

Twenty-three Cases of Cerebro. Spinal
Meningitis treated in the City
Hospital, Edinburgh during the
present outbreak.

by Andrew Adams Rutherford

31st March 1915

M. D. 1915.



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Introduction

This thesis contains details of the cases of cerebro-spinal meningitis admitted to the City Hospital,

Edinburgh, during the present ~~outbreak~~ epidemic. As Senior Resident, I was in charge of the ward in which these cases were treated. The cases were all taken by me, and I conducted the bacteriological examinations and carried out the serum treatment described. Owing to pressure of work in ~~the~~ other wards, it was not possible to investigate the cases more fully than was necessary for practical purposes.

Cases still under treatment.

Case 1. Private M^cJ. 42. 19 years. Soldier.
admitted 14th Feb 1915

History. On the 20th of Jan 1915, patient was admitted to Craiglith Military Hospital with severe headache & pain in the legs. He was delirious. His pupils were of medium size; & reacted sluggishly to light. Kernig's sign was present. His knee jerks were diminished. Babinski negative. No splenic enlargement. Widal negative.

On the 29th Jan, he was lumbar punctured. The C.S. fluid was under normal pressure; it contained numerous polymorphs but no organisms were found.

Patient had raps on the 5th, 6th, 8th, 9th, 11th & 13th of ~~January~~ ^{February}.

On the 7th of Feb. he was complaining of pain in the head & back. Pupils dilated & very sluggish. Knee jerks dim.

inished. Abdominal reflex exaggerated.

Patient still delirious at night.

On the 13th July 1915, another lumbar puncture was done. About 60 c.c. cloudy fluid were taken off. ^{The fluid} ~~it~~ was under great pressure. It contained numerous polymorphs & a few characteristic intracellular diplococci. The lumbar puncture relieved the patient's symptoms - headache etc.

On the 14th July 1915, the patient was transferred to the City Hospital.

14th July. State on admission

Mental condition clear.

No headache.

No head retraction.

Patient had pains in the legs.

Kernig's sign was positive but not marked.

Pulse regular.

Patient had rigors every night from the 14th till the 19th. Vomiting always occurred at the same time.

Lumbar punctures

14th Feb. 40 c.c. removed. Normal pressure.

Slightly cloudy.

Micro? Many cells, mononuclear & polymorphonuclear. No organisms found.

25 c.c. anti. meningococcal serum injected into spinal canal.
(Burrows & Wellcome)

17th Feb. 40 c.c. removed. Normal pressure.

Turbid

Micro? Polymorphs only.

25 c.c. anti. meningococcal serum injected into spinal canal
(B. & W.)

18th Feb. 45 c.c. removed. Normal pressure. Slightly turbid.

20 c.c. anti. meningococcal serum injected into S.C. (B. & W.)

19th Feb.

40 c.c. removed. Clear: yellowish.
Normal pressure.

Micro. Polymorphs & a few
intra-cellular diplococci.

No injection.

The patient steadily improved
after the 20th of Feb., & lumbar puncture
was no longer necessary.

9th March. Patient got up today. His
legs are stiff; the stiffness is
specially marked on the right
side. He walks with a limp.

21st March. Patient quite convalescent.
The limp has entirely disappeared.
He will be able to leave hospital
in a few days.

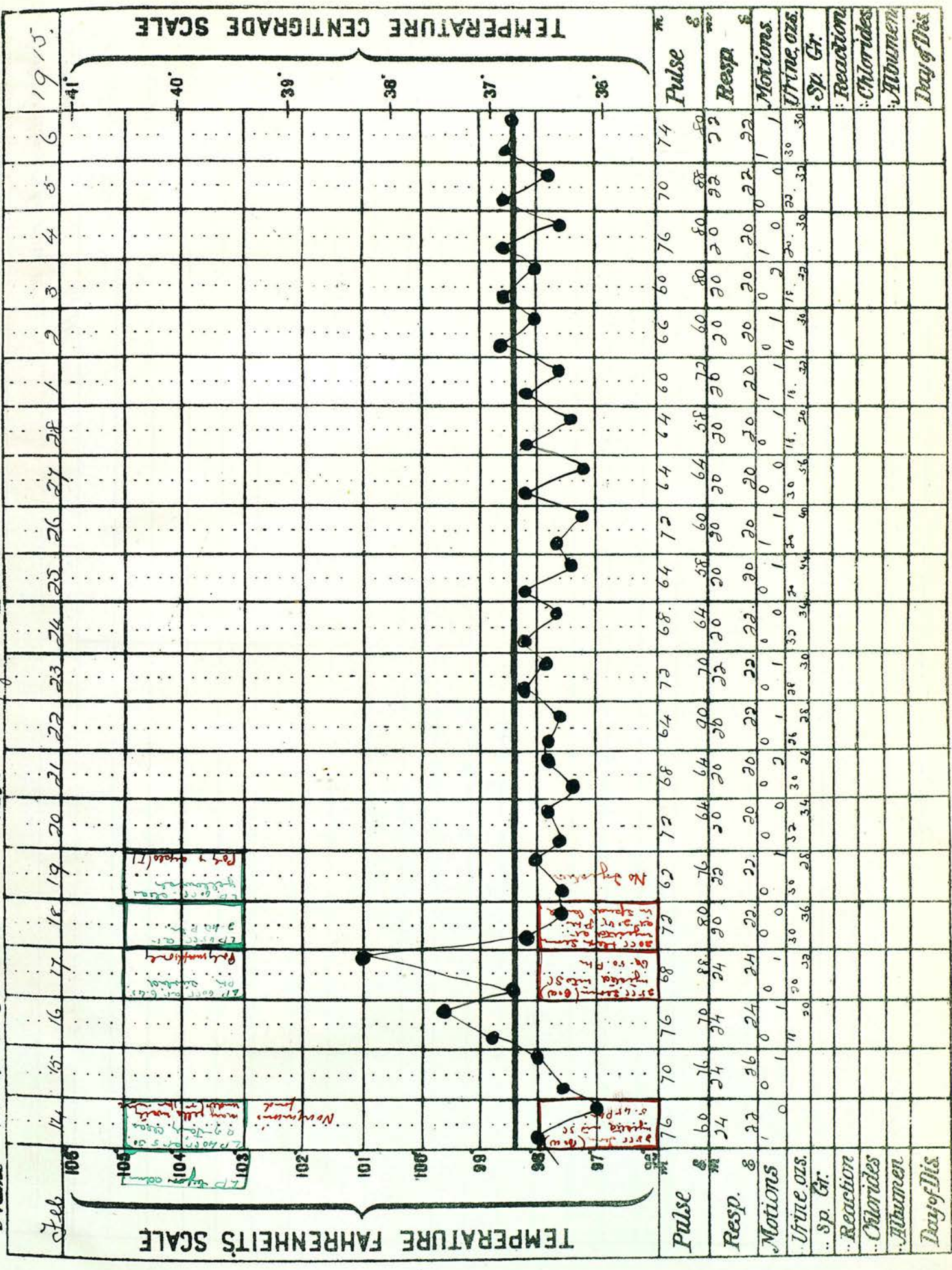
Total amt. of serum injected 70 c.c. (B.H.W.)

Other treatment. Hot sponging t.i.d.

Aperients. Tinct. Digitalis.

Name *Murphy M.J.* Age *19 yrs* Disease

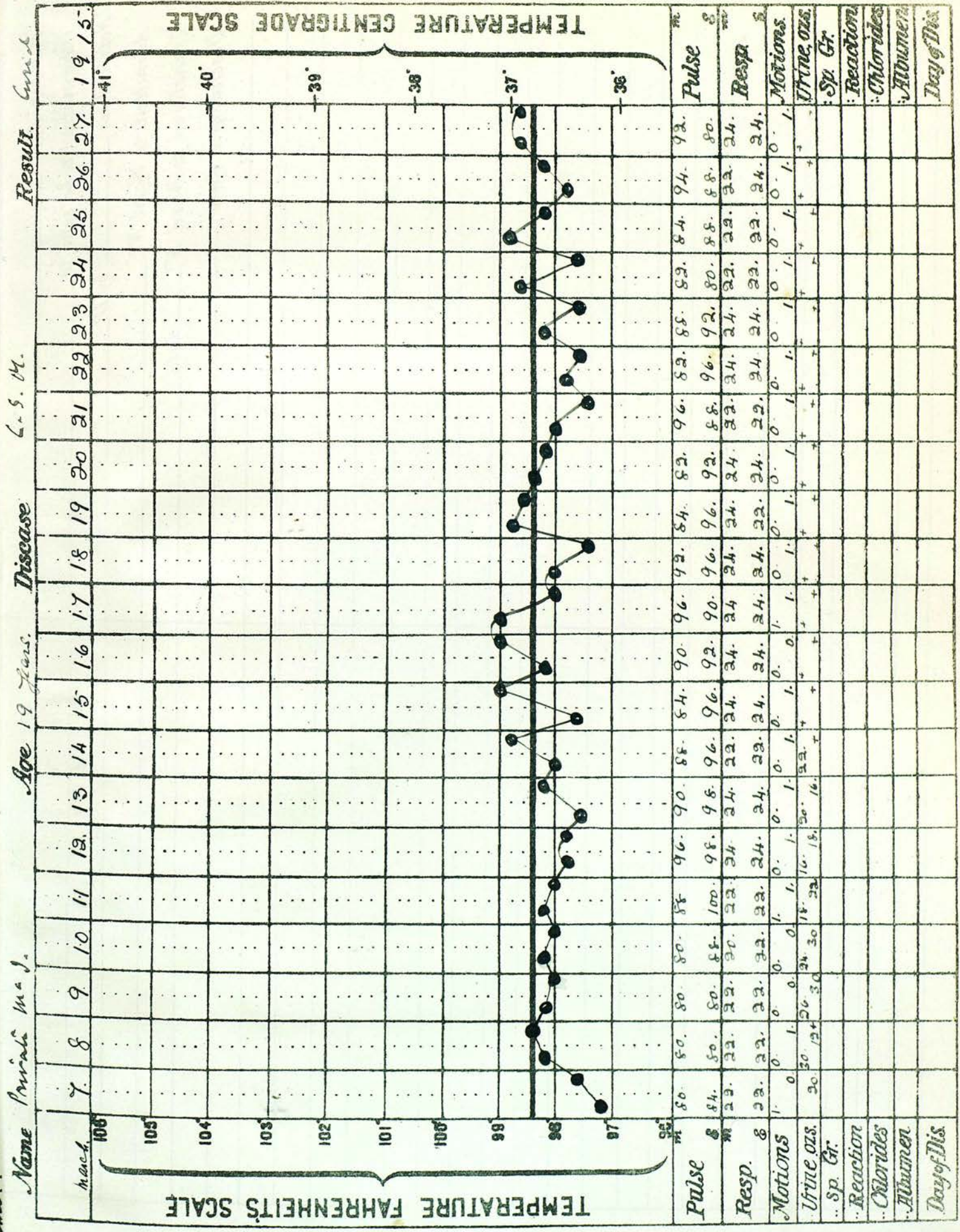
Result.



TEMPERATURE FAHRENHEIT SCALE

TEMPERATURE CENTIGRADE SCALE

Case 1.



Case 2. Private W. age 22. A soldier

Admitted 18th July 1915

History - Patient was ill for 3 days before admission. The case was thought to be one of influenza. On the 15th he complained of headache & pain all over the body. On the 16th, vomiting commenced.

State on admission (18th July 1915)

Pain all over the body.

Headache

neck rigidity & head retraction

Patient delirious.

Kernig positive on both sides but not very marked.

Abdominal reflexes exaggerated

Knee jerks exaggerated

Babinski negative on both sides.

Internal strabismus on both sides - more marked on the right.

Incontinence of urine & faeces.

Temperature 102°.2 F

Pulse weak & irregular.

18th July

Lumbar puncture. 50 c.c. drawn off.

Turbid. Under slight pressure.

Micro? Polymorphs. A few intra.
cellular diplococci.

20 c.c. Flexner's serum injected
into spinal canal.

19th July

L.P. 50 c.c. drawn off.

Turbid. Normal pressure.

20 c.c. Flexner's serum injected
into S.C.

20th July

L.P. 45 c.c. drawn off.

Turbid. Normal pressure.

Micro. Polymorphs only.

30 c.c. Flexner's serum injected
into S.C.

21st July

L.P. 40 c.c. drawn off.

Turbid. Normal pressure.

20 c.c. Flexner's serum injected
into S.C.

22nd Feb L.P. 50 c.c. drawn off.

Rather clearer. Normal pressure.

20 c.c. Flexner's serum injected
into S.C.

23rd Feb.

Patient is still delirious at night
but his mental condition has improved.

No headache.

Head retraction still present.

Kernig present on both sides.

Slight ptosis right eye.

Incontinence of urine & faeces.

Pulse intermittent at times.

~~At~~

8 P.M. Patient's respiration suddenly
became rapid this evening, and his
pulse very irregular. A lumbar
puncture was done immediately.
75 c.c. were drawn off. The C.S. fluid
was under pressure & turbid. No
injection was given. The patient's
symptoms were ^{not} relieved to any
great extent. At midnight his

breathing was still rapid although his pulse was more regular.

24th July Noon. Respiration 32.

Patient - rather better.

L.P. 40 c.c. drawn off. Normal pressure. Turbid.

No injection given.

25th July.

L.P. 50 c.c. drawn off. Under pressure. Turbid & yellowish.

17 c.c. Flexneri serum injected into S.C.

28th July

L.P. 40 c.c. drawn off. Normal pressure. Turbid.

- 15 c.c. Flexneri serum injected into S.C.

3rd March L.P. 40 c.c. drawn off. Turbid.
Normal pressure. No injection.

At 6 P.M. on Dr. James's advice
1000 units diphtheria antitoxin
were injected subcutaneously.

8th March

Severe headache & pain in neck.

L.P. 45 c.c. drawn off. Turbid.
Normal pressure.

No injection.

Symptoms relieved.

10th March

L.P. 37 c.c. drawn off. Turbid.
Under slight pressure.

No injection.

11th March

L.P. 36 c.c. drawn off. Turbid.
Under slight pressure.

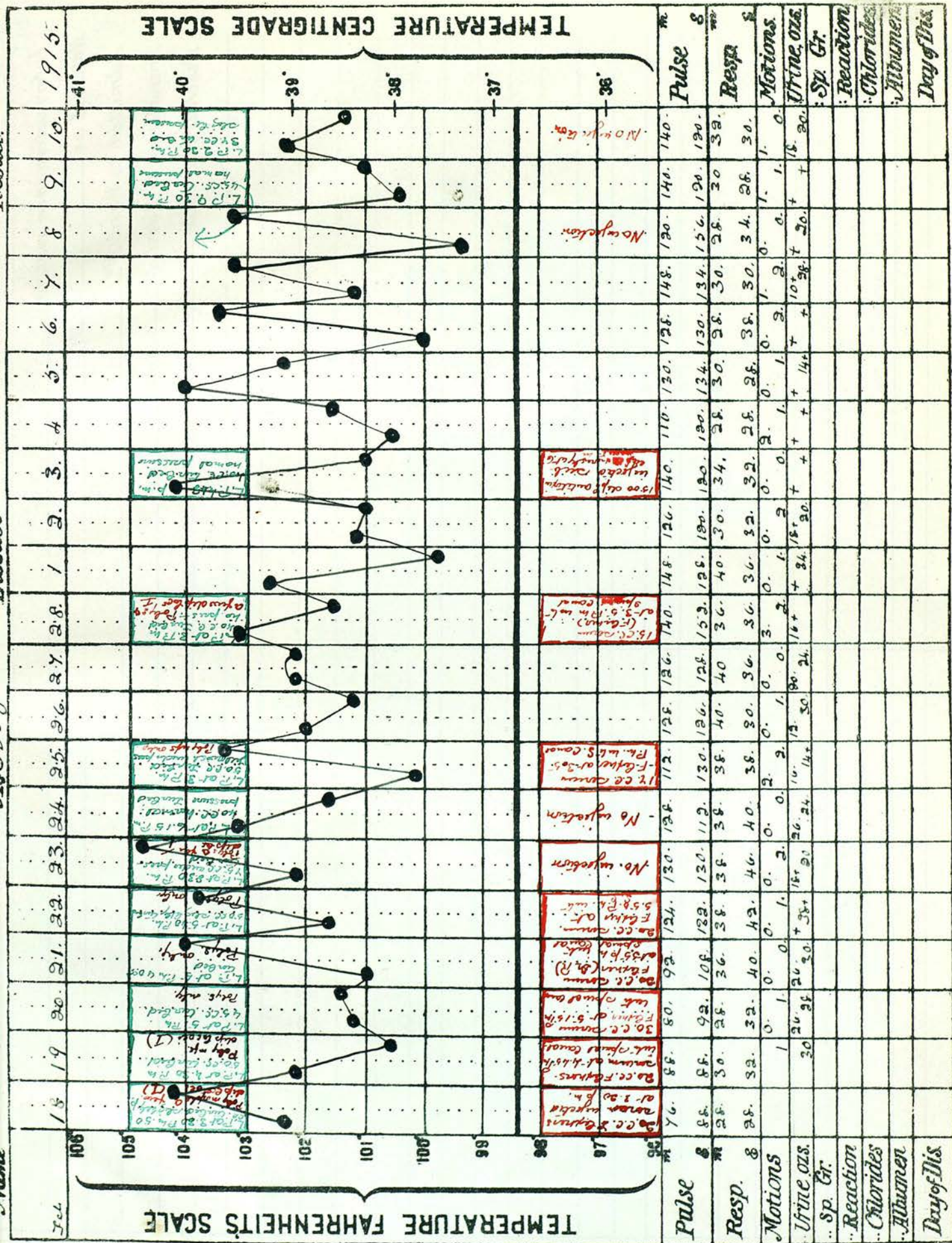
No injection.

28th March

Since the 12th of March, patient has not complained of headache. He is slowly becoming emaciated. His appetite has been failing since the 23rd of March. Although he can answer simple questions intelligently, his mind is somewhat confused, and he suffers from delusions. He has still slight neck rigidity but no pain, and Kernig's sign is positive on both sides. The internal strabismus is well marked. Patient appears to be passing into the chronic stage. Hot sponging t.i.d. is still being continued.

Patient has been 142 c.c. Flexner's antimitisproccat serum injected into the spinal canal since admission.

Other treatment 1000 units antitoxin (diphtheria) : hot sponging t.i.d.



Name _____

Private W.

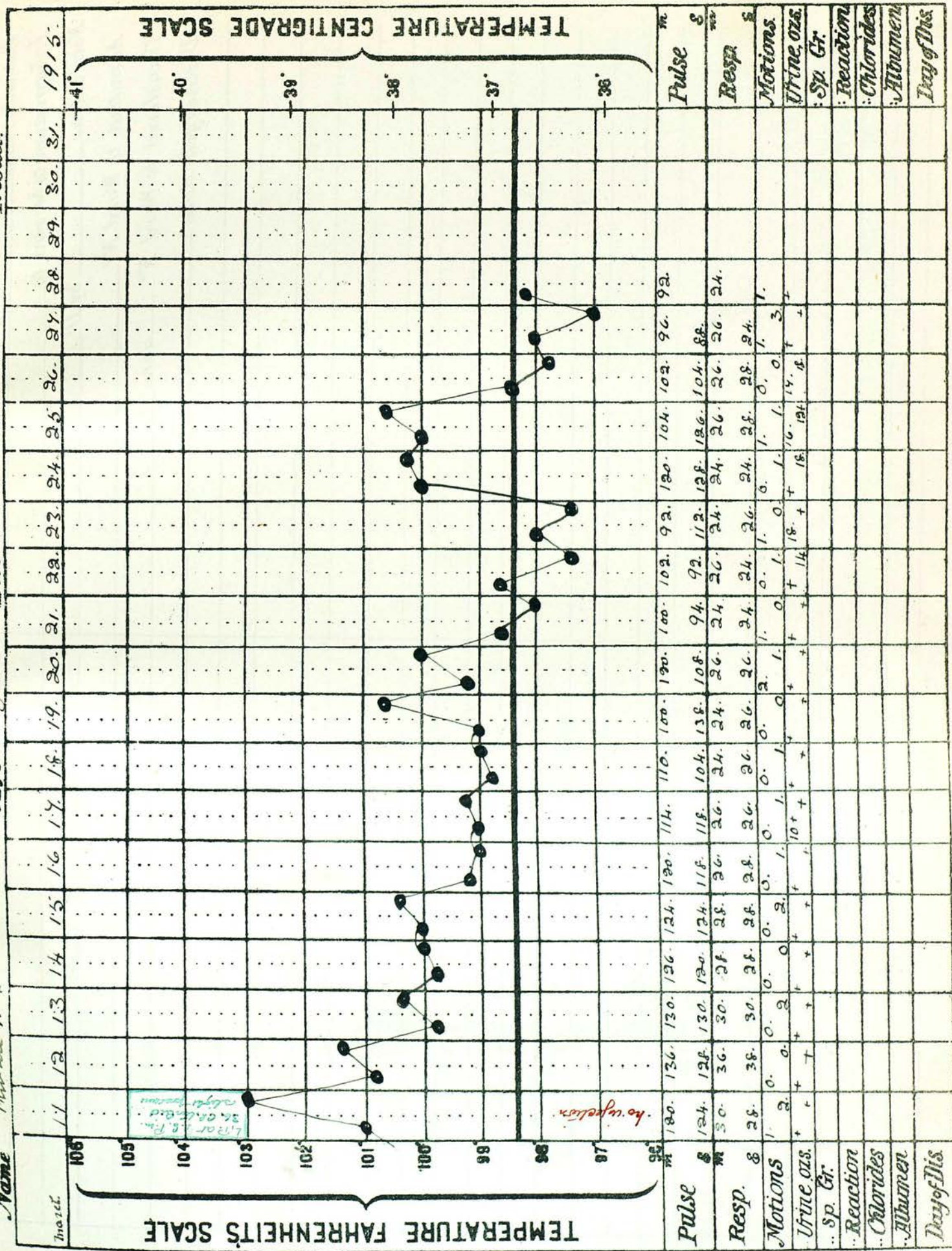
Age 29 years.

Disease

Result.

TEMPERATURE FAHRENHEIT'S SCALE

TEMPERATURE CENTIGRADE SCALE



Case 3. Private M. Aet. 20. A soldier (R.A.M.C.)
Admitted 18th July 1915

History. Patient took ill 3 days before admission. He was thought to have influenza. He had shivering attacks, severe occipital headache & pain in the neck.

State on admission. (18th July 1915)

Occipital headache

Pain in neck

Neck rigidity & slight head retraction.

Kernig positive on both sides - well
marked

Very sensitive to cold.

Tache cérébrale well marked.

Pupils equal. React to light & accommod.

Abdominal reflexes absent.

Knee jerks exaggerated.

No ankle clonus.

Babinski negative on both sides

Pulse regular.

Slightly delirious at night.

18th Feb.

L.P. 40 c.c. drawn off. Turbid. Under slight pressure.

Micro? Polymorphs only.

20 c.c. serum (Burrows & Welles) injected into S.C.

19th Feb

L.P. 40 c.c. drawn off. Turbid. Normal pressure.

Micro³. Polymorphs. Diplococci, intra- + extracellular.

22 c.c. serum (B. & W.) injected into S.C.

20th Feb

L.P. 50 c.c. drawn off. Fairly clear. Normal pressure.

Micro? Polymorphs only.

25 c.c. serum (B. & W.) injected into S.C.

21st Feb. Patient much better. Temp.
normal

23rd Feb. Marked improvement.

No headache

Neck slightly stiff

Kernig almost gone.

No delirium at night.

27th March

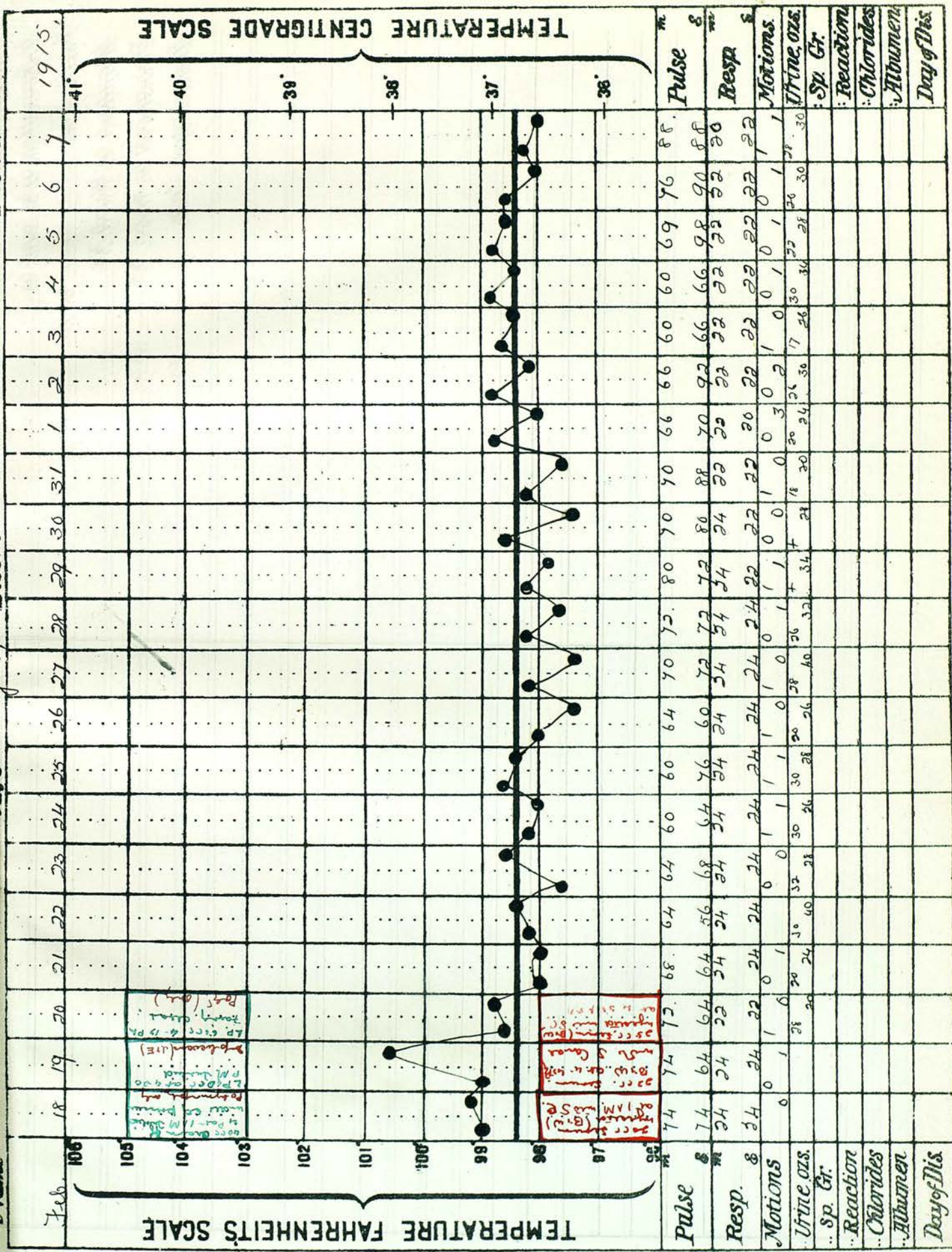
Patient's temperature has been
normal since the 21st of Feb. He
~~has~~ has been up since the 11th of
March and is perfectly well. He
will be discharged as soon as a
negative swab is obtained from
his naso-pharynx.

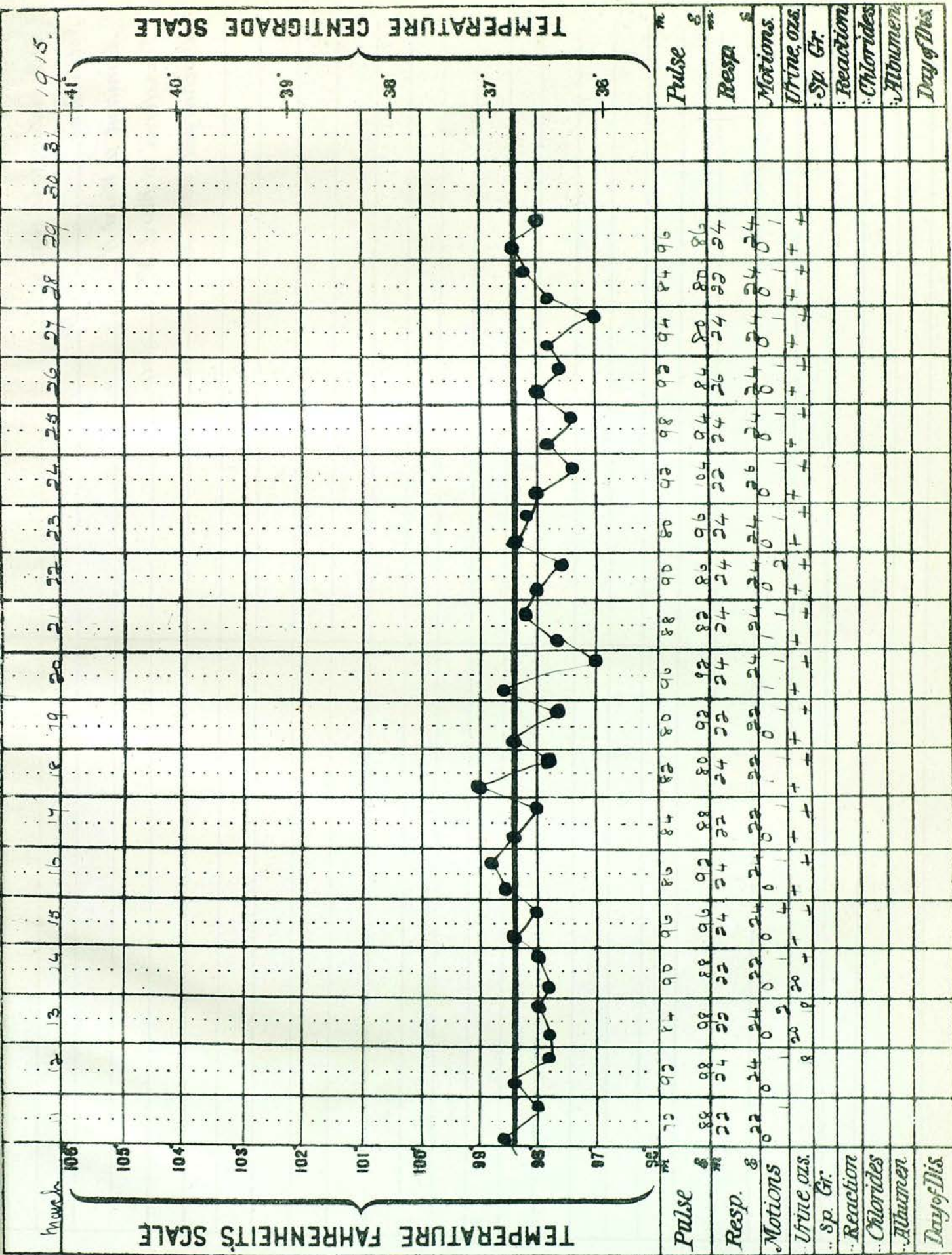
P. discharged.

31/3/15

67 c.c. anti-meningococcal serum
(Burrows & Wellcome) injected in all.

Other treatment. Hot sponging
t.i.d. for the first few days.





Case 4. Sergeant W. Aet. 26. Soldier
Admitted 19th July 1915

History of "influenza" and constipation
since 14th July. On 19th July, slight
vomiting. An injection of morphia
had been given shortly before.

State on admission

Patient slightly delirious.

Severe headache.

Neck rigidity & head retraction.

Kernig absent on both sides.

Pupils equal and react to light.

Abdominal reflexes positive.

Knee jerks positive.

Slight ankle clonus.

Babinski negative on both sides.

Pulse regular.

Lumbar punctures.

19th July. L.P. 60 c.c. Turbid. Under
slight pressure.

Micro? Polymorphs & intracell^r
diplococci

25 c.c. serum (B+W) injected into S.C.

20th Feb

L.P. 50 c.c. drawn off. Turbid.
under pressure.

30 c.c. serum (Burrows + Wellesley)
injected into spinal canal.

Kerning well marked on both sides.

21st Feb

L.P. 40 c.c. drawn off. Turbid.
Normal pressure.

20 c.c. serum (B. + W.) injected
into S.C.

22nd Feb

L.P. 35 c.c. drawn off. Much
clearer. Normal pressure.
Mucro? Polymorphs only.

(Flexner's
20 c.c. serum (~~B. + W.~~) injected into
S.C.)

(Flexner's serum was used as
Burrows + Wellesley's was not available at
the moment.)

23rd July

Marked improvement in patient's condition.

No headache

Neck still stiff

Kernig positive on both sides.

Temperature normal

24th July

Headache

L.P. 45 c.c. drawn off. Very slightly turbid. Normal pressure.

No injections.

25th July

L.P. 45 c.c. drawn off. Slightly turbid. Normal pressure

22 c.c. serum (B.H.W.) injected into S.C.

26th July

Headache & pain in back of neck

L.P. 45 c.c. drawn off. Clearer.

Under pressure.

No injections.

1st March Headache & pain in back of neck.

L.P. 40 c.c. drawn off. Very slightly
turbid. Normal pressure.

25 c.c. serum (B. + W.) injected
into S.C.

6th March Headache & pain in back of neck

L.P. 35 c.c. drawn off. Slightly
turbid. Normal pressure.

No injection.

13th March Headache & pain in back of neck

L.P. 30 c.c. drawn off. Slightly
turbid. Slight pressure.

No injection.

17th March Headache & pain in back of neck

L.P. 35 c.c. drawn off. Slightly
turbid. Normal pressure.

No injection.

26th March. Patient is gradually improving, but still complains of headache & pain in the back of the neck at times. The pain, however, does not seem to be very severe.

The patient's mind is quite clear, but his memory is slightly affected.

28th March

Patient has been feeling much better yesterday & today. There is still very slight rigidity of the neck. Kernig is negative on both sides. Hot sponging t.i.d. has been continued till today. Patient is to be allowed up for a little tomorrow.

31st March Improvement maintained.

122 c.c. anti-meningococcal serum (Burrows & Williams) & 22 c.c. Flexner's serum have been injected into s.c. since admission.

Other treatment. Lumbar punctures; aperients; hot sponging t.i.d.

TEMPERATURE FAHRENHEIT SCALE												TEMPERATURE CENTIGRADE SCALE												Pulse		Resp		Motions		Urine, ozs.		Sp. Gr.		Reaction		Chlorides		Albumen		Day of Dis.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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[illegible]

Case 5. G. R. ad. 4 years. (Father not a soldier)
admitted 19th July 1915

History. Patient has been ill for 4 days.
Symptoms - vomiting, delirium, head
retraction. He was lumbar punctured
on the 18th of July, & a purulent fluid
containing intra-cellular diplococci
was drawn off.

State on admission (19th July 1915)

Severe headache

Some mental confusion

Neck rigidity & marked head retraction

Kernig well marked on both sides

Abdominal reflexes absent

Babinski's negative

Pupils equal & react to light.

Right thumb flexed into palm of hand.

Pulse weak & irregular.

L.P. 20 c.c. drawn off. Turbid & blood-stained.

Normal pressure.

Micro? Polymorphs & intra-cell^l diplo?

15 c.c. serum (B & W) injected into s.c.

20th July

L.P. 30 c.c. drawn off. Turbid.

Slightly blood stained. Normal pressure.

15 c.c. serum (B.W.) injected into S.C.

21st July

L.P. 25 c.c. drawn off. Turbid.

Normal pressure

15 c.c. serum (B.W.) injected into S.C.

22nd July

L.P. 35 c.c. drawn off. Turbid.

Under slight pressure.

Micro. Polymorphs only.

15 c.c. serum (B.W.) injected into S.C.

23rd July. Very considerable improvement
in patient's condition.

No headache

Neck rigidity & head retraction still

Kernig positive. present.

Pulse regular & stronger.

26th Feb

Headache.

L.P. 23 c.c. drawn off. Turbid.

Normal pressure

15 c.c. serum (B. & W.) injected into S.C.

27th Feb. Morbilliform serum rash
especially marked on legs.

1st March Rash has disappeared.

4th March Headache.

L.P. 35 c.c. drawn off. Fluid
much clearer. Under pressure.

10 c.c. serum (Parke Davis) injected
into S.C.

22nd March

Patient 101° up Today.

Has had no headache since 4th March

Rash injected has disappeared.

Urticaria disappearing.

26th March

Scarlatiniform

Rash. Disappeared

at 2 days.

27th March Patient's legs very stiff, but
can walk a little.

28th March. Still improving. Legs
not quite so stiff.

Knee joints exaggerated

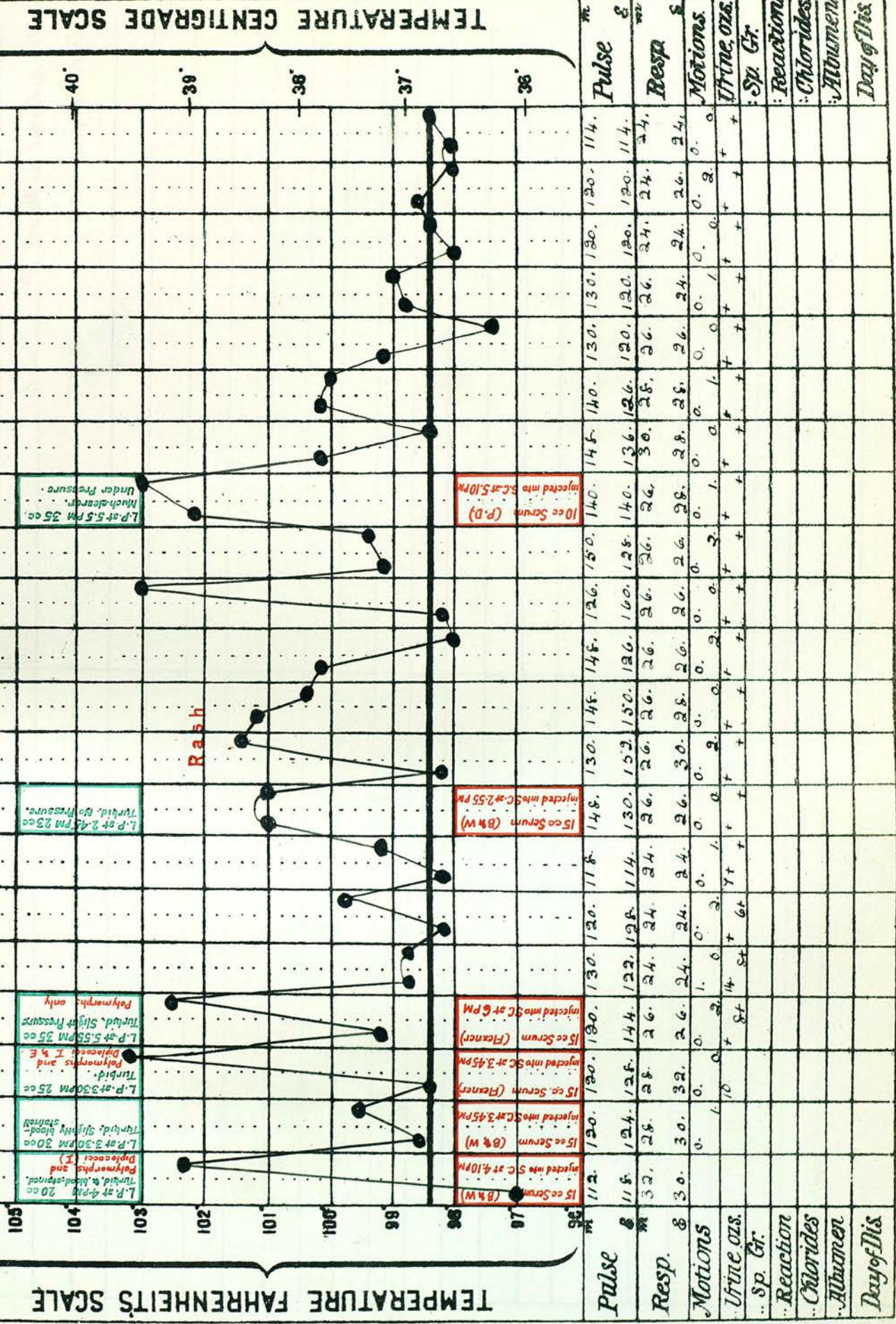
kerning practically absent

Patient is quite deaf.

85 c.c. serum injected into S. C. Sinus
Admission (45 c.c. B.H.W., 30 c.c. F. and
10 c.c. P.D.)

TEMPERATURE FAHRENHEIT'S SCALE

TEMPERATURE CENTIGRADE SCALE



Name	7. R.	Age	Disease	Result.
	13.	13.		
	14.	14.		
	15.	15.		
	16.	16.		
	17.	17.		
	18.	18.		
	19.	19.		
	20.	20.		
	21.	21.		
	22.	22.		
	23.	23.		
	24.	24.		
	25.	25.		
	26.	26.		
	27.	27.		
	28.	28.		
	29.	29.		
	30.	30.		
	31.	31.		
	1915			

TEMPERATURE FAHRENHEIT SCALE

TEMPERATURE CENTIGRADE SCALE

Pulse

Resp

Motions

Urine ozs.

Sp. Gr.

Reaction

Chlorides

Albumen

Day of Dis.

21st July

L.P. 45 c.c. drawn off. Turbid. Normal pressure.

Micro. Polymorphs & a few intra-cellular diplococci.

25 c.c. serum (B.W.) injected into S.C.

22nd July

L.P. 50 c.c. drawn off. Turbid. Fluid under pressure.

21 c.c. serum (Flexner) injected into S.C.

23rd July

Patient feverish. Still complains of severe headache. Has had occasional epistaxis from time to time since admission. The bleeding relieves his headache. He states that he suffered from occasional epistaxis for some time before his present illness.

Marked neck rigidity ~~irritation~~ + head

retraction still present.

Kernig positive.

No marked improvement since admission.

L.P. 35 c.c. drawn off. Turbid. Blood stained. Normal pressure.

25 c.c. serum (B. & W.) injected into S.C.

24 July Headache & pain in back of neck

L.P. 40 c.c. drawn off. Turbid.

Blood stained. Normal pressure.

No injections.

26 July

L.P. 46 c.c. drawn off. Turbid.

Under slight pressure.

25 c.c. serum (B. & W.) injected
into S.C.

27 July L.P. 32 c.c. drawn off. Slightly
turbid. Slight pressure

No injections.

1st March

L.P. 50 c.c. drawn off. Much

clearer. Normal pressure.

25 c.c. serum (B.W.) injected into S.C.

4th March

L.P. 25 c.c. drawn off. Slightly

thick. Under slight pressure.

15 c.c. normal saline injected into
S.C.

5th March Till today since admission
patient has had marked neck
rigidity & head retraction, severe
headache & pain in the back of the
neck. All these symptoms are less
marked this morning.

16th March Improvement maintained.
Temperature normal. Neck still a
little stiff. Occasional headaches, but
pain not nearly so severe as it was.

19th Mar. Patient still improving.

22nd Mar. Patient allowed up today.

No headache since the 19th March.

Practically no stiffness in neck.

28th March. Patient very well. No

headache nor stiffness of neck.

Will be able to leave hospital in
a very few days.

125 c.c. anti-meningococcal serum

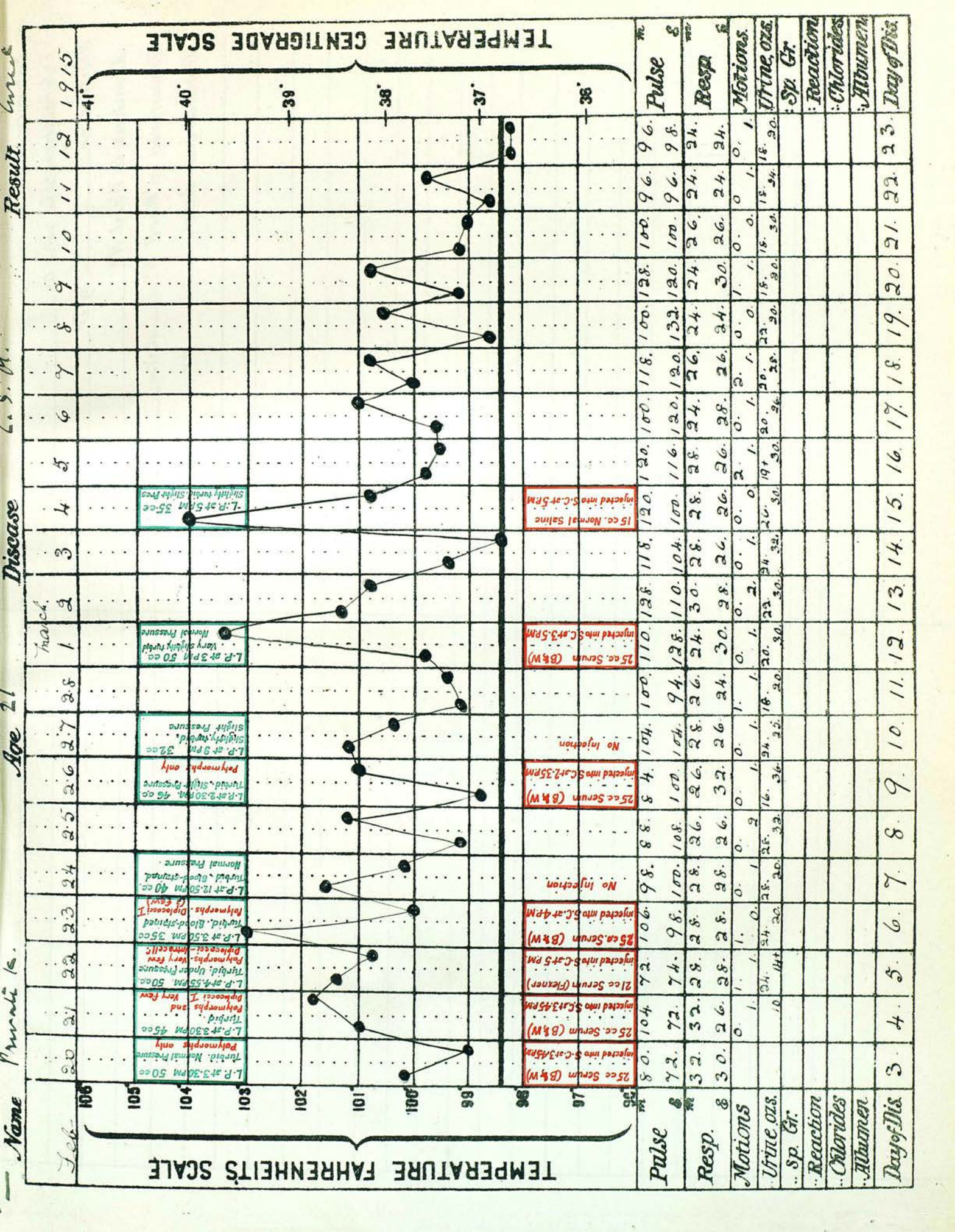
(Burrows & Welcome) and 21 c.c. Flexneri
serum ^{have been} ~~was~~ injected into S.C. since
admission.

15 c.c. normal saline were also

injected into S.C. on 4th March.

Other treatment. Lumbar puncture;

hot sponging I.C.D. & aperients.



Name

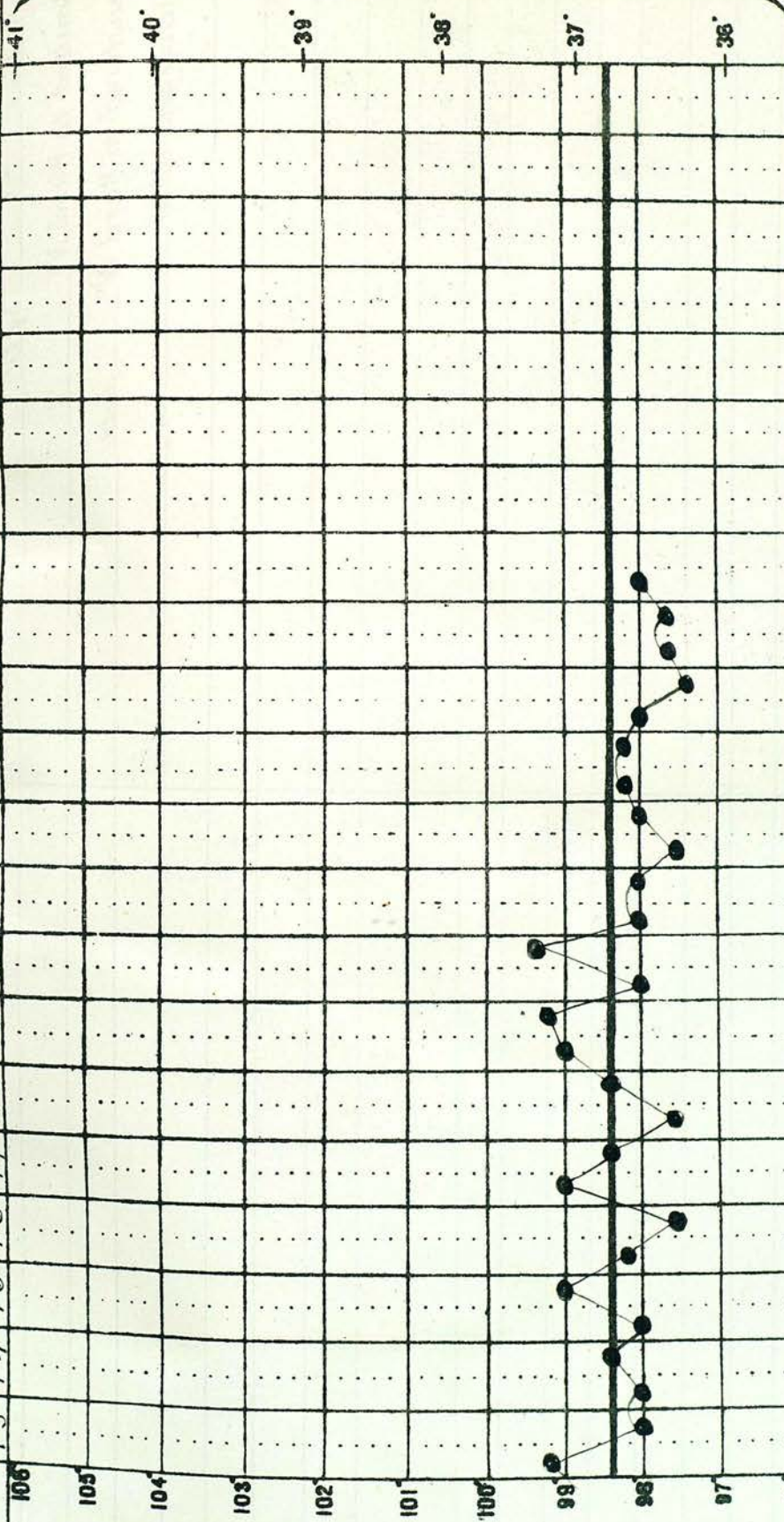
Age

Discase

Result

TEMPERATURE FAHRENHEIT'S SCALE

TEMPERATURE CENTIGRADE SCALE



Pulse

Resp.

Motions

Urine ozs.

Sp. Gr.

Reaction

Chlorides

Albumen

Day of Dis.

Pulse

Resp.

Motions

Urine ozs.

Sp. Gr.

Reaction

Chlorides

Albumen

Day of Dis.

92

84

100

90

102

96

84

90

84

84

98

104

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Case 7. Driver S. age 20 years. A soldier.

Admitted 23rd July 1915

History. Patient was ill for 5 days before admission. He was thought to have influenza. On 19th July, he had a high temperature, pains all over the body, headache & stiff neck. On the 20th July, shivering & vomiting set in. The symptoms gradually increased in severity till admission.

State on admission (23rd July 1915)

No headache

Pains all over the body.

Neck rigidity & head retraction

Kernig's sign well marked on both sides.

Pupils equal. Photophobia & com.

plaint of pain in eyes.

Abdominal reflexes exaggerated.

Knee jerks normal.

Babinski negative.

Pulse regular.

L.P. 22 c.c. drawn off. Slightly turbid

Normal pressure.

Micro? Polymorphs only.

25 c.c. serum (B. & W.) injected into S.C.

24th Feb

L.P. 45 c.c. drawn off. Slightly turbid.

Normal pressure.

25 c.c. serum (B. & W.) injected into S.C.

25th Feb

L.P. 50 c.c. drawn off. Slightly turbid.

Under slight pressure.

40 c.c. serum (B. & W.) injected into
S.C.

26th Feb

L.P. 48 c.c. drawn off. Slightly
turbid. Under slight pressure.

No injections.

1st March. Temperature normal
today & patient much better. No
headache nor neck retraction.

Patient has been delirious at times
at night since admission. He has
also suffered from severe headaches
from time to time. Pain in eyes has
disappeared.

8th March Improvement maintained.
Patient's condition very satisfactory.

12th March. Patient's temperature rose
to 103° today. He has been
vomiting, complains of pain in
the back of his neck & severe
headache. His neck is stiff.
Kernig is positive on both sides.
Pain in eyes.

L.P. 75 c.c. drawn off. Clear.
Under pressure.

25 c.c. serum (B.W.) injected
into s.c.

Relapse on
18th day
after admission.

13th Mar . Symptoms continue .

L.P. 45 c.c. drawn off . Clear .

Under slight pressure .

No injection .

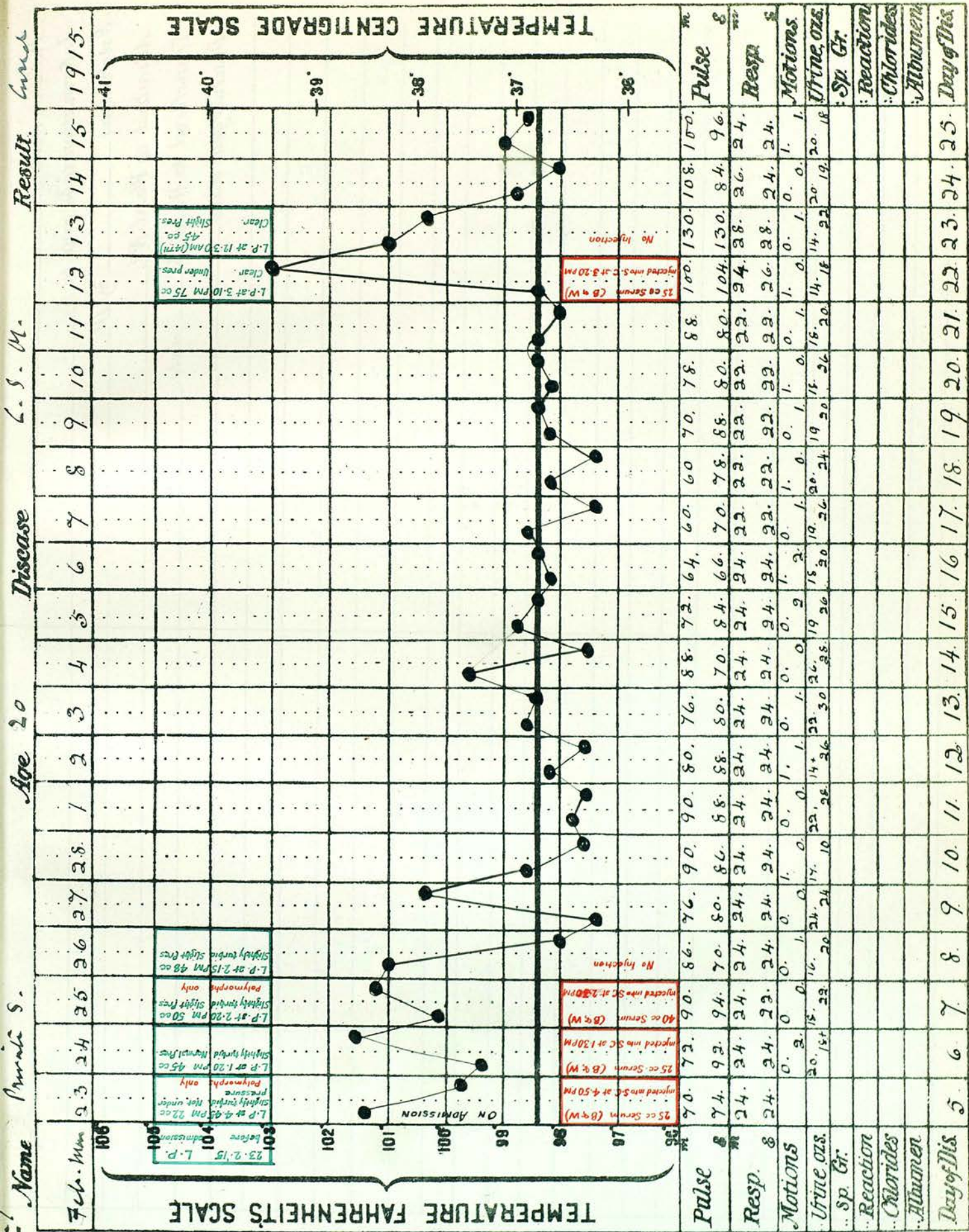
15th Mar . No headache nor pain in
neck . Patient feels better . Neck
much less stiff .

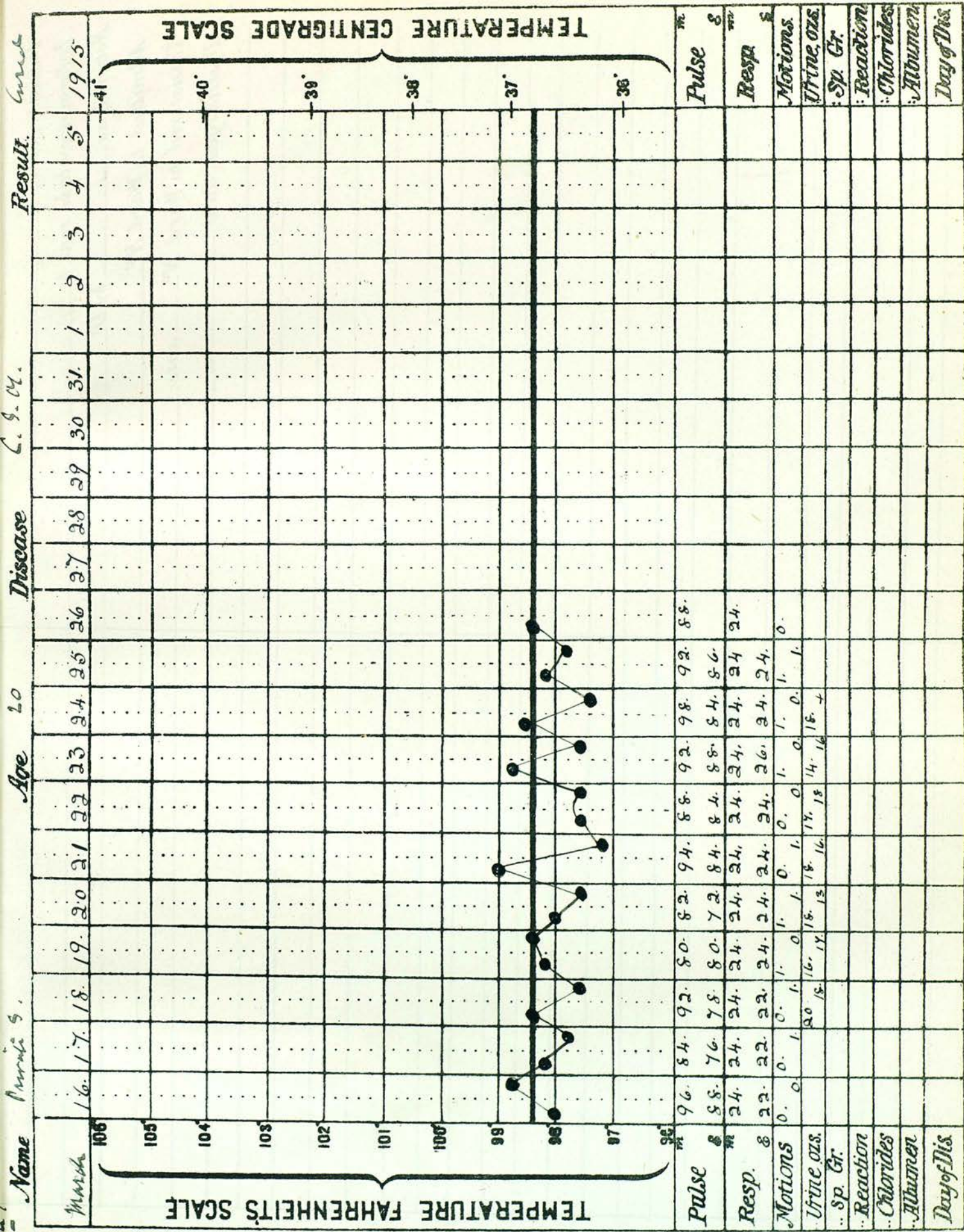
23rd March Patient got up today .
He is feeling very well .

28th March Patient quite well .
Will leave hospital in a few
days .

115 c.c. anti-meningococcal serum
(Burrows & Welcome) injected into S.C.
Since admission .

Other treatment . Lumbar puncture ;
hot sponging t.i.d. for first few
days & during relapse ; Aspirin .





Case 8. Private H. age 22 years. a soldier.

Admitted 27th July 1915

History. Patient was perfectly well on the 25th. On the morning of the 26th, he had a temperature of 100°F and a slight frontal headache. He was thought to have a mild attack of influenza. At 6 P.M. vomiting commenced. During the night, the patient became unconscious. The following morning, he was sent to Craiglockhart Military Hospital, and from there to the City Hospital.

State on admission (27th July 1915)

Patient in a state of profound coma.

Neck rigidity and head retraction.

Kernig position on both sides.

Tache cérébrale well marked

Pupils equal; fairly large; react to light.

Knee jerks exaggerated

Babinski's negative on both sides.

Pulse regular & strong.

2.30 P.M. L.P. 70 c.c. drawn off. ^{very} Turbid.
Under pressure.
Micro? Polymorphs + a few intracell^r
diplococci

40 c.c. Flexner's serum injected
into S.C.

8 P.M. Patient beginning to be conscious.
Can not speak but seems to under-
stand simple remarks.

Patient has incontinence of urine +
faeces.

28th ^{Feb.} ~~March~~ . No change in patient's condition.
L.P. 40 c.c. drawn off. Rather less
turbid. Under pressure.

22 c.c. serum (Burrows & Welcome)
injected into S.C.

1st March . Patient quite conscious
but cannot speak.

L.P. 45 c.c. drawn off. Slightly turbid.
Under slight pressure.

30 c.c. serum (B Parke Davis)
injected into s.c.

2nd March Headache. Stiff neck.

L.P. 45 c.c. drawn off. Slightly
turbid. Under pressure.

30 c.c. serum injected in the s.c.
(Parke Davis)

3rd March Headache. Stiff neck. Kernig +.

L.P. 50 c.c. drawn off. Slightly
turbid. Under slight pressure.

No injections.

7th March. Patient much better. Can
speak a little today. Still
has incontinence of urine & feces.

From the 27th Feb till the
3rd March, patient had severe
headaches at times & his neck was

very stiff. Since the 3rd March, he has had no headache & his neck is much less rigid.

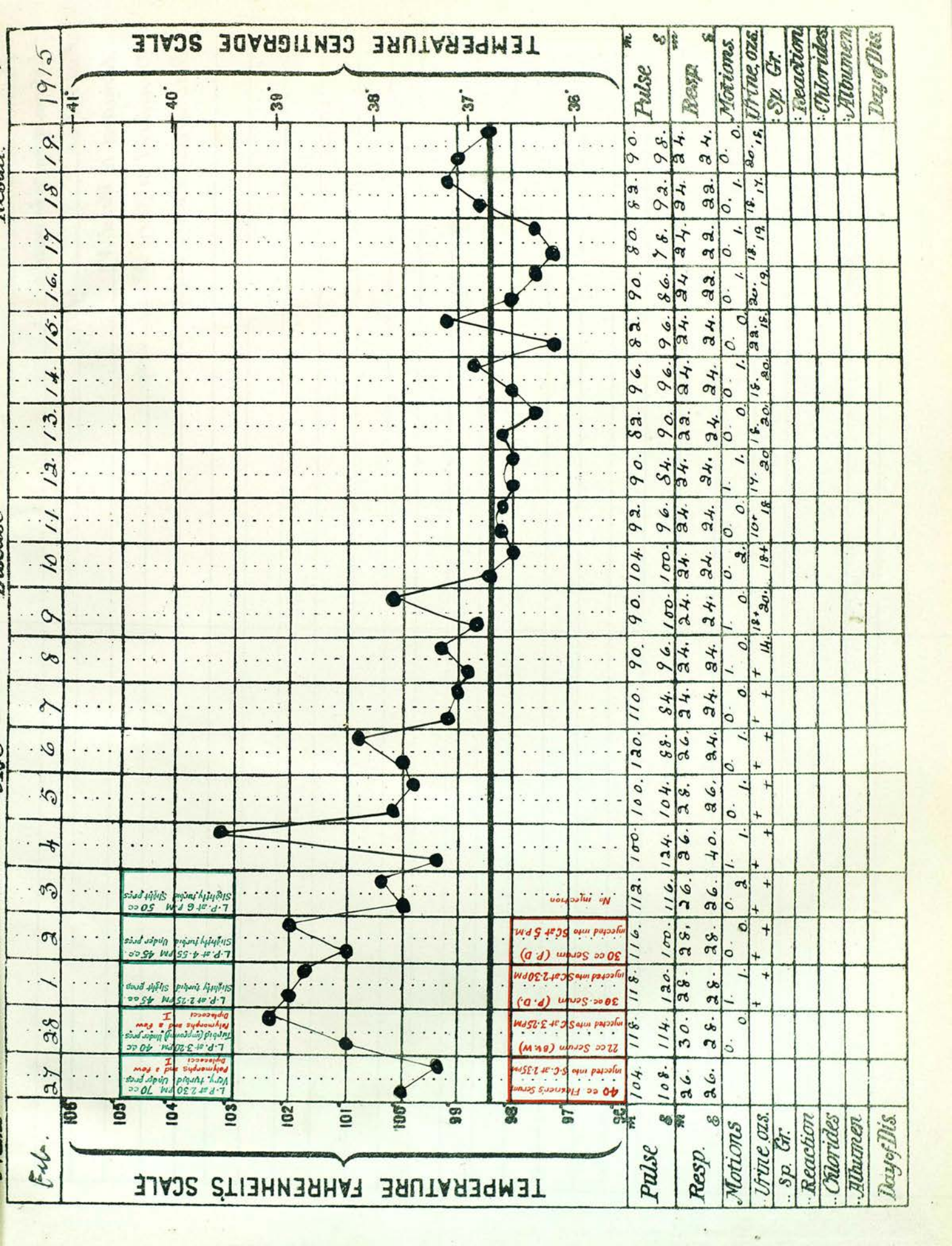
11th March. Incontinence of urine & faeces ceased today. Patient very much better.

21st March Improvement maintained. Patient got up today.

28th March Patient quite convalescent.

122 c.c. Ambioninocereal serum
(40 c.c. Flexner; 22 c.c. Burrows & Welcome;
60 c.c. Parke Davis) ~~has~~ have been
injected in 3 c.c.

Other treatment. Lumbar puncture;
hot-sponging t.i.d. till convalescent;
aperients.

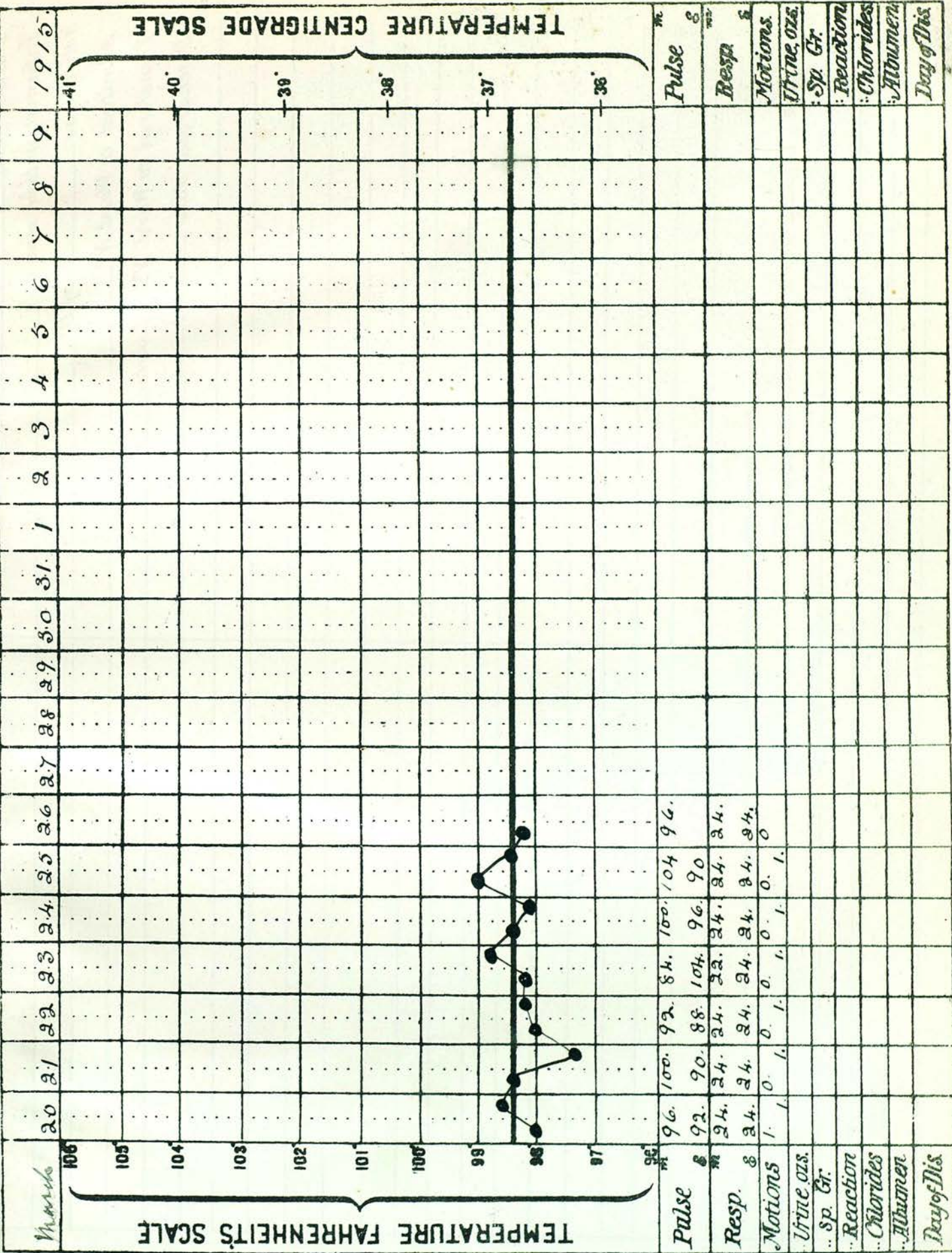


Name

Age

Disease

Respir.



Case 9. Bombardier J. Aet. 26. A Soldier.

Admitted 28th July 1915.

History On the evening of the 23rd July, patient felt his neck stiff, and he had some abdominal pain. The following morning, he had a severe headache, and could not rise. He became semi-comatose at 9 P.M. on the 27th of July, & was admitted to the City Hospital at 1.10 A.M. on the 28th July.

State on admission (28th July 1915)

Patient slightly comatose but sensible & can answer simple questions.

Severe headache

Rigidity of neck & slight head retraction.

Kernig negative on both sides.

Slightly marked tache cerebrale.

Very sensitive to cold.

Pupils large; equal in size; react to light.

Abdominal reflexes exaggerated.

Knee jerks exaggerated

Ankle clonus on both sides.

Babinski's negative on both sides.

Pulse regular.

Patient moans & yells at times.

L.P. 50 c.c. drawn off. Turbid.

Under pressure.

Micro? Polymorphs and a few
intracellular diplococci.

30 c.c. Flexner's serum injected
into S.C.

28th Feb. Incontinence of urine & feces.

Patient confused mentally at times.

He is restless & delirious at night.

Kernig positive on both sides.

L.P. 55 c.c. drawn off. Turbid.

Under pressure.

35 c.c. Flexner's serum injected
into S.C.

1st March. Still marked head retraction.

L.P. 65 c.c. drawn off. Slightly turbid.
Under pressure.

40 c.c. (25 B.W. and 15 F.) injected
into S.C.

2nd March L.P. 70 c.c. drawn off. Slightly
turbid. Under pressure.

22 c.c. (B.W.) injected into S.C.

3rd March

L.P. 50 c.c. drawn off. Under
slight pressure. Slightly turbid.

No injection.

4th March - No head retraction for
first time today - Neck still stiff.

5th March Incontinence of urine +
faeces noted today.

8th March Temperature high. Urthianal
rash all over body - very itchy.

11th March . Patient very deaf today.

12th March Stiffness in neck has dis-
appeared. Patient complains
of joint pains at the shoulders,
wrists, knees & ankles.

15th March Joints no longer painful
this morning. Patient still
deaf; otherwise much better.

21st March Deafness gradually passing
off. Patient very well. Got up
today.

28th March Patient quite convalescent.
Hearing almost normal.

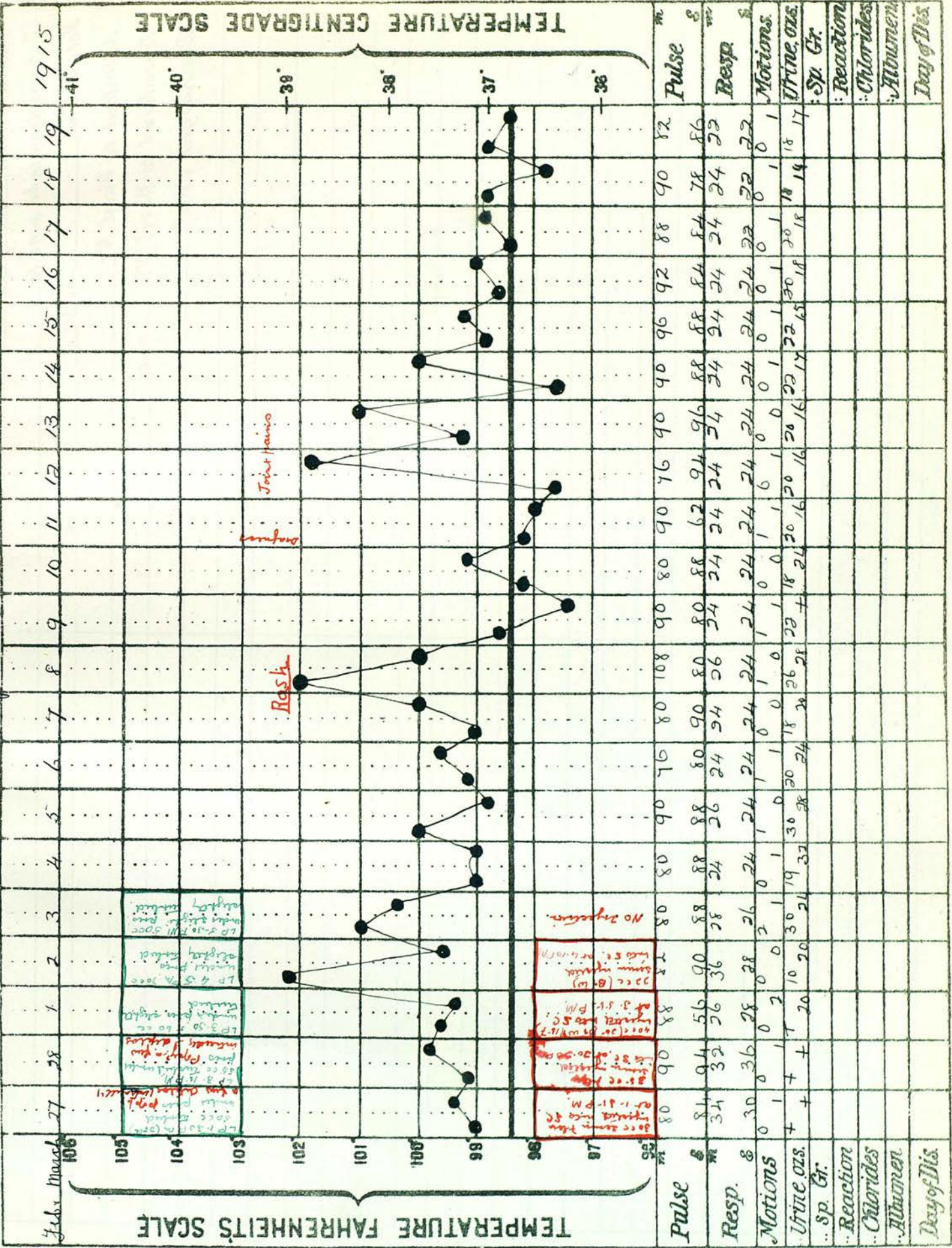
127 c.c. Anti meningococcal serum
(80 c.c. Flexner & 47 c.c. Burrows & Welcome)
have been injected into S.C. since
admission.
Hot sponging T.i.d. for first 16 days.

Name *Bombardier 7:*

Age *26 yrs*

Disease *Enteric spinal meningitis*

Result *Curd*



Case 10. Baby D.S. det. 4 months. A soldier's child.

Admitted 2nd March 1915.

History. Patient has been ill for 6 days.
Symptoms - loss of appetite, drowsiness,
& intermittent head retraction. The
drowsiness gradually increased.

State on admission (2nd March 1915)

No neck rigidity no head retraction

Kernig negative on both sides.

Small ~~purpuric~~ ^{purpura spots} on trunk & face ^{of varying size.}

Internal strabismus of both eyes.
Occasional vomiting.

L.P. 35 c.c. drawn off. very turbid.

Under slight pressure.

Micro? Polymorphs & diplococci - intra- & extra cell.

15 c.c. serum (Parke Davis) injected
into S.C.

3rd March. Vomiting is continuing.

L.P. 5 c.c. drawn off. very turbid.

Normal pressure.

5 c.c. serum (Parke Davis) injected
into S.C.

4th March Vomiting. Patient appears to be suffering from loss of the power of accommodation. Neck rigidity.

L.P. 5 c.c. drawn off. Very turbid.
Normal pressure.

5 c.c. serum (Parke Davis) injected
into S.C.

Several attempts were made after the 4th March to lumbar puncture the patient on different days and at different levels, but as nothing but blood could be obtained, no further injections were given into the spinal canal.

5th March Vomiting ceased today.
Purpuric spots have disappeared.

7th March Power of accommodation apparent.
by regained.

9th March. Neck rigidity + head retraction.
Kernig positive on both sides.
Opisthotonus.

5 c.c. serum (Paulin Davis) injected
subcutaneously.

24th March No change in "paralytic"
condition. No marked wasting. Food
taken well.

100 units anti-diphtheritic serum
injected subcutaneously on Dr.
James' advice.

25th March

Head retraction less marked

26th March

100 units anti-diphth serum
injected subcutaneously.

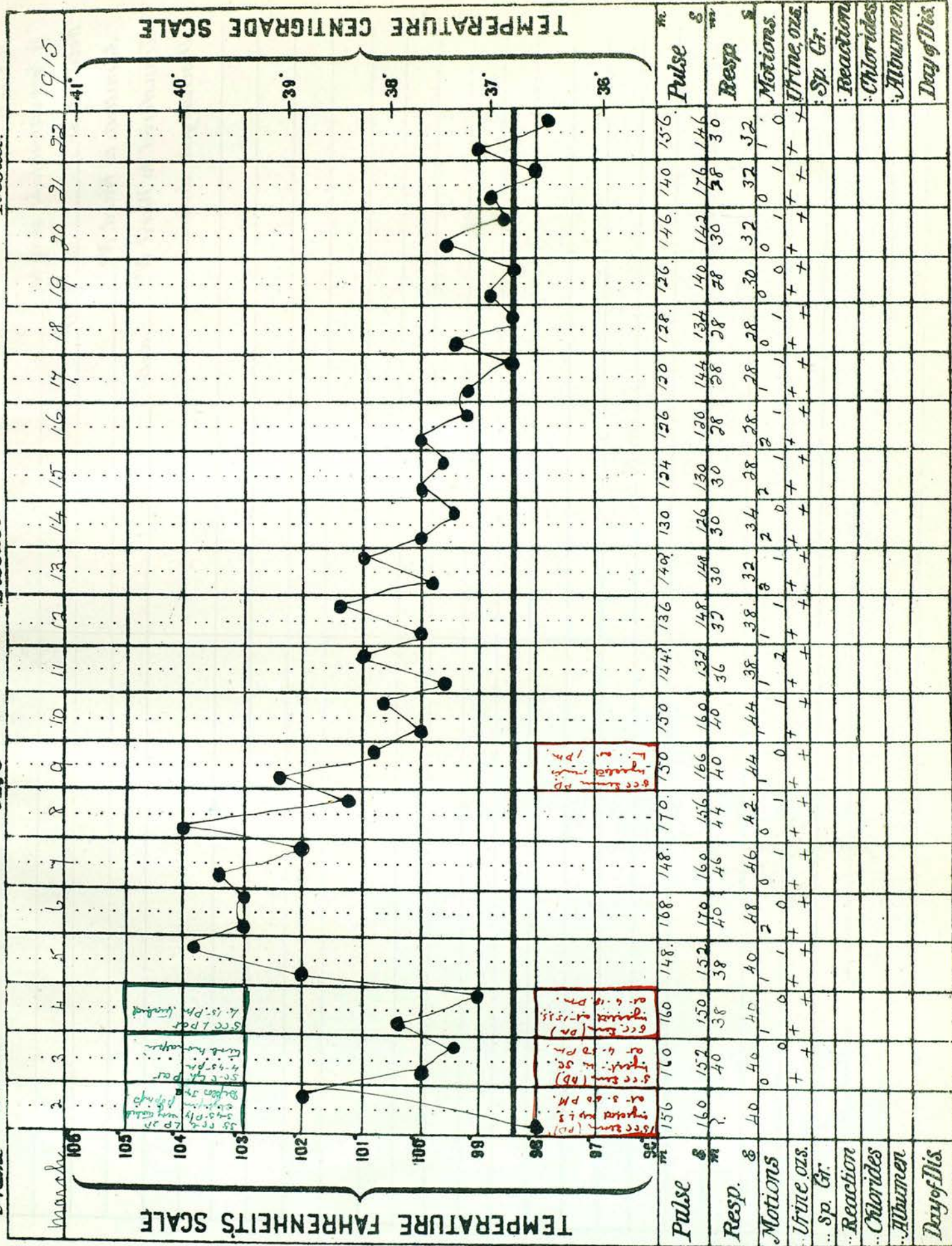
28th March

100 units anti-diphth serum
injected subcutaneously.

Head retraction much less marked. "Paralytic"
condition otherwise the same.

Result.

Result.



Case 11. Miss K. aet. 22 Hospital nurse.

Admitted 17th March 1915.

History.

16th March. In the morning patient's temperature was 104°F . She was vomiting at intervals, and complained of headache & pain in the neighbourhood of the lower angle of the scapula. In the evening, she had a slight pain in the back of the neck. At midnight, her temperature was lower, and she was apparently better. Between 4 and 6 A.M. on the 17th, patient became semi-comatose. Her head was not retracted; Kernig's sign was negative. She was admitted to the City Hospital in the forenoon.

State on admission (17th March 1915)

Patient comatose

Slight tendency ~~of~~ to head retraction.
Kernig well marked on both sides.
Tache cérébrale well marked.

Small purpuric spots scattered over body.
Pupils equal, reacting sluggishly to light.
Pulse regular.

L.P. 55 c.c. drawn off. Turbid.

Under slight pressure.

Micro Polymorphs & diplococci -
mostly intracellular.

45 c.c. serum (B.H.W.) injected into
S.C.

Patient became conscious in the
evening. She was able to answer
simple questions. She complained
of severe headache.

18th March. Headache much better.

L.P. 55 c.c. drawn off. Rather
less turbid. Under pressure.

50 c.c. serum (B.H.W.) injected
into S.C.

19th March Mental condition quite clear.
Slight herpes on lower lip.

L.P. 55 c.c. removed. Clearer.
Under pressure.

50 c.c. serum (B.W.) injected into
S.C.

20th March Headache.

L.P. 37 c.c. removed. Slightly
turbid. Under pressure.

No injections.

21st March Midnight. Severe headache.

L.P. 45 c.c. removed. Somewhat
turbid. Normal pressure.

No injections.

23rd March Patient much better today.
Slight headache occasionally.

25th March Severe headache since L.P.M.

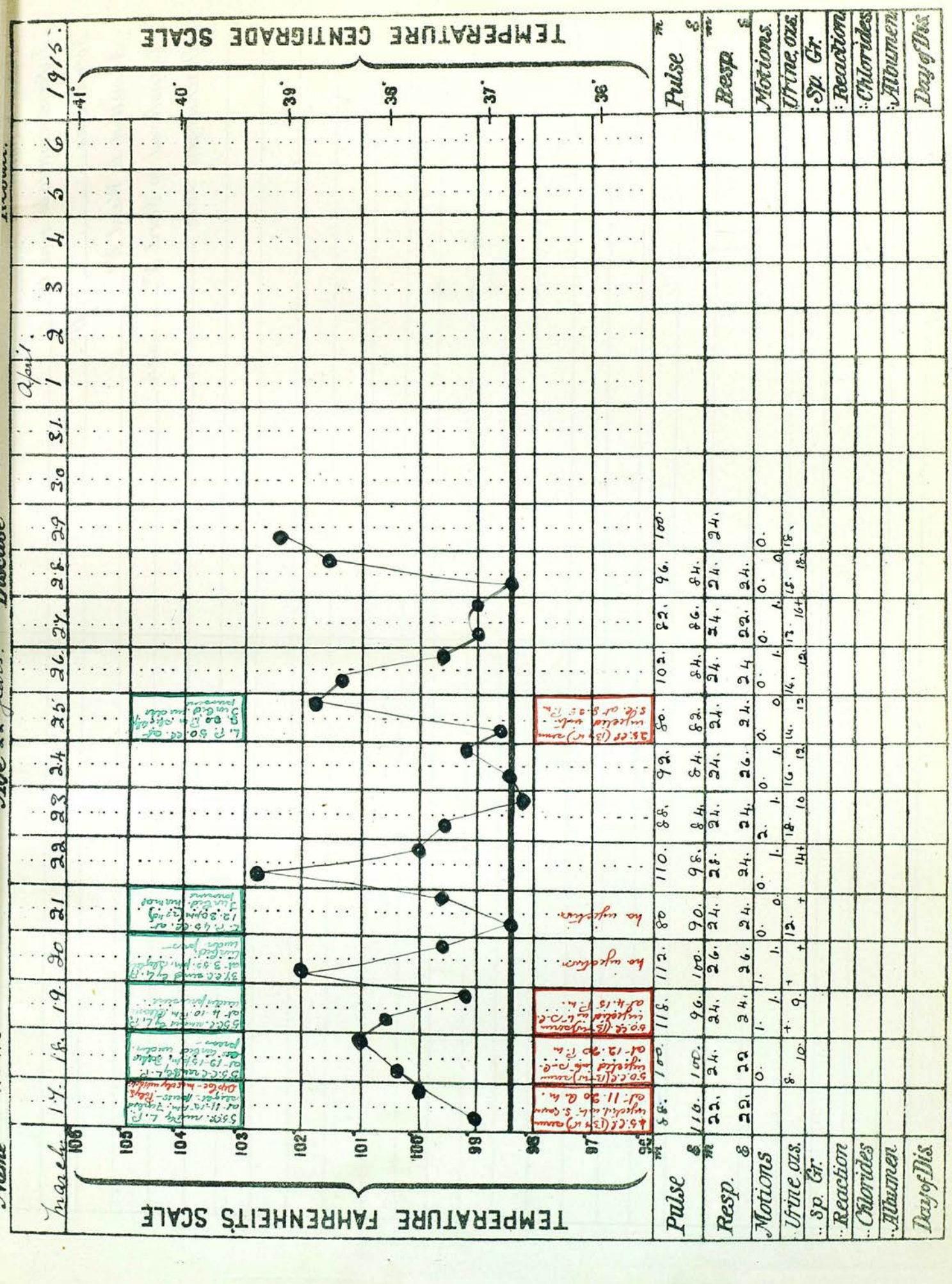
L.P. at 8.45 P.M. 50 c.c. removed.

Slightly turbid. Under pressure.

25 c.c. serum (B.W.) injected into S.C.

27th March Patient improving. Her neck is still slightly rigid. She occasionally suffers from slight occipital headache. Patient distinctly
neurotic.

This patient may require further treatment. 170 c.c. anti-meningococcal serum have been injected into the spinal canal since admission.



L.P. 55 c.c. drawn off. Slightly turbid.
under normal pressure.

45 c.c. serum (B.W.) injected into
S.C.

23rd March

L.P. 50 c.c. drawn off. Slightly turbid.
under normal pressure.

40 c.c. serum (B.W.) injected into S.C.

As patient was coming out of
chloroform, he apparently took a
fit. His breathing suddenly became
stertorous, and a little later there
~~was twitching and profuse~~
~~movements of the arms & hands.~~
twitching of the hands & arms
commenced. The patient's eyes
were turned up. His pupils were
of ^{moderate} ~~equal~~ size & reacted to light.
Pulse feeble. Breathing poor.

24th March Slight twitching movements
from time to time. Although conscious
& able to answer questions, patient
does not seem quite clear mentally.
He has incontinence of urine & feces.

L.P. 25 c.c. drawn off. Turbid.

Normal pressure.

20 c.c. serum (B.W.) injected
into S.C.

26th March

L.P. 15 c.c. drawn off. Turbid.

Normal pressure.

15 c.c. serum (B.W.) injected into
S.C.

28th March

L.P. 6 c.c. drawn off. Turbid;

yellowish. Normal pressure.

10 c.c. serum (B.W.) injected
into S.C.

29th March. No marked improvement
since admission.

Still marked neck retraction &
incontinence of urine & faeces. The
twitching movements continue, &
the patient's mind is not quite clear.
Slight ptosis both sides - Kernig position.

Case 13. H.S. ad. 17 years. A soldier.

Admitted 24th March 1915 as an
Observation C.S.M.

This case is quite probably not
one of C.S.M. at all. It is included
here as a possible example of the
ambulant or abortive type of the fever.

As Dr. Lee says in his book on
"Infectious Diseases" — "The true
nature of such attacks would not
even be suspected were it not for
their appearance in connection with
cases of ordinary or pulmonary types,
or perhaps for the presence of labial
herpes".

History. On the 22nd of March, patient had
a sore throat & frontal headache.
He was shivering. In the evening, he
had pains in his back & in the
back of his neck.

State on admission (24th March 1915)

Slight headache.

Slight pain in back of neck. No head
retraction.

Kernig absent on both sides.

Lungs healthy

H.S. closed

Throat inflamed - slight patching -
probably only exudation.

Tongue clean

I thought the patient was probably
suffering from a slight attack of
influenza + tonsillitis, + treated him
on that assumption. A swab was
taken of his throat; the culture was
found to contain no diphtheria
bacilli the following morning.

25th March Patient feeling better. Throat
clearing. Still slight pain in back of
neck. No Kernig.

Development of herpes round
mouth.

27th March Temperature normal.
No pain in back of neck. Patient

feeling quite well.

28th Mar.

P. was lumbar punctured for purpose of diagnosis today. The fluid was clear, but as it was under pressure, 30 c.c. were removed. No organisms & very few cells were found on microscopic examination.

The patient is apparently quite well, but is still being kept under observation.

Name

Female H.S.

Age

17 yrs

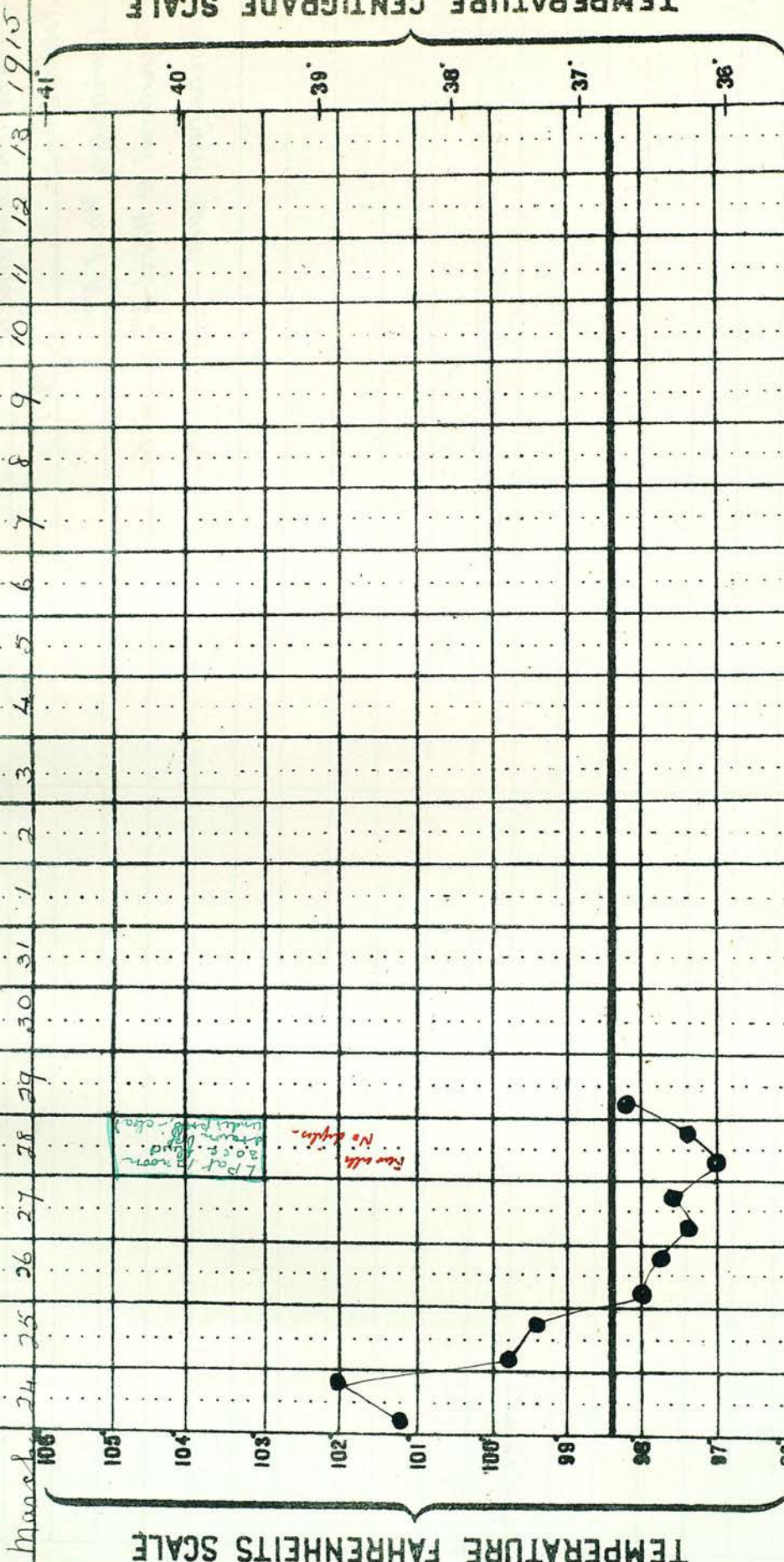
Inocase

Result.

Result.

TEMPERATURE FAHRENHEIT'S SCALE

TEMPERATURE CENTIGRADE SCALE



Pulse

Resp.

Motions

Urine ozs.

Sp. Gr.

Reaction

Chlorides

Albumen

Day of Dis.

Pulse

Resp.

Motions

Urine ozs.

Sp. Gr.

Reaction

Chlorides

Albumen

Day of Dis.

Case 14. Private P. Aet. 23 years. A Soldier.
Admitted on 4th July 1915.

In this case, the C.S. fluid was slightly turbid on admission. It contained numerous polymorphs but no organisms were found either then or subsequently. The causal organism may possibly have been the pneumococcus.

History On the 31st of Jan., patient took ill suddenly. Shivering, headache & vomiting. Patient was feverish & delirious. Condition continued much the same till the 4th July, when patient was sent to Craiglockhart Military Hospital, lumbar punctured in the O. P. D., and transferred to the City Hospital as a C.S.M.

State on Admission [4th July 1915]

Patient conscious. Delirious at times.

Severe headache

No neck retraction

Marked Kernig on both sides.

Pulse very irregular & feeble.
Patient has incontinence of urine & feces.
~~Microscopic~~ Patient is slightly deaf.
5th Feb.

L.P. at 1 A.M. 15 c.c. drawn off.

Slightly turbid. Normal pressure.

Micro Polymorphs only.

25 c.c. serum (B.W.) injected into S.C.

L.P. at 3 P.M. 27 c.c. drawn off.

20 c.c. serum (B.W.) injected into S.C.

6th Feb

L.P. at 2:30 P.M. 30 c.c. drawn off.

Slightly turbid. Normal pressure.

Micro Polymorphs only.

25 c.c. serum (B.W.) injected into S.C.

7th Feb Incontinence of urine & feces has ceased.

L.P. 32 c.c. drawn off. Clear.

Normal pressure.

15 c.c. serum (B.W.) injected into S.C.

7th Feb. Patient has a cough.
Slight dullness on left side
below clavicle.

9th Feb Dullness over left base posteriorly
and tubular breathing in same
position. Deafness increasing.

13th Feb Patient's temperature fell
early this morning. He is looking
much better.

No headache

Kernig present but not marked.

19th Feb Patient feverish. Morbilliform
serum rash on back.

20th Feb Rash has disappeared
from back. On chest, abdomen &
over joints today.

21st Feb. Rash has disappeared.
Finger joints swollen and
painful. Shoulders, knees, wrists
& ankles painful.

23rd Feb Temperature normal.

Toni- ham's have disappeared.

No headache

No kernig.

Patient- feeling very ~~well~~ ^{much} better.

His hearing is improving.

28th March. Patient- quite con-

valercent. Deafness has almost
entirely disappeared.

85 c.c. Serum (Burrows (Wilsons) ^{have been} ~~was~~
injected in S.C. since admission.

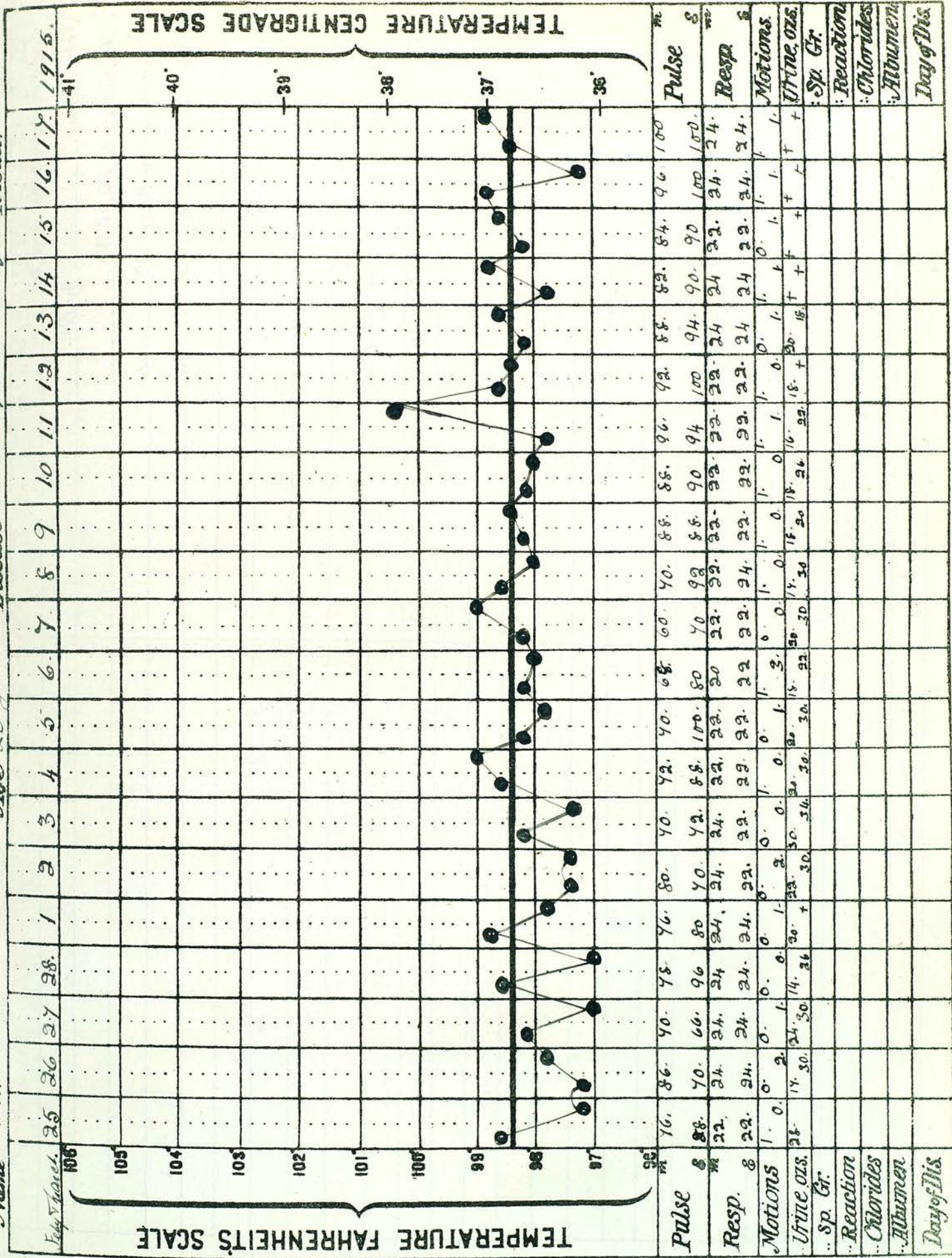
100

Name *Private P.*

Age *23 years.*

Disease *Cerebro-spinal meningitis.*

Result. *Cured.*



Green

TEMPERATURE FAHRENHEIT'S SCALE												TEMPERATURE CENTIGRADE SCALE												Pulse		Resp.		Motions.		Urine, ozs.		Sp. Gr.		Reaction.		Chlorides.		Albumen.		Day of Dis.	
March.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	1.	2.	3.	4.	5.	6.	7.	1915.																			
	96.	98.	96.	84.	86.	82.	73.	96.	90.	96.	80.	88.																													
	90.	98.	96.	80.	90.	108.	108.	88.	92.	88.	82.	82.																													
	24.	24.	24.	22.	24.	24.	24.	24.	24.	24.	24.	24.																													
	22.	22.	24.	22.	24.	26.	24.	24.	24.	24.	24.	24.																													
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	+	+	+	+	+	+	+	+	+	+	+	+																													

Case 15. John McKay, aet. 17 (Gordon's child)
Admitted 28th March 1915 Father has been at front since Aug 14

History. Patient was perfectly well on Monday, 22nd March. On Tuesday morning, he complained of severe headache, pain in the back of the neck, vomiting & shivering. There was no change till Saturday morning (27th) when he became delirious. This morning (28th) he was only semi-conscious and did not seem to recognise his people. He was admitted to the City Hospital about 1 P.M.

State on admission (28th March)

Patient is conscious. He can answer questions but is slightly confused mentally.

No headache.

Pain in back of neck

Neck rigidity - not marked - but present

Rernig present but not marked.

Slight herpes, upper lip.

Pupils equal; of moderate size; react
to light & accommodation.

Abdominal reflexes active.

Knee jerks scarcely perceptible.

Babinski's negative

Pulse regular.

L.F. at 1-30 P.M. 55 c.c. drawn off.

Turbid. Under pressure.

Micro Polymorphs - Diplococci

intra- and extra-cellular -

the latter being more numerous.

40 c.c. serum (Burrows & Welcome)

injected into S.C.

Result.

1.2

TEMPERATURE CENTIGRADE SCALE

18.

20.

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Cases which have died since admission.

Case 16. Lieut. P. aet. 28 years. A soldier.
Admitted 4th Feb. 1915

History. Patient was perfectly well on
the 2nd of Feb. He felt ill on the
following morning and had a severe
headache. At 10 P.M. he became
unconscious. He was admitted to the
City Hospital between three & four
A.M. on the 4th of Feb.

State on admission (4th Feb. 1915)

Patient comatose.

No head retraction

Kernig positive on both sides.

Legs flexed at hips & knees.

Patient irritable when moved.

Babinski positive on both sides

A few characteristic purpuric
spots over trunk.

L.P. 5.15 A.M. 15 c.c. drawn off.

Turbid. Under pressure.

micro¹ Polymorphs & intracellular
diplococci

The puncture was done without
any anesthetic & the patient
struggled so much that it was
impossible to give an injection.

L.P. 3 P.M. 40 c.c. drawn off.

Turbid. Under pressure.

30 c.c. serum (B.W.) injected into S.C.

5th July.

Patient unconscious. No
improvement. Very restless.
Mourns & yells from time to time.

L.P. 3 P.M. 16 c.c. drawn off.

Turbid.

6 c.c. serum (B.W.) injected
into S.C.

6 July.

Patient more conscious this morning and looking better. He appeared to recognise his mother.

12 noon

L.P.

10 c.c. drawn off.

Turbid. Normal pressure.

10 c.c. serum (B. & W.) injected.

In the afternoon patient's breathing became faster. As its rate continued increasing, he was lumbar punctured again at 10 P.M. No injection was given. No improvement resulted, and the patient died at 2 A.M. on the 7th July.

4 c.c. antimeningococcal serum (Burrows & Williams) injected into 9 c.c. spinal fluid.

[illegible]

Day of Dis.

Case 17. Private B. M.C. 21. A soldier.

Admitted 20th Feb 1915.

History. Patient has been ill for two days. ~~He had~~ He was thought to have influenza. Headache & vomiting. Patient became delirious on the morning of admission at 8 A.M.

State on admission (20th Feb 1915)

Patient delirious & apparently unconscious. Marked neck rigidity & retraction of head.

Kernig positive on both sides.

Pupils equal & react to light.

Patient was very ill on admission. His face was cyanosed & his pulse intermittent & very feeble.

Hypodermics of strychnine & strophantine were given and a lumbar puncture was done immediately.

L.P. 80 c.c. drawn off. Turbid. Under
high pressure.

Micro?. Polymorphs &
diplococci - mainly intra.
cellular but some intracellular. X

30 c.c. serum (B.W.) injected into S.C.

Pulse improved immediately & also
patient's colour.

L.P.
21st Feb. 55 c.c. drawn off. Turbid.
Normal pressure.

25 c.c. serum (B.W.) injected into S.C.

Patient has retention of urine & in-
continence of faeces.

22nd Feb

L.P. 45 c.c. drawn off. Turbid.
Normal pressure.

25 c.c. serum (Flexner) injected into S.C.

Patient has been delirious till this evening since admission. Quiet now. Pulse still fairly strong.

23rd Feb

Patient conscious today. Can speak. Mental condition clear.

No headache

Neck rigidity & head retraction still present

Kernig position on both sides

Pulse fair.

L.P. 80 c.c. drawn off. Turbid.
Under pressure.

37 c.c. serum (B.W.) injected into
S.C.

24th Feb

L.P. 40 c.c. drawn off. Turbid.
Under slight pressure.

Breathing gradually became more rapid this evening. Pulse very feeble.

L. P. 10 P. M. 45°C. - drawn off.

Turbid. Normal pressure.

No injection.

26th July. Patient unconscious.

Patient did not regain consciousness; his pulse was so feeble that it was not thought desirable to lumbar puncture; his breathing gradually became more rapid ~~and shallow~~ ~~the day after 26th July~~ about 11 P. M. He died at 2.55 A. M. (27th July).

P. M. Exam. (27th July 1915)

Brain. Membranes not adherent.

Brain edematous. Fluid under pia arachnoid. Yellow pus in some of the sulci at vertex. Large quantity of yellow exudation at base of brain on anterior surface of pons & posterior to optic chiasma. Little fluid in lateral ventricles. Some yellow pus

+ Signs of small haemorrhages round walls
of lateral ventricles.

Cord. membranes not adherent. Thick
deposit of yellowish exudation on
surface of cord.

117 c.c. anti-meningococcal serum
(92 c.c. B.H.W., and 25 c.c. Flexner)
injected into s.c. since admission.

Case 18. J. S. ad. 8 years. A Sudan child.

Admitted 3rd March, 1915

History. Patient took ill on the 25th
of Feb. Symptoms. Headache, shivering,
vomiting, abdominal pain, constipation
& delirium. These symptoms persisted
and he was sent in to the City Hospital
on the 3rd March, 1915, as a typhoid.

State on admission (3rd March 1915)

Patient conscious.

Neck rigidity present.

Kernig positive on both sides

Limbs stiff

No abdominal tenderness.

Spleen not enlarged.

L.P. 15 c.c. drawn off. Turbid.

Normal pressure

Micro? Polymorphs & a few
intra- & extra-cellular diplos.

10 c.c. serum injected into S.C.
(Parker Davis)

On the evening of admission, p. had severe abdominal pain which seemed to
in to cramp-like. Comminutives were applied & p. was given a rectal injection of hot olive oil & was better.
As soon as his bowels acted, the pain disappeared.

4th March Widal negative.

Patient unconscious.

Neck rigid & throat retraction marked.
Ptosis left eye.

L.P. 25 c.c. drawn off. Turbid.

Under slight pressure.

15 c.c. serum (Parke Davis) injected
into S.C.

5th March Patient still unconscious.

Intermittent of urine & feces.

L.P. 10 c.c. drawn off. Very turbid.

Subnormal pressure.

10 c.c. serum (Parke Davis) injected
into S.C.

6th March Patient unconscious.

Breathing became very rapid;
temperature rose to 104°F , and
patient died in the evening.

Name J. S.

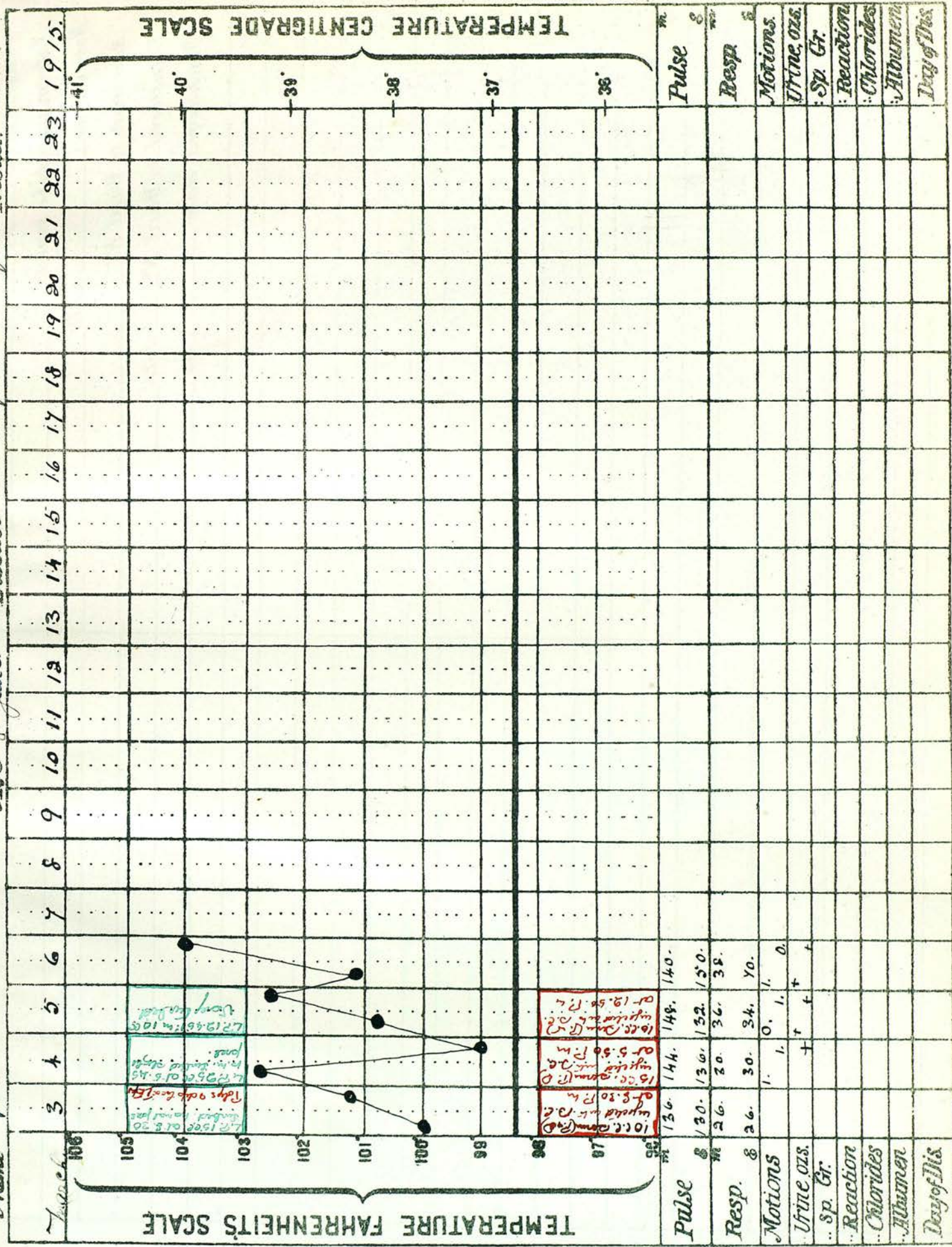
Age 8 years.

Disease

Cerebro-spinal meningitis

Result.

Death



Case 19. S. R. Female. aet. 13 years. A Goldstein child.

Admitted 13th March 1915

History. Patient became drowsy at school on the 12th March. On returning home, she had severe ~~for~~ frontal headache & the drowsiness increased. During the night, vomiting commenced & there was incontinence of urine. The vomiting continued next day.

State on admission.

Patient was admitted about 5.15 P.M.

She was in a dull semi-comatose condition.

No head retraction

Kernig negative on both sides.

At 6.45 P.M. 10 c.c. C.S. fluid were drawn off. The fluid was clear & under slight pressure.

Micro? Very few cells. A few intracellular diplococci of characteristic shape.

Patient suddenly collapsed & died at 6.55 P.M.

Chloroform was given but very little as it was not under pressure.

P. M. exam (15th March)

Brain. Two or three small deposits of pus near vertex of brain. Slight milky exudation below pia arachnoid along sulci over vertex. No exudation nor pus at base of brain. Blood vessels on surface of brain congested.

Cord Slight sero-purulent exudation on posterior aspect of cord.

Name E. R. (Female)

Age	13 yrs	14 yrs	Disease	Cerebro. spinal meningitis	Result.

Death

[illegible]

Case 20. W. M. D. ad. 16½ years. Engineer.

Admitted 15th March 1915

History. Patient was perfectly well yesterday. At 5.30 A.M. this morning (15th March), he got up to go to work but had to go back to bed. He had a severe headache and felt sick but did not vomit. He has been feverish, complaining of headache, & unconscious at intervals all day. Admitted to the City Hospital about 6 P.M.

State on admission (15th March)

Patient practically comatose
Neck slightly rigid & tendency to
head retraction.

Kernig negative on both sides.

Pulse regular but weak.

L.P. 35 c.c. drawn off. Clear.

Under great pressure.

Micro. Few cells. No organisms.

25 c.c. serum (B.T.W.) injected

into s.c.

16th March. Patient still dazed but can understand simple questions and answers intelligently. Kernig negative.

L.P. 30 c.c. drawn off. Clear. Under slight pressure.

Micro? Few cells. No organisms.

22 c.c. serum (B.W.) injected into S.C.

17th March. Patient quite sensible.

Can talk naturally. Looks much better.

L.P. 47 c.c. drawn off. Very slightly turbid.

Normal pressure

Micro?. Few cells. No organisms.

45 c.c. serum (B.W.) injected into S.C.

Evening. Improvement maintained.

Right pupil larger than left.

Patient complains that he has seen double for 2 or 3 days. No obvious

strabismus. Temperature falling.

20th March

Turning position on both sides.

Retention of urine & incontinence of faeces.

L.S. 55 c.c. drawn off. Clear. Under
slight pressure.

Micro. Few cells. No organisms.

25 c.c. serum (B.T.W.) injected into S.C.

22nd March

Severe headache.

L.S. 40 c.c. drawn off. Slightly turbid.

Normal pressure.

Micro?. Polymorphs & diplococci
mostly intracellular: but some intra-
cellular.

No injections.

23rd March Temperature on 105°F last
night. Profuse sweating. Breathing
becoming more rapid.

Complete ptosis left eye.

L.P. 60 c.c. drawn off. slightly turbid.

Normal pressure.

25 c.c. serum (B.W.) injected into

S.C.

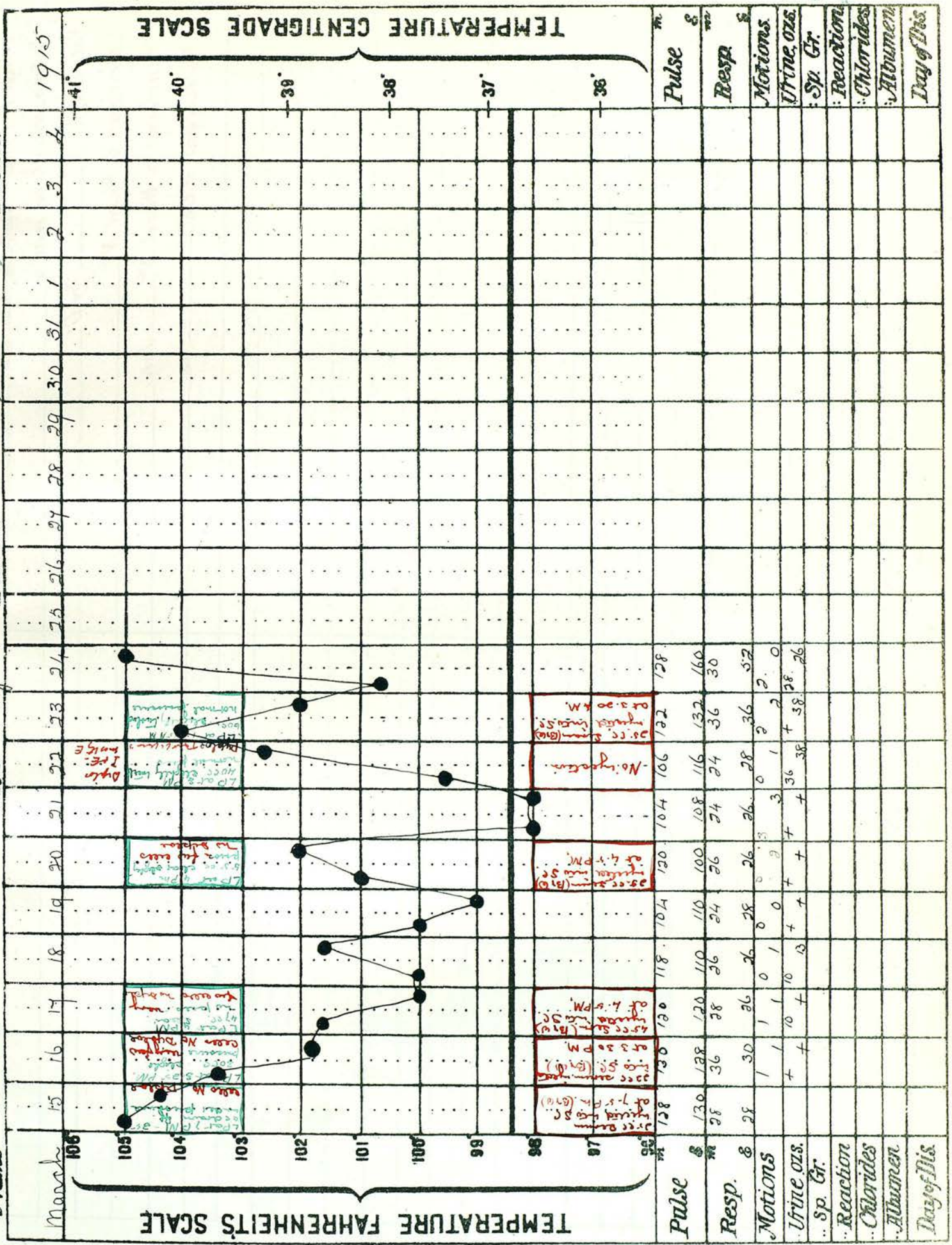
24th March Patient died this evening.

Temperature 105°F before death, &
breathing became very rapid.

142 c.c. anti-meningococcal serum
(Burrows & Welcome) injected into S.C.

Since admission.

Name W. M. D. Age 16 1/2 yrs. Disease Cerebro-spinal meningitis Result Death



Case 21. D.B. aet. 43

Admitted 21st March, 1915.

History. Patient suddenly took ill on the 7th of March. Symptoms. headache, vomiting and diarrhoea. On the 19th of March he became delirious, & the vomiting which had stopped for a few days commenced again. Two days later he was admitted to the City Hospital.

State on admission.

Patient mentally confused & noisy.

He does not answer questions in.

intelligence but yet seems to under-

stand to a certain extent what is

said to him.

Neck rigid. Head retracted.

Kernig positive on both sides.

Pupils of moderate size; equal ~~size~~;

react to light.

Abdominal reflexes absent

Knee jerks exaggerated

Tache cérébrale marked.

Patient makes slight nervous movements
with his fingers & hands.

L.P. 20 c.c. drawn off. Slightly
cloudy & amber coloured.

Micro? Polymorphs only.

25 c.c. (B.W.) serum injected into
S.C.

22nd March

Slight facial paralysis & slight
ptosis on right side. Right arm
weaker than left.

Patient has incontinence of urine &
faeces.

23rd March Ptosis on both sides.

Patient semi-comatose. No
improvement.

L.P. 15 c.c. drawn off. Serum coloured
clear.

15 c.c. serum (B.W.) injected into
S.C.

24th March. There was no improvement
in patient's condition today. He died
in the evening.

P.M. examⁿ. (25th March)

Brain. Great congestion of blood
vessels. A large amount of purulent
fluid in the sub^a below the pia
arachnoid all over the upper surface
of the brain. A good deal of yellow
pus in some positions.

Large quantities of purulent
yellow exudate in front of the pons
& posterior to the optic chiasma, &
on the posterior surface of the cerebellum.
The under surface of the cerebellum
covered with a thick gelatinous
exudate.

Lateral ventricles distended
with turbid fluid, & also contain
a little yellow pus.

Heart. No marked changes in lower
half. About the level of the lower

angle of the scapula there was a deposit
of thick creamy pus, & about 3 or 4 in.
higher up, the cord was almost
completely disintegrated for $\frac{3}{4}$ of an
inch, & there was a large amount of
creamy pus in the same position.

Characteristic intra-cellular
diplococci were found in the fluid
removed from the lateral ventricles.

Case 22. J. M. (male) Aet. 6 A Soldier's child -
Admitted 22nd March 1915

History. Patient took ill on the 20th of
March. Symptoms. Headache, vomiting &
pain in the back. He became delirious
on the same evening.

State on admission (22nd March 1915)

Patient conscious & sensible.

Severe headache

Stiffness of neck

Kernig position but not marked on
both sides.

Slight ptosis on the right side.

Brudzki's position

Babinski's negative.

Incontinence of urine & faeces.

L.P. 22 c.c. drawn off. Normal
pressure. Turbid.

Micro! Polymorphs. Diplococci
extra- & intracellular - mostly
intracellular.

22 c.c. serum (B. & W.) injected into
S.C.

23rd March

L.P. 25 c.c. drawn off. Turbid.

Normal pressure.

25 c.c. serum (B.W.) injected into
S.C.

24th March

Breathing rapid. Patient much
worse.

L.P. 5 c.c. drawn off. Very thick
and turbid.

5 c.c. serum (B.W.) injected into
S.C.

Patient died this evening.

49 c.c. anti-meningococcal serum
(Burrows & Welcome) injected into
S.C. since admission.

Disease Crabs - spinal meningitis Result. Death

TEMPERATURE FAHRENHEIT SCALE												TEMPERATURE CENTIGRADE SCALE												Pulse	Resp	Motions	Urine, ozs.	Sp. Gr.	Reaction	Chlorides	Albumen	Day of Dis.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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Case 23. S.P. ad. 30 Civilian

Admitted as observation C.S.H. no

28th March 1915.

This case was not definitely diagnosed
as one of cerebro-spinal meningitis.

History Patient took ill on Wednesday,
24th March. Symptoms - headache,
vomiting, & pains all over the body.

State on admission (28th March 1915)

Severe headache

No definite head retraction nor
stiffness of neck.

Kernig negative on both sides.

Abdominal reflexes negative

Babinski negative

L.P. 25 c.c. drawn off. Clear.

Under pressure.

Micro¹ Few cells. No diplococci.

No T.B.

No injection.

1st March

Stiffness of neck & slight head retraction
Kernig negative.

L.P. 40 c.c. drawn off. Very slightly
turbid. Under pressure.

Micro - No organisms.

25 c.c. serum (B.T.W.) injected into
S.C.

2nd March

60 c.c. drawn off. Slightly turbid.
Under pressure.

Micro - A considerable number of
polymorphs & mononuclear cells.

No diplococci; no T.B.

~~60~~ S.C. irrigated with normal
saline.

25 c.c. serum (B.T.W.) injected
into S.C.

Patient much worse this evening.
Pulse very weak & irregular.

On the 3rd & 5th of March, 3 c.c.

bone marrow & spleen juice were
injected subcutaneously on the advice
of Dr. James.

Patient died on the 6th March.

P.M. Exam (7th March)

Brain. ~~Encephalitis~~. Congested.

Slight induration along sulci
over vertex of brain. No
condensation at base of brain.
No fluid in ventricles.

Cord. Apparently normal.

The fluid below the pia
arachnoid on the vertex of the
brain was examined microscopically
but no organisms were found.

5-3 c.c. serum (Burrows & Wilcome) injected
into s.c. since admission.

Case 27

Name

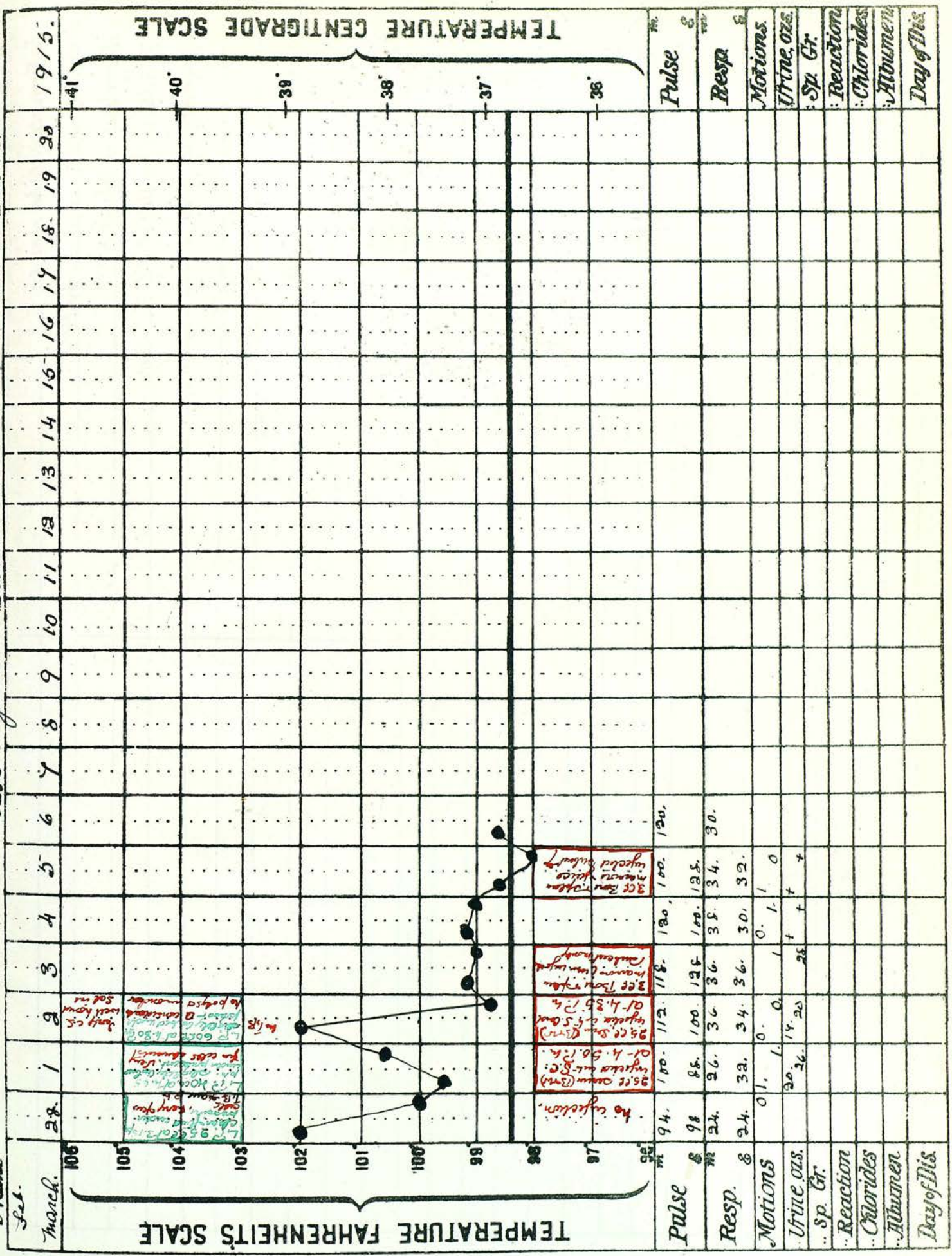
A.P.

Age 30 years

Disease

Meningitis

Result Death



Summary of Cases:

Sex	Case	Occupation	Age	Disease	Result
	1	Soldier	19	Headache, rigor, vomiting, delirium	Anal. 17 serum inj. 70 B.W.
	2	Soldier	22	Influenzal symptoms. Vomiting, headache	142 B.W.
	3	Soldier	20	Influenzal symptoms. Headache, pain in neck	67 B.W.
	4	Soldier	26	Influenzal symptoms.	122 B.W. + 22 F.
M.	5	—	4	Vomiting, delirium, head retraction	846.6 (45 B.W., 30 F., 100 F.)
	6	Soldier	21	Influenzal symptoms. Headache, pain in back of neck	125 B.W. + 21 F.
	7	Soldier	20	Influenzal symptoms.	115 B.W.
	8	Soldier	22	Headache; vomiting; influenzal symptoms; rapidly became unconscious	(40 F.; 22 B.W. 60 P.D.)
	9	Soldier	26	Stiff neck; abdominal pain	80 F. + 47 B.W.
M.	10	Soldier's child	4 mos.	Drowsiness; intermittent head retraction. Purpuric spots	25 F.
F.	11	Hospital nurse	22	Influenzal symptoms; rapidly became unconscious.	170 B.W.
	12	Soldier	36	Unconscious; stiff neck; headache; vomiting	140 B.W.
	13	Soldier	17	Influenzal symptoms.	—
	14	Soldier	23	Shivering, headache, vomiting, delirium.	45 B.W.
	15	Soldier's child	17	Shivering, headache, pain back of neck, vomiting.	40 B.W.
	16	Soldier	28	Headache; became rapidly unconscious. Purpuric spots	41 B.W.
	17	Soldier	21	Influenzal symptoms. Headache. Vomiting. Delirium.	117 (92 B.W. + 25 F.)
M.	18	Soldier's child	8	Headache, shivering, vomiting, abd. pain, delirium	35 P.D.
F.	19	Soldier's child	13	Drowsiness, headache, vomiting, incontinence	—
	20	Engineer	16 1/2	Headache; became rapidly unconscious.	142 B.W.
	21	Civilian	43	Headache, vomiting, diarrhoea.	40 B.W.
M.	22	Soldier's child	6	Headache, vomiting, pain in back, delirium.	47 B.W.
	23	Civilian	30	Headache, vomiting, pain in body.	53 B.W.

<u>Points of interest about case.</u>		<u>Result.</u>
Paresis lower limbs which has passed off. Incontinence of urine & faeces. Strabismus. Slight ptosis. Slight mental confusion. ^{wasting} Becoming chronic. P. better but improvement slow. Slight impairment of memory. P. completely deaf. Legs stiff. Serum rashes.		Cured 1
		Cured 3
		Improving 4
		Improving 5
		Cured 6
Relapse 18 th day. P. improving.		Improving 7
Incontinence of urine & faeces as first.		Cured 8
Deafness which has now disappeared.		Cured 9
Temporary loss of power of accommod ⁿ . Later marked head retraction.		Very doubtful 10
Herpes on upper lip. Purpuric spots.		Improving 11
Incontinence of urine & faeces. Twitching. Ptosis		Doubtful 12
Herpes developed. C.S. fluid clear. Possible amblyop ^a case		Improving 13
Incontinence of urine & faeces for a few days. Temporary deafness. Serum rash. Trinit ^a pain.		Cured 14
Herpes, upper lip.		Further treatment 15
Retention of urine & incontinence of faeces. P.M.		Death 16
Ptosis left eye.		Death 17
Sudden death after lumbar puncture. P.M.		Death 18
		Death 19
Retention of urine & faeces. Ptosis left eye.		Death 20
nervous movements. Facial paralysis. Ptosis. Paresis right arm P.M.		Death 21
Incontinence of urine & faeces. Ptosis.		Death 22
Diagnosis doubtful.		Death 23

The present epidemic is mainly confined to soldiers. 13 of our 23 patients were in the army, & 5 were children of soldiers. On this account

The age incidence is different from that of in other general epidemics, in which more than 50% of the cases occur among children less than 10 years old. The age incidence of our cases ~~was~~ is as follows —

Below 10	4
10 - 15	1
15 - 20	4
20 - 25	9
25 - 30	2
30 - 45	3

Of the 23 cases, 15 are alive & 8 have died.

Of the 15 alive, 6 have been cured;

5 are improving;

1 requires further treat.

ment before any opinion can be formed;

2 are ^{in a} doubtful condition;

1 appears to be passing into the chronic stage.

In only one case has a relapse occurred in the 3rd week. (Case 7)

One case has become completely deaf (Case 5); two others were

temporarily so. Their hearing is almost normal again. (Cases 9 + 14)

In 9 of the cases, the symptoms at first suggested influenza. In 2 (10 + 19) drowsiness was the first marked symptom; in 1 the attack commenced with convulsions, headache, vomiting etc. ^(Case 12) Purpuric spots were only found in 3 cases. (Cases 10, 11 + 16)

Treatment employed in above cases.

Delirious patients ~~have been~~ ^{are} given Veronal $\text{gr } \frac{1}{2}$ followed by another 5 grains if necessary in half an hour.

All patients are hot sponged t.i.d. while they are acutely ill. This has a very soothing effect and relieves their symptoms.

Patients are invariably constipated & require aperients.

~~Their food should be as nourishing as possible.~~
Nourishing food is given.

Patients are lumbar punctured to relieve symptoms e.g. headache, rapid breathing.

Serum Treatment.

Anti-meningococcal serum is injected into the spinal canal after the withdrawal of a larger amount of C.S. fluid. Satisfactory results have been obtained with Burrows & Welcomes' serum; Flexner's serum & Parker Davis's serum have also been used occasionally.

As a rule injections are given daily for 3 or 4 days. Whether further injections are given depends on the patient's condition. My experience is that large doses - say 40-50 c.c. - should be given at first if a sufficient amount of ^{C.S.} fluid ^{can be} drawn off.

Patients are given $\frac{1}{4}$ gr. morphine at least $\frac{1}{2}$ an hour before an injection of serum, & a glass of whiskey just before the operation, or a general anesthetic is administered.

In a few of our cases serum rashes have appeared - urticarial, morbilliform or scarlatiniform. e.g. Case 9 & Case 14. In Case 14 the

rash was followed by joint pains.

Patients who are making satisfactory progress are allowed up in about three weeks after admission.