General Paralysis of the Insane

A clinical study.

Thesis

for

The degree of M.D. 1913

This thesis is a clinical study of General Paralysis with especial reference to its early diagnosis and to the reactions of the blood and cerebrospinal fluid. The subject of aqueous tension has been studied over a very considerable period and during my tenure of office as House Physician in Bethlem Royal Hospital, it has been applied to mental cases.

Thomas Robertson Noble

Bethlem Royal Hospital

London S.E.
Introductory

The early and accurate diagnosis of General Paralysis is often difficult and more important than the diagnosis of most forms of insanity. It progresses rapidly compared with other psychoses and it is extremely important that it should be recognised in its earliest stages. Some recent pathological researches have given us a clearer picture and a more accurate knowledge of the course and nature of the disease than almost any other psychosis, so that we can foretell what events are likely to happen and to take measures to guard against them. On the other hand the prognosis is more fatal and the lethal termination more rapidly reached than in any other form of insanity, so that it is important to recognise the condition as soon as possible and to get the patient's affairs arranged on the basis of that knowledge.

The proportion of General Paralysis on the male side of this hospital varies from 10 - 20%. A typical case presents a rather definite clinical picture yet in early and non-typical cases, the difficulties in diagnosis are exceedingly great and very easily confused with other psychoses.
So much so is this the case, that it is found in hospital practice here, that the majority of patients are admitted either with an erroneous diagnosis or else comparatively late in the course of the disease.

The mental symptoms are not enough for accurate diagnosis for they may simulate any other form of mental disorder, they should be supplemented by careful physical examination as well as the examination of the blood and cerebrospinal fluid. The additions to our knowledge that have in late years accrued from the study of the blood and cerebrospinal fluid have been welcome and valuable aids especially in obscure and doubtful cases. Since this disease may simulate any form of mental disorder it is always well to exclude it before making up one's mind as to the diagnosis, especially if the patient is between the ages of 30 and 50.
Sociology

General Paralysis strikes down its victims in the prime of life, when as a rule they are usually engaged in the pursuit of their profession or business. 30-50 is the common age, but a few cases occur before 30 and a small number after 50. The male is much oftener affected than the female. The proportion being about 5 to 1.

General Paralysis is rare in uncivilized countries, although syphilis is quite common. It is common among the civilized and in large towns and manufacturing centres. It is generally stated that the disease does not occur in the highlands of Scotland or Ireland, outside the larger towns or in the more rural or more remote districts of Wales and South of England. It reaches its maximum in the busy manufacturing towns of the Midlands and in the larger cities of the United Kingdom.

It is generally recognised that syphilis is the essential cause, but other factors play their part, such as alcoholism, sexual excess, trauma, previous simple psychosis, heredity, prolonged mental and physical stress. The occurrence of
juvenile and adolescent General Paralysis do not however lend support to the view that these accessory factors play an important part or are essential.

Syphilis: A history of syphilis is very difficult to get as a rule, owing to the time that has elapsed and the mental embitterment and loss of memory caused by the disease. The statistics vary very widely on this point 14 to 94%. Syphilis may persist in a latent form for many years and these latent forms appear to be specially liable to General Paralysis.

It is now generally held that no one can become a General Paralytic who has never previously suffered from syphilis. Syphilis is absolutely necessary for the production but not all syphilis do not become General Paralytics only about 3%. The syphilis has been caught in early manhood and General Paralysis develops 10-20 years afterwards. Treated cases appear to be as prone to suffer as untreated cases.

The relationship of syphilis to General Paralysis is shown by the following facts:

1. A large number of General Paralytics have had
SYPHILIS

2. The geographical distribution corresponds to syphilis very closely.

3. Men who are more frequently exposed to syphilitic infection than women are more frequently affected.

4. Women who suffer from General Paralysis are usually prostitutes.

5. In juvenile General Paralysis, the same number of males are affected as females, because hereditary syphilis is as common among males as females.

It is interesting to note that there has been only one case of General Paralysis reported as having a hereditary taint, upon him at any time during his General Paralysis, but Professor Bianchi has seen cases in which General Paralysis has preceded injection by syphilis.

Krafft-Ebing - International Medicine Congress.
Moscow 1897, communicated by him on behalf of an anonymous person. General Paralysis was associated with syphilis. Thus, and after keeping them under observation for 120 days, he was able to determine that syphi-
Signs of primary or secondary syphilis appeared in any of the cases, and that the declaration of these persons was incorrect, but he forgot to take into account that syphilis is very frequent.

Alcoholic excess: This was formerly looked upon as being as potent as syphilis in the production of General Paralyses, now it takes a second place, there is no doubt that the abuse of alcoholic liquor is a powerful factor in the production of General Paralyses.

Heredity: It is clearly evident that the great majority of General Paralyses have been intelligent persons, many of them holding high positions in life, mentally well balanced and without any neurotropic tendency. They are furthest removed from the degenerate. It is generally affirmed that this malady is the least hereditary of psychopathics and that it develops in individuals under the influence of causes that act independently of hereditary predisposition, but by examining the literature of the subject, there is every reason to believe that it is much more frequent than is generally supposed.
Previous Simple Paralytic: These act by preparing
the soil for the development of progressive
paralysis. These are patients who years before
have suffered from an attack of mania or
melancholia and after an interval of 5-6-8
years, the second attack takes the form
of General Paralysis. It would be impossible
to predict that the first attack represents
a prelude to the succeeding morbid condition.
Again, it may develop in the brain of other
incurred mental diseases. These previous
attacks of insanity of whatever form, dastard
the nutritive processes of the nerve cells and
degenerate after a shorter or longer time.

Infectious and Trauma: These two also play
a part in the production of the disease.

Jord Robertson, Jeffery and McRae have
discovered a diphtheroid bacillus (B. paralytica)
which they have found in the bronchi,
internal bones, blood, cerebrospinal fluid
and urine of General Paralytics, and that
the phagocytic action of the polymorphonuclear
leucocytes against that bacillus is increased
in General Paralysis, indicating a partially
acquired immunity. They have produced
Symptoms resembling General Paralysis in goats and mice by inoculation with the bacillus of W. McIndoe has also got a diphteria-cord in the blood and cerebrospinal fluid in 33% of General Paralytics, these organisms were not especially in relation to the seizures. She also found them in other types of insanity delicious mania, acute Hallucinatory diseases etc.

Dr. Phillips has discovered a minute diphtecoccus (not a meningococcus or a pneumococcus) in the cerebrospinal fluid of General Paralytics, but only in those suffering from convulsions. He has succeeded in cultivating the organism on Naga, inoculated rabbits with subcultures and produced symptoms corresponding to those of General Paralysis and thus caused death. He recovered the diphtecoccus from their cerebrospinal fluid and grew it again on Naga.

The diphteria of Robertson and Hervey and the diphtecoccus of Phillips are probably one and the same organism, the one being a degeneration form of the other.

These organisms are not regarded as the essential cause of General Paralysis but merely as
Secondary infections.

The diphtheria in all probability paves the way for the entrance of the diphtheroid or diplococcus by producing degenerative changes and thus creating a suitable soil, a soil with insufficient resisting power for the organism. It then acts in and finishes off the individual.

These diphtheroïdes appear to be very potent factors in the production of the sequelae, if not the essential cause, for they are found in the cerebrospinal fluid, especially in relation to the foci and since the introduction of the cerebrospinal treatment these foci have been very considerably reduced in number and size. Then we have been unable to find the diplococcus or diphtheroid in either the blood or cerebrospinal fluid.

Parasphilitic Hypothesis: Gowers's Hypothesis that while of syphilitic origin General Paralysis was not of syphilitic nature, but since the discovery of the spirochaete pallida by Neisseri in the brains of 14 cases of General Paralysis we now regard it as one of the manifestations of active syphilis.
Noguchi employed a modification of Lecydriti's stain and found the spheroplasts in large numbers in the grey matter of the convolutions.

Since this discovery by Noguchi, spheroplasts have been demonstrated by many other observers. We have examined two brains of General Paralytics very carefully for spheroplasts, in both cases we have stained the sections by Lecydriti's method and by a special silver impregnation method of our own. In the second case by both methods we have found spheroplasts in large numbers.

The positive Wassermann reaction although not a specific reaction is got in the great majority of cases, over 90% of the cases. It is a definite chemical reaction but nevertheless gives strength to the syphilitic hypothesis.

The presence of a positive Wassermann reaction in the wives and children of General Paralytics is interesting 60% in the case of the wives, 80% in the case of the children.

Syphilitic infection more than any other processes an enormous potential for producing disturbance in the function of the central nervous system. So apparent has been this etiological relation that not uncommonly it has been assumed
and contended that there are certain variations in the character of the syphilitic toxin and that there is an especial strain of syphilitic virus which possesses a peculiar affinity for nervous tissue, however, there is not sufficient data to make it convincing.

Incidence

Incubation Period 3 to 20 years

1. General paralysis is commonest where syphilis is commonest, and corresponds to the professions ages and sexes where it is commonest.

2. Men are more frequently attacked than women, (3:1), in the native classes (15:1), in the poorer classes (3:1).

3. In congenital General Paralysis, it develops in the wife as a rule after the husband, because the wife is infected from the husband, if in the wife first the woman infected the husband.

4. Much commoner in asylums, drawing their patients from cities and manufacturing centres, than in those drawing them from rural districts.
Prophylaxis

The best means for the prevention of General Syphilis is the thorough treatment of the syphilis. It is generally regarded that mercury alone does not cure syphilis, although this statement is debatable to some extent, up to the present time there is no medication or serum which has been discovered which is a specific in a single or multiple doses. It is not fair to the profession or the patient to give him one or two doses of salvarsan and then discharge him as cured. Antisyphilis, without the constant employment of the serum diagnosis is inconceivable, since the absence of clinical signs afford absolutely no information as to the true condition of the syphilis. The serum diagnosis in all such cases is quite indispensable. The positive reaction is a certain proof of the existence of an infection when obtained at the proper time, also the negative reaction correctly estimated provides very valuable and usually decisive data for diagnosis as well as treatment. The serum diagnosis has given us the very important, at the very disturbing knowledge, that our previous treatment of syphilis in the majority
of cases was totally inadequate.

In the past the majority of syphilitic lesions have remained uncured, in support of this we have the great number of post-syphilitic diseases affecting the heart, aorta and central nervous system and on the other hand the rarity of re-infection.

Gibbard and Harrison report on a series of observations to ascertain the most efficient and yet economical method of treating syphilis. Using salvarsan exclusively in some cases and in conjunction with mercury in others. In the result they found that the smallest percentage of relapses, both clinically and to the Wassermann test, followed the administration of two doses of salvarsan and 9 mercurial injections. This treatment giving 51% clinical and 15.4% Wassermann relapses or a total of 20.5% within one year.

Mercury alone 33% clinical as compared with 51% clinical with Salvarsan + mercury and the average time in hospital for each man was just about half the duration.

Oguchi's stimulated by the von Pirquet reaction for tuberculosis described last year a cutaneous
reaction for syphilis which he calls the 
Huitz reaction. This reaction appears to be a
much more delicate test for the presence of
syphilitic infection than the Wassermann reaction.
The material for injection is prepared in an
almost identical way to the tuberculin used
for the Von Pirquet reaction i.e. a culture of
spirochetes containing the pallida of different
ages as well as their metabolic products
is taken, emulsified by water, ground up and
killed by heat.

The injection is carried out by injecting with
a fine hypodermic needle 0.07 cc between the
superficial and deep layers of the arm, using
a control on the other arm.

A positive reaction shows itself in various
ways either as a papule, or a pustule or
what he calls the Torpid form.

**Papular Form**: Large raised reddish papule
in 24-48 hours slowly increasing during
the following 4 or 5 days after which it
begins to resolve. This reaction is usually
not in secondary and congenital cases.

**Pustular Form**: Begins as above but instead
of subsiding at the 4th or 5th day it passes
on to a freckle, then it disappears. This type of reaction is got in tertiary or budding hereditary syphilis and secondary syphilis treated with salvarsan.

Feverish form: It fades away and comes up again in about 10 days and goes on to a particular form got in syphilis of the entire nervous system, primary, secondary, and congenital syphilis.

Negative reaction: After 72 hours there is a small erythematous area around the point of injection which gradually necedes in 2-3 days leaving no induration.

Results of the Cutaneous Reaction:

Primary and secondary syphilis: Those who have had insufficient treatment or none at all gave no reaction except in a few cases when positive it was of the papular type.

Secondary cases: Treated with salvarsan and mercury and after several months without treatment gave striking and unmistakable reactions.

Tertiary and late hereditary syphilis: Skin reacted intensely and hence a valuable diagnostic aid as it is in this stage that syphilis
manifests itself in its most obscure forms. In tertiary forms the Wassermann is often absent after anti-aphthelitic treatment and thus it is important to find that the skin reaction is more constant than the Wassermann reaction in tertiary syphilis.

**S y p h i l i s of the Central Nervous System:** The luetic reaction is less constant than the Wassermann reaction as long as treatment remains ineffective, but the luetic reaction appears in every case which has been energetically treated. In well treated cases the Wassermann disappears.

**Parasyphtilistic Lesions:** In a series of 72 Genae Paralytics 115 reacted. This is unsatisfactory and calls for further study with more active preparations.

**Conclusions:** Luetin is a specific for syphilis and occurs most constantly and most intensely during the period of tertiary syphilis. In primary and secondary syphilis it is usually absent or very mild, while most intense after energetic treatment. In parasyphtilis the Wassermann is more satisfactory than the luetic reaction.
With this local reaction there is little or no constitutional reaction and repeated inoculations reduce the incubation period of the reaction.

Effect of Treatment on the Dextro Reaction

This reaction is not affected by the intermittent mercurial treatment which is so often carried out. Salvarsan + Mercury appear to have the greatest effect not only in inducing this reaction but causing it to disappear when once it has developed. The explanation doubtless lies in the great sporochalial power of salvarsan, by virtue of which it destroys a large number of sporochalies, thus inducing the allergic condition in the earlier stages of syphilis and then if successful annihilating all pallidia, thus removing the source of this condition. The latter is a cure in other words. Mercury does cure a number of cases. Still early to say a cure by salvarsan, yet I am inclined to believe that certain cases are cured. The absence of clinical and serological signs for over one year is certainly encouraging aspect, but considering the possibility of these relapses being about in latent cases one has a right to hesitate in pronouncing these cases
as cured. It is here that the luetin reaction is valuable in settling the question, not of value alone but with other means it is of great value.

A series of cases with salvarsan plus mercury or potassium iodide occasionally afterwards gave a positive luetin reaction. These indicate that they were mostly in the latent stages of the disease and could be detected by a positive luetin reaction. I have treated a series of cases more rigorously than the above with 2, 3 or 4 injections of salvarsan all gave a negative Wassermann and the great majority gave a negative luetin reaction.

Yet it remains for the future to decide whether these with a negative Wassermann and a negative luetin reaction are really cured or not.

At present the mode of application of this reaction is not perfect, later it is hoped there will be a more active union for a simpler cutaneous procedure.

In future our treatment must not rest content with clinical absence of symptoms it must achieve a lasting negative
wassermann taken at frequent intervals and
if possible a negative kluvin reaction.
Late cases which show a positive wassermann
reaction with or without cutaneous manifestations
require an especially rigorous and persistent
form of treatment, for experience has
taught us that the transformation from
a positive to a negative reaction is much
harder to achieve than in early cases.
Sero-Cytopathology.

Within recent years the methods of examination of the blood and cerebrospinal fluid in cases of General Paralysis have advanced very markedly and the results got by examination of these fluids give us very great help in the diagnosis of early and atypical cases.

The examinations made now are:

1. Wassermann Reaction on blood and cerebrospinal fluid
2. Neuhoff's and Ross Jones globulin tests on cerebrospinal fluid
3. Cellular content of cerebrospinal fluid

Wassermann Reaction.

The test for the detection of syphilis diseases by Wassermann depends on the phenomenon known as the fixation of complement which had been previously worked out by Bordet and Gengou. Briefly stated, it is supposed that the complement which is a constituent of all sera is fixed by a superimposed immune body (antitoxin) in the blood of the syphilitic after this antitoxin is combined with syphilitic antigen. We prove the fixation of complement by adding to the mixture of syphilitic antigen, antibody and complement and haemolysin.
antibody and erythrocytes. If complement were free, it would immediately combine with the haemolytic antibody and produce haemolysis of the erythrocytes. Thus we have in the blood serum or cerebrospinal fluid of the individual with syphilis either in an active or latent form a substance which inhibits haemolysis by fixing the complement. This phenomenon of complement fixation is a type of reaction distinct in itself and differing widely from all other known examples of complement fixation. The principal differences between the two types of phenomena arise from the non-specific nature of the substances that functionate as antiseptics in the Wassermann reaction. We have seen that the complement is absorbed or fixed only when brought in contact with combinations of specific antigens and antibodies. In the general it may be said that the specificity of these antigens and antibodies can be compared in a way to the relation which exists between locks and keys and can be stated that they do not interact with one another unless in exact correspondence. On the other hand the phenomenon of the Wassermann
reaction is produced by what appears to be a specific antibody and certain non-specific antigenic substances. Therefore in this case the law of specificity does not operate in the same strict sense as in other known examples of the Bordet-Gengou phenomenon.

It has been shown that several phosphorus and non-phosphorus lipoids and a few salts can act as syphilitic antigens and that there is no necessary relation between them and a syphilitic infection. When these substances are brought into combination with the blood serum or centrifugal fluid of syphilitic patients, they alter the fluids in such a way as to render them able to fix complement, which is introduced into the reaction. It is this peculiarity of the serum of syphilis patients which the serum diagnosis is based. This interesting property of the serum is due to the presence of syphilitic antibodies, the nature of which we are ignorant. They are however reaction products of syphilitis and appear constantly in the serum of infective syphillis at certain stages of the disease.

The frequency of the Wassermann reaction in the
Seme of General Paralyses: Statements vary considerably from 65% to a minimum to 100% as a maximum. The following are a few percentages from recent literature:

<table>
<thead>
<tr>
<th>Source</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>almost 100%</td>
</tr>
<tr>
<td>Smith &amp; Candler</td>
<td>86.6%</td>
</tr>
<tr>
<td>Rosanoff &amp; Weisner</td>
<td>90%</td>
</tr>
<tr>
<td>Neurhead</td>
<td>76.6%</td>
</tr>
<tr>
<td>Aguesi</td>
<td>65%</td>
</tr>
</tbody>
</table>

The same writers in recording cases show that in their later work, their results give a much higher percentage of positives. How far this is due to improved technique, it is not possible to say, it may be that the use of antigens has not been carried out under the same conditions, for an old antigen will give a higher percentage of positives than a freshly prepared one.

Nasal Secret: The Wassermann reaction in the cerebrospinal fluid: Statements again vary: 52% - 90%.

<table>
<thead>
<tr>
<th>Source</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith &amp; Cander &amp; Moten</td>
<td>90%</td>
</tr>
<tr>
<td>Smith, Cander &amp; Jones</td>
<td>85% - 90%</td>
</tr>
<tr>
<td>Aguesi &amp; Mone</td>
<td>73%</td>
</tr>
<tr>
<td>Rosanoff &amp; Weisner</td>
<td>87.5%</td>
</tr>
</tbody>
</table>

The results on the whole show a smaller
percentage of positive results in the cerebrospinal fluid.

Relative frequency of a positive result in the serum and cerebrospinal fluid. There is a notable discrepancy in the statements, some maintain that the reaction is more frequently obtained and is more definite and reliable in the cerebrospinal fluid, others state that it is more constant and more reliable in the serum.

Some have found the cerebrospinal fluid positive with a negative Wassermann others have not.

Varied alike in different phases. Here again statements vary. Some say that the serum reaction are present from the first and not modified by an amelioration in the patient's condition; others say that the reaction is subject to oscillations in any individual being negative or feeble at one time and positive later on, this usually coincided with the symptoms.

The following are the typical reactions and abstracts from the histories of twenty cases which have been admitted during my tenure.
A office as house physician. The cases nearly all presented a fairly definite clinical picture.

<table>
<thead>
<tr>
<th>Syphilitic Reactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. M. A.</td>
</tr>
<tr>
<td>2. M. B.</td>
</tr>
<tr>
<td>3. M. C.</td>
</tr>
<tr>
<td>4. M. D.</td>
</tr>
<tr>
<td>5. M. E.</td>
</tr>
<tr>
<td>6. M. F.</td>
</tr>
<tr>
<td>7. M. G.</td>
</tr>
<tr>
<td>8. M. H.</td>
</tr>
<tr>
<td>9. M. I.</td>
</tr>
<tr>
<td>10. M. J.</td>
</tr>
<tr>
<td>11. M. K.</td>
</tr>
<tr>
<td>12. M. L.</td>
</tr>
<tr>
<td>13. M. M.</td>
</tr>
<tr>
<td>14. M. N.</td>
</tr>
<tr>
<td>15. M. O.</td>
</tr>
<tr>
<td>16. M. P.</td>
</tr>
<tr>
<td>17. M. Q.</td>
</tr>
<tr>
<td>18. M. R.</td>
</tr>
<tr>
<td>19. M. S.</td>
</tr>
<tr>
<td>20. M. T.</td>
</tr>
</tbody>
</table>
1. Mr. H. proprietor of Dukelio Chambers. 37.

Incoherent in speech, noisy and impulsive, suffering from delusions of grandeur. States that he is the finest and strongest man on God's earth. Has innumerable motor cars and possessions. Makes extravagant purchases. Exaggerated ideas of his own capabilities. Was both markedly exaggerated and floppy. Pulse regular in outline, right smaller than the left, both reach fairly actively to light, consensual reaction absent. Sealed tenor of voice and lips. Minor of fingers, slightly blurred speech, Ulnar Anesthesia.

2. Mr S. 50. Actor.

Depressed, agitated and incapable of exercising sufficient self-control to follow his occupation or behave in a rational fashion. Controlled by a delusion that he is near his end. Insinuates of certain persons imagining they are going to do him harm. Disturbed by the fact that he contracted smallpox 16 years ago.

Pupil contracted, fails to respond to light, consensual reaction absent. Was both markedly exaggerated.

3. Mr. J. Shop assistant

Loss of memory, Loss of keenness in his work
Repeating sentences. Had transient paralysis
of speech, rambling and childish in conversation.
Has had one seizure. Faulted ideas regarding
his business capacity and gifts for surgery.

Not both about.

His controls equal and both inactive to
light. Sensory of face, tongue and fingers.
Speech slurred, writing shaky.

4. Mrs. J. Sanitary officer

Ideas of exaltation concerning his health
and his business affairs, making extravagant
purchases of motor cars and jewellery not
beyond his means. He bought a motor car
for the minister. Has a wildly extravagant
scheme whereby he will be worth $5,000,000.

His exaggerated unequal and fleshy

Pupils unequal and respond sluggishly to light.

Conscious reaction just appreciable
Speech slightly slurred

Tremor of face, lips and tongue.
5. H.W.L. (38) Engineer.

Full of delusions regarding wealth and position. He has a box full of broken bottles which he says are diamonds. Imagines he is imprisoned here as a spy being kept in some conspiracy between the Spanish and English Governments.

Not markedly exaggerated and flabby

Pale, emaciated, left arm idiotic, right responsible

He tremors of fingers or face.

Suffocating tremors of tongue, almost anaesthesia.

Speech silenced.


Excited, talking incoherently and incessantly about his grand mechanical schemes, such as putting silver bands into his calf muscles to make them lighter, incorporate springs under his toes to make him to take long strides.

Not both markedly exaggerated and flabby in character.

Pale, emaciated both face, slight, and slightly to light. Corneal reaction absent.

Speech silenced. Tremors of face and lips.

Ataxic tremor of tongue.
y. Mr. R. 80) Gentlemen of independent means.

The recent attacks give a history of syphilis. Restless, restless and emotional. Sustained a dislike to his wife, assaulted her and seeks a separation from her. Imagines his wife is intriguing and plotting against him. Sudden, writes voluminous letters containing silly jokes and feeble tunes.

Both absent.

While equal, react to light right rather sluggish. Consensual reaction absent.

Slight tremor of tongue, slight tremor of lips. Slight tremor of fingers, no ulnar anaesthesia. Speech, soft monotonous and slightly slurred.

8. Mr. P. 183) Teacher of Telegraphy.

Excites and beautiful, talks a great deal.

He knows himself about in bed and at frequent intervals takes his head and holds conversation by wireless telegraphy. He says that the old story of which there are in spirit, tells him that I was to kill him. Full of absurd projects, abusive, destructive and violent at times.

While left resists to light directly, but not consensually.

Right - aphasia, 153 exaggerates and unequal.

Right tremor of tongue and lips. Speech rapid but unclear, ulnar anaesthesia.
9. Mr. M. 46. Schoolmaster.

Confused restless, unable to concentrate
his attention, fear of impending harm
drug administration, threatened suicide,
recorded ideas of his own ability.

Pupils right, left irregular in outline,
right pupil normal, left response sluggishly,
consensual reaction absent in both.

Linear anesthesia, sense of life in fingers,
Sensory tremor of tongue, slight nystagmus of
speech.

10. Mr. A. 50. Actor.

Depressed and thinks he is highly infectious
from a contagious disease which he is
communicating to his son and others by letters.
Restless and goes about haranguing many people
with inquiries. Dares he to a letter from
the effects of syphilis, afraid he will kill himself.
Sleepless and makes noises all night.

Pupils unequal but responds fairly actively, to light
his absent, nystagmus detectable.

Tongue - slight fasciculation, no fasciculation.
Speech normal. No ulcer, anesthesia.
November 12, 1924
Barrester

Restless, excited, talkative and full of wild schemes as to how he is making large fortunes, exaggerated ideas of grandeur. So about to make $50,000 her annum. Purchased property which he had neither seen nor had the money to pay for.

Pupils equal, myopic, both respond sluggishly to light, consensual reaction absent.

K's exaggerated unequal and floppy.

Speech slurred, very emotional, no facial tremor, ulnar anesthesia.


Very depressed, years of impending harm.

Insomnia, delay in answering questions.

Refusal of food, very suspicious ideas of perdition and intestinal obstruction.

Had an attack of melancholia 5 years ago.

Yellow skin. K's unequal, left marked, exaggerated and floppy, right normal.

Pupils equal respond to sluggishly, especially the right. Consensual reaction present in both but very slight. Slight febrile tremor of tongue.

Tremor of lips, no tremor of fingers, slight Slurring of speech, no ulnar anesthesia, green negative dilatometer separated from his blood.
13. Mr. C. Stockbroker

Dissertation and modest talk. Imagines he is a very rich man and able to sign cheques to practically any extent. In reality he is quite poor, makes extravagant and senseless purchases. Imagines he can write poems and paint pictures as well as anyone.

Her breath fills equal left irregular, both redors very sluggish, right light.

Coronary reaction about. Stimulation of tongue, near anaesthesia, facial tremor, speech slurred.

14. Mr. C. Bookkeeper

History of accidents, very depression thinks he will never get well, has severe times tried to injure himself, insomnia, complaints of having no power left vague sensations in the abdomen.

Kt - Right exaggerated and flabby, left normal. Pulses equal and respond both directly and consensually. Sympathetic reflex gone. Tilibrium tremor of fingers and tongue. No facial tremor, speech slurred and stammering, near anaesthesia.
Vacant expression, want of realization of his condition, said "yes" to all questions one asks him, speech slurred, often unbroken, weeps his food on the table, wanders about aimlessly, often all night.
Writing illegible.
His exaggerated unequal and floppy.
Pupils unequal, left the larger and slight, irregular in outline. Both react very slightly and very sluggishly to light. Consensual reaction absent.
Tremor of tongue, tremor of lips, face and eyelids. Speech slurred and soft.
Tremor of fingers, ulnar anesthesia, mandible face.

Very droll and slow in answering questions, unable to sleep properly, owing to the belief that someone is after him going to kill him. Imagines there is poison in his food. Takes no interest in anything.
His unequal and floppy in character.
Pupils unequal, left slightly irregular, both react directly, but sluggishly, consensually very slight.
Reaction in both. Epochary tremor at sides and ataxic tremor along surface of tongue. Tremor of face and fingers, monotonous voice, slurred speech, no ulnar anesthesia.
17. 46 yrs. Dr. Inspecter (46)

One previous attack.
Admitted with wound in the throat, attempted suicide, said he was told by Satan to cut his throat. Sees visions occasionally, which terrify him. Depressed, emotional and confused. Refuses food, has tried to burn his penis. Hallucinations of hearing. Fancies he is one half God and one half Satan.

His recent is exaggerated and hostile.

Both equal and regular in outline, both respond to light but rather sluggishly, consensual reaction slight in both. Light subcutaneous tend to tongue and lips, sense of fingers, cleared cheeks, chilly anaesthesia.

R. 46. F. 47. Dairy keeper.

Depressed and acutely he is manic. He says he is watched by detectives and believes that he may be held responsible for causing the death of a child. Afraid of the work while he sells milk poison people. Insane and hears voices all night.

Reflexes normal and fail to respond to light either directly or consensually. Nk is markedly sagged and floppity. Tenderness here to tongue & face.

Speech slow and hesitating.
19. 16-7. 85. Incomical driver.

Fanciful and continually talking, intending to divorce his wife and marry two or three others. He has all kinds of grandiose ideas, wanting to buy all kinds of presents for the patients and attendants, making plans for future impossible work. Sleepless, unable to fix his attention on anything. History of syphilis.

Pupils equal but respond sluggishly, and slightly to light, unconscious reaction absent. Iris unequal, exaggerated and flabby. Slight hemis of tongue and face. Speech nothing special but male.

80. 16-73. Mr. Mining Engineer.

Excitable and says he is making large sums of money and he has offered me a large share in his mines in Mexico. He is going to buy his wife and all his friends motor cars. Sits amenable and faces at night. Going to retire to the country and buy an estate, he being quite poor.

Pupils left larger than the right, reaction slow and small in extent in both, consensual reaction absent. Iris unequal and exaggerated. Slight fibrillation hemis of tongue. No change in speech.
Comment on the statements from the recent literature based on our own results.

1. As to frequency of the results in the serum, our results 95% agree most closely with Novis.
2. As to frequency of reaction in the cerebrospinal fluid, our results 80%, fall about intermediate between those from the literature.
3. Relative frequency in the two fluids: our results agree with the writers who state that the reaction is more constant in the serum, and we have always found that a negative reaction in the serum is always associated with a similar one in the cerebrospinal fluid, disagreeing with Scholberg and Goodall who state that in one out of eight, the cerebrospinal fluid was positive when the serum was negative.

Variability of the Reaction

As to whether the reaction is present from the first in General Paralysis. This is a point which experience derived from an institution to which patients are brought in the early stages of the disease can elucidate, all our cases were early cases and the last Wassermann done on admission.

In several of our cases, the serum has been
examined repeatedly for controls, etc. and we have noticed that it gradually became less marked toxemia as the disease advanced. Our experience also supports the statements that the intensity of the reaction and the severity of the symptoms are not parallel.

Influence of Drugs: In three of our cases we have given paraseum and the Wassermann being taken both before and after in both blood and cerebrospinal fluid. The reaction in the serum remained as positive as before and that in the cerebrospinal fluid in two out of the three cases became much more markedly positive.

Cerebrospinal Fluid.

During recent years special attention has been paid to the examination of the cerebrospinal fluid. The normal cerebrospinal fluid is a clear colorless fluid of specific gravity 1006-1008. It contains serum globulins and albumin, but no cellulose, but also contains a sugar reducing substance which has been proved to be glucose. The normal fluid is toxic to cellular contents, an occasional lymphocyte but never a polymorph. The fluid
is alkaline in reaction and contains chlorides, phosphates, carbonates and uric in small quantities. The investigations of this fluid as far as General Paralysis is concerned is chiefly with regard to its protein content, its surface tension and its cytology.

**After Effects.**

The method of performing lumbar puncture need not be entered into here, but it is interesting to note the after effects concerning which there is a great diversity of opinion.

The one class of case which suffers little or no after effects is the General Paralytic, due doubtless to the excess of cerebrospinal fluid which he possesses from the point of the needle he scarcely feels and it is a very rare thing indeed for him to complain. Of the number of lumbar punctures we have performed amounting now to a very considerable number only one has suffered and that one only slightly. He was not a General Paralytic, his symptoms were sweating, nausea and a temperature of 102.7. The usual amount of fluid withdrawn was 5-10 cc.
Protein Content

Two methods are usually employed for the estimation of it:

1. The Butyric acid test of Noguchi
2. The ammonium sulphate test of Hoss & Jones

Noguchi while studying the relation of proteins, lipoids and salts to the Wassermann reaction observed that the amphilic antibody is precipitated with the globulin of the blood serum and the cerebrospinal fluid. He incidentally discovered that the globulin fraction of these fluids is increased in syphilis and that there is a parallel between the titre of the amphilic antibody and the amount of globulin with certain exceptions. There is no necessary connection between them although likely to be associated.

The increase of globulin is recognizable earlier than the presence of the antibody and in the early stages of primary syphilis when the presence of an antibody is not detectable, the globulin content is already increased. The same is in latent syphilis where the antibody is more or less inconstant. We often find the globulin increased. These facts apply both to the blood serum and cerebrospinal fluid.
in parasyphilis affectione when the central nervous system is primarily involved, the detection of the antibody is as a rule easy. The increase of protein in these cases is greater than the appearance of the antibody and Negev's experience leads him to believe that the abnormally high protein content is a more constant occurrence in the cerebrospinal fluid in syphilitic and parasyphilitic cases than in the presence of a detectable antibody.

This method of Negev for detecting an increase of globulin content is applicable regardless to the cerebrospinal fluid and is so simple as to be within the reach of the simplest laboratory.

Method for Cerebrospinal Fluid: Two parts of cerebrospinal fluid are mixed with four parts of a 10% solution of hydrochloric acid in physiological salt solution, heat over the flame and boil for a brief period, one part of normal solution of sodium hydroxide is then added quickly to the heated mixture and the whole boiled over more for a few seconds.

The cerebrospinal fluid must be free from blood. The presence of an increased content
of protein in the cerebrospinal fluid is indicated by the appearance of a granular or floccular precipitate which gradually settles to the bottom of the tube beneath a clear supernatant fluid. The greater the protein, the more quickly the reaction. If the granular precipitate appears in a few seconds, there is a considerable increase in protein, while an hour may be required for a weaker amount of protein. This time period should not be greater than two hours.

Normal cerebrospinal fluid grieves with the butyric acid test a slight opalescence but the granular precipitate does not occur at all or only after many hours.

Present in syphilis and para-syphilis affects, and in all cases of inflammation of the meninges, such as pneumococcal and influenza meningitis, and poliomyelitis etc.

2. Rose-Jones Reaction:

1 cc of cerebrospinal fluid is run on the surface of 2 cc of a saturated solution of neutral ammonium sulphate. A protein reaction is indicated by the appearance of a ring at the junction of the two fluids clear cut and thin.
Cytology

Two methods for enumerating the cells are commonly used.

1. The wilde method which consists in centrifuging 5 cc of cerebrospinal fluid, decanting the supernatant fluid, and inverting the tube for a few seconds; the bottom of the tube is then scraped with a capillary pipette. The drop obtained is put on to a slide, fixed with alcohol and ether, stained, and the average of ten consecutive fields taken. This only gives the relative quantity.

2. The Reed-Zeiss method where the ordinary haemocytometer is used and counting fluid, estimating the number of cells per cc. In this there is a very big error, and the fewer the cells, the bigger the error.

The method used in this series has been the ordinary haemocytometer, diluted with Driscoll's blood fluid, which stains the lymphocytes purple. The microscope is set so that the field equals 20 mm in radius. This is effected by using the objective and 603 aperture and pulling the tube out until the squares each 50 mm of the counting stage appear in the diameter of the field. Then by moving the
slide about 100 squares can be counted and thus the error is reduced to a minimum.

No. of cells \[ \times \frac{100}{9} \times \frac{1}{20} \times \text{dilution} = \text{no. of cells per mm}^2 \]

**What constitutes a lymphosarcoma.**

The lymphosarcoma is of the monocellular type, occasionally polymorphous, plasma, endothelial and mast cells.

Normally 5-7 cells per mm$^3$ by haemocytometer in the field after thoroughly centrifuging 5000 with 450 magnifications. In German Flanders it rarely falls below 100 in the field.

Lymphosarcoma in non-female cases leads to a diagnosis of paracryphilus. Lymphosarcoma is more marked in the earlier stages and more or less paralleled with the globulin increase. Lymphosarcoma occurs all the way through the disease.

The following are figures from the recent literature as to the presence of the Naguchi and Rappo Jones reaction and the lymphosarcoma.

1. Mc Campbell - Raveland
   - Naguchi 95.4\%
   - Rappo Jones 94\%
   - Cytology 95.6\%

2. Woe and Nakachi
   - Naguchi 94.7\%
   - Cytology 93\%

3. Rosanoff and Wineman
   - Naguchi 97.7\%
   - Cytology 95.5\%
Our results

Noguchi 95%  Ross Jones 95%  Cytology 95%

The Noguchi and Ross Jones reactions run practically parallel with the cytology in General Paralysis. These tests taken together give us a reliable indication, but they do not run parallel with the Wassermann reaction or the cerebrospinal fluid test, and give a much higher percentage of positive results. We have noticed in carrying out the Noguchi and Ross Jones tests that sometimes the one is markedly positive and the other only faintly positive, and vice versa.

The interpretation of the Wassermann reaction itself is a matter of great deal of dispute. It can, up briefly, a positive reaction in the blood may be interpreted in several ways, but a negative reaction should be taken as evidence against a diagnosis of General Paralysis, as the serum nearly always gives a positive result in this disease. A positive reaction in the cerebrospinal fluid can be interpreted as strongly indicative of General Paralysis. A positive reaction in the cerebrospinal fluid in addition to a globulin increase almost never occurs unless General Paralysis is present, the only exception in syphilitic aphielia.
Surface Tension of Blood and Cerebrospinal Fluid

The subject of surface tension is one of great interest, both from a scientific point of view and from the point of view of treatment.

Of the numerous methods of surface tension described in text books, the only one applicable to serum work is the capillary method. Here the surface tension upholds a column of the liquid in a capillary tube and the value of the surface tension is deduced from the weight of the column supported.

\[ T = \frac{h \cdot g \cdot p \cdot \cos \theta}{2} \]

where \( h \) = the height of the column
\( r \) = the radius of the capillary at the level of the top of the column
\( g \) = acceleration due to gravity
\( p \) = specific gravity of the liquid
\( \theta \) = angle of contact between the liquid and the tube, \( \theta = 0^\circ \) and \( \cos \theta = 1 \) so that in experiments with water serum,

\( T = \frac{h \cdot g \cdot p}{2} \)

The liquid is placed in a small tube and the
Capillary dropped into it, and attached so as to keep it steady and yet allow air to pass freely.

This is best done by using a small cork, bored for the capillary and with a channel cut on one side. The tube is filled until the liquid has risen up the capillary, in order to ensure wet contact. The tube is placed vertically, the levels at the top and bottom of the capillary column are read by means of a cathetometer placed about 5 feet away and reading with cross lines and vernier to 0.1 centimetre.

The level is then marked and the tube cut at the level of the meniscus. A small piece is cut off and mounted vertically in vaseline on a slide. The internal diameter is measured by some form of micrometer.

In the experiments described below the equation \( \frac{1}{log x + \log y} \) was marked out with \( \frac{2}{2} \) as a constant, and instead of \( x \), the reading of the diameter in divisions of the eyepiece micrometer, appropriate correction being made, so that:

\[ \log T = \log b + \log a + \log b + \log x - \log z \]

The eye piece and stage micrometers were used with
Draw a line in and one such objective.

To graduations of the eye-piece = 3 divisions of scale used = 0.03 millimetres

= 0.03 centimetres

1/16 graduations of eye-piece = 0.0015 cm

\[
\log T = \log b + \log p + \log n + \log 0.0015 + \log g - \\
\log 2 = \log b + \log p + \log n + 0.687003
\]

\[
= \log b + \log p + \log n + 0.687003
\]

\[
T = \text{Surface tension}
\]

\[
L = \text{Corrected height of capillary column}
\]

\[
b = \text{Specific gravity of liquid}
\]

\[
i = \text{internal diameter of capillary tube in eye-piece divisions}
\]

The specific gravity \((b)\) is measured by placing drops of the liquid on a mixture of chloroform and benzene, which is adjusted until the drops neither float nor sink. The specific gravity of the liquid is taken with a No. 1 Swaddie's hydrometer.

The lowest part of the meniscus in the capillary must be focused with the telescope. A correction of \(l\) the diameter of the capillary is added to the height of the column. The tube must be perfectly clean and the bore as uniform as
possible, when reading by artificial light placed behind the tube, a plate of glass
must intervene to prevent the tube being heated.

Reade's hydrometers are graduated from water,
denser than water, to estimate the specific gravity
of the mixture of chloroform and benzine which
has a low surface tension. It must be deducted
from the reading to correct the error.

The cathetometer reads correctly to 0.01 centimetre.

The eyepiece will measure accurately to 0.25 of
an eyepiece division.

Apart from considerations of necessity, the possible
error should be evenly balanced between the reading
of height and diameter.

For instance in one experiment \( h = 7.6 \) cm and \( n = 19 \)
eyepiece divisions. This gives a possible error of
1 in 700 for height and 1 in 72 for diameter. In
another experiment, however, where \( h = 2.07 \) cm and
\( n = 56 \) eyepiece divisions, the possible error in height
is 1 in 207 or 1 in diameter 1 in 224.

Surface tension in liquids of simple composition
liquids like water, sulphuric acid, olive oil,
solutions of salts do rapidly assume a position
of rest at a level which is maintained. But
Liquids of high viscosity do not behave in this manner. If blood seeps with a narrow capillary, the surface tension declines at first rapidly and then less quickly.

If we plot a curve showing the value of $h$ we get this form.

The height of the capillary tube at any instant depends on the following factors:

1. The surface tension which in the case of water and other stable liquids is constant during the experiment; but which may vary during the experiment as the result of chemical changes in the liquid.

2. The force of gravity is greater as the specific gravity of the liquid is higher. Thus if $h$ be the height of the column when at rest and $h'$ the height before this, then the weight moving the meniscus downwards is

$$(h' - h) \pi r^2 \rho g$$

and as $h'$ approaches to $h$ value...
we have at rest the remainder \( \pi \text{ atm} \) of which is balanced by the surface tension \( \pi \text{ atm} \).

2. The viscosity which may alter during the experiment.

4. The temperature.

5. The diameter of the capillary tube which bears not only on the ultimate reading \( -\frac{\log \frac{1}{2}}{2} \)
but upon the rate of fall:

(a) The relation of the volume of liquid passing through a tube to the viscosity is

\[ \text{Vol.} = \frac{\pi \text{ atm} \cdot \log \frac{1}{2}}{2 \pi} \]

(b) Molecules which lower the surface tension of a liquid tend to accumulate at the surface.

6. The third medium in the tube is generally air.

7. The nature of the glass.

8. The local variations in the value of \( \pi \).

9. The time.

of these factors \( 6, 7, 8 \) are negligible.

A. Is the decline of the mercury at all dependent on chemical changes occurring during the experiment?

Seas were taken and a curve plotted out.
Showing the gradual decline. The tubes were then closed and the serum allowed to run up again. The former movements were repeated. There is no appreciable effect due to autolysis in the serum during the experiment.

A. Serum, blebbled, clotted, centrifuged at once and estimation begun at once

B. Serum, blebbled, clotted, kept for 2 hours, then centrifuged & estimated.

Estimates represent the height of the capillary columns, abscissae represent the hours.

The blue lines represent the first readings; after 20 hours the tubes were sealed. The red lines represent the second reading.

B. The specific gravity of the serum varies but little and in routine examination, the factor is taken as 1.020, but in exact determinations it is taken and used in the calculation.

C. The viscosity

It appeared at first that the viscosity of
The curve was responsible for the slow decline and that the curve might be a part of a slow oscillation. This is readily shown to be untrue.

This is a curve of glycerin, a liquid with high viscosity in which the fall is shown to be over in about 2 hours whereas the fall in serum period of days.
D. The temperature

The tension of pure water at 18° C has been estimated at about 70.6 dynes per cm, as the temperature rises the tension falls, the relation for water being

\[ T = 70.2 \left(1 - 0.00187t\right) \]

where \( t \) is the temperature on the centigrade scale. In a series of experiments on ice it was found that

\[ T_2 = T_1 \left(\frac{1 - n^2t_2}{1 - n^2t_1}\right) \]

where \( n \) had a value of 1.009, so that, using the room temperature, the factor is negligible.

The noteworthy feature is that in the menisci, the meniscus did not appear to decline.

E. The diameter of the tube

As the radius of the tube increases, the relation in which the surface tension is based breaks down. Using tubes of different bore with mercury, it was found that the narrower tubes gave the higher reading, and that the curves showing the moment of the meniscus in tubes of different bore are almost parallel, but that the actual face in the wider tubes is not appreciable after two or three hours, so that two readings taken an hour apart, after two or three hours have
depressed may give a constant result. Yet if
the tubes be observed some hours afterwards a
further fall may be noticed - see previous graph.
Since the same serum gave different results
according to the bore of the tube and since
the decline lasted for days, the problem was
to find some means of correlating the results
so as to permit comparison between different
sera. A long time was spent in trying to
find some equation which would enable us
to transfer readings with one tube to readings
with another tube. Further some time must be
spent upon at which to take all the readings.
Now the reading which gives a result most
nearly that of the living serum must be taken
at once when the tube is set up, but after
three hours the rate of fall is so slow
that at intervals of 1/2 hour there appears
to be no change, therefore using tubes of
medium bore, the readings after three hours
give us comparable estimates of the amount
of surface tension reducing substances in
the serum.
The clue was ultimately got to the equation
connecting the reading at different channels.
The Intermolecular Cohesion of Blood Serum

It is now possible to reduce readings of surface tension of sera to one standard, so that direct comparison can be made.

The curve showing the decline of the meniscus in a capillary tube approximates to a simple harmonic curve. This fall is due to an accumulation of surface tension reducing bodies at the surface etc.

By taking a large number of readings of surface tension of normal sera, and by taking the means,
If these values, we can construct a curve showing the average value of surface tension for normal ascovc in raising tubes of any diameter. If we transfer the curve to logarithmic paper, the curve is a straight line, now as the angles made by this straight line with horizontal lines are all equal.

\[
\text{Angle} \theta = \text{constant}
\]

\[
\tan \theta = \text{constant}
\]

\[
\frac{\log T}{\log 2} = \frac{\log K}{\log \tau} = K
\]

By this relation, given a reading of surface tension and the diameter of the tube, we can tell what the reading would have been, had any other tube been used.

If a serum of abnormally high surface tension is examined using tubes of different bore and the results plotted on logarithmic paper, the resulting line will be parallel with the line of normal serum.

In this case the angles made by this line with the horizontal lines is the same as above and the same equation holds good.

The value of \( K \) is found to be \( \pi \).

The relation from which the value of surface
Tension is defined. It breaks down as the size of the capillary tube increases, but as shown before, the error in estimation is reduced to a minimum when tubes are used which have a diameter about 0.075 cm (50 x objective divisions). This diameter is taken as a standard and other readings are reduced to it.

The final results are strictly comparable.

The mean value of surface tension of normal sera using a tube 0.075 cm in diameter is 44.8 dynes per cm. It may be suggested that the results obtained after three hours do not give a true reading of the surface tension of the serum, as during these three hours surface tension reducing bodies have been accumulating at the surface. This is so, but the percentage at the end of these three hours is so small that we have a very fair indication of the amount of tension altering bodies in the serum.

The cathetometer must be adjusted so that the horizontal spider line must be truly horizontal so that all readings must be made at the intersection of the spider lines. The instrument is adjusted by the levelling screws until the standard is vertical. This may be done
by moving the telescope to a position at right angles to the adjustable feet and adjusting by the spirit level above the telescope.

The cathetometer is placed about five feet from the capillaries. The instrument is focussed until the image of the capillaries is in the same plane with the image of the objective lines. When they are in the same plane, there is no apparent movement of the meridians when the observers eye is moved up and down at the eyepiece. With any one tube the upper and lower meridians must be read with the telescope travelling the same way either upwards or downwards for instance.

The cross lines must be from A towards B, reading at B + C, or less accurately from E towards A, reading at C + B. It must not be used from D reading upwards to C and then downwards to B.

In no other way can the vagaries of the instrument be overcome and in no other way will be certain to give an accurate result.

Fresh blood is quite useless, for in the first place, the whole estimation is based on
Contact between the blood and the tube and secondly the blood undergoes changes as soon as it is dried, and ultimately clots in the capillary.

This method was soon abandoned and now using serum the tube is shaken four or five times slowly to wet the glass above the ultimate position of the meniscus when the tube is set up vertically.

For instance using distilled water:

Dry contact \( T = 30, 20 \)

Wet contact \( T = 25, 15, 10, 5, 6, 51 - \)

Using serum:

Wet Dry Contact \( T = 44, 41, 34, 42, 39, 33 \),

quite unreliable.

Hitherto no device of apparatus has been devised to show the action of intermolecular cohesion below the surface of a liquid.

It appears that the red cells show the effect of this force.

If we view a corpuscle from its axis so that the outline is circular, then as shown above, there is no tendency to deformation of this figure. But viewed from its edge there is a force, small indeed, but present, which tends to make the corpuscle assume a spherical
If we lower the osmotic tension of a sugar or salt solution containing red blood corpuscles we arrive at a point at which the cells viewed from their edge become shorter and thicker and yet ultimately crenate. Beyond this endosmosis occurs and the cells swell up.

For example:

1. Red blood cells were placed in forty volumes of 7.5% solution of saccharose in distilled water. There was thickening of the rim and marked umbilication of the corpuscles. Many resembled half-filled india-rubber balls. The diameters of the cells became less. Some showed thickening of the other part of the rim only. Then endosmosis began, the cells became irregular and bent and showed irregular, generally tripod figures when viewed on the flatter aspect. The cells then crenated.

2. 6% saccharose

The cells showed thickening and umbilication and the other changes as above.

3. 5% saccharose

The cells at once showed the ring form with thickening and umbilication.
3.75% Solution

The endomorphs caused the cells to become spherical. The broccoli shapes could be seen. The cells were then destroyed.

1. The tension of the saccharose solution was lower. Twenty volumes of 6% saccharose were added to 2% sodium glycocholate. This appeared to dissolve the substance to which the red cells owe their rigidity. The cells become small but spherical. In a few of the spheres a small pit could be seen.

2. Supposing a non-spherical cell to be surrounded by a fluid of abnormal high surface tension, then not only will the cell be subject to an actual pressure, tending to make it spherical, but the chemical changes between the cell and the surrounding fluid will be more difficult. Hence we should expect such a cell under harder conditions of life to show signs of degeneration or adaptation.

Solutions of saccharose are found by experiment to raise the surface tension and solutions of sodium glycocholate to lower it.

Effect of Varying the Surface Tension in Animals

Solutions of saccharose when injected into
queens pigs raise the surface tension. This tension is estimated when the
animals are killed and it is found to
vary from 44.5 to 50 dynes per cm. Post mortem
there is found emphysema of the lungs both
macroscopically and microscopically, changes
in the skin and a marked deposition of fat in the various organs.
When sodium hydroxide is injected to
lower the surface tension, the animals
nearly always die. The surface tension
varies from 31 to 35 dynes per cm. Post mortem
there is broncho-pneumonia and scattered
haemorrhages throughout their bodies.

**Effect of heating to 55°C for 30 minutes on normal and syphilis serum and cerebrospinal fluid**

<table>
<thead>
<tr>
<th>Time</th>
<th>h</th>
<th>T (°C)</th>
<th>W</th>
<th>T (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>2.17</td>
<td>64.4</td>
<td>2.31</td>
<td>45.3</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>2.50</td>
<td>46.3</td>
<td>2.15</td>
<td>41.6</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>2.53</td>
<td>44.4</td>
<td>2.10</td>
<td>41.2</td>
</tr>
<tr>
<td>3:30 pm</td>
<td>2.47</td>
<td>42.4</td>
<td>2.10</td>
<td>41.2</td>
</tr>
<tr>
<td>4:00 pm</td>
<td>2.45</td>
<td>42.0</td>
<td>2.10</td>
<td>41.2</td>
</tr>
<tr>
<td>4:30 pm</td>
<td>2.43</td>
<td>42.7</td>
<td>2.10</td>
<td>41.2</td>
</tr>
</tbody>
</table>

W = 44.5°F, p = 1025
w = 52, p = 7025
Normal Cerebrospinal Fluid. Heated 4 hour at 56°

<table>
<thead>
<tr>
<th></th>
<th>1st hour</th>
<th>2nd hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>l</td>
<td>2.00</td>
<td>1.59</td>
</tr>
<tr>
<td>n</td>
<td>61</td>
<td>65.5</td>
</tr>
</tbody>
</table>

Serum and Cerebrospinal Fluid of General Paralytic

Sera

<table>
<thead>
<tr>
<th></th>
<th>Plain</th>
<th>Heated</th>
<th></th>
<th>Plain</th>
<th>Heated</th>
</tr>
</thead>
<tbody>
<tr>
<td>l</td>
<td>1.63</td>
<td>2.74</td>
<td>l</td>
<td>2.18</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>60.5</td>
<td>44.4</td>
<td>n</td>
<td>84.5</td>
<td>57.5</td>
</tr>
<tr>
<td>T</td>
<td>37.2</td>
<td>45.4</td>
<td>T</td>
<td>39.1</td>
<td>44.8</td>
</tr>
</tbody>
</table>

T (H-R) Plain | Heated | T (H-R) Plain | Heated |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>l</td>
<td>2.44</td>
<td>1.45</td>
<td>l</td>
</tr>
<tr>
<td>n</td>
<td>65.2</td>
<td>46.5</td>
<td>n</td>
</tr>
<tr>
<td>T</td>
<td>47.2</td>
<td>36.4</td>
<td>T</td>
</tr>
</tbody>
</table>

Cerebrospinal Fluid

<table>
<thead>
<tr>
<th></th>
<th>Plain</th>
<th>Heated</th>
<th></th>
<th>Plain</th>
<th>Heated</th>
</tr>
</thead>
<tbody>
<tr>
<td>l</td>
<td>2.98</td>
<td>2.23</td>
<td>l</td>
<td>2.03</td>
<td>1.82</td>
</tr>
<tr>
<td>n</td>
<td>55.5</td>
<td>68.5</td>
<td>n</td>
<td>41.1</td>
<td>65.9</td>
</tr>
<tr>
<td>p</td>
<td>1.008</td>
<td>1.008</td>
<td>p</td>
<td>1.008</td>
<td>1.008</td>
</tr>
<tr>
<td>T</td>
<td>55.7</td>
<td>40.1</td>
<td>T</td>
<td>45.9</td>
<td>44.2</td>
</tr>
</tbody>
</table>

T (H-W) Plain | Heated | T (H-W) Plain | Heated |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>l</td>
<td>2.66</td>
<td>2.16</td>
<td>l</td>
</tr>
<tr>
<td>n</td>
<td>47.7</td>
<td>53.2</td>
<td>n</td>
</tr>
<tr>
<td>p</td>
<td>1.008</td>
<td>1.008</td>
<td>p</td>
</tr>
<tr>
<td>T</td>
<td>48.3</td>
<td>48.3</td>
<td>T</td>
</tr>
</tbody>
</table>
When these lesions are reduced to T so they show nothing very definite.

In estimating the surface tension of the serum in a large number of cases of different types of insanity, we found that in two different classes of cases the surface tension is definitely altered:

1. Stuporous and some melancholic cases, the surface tension is distinctly raised, often amounting to 48 dynes.

2. Maniacal cases, here the surface tension is distinctly low, often as low as 34 dynes.

The surface tension of the serum of General Paralysis does not show any very definite alteration from the normal; yet in some cases, when there is marked depression, the surface tension is distinctly raised and in some excited cases it is distinctly lowered, but a very striking alteration takes place during the fit.

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>2:01</th>
<th>3:02</th>
<th>4:02</th>
<th>5:02</th>
<th>6:02</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

During a generalized fit: 5 1.02 10.25 72 20.2 34

Two days after this fit: 4 1.41 10.75 61 34 36.5

Some days afterwards: 3 1.64 10.75 60 37.1 39.5

Patient much better.
Immediately after fit—3 162 1025 56 24.2 35.5
Three days after fit—3 169 28 30 9 39.4
Several days after—3 186 28 57 40 42

H. M. S. G.P.J June 1 2 p.m. T 7 9

Immediately after fit—3 hr. 2.77 1025 36.25 378 33.5
Three days after fit—3 169 62.5 38.1 38
Afterwards—3 179 28 39.9 42

In contrast to the above, I give below the

records from a case of epilepsy.

Miss S. age 18, been June 1. 4 p.m. T 7 9

to a whist drive and 5:30 1025 299 49

had an epileptic fit. 6.

Brought to her room and 6:30 7.

Sessen taken 10.30 a.m. 7.

7:30 2:28

8 2:27

8:30 2:27 111 9 445

She became manacled 2 14 52.5 324 35.5

During recovery

T = invasion estimated with a capillary

tube with a bore of 50 systolic divisions.
The following are the records of the surface tension of a few cerebro-paralytic subjects.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Surface Tension</th>
<th>Initial</th>
<th>Change</th>
<th>New Tension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mrs. S. (fracture)</td>
<td>1.42</td>
<td>10.25</td>
<td>62</td>
<td>16.9</td>
</tr>
<tr>
<td>Mr. B. (obstetric)</td>
<td>2.18</td>
<td>10.25</td>
<td>66</td>
<td>16.1</td>
</tr>
<tr>
<td>Mr. D. (depressed)</td>
<td>1.47</td>
<td>10.25</td>
<td>63</td>
<td>14.9</td>
</tr>
<tr>
<td>Mr. L.</td>
<td>2.10</td>
<td>10.25</td>
<td>57.6</td>
<td>10.8</td>
</tr>
<tr>
<td>Mr. N.</td>
<td>2.41</td>
<td>10.25</td>
<td>57</td>
<td>11.2</td>
</tr>
<tr>
<td>Mr. M.</td>
<td>2.32</td>
<td>10.25</td>
<td>57</td>
<td>11.2</td>
</tr>
<tr>
<td>Mr. R.</td>
<td>2.54</td>
<td>10.25</td>
<td>57</td>
<td>11.2</td>
</tr>
<tr>
<td>Mr. B.</td>
<td>2.21</td>
<td>10.25</td>
<td>57</td>
<td>11.2</td>
</tr>
<tr>
<td>Mr. W.</td>
<td>1.99</td>
<td>10.25</td>
<td>57</td>
<td>11.2</td>
</tr>
<tr>
<td>Mr. C.</td>
<td>1.96</td>
<td>10.25</td>
<td>57</td>
<td>11.2</td>
</tr>
</tbody>
</table>

Conclusions.

As we have seen above, the higher the surface tension, the less change there is between serum and cell, and consequently there is less tissue change. The lower the surface tension, the more interchange there is between serum and cell, and the greater the rate of tissue change.

In these cases with a high surface tension,
the body appears to be living at a lower rate than normal and in those with a low
surface tension at a much greater rate than normal.

The fits of General Paralysis appear to be of quite a different nature from those of
Epilepsy, in Epilepsy, the surface tension remains at the same level during the
fit and immediately afterwards as it was before whereas in General Paralysis during the
fit the surface tension is destinely lowered and reeco again slowly after the fit.
Mental Symptoms

The mental condition is one of progressive failure and follows the general law of dissolution. General Paralysis may first make itself evident by the failure of the mental faculties or by some disorder of the sensory or motor apparatus, but one generally finds on enquiring carefully into the history that friends have noticed some change in his mental condition for some time previous to consulting the physician.

The disease assumes a different character according to the individual organic constitution, the degree of culture and the individual tendencies, but there are always characteristic features which are common to all and which form a valuable aid to diagnosis. Here is mental decadence in all the manifestations of the patient, both within the small sphere of domestic life and within the larger circle of social relations. Altho at first he may be able to conduct his business, but may appear dreamy and preoccupied, loses interest in any conversation, lazy and indifferent to things around him, not because I lack
of intelligence, but from lack of attention and of sufficient rapidity of perception. It is unconscious
of this insolvency which affects his ideation and attention.
Resistance to fatigue is diminished he is incapable of sustained attention.
Another patient may develop mental irritability quite early and become quick and irritable, everything has to be done at once and as he wishes it, or thence on the slightest provocation he gets very irritable and turns out itsiveness against everyone.
His memory becomes faulty and uncertain, he may forget to keep business appointments and to rapidly loses his money, makes errors in accounts and makes impertinent remarks to his clients. He may set out on an objectless journey, on being questioned about it, he makes lame excuses or offers a peculiar remark. At first there is loss of recent impressions and occasionally transitory loss of memory.
His conduct - emotional, pernicious of society are neglected, loses self-control and uses offensive language, actions may be objectionable and serious breaches of the moral laws may occur.
Eats and drinks often in excess and thus hastens the onward march of the disease.

Emotions - Hilarious one moment, weeping the next.

The mental change may be of a variety of types.

1. Expansive form: This is the classical type.
   He is expansive generous and happy, sometimes lively and witty, more enterprising, more active and more restless. He possesses a sense of well-being, never enjoyed such excellent health and extravagant ideas of wealth, social position and physical strength.
   He jumps into foolhardy undertakings without reflecting the means to be employed, impetuous by opposition and breaks out into excesses, excited and restless.

   Insomnia is frequent and sometimes painfully felt. He has as a rule lucid moments when he is painfully aware of his changed mental condition and seeks the advice of the physician, but this is only a fleeting reawakening.

2. Depressed or Melancholic form: Hypochondriacal, and believes himself suffering from various diseases.
   Complains of feeling tired, attention cannot
to sustained as long, gradually becomes more
incapable. New acquisitons are more difficult
even some of the old ones are lost.
Memory and judgment may fail.
This threatening mental decay is often noticed
early by the patient who becomes alarmed
albeit it progresses unconsciously. He many
fits in common with Melancholia and
Neurasthenia, but the rapid progression and
the somatic condition especially the speech
serve to distinguish it.
2. Somatic Form: Physical signs stand out
while the mental symptoms are in the back
ground. A similar to disturbances of sensation,
suffer from headaches and neuralgias.
Changes in speech especially marked.
Psyche disturbances are not entirely wanting
but in the early stages are less evident.
There is a depressed state of mind, Slowness
of mentation.
4. Demented Form: Progressive mental enfeeblement
is characteristic from the beginning, memory
poor and unfit for duty; outbursts of passion
and excitement at times; usually very tractable.
These are the commonest forms but there are others.
with indefinite symptoms, such as vertigo, fleeting confusion, sometimes headache, feeling of weight in the head, ophthalmic hemianopia, others are excitable, irritable and restless for which no cause can be assigned until struck down by an apoplectic seizure.

In other cases where the special symptoms predominate, and are more like cases of dementia praecox, others believe themselves the victims of a cruel conspiracy and angered by a system of persecution.

The mental confusion and instability, the incapacity to pay attention, the length of memory for recent and past events, his errors in judgment, his childishness and facility, all clearly point to intellectual degradation.

**Physical Signs.**

The pulse.

The examination of the habits is a very important point in the diagnosis of General Paralysis. At first the alteration may be merely temporary later they become permanent. It is the failure of the reflex adjustments that is so characteristic in
General Paralysis. There is at present considerable
difference of opinion as to the exact path of the
reflex arc. The afferent fibers appear to run in
the optic nerve and probably partly decussate in
the optic chiasma, they then pass along the optic
tract to the corpora quadrigemina, and thence
to a special part of the 3rd nerve nucleus.
The efferent fibers pass along the 3rd nerve to
the ciliary ganglion and thence to the pupil
by the short ciliary nerves.

Defect Indeplasia or Irregular Robertson's Pupil

This is a reaction to accommodation but not to
light, it is purely a parasplidetic sign and
cannot be a former attack of aphakia and indicates
that the patient if not a parasplidetic is a
candidate for one of the parasplidetic diseases.

This reflex undeplasia is a common early symptom
of General Paralysis, although this condition is not
present in a great number of General Paralytics
yet the pupils often respond to a stimulus
of light by an action which is slower and
weaker than normal, they vary from this
slight degree of deviation from the normal to
absolute fixation. This is often an inequality of
response. This immobility may disappear and reappear
in the course of General Paralysis as it sometimes does in Tades. This reaction may be tested either by a small electric lamp, switched on and off while the patient is standing in the shade or by a beam of light thrown on by the ophthalmoscopic mirror in the dark room.

**Consensual Reaction**

Much more important from the point of view of early diagnosis is the consensual reaction than is the fundusphotograph, which is in the majority of cases only present when the other signs are marked. This reaction consists in the contraction of the pupil of one eye when the fundus area of the other eye is illuminated. The direct and consensual reactions are not equal in intensity, the former being greater than the latter.

The consensual reflex occurs because the stimulus passes to the other by reason of the decussation of the fibers at the chiasma or because of the transference from one 3rd nerve nucleus to the other 3rd nerve nucleus.

This reaction is lost as a rule very early in General Paralysis or if not quite gone may be of the very slightest nature, or again there may
Equality and Symmetry of the Pupils

Sometimes the pupils are equal and symmetrical as in normal individuals, but often there is a temporary asymmetry due to differences in their reactivity to light, as with each change of light one pupil reacts much sooner than the other, but much more commonly the asymmetry is permanent and in these cases there is more or less complete immobility of that pupil, generally in the dilated pupil.

The size of the pupil may vary from extreme myosis to extreme mydriasis. Myosis is much more common in the earlier stages and in the tabetic forms and is expressive of hyperactivity of the oculomotor nerve. Mydriasis common in the later stages, expressive of defective action of the oculomotor nerves, is more common in the terminal stages of exhaustion and in those that run a rapid course.

There has been some exceptional cases described by Raggi, Moscelli and D'Atunno where there is contraction from diminution of the intensity of the terminal stimulus instead of dilatation. The pupil often presents abnormal forms, such
or polygonal. The irregularities of outline are important but are usually due to posterior hyperemia.

All the pupillary symptoms are dependent upon the action of the oculomotor nerve and not upon the sympathetic. The lesion whether centripetal or centrifugal is always limited to the nucleus of the oculomotor nerve which supplies the intrinsic muscles of the eye.

The other nuclei such as the 6th may also be affected but much more rarely.

Temporary lability of an ocular muscle is a symptom which is occasionally found, these cases as a rule are first seen by the ophthalmic surgeon.

Ptosis, strabismus, and nystagmus are rarely exceptional symptoms in cases of progressive paralysis.

Henceforth

General Paralysis is chiefly a brain disease and the alterations in the patellar reflexes are for the most part determined by the central lesions, but in these are often added certain peripheral lesions such as degeneration of the posterior column. Such complications also help to produce alterations in the patellar reflexes. The change from magnum
to abolition is due as a rule to the motile process becoming more intense and thus able to produce different effects without change of locality. The transference from myotonia to myosis seems also to support this view.

The knee-jerks are seldom or never normal in this disease, the most common condition is exaggeration and often associated with this exaggeration is ankle and patellar clonus. The jerks when not exaggerated are usually abolished or nearly so, rarely normal. Associated with this abolition of the knee jerks there is often abolition of the achilles jerk.

Generally there is inequality of the jerk, one may be markedly exaggerated and the other abolished and from these extremes there are many intermediate conditions. The jerk varies during the stages of the disease generally at first exaggerated, later less marked or abolished.

The exaggeration of the knee jerk is almost characteristic in that the excursion of the foot is large, the anterior movement lively, but the return sluggish due to defective action of the semimembranosus muscle. This gives the knee-jerk a flabby character.
Facial Expression and Sensory

An important early symptom is loss of facial expression--hypotonic or fasciculus affecting the region supplied by the inferior facial nerve. The original lines are smoothed out or obliterated. The brow and eye muscles contract all right, but there is an inertia and slowness with which the impulses appear to reach the cheeks and lips.

This paralysis of the facial muscles is as a rule bilateral and symmetrical and its slightest degree is not always easy to recognize especially if you have not seen the patient before.

This smooth expressionless face is very characteristic and when the patient tries to speak or show his teeth, there are fibrillary contractions or twitching of the facial muscles especially those around the mouth.

There are two types of hemor, both occur early as a rule and affects the left and sides.

1. The free twitching is a late in the disease.

Some osteo hemor
There may be of the nature of Apoplectic, epileptic or epileptiform attacks. They may occur at any time during the course of the disease. They may be the initial symptom calling attention to the patient’s condition or they may be the concluding event determining the fatal issue. They are however most common in the 2nd stage. Epileptiform attacks: These are usually associated with a disturbance of consciousness, varying from mere somnolence to coma with stertorous breathing.

As the consciousness is restored it is found that the patient is suffering from hemiplegia or bulbar monoplegia. This usually passes off in a few days.

Epileptic fits occurring in the course of General Paralysis are in no way indistinguishable from those seen in idiopathic epilepsy. Paroxysms of fits are not infrequent giving rise to a true status epilepticus. Isolated fits occur in all degrees of severity. Jacksonian fits without loss of consciousness are very distinguishable from Jacksonian fits seen in cases of subcortical tumors or lesions to occur in General Paralysis.
Writing

This affected as a rule in the early stages. It is one of the finer muscular adjustments and is of late development and therefore in dissolution soon loses its highly acquired characteristics. It is slower, uncertain and unequal, upstrokes tremulous and unequal and zig-zag due to imperfect coordination of the movements of the extensors and abductors of the fingers. The words may be changed, consonants substituted and syllables and words half completed, and the paper often smudged and blotched.

Speech

Slight degrees of dysarthria are very important from the point of view of early diagnosis and is one of the most characteristic of early symptoms. This occurs at first from time to time in a hardly appreciable way. Right clurring at first without actual interruption of the flow when articulating clearly placed letters or words using such tests as Royal Artillery, Biblical Commentators etc when the clurring is more marked and there is clipping of the syllables the patient has
difficulty in articulating and during these phases of difficulty, there is marked tension and contraction of the facial muscles. Some are aware of the difficulty and hold their tongue. Alteration in the timbre of the voice often constitutes the first symptom and temporary aphasia may appear very early.

**Analgesia of Ulnar Nerve**

This was originally described by Bernhardt as a sign of tabs and it is maintained by many as pathognomonic of General Paralysis. In health acute pain is got by pressing with the finger in the olecranon fossa, but in the great majority of General Paralytics no pain is felt.
Treatment

The treatment resolves itself into two classes:

1. Curative
2. Symptomatic

Curative

Antisyphilitic Treatment:

Mercury and Potassium Iodide are of no avail. Salsalvarsan and Neosalvarsan, a difference of opinion exists as to the therapeutic efficiency of these two drugs. Neosalvarsan is said by some to be as efficacious as ordinary salvarsan and devoid of its undesirable effects. This advantage is attributed to the neutral solution which allows intramuscular injection to be given, but most prefer intravenous. Others say it acts where ordinary salvarsan fails and regard it as having a greater effect in transforming a positive into a negative Wassermann. Others on the contrary say that neosalvarsan is much less specific and much more toxic.

My experience of neosalvarsan is not a very extensive one. We have only treated three cases in this way. The dose of neosalvarsan was .9 gramme; it was dissolved in 4 oz. of...
freshly distilled sterile water and injected at
blood heat into the median basilic vein by
means of McDougall's special syringe. There were
no after effects in any of the three cases, no rigor
no weakness no rise of temperature.

1. Mr A. Positive Wassermann in blood and
encephalitic fluid 19 quinacrine. The
effect, gradually and steadily went downhill
and died before Wassermann was again done.

The typical lesions of Encephalitis.

2. Mr A. Positive Wassermann in blood and
cerebrospinal fluid etc 19 quinacrine.

One week returned more or less to normal,
fever returned more briskly and he got
well enough to go home and resume his
duties. Wassermann 4 weeks after injection
not quite so marked in the blood but
much more marked in cerebrospinal fluid.
Clinically he appeared much better, but
by pathological test he was worse.

3. Mr D. Positive Wassermann in blood
and cerebrospinal fluid etc 19 quinacrine.
No improvement clinically Wassermann
reaction just as marked in blood and
cerebrospinal fluid as it was previously. Before
before the administration of the tuberculin.

b. Koch's Subcutaneous: It has often been observed
that Paralyses Paralyticus are benefited as regards
their mental symptoms by the intervention of some
intercurrent fertile disease. With this object of
producing a temporizing fertile reaction gradually
increasing doses of Koch's Subcutaneous have been
administered hydrodynamically. Cases are reported
as being cured others as profoundly, modified.

c. Sub Nucleare: This has been observed,

studied by Denath, he used a 2% solution
in normal saline, since are injected intramuscularly
into the buttock or into the lumbar region, this
is repeated once a week as long as sufficient
fertile reaction occurs (10°F). The reaction
attains its maximum in from 4–10 hours
and as a rule returns to normal in 1 or
2 days. This is accompanied by a leucopenia
in the blood (10,000 – 25,000 per mm) which
subsides about the 5th day. Again a remission
are reported to be well enough to resume
work.

It is premature to pronounce an opinion as
to whether a cure has been achieved or merely
a remission in the course of the malady.
Repeated observations will be necessary, not only
show the ordinary mental and physical signs
but also the cerebrospinal fluid, its cell contents
and its Wassermann and globulin reactions.

Symptomatic Treatment

Confined in an asylum is often necessary
for personal safety and for reasons of a
public nature. These regular hours, the rest and
attention experienced in an asylum, have an
immediate beneficial effect, after a short
residence in an asylum, they are often rendered
fit to return to their homes. When a patient
is dominated by hallucinations delirious
he may remain at home, but when he suffers
from euphoria and optimistic carelessness
these rather form an obstacle to treatment
and he is better in an institution.

Complete rest is necessary and, travelling is
contraindicated. He must abstain from
alcohol, all excitement and excessive eating.
Bowels must be kept in proper order
by purgatives or enemata and intestinal
antiseptics used when necessary.

Diet should be light and nutritious
with in quantity restricted meat supply.
and all alcohol forbidden.

Baths should be frequently given and are especially useful in excitement lasting one hour will cool compresses to the head.

Insomnia. Hypnotics must be given. Iodine is our favorite and is very suitable when urethane is given. Three times a day.

Urethane - introduced about 12 years ago by Townsend. It is of value because it is exercised into the urethane fluid. Every General Paralysis is put on 10 grains of this drug three times a day, as soon as he is diagnosed. A number improve, others on the other hand seem to go steadily downhill. There is no doubt that it prolongs life in the majority of cases. The most noticeable feature about it is that it prevents the fits to a very great extent, this being due to all probability to the sterilization of the urethanes fluid and thus preventing the secondary infection by these diptheroides. This drug also helps the urine device at least for a considerable time and very often they develop cystitis before death.
References

1. W. H. Penrose Mental Affections
2. Damitch's Text Book of Psychiatry
3. Minard quoted by Robertson Melon Lectures Journal of Mental Science April 1913
4. Stoddard Blush and Its Disorders
5. Nozichi Journal of Experimental Medicine July 1913
6. Gibbard and Harrison International Medical Congress August 1913
7. Nozichi Serum Diagnosis of Syphilis
8. Cobbe Medical Record for 18th 1911
13. Jones - A review of our present knowledge concerning the serodiagnosis of General Paralysis - American Journal of Insanity LXXV, April 1909
14. Nozichi Moore - The Butyric acid test for
Pyhrilus in the diagnosis of neurophilus and other nervous disorders - Journal of Experimental Medicine 1909, xi, 634


Thomas Paterson Noble
Bethlem Royal Hospital
Lambeth Road
London S.E.