"A STATISTICAL INQUIRY into the CONDITION of the
FACIAL and other REFLEXES in GENERAL PARALYSIS
of the INSANE."

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The condition of the Superficial Reflexes in General Paralysis of the Insane is so briefly dealt with in text-books of Neurology, Psychiatry and Diseases of the Nervous System, that the following observations have been made in order to ascertain their diagnostic value, and incidentally the associated conditions of other reflexes.

In the text-books, references are made to the state of the Knee-jerks and other reflexes, but the condition of the Superficial Reflexes is untouched.

Cutaneous Reflexes have received a lot of attention during the last ten years, but at present, with the exception of the plantar reflex, their diagnostic value is undetermined.

The following observations were made on cases which had been certified and confirmed as General Paralytics, doubtful cases being excluded as far as possible.

Method of Examination.

The examination of some General Paralytics is effected with the greatest difficulty owing to their restlessness, irritability or antipathy to disturbance. In a few cases examination was impossible even on repeated attempts. With patience, however, a satisfactory examination was achieved in the majority of cases. Failure

on the first attempt was often followed by success on repeated trials. One patient, who kicked violently the first time he was examined, was tractable and docile when examined the following day.

The reflexes were tested in the simplest manner so as, if possible, not to excite the curiosity of the patient.

The Superficial Reflexes were tested by means of (a) a camel's hair brush, (b) an ordinary surgeon's probe, (c) a common pin; the observation being recorded from the smallest stimulus which produced a response.

A percussion hammer was used to test the tendon reflexes.

The patient was in bed in the horizontal position, and every effort was made to obtain complete muscular relaxation. The attention of the patient was distracted as much as possible. An illustrated paper was a favourite method employed, which not only attracted the patient but served to obscure the hand of the examiner and the part examined, from his view.

Repeated examinations were made on all cases and any marked difference of results noted. Special observations were made during and after seizures and also whilst the patients were asleep. In addition to the ordinary cutaneous and tendon reflexes, a few reflexes which have only recently been described were tested.
A short note of the mental and physical condition was added to the notes on the reflexes.

The following Reflexes were systematically examined -

**Cutaneous.**
- (1) Plantar
- (2) Cremasteric (Epigastric Umbilical)
- (3) Abdominal (Hypogastric)
- (6) Scapular
- (7) Gluteal
- (8) Oppenheims.

**Tendon & Muscle**
- (1) Knee Jerks
- (2) Achillis Jerk
- (5) Front Tap
- (6) Gordon's Paradoxical.

**Eye Reflexes**
- (1) Reaction of pupil to light
- (2) Reaction of pupil to accommodation
- (3) Cilio-spinal
- (4) Consensual.

**Facial**
- (1) Supra-Orbital
- (2) Malar
- (3) Chvostek's
- (4) Depressor Labii Inferioris
- (5) Risorius
- (6) Corneo-Mandibular.

Vide Appendix.
Plantar Reflex.

The reflex was tested with the patient lying on his back with the lower limbs extended and uncovered.

The usual precautions were taken to ensure muscular relaxation and to distract the patient's attention.

The condition of the skin of the soles with regard to excessive thickening, the temperature of the feet and the absence or presence of visible perspiration, were noted. The stimulus was applied to the sole of the foot by means of the instruments already mentioned, viz: camel's hair brush, probe and pin. The area first tested was the outer part of the sole, the stroke being made from heel to toe, and if no response was obtained from this area, the inner part and centre of sole were then tested.

The first response obtained was the one taken in determining the activity and nature of the reflex. After the response had been noted various other skin areas were tested, such as the dorsum of the foot, outer side of leg and thigh—thus any response from an abnormal area was ascertained. In a few cases the "ticklishness" of the soles was so excessive that the nature of the response, owing to the addition of volitional movements, was difficult to ascertain.

Two types of the plantar reflex are described in adults:

1st. The normal or flexor response,
2nd. The extensor response or Babinski phenomenon.
In children "the Infantile Response," which consists of brisk extension and spreading out of all the toes, may be observed up to the age of four whilst they are awake, and up to the age of twelve when asleep.

The normal plantar reflex consists of contraction of the thigh muscles, plantar flexion of the toes and movements of the foot. The earliest response and the one evoked with the least stimulus is contraction of the Tensor Fasciae Latae - Brissaud's "Reflexe du fascia lata." This is sometimes accompanied by contraction of the muscles on the front of the thigh. With increased stimulus all the toes are flexed, the ankle is dorsiflexed and the foot inverted. With still stronger stimulation, the knee is flexed, the thigh flexed on the pelvis and the limb rotated outwards. In very few cases do all these movements appear, but the essential part of the reflex is the movement of the toes. The reflex is a "cortical" phenomenon, the spinal segments involved being the first and second Sacral. It is always present in healthy adults.

The plantar reflex is absent when the continuity of the reflex arc is destroyed either by disease or injury. It is sometimes present in complete transverse lesion of the cord. It is sometimes absent in profound hysteria. It is absent in severe shock and just before death. When the feet are cold or the epidermis of the
sole is excessively thickened, the response cannot be elicited.

The Extensor Response.

This abnormal type of plantar reflex was first described by Babinski and is known as the "Babinski's sign." It has received great attention, and medical literature swarms with references to its diagnostic value. The extensor response is present as a rule in organic affections of the pyramidal tract either in the brain or spinal cord. It is sometimes present in extra-pyramidal lesions, in Epilepsy, especially after seizures, in uraemic convulsions and meningitis, and in cerebral tumour not affecting the pyramidal tract. It has also been found present in cases of strychnine poisoning and tetanus.

In old standing cases of hemiplegia the reflex is often of the flexor type.

Absence of the extensor response does not exclude pyramidal disease.

The following are the varieties of the extensor response:

1. Extension of the great toe with flexion of the other toes.
2. Slight flexion of the four outer toes followed by slow and strong extension of the great toe.
3. Extension of the big toe alone: (i.e., no movements of other toes.)
iv. Extension of all the toes simultaneously.

Combinations of the flexor and extensor types of response are often present, and the extensor response may be obtained by stimulating the outer half of the foot even whilst stimulation of the inner half produces a flexor response.

(5) According to Schneider the extensor response is a spinal reflex and the facility of its production depends upon a condition inducing general increase of the spinal reflexes.

Crossed Plantar Reflex.

This reflex when present was noted.

It consists of a flexor or extensor response of the big toe, or all toes, of one foot upon stimulation of the other.

The nature of the response may vary in a crossed reflex, i.e., a crossed flexor response may be obtained when the direct response is one of extension. - or the crossed and direct responses may be similar.

II. OPPENHEIM'S REFLEX.

This reflex as described by Cassivel consists of flexion of the big toe or all toes, with plantar flexion of the foot, accompanied sometimes, by flexion of the thigh on the pelvis and contraction of the fascia lata, - on stroking the skin on the inner side of the leg.

(8)
The technique employed in testing this reflex was as follows. The patient was in the horizontal position, on his back; the knee was semi-flexed and the thigh rotated outwards: a probe was then quickly drawn along a line extending from a point just behind the knee joint near the internal border of the tibia to the internal malleolus.

Oppenheim describes a modification of this reflex in lesions of the pyramidal tract - the big toe is extended and the foot dorsi-flexed.

III. CREMASTERIC REFLEX.

This reflex was examined by stimulating the skin on the inner side of the thigh, the legs being slightly abducted. The nerve areas implicated are the external, middle and internal cutaneous, the ilio-inguinal, the iliac branch of the ileo-hypogastric and the genito-crural. The spinal segments are the first and second Lumbar.

In health the reflex is present in 97% (Steiner); 30% (Schönborn & Geigel).

The reflex is sometimes unequal on the two sides. Sometimes a unilateral stimulus produces a bi-lateral response.

The area of skin from which the reflex may be elicited varies. It is sometimes produced by stimulation of the
skin of the sole, or of the abdomen, Penusini. Pressure over the sartorius muscle in the lower third of Hunter's Canal may also prove efficient.

Accompanying the reflex proper (and sometimes when the reflex is absent) there is contraction in the inguinal region (Geigel's inguinal reflex). This is explained by the anatomical unity of the cremasteric muscle and the internal oblique.

Synergic contraction of the cremaster may accompany contraction of other muscles.

The Cremasteric reflex may be abolished in certain local affections, such as Varicocele or Hydrocele, and in some cases of Sciatica (Gibson). In functional nervous diseases its behaviour is variable (Penusini).

ABDOMINAL REFLEX.

This reflex was sub-divided into three segments - Epigastric, Umbilical and Hypogastric.

i. Epigastric comprised the area above a line drawn horizontally from the lowest points of the 10th costal cartilages.

ii. Hypogastric, the area below a line drawn between the most prominent parts of the iliac crest.

iii. Umbilical, the area situated between the Epigastric and Hypogastric.

In testing the reflex, in order to secure as complete muscular relaxation as possible, the patient's
legs were drawn up and the shoulders slightly raised.

The various areas were systematically tested by lightly and quickly stroking the skin with the usual appliances.

The reflex consists in contraction of the abdominal muscles of the side stimulated.

The spinal segments involved are the 4th to the 12th Dorsal inclusive.

These reflexes are present in health, below the age of 50 years. Müller and Seidlemann examined 3,000 cases free from abdominal or nervous disease and in only one case were the reflexes absent.

Excessive Obesity, and Laxity of the abdominal wall interferes with the activity of the reflex. In ticklish and apprehensive patients the response is exceedingly difficult to estimate.

In infants the abdominal reflexes are ill defined. Absence of the abdominal reflex, sometimes known as Rosenbach's sign, is met with in acute affections of the abdominal organs and in some nervous diseases.

Rolleston states that the abdominal reflexes are absent in a large percentage of cases of enteric fever, and that there is no constant relation between the condition of the abdominal reflexes and the tendon reflexes.

The abdominal reflexes are sometimes produced by stimulating other skin areas, such as the inner side of thigh.
Variations in the activity of the two sides is sometimes to be observed in health.

**SCAPULAR REFLEX.**

This reflex was tested with the patient in the sitting posture, with the arms hanging loosely by the side. A sharp stroke was then made between the scapulae from above downwards. The reflex when present consists of contraction of the scapular muscles. The spinal segments are the first to fifth Dorsal. The reflex is not always present in health.

**GLUTEAL.**

This reflex was tested with the patient lying in the prone position, the pelvis being supported by a pillow. Care was taken to obtain muscular relaxation.

The skin of the buttock was sharply stimulated. The reflex consists in contraction of the gluteal muscles. It is not always present in health and may sometimes be produced by stimulating other skin areas, such as the back of the thigh. The spinal segment is the 5th Lumbar.

**TENDON and MUSCLE REFLEXES.**

**KNEE-JERKS.**

The knee-jerks were tested with the patient sitting on the edge of the bed with one knee crossed over the other. When this position was impossible the knee was
supported by passing the forearm under it. The patellar
tendon was sharply tapped with a percussion hammer.
When no response was obtained, before deciding the reflex
was absent, "reinforcement" was tried. The patient was
made to perform a voluntary muscular effort with the arms.

The spinal segments concerned in the knee-jerks are
2nd to 4th Lumbar. The reflex is exaggerated in con-
ditions affecting the upper neurons and when the lower
neurons are stimulated.

Loss of the knee-jerks indicates a lesion affecting
the lower neuron with one notable exception, viz., com-
plete transverse lesion of the cord above the Lumbar en-
largement. Enfeeblement of the knee-jerks on one or
both sides may be due to previous toxic influences.

The nature of the knee-jerk, whether it is a true
reflex or not is still sub judice.

ACHILLIS JERK.

In testing this reflex the kneeling position was
employed. The patient knelt on the bed with his feet
projecting a few inches over the edge. In bed-ridden
or feeble cases the patient was rolled on his face, the
knee flexed and the foot dorsi-flexed and held in this
position.

The Achillis tendon was smartly tapped, with a
percussion hammer, near its insertion to the os calcis.
The reflex consists of a quick plantar flexion of the
foot at the ankle joint. If no response was obtainable
"reinforcement" was tried by making the patient perform a voluntary muscular action with the arms, and also by sharply striking the calf muscles several times.

The reflex is present in health under 50 years of age. Loss of the reflex is indicative of organic disease. Absence of the knee-jerks is generally accompanied by absence of the Achillis Jerk. The spinal segments for the reflex, according to various authors, are the 5th Lumbar to 5th sacral inclusive. Loss of the Achillis jerk may precede loss of the knee-jerk.

THE "FRONT TAP."

The method of testing the front tap consisted in smartly tapping the tibialis anticus muscle with a percussion hammer, the foot being dorsi-flexed and held in this position, resting on the bed. The reflex consists in plantar flexion of the foot. The explanation of the phenomenon is still undetermined.

In health it is present in 40%. In organic disease the front tap is generally increased with the other reflexes in hypertoxic, and decreased (generally wanting) in hypo-toxic states. In functional disorders it is present in 71% of cases. In Epilepsy in 75%.

GORDON'S PARADOXICAL FLEXOR REFLEX.

The patient sits with his feet on a stool. When this position was impossible, he lay on his back with the knees slightly flexed and the feet resting on the
bed. Standing on the outer side of the patient the hand
was placed on the tibia and the fingers executed deep
pressure on the calf muscles.

The reflex consists in extension of the great toe
or all the toes.

Gordon considers this reflex paradoxical as the
muscles irritated are the gastro-cnenius and deep flexors.

He found the reflex present in affections of the
motor tract. The reflex sometimes accompanies the plantar extensor response.

In pyramidal lesions it is sometimes present when
the extensor response is absent and it may precede it.

The value of this reflex is undetermined. Several
authors consider the reflex a modification of Oppenheim's.

PUPILLARY REFLEXES.

After noting the size, symmetry and outline of the
pupils, the following re-actions were tested:--

i. Light.

One eye was covered and the light, from a 16 c.p.
electric light with ground glass lamp, directed into the
other, care being taken to avoid an accommodative contrac-
tion. The degree and the activity of the contraction of
the pupil were noted.

ii. Accommodation.

Both eyes being open efforts were made to get the
patient alternately to fix a distant and a near object.
The dementia of some patients made it impossible to test this reflex.

iii. Consensual Reflex.

In the absence of bright light the effect of covering one eye was observed on the other. Another method was frequently employed, viz., shading one eye and shining a bright light into the other. The reflex when present, in the first method, consists of dilatation of the pupil of the uncovered eye, in the second of contraction of the pupil of the shaded eye.

Cilio-Spinal.

The skin of the back of the neck was stimulated by pinching or pricking. When the reflex is present the pupils dilate.

**FACIAL REFLEXES.**

The following reflexes were tested:

**Supra-Orbital.**

This reflex was simultaneously described by **McCarthey** and von Bechterew in 1901.

It consists of a fine fibrillary tremor of the lower lid when the supra-orbital region is percussed. The nature of the reflex has been discussed by the authors. **McCarthey** believes it to be a true nerve reflex, whilst von Bechterew holds that it is partly a nerve reflex and
partly due to mechanical irritation transmitted through periosteal, muscle, and tendon fibres. The reflex may be obtained from the temporo-frontal region, the nasal region and the zygomatic arch.

In eliciting the reflex it is necessary to obtain complete muscular relaxation; very light percussion is used, a rubber percussion hammer weighing about one ounce being employed.

The reflex is present in health and may be obtained by percussion of the forehead as far back as the hair border. A diminished reflex can only be obtained by direct percussion over the supra-orbital notch, whilst an exaggerated response may be elicited by percussion over the vertex. Percussion to one side of the fronto-temporal region produces a greater response from the corresponding lower lid.

The reflex arc is the sensory division of the trigeminal, and the facial nerves.

The reflex is absent in lesions of the arc and exaggerated when there are degenerative changes in the cerebral cortex.

CHVOSTEK'S PHENOMENON.

This reflex consists of a twitching of the muscles of the facial distribution on percussion over the pes anserinus. A mere stroking, in some cases is enough to
produce it. The arc for the reflex is the 2nd division of the trigeminal, and the facial nerves. The nature of the reflex is undetermined; it is probably muscular and indicates a hypertonic condition of the facial muscles. The reflex is not present in health; it has been found in the following diseases, Tetany, Hysteria, Neurasthenia, Epilepsy, Tubercular and rachitic conditions, Bulbar paralysis, Spinal tumours and the late stages of facial paralysis.

MALAR or ZYGOMATIC PHENOMENON.

This reflex, as described by Bechterew, is produced by percussing the malar bone and results in a twitching of the corresponding side of the mouth, the movement being in an upward and backward direction. The reflex is sometimes present in health. The reflex arc is the 2nd division of the trigeminal and the facial nerves.

DEPRESSOR LABII INFERIORIS PHENOMENON.

This is produced by percussing the lower jaw 1½ inches behind the symphysis menti. The response is a twitching of the lower lip on the same side, the movement being either in an upward or a downward direction.

Weisenberg considers this to be probably a phase of Chvostek's Phenomenon.
RISORIUS PHENOMENON.

When present, percussion over the angle of the lower jaw causes a distinct retraction of the corner of the mouth on the same side, in a backward and slightly downward direction.

CORNEOMANDIBULAR REFLEX.

Von Sölder describes a reflex movement of the lower jaw on irritation of the cornea. The movement of the lower jaw is purely lateral and is due to contraction of the external pterygoid. The jaw moves towards the side away from cornea stimulated. It is associated with the usual corneal reflex. The mouth must be held partially open and the lower lip retracted. The reflex is not always present in health and little is known of its presence or absence in disease. It is said to persist in coma when the corneal reflexes are absent.

Von Sölder considers it is a superficial reflex, the arc consisting of the first branch of the trigeminal, the fifth nucleus, and the motor branch of the fifth nerve. Kaplan suggests that the reflex is not a true one, but simply an associated contraction of the orbicularis and external pterygoid.

The fact that the reflex is present in coma when the corneal reflex is absent strengthens von Sölder's view.
It is an extremely difficult reflex to test in general paralytics and is generally accompanied by voluntary movements of the facial muscles.

TABLE A.

Findings of all the reflexes tested.
The figures denote the activity of the reflexes thus,

Very exaggerated = 3. Exaggerated 2. Medium response 1. Faint response ½. Absent 0. A dash - indicates that the reflex was not tested.

R or L after a number denotes the presence of the reflex on (R = right side. L = left side) one side only.

X denotes that the reflexes are unequal, the right brisker than the left or vice versa.

E after the plantar reflex indicates the presence of an extensor response from both feet.

ER = extensor response from right side only.

EL = extensor response from left side only.
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>SUPRA-O RBITAL</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>MALAR</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
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<td>1</td>
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<tr>
<td>CHVOSTE K</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>DEP.LABII INF.</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>RISORIUS</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<td>CORNEA-MAND.</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>KNEE JERKS</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>ACHEL LES</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>FRONT TAP</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>GORDON PUPILS LIGHT</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ACCOMMOD.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>CONSENSUAL CILIO-SPINAL</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>REFLEX du FASCIA LATA</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

(26)
ANALYSIS of TABLE A - with further details.

**Plantar** - very exaggerated 3 3.75%

" 23 28.75%

medium 29 36.25%

faint 21 26.25%

nil 4 5.00%

In 16 cases there was marked difference in the activity of the response from the two feet.

The response was extensor in type on both sides in 3 cases; upon one side only in 4.

In the cases in which no response was obtained the "Reflex du fascia lata" was well marked in one case, faint in one, present on one side only in one case, absent in one.

Comparing the "Plantar" and "Reflex du fascia lata" it is found that the latter affords the more delicate indication of the condition of the reflex arc, thus:

<table>
<thead>
<tr>
<th></th>
<th>Plantar</th>
<th>Reflex du fascia lata</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.E.</td>
<td>3.75%</td>
<td>22.50%</td>
</tr>
<tr>
<td>E.</td>
<td>28.75</td>
<td>30.00</td>
</tr>
<tr>
<td>M.</td>
<td>36.25</td>
<td>21.25</td>
</tr>
<tr>
<td>F.</td>
<td>26.25</td>
<td>18.75</td>
</tr>
<tr>
<td>Abs.</td>
<td>5.00</td>
<td>7.50</td>
</tr>
</tbody>
</table>

During sleep, an extensor response, which was not present when the patient was awake, was obtained in three of fifty cases examined.
Tested in twenty cases of seizure, an extensor response was obtained from one or both sides in fifteen; in all the response previous to the seizure was flexor. In cases affecting both sides equally, a double extensor response was obtained in eight of ten cases examined; in the other two on one side only. In the five cases of seizures affecting one side, the extensor response was present only on that side. Of the five patients in whom the extensor response was not obtained, the seizures were general in three, unilateral in two. The period during which the extensor response lasted varied with the severity of the attack; in one case it was present for three days; in the others for from two to six hours.

The instance (Case IX) in which the duration was three days, was one of marked paresis with some disturbance of sensation on the affected side, and it is possible that a cortical Haemorrhage occurred.

In some very advanced cases, where the paresis is marked and any attempt at movement causes fibrillary tremors in the muscles of thigh and leg, the plantar reflex is undeterminable; the small toes spread out and oscillate between a flexor and extensor position, the former predominating. The great toe after several short, sharp, and jerky attempts at extension comes to rest in a position of flexion.
Oppenheim's Reflex.

In 12 cases a response was obtained on both sides, in 3 of which there was a marked difference in the activity on the two sides.

In 3 there was response on one side only.
In 1 there was a unilateral extensor response.
In 64 there was no response.

Of the twelve positive cases, the plantar reflex was very exaggerated in 1

" in 8
medium in 2
faint in 1.

Thus, the responses for both reflexes are similar.

In the case where the extensor response was obtained on the left side only, there was a well marked flexor plantar response.

In two of the three cases where the response was unequal the plantar response also was unequal.

In all the three cases where the response was obtained from one side only, the plantar response was present on both; in one there was an extensor plantar response present on the same side as the flexor Oppenheim response.

Of the 7 cases where a plantar extensor response was obtained, Oppenheim's response was as follows:

In 6 cases no Oppenheim response, whilst in the other case there was a flexor response from the left side only.
Cremasteric.

<table>
<thead>
<tr>
<th></th>
<th>V.E.</th>
<th>E.</th>
<th>M.</th>
<th>F.</th>
<th>Ab.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9</td>
<td>12</td>
<td>26</td>
<td>10</td>
<td>12</td>
</tr>
</tbody>
</table>

13% 17.5% 37.75% 14.5% 17.25%

In ten cases of the series the reflex was not tested; marked differences of the two responses was noted in eight cases. It was present on one side only in four, and was obtained in two cases from below the knee, from the sole of the foot in one, from any part of the thigh but not below the knee in twelve.

The Abdominal Reflexes.

<table>
<thead>
<tr>
<th>Hypogastric</th>
<th>Umbilical</th>
<th>Epigastric</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.E.</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>E.</td>
<td>33</td>
<td>37</td>
</tr>
<tr>
<td>Mid-response</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Faint</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Absent</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Not tested</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Marked difference in equality on sides</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

The Hypogastric reflex was obtained from the front of the thigh as low as the knee in one case. In 51 cases

it was obtained from the inside of the upper part of the thigh.

In 20 cases it was obtained from the Abdomen (Hypogastric region) only.

In Case X - The only case in which the umbilical reflex was absent. All the Superficial reflexes were absent, except the plantar which was very faintly marked. The case was one of very advanced Locomotor Ataxia with G.P.I. seizures. His sensation seemed to be unimpaired. The profound dementia of the patient, however, rendered a satisfactory examination of the Sensory functions impossible.

<table>
<thead>
<tr>
<th>Gluteal</th>
<th>Scapular</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.E.</td>
<td>6</td>
</tr>
<tr>
<td>E.</td>
<td>17</td>
</tr>
<tr>
<td>M.</td>
<td>23</td>
</tr>
<tr>
<td>Faint</td>
<td>7</td>
</tr>
<tr>
<td>Absent</td>
<td>16</td>
</tr>
<tr>
<td>Not tested</td>
<td>11</td>
</tr>
<tr>
<td>Unequal on sides</td>
<td>2</td>
</tr>
</tbody>
</table>

In Case IV. A crossed Gluteal reflex was obtained in Cases XXII and LXXVII; the Gluteal reflex which was very exaggerated was obtained by stroking the back of the thigh on the same side.

\[\text{Crossed Gluteal, i.e., stroking one buttock produces contraction of the opposite buttock only.}\]
Table for comparison.

<table>
<thead>
<tr>
<th>Knee Jerks</th>
<th>Achilles</th>
<th>Front Tap</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.F.</td>
<td>29</td>
<td>17</td>
</tr>
<tr>
<td>F.</td>
<td>31</td>
<td>25</td>
</tr>
<tr>
<td>Med.</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>Faint</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Absent</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Present on one side only</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Unequal</td>
<td>10</td>
<td>4</td>
</tr>
</tbody>
</table>

The Front Tap was present in thirty-four cases and absent in forty.

It was never obtained when the knee-jerks or Achilles jerks were absent.

In 21 cases where the knee jerks were exaggerated the Front Tap was present but the response was only medium or faint.

In 22 other cases of exaggerated knee jerks no Front Tap was obtained.

In the 17 cases in which the reflex was exaggerated both the knee jerks and Achilles jerks were also exaggerated.

The absence or diminished activity of the Front Tap in some cases where the knee jerks and Achilles jerks were exaggerated may be accounted for by the extreme wasting of the tibialis anticus muscle.
Achilles Jerks.

Examination of the Achilles jerks confirms the conclusions of others as to the state of the Achilles jerks in Health.

In 33 cases the Achilles and knee jerks were both exaggerated.

In 18 cases the knee jerks were exaggerated and the Achilles was present but not exaggerated.

In 13 cases the knee jerks and Achilles jerks were both absent.

In 2 cases the knee jerks were present (one exaggerated and one faint) and the Achilles jerks were absent.

In 2 cases the Achilles jerk was much more active than the knee jerk.

PUPILLARY REFLEXES.

<table>
<thead>
<tr>
<th>Reaction</th>
<th>Light</th>
<th>Accommodation</th>
<th>Consensual</th>
<th>Ciliospinal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaction good</td>
<td>23</td>
<td>65</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>Reaction sluggish</td>
<td>14</td>
<td>6</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>Reaction absent</td>
<td>43</td>
<td>3</td>
<td>46</td>
<td>62</td>
</tr>
<tr>
<td>Present on one side only</td>
<td>1</td>
<td>-</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Unable to test</td>
<td>0</td>
<td>6</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Inequality on two sides</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

GORDON'S REFLEX.

In two cases there was a well marked response from both legs and in these cases (viz: Nos. III and LXXVI)
the plantar reflex was of the "flexor type."

In two cases the response was present on both sides but there was marked difference in the activity of the responses from the two sides.

In seven cases a well marked response was present on one side only, and in four a faint response was present on one side only. In sixty-five cases no response was obtained from either side.

An extensor plantar response and a "Gordon response" occurred together only in two cases, viz: Case XVI, where there was a double extensor plantar response, and a faint "Gordon" on the right side only, and Case LXIII, where there was an extensor plantar response from left foot and a "Gordon" from the left leg.

Gordon's reflex was tested in 100 patients who had no gross nerve lesion.

In 59 cases there was no response.

In 11 cases the reflex was present.

In 30 cases the response was flexion of the toes.

In the eleven cases where a response was obtained the plantar reflex was flexor in type.

(See special Analysis sheet p)
Supra-orbital.

In one case only there was no response, the case in question being one of advanced Locomotor Ataxia with General paralytic seizures (Case No X).

In twenty cases the response was very exaggerated, exaggerated in twenty-five, medium in thirty-three, and faint in one, with an unequal response from the two sides in one case.

Malar.

This reflex was tested in 79 cases. In two the response was very exaggerated, in fifteen exaggerated, in twenty-four medium, in eight faint, and in thirty no response was obtained. It was elicited on one side only in five cases and was unequal on the two sides in three cases.

Chvostek.

A response was obtained in 38 out of the 79 cases tested.

In two the response was very exaggerated.
In eleven exaggerated.
In seventeen medium, and
In eight faint.
Elicited from one side only in one case.

Depressor Labii Inferioris.

This reflex was tested in 78 cases. In one case the response was very exaggerated, in 10 exaggerated,
in 27 medium, faint in two and not obtained in 38.
Unequal on the two sides in one case. Elicited from one side only in one case.

Risorius.

Seventy-eight cases were tested.
In one case the response was very exaggerated, in five cases exaggerated, medium response in 6.
In 66 cases no response was obtained.

Corneo-Mandibular.

In two cases it was impossible to test this reflex. In the majority of cases the patients seemed to resent the touch upon the cornea, and after the first trial some prevented another examination of the reflex by tightly closing their eyes.

Seventy-eight cases were tested and in three a faint response was present on both sides; in two a response was obtained from one side only.

There was no doubt as to the reflex character of the responses.

The facial reflexes were tested in healthy adults and in epileptics.

The results are shown in tabular form.

Considering the facial responses in association with facial tremors, the relation is variable.

In 20 cases facial tremors were exceedingly pro-
nounced, and in seven of these cases the facial reflexes (Supra-orbital excepted) were unobtainable.

In 36 cases facial tremors were present although not very marked and in 11 of these a Supra-orbital response only was obtained.

In 23 cases no facial tremors were present, and in 16 of these the facial reflexes were present; in seven no responses except the supra-orbital were obtained.

CONCLUSIONS.

The results of this statistical inquiry may be considered both in their direct relation to the hitherto imperfectly observed field of the reflex conditions in General Paralysis, and also in their bearing upon the relative value of some of the multitudinous named reflexes with which neurological diagnosis has become encumbered.

The figures here presented, demonstrate, so far as they go, that Gordon's Reflex deserves no place in routine diagnosis. In a few cases where the better known and better established phenomena cannot be obtained, Gordon's and Oppenheim's reflexes may possibly afford information, but the value of deductions therefrom will be as dubious as the responses are uncertain.

It would appear that but little diagnostic importance can be attached to the condition of the cutaneous reflexes in General Paralysis, and it must be admitted therefore that the results of this inquiry are, in the main, negative.
The explanation of an extensor plantar response, will naturally be found in a superadded pyramidal lesion, but the remarkable observation upon the transient character of the extensor response during seizures compels one to seek an explanation such as that of Toulouse and Vu^pas, who state, in view of the 'infantile' and 'sleeping' extensor responses, that in General Paralysis there is a reversion to a primitive state.

Barnes uses the term "disturbance of Pyramidal Equilibrium," a phrase which certainly describes fairly accurately the uncertain, transitional forms of plantar reflex found in very advanced cases of General Paralysis.

Examination of the Tables showing the condition of the Knee jerks and Cutaneous reflexes in individual cases illustrates clearly the -

(1) incongruous condition of the reflexes in different cases - no two cases presenting a similar course;
(2) the dissociation of the tendon and cutaneous reflexes;
(3) a marked tendency for the abdominal reflexes to be exaggerated, when other cutaneous reflexes are not

Marked difference of the Reflexes on the two sides.

In 38.75% or 31 out of 80 cases tested there was a marked difference in the activity of the response of one or more of the cutaneous reflexes, viz: Plantar, Cremasteric, Hypogastric, Umbilical, Epigastric, Gluteal and Scapular.

(38)
In 27.5\% cases there was a difference of equality of one or more of the Deep Reflexes, viz: Knee jerks, Achilles, and Front Tap.

**Facial Reflexes.** (Vide Tables V, VII and VIII.)

The Supra-orbital reflex is present in G.P.I. very frequently exaggerated - (71.25\%). It is also present in Health and Epilepsy.

The consistency with which it is present in Health points to its being a physiological and not a pathological reflex - (Vide Table VI).

The Malar, Chvostek, Depressor Labii Inferioris and Risorius are pathological reflexes which are occasionally present in G.P.I. and Epilepsy, more frequently in the former than in the latter.

The cause of the reflex is evidently a degeneration of the Cerebral Conductors.

Hudovering’s view that the facial responses are due to an overflow of muscular irritability into neighbouring muscles enervated by the same nerve is inconsistent with the dissociation of facial tremors and the facial responses. (18)

(19) Bechterew has examined some facial reflexes in G.P.I. and finds they are exaggerated but he makes no mention of this dissociation.

(20) Weisenberg suggests that Chvostek, Malar, Depressor Labii Inferioris and Risorius are closely allied
and indeed all simply phases of one phenomenon.

This may be so but in the majority of cases the contractions obtained by percussing the various regions were quite different, - a result better explained by regarding each reflex as separate and distinct.

The Chvostek phenomenon, it is true, gave variable results, the following responses occurring:-

(1) Twitching of upper lip.
(2) Twitching of lower lip.
(3) Twitching of both lips.
(4) Twitching of buccal muscles.
(5) Combinations of 1 and 4.
(6) do. 2 and 4.
(7) do. 3 and 4.

Thus it may well be that Chvostek's phenomenon is due to an increased myotatic irritability, the various responses being due to Rudovering's "Overflow."

Corneo-Mandibular.

This reflex is valueless as it is so seldom present. It does exist in a few cases of G.P.I. - .5%. It was not present in the Healthy or Epileptics examined.

In three cases of coma in which the corneal reflex was absent attempts to elicit the corneo-mandibular failed.

The corneo-mandibular and corneal reflex was tested in twenty cases of Epileptic seizure and in no case were either present.
The condition of the pupillary reflexes and the knee jerks in G.P.I. have been so fully dealt with that the results tabulated in this paper call for no comment.

**Front Tap.**

This reflex seems of little value; it only occurs when the knee jerks and Achilles jerks are present, and it is frequently absent in cases where the knee jerks and Achilles are exaggerated. The condition of the tibialis anticus (i.e., wasting) etc., seem to have a distinct effect on the result of the reflex.

**Table V.**

Shows -(1) The general dissociation in some cases of the facial reflexes.

(2) Dissociation of Supra-orbital and other facial reflexes.

(3) Dissociation of the knee jerks and facial reflexes. (Supra-orbital and others).

The curves plotted in Tables I, II, III, IV, V, VI, VII and VIII were prepared in the hope that they might fall into groups which it would be possible to associate with certain definite phases or stages of the disease. This has not been found feasible, but it is noteworthy that Case X (Tables VI), the only really doubtful case of G.P.I. in the series, exhibits a quite singular curve. The case was not eliminated because it had been certified on a balance of probabilities, before subject to this test.
TABLE I.

and the Superficial Reflexes.

Shewing the Relation between Very Exaggerated Knee Jerks

Absent.

Diminished.

Medium.

Exaggerated.

Very Exaggerated.

Knee Jerks.

Plantar.

Cremasteric.

Hypogastric.

Gluteal.

Umbilical.

Sclerotic.
Shewing the relation between very exaggerated knee jerks and the superficial reflexes.

<table>
<thead>
<tr>
<th>Knee Jerks</th>
<th>Plantar</th>
<th>Cremasteric</th>
<th>Hypogastric</th>
<th>Umbilical</th>
<th>Epigastric</th>
<th>Gluteal</th>
<th>Scapular</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diminished.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exaggerated.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE I. (Cont.)**

- Knee Jerks
- Plantar
- Cremasteric
- Hypogastric
- Umbilical
- Epigastric
- Gluteal
- Scapular
TABLE 2

Shewing the Relation between Exaggerated Knee Jers

and the Superficial Reflexes.

Very Exaggerated

Absent

Diminished.

Medium.

Exaggerated.

Knee Jerks.

Umbilical.

Plantar.

Gastreal.

Hypogastric.

Sacral.
and the superficial reflexes.

showing the relation between exaggerated knee jerks

| TABLE 2 (contd) |


Plantar, Cremasteric, Hypogastric, Epigastric.
TABLE 3.

and the superficial reflexes.

Shewing the relation between medium knee jerks

Absent.

Diminished.

Medium.

Exaggerated.

Very Exaggerated.

Knee Jerk.

Plantar.

Gastrocnemius.

Umbilical.

Epigastric.

Gluteal.

Scapular.

Femoral.
TABLE 4

SHOWING THE RELATION BETWEEN LOSS OF KNEE JERKS

PHENOMENON

Dramatized.

Medium.

Exaggerated.

Very Exaggerated.

Knee Jerks:

Planter, Hypeastric, Crenastric.

Umbilical, Gluteal, Scojular.
and the facial reflexes.

Showing the relation of the knee jerks.

Table 5.
TABLE 5. (contd)

Shewing the relation of the Knee Jerks

and the Facial Reflexes.

<table>
<thead>
<tr>
<th>Absent</th>
<th>Diminished</th>
<th>Medium</th>
<th>Exaggerated</th>
<th>Very Exaggerated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knee Jerks</td>
<td>Supra-orbital</td>
<td>Malar</td>
<td>Cheek</td>
<td>Dep. Lab. Inf.</td>
</tr>
<tr>
<td>Corneomandibular</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE 5. (contd)

- Shewing the relation of the Knee Jerks and the Facial Reflexes.

Knee Jerks.
Supra-orbital.
Malar.
Chvostek.
Dep. Lab. Inf.
Risorius.
Corneo-mandibular.
TABLE 5. (contd.)

|-----|-------------------|--------------|---------|-------------|--------|

Knee Jerks.
Supra-orbital.
Malar.
Chvostek.
Dep. Lab. Inf.
Risorius.
Corneo-mandibular.

Shewing the relation of the Knee Jerks and the Facial Reflexes.
TABLE VI
Shewing the relation of the Facial Reflexes in General Paralytics, Health, and Epilepsy.

<table>
<thead>
<tr>
<th>SUPRA-ORBITAL.</th>
<th>MALAR.</th>
<th>CHVOSTEK.</th>
<th>DEP. LABII INFERIORIS.</th>
<th>RISORIUS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very exaggerated</td>
<td>25%</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Exaggerated</td>
<td>32%</td>
<td>44%</td>
<td>16%</td>
<td>0%</td>
</tr>
<tr>
<td>Medium</td>
<td>41%</td>
<td>52%</td>
<td>84%</td>
<td>0%</td>
</tr>
<tr>
<td>Faint</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>10.50%</td>
</tr>
<tr>
<td>Absent</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>39.25%</td>
</tr>
</tbody>
</table>

CORNEA-MANDIBULAR.

<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Present on both sides</td>
</tr>
<tr>
<td>Present on one side</td>
</tr>
<tr>
<td>Not obtained</td>
</tr>
</tbody>
</table>
Table 7. Showing the Average Condition of the Reflexes.

<table>
<thead>
<tr>
<th>Reflex</th>
<th>Average Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knee Jerks</td>
<td>Absent</td>
</tr>
<tr>
<td>Achilles</td>
<td>Diminished</td>
</tr>
<tr>
<td>Front Tap</td>
<td>Medium</td>
</tr>
<tr>
<td>Plantar</td>
<td>Exaggerated</td>
</tr>
<tr>
<td>Cremasteric</td>
<td>Hypogastric</td>
</tr>
<tr>
<td>Umbilical</td>
<td>Exaggerated</td>
</tr>
<tr>
<td>Epigastric</td>
<td>Medium</td>
</tr>
<tr>
<td>Scapular</td>
<td>Very Exaggerated</td>
</tr>
<tr>
<td>Gluteal</td>
<td>Absent</td>
</tr>
</tbody>
</table>

In General Paralysis of the Insane.
TABLE 8

G.P.I. Average condition of the Facial Reflexes.


APPENDIX I.

Notes on the general condition of the eighty patients included in the series.

Case I.

Henry Cousins, aet 48 years.

Case II.

E. Villion, aet 40 years.

Case III.

Morgan Rees, aet 41.
Is exalted, with marked loss of reasoning power. Speech is slurred for difficult test words. Gait is slightly unsteady. Fine tremors of tongue and fingers.

Case IV.

Jas. Purdie, aet 37.
Has had seizure, is very lost and answers questions
irrelevantly, in a slow monotonous manner. Gait is slightly unsteady. Habits clean. No tremors.

Case V.

F. Cavill, aet 47.


Case VI.

Cornelius de Windt, aet 41 years.


Case VII.

Jas. Fury, aet 40 years.


Case VIII.

Henry J. Jones, aet 45 years.
Very demented and exceedingly irrational. Somewhat restless and a difficult patient to examine. Gait steady. Habits clean. No tremors of tongue or hands but slight of face when patient stands to talk. Speech is thick and slurred.

Case IX.

John Grace, aet 33.

Is very dull and demented - was allowed out on a month's trial but was detained at end of trial. Hallucinated occasionally. Gait is a little impaired. Speech is slurred. Tremors of fingers and coarse lingual tremors. Is frequently wet during the night.

Case X.

George Parkinson, aet 38 years.

Marked Tabetic. Is very exalted and declares he has done everything - including swimming the Channel. Had seizures. Is in bed all day. Unable to stand without assistance. Constantly wet and dirty. Co-ordination is very poor. Tremors of facial muscles. Speech slurred and there is marked syllable stumbling. Patient is very emaciated.

Case XI.

E. Cherry, aet 40 years.

Case XII.

G. Heathfield, aet 37 years.

Patient refuses to speak. Is very lethargic. Frequently refuses his food and has to be fed nasally. Refuses to stand - is in bed all day. Coarse facial and lingual tremors. Spasticity of arms and legs. Is wet and dirty.

Case XIII.

Robert Creasy, aet 40 years.


Case XIV.

F.R. Smith, aet 38 years.

Exalted and very deluded, imagines his body is invulnerable and states his skin is so tough, bullets cannot pierce it. Gait is not quite steady and co-ordination is impaired. Speech is slurred. Has marked facial and lingual tremors on attempting to speak or protruding

Case XV.

George Wood, aet 40 years.


Case XVI.

Henry Saltmarsh, aet 42 years.

Is very exalted, "the owner of millions." Demented, excitable, noisy and restless. Was difficult to examine owing to extreme restlessness. Speech slurred. Gait unsteady and co-ordination clumsy. Tremors of tongue and hands. Habits clean.

Case XVII.

J. Brickell, aet 33 years.


Case XVIII.

H. Bigginton, aet 36 years.
Is dull and demented. Gait steady. Co-ordination good. Tremors of tongue and hands. Slight tremors of face when patient stands to talk. Speech is monotonous and slurred. Habits are clean.

Case XIX.

John Franklin, aet 33 years.

Is very exalted, is a Persian King and is going to make a universe entirely of wine. His wife is forty feet high, etc. Noisy, restless and excitable. Tractable when examined. Old tubercular hip on left side with 1½ inches shortening. Co-ordination good. Habits clean. Articulation unimpaired. No tremors.

Case XX.

F.J. Williams, aet 35 years.


Case XXI.

R.I. Darlasson, aet 36 years.

Has had seizures. Is exalted and has the most extravagant ideas of grandeur. Restless and confused. Habits defective. Gait is unsteady and co-ordination is poor,
fumbles whilst attempting to button his waistcoat. Speech slurred. Has paralysis of lower half of right side of face. (Supra-nuclear). Marked flat foot.

Case XXII.

John Thomas MacMullen, aet 35 years.


Case XXIII.

John J. Maguin, aet 36.


Case XXIV.

Philip Adams, aet 34 years.

Demented, restless and resistive. Absolutely refused to be examined on the first three attempts but was fairly tractable on fourth attempt. Speech is thick and slurred. Gait unsteady. Co-ordination impaired. Lingual tremors. Spasticity of arms and legs. Habits defective.
Case XXV.

Thomas Joseph Wilson, aet 35 years.

Demented and exalted - "is very comfortably off having an income of £40,000 a year and a lot of property." Some unsteadiness of gait, best noticed when patient turns quickly. Co-ordination good. Speech - defective articulation of test words. Lingual and facial tremors. Habits clean.

Case XXVI.

Fred Glide, aet 34.


Case XXVII.

John Goddard, aet 40.


Case XXVIII.

Walter Kelly, aet 45 years.

Demented and slightly exalted. Gait reeling and patient is scarcely able to walk without support. Co-
ordination - marked impairment. Coarse lingual tremors, also tremors of hands. Tremors of face when speech attempted. Speech slow and slurred. No control of bladder and rectum. Slight spasticity of arms and legs.

Case XXIX.

Joseph Lockwood, aet 36 years.

Dull, demented and emotional. Speech is slow and slightly slurred. Fine lingual and facial tremors. Gait firm and steady. Co-ordination not impaired. Is frequently wet especially during the night.

Case XXX.

William Wakefield, aet 41 years.


Case XXXI.

Thomas A. Nash, aet 31 years.

Has had seizures. Demented, childish and emotional. Gait steady. Co-ordination good. Marked facial and lingual tremors. Speech - articulation is not clear
although there is no actual slurring. Has fine fibrillary tremors of thigh muscles. Habits are clean.

---

Case XXXII.
Richard Williams, aet 44.

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Case XXXIII.
W. Cowell, aet 39.
Is dull and demented, scarcely ever speaks and occasionally has to be fed nasally. Speech is slow and slurred. Gait steady. Co-ordination fair. Is wet and dirty.

---

Case XXXIV.
Thomas Shephard, aet 39.
Is very demented and dull, approaching the paralytic stage. Gait very unsteady. Co-ordination - marked impairment. Speech slow and slurred. Tremors of face, tongue and hands. Wet and dirty.

---

Case XXXV.
Herbert Barnett, aet 42 years.
Is demented. Speech is slightly slurred and he is
inclined to drawl his words. Gait is unsteady. Coordination is fair. Slight facial and lingual tremors.
Habits clean.

Case XXXVI.
Philip Hood, aet 30 years.

Case XXXVII.
Jas. C. Lay, aet 46 years.
Is exalted, excitable and demented. Gait steady. Coordination good. Is occasionally wet at night. Speech is a little indistinct. Facial and lingual tremors.

Case XXXVIII.
J. Langmaid, aet 40 years.

Case XXXIX.
J.W.Kirk, aet 42 years.
Very demented and very exalted. Talks about the millions
he possesses, etc. Gait is very tottery. Patient frequently falls. Co-ordination is poor - unable to button his waistcoat. Is wet and dirty. Speech is slow and slurred and on attempting test words - syllable stumbling. Facial and lingual tremors. Coarse tremors of fingers.

Case XL.

J. P. Wilday, aet 38 years.

Is very demented - unable to walk without support. Wet and dirty. Has to be hand fed. Spasticity of arms and legs. Patient has had seizures. Marked facial tremors on attempting to talk.

Case XLII.

C. Gotts, aet 38 years.


Case XLII.

J. Vickery, aet 47 years.

A well marked paralytic. Never speaks, is hand fed with difficulty. Lies in bed with knees fully flexed and thighs flexed on abdomen. Marked spasticity of arms and legs. Constantly wet and dirty. Coarse facial tremors.
Case XLIII.

Charles Woods, aet 32 years.


Case XLIV.

Jas. Whitfield, aet 44 years.

Is very demented and has some exalted notions of his power as a butcher. Gait is unsteady and co-ordination poor. Tremors of face, tongue and hands. Speech is very slow and slurred. Is frequently wet.

Case XLV.

Arthur Grace, aet 36 years.


Case XLVI.

William Bunn, aet 37 years.

Dull and demented. Able to walk alone but extremely tottery. Co-ordination very poor - unable to dress himself. Speech is very tremulous. Marked facial lingual and hand
tremors. Is wet and dirty.

Case XLVII.

J. Tucker, aet 34 years.

Is dull and demented. Very exalted but reserved
and only talks of his "fabulous wealth" when questioned
about it. Has had seizures. His complexion is pale and
Co-ordination good. Speech is thick and he fails utterly
to articulate such words as "initiative" and "innumerable."
Habits are clean.

Case XLVIII.

William Sewell, aet 36 years.

Was an extremely difficult patient to examine. Is
very excitable, noisy, and continually shouting out
about the marvellous feats he is going to perform. Has
had seizures. Gait is unsteady and co-ordination poor.
Has facial, lingual and hand tremors. Speech is slurred.
Habits filthy.

Case XLIX.

T. Millard, aet 44.

Is demented and exalted. Gait unsteady. Co-ordin-
ation poor. Facial, lingual and hand tremors. Speech
is slow and slurred. Is frequently wet both day and night.
Case I.

H. Wilson, aet 38 years.


Case II.

George Lock, aet 42 years.

Is very dull and demented. Is confined to bed - unable to stand. Wet and dirty. Speech slow and tremulous. Tremors of face on attempting to speak. Coarse lingual tremors.

Case III.

Charles Osborne, ...

Is very demented and dull. Is paralytic - unable to stand. Wet and dirty. Tremors of face on attempting to talk. Lingual tremors, and fine fibrillary tremors on front of thighs when the legs are moved.

Case III.

Charles Evans, aet 41.

Case LIV.

Josiah Franks, aet 36 years.

Is very dull, demented and childish. Has a mania for collecting rubbish. Is very tottery and frequently falls. Is up all day. Habits defective. Speech is slow and slurred. Co-ordination very poor. No tremors of face, etc.

Case LV.

Robert Davis, aet 40.

Very demented, unable to stand. Can only swallow liquids. Constantly wet and dirty. Spasticity of arms and legs. Voice is low and inarticulate. Facial and lingual tremors on attempting to protrude tongue. Has had several seizures.

Case LVI.

A. W. Woods, aet 37 years.

Is demented and mildly exalted. Gait is a little unsteady. Co-ordination fair. Facial, lingual and hand tremors. Speech is slow and test words are slurred. Complexion is greasy and there is marked loss of facial expression.

Case LVII.

H. Duberry, aet 39 years.

Dull and demented. Gait unsteady. Co-ordination

Case LVIII.

J. Cameron, aet. 45 years.

Well marked dementia. Incoherent and impulsive at times. Lingual and facial tremors. Speech is exceedingly slow and words are slurred. Gait is a little unsteady. Co-ordination impaired. Habits defective - is frequently wet.

Case LIX.

E. Childs, aet. 38 years.

Is very demented. Unable to stand alone. Co-ordination extremely poor. Habits defective, constantly wet and dirty. Speech slow and almost inarticulate. Marked facial or lingual tremors when any attempt is made to speak or protrude the tongue. Fibrillar twitching of thigh muscles.

Case LX.

D. Ross, aet. 40.

Is very exalted - has a complete set of joiner's tools made of diamonds, etc. Is demented and usually hallucinated. Trephine wound on left frontal region. Gait steady and co-ordination good. Speech is slightly
affected and slurring is only noticed after patient has
talked for some time. Coarse lingual tremors and fine
tremors of fingers. Habits clean. Has had seizures.

Case LXI.

R. Wild, aet 43 years.

Confined to bed - unable to stand. Dull and de-
mented. Wet and dirty. The voice is tremulous and the
words inarticulate. Any effort to speak is accompanied
by tremors of the facial muscles. Coarse lingual tremors.
Marked spasticity of arms and legs.

Case LXII.

Jas. Males, aet 42 years.

Co-ordination fair. Speech is slurred. Face fat and

Case LXIII.

Frank Lawrence, aet 43 years.

Is very dull and demented. Unable to stand. Co-
ordination extremely poor. Speech is slurred and tremu-
rous. Marked facial and lingual tremors. Wet and dirty.
Spasticity of arms and legs.
Case LXIV.

A. W. Scott, aet 41 years.


Case LXV.

W. Holmes, aet 45 years.


Case LXVI.

R. Hall, aet 44 years.


Case LXVII.

Ada Thomas, aet 43 years.

Is simple-minded, emotional, irrational and her
memory is impaired. Gait is slightly unsteady. Co-
ordination fair. Facial and lingual tremors. Speech
slurred and she omits syllables. Is frequently wet but
very seldom dirty. Has had seizures.

Case LXVIII.
Isabella Butt, aet 54 years.
Is weak-minded, childish, elated and irrational.
Gait unsteady. Co-ordination fair. Facial and lingual
tremors. Speech slurred and hesitating. Is occasionally
wet.

Case LXIX.
Mary Alexander, aet 35 years.
Demented, exalted and excitable. Slight unsteadiness
of gait. Co-ordination fair. Fine lingual and hand
tremors. Speech slurred and very indistinct. Is defective
in her habits.

Case LXX.
Annie Howe, aet 39 years.
Demented, restless and excitable. Gait is unsteady.
Co-ordination impaired. Facial, lingual and hand tremors.
Speech slow and slurred. Is wet and occasionally dirty.
Has had seizures.
Case LXXI.

Louisa Russel, aet 52 years.

Is demented, self-satisfied and irritable. Gait is tottery and co-ordination poor. Has lingual and hand tremors. Speech is slurred, and she misplaces syllables. Frequently wet but seldom dirty.

Case LXXII.

Sarah E. Alderman, aet 49 years.


Case LXXIII.

Violet Graham, aet 34 years.

Is demented, excitable and frequently has furious outbursts of passion. Gait is very unsteady and she frequently falls. Römergism well marked. Co-ordination very poor. Facial, lingual and hand tremors. Speech is very slurred. Frequently wet and dirty. Has had seizures.

Case LXXIV.

Sarah Alice Fletcher, aet 50 years.

Her face is pale, fat, greasy and expressionless. Is demented, exalted, restless and excitable. Gait is
unsteady. Co-ordination is impaired. Lingual, facial and hand tremors. Speech is exceedingly slurred, almost inarticulate. Wet frequently and dirty occasionally.

Case LXXV.

Sarah Radcliffe, aet 40 years.

Is dull and demented. Confined to bed. Unable to stand, and unable to feed herself. Facial and lingual tremors. Speech is tremulous, slow and slurred. Is wet and dirty.

Case LXXVI.

C. Bridgens, aet 32 years.

Is very demented and dull. Rarely talks and when she does her speech is slow and slurred. She is restless and resents examination. Is just able to stand unaided. Co-ordination very poor. Fine facial and coarse lingual tremors. Is wet and dirty.

Case LXXVII.

E. Knight, aet 33 years.

Is fatuous and exalted. Memory impaired. Gait is steady. Co-ordination good. Has well marked lingual tremors. Fine hand tremors, and facial tremors appear after talking for some time. Speech - articulation appears unimpaired till patient has spoken for some time, then there is slurring of words. Habits clean.
Case LXXVIII.

H. D. Wilson, aet 50 years.

Is demented, mildly exalted, hallucinated and irrational. Gait is steady. Co-ordination is fair, the movements being slow and somewhat clumsy. Has facial, lingual and hand tremors. Speech is slow, syllables are misplaced and slurred. Is occasionally wet at night.

Case LXXIX.

Charles Lehenner, aet 45 years.

Weak-minded, very exalted and childish. Gait is very unsteady. Co-ordination very poor. Marked lingual, facial and hand tremors. Speech is very tremulous and slurred. Is wet occasionally.

Case LXXX.

N. Triplow, aet 40 years.

APPENDIX II.

ANALYSIS of 100 Cases, Gordon.-
in patients without any nerve lesion.

<table>
<thead>
<tr>
<th>No response</th>
<th>Flexion</th>
<th>Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1 (slight)</td>
<td>(1) LR. K Ji. P. i F.</td>
</tr>
<tr>
<td>2</td>
<td>½ L</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>½</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>S. Flex. 4 outer toes ½ L</td>
<td>(2) One-legged man.</td>
</tr>
<tr>
<td>5</td>
<td>Slight flex. 4 O.T.</td>
<td>T. K Ji. P. i F.</td>
</tr>
<tr>
<td>6</td>
<td>Slight flexion</td>
<td>(slight spasticity).</td>
</tr>
<tr>
<td>7</td>
<td>Slight flex. 4 O.T. ½ R</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Slight flexion</td>
<td>(3) Extension great toe</td>
</tr>
<tr>
<td>9</td>
<td>Slight flex. 4 O.T.</td>
<td>Left ½</td>
</tr>
<tr>
<td>10</td>
<td>Flex. Big toe ½ R</td>
<td>Knee jerks ii.</td>
</tr>
<tr>
<td>11</td>
<td>Slight flex. 4 O.T. ½ R</td>
<td>Plantar 0.</td>
</tr>
<tr>
<td>12</td>
<td>Flexion 4 O.T.</td>
<td>(no movement of toes).</td>
</tr>
<tr>
<td>13</td>
<td>Slight flex. 4 O.T.</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Flex. all toes</td>
<td>(4) Extens. great toe (slow)</td>
</tr>
<tr>
<td>15</td>
<td>Slight flex. all toes</td>
<td>Knee jerks i.</td>
</tr>
<tr>
<td>16</td>
<td>Slight flex. all toes</td>
<td>Plantar. Flex. (brisk,</td>
</tr>
<tr>
<td>17</td>
<td>Flex. all toes</td>
<td>ticklish).</td>
</tr>
<tr>
<td>18</td>
<td>Flex. all toes &amp; R.</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Flex. all toes</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Slight flex. 4 O.T. ½ L</td>
<td>(5) L. Extens. all toes</td>
</tr>
<tr>
<td>21</td>
<td>Slight flex. 4 O.T.</td>
<td>Rt. Flexion all toes</td>
</tr>
<tr>
<td>22</td>
<td>Slight flexion</td>
<td>Knee jerks i.</td>
</tr>
<tr>
<td>23</td>
<td>Slight flexion</td>
<td>Plantar Flexor response</td>
</tr>
<tr>
<td>24</td>
<td>Slight flexion</td>
<td>both feet.</td>
</tr>
<tr>
<td>25</td>
<td>Slight flexion</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Slight flexion</td>
<td>(6) Slight Extens. 4 O.T. ½ R</td>
</tr>
<tr>
<td>27</td>
<td>Slight flexion</td>
<td>Knee jerk i. Plant. Flex.</td>
</tr>
<tr>
<td>28</td>
<td>Slight spreading out of</td>
<td>(brisk).</td>
</tr>
<tr>
<td>toes &amp; attempt Flex.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Slight attempt Flexion.</td>
<td>(7) Extens. 4 O.T. ½ R, K J</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>T., Plantar flexion.</td>
</tr>
<tr>
<td>Total. No Response</td>
<td>59.</td>
<td>Extensor Response 11</td>
</tr>
<tr>
<td>Flexor Response</td>
<td>one or both 30</td>
<td></td>
</tr>
<tr>
<td>Extensor Response</td>
<td>11</td>
<td>x 100.</td>
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"Graphic Study of the Plantar Reflex in Health and in certain affections of the Pyramidal System."


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"Corneo-mandibular reflex."


"Achilles and Front Tap."


"The Superficial and deep reflexes and tremors of the fingers in Neuroasthenia."


"Supra-orbital Reflex."


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