	12	15	18	21	24	27	3	6	9	12	15	18
Time (P.M.)	3.45		4½	4.15		4.40		3.30				3.30					3.30				3½	
P.	64.5		56.5	74.5		57.5		54.5				65.5					72.				64.	
L.	28.		38.	24.		38.5		39.				30.					25.				30.5	
L.M.	6.		3.5	1.		2.		3.				2.5					2.5				4.5	
E.	.5		1.5	—		2.		2.5				2.					.5				.5	
B.	1.		.5	.5		—		1.				—					—				.5	



M. D II (b.)

H.L.

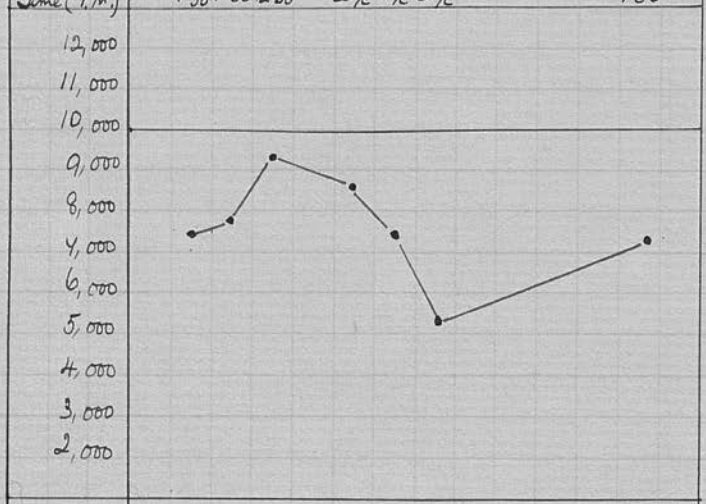
1909



M D II (c) H.L.

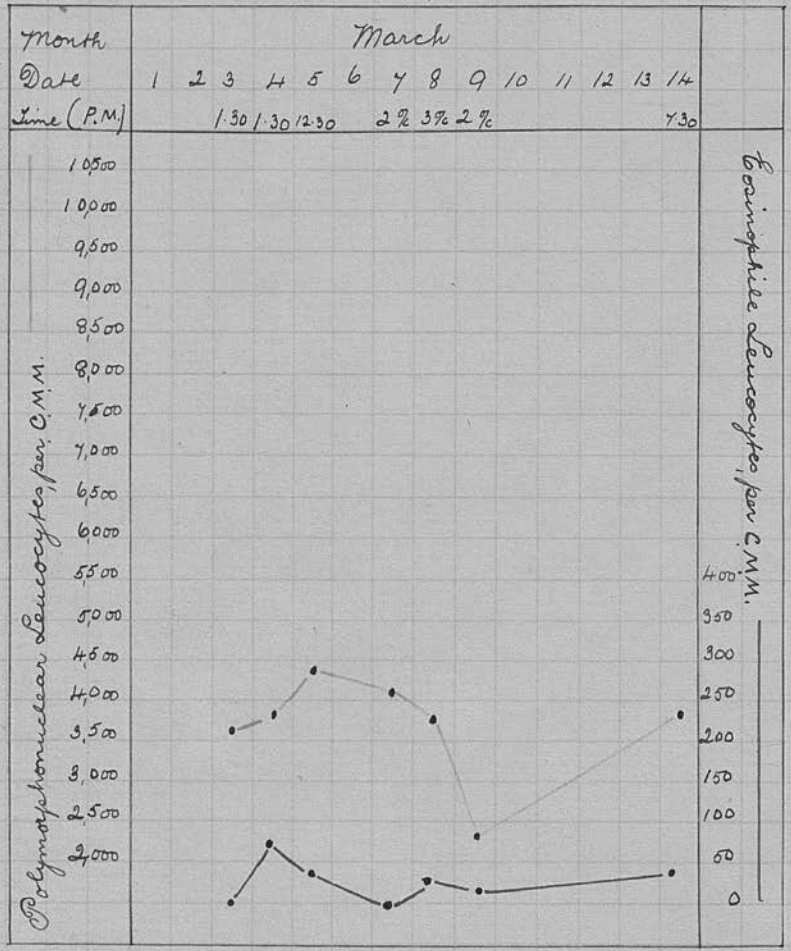
1910

Month.	March													
Date.	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Time (P.M.)		1·30	1·30	12·30		2 ¾	3 ¾	2 ¾					4·30	
P.		47·5	49·	48·		48·	50·	44·					52·5	
L.		51·	48·	50·5		50·	47·	55·					46·	
L.M.		1·	1·5	5		·5	1·	·5					1·5	
E.		—	1·	—		—	·5	·5					·5	
B.		·5	—	1		1·	1·	—					·5	



M.D. II (d.) H.L.

1910



physically and mentally. By June she was able to work in the ward.

She has remained well since, but when the second series of counts were made she was still somewhat boisterous and easily excited.

Remarks:-

On no occasion on which a count was made was there any well-marked leucocytosis. On one occasion, when she was at her worst, on the 6th March, the count was slightly over 10,000, the polymorphonuclear percentage rising to 72. The polymorphs per c.m.m. were highest at the period when she was most excited, but the numbers scarcely exceeded the normal limits. The eosinophiles were not increased.

A second series of counts were made when she was practically well. The only difference between the two series is that the polymorphonuclear percentage was 10 to 20 per cent. lower in the second series.

III.

E.McC. female, aged 22, single. Domestic servant. Admitted 20th November, 1909.

She came of an insane stock, her mother, brother and sister being insane.

This was her first attack. She had been becoming excited for a week before admission.

On admission:-

Consciousness was somewhat clouded, and she did not completely realise her surroundings, but was able recognise the doctors and nurses as such. She was aurally hallucinated

MD III (a) E. McC.

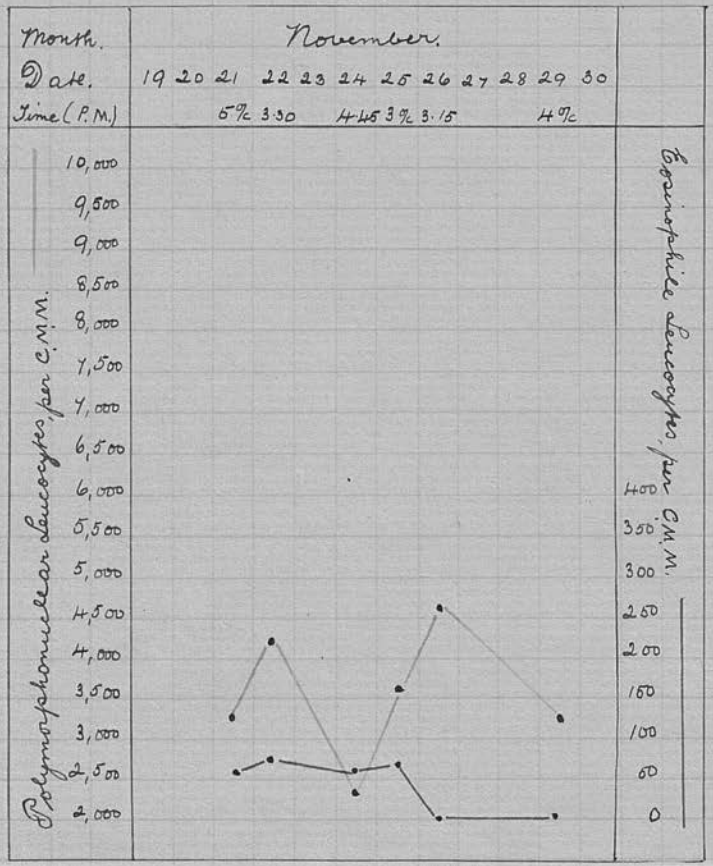
1909

Month.	November												
Date.	19	20	21	22	23	24	25	26	27	28	29	30	
Time (P.M.)		5¾	3.30			4.45	3½	3.15				4¾	
12,000													
11,000													
10,000													
9,000													
8,000													
7,000													
6,000													
5,000													
4,000													
3,000													
2,000													
P.		57.5	56.5			43.	54.	69.5				49.	
L.		39.	44.			50.	39.5	28.5				47.	
L.M.		2.5	1.5			4.5	2.	1.5				3.	
E.		1.	1.			1.	1.	—				—	
B.		—	—			.5	.5	.5				1.	

M. D. III (b)

E. McC.

1909



people were talking to her from outside the window of the padded room. She was at times depressed, throwing herself about in a histrionic manner, and bemoaning her misery in having had an illegitimate child two years previously; she would shout about this in a loud voice. She mixed this with much erotic talk. At other times she was elated and happy.

Her bodily health was fair, though she was somewhat thin.

Progress:-

She got a little quieter, but is still aurally hallucinated and shows no very well-marked mental improvement.

Remarks:-

The counts were practically normal, the polymorphonuclear percentage being rather low.

M.D. IV (a)

E.R.

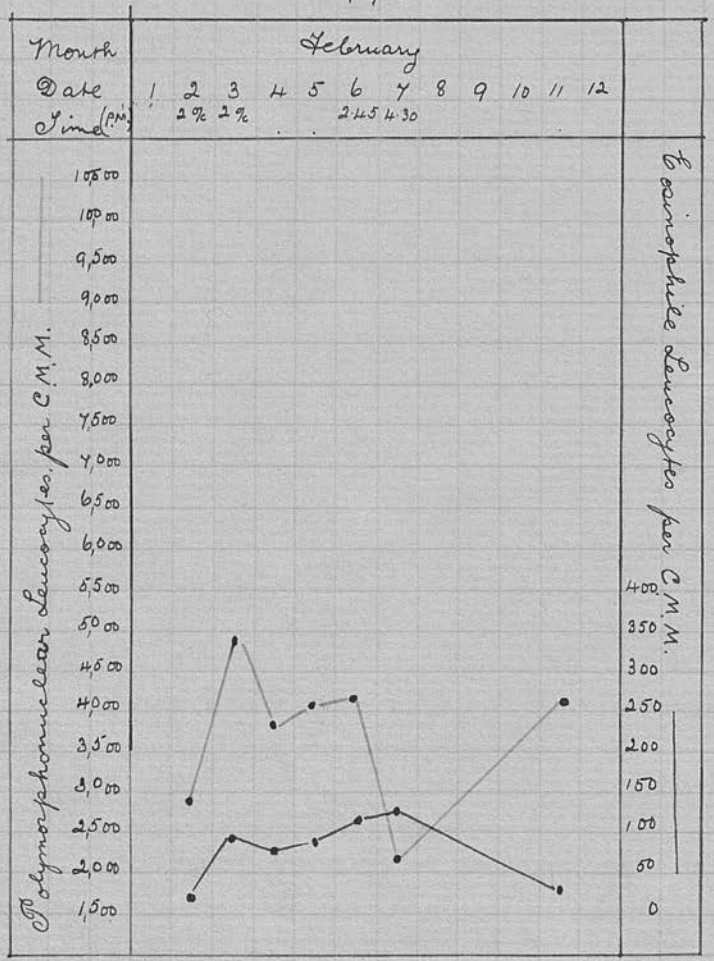
1910

Month	February											
Date	1	2	3	4	5	6	7	8	9	10	11	12
Time (P.M.)	2½	2½	.	.	2	4	5	4	30			.
12,000												
11,000												
10,000												
9,000												
8,000												
7,000												
6,000												
5,000												
4,000												
3,000												
2,000												
P.	52·5	44	55	57	56	68·	55·	41·5				61·5
L.	46	28·	39	52	9·	42·	54·					34·
L.M.	—		·5	1·		5	·5	1·				3·
E.		·5	1·5	1·		5	1·5	2·5				·5
B.	1·		·5	1·	—		·5	·5				·3

E.R.

M D IV (6)

1910



IV.

E.R., aged 38, single. A charwoman. Admitted 21st December, 1909

She had a well-marked insane heredity. This was her first attack. She was suffering from an attack of acute mania on admission, and at the time the counts were done she was in bed in a side-room. She was actively hallucinated; was very restless and talkative, very foul-mouthed and erotic. Her restlessness was only kept within limits by keeping her constantly under the influence of sulphonal and trional.

Remarks:-

The blood count is of interest only from the fact that during a very severe attack of acute mania the leucocytes were within the limits of the normal, both in numbers and in percentage composition.

V.

W.R.H., female, aged 17, single. A needlewoman. Admitted 19th August, 1909.

This was her first attack. No heredity.

Previous to admission she had shown mental symptoms for about a fortnight: she thought people were putting things in her food. In the Infirmary she had been depressed and quiet, constantly muttering that she had done wrong. She had refused her food because she thought it was poisoned.

On admission:-

Consciousness was somewhat clouded: she had no idea of her surroundings. She could remember her being in the Infirmary, but nothing after that. She was retarded, confused, quiet, and gave no trouble. She was decent in her language and behaviour.

Progress:-

She remained in this state till the middle of November, when she was put on thyroid extract. She began to improve after this, but still remained somewhat quiet, and it was difficult to get her to speak. Throughout December and January she gradually began to get freer in her talk, and the thyroid extract was reduced in dose, and finally suspended. By the beginning of February she was in a state of acute mania. She was now cheeky, pert, rude; continually talking and laughing. She would no sooner start one subject than she was off on another: she was at times quite incoherent. Her attention was very difficult to obtain. She now

swore freely; was erotic, and her talk was frequently on sexual topics. She was mischievous, throwing things about, and was spiteful towards the nurses.

She has continued more or less in this state since the middle of February. Sometimes she has required to be kept in bed, but is now usually able to be up, but still remains in an acutely maniacal state.

She was sparely nourished on admission, but has got thinner since, though her general physical health is fairly good and she takes her food well.

(CHARTS M.D.V. (a) and M.D.V. (b) follow this page.)

Remarks:-

Unfortunately no counts were made during her stuporose state. During her maniacal attacks counts were made frequently over a period of over two months.

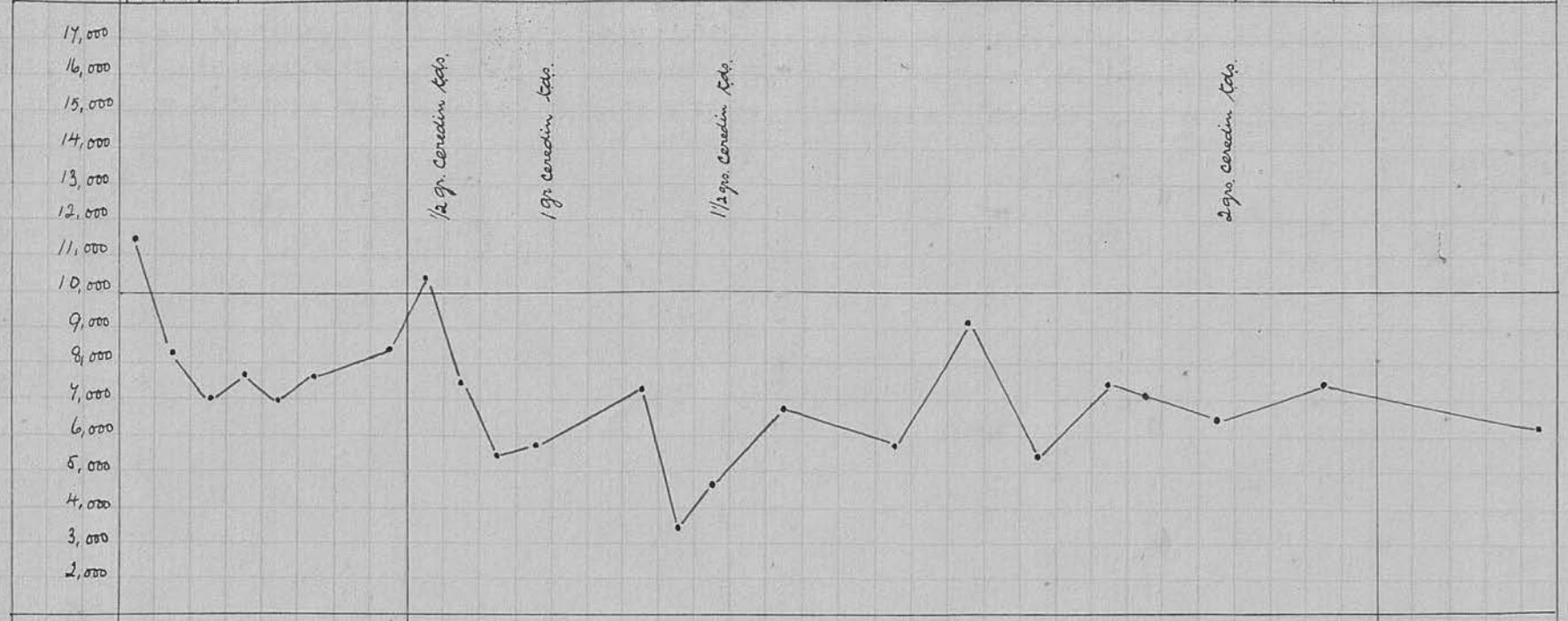
The chart shows a complete absence of leucocytosis.

M. D. V. (a)

W. R. H.

1910

Month.	February								March.																				April.				
Date.	21	22	23	24	25	26	27	28	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	14	18	19	20	21	22	23	24	25	26	27	1	2	3	4	5
Time.	5% P.M.	1·30 P.M.	4% P.M.	1% P.M.	5% P.M.	1% P.M.		5% P.M.	11% A.M.	12% Noon	12% Noon	12% Noon		12% Noon	1% P.M.	12% Noon		1% P.M.				1% P.M.		6% P.M.		1·30 P.M.	1% P.M.			1% P.M.			1·30 P.M.					1% P.M.
P.	33·5	43·	39·	54·5	31·5	43·5		51·	52·5	44·	40·5	37·		42·	50·5	48·5		46·5				55·		51·5		57·5	45·			54·5			64·5					55·
L.	64·	54·5	58·	41·	61·	53·5		44·5	46·	53·	56·	60·5		56·5	48·	50		52·				43·		45·5		39·	61·5			44·			34·5					40·75
L.M.	1·	2·		·5	1·5	1·	1·		1·	1·5	3·	1·5		1·	1·5	·5		·5				·5		1·5		1·	1·			1·			·5					2·5
E.	1·		·5	2·	2·5	1·	1·5	3·	·5	·5	—	1·		·5	1·	1·		1·				1·5		1·		1·5	2·5			—			·5					1·75
B.	·5	—	·5	·5	·5	·5		—	—	1·		·5	—	—	—	—		—				—		·6		1·	—			·6			—					—

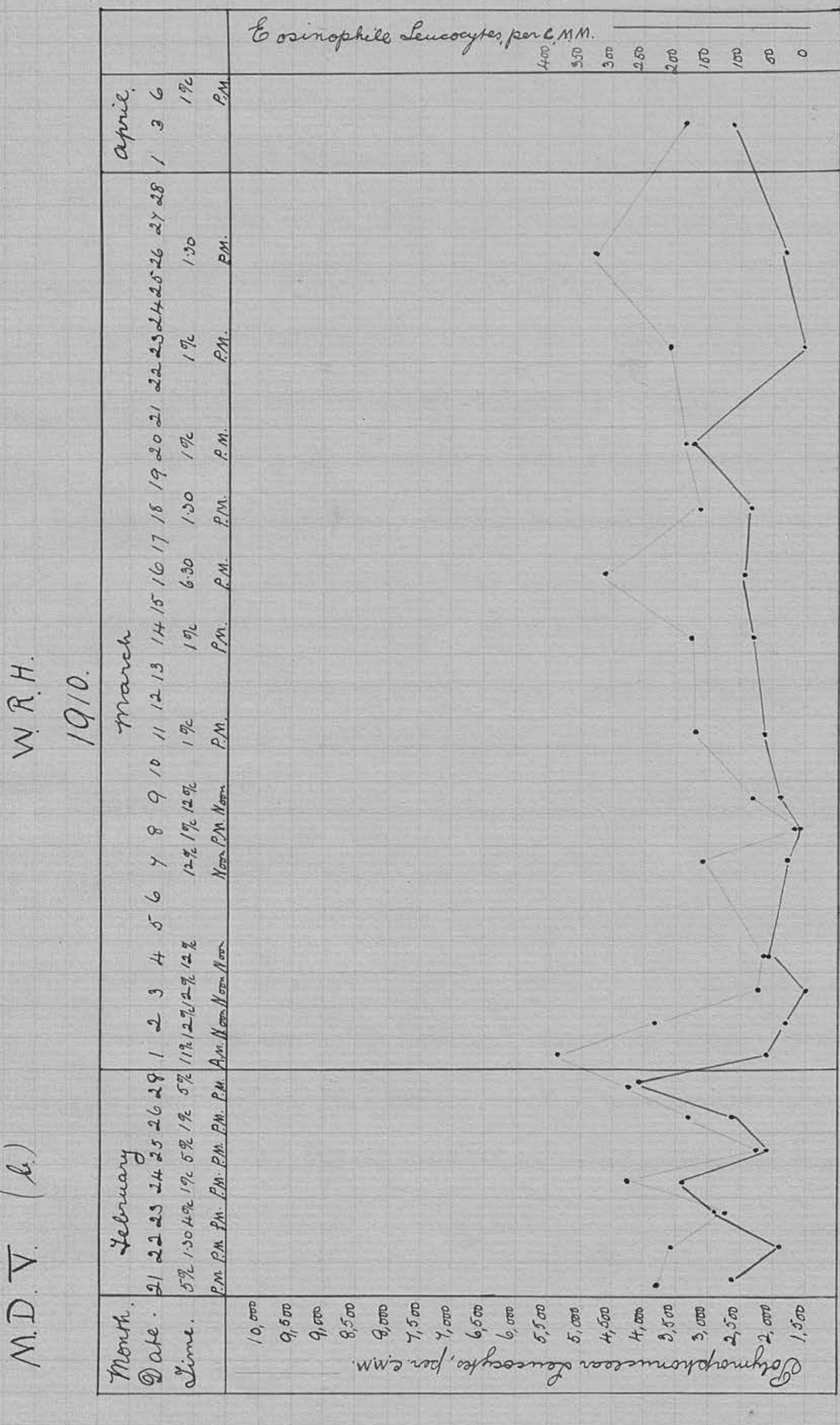


M. D. V. (a) W. R. H. 1910.

M.D.V. (b.) W.R.H.

1910.

To follow p. 31



On only two occasions did the count rise above 10,000, and then only very slightly.

The polymorphonuclear percentage was persistently somewhat low, and the total number of polymorphs per c.m.m. never exceeded 5,500 and was more commonly much below this. The eosinophiles were present only in their normal percentage.

In this case an attempt was made to produce an artificial leucocytosis by giving Ceredin, a preparation of yeast. Half-a-grain was given three times a day on March 1st. This was increased to 1 grain three times a day on the 4th. One-and-a-half grains three times daily were given from the 9th, and on the 23rd the dose was increased to two grains three times a day.

The giving of Ceredin did not affect the leucocyte count in any way, and certainly it failed completely to raise the number of the leucocytes present in the blood.

It is but fair to say, however, that the nurse in charge of the patient reported the patient much quieter while she was taking the Ceredin, and actually thought that it was a sedative medicine. It seems more likely, however, that the sedative effects were produced by her nightly paraldehyde draught, which she required to make her sleep.

VI.

F.H.B., male, aged 39, married. Cattle salesman. Admitted 13th January, 1910.

This is his fourth attack.

For one week prior to admission he had been becoming gradually more excited.

On admission:-

Consciousness was quite clear and he could orientate correctly. He rapidly became incoherent if permitted to go on talking. He was silly and irresponsible in his conduct. He was elated and in a state of exaltation, and had numerous fleeting delusions of an exalted type. He boasted of his doings at Christmas time, which consisted of the worst forms of debauchery. His wife being away from home, he spent his time with other women, and recounted with glee the domestic trouble which followed. His moral sense was much perverted.

At the time the counts were made he was in the same state: restless, talkative, elated; dirty in his habits: rubbing urine into his hair, etc.

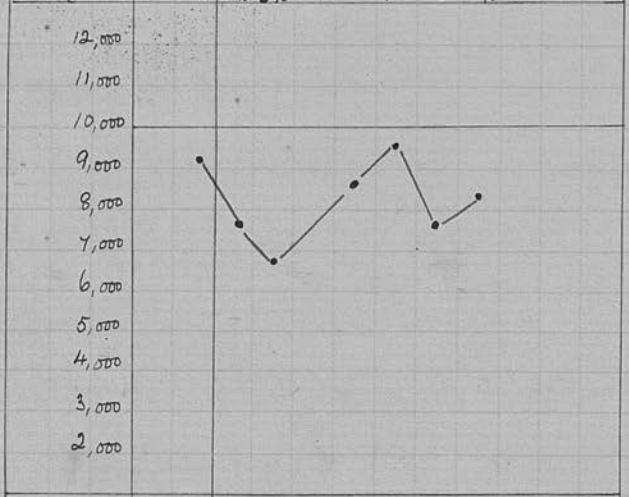
(Charts M.D. VI (a) and M.D. VI (b) follow this page)

M. D. VI (a)

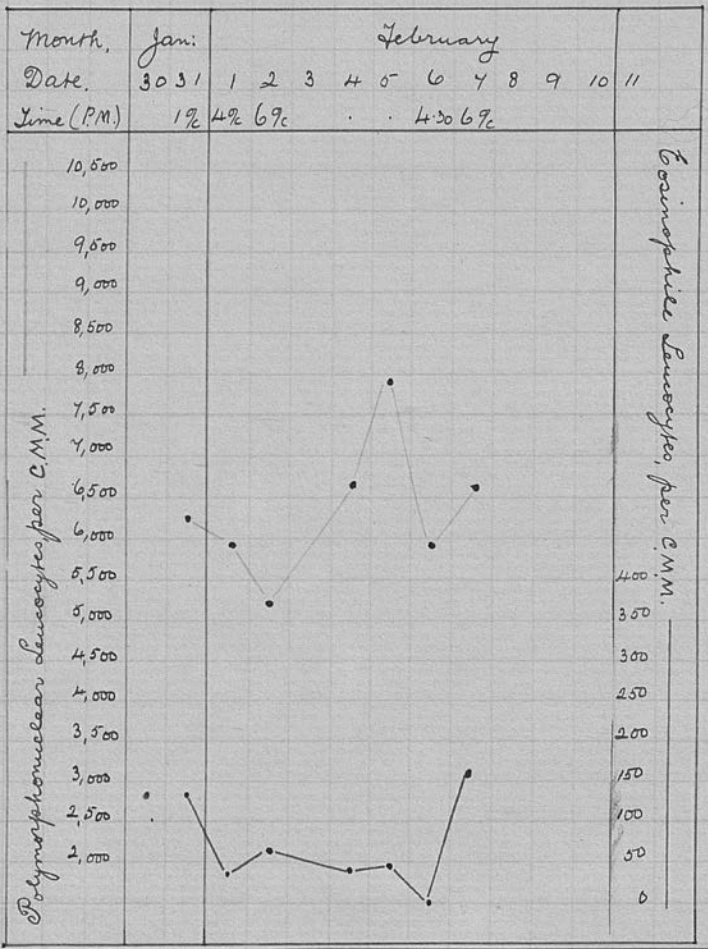
T. A. B.

1910

Month.	Jan:		February.									
Date.	30	31	1	2	3	4	5	6	7	8	9	10
Time (P.M.)		1%	4%	6%				4:30	6%			
P.		68·5	76·	76·5		74·	81·5	74·	78·5			
L.		26·	21·	21·		23·5	17·	24·	17·5			
L.M.		2·5	1·5	1·5		1·5	·5	1·	1·5			
E		1·5	1·	1·		·5	·5	—	2·			
B		1·5	—	—		·5	·5	·5	·5			



M. D. VI (l) J. H. B.


Month. Jan. February
Date. 30 31 1 2 3 4 5 6 7 8 9 10 11
Time (P.M.) 1½ 4½ 6½ 4:30 6½
Polymorphonuclear Leucocytes per C.M.M.
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
6,000
5,500
5,000
4,500
4,000
3,500
3,000
2,500
2,000
Eosinophile Leucocytes per C.M.M.
400
350
300
250
200
150
100
50
0

Remarks:-

The counts did not exceed the normal, though they were slightly high. The polymorphonuclear percentage was somewhat higher than the normal, and on one occasion was over 80 per cent. Even with this high percentage, however, the total polymorphs per c.m.m.on only one occasion exceeddd 7,000.

The eosinophiles were not increased.

VII.

L.M., aged 53, female, admitted 12th February, 1909.

Had had four previous attacks.

Prior to her admission here, she had been for a year in Barming Heath Asylum.

On admission she was in a state of acute mania, constantly talking and subject to outbursts of excitement, when she was destructive.

Progress:-

She improved, and was discharged, recovered, in July, 1909.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
22:2:09.	6 p.m.	6,200.	52·5	40·0	6·5	1·0	-

VIII.

A. B., female, aged 42, single. Admitted 11th March, 1909.

This was her second attack.

On admission:-

She showed considerable clouding of consciousness. There was great increase of psychomotor activity. She sang, laughed, shouted, gesticulated. Her conversation was quite incoherent. She refused her food and required nasal feeding. She was wet and dirty in her habits.

Progress:-

On the 16th March she had some bronchitic signs in her chest, and developed an irregular pyrexia. A few days later she developed a foul diarrhoea.

Subsequent to this she did not improve mentally, and never recovered physically. She died in December of septic broncho-

pneumonia, and, post mortem, was found to have old-standing bronchiectasis.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
12:3:09	4:15 p.m.	8,400	81·0	17·0	1·5	-	-
16:4:09	6:0 ,,	12,500	80·0	17·0	1·0	1·0	1·0
21:4:09	3:0 ,,	6,600	79·5	18·5	·5	·5	1·0

Remarks:-

The complicating physical condition is probably responsible for the slight leucocytosis and raised polymorphonuclear percentage.

IX. M. S., female, aged 24, married, admitted April 8th, 1909.

She had given birth to a child 20 days prior to admission.

On admission:-

She was acutely excited, noisy and silly in her speech and behaviour. She was aurally hallucinated, and had many fleeting delusions dependent on her hallucinations.

She had a vaginal discharge on admission, and had a severe secondary uterine haemorrhage on the 8th and another on the 14th. She afterwards developed pyrexia, and was found to have an inflammatory swelling of her knee.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
15:4:09.	3 p.m.	7,500	34·0	64·0	·5	1·5	-
20:4:09.	3:30 p.m.	9,700	63·5	32·0	1·5	1·5	1·5

Remarks:-

Remarks:-

The physical state in this case was such as might well have affected the leucocyte count, and further counts would have been of little interest. It is noteworthy that after the haemorrhage on the 14th, the polymorph. percentage was low; by the 20th it was again normal.

X. G. T., female, aged 22, single, admitted 6th May, 1909.

She had a well-marked insane heredity.

This was her second attack.

On admission:-

She was in a state of acute mania with aural hallucinations, and delusions dependent on them. She was constantly chattering and singing. She remained in this state till the end of May, after which she improved, and was discharged, recovered, in October.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
22:5:09	3 p.m.	10,900	65·5	30·5	3·0	·5	·5
25:5:09.	3 ,,	9,400	63·0	29·5	3·0	2·5	2·0
31·5·09	11 a.m.	9,700	93·0	6·5	·5	-	-

Remarks:-

The counts in this case were rather high, though there was no very well-marked hyperleucocytosis. The last count showed a greatly increased polymorphonuclear percentage. Another differ-

ential count was made from a film taken from the patient at the same time, and the polymorph. percentage was found to be 89·5. The cause of this increased percentage is not obvious, as the total count was not raised.

XI.

A. R., female, aged 17. tailoress, admitted 14th May, 1909.

She was suffering from the stupor of manic depressive insanity, but the physical state was probably responsible for the hyperleucocytosis. She had pyrexia associated with an erythematous rash.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
24:5:09.	3:30 p.m.	16,200.	65·5	29·5.	4·0	·5	·5

XII. A.K., aged 38, female, married, admitted 17th April, 1909.

A case of manic depressive insanity; excitement beginning a month after childbirth. She had been a year in another Asylum. Was in a state of acute mania at the time the count was made.

She improved and was discharged, recovered, three months later.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
1:6:09.	11:30 a.m.	7,800	67·5	31·0	1·0	-	·5

XIII. G. T., aged 22, single.

She was pregnant on admission. She was dull, retarded, and very depressed, and had, before admission, made a suicidal attempt She was in the depressive stage of the disease.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
10:6:09	3 p.m.	7,500	66·00	28·0	4·0	·5	1·5

XIV.

A.M.B., female, aged 29, married, admitted 8th June, 1909.

She had had a previous attack in 1904.

She had given birth to a child 15 days prior to admission.

For ten days before admission she had been in a state of melancholia with excitement, and had been very violent. At the time when the first count was made she was confused, restless, hallucinated and depressed. By the 24th she was much better, but still worried a good deal. She made a rapid recovery, and left the Asylum on August 1st.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
12:6:09	3 p.m.	11,500	69·5	29·0	·5	1·0	-
24:6:09	4 ,,	5,500	64·5	31·5	3·0	·5	·5

Remarks:-

The first count showed a slight leucocytosis without any great increase in the polymorph. percentage. This may have been

in association with her mental condition, but the possibility of some slight infection of some part of the genital tract cannot be excluded, though there was no obvious pathological condition present.

XV.

E. C. B., female aged 32, married, admitted 23rd June, 1909.

She had a well-marked insane heredity.

On admission:-

Consciousness was clear. She was actively hallucinated, and had delusions dependent upon her hallucinations. She was wildly excited, spiteful and purposeful in the trouble she gave. She was wet and dirty and degraded in her habits. She talked in a filthy way of sexual matters. She continued in this condition while the counts were made

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
26:6:09.	3 p.m.	15,300	69·0	29·5	1·5	-	-
28:6:09	3 ,,	6,000	53·0	42·0	2·5	1·5	1·0
2:7:09.	4:30 p.m.	8.100	69·0	29·0	1·5	-	·5

Remarks:-

There was no obvious physical condition to explain the hyperleucocytosis of the first count, and it may have been in association with the mental disease. It is noteworthy that, in spite of the rather high degree of leucocytosis, the polymorph. per-percentage did not rise above the limits of the normal. Subsequent counts showed no hyperleucocytosis, and the percentage of

the different types of leucocytes showed no variation from the normal.

XVI.

M.C.N., female, aged 20, admitted 16th July, 1909.

This was her first attack. She had a well-marked insane heredity.

She had been becoming excited for ten days prior to admission.

On admission:-

Consciousness was clear. She had some idea of her state, but made errors of identity and could not orientate correctly. She had aural hallucinations. Psychomotor activity was markedly indreased. She talked incessantly, wandering from subject to subject in an incoherent manner. She was restless, histrionic, and imitated the other patients. She was wet and dirty in her habits, and required nasal feeding.

Progress:-

She continued in this state till August, when she began to improve, and was discharged in December, 1909.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
19:7:09	3:30 p.m.	5,300	41·0	57·5	1·0	·5	-

Remarks:-

The polymorph. percentage was rather low in this case, but otherwise there was nothing abnormal noted.

XVII. M. E., female, aged 19, married, admitted 13 July, 1909.

This was her first attack. There was no hereditary taint.

She had been excited and restless for three days before admission.

On admission:-

Consciousness was clear. She was much hallucinated. Talked nonsense about kings and queens, etc. She was restless and troublesome: tore her bed-clothes. She was wet and dirty in her habits.

Shortly after admission she developed a pelvic cellulitis, and there was a large inflammatory swelling on the left broad ligament. She had an irregular pyrexia in association with this.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
20:7:09.	4 p.m.	9,400	67·5	30·0	1·0	1·0	·5
29·7·09·	4 ,,	14,000	84·0	12·5	2·5	1·0	-

Remarks:-

The first count showed nothing abnormal. The second one showed a leucocytosis due to the inflammatory pelvic condition.

XVIII. A. L., female, aged 55, admitted 12th August, 1909.

Her brother was also insane.

She had had six previous attacks, the first one at 33 years of age.

On admission:- She was in the depressive stage of the disease.

She was exceedingly restless, and agitated and depressed. She grimaced and rubbed her hands in her misery. She had aural hallucinations - heard the Devil speaking to her. She had numerous visceral delusions, such as that she had no heart and no stomach. She thought she had been very wicked.

Progress:-

Her condition is gradually passing into that of dementia.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
14:8:09.	3:30 p.m.	8,700	57·5	41·5	1·0	-	-

XIX.

A. E. G., female, aged 22, married, admitted 1st December, 1909.

She had an insane heredity. This was her first attack.

She had given birth to a child on the 22nd November.

On admission:-

She still had a slight lochial discharge.

She was restless, excited and talkative. She had hallucinations of hearing. Consciousness appeared to be somewhat clouded. She has continued in the same excited condition up to the present.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
7:12:09.	4 p.m.	6,000	63·5	33·5	1·5	1·5	-

XX. M.E.R., female, aged 33, single, admitted 11th December, 1909.

She had had five previous attacks.

On admission:-

She was in a state of acute maniacal excitement. She was actively hallucinated. Consciousness was clear. She improved rapidly, and by February was in her normal mental state, except that she had some delusional ideas about her mother.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
12:12:09	7 p.m.	5,300	69·0	28·0	1·5	1·0	·5

XXI. L. B., female, aged 36, single, admitted 13th December, 1909.

This was her first attack.

The mental symptoms had been noticed for three months.

On admission:-

She was wildly excited and required seclusion in the padded room She had active hallucinations of many of the special senses. Affectively she was alternately depressed and elated.

Consciousness was clear.

She had numerous fleeting delusions dependent on her hallucinations .

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
13:12:09.	5 p.m.	8,400	84·0	14·5	1·0	-	·5

Remarks:-

The polymorph.percentage was considerably above normal in this case, though the total count was not raised.

XXII. A. F. J., female, aged 66, admitted 15th December, 1909.

She had had five previous attacks.

On admission:-

She was happy and elated. She was very noisy: continually talking and shouting. She refused her food. She had delusions about her relatives.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
17.12.09	3 p.m.	7,500	65·0	30·5	1·0	3·5	-

CASES OF THE ACUTE EXCITEMENT OF DEMENTIA PRAECOX.

I. E. H., female, aged 28, single, a housemaid, admitted 7th January, 1909.

She had an insane heredity, her uncle and sister being insane.

She had a previous attack of excitement at 26.

She had become increasingly restless, noisy and violent for seven days prior to admission.

On admission:-

Consciousness was clear. She could not, however, orientate correctly, and made numerous mistakes of identity. She was somewhat confused and apt to mix up past and present events. She had aural and visual hallucinations, but did not give a good account of them. She had numerous fleeting delusions. She made the statement that she was sent here to be circumcised, and that the doctors wanted to marry her. Called this place the "Abode of Love". Affectively she was in a state of joy and happiness.

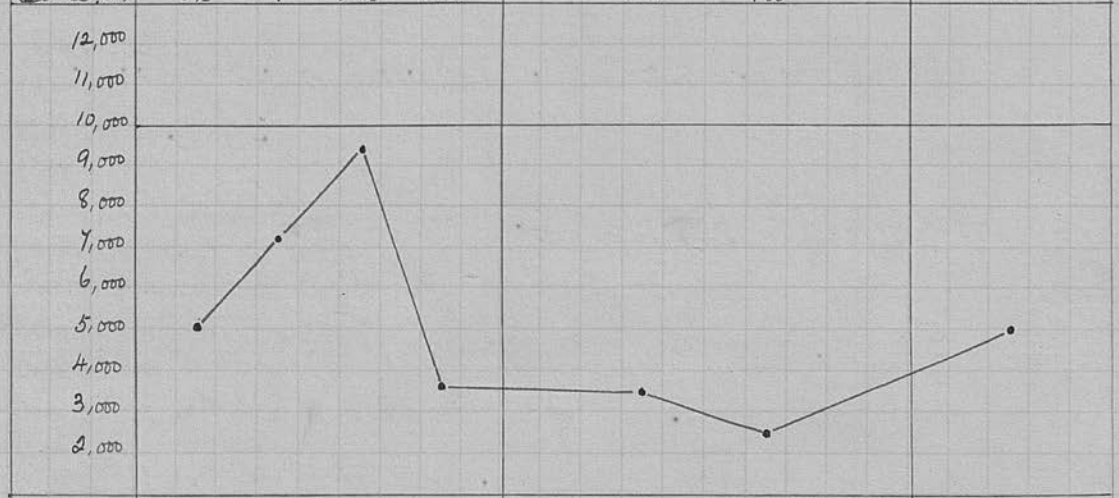
Progress:-

She remained happy, elated; hallucinated and irrational, and showed no signs of improvement up to the beginning of March, after which she improved sufficiently to be able to work in the laundry; but she still (March,1910) remained hallucinated and irrational.

D. P. I (a) E. H.

1909

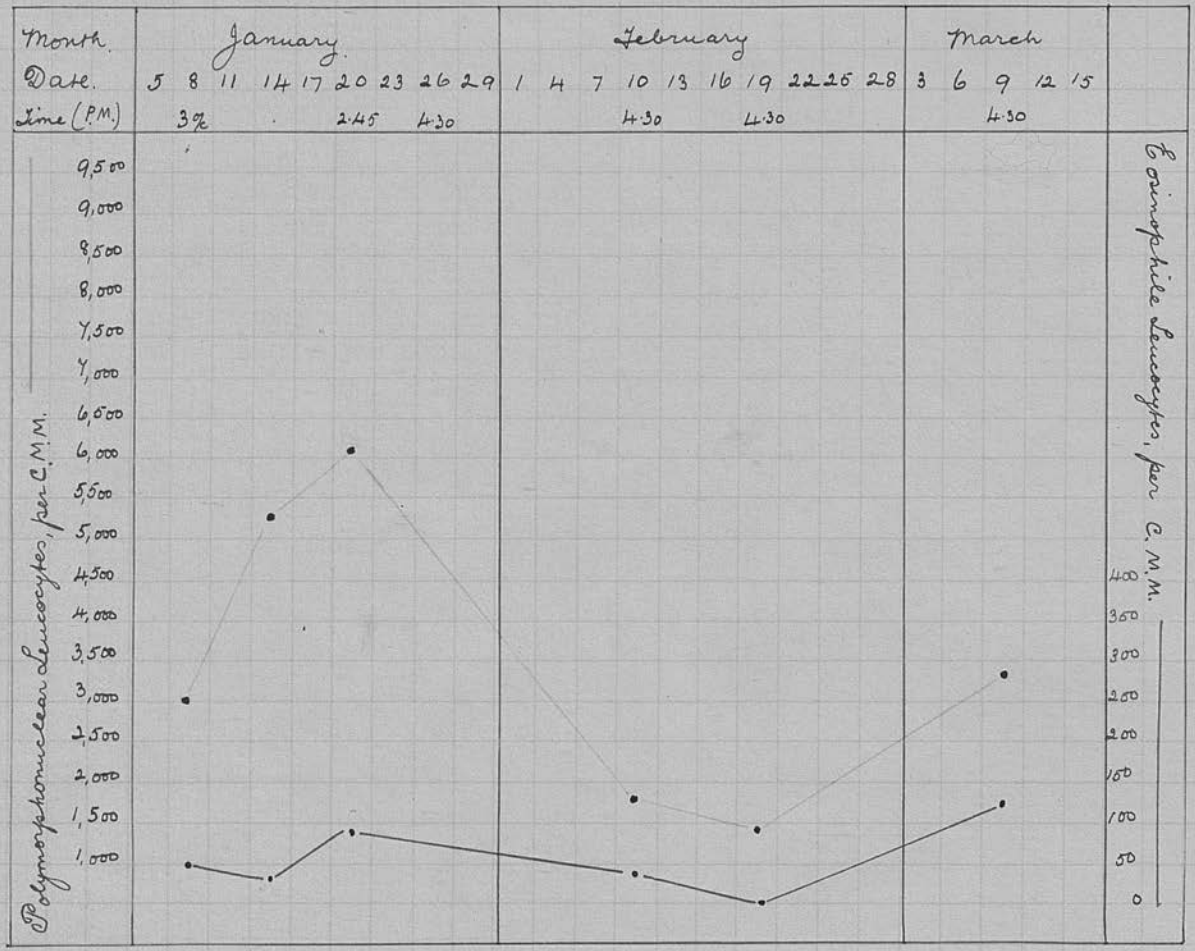
Month.	January.									February.										March.				
Date.	5	8	11	14	17	20	23	26	29	1	4	7	10	13	16	19	22	25	28	3	6	9	12	15
Time (P.M.)	3					2.45		4.30					4.30		4.30							4.30		
P.	60.		72.5		62.			/					50.		59.					66.5				
L.	34.		24.5		35.			/					45.		41.					29.				
L.M.	5.		2.		2.			/					4.		/					2.				
E.	1.		.5		1.			/					1.		/					2.5				
B.	/		.5		/			/					/		/									



D. P. I (b)

E. H.

1909


Month.
January.
February
March
Date.
5 8 11 14 17 20 23 26 29 1 4 7 10 13 16 19 22 25 28 3 6 9 12 15
Time (P.M.)
3½
2.45
4.30
4.30
4.30
4.30
Polymorphonuclear Leucocytes, per C.M.M.
9,500
9,000
8,500
8,000
7,500
7,000
6,500
6,000
5,500
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
Eosinophile Leucocytes, per C.M.M.
400
350
300
250
200
150
100
50
0

Remarks:-

None of the counts exceeded the limits of the normal in either the total amount of the leucocytes or in their percentage composition. The later counts were very low, but this corresponded to no mental change in the patient. The polymorphonuclear percentage also became rather low in the later counts at the time the leucopenia was present. The eosinophiles occurred in their normal proportions.

II. M. R., female, aged 17, seamstress, admitted 14th January, 1909.

She had no insane heredity, but the father was alcoholic.

For three weeks before admission she had been becoming increasingly noisy and excited.

On admission:-

Consciousness was clouded: she had no idea of her surroundings. She could not reason, and her memory for recent events was much impaired. She had active aural hallucinations, and, dependent on them, numerous fleeting delusions. She stated that she was God; that her tonsils had fallen down her throat; that this was the end of the world, etc. Psychomotor activity was much increased: She was restless, noisy; singing and shouting and using abusive language:-

Progress:-

She continued acutely maniacal till the beginning of February, bur became quieter after that, though still remaining silly, irrational and mischievous. She continued in her improved state for about a year, but had recently relapsed.

(Charts D.P. II (a) and D.P. II (b) follow this page.)

D. P. II (a)

M. R.

1909

To follows p 48

Month.	January						February							March		
Date.	20	22	24	26	28	30	2	4	6	8	10	12	14	2	4	6
Time (P.M.)	4.45			5	7						3.30	3.30				3.30
12,000																
11,000																
10,000																
9,000	•			•												
8,000																
7,000																
6,000																
5,000																
4,000																
3,000																
2,000																
P.	32.			65.			42.				56.	25.				65.5
L.	64.			30.5			49.				40.	66.				32.5
L. M.	2.			3.			3.5				2.5	2.5				1.
E.	3.			1.			—				1.	—				1.
B.	—			.6			.5				.5	1.5				—

M. R.

D. P. II (b)

1909

Month.	January						February							March		
Date.	20	22	24	26	28	30	2	4	6	8	10	12	14	2	4	6
Time (P.M.)	4.45			5	7						3.30	3.30				3.30

Polymorphonuclear Leucocytes, per C.M.M.

10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
6,000
5,500
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500

Eosinophile Leucocytes, per C.M.M.

400
350
300
250
200
150
100
50
0

Remarks:-

The only thing worthy of note about the counts is the persistently low polymorph.percentage. The increase in the polymorph. percentage on the 26th January was probably due to the fact that she had been vaccinated six days previously. The eosinophile percentage did not exceed the normal limits.

III. J. H. C., male, aged 28, stableman, admitted 4th January, 1910.

His mental symptoms dated from ten days before admission, and while in the Infirmary he had been noisy and violent.

On admission:-

Consciousness was clear: he had a very clear insight into his state, and could orientate correctly for both time and place. Hallucinations and delusions were not evident. He had great pressure of psychomotor activity: he was constantly talking in a loud manner, swearing freely and using obscene language. He was restless, resistive, destructive, and had to be put in the padded room in strong clothes for this reason.

Physically he was in an unhealthy state: his mouth was foul and covered with sordes. He had a sinus leading down to the lower maxilla on the left side. He had probably had an alveolar abscess which had discharged externally. The pus would accumulate for a day or so and then discharge externally through the sinus.

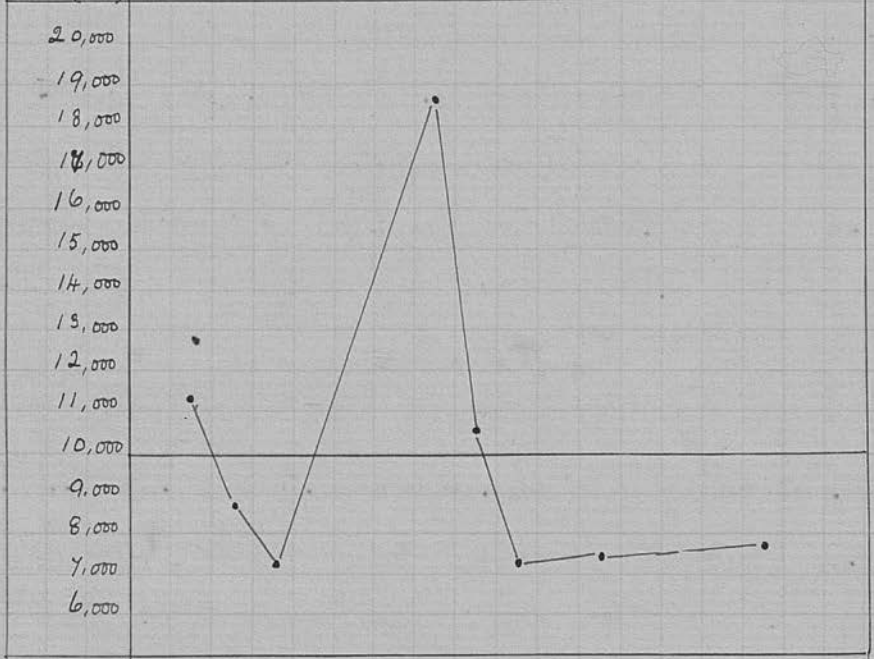
Progress:-

Since the counts were made he has improved slightly. He is, however, still noisy, silly and excitable.

D. P. III (a.)

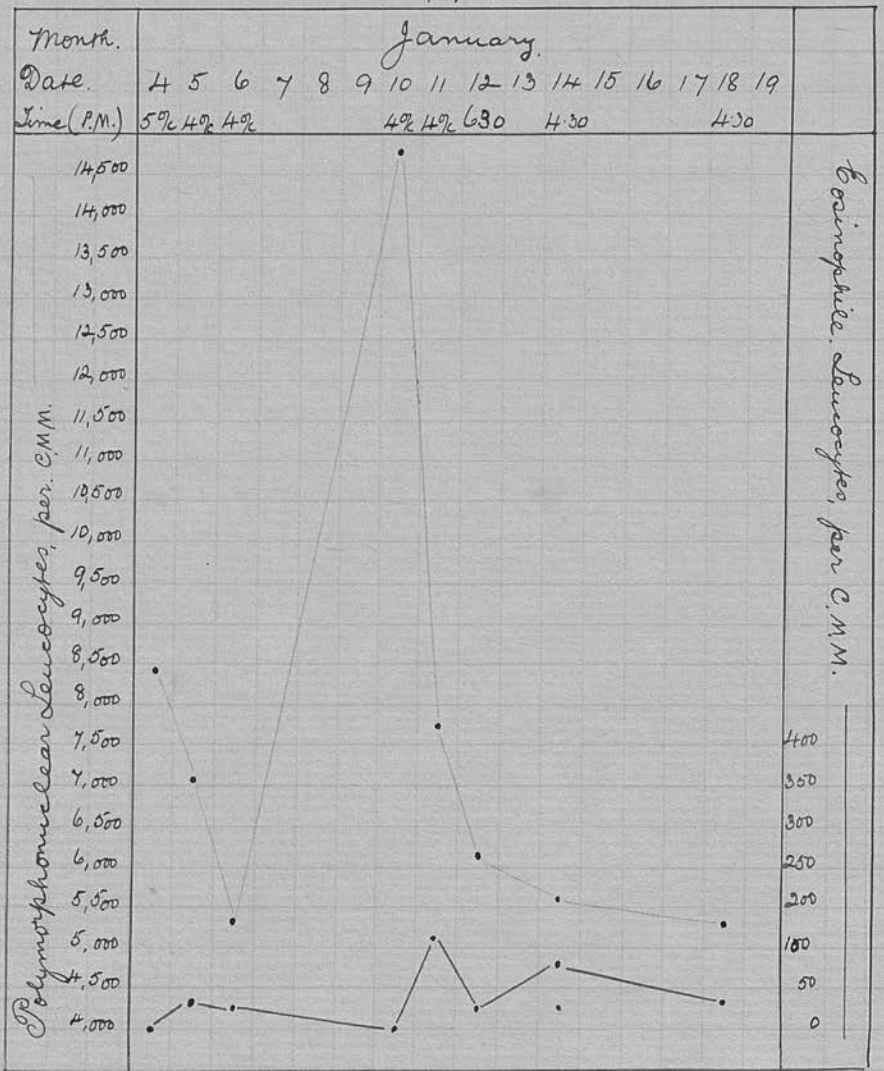
J. H. C.
1910

Month	January																		
Date	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Time (P.M.)		5¾	4¾	4¾				4¾	4¾	6.30		4.30				4.30			
P.		96·	99·5	94·5				99·	93·	84·5		94·				61·			
L.		23·5	20·	23·				18·5	24·5	14·		23·5				37·			
L.M.		·5	—	1·5				1·5	1·5	1·		1·5				·5			
E.		—	·5	·5				—	1·	·5		1·				·5			
B.		—	—	·5				1·	—	—		—				1·			



D. P. III (a) J. H. C.

1910



Remarks:-

There was in this case, as will be seen by the chart, a well-marked hyperleucocytosis, the count rising on one occasion to over 18,000. There seems little doubt, however, that this was due to the absorption of toxins from the septic sinus in his lower jaw.

The eosinophiles were only met with in most of the counts as occasional units.

IV. A. G., female, aged 19, admitted 29th, December, 1908.

This was her first attack of insanity.

On the 22nd April, 1909, she was acutely maniacal; consciousness was clouded. She was noisy - constantly singing and shouting. She was wet and dirty in her habits. On the 9th June, when another count was made, she was much quieter, though still somewhat maniacal. She eventually recovered, and was discharged in November, 1909.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B
22:4:09	4 p.m.	5,900	20·0	75·0	3·0	-	2·0
19:6:09	3:30 ,,	6.600	47·0	50·5	2·0	·5	-

Remarks:-

Both counts show a rather low polymorph. percentage, the first one being the more extreme.

V. R. S., Male, aged 25, labourer, admitted 8th April, 1909.

He came of an insane stock, two of his sisters being in Bexley Asylum, and an aunt being also insane.

This was his first attack.

At the time the count was done he was noisy, restless, foul-mouthed and destructive. He was very resistive. Consciousness was quite clear.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
4:6:09	3 p.m.	6,000	49·0	46·5	1·5	2·0	1·0

OTHER FORMS OF ACUTE EXCITEMENT.

I. ACUTE MANIA OF INDEFINITE TYPE.

E.S., aged 33, married, admitted 13th March, 1909.

This was her first attack.

She had a child six months previously.

She was suffering from an attack of acute mania. She was noisy and actively hallucinated. She still remains in much the same condition (March, 1910.)

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
13:4:09:	3 p.m.	6,900	71·0	25·5	2·0	·5	1·0

II. ACUTE MANIA OF AN INDEFINITE TYPE.

A. B. A., female, aged 41, admitted 21st June, 1909.

She was admitted with an attack of acute mania.

Her temperature was 102° F., and she was suffering from bronchitis and tonsillitis.

The count was not raised, but the polymorph. percentage was 87. This was probably due to the physical condition.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
22:6:09.:	3:30 p.m.:	8,100	87·0	7·5	3·0	2·0	·5

III. SENILE MANIA.

F.H.W., male aged 70, admitted 13th May, 1909.

There was no known heredity.

He had shown signs of insanity for years prior to admission, and had always been a "ne'er do well".

On admission:-

He was wildly excited. He was noisy, garrulous, highly irrational, and full of strange tricks of speech and action. He was filthy in the disposal of his excreta. He never recovered mentally, and died 30th August, 1909.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
19:5:09.	5 p.m.	5,900	66·5	28·0	2·0	3·0	·5
2:6:09.	3 ,,	8,100	60·0	32·0	4·5	3·0	·5

IV. DOUBTFUL CASE OF GENERAL PARALYSIS OF THE INSANE.

H.J., female, aged 42, single, admitted 8th January, 1909.

The mental symptoms dated a month before admission, and when in the Infirmary she had been very noisy and foul-mouthed. She frequently refused her food.

On admission:-

Consciousness was clouded: she did not realise her surroundings. Memory was grossly impaired. She had aural hallucinations; she thought her food was poisoned. She was constantly creating trouble; was restless, and refused her food.

It was thought that she might turn out to be a case of G.P.I.

Progress:-

She remained mentally unchanged till her death. She

developed pyrexia on January 28th, and had an irregular pyrexia till her death on April 10th.

Post mortem, the only thing found to account for the pyrexia was pyelitis of the right kidney.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
16:1:09.	3 p.m.	6,900	68·5	28·5	1·0	1·0	-
25:1:09	12 noon	10,000	79·0	14·5	3·0	2·5	1·0
28:1:09	12:30 pm	10,000	76·5	17·5	4·0	1·5	·5
9:2:09	6 p.m.	14,000	78·0	18.0	4.0	-	-

Remarks:-

The leucocytosis was dependent upon the physical condition.

V. GENERAL PARALYSIS OF THE INSANE.

L.T., female, aged 42, admitted 26th August, 1909.

She was in a state of acute mania on admission, and was very noisy, restless, and degraded in her habits. She afterwards developed into a typical general paralytic.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
28:8:09.	3:30 p.m.	6,200	48·0	49·5	1·5	·5	·5

VI. DOUBTFUL GENERAL PARALYSIS OF THE INSANE.

E. B., male, aged 39, labourer, admitted 21st June, 1909.

On admission:-

He was not fully conscious of his surroundings, and he could

not orientate correctly. He was very irrational and incoherent. He had active aural hallucinations and numerous fleeting delusions dependent on them. He was noisy, resistive, destructive, and required nasal feeding.

He was a typical alcoholic rough and it is still doubtful whether his symptoms are due to alcohol, or whether he is a general paralytic.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
30:6:09	3 p.m.	10,600	56·5	41·25	1·75	-	·5
1:7:09	11 a.m.	7,500	78·25	19·5	1·75	·5	-

Remarks:-

His mouth and gums were very foul on admission, which might account for the slight leucocytosis. The increase seemed to be chiefly in the lymphocytes.

VII. CHRONIC MANIA OF INDEFINITE TYPE.

E. C. aged 27, married, admitted 4th June, 1909.

She had given birth to a child on March 21st.

This was her first attack.

On admission:-

She was hallucinated, worried and confused. She was restless excited, and required to be put into a padded room. She took every opportunity to smash. She was wet and dirty in her habits.

Date.	Time.	Leucocytes.	P.	L.	L.M.	E.	B.
18:6:09	3 p.m.	6,600	48·5	48·0	2·0	·5	1·0
23:6:09	3:30 pm.	6,900	52·5	44·0	3·0	·5	-

There counts were all made in patients suffering from acute mania. They were almost all made in women, as I was connected with the female side of the Institution, and thus more in touch with the female than with the male admissions. For the diagnosis of the female cases I am indebted to M.Abdy Collins, M.D., B.S. (Lond.), the senior assistant medical officer, under whose care the cases were, and for the diagnoses of the male cases to Edgar Faulks, M.R.C.S., (Eng.) L.R.C.P. (Lond.), who is in charge of the male Admission Hospital.

The insanities which go by the name of dementia praecox and manic depressive insanity are well known, and it is only necessary to refer to any textbook on mental diseases for a description of them.

Confusional Insanity, in which the blood changes are of the greatest interest, goes by a variety of names, and I think it is advisable to describe this form of insanity.

This type of mental disorder is classified by Kraepelin (23) under the heading of Exhaustion Psychoses, and is divided by him into two classes - Collapse Delirium, and Acute Confusional Knsanity. This is generally regarded as a refinement and the two conditions are usually regarded as one disease. Confusional Insanity has also been termed Amentia. Bianchi (24) does not regard this phychosis as a separate disease, but includes under one heading - Sensory Insanity - a number of types of mental disease such as dementia praecox, confusional insanity, katatonia, stupor, etc., stating that these terms "in most instances are

> "only syndromes particular attitudes of the disease: not the "disease in its entirety; they represent, also, a changeable "phase, a chronological feature of a complex phychosis".

He regards as the essential feature of all these types the hallucinatory explosion of the disease. Maurice Creig (25) describes the condition under the name of Acute Hallucinatory Insanity.

Aetiology.

It is not a common disease in this Asylum, and during the time my counts were made there were only four cases in 491 admissions, all of these being in females. It occurs as a rule in persons predisposed to mental disease, either from a neurotic constitution or from an insane heredity. The exciting caused are many. Exhausting fevers, such as typhoid and influenza; child-birth, loss of blood, excessive mental strain, mental shock, and deprivation with worry have all been assigned as exciting causes. In my four cases, in one the cause was not apparent; in the other three, child-birth, abortion, and the shock of finding her child dead in bed were the probable exciting causes.

Mental Symptoms.

The patient at the beginning of the disease becomes restless and fidgetty, and does not sleep at night. Bianchi lays stress upon the fact that this restlessness is always due to hallucination. In a few days, mental confusion, of a varying degree, develops. Hallucinations become more pronounced, and affect all the special senses. The patient sees relatives in the ward; flashes of light are seen passing from heaven to earth; and she hears God's voice. The ward is peopled with animals. Poison is put into the food, and the patient frequently refuses food and requires nasal feeding. In one of my cases, the act of taking the blood from the ear threw the patient into a state of terror, as she thought I was putting poison into her blood. The patient is restless, frequently getting out of bed, and is often noisy.

The affective state is most commonly that of apprehension and terror. The patient is as a rule, when in this state, completely unconscious of her surroundings. At intervals there are periods when she is fairly conscious.

Physical symptoms.

The general health is poor: the mouth is foul and dry, and the tongue furred. The bowels are constipated; the pulse frequent, and the patient sleeps badly.

Course.

Under treatment, the patient usually begins to recover in a few weeks. The hallucinations become less evident - at first intermittently - and finally they disappear altogether, and consciousness is gradually restored. For some weeks the patient remains irritable and easily fatigued, and any prolonged mental exertion is apt to produce slight mental confusion.

The outlook as a rule is favourable, and death rarely occurs. It rarely leads to permanent mental impairment.

State of the Leucocytes in my cases of Confusional Insanity.

I have only had the opportunity of examining the blood of four cases of confusional insanity. One of these, Case II, was practically recovered from a short attack of Confusional Insanity on admission, and in this patient on two occasions when a count was made, neither was the total number of leucocytes increased nor was there any increase in the polymorph-percentage: in fact this was unusually low.

In Case III a leucocytosis of 14,000 was present, but she developed subsequently pyrexia with signs of pneumonic consolidation of the lung, and as this physical condition is one which is usually accompanied by a leucocytosis, further counts would have been of little interest except to show the course of leucocytosis in a well-known physical disease.

Case I showed a moderate leucocytosis of 16,000 at the height of the mental illness, the polymorph. percentage being increased, ranging from 85 to 87. The leucocyte count remained near this figure till the mental symptoms began to subside, when it gradually dropped to normal. This is practically the same course as other observers have found. Both Bruce and McDowall describe a slight drop which occurs and then a second rise which occurs about the time that the mental symptoms begin to improve; but there is no evidence of this in my chart. As convalescence became established, the hyperleucocytosis disappeared, and a count made a short time before her discharge showed a leucocytosis of 7,500 with a polymorph. percentage of 71 - a perfectly normal count.

In this it differs from Bruce's cases when he found that the leucocytes increased in numbers and remained high for a long period after recovery. In fact, to this increase in the leucocytes, regarded as an indication of an increase of the defensive powers of the body generally, he attributed the recovery of the patient and the continued maintenance of health.

The eosinophilia on which McDowall lays such stress was completely absent: the highest eosinophile percentage met with was 2, and the total eosinophiles per c.m.m. never exceeded 300.

The chief interest in the case lies in the fact that a leucocytosis was present; that in a favourable case - she made

an excellent recovery - the count fell with the subsidence of the symptoms, and that no eosinophilia was present.

In Case IV again, a leucocytosis was present, but this was of a very irregular nature, and was not sustained. The highest recorded was 16,800, but the fluctuations were considerable, and most of the counts were below 10,000. The polymorph. percentage remained high, ranging from 45 to 86. The polymorph. chart shows the fluctuations with a considerable proportion of the counts above the limits of the normal (7,000 per c.m.m.). The eosinophiles were not markedly increased, though on one occasion the percentage was 2·5, the total number per c.m.m. was slightly over 300.

Arguing from the analogy of physical disease in this case, one has either a slight toxaemia, or a severe toxaemia with a poor reaction on the part of the patient; and as the symptoms - the mental symptoms - were severe, one is justified in concluding that the latter is the case. According to the literature, this case would carry a bad prognosis, and, so far, this opinion is being justified, inasmuch as at present there are no signs of improvement in her mental condition.

State of the Leucocytes in Manic Depressive Insanity.

In this type of acute mental excitement - and it is the most frequently met with - leucocytosis appears to be the exception. In cases I, VIII and XVII a leucocytosis was present, but the physical conditions present were such as might cause a leucocytosis, and one is justified in attributing it to these. In XIV a count of 11,500 was found, but as this was taken nineteen days after confinement, it is possible that some slight infection of

the genital tract would account for it, though no pathological condition was found. Twelve days later the count was normal, though she was mentally unimproved.

In X a leucocytosis of 10,900 was present, possibly in association with the mental disease.

In XV a leucocytosis of 15,200 was met with. Subsequent counts showed the leucocytes to be 6,000 and 8,100. In this case there was no demonstrable physical lesion to account for the leucocytosis.

In V, in counts made frequently over a period of two months, an increase of the leucocytes above 10,000 was only found on two occasions, in one the number was 11,500, in the other slightly over 10,000. These corresponded to no change in the mental state.

Out of a total of 75 counts made in patients suffering from the acute mania of manic depressive insanity, only 6 showed a leucocytosis of over 10,000 with no obvious physical condition to account for it, and only one of these showed a count above 12,000.

From this one would infer that there is seldom a hyperleucocytosis present in this type of mania, and when it is present it is of very moderate degree and is transient in character. In fact, from my observations I should be inclined to conclude that a leucocytosis is never present except when it is the result of complicating physical disease. Bruce, however, has found a fairly well marked leucocytosis in these cases.

As to the percentage composition of the leucocytes in this condition, no constant deviation from the normal has been found.

The polymorphonuclear percentage varied considerably: the lowest count met with was 44, and the highest 93. The vast

majority of the counts, however, showed a polymorph. percentage between 50 and 70. Only on three or four occasions did the total polymorphs rise above 7,000 per c.m.m., apart from cases where the count was raised due to complicating physical disease.

The eosinophiles varied from 0 to 3%, but in the majority of the counts they were not met with or were found as single units in 200 cells. They never exceeded to any extent the number of 300 per c.m.m., which is considered to be the limits of the normal.

The leucocytes in Dementia Praecox.

There was considerable fluctuation within the limits of the normal in Case I, but this corresponded to no mental change in the patient. The count varied between 8,500 and 9,000. The other cases showed nothing abnormal.

In 23 counts, apart from physical conditions, no leucocytosis was found, nor was the percentage composition of the leucocytes strikingly different from the normal.

The highest polymorph. percentage was 72·5 %, except in Case III where the physical condition dominated the situation as far as the leucocyte alterations were concerned.

As to those forms of acute mental excitement which do not fall into any of these groups I have mentioned, there was nothing abnormal noted in the counts. In case IV there was a leucocytosis, but a physical condition was present, probably due to the pyelitis which was found post mortem.

On all the counts made in cases of acute mania the basophiles were present in the percentage of 0 to 2, but in the majority of cases they were not found at all, or only as occasional units.

Significance of the Blood Changes.

In estimating the significance of the changes in the leucocytes in acute insanity, which is frequently a prolonged disease, it is necessary first to exclude the possibility of the leucocyte alterations being due to complicating physical disease. The leucocyte is an exceedingly delicate barometer indicating the presence or absence of toxins in the blood stream. Even trivial infections, as I have already mentioned, leading to very little or no disturbance of the health of the individual, are at once registered by the leucocytes by an increase in their number.

C.J.Shaw (26) points out that the insane as a class are more liable to organismal infection than the sane. He concludes from observations on the opsonic index of various organisms that "

> "persons suffering from acute mental disease are more liable to "organismal infection than more chronic cases, but the latter "have less resistive power than sane healthy individuals".

A mere occasional leucocytosis occurring in acute mental disease may very well be due to some organismal infection which is not apparent. Bruce, for example, quotes a csse (27) where,with a uterus swarming with organisms, he found a leucocytosis. He attributed this to the confusional insanity which he considered to be present. Might not the uterine infection have caused the leucocytosis and be an intercurrent affection with little or no relation to the mental disease ?

The only form of acute mania in which I have found a well-marked leucocytosis is Confusional Insanity. In this disaase a leucocytosis has been found by all those who have examined the blood in cases of acute insanity. I propose now to discuss its significance in this disease.

Aetiology.

Aetiology.

The almost invariable presence of a leucocytosis is interesting, and throws a light upon the possible causation of the disease. A leucocytosis is a defensive reaction on the part of the body against toxaemias, and most commonly these toxaemias are of bacterial origin.

Bruce, from further investigations on this subject has come to the conclusion that the seat of infection is the intestine. He has demonstrated, and his results have been corroborated by Howard, that the coccal organisms are increased in the intestine of these patients, and he regards these as the probable cause of the disease. The toxins apparently can only cause insanity in persons predisposed to mental affections by a neurotic constitution or insane inheritance. It must not be forgotten that in many physical diseases of prolonged duration, disorder of the intestine with increase in the intestinal flora frequently occurs, e.g., tuberculosis, without this having in any way to do with the aetiology of the disease. Still their observations are suggestive and point to the necessity of as far as possible disinfecting the intestinal canal in this condition.

Diagnosis.

Bianchi does not think that confusional insanity is a separate psychosis, but classifies it along with a number of other conditions, including dementia praecox, under the heading of sensory insanity. If such observations as I have been able to make are correct, then there is one striking difference between dementia praecox and confusional insanity, viz., that in the one a leucocytosis is seldom met with, whilst in the other it is of almost invariable occurrence. This points to the fact that the two diseases are

distinct. In confusional insanity there is evidence of bacterial infection. In dementia praecox I have not found any evidence of this in the leucocyte reaction.

Bruce and Howard have found that the presence of a leucocytosis is of value in distinguishing alcoholic mania from confusional insanity where the history of alcoholism would be apt to mislead. They also find it of value where the symptoms of confusional insanity are marked and the case resembles one of delusional insanity.

Prognosis.

From a study of my own cases, it is difficult to arrive at any conclusion as regards the prognostic value; but Case I agrees with Bruce's statement that a leucocytosis of moderate extent with a polymorph percentage above 80 is a favourable prognostic sign.

Though in an Asylum such as this one does not get the cases early enough to observe them at the commencement of the attack, and it may be that an eosinophilia is present then, I have not found the eosinophiles to be present in abnormal proportions nor to be or prognostic value.

Treatment.

It has often been noticed that the occurrence of a physical disease in an insane patient occasionally leads to the mental recovery of a patient. In many of these intercurrent diseases a leucocytosis is present, and Bruce suggests that a stimulation of a leucocytosis by the disease enables the patient to overcome the mental disease also. Against this theory is the fact that typhoid fever is one of the diseases which are occasionally followed by mental recovery, and in this disease, leucopenia is the

rule.

He also suggests that the older forms of treatment, which have now been given up because of their somewhat barbarous nature, such as applying setons to the back of the neck and painting the scalp with croton oil, owed their beneficial action to the fact that they induced an artificial leucocytosis and thus enabled the body to successfully combat the toxaemia present.

In physical diseases it has now become a common practice to stimulate the bacteriocidal properties of the blood. As a rule, e.g., in tubercle and diphtheria, it is the bacteriocidal properties of the blood serum which are stimulated and assisted; but good results have also been obtained,e.g., in furunculosis, by giving such substances as yeast, which causes an artificial leucocytosis. This has been suggested and tried in the case of mental diseases. A variety of substances have been used for this purpose.-

(1) Bruce and Howard have used turpentine and its derivative, terebene. They injected it hypodermically into the flank in doses of 2 c.c. of turpentine and 1 c.c. of terebene. The injection of these substances produced an abscess, which remains non-infective, unless accidentally infected during injection or afterwards by organisms which may be circulating in the blood. They find it produces a high leucocytosis: in one of Bruce's cases the count rose to 50,000. The leucocytosis remains high for a varying period; it has been found to last over a month.

They claim to have had good results from its use, and they found that the higher the leucocytosis the greater the amelioration of the mental symptoms. It is not a new method of treatment, and Ford Robertson mentions that it was extensively used in Italy some ten years ago, but has since been abandoned. It is a method

of treatment not without risk and apparently attended by a good deal of pain, and unless the results from it in future be of great value, it is scarcely a form of treatment which is likely to come into general use.

(2) Nucleinic acid - Synonyms, nucleic acid, nuclein, - has been used to induce an artificial leucocytosis in acute insanities. It is the true nucleic acid of yeast, with a certain proportion of the albuminates and carbohydrates. It is given in doses of 1 - 5 grs and is said to produce an increase in the white blood cells.

(3) Ceredin. This is the fatty acid of yeast. McDowall tried this in one of his cases, and states that with a dose of •05 grms three times a day he produced a leucocytosis of 16,000, and on increasing the dose to •075 grms a leucocytosis of 19,000 was produced. I tried it in Case V of my manic depressive cases, and it will be seen from the leucocyte chart of this case that doses of 1 grain, 1½ grains and 2 grains three times a day had no effect whatever upon the leucocyte count. The smaller variations in the number of the leucocytes present did not have any relation whatever to the exhibition of the drug, though, as I state in my remarks on this case, the patient was thought to be a little quieter while taking it.

Conclusions.

From my own observations and from a study of the literature on the subject, I think one may draw the following conclusions:-

i. A leucocytosis is of almost invariable occurrence in confusional insanity, its type varying considerably and, just as in physical diseases of bacterial origin, its extent and course would appear to be of some value in prognosis.

ii. Its significance is that it is a defensive force of the body against bacterial toxaemia, and the fact that it is present in confusional insanity points to this psychosis being

of bacterial origin.

iii. I have not found any evidence of an increase in the eosinophile cells in any of the forms of acute mania I have examined and I do not regard the presence or absence of eosinophilia as of prognostic value.

iv. The presence or absence of a leucocytosis may be of value in differentiating confusional insanity from other mental diseases.

v. The presence of a leucocytosis in confusional insanity and its absence in dementia praecox is an argument in favour of their being different diseases, and not, as some regard them, two different phases of the same psychosis.

vi. A leucocytosis is rarely present in the acute mania of manic depressive insanity, and, when present, is very moderate in degree and transient in character.

vii. In the cases of the acute excitement of dementia praecox which I examined, the leucocytes showed no marked deviation from the normal, either in their number or percentage composition.

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