CHOREA and its TREATMENT with FORMIC ACID

being a Thesis for the Degree of Doctor of Medicine

by

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Introduction.

The subject of this Thesis is a disease commonly known as St Vitus dance. The latter complaint owes its name to a dancing epidemic in the 14th century which was propagated by imitation and to which the one unfailing remedy seems to have been a visit to the shrine of St Vitus - Chorea Minor, the ordinary acute chorea is of course quite separate from such mere hysterical outbursts and has to be treated by more heroic methods. There is another form of chorea which is again due to hysteria, and to which the name Chorea Major is given, and this has not been considered - under this latter classification falls Salaam Convulsions, Saltatory, spasms, etc.

Different definitions have been given for the general symptomatology of the disease that of Taylor being perhaps the most concise, namely "the name given to a patient suffering from irregular involuntary movements of any part of the body and limbs."

Osler describes it as "a disease characterised by irregular involuntary contractions of the muscles, a variable amount of psychical disturbance, and a remarkable liability to acute endocarditis."

MORBID /
MORBID ANATOMONY.

Nervous System.

The Nervous System has been carefully examined microscopically, and macroscopically in fatal cases, and no lesions have been found constantly enough or of such a nature to account for this disease - Endocarditis being so often present suggests embolic processes, and small areas of cerebral softening have been found, as has Thrombosis of Cerebral vessels, but this is rare.

Again changes have been noted in nerve cells, vascular dilatations and distended perivascular sheaths, with added leucocyte accumulations and increase of connective tissue. These phenomena were noted in the brain, spinal cord, and peripheral nerves, but they in themselves are not sufficient to account for the symptoms in Chorea, nor can they be said to be specially Choreic. Some of them, however may be indications of an influence at work on the nervous system, indeed, they might easily be ascribed in part, to the extreme muscular excitement preceding the patient's death.

Raymond in 79 Autopsies found
(1) Hypaeraemia most common.
(2) Next softening from embolic plugging of Cerebral Vessels.
(3) Lastly Chronic Encephalitis.

Dana /
Dana in thirty-nine autopsies showed in 16 cases pronounced hypaeraemia.

Of the remaining 13 cases, some shewed punctiform haemorrhages, others perivascular exudations, and others again foci of softening. In one case he found an embolus present. All of these changes were more often present in the region of the Basal ganglia than elsewhere.

**Motor Neurons of Cerebral Cortex.**

Turner, in three cases, found the pyramidal cells enlarged and having cloudy protoplasm.

Dana found, in six cases, these cells in a state of hyaline degeneration.

**Peripheral Nerves.**

Elischer found, in a few cases, hyaline swelling of axis cylinders with increase of interstitial tissue.

**Micro Organisms.**

Pianise found, in the blood of patients affected with chorea, organisms which grew in cultures. With these he inoculated animals giving them convulsions. A pure culture from the cord of these animals was then made, the same organisms being again present; but these experiments have not been confirmed.

Staphylococci, and Streptococci, have also been separated from the blood of choreic patients.
Cardiac Lesions.

The heart also often shews endocarditic changes mainly in the form of minute granulations on the mitral valve. These are rarely septic in nature. The aortic valve is more rarely affected, and occasionally both valves suffer.

It is noteworthy that these changes do not necessarily occur in those cases, which are said to be Rheumatic in origin.

Pericarditis is also rarely found.

The pathological data being so varied and contradictory, localisation of the area at fault is extremely difficult, but from consideration of the facts:

1. That an attack may originate in fright;
2. The aggravative effect on movement by will effort;
3. Cessation of movement during sleep,
4. Phenomena of Hemi-Chorea, especially in consideration of the fact, that the muscles of the trunk and face on both sides, are associated with the movements of arm and leg, on one side only,
5. Delirium and maniacal delirium in cases of Chorea gravis.

The brain is evidently the seat of the disturbance.
turbance and probably the fault lies in the cortical motor cells.

The repeated failure in many cases, to find constant lesions, makes one sceptical as to belief in its being embolic, thrombotic or degenerative in nature. Added to this, the fact that some severe emotion has such an undoubted causal influence, excludes the fact, that any pathological change, must be necessarily present.

That it is purely functional in origin, is rendered equally unlikely, when one considers that endocarditis is found in at least one half (Osler) of the authentic cases of this disease.

We are therefore driven to the theory, that both nervous and cardiac changes, are due to the action of some unknown virus or toxin circulating in the blood. This theory is strongly confirmed by the consideration that other convulsive disorders, especially hydrophobia, and Tetanus, are explained not by gross pathological changes, but by the action of a definite organism on nerve cell structures.

All three of these diseases shew involuntary muscular contractions, evidently arising from some central disorder, and, they have in common, a short period of illness with rapid exhaustion - in Chorea, and hydrophobia one also often sees the marked mental /
6.

mental symptoms, and the rapid emaciation. Further, one sees occasionally in all these cases, just before death, (10-24 hours) an entire loss of spasmodic movements.

Another fact that leads one to still further accept this, is seen in the Etiology, where Chorea so often follows some acute infective disease.

The theory that Chorea is merely a functional disorder is difficult to explain, but such causes of the disorder as fright and severe emotion, may, by their depressing and exhausting effect on the cells, produce a good nidus for a toxin to react.

Diagnosis.

This as a rule is extremely easy. The disease is so essentially typical in its character that there is little chance of confusion, but one must exclude the following diseases:

1. **Multiple cerebral sclerosis.**

   Here the onset is in infancy. There is impaired intellect, increased reflexes, at times rigidity; and its chronicity distinguish it from Chorea.

2. **Friedreich's Ataxia.**

   In this complaint the Scoliosis, scanning speech, early talipes and Nystagmus all separate it from Chorea.

3. /
3. **Hysteria.**

In Chorea Minor the differential diagnosis is at times difficult, but the few cardinal symptoms of hysteria, and the rhythmic nature of the movements, are generally sufficient to clear up the nature of the case.

4. **Insanity.**

In some severe cases where mental symptoms predominate, a case may easily be mistaken for insanity; and in rare cases of paralytic type poliomyelitis may be erroneously diagnosed.

**Previous Treatment.**

The first essential point is to see that the patient gets absolute rest, in fact, some authorities state, that this is sufficient to cure the disease. Anything that may excite or annoy the patient must be removed, mental as well as bodily rest, being essential. If there is any direct cause, such as worms, or pregnancy, these defects must be remedied. In children we must be specially careful that this complaint leads to no ridicule from their companions, and such patients must in all things be led and not driven. Hygenic conditions must be attended to, the patient being given as much fresh air and warmth, as possible.

Food /
9.

Food at first should be restricted to a milk diet - later it must be nourishing, the patient's appetite being strengthened, if necessary, by suitable drugs.

Treatment by Drugs.

Many drugs have been used in this disease, but at the present time the following are most commonly prescribed: Arsenic; strychnine, Cimicifuga; antipyrin; Iron and Zinc; and the Salicylates.

None of the above are entirely satisfactory, the best results being probably obtained from the use of arsenic. This drug according to Osler is given without any specific action, and yet has a good effect on the general state of nutrition. Certain cases however, seem to derive no benefit from it; added to this it is cumulative, and tends at times, even with slowly increased doses, to upset a digestion already hypersensitive, from the disease it is attempting to cure. Again peripheral neuritis is always a possibility, and there are reported cases of death from this misfortune. Finally it also tends to give rise to brown pigmentation of the skin, and in repeated doses, is said to diminish the Glycoginic reaction of the liver (Hale White.)

The drug is given in the form of liquor arsenicalis. The usual doses one starts with is from 2-5m. According /
According to the age of the patient three times a day, the dose being increased daily by 1m, till as much as 25m may be prescribed, thrice in the day.

Strychnine is also greatly used. This drug does not act on the cerebral cortex, as convulsions have been caused when the spinal cord was separated from the brain; nor by excitation of the motor nerves or muscles, for convulsions after a toxic dose are absent in a limb whose spinal anterior nerve roots have been severed.

Neither do they depend on the stimulation of sensory nerves, for convulsions occur even if the posterior nerve roots are cut. The action must therefore be spinal, and this is proved by the fact that if a probe be passed slowly down the cord of an animal convulsed by strychnine, the convulsions will gradually cease from above downwards. Strychnine therefore increases the power of the anterior cells of the spinal cord.

Strychnine also acts on the heart directly by stimulating the motor ganglia. The blood pressure is raised partly by this action and also by its action on the vaso-motor centre.

From the pathological standpoint, strychnine should be of service in chorea, but its use is attended usually, with most unsatisfactory results. It is recommended to be given in large doses till toxic symptoms appear, when the drug is stopped for a few days.
few days and then again proceeded with. The cases that seem to do best thus treated are those in which pareis is exists.

Bromides.

These are also given in this disease, as is chlortal, acting as general depressors of the nervous system. They are specially useful in the early stages of the case, when there are very marked spasms which are tending to wear out the patient's strength, and preventing him sleeping at night. The action of the bromides on the muscles themselves is also depressant, helping to control the violent movements present.

Salycilates.

These have also been recommended for the cure of this disease, presumably on the ground that the Diplococcus Rheumaticus is the causal feature of the complaint, but the results from its use are mainly negative.

Antipyrin.

This is also used, and seems specially useful in children, the dose advocated rising daily from 10 grains three times a day to 20 grains thrice in the day. Its action is also depressant in nature.
Iron and Zinc.

Iron and Zinc compounds owe their use to being general nerve tonics. They are useful adjuvants, but, by themselves are of little use.

Massage, Electricity, and later Gymnastics, are all of use in the after treatment of the complaint.

All the above drugs, however, frequently fail, and Clement in 1904, after publishing some experimental work done with Formic Acid, first suggested from his results, that this drug might be of use in Chorea. He personally did not experiment in Chorea, but, it was from his successes with analogous diseases, that led to the suggestion of its use.
FORMIC ACID.

History.

Formic Acid occurs in concentrated form in the hairs of certain caterpillars, in stinging nettles, and in the bodies of ants. As a stimulant, its properties have for centuries been known to the Chinese and Indians, inducing in the latter a state of high exaltation known as "Running amok". The Arabs also in ancient times, use to feed their horses before going on a long journey with the drug, giving their steeds an extra endurance much appreciated by these horsemen. As far back as 1697, in the Pharmacoplex Universelle de Lemery, we have mention of Formic Acid, where, it is extolled as a spirit reviver and a dissembler of the vapours.

In the 17th century it was frequently mentioned as a general tonic, and in 1885 Kocwacs (Contralb. f. Klin) describes the Acid as acting on nerve cells, and motor nerves.

Till the present time the drug seems to have fallen into obscurity, though it was, and still is, one of the official preparations in the Swiss Pharmacopeia.

Chemistry.

The drug is to be obtained in the following manner:

Equal /
Equal parts of Anhydrous Glycerin (or mannite) and crystallised oxalic acid are heated in a retort to 75% till Carbonic Acid is no longer given off. To the retort, more oxalic acid is added, and the distilling process then proceeded with. This process may be repeated several times.

The distillate thus obtained contains 55% of the acid, and this is now redistilled over anhydrous oxalic acid till a 75% solution of the acid is obtained. To this is added Sodium Carbonate to neutralise it, the dry sodium salt being distilled with anhydrous oxalic acid when a 99% acid is obtained.

To remove the remaining particles of water, distillation is further carried on over Zinc Anhydride, and the acid is further subjected, several times, to a freezing mixture.

The crystals are then separated from the liquid and allowed to melt, or a dry lead or copper salt is heated at 130° in a current of dry hydrogen Sulphide, but in the latter case, the product is apt to be mixed with sulphur products (Lorin).

In the process given above, the crystallised oxalic acid decomposes into water, Carbonic acid, and Formic Acid. The latter combines with the glycerin to form monoformine, which is subsequently broken up by water into Glycerin and Formic Acid.
The following is the equation:

\[
\begin{align*}
C_3H_5(OH)_3 + C_2O_4H_2 & = CO_2 + H_2O + C_3H_5(OCHO) \\
C_3H_5(OCHO) + H_2O & = C_3H_5(OH)_3 + HCOOH
\end{align*}
\]

LUBIG, in a description of the drug, states it is solid below 0°C, and exhibits the phenomenon of superfusion. It is a colourless liquid of sp gr. 1.060 - 1.063. The preparation is mixable with water, and contains about 25% of pure acid. The internal administration of preparations containing formic acid has for centuries figured among household remedies where these preparations were thought of great value not only as tonics, but for their diuretic qualities.

In 1903 Clément, in a paper read before the Société Nationale de Médecin de Lyon, brought forward experimental work to bear out his statements as to the efficiency of the drug. His observations shewed Formic Acid to be a powerful stimulant of muscular action, and in its tonic action to have properties closely allied to coca, and caffeine. Internally, formic acid dispels the sensation of general lassitude, which is a characteristic experience of nervous individuals when awakening in the morning.

Experiments controlled by the Ergograph and dynameter, shewed, the muscular power undergoes marked elevation after two days treatment, whilst bodily exercises, mountain climbing, and various other sports /
sports are undergone with marked diminution in the amount of fatigue. Clement administered the drug in doses of 8 to 10 m. taken four times daily in a little aerated water.

Krull (München 1903) shewed that formic acid, injected subcutaneously, induced an improved state of nutrition, an increased power of resisting germs, and an increase in the patient's weight.

Clement (Tribune Medicale 1904) reported, that after the administration of formic acid, the subjects experimented with registered with the ergograph, ten periods of work instead of five, as before administration. In the ten periods of work, he realised, with the ergograph, 479 of the weight of five kilogrameters as opposed to 132. The total work done was 106 kilogrameters, while before the administration of formic acid, the patient could only do 21 kilogrameters.

He further stated that the effect of the drug on the muscle tissue was very lasting, and persisted for eight to ten days after administration, and that the muscle experimented with shewed little painful sensation to the operation, so that a muscle so stimulated recovered its energy very quickly. This tonic muscular action he affirms, acts not only on striped but also on unstriped muscles; and thus stimulates the heart and vessels; the diaphragm and the muscular coats of the intestine, in fact all muscles concerned in the general bodily functions. The blood pressure is /
is, however, not raised, due no doubt to the vaso dilating action of the formates (Huchard.)

In 1904 Clément further reported two cases of Tremour due to muscular atony. These patients were unable to lift a glass of water without spilling the contents. The condition was of eighteen years' standing, and he states that after two days marked relief was given when treated with Formic Acid.

L. Garrique (Semaine Medicale 1904) shewed that the drug in the form of Calcium and sodium formate improved not only the strength of the patient, but stimulated and increased the appetite. He further stated that the drug provided it was taken with food did not cause any gastric disturbance if taken over a long period.

Huchard (Bulletin de l'Academie de Medecine 1904) gives the result of a series of experiments which extended over four months conducted with Mossob Ergograph in which the formate of soda was used, 3 grms. in the 24 hours being the maximum dose.

He first experimented with himself and found that after five days his muscular force had risen from 8 kilogrameters 750 to 30 Kilogrameters 650, his muscular force being thus tripled in that period.

He had equally successful results in a case of tubercule, in one of heart disease, and in a case of catarrhal pneumonia - added to this he experimented on 11 of his colleagues with confirmatory increase
in their muscular contractions as evinced by the ergograph.

Huchard lays special stress on the action of the drug as a diuretic (increasing the amount of urine and diminishing the albumen in nephritis, and a heart stimulant in a later paper (Annales de Pharmacie 1904.)

Rochen (Journal des praktiens 1906) claims for the drug a definite Germicidal action; his work was confined to the Bacillus of Pneumonia, where he had excellent results.

Stern (Journal of the American Medical Association 1906) used formic acid with success in intestinal toxaemia, giving 2.5 min. of 25% solution every hour.

D. H. Croom (Edin. Medical Journal 1906) had equally good results, using the acid preparation in diptheria, the resultant trouble with post diptheretic paralysis being much reduced and the heart being stimulated without any rise of blood pressure. Also the mortality was decidedly decreased.

Goodall in a paper published in the Edinburgh Medical Journal 1909 was strongly adverse to the use of the drug. His results, plus experimental data, went to prove that the drug was not only innoxious but toxic in its action,
In reply to this we would like to point out that his work was mainly done with the formates. He, however, gave no evidence that the salts of formic acid were pure (as is well known potassium formate is extremely difficult to prepare in a pure form, as it is highly deliquescent by nature, and also powerfully hygroscopic) and it is this salt he specially blames for being toxic.

Again the mono-atomic homologous series of fatty acids with the general formula \( C_2H_2NO_2 \) have, like the active principles of say the Atropinae i.e. Atropine, Hyoscine, Scopolamine etc., a general affinity in physiological action; hence it is not at all likely that potassium formate will differ greatly, in this action to potassium acetate, i.e., \( K \text{COOH} \). Its toxic or Tonic action in the pure state will depend on the power of regulating the dose to its right proportion.

Added to this the patients Dr Goodall experimented upon, were prepared for, and knew about, the tests.

Further the effect on a healthy and a diseased person, must, to a great extent differ and results cannot be trusted in a discussion relating to pathological structures.

**Synopsis of Previous Results.**

From the foregoing experimental, and clinical work, by well known authorities the drug is claimed to be -
1. A powerful stimulant of muscular action - an action which is lasting in character.

2. A stimulant to the vascular system without any rise of blood pressure.

3. A specific to muscular tremors due to atony.

4. A non-toxic and non cumulative drug.

5. A germicide.

6. A drug which may be given without fear of upsetting the digestive organs.

7. A general stimulant to the whole body increasing the appetite and the patient's feeling of well being.

It was owing to the above qualities and to the suggestion of Clement in 1904 that formic acid was first tried in Edinburgh in Chorea, the result of which is shewn in the following cases. The acid itself was used, none of the cases being treated with the formates. The drug given in this form is absorbed probably as the salt of sodium.
CASES.

Seven Cases treated while House Physician in Royal Infirmary, and
Four Cases which, by kind permission of the Physician in charge, I have carefully watched since that date.
CASE I.

D. G. - 22- A Watchmaker.

Family History.

Father and Mother alive and healthy - no rheumatic history.

Patient is an only child - no brothers or sisters have died.

Home surroundings good, but he is confined to a small room during work hours, when hygienic measures are not carefully regulated.

Smokes very lightly, rarely takes alcohol, takes tea twice a-day.

Previous Illnesses.

Brain Fever - as a child.

No history of Rheumatic Fever, or Erythema Nodosum

Denies specific disease or Gonorrhoea.

Present Illness.

Began a month before admission. He was working hard overtime and got a chill, to which he attributes his present state. The movements first began in the right arm, and spread to the other extremities /
tremities within twenty-four hours. He did not give up all work for ten days, but finding he was getting worse went to bed for a fortnight. He was admitted to the Deaconess, and after three days transmitted to the Royal Infirmary.

Patient is a pale, aenaemic man, of evidently rather a neurotic temperament. He is never at rest in bed, his clothes having to be continually rear ranged to keep him covered.

- **Height** - 5ft. 6in.
- **Weight** - 9st. 12lbs.
- **Tempr.** - 99.

**Nervous System.**

Marked choreiform movements of both extremities, and of the body and face are present. Patient is never still and is continually having to be watched as the movements are so violent that he is in constant danger of falling from his bed. He complains of no pain or abnormal sensation. His speech is indistinct, the words used being 'mouthed' in a peculiar manner. While speaking he frequently bites his tongue. His mental system is distinctly abnormal, being continually worried by his fellow patients.
patients, and threatening to kill them for imaginary trifles.

No change from the normal in his sensation to heat, pain and cold.
Muscular sense good.
No Ocular Phenomena.

Plantar Flexion present, and active. Cremastic and Abdominal reflexes lively. Knee jerks present, No exaggeration. No Clonus to be elicited.
Patient is extremely irritable, as noted, otherwise his mental condition is quite normal.

He sleeps well, and when asleep his movements disappear entirely.

Circulation.
Nothing to note except that heart is beating a little irregularly and quickly. There is a very slight roughing of the first sound in the mitral area, scarcely amounting to a murmur.
Other Systems show nothing noteworthy.

Progress Notes.
Under treatment patient rapidly improved. At first he had to be fed with a spoon, being totally unable
unable to feed himself. For three days after admission he had to be tied to his bed, as he not only was in danger of falling out of bed, but tried to jump through the window.

After a week's treatment with Formic Acid the movements were much diminished, he could then with difficulty feed himself, and his mental condition was distinctly better.

On the first day he had a slight exacerbation, but this quickly subsided.

Three weeks after admission patient was absolutely free from all movements, and went out a fortnight later with no recurrence of symptoms.

It may be stated that this case was treated with Arsenic for three weeks before admission, but whether the Doctor's orders with regard to quiet were carried out, it is impossible to say.

Treatment.

Patient was given absolute rest (behind screens for a week) and given ten minims of a 25% Solution of Formic Acid 4 hourly.
CASE II.


Family History.

Eight in family, all of whom are robust with the exception of one sister aged 15, who is extremely nervous and generally weak.

Father and Mother alive and well.

No history of antecedent Rheumatic trouble.

Food and home satisfactory. She sleeps with two sisters in a well-ventilated room. Food plain but good.

Previous Illnesses.

Suffered slightly with growing pains.

Never Rheumatic Fever.

Present Complaint.

The mother states the child has been very nervous and self-centred all her life. A week before admission the patient was punished at school. She was very frightened, and that night the mother noticed she was very fidgety. These movements during the week have got worse, so she was brought to the Infirmary.

On enquiry there is a history of a friend with the same complaint, with whom she very often plays.

Patient /
Patient is rather a thin emaciated child. The left side only is affected, the movements being especially marked in the left arm.

Weight - 3st. 12½ lbs.
Height - 4ft. 1½ in.
Tempr. - 99½.

Nervous System.

Patient complains of no pain. Movements in left side are markedly spasmodic and out of patient's control. The left hand, when she holds anything, markedly relaxes and contract.

The left leg is also affected, the upper and lower limb on that side being continually moving. The face is not affected, but she continually draws her head in a spasmodic manner to the left side.

Sensation to touch, heat, pain and cold, all quite accurate.

Sight, taste and smell all excellent.

Organic reflexes all present and normal.

Skin Reflexes.

All present, and slightly more active in the left side.

No Babinski.

Deep Reflexes.
Deep Reflexes.

All present. Knee jerk in left side is a little more active than in right. No ankle or knee Clonus.

Circulation.

No Subjective Phenomena.

Heart normal in size and position.

All sounds closed - mitral 1st is slightly roughened.

Pulse is slightly quickened and a little irregular - pressure is low.

Maximum systolic pressure with Riva-Roci was 85 m.m. of Mercury.

Other systems shew nothing of interest.

Progress.

Patient after a week on Formic Acid shewed little change, after a fortnight the movements were greatly diminished. This improvement continued slowly but surely, till at the end of five weeks there was no movement to be seen. She was sent out a week later absolutely cured.

The Blood pressure was carefully taken during the illness by means of a Riva Roci Sphygmomanometer - it shewed no increase in pressure, but the pulse became much more regular.

Maximum /
Maximum Systolic pressure in m.m. of Mercury.

On admission October 14 85 m.m. of M.
October 20 80 " "
October 25 90 " "
October 30 85 " "
November 8 80 " "
November 13 85 " "
November 20 80 " "
November 25 85 " "

Treatment.

Patient was put behind screens, given a milk diet with m VIII of a 25% solution of Formic Acid 4 hourly.

CASE III.

J. C. - age 13 - School girl.

Family History.

Good. No Rheumatic history in forbears.
Home comfortable and dry.
She drinks tea rarely.

Previous Illnesses.

Measles and Whooping Cough as an infant, otherwise very strong and healthy. No Rheumatic history.
Slight growing pains a year ago.

Present Illness.

The movements first noticed in the child began
eleven months before her admission, her right eyelid and shoulder twitching. This went on till four months ago, the right arm and shoulder being specially affected, the left being also affected, but to a less degree. The lower limbs were not, and have never been affected.

The mother states her Doctor at home ordered her child to bed, and gave her medicine. A Doctor's letter accompanying the child explained she had been given Arsenic, and he had ordered absolute rest for the child, but the movements had not shewn any sign of improving. She was accordingly taken in for treatment.

Child is a healthy looking girl, who shews marked spasmodic movements of both arms and shoulders.

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Nervous System.

Patient complains of no pain.

Sensations to heat, pain, temperature present and normal.

Special senses accurate.

Skin Reflexes.

Present /
Present. No exaggeration. No Babinski.

Tendon Reflexes.

All present, they shew no increase on either side.

No ankle or knee Clonus.

Patient as noted is continually moving left and right arms and shoulders. Also marked twitching of face is present. The legs and trunk are quite unaffected. Attempts to hold one's hand or button her nightgown are quite beyond the patient's power, and render the movements much more marked. The presence of strangers also increases the movements.

Well marked tremor of the tongue is present, and she protrudes and retracts that organ in a characteristic manner.

The other Systems shew nothing to note. Heart sounds are all closed, and that structure is not enlarged.

Progress.

Patient was put behind screens, and in three weeks time the movements ceased entirely. At the end of four weeks, she was allowed up, but just before she was to go out very slight movements returned. She was put back to bed, and in a fortnight was /
was up again with no symptoms. She was kept in for another fortnight to see if the movements returned, but as there was no evidence of this, was discharged.

Treatment.
Rest with milk diet and Acidi Formici in X three times a day.


Family History.
Excellent. Mother, father alive and well. No history of trouble in brothers or sisters.

Food and home surroundings - not very satisfactory hygienic measures being evidently uncared for.

Previous Illnesses.
Rheumatic Fever 1 year ago.
Measles and whooping cough in infancy.

Present Illness.
One day at school patient noticed she suddenly began to shake, and being scolded for this, states the movements became much worse. A few days later the mother noticed the same movements and took her from school. She was sent to a ward in the Infirmary, where she was treated with Arsenic. She left apparently cured. Three weeks after this she again went to school, but only for a week, when the movements were again seen to be present. She had slight vomiting next day and was at once brought to the Infirmary.

Patient /
Patient is a shy nervous child, and rather unkempt with marked choreiform movements in her hands and arms.

**Nervous system.**

No pain. Sensations all accurate. Organic reflexes nothing to note. Skin and tendon reflexes all present but all tend to be a little sluggish. Intelligence, memory, etc., all good. The movements are present in both upper extremities of patient. The movements are peculiar supination and pronation, alternating with occasional twitching movements, all of which are much exaggerated if trying to do any definite movements.

**Circulation.**

No pain in praecordia or dispnoea; marked venous pulsations in neck.

**Percussion.**

In 3rd space 1 inch to left of mid line of sternum, to 2 inches on right.

In 4th space 1 inch to left, and 2½ to right. Again in 5th interspace 3½ inches from mid sternal line.

**Auscultation.**

At Nitral area there is a soft systolic bruit propagated /
propogated to axilla and all over the chest.

Second sound closed.

Aortic area is also marked by a soft systolic bruit, evidently propogated from mitral area.

There is also a soft systolic at pulminary orifice of same pitch as that at mitral.

Second sound is reduplicated.

Pulse irregular, fast, and of low pressure.

No dicrotic wave present. Pressure as estimated with Riva Roci. Maximum Systolic pressure in m. m.

of Mercury 4 days before admission Nov. 29 M.S.P. 85 m.m. My.
4 days after admission Dec 2. M.S.P. 80 m.m. My.
Dec. 6 M. S. P. 90 m.m. of My.
Dec 15 " 80 "
Dec 30 " 85 "
Jan 2 " 85 "
Jan 16 " 90 "

Progress.

Patient was in the ward for eight weeks. During the first week there was little improvement, but subsequestently she improved rapidly. At the end of six weeks all movements had gone, and in eight weeks from entrance she was sent out as cured.

Treatment.

Acidi Formicii m.x. T. I. D.

Father alive with decidedly neurotic history.
Mother alive and well.
Only child. No deaths or miscarriages.
Home surroundings good. Sleeps in a room by himself with the window always open.
Food plain but wholesome.

Previous Illnesses.
No definite history of any disease, but child always rather an invalid.
Never Rheumatic or Scarlet Fever.

Present Illness.
Patient for four months has been troubled with slight Choreiform movements, and these have been getting slowly but steadily more marked. His shoulders and head were first affected. The patient has a peculiar nodding movement constantly present. His hands and arms then began to twitch, and his fingers were never still. He was treated at home, but not sent to bed; the doctor again prescribing arsenic.

Patient is a pale anaemic boy of evidently a very nervous temperament. No history of fright or of friend with a similar complaint.

Temp. 98.
Weight 2 stone 12.

Nervous System. /
Nervous System.

Patient complains of no pain, nor is there a history of tingling, or numbness in the limbs.

Sensations to heat, pain, and temperature are all correct.

Sight is good - the eye reacts to light and accommodation. No Nystagmus. Taste and smell both normal.

Sensory.

Skin reflexes are present, and show no exaggeration.

No Babinski present.

Tendon Reflexes.

Knee jerks present, and show no increase.

Achilles jerk and Adductors present.

Arm reflexes present and show no exaggeration.

No knee or ankle Clonus.

Patient has constant spasmodic movements of the arms and hands, and also constant nodding movements of the head. His tongue when protruded is withdrawn with a characteristic jerk.

His grip when endeavouring to grasp an object is spasmodic, alternately relaxing and contracting.

Circulatory System.

Nothing to note on Inspection and palpation.

Percussion /
Percussion shews no enlargement of the heart.

Auscultation.

There is a well marked blowing systolic bruit at mitral area propagated to axilla and also to the other areas obliterating the first sound.

Second Sound closed.

Aortic area shews systolic bruit evidently mitral in origin.

Pulmonary area shews a marked systolic bruit of a higher pitch than that at mitral which is propagated upwards and to the left.

Pulse regular, pressure well sustained.

No dicrotic wave is present.

Pulse pressure in m. m. of mercury

M. S. P. 96 4.12.06.

Other systems shew nothing noteworthy.

Progress.

Patient in all was in hospital for six and a half weeks. After a fortnight's treatment all movement except the nodding of the head was gone. He was kept in bed for another week and except for a slight occasional movement of head was perfectly steady. At the end of his time he was practically cured though if made nervous by students watching him his head movements returned a little. He was sent out with /
with a prescription of formic acid with instructions to return if the movements did not go in a month. No more was seen of him.

**Blood pressure taken during his illness and convalescence shewed practically no change.**

**Maximum systolic pressure in terms of m. m. of Mercury.**

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It is of interest to note that the patient gained 8 lbs. during his treatment and that the mother states he has never in his life looked and felt so well.

**Treatment.**

Rest in Bed.

Formic Acid V. m. T. I. D.

CASE /
CASE 6.

S. C. (Age 15.) School Girl.

Father alive and well.
Mother dead of heart disease.

Two Brothers and three sisters all are strong and healthy. There is no history of Rheumatic trouble in parents or family.

Food and home surroundings are unsatisfactory. Patient dwells with the rest of the family in two rooms. The windows she does not remember to have ever seen open. She takes whatever she can get for food.

Previous illnesses.

Scarlet Fever as a child.
Never Rheumatic Fever.

Present Illness.

Three years ago patient got a severe fright and as a result developed St Vitus Dance. She was treated in the Infirmary and after three months left as cured.

Last year patient was punished at school and as a result the disease again manifested itself. She was again brought to/Infirmary and again discharged as cured. Six months ago she had another slight attack as the result of a fright, the movements coming again but disappearing within a week.
of their own accord. Three months later she got another fright and the attack again came on. She was brought to the Infirmary and dismissed as cured in a fortnight.

A week before admission patient again developed the symptoms being started by a friend, and by mistake was sent to another ward in/Infirmary when she was admitted.

Patient is a well developed girl evidently highly neurotic. She is continually twisting about in bed and while being examined alternately laughed and cried in a very hysterical manner.

Nervous system.

She complains of no pain.

Sensibility to pain, heat and cold, all excellent.

Sight good, pupils react to light and accommodation. No nystagmus.

Reflexes.

Skin reflexes all present and very active.

No Babinski.

Tendon Reflexes.

All present and active.

No knee or ankle clonus.

Intellectual.

Patient is very emotional crying and laughing alternately /
alternately. Her memory is very elusive. She sleeps badly but when asleep the movements all go.

Speech for two days was altogether gone, but, on admission, it was present but very indistinct.

Patient on examination is seen to be continually moving. When admitted her movements were so violent that she had to be strapped to the trolley to be brought to the ward. Her whole body is affected, her arms and legs being continually thrown about, her face grimacing and her body writhing into most extraordinary attitudes. On attempting any simple movement, such as buttoning her nightgown the movements became even more marked. On being told to protrude her tongue, it is withdrawn almost as soon as it is put out, entirely against her will. The movements were so continuous and severe, that she had to be packed round with cushions to prevent her hurting herself.

Circulatory.

Shews nothing noteworthy, as do any of the other systems, no trouble with rectal or vesical systems.

Progress.

Patient was in for seven weeks; during the first two nights she was given Ammonium Bromide gr. XXX. Chloral gr. XV. to make her sleep.

At the end of a week the movements were much decreased
In three weeks' time she could feed herself and was generally greatly improved. At the end of six weeks patient was out of bed and all movements had gone except, if she endeavoured to hold an object tightly there was a little incoordination in her movements. This, when dismissed at the end of seven weeks had entirely gone.

Blood pressure again shewed no change, though the pulse which was irregular being 120 per minute at entrance, steadied down to 80, with complete regularity.

M. S. P. in terms of m. m. of Mercury.

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<tr>
<th>Date</th>
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Treatment.

Patient was put behind screens and given a milk diet.

Drugs.

Chloral and Bromides for 2 nights.

Acidi Formici m. XV. T. I.D.

CASE /
CASE 7.

M. M. Age 11. Schoolgirl.

Father and mother alive and well.

Two brothers and two sisters, one of whom is subject to rheumatism. No other rheumatic trouble.

Home is comfortable, dry and well ventilated. Her food is good and regular, but her appetite is capricious. She is very fond of tea and usually takes as much as she can get.

Previous illnesses.

Always fairly strong. No history of scarlet, sore throats, or rheumatic fever.

Growing pains one and a half years ago.

Present illness.

Eight months ago the patient had a bad attack of growing pains one joint being affected for a time, the pain then going off to another joint, and later returning to its former position. These pains lasted for two months coming and going. A month ago the patient's mother noticed the child was getting fidgety. The movements got steadily worse, the left side being mainly affected. A week before admission she went to a Doctor who gave her a prescription. Since then the movements have got markedly worse. The mother states the child did not go /
go to bed but was practically unable to walk, whilst at times she was almost completely paralysed.

During the two days before admission, she had difficulty also in swallowing, and with micturition, and the child continually saw "evil faces" peering at her wherever she went.

No history of fright or of a companion with a similar affliction.

Patient is a very timid child, easily startled. She is very thin and decidedly anaemic.

Nervous system.

No history of pain, tingling or numbness. Sensation to pain, heat and cold accurate.

Special Senses.

Eye reacts to light and accommodation and there is no nystagmus.

Speech.

This is quite natural and unimpaired. Taste and smell normal.

Reflexes.

Superficial all present and shew no change. No Babinski.

Deep.

Knee Jerks are active and sustained on stimulation. The leg becomes extended and the muscles are contracted /
contracted and relax slowly. The remaining jerks are present but shew nothing noteworthy. Neither ankle or knee clonus is present.

Organic Reflexes.

Patient has some slight difficulty with swallowing, the food tending to be arrested in the pharynx.

Micturition is sluggish but so far no catheters have been passed.

Mental condition.

Patient imagines still she sees faces and if approached suddenly is very easily startled.

Movements.

Well marked spasmodic movements affecting both arms and legs are present, the trunk and head is similarly affected, the patient never being still. If asked to hold an object tightly the whole body is thrown about in a most violent manner. Patient tends rather to be hysterical alternately crying and laughing for no obvious reason.

All movements cease during sleep.

Circulatory System.

Shews nothing to note. All the sounds are clear and there is no enlargement of the heart itself.

The /
The pulse is decidedly changeable—at times being rapid, and a little irregular, and sometimes quite steady and strong—depending on the amount of excitement present.

Other systems shew nothing to note.

Progress.

This patient was of great interest as after a fortnight's treatment on Formic Acid there was only slight improvement. She was accordingly put on arsenic in increasing doses but she got worse. After a fortnight's trial on this drug she was put on a mixture of Formic acid and arsenic and in ten days all her symptoms were gone. The blood pressure was also taken in this case but was abandoned as the treatment under Arsenic was introduced.
CASE 8.


Patient's family history shows nothing noteworthy. Home conditions satisfactory with abundance of good healthy food.

Previous illnesses.

No rheumatic History.
Measles at four years of age.
Tonsils and adenoids removed when ten.
Chronic ear disease at age of ten.

Present illness.

A year before admission he began to be troubled with involuntary shoutings. These gradually got worse till before admission he shouted practically every other minute; about two months after the above complaint was first manifested he began to be troubled with twitching movements of the fingers. The fore-arms on both sides also have this irregular purposeless movement as have his facial muscles and he states these areas were affected in that order. As the affection was not improving under the local practitioner's treatment, he was sent to R. I. E.

Patient on examination has rather a vacant expression. He tends to be restless the choreiform movements /
movements above noted being markedly present and he is continually shouting.

Height 4.10 ft.
Weight 6 st. 2 lbs.
Temperature 96.

Nervous system.

No feeling of pain, cold, fornication, numbness or tingling.

Sensibility to touch, heat, pain, all present and quite accurate.

Sight.

Eyes react to light and accommodation.

No Nystagmus, vision is defective in the left eye, but normal in right. Slight Int. Strastismus of left eye.

Hearing.

Is defective in right ear. The result of chronic ear trouble. Hearing in left ear is perfectly normal.

Taste and smell healthy.

Organic Reflexes.

All present and healthy.

Tendon Reflexes.

Knee jerks quite normal.
Ankle jerks difficult to illicit.
No ankle or knee clonus.
Triceps /
Triceps and wrist jerks present but neither is brisk.

Superficial Reflexes.

Present but not noteworthy. No Babinski is present.

Movements.

Patient as stated has well marked choreiform movements of hands, forearms and face. These all cease during sleep.

Circulatory system.

No dispnoea or palpitation.

Heart shews no dilatation and the sounds are all closed.

The other systems shew nothing to note.

Progress.

The patient was put on a milk diet, placed behind screens and given Formic Acid starting at 10 min. three times a day and rising to XXV 4 hourly. The patient improved slowly at first but after the first fortnight made rapid progress. After six and a half weeks he was dismissed cured.
CASE 9.

A. B. 12 years of Age. School Girl.

Complaint.

Movements of Hand and Stammering.

Family History.

Father and mother alive and well, as are three brothers. No suggestion of any similar family trouble.

Social Conditions.

Excellent. Food good, and house large, dry and well ventilated.

Previous Illnesses.

Measles when six and again when nine years of age.

Scarlet Fever when seven followed by an attack of Acute Rheumatism but this did not attack any of her joints. She states, however, that she had growing pains before the acute attack of Rheumatism came on. She was treated for a year for her Rheumatism at Polton Hospital and soon after leaving there developed chorea, with marked stammering. She was treated in a home, being given arsenic and left quite cured.

Till a fortnight before admission patient had no further trouble from either chorea or rheumatism but /
but then a second attack developed in which again she was troubled with stammering. These symptoms were gradually increasing so she was admitted to R. I. E.

Present Illness.

A fortnight before admission patient's mother noticed that she was stammering and suspected the approach of a second attack of Chorea. A day later patient dropped a cup she was carrying and was unaware of this till she heard it rattle on the floor. She then noticed her left leg was weak and fell while coming downstairs. She has had no pains in any of her joints during the present attack but states she had growing pains very severely a month ago.

No history of ErythemaNordosum at any time.

General Facts.

Patient is a well grown child, intelligent and lies comfortably in any position.

Height 4 ft. 5 in. Weight 4 st. 7 lbs.

Temperature 98.6.

Nervous System.

Patient is an intelligent girl with very marked stammering. There seem to be no special words that cause this trouble, but rather seems to suffer /
fer from paroxysms of difficulty, and at times, seems quite free from her complaint, for a few minutes at a time.

She has also great difficulty in keeping her hands steady; the left hand is much more severely affected than the right, though the latter is by no means steady.

There are also slight facial twitchings but these are not pronounced.

Her tongue is very tremulous, and is withdrawn in the typical spasmodic fashion.

When resting in the bed her feet are comparatively steady, but when held up, the same movements are present affecting more particularly the left side.

Sensation to heat, pain, cold, all excellent.

Sight is good, the pupils react to light and accommodation.

Organic Reflexes are normal.

Skin Reflexes.

Plantar Reflex normal.

Cilio Spinal, Epigastric, and Abdominal all healthy.

Tendon Reflexes.

All present and normal.

No knee or ankle clonus.

Voluntary
Voluntary Movements.

Patient on attempting voluntary movements with her hands is markedly unsteady especially on the left side her "will effort" tending to exaggerate this condition. She can touch her nose without the least trouble if asked to do so, but if asked to squeeze one's hand the spasmodic movements are very marked.

The feet as stated are similarly affected but to a less degree.

Circulatory System.

No Subjective phenomena.

Apex beat is visible in 5th interspace.

No abnormal pulsation is visible.

Percussion.

Shews no cardiac enlargement.

Auscultation.

Mitral 1st sound is replaced by a soft blowing systolic murmur. There is also a faint blowing diastolic murmur to be heard at the same orifice.

Heart sounds are quite regular and otherwise shew no noticable feature.

Pulse.

Is regular in force and rythm. The pressure is well sustained. No dicrotic wave. The fall of the wave is rather fast.

Blood /
Blood.

Shewed nothing noteworthy except in the differential count.

Polymorphonuclear 42%
Lymphocytes 51%
Large Mononuclear 3%
Eosinophiles 4%

Other systems shewed nothing noteworthy.

Progress.

Patient was at once put on Formic Acid being given m. v. 4 hourly and increased to m XV. 4 hourly after 3 days' treatment.

She rapidly began to improve and at the end of a fortnight her feet movements had ceased, and her speech was much improved. At the end of third week patient was practically well. She was dismissed in a month from her entrance absolutely cured.

Her pulse pressure was taken and though it varied as shewn below there was little change from the original state of affairs.

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<td>Feb. 2</td>
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CASE 10.


Father and Mother alive. Father afflicted with syphilis, the child having rashes soon after birth. Nothing further known of family as he was adopted.

Home surroundings excellent.

Previous illnesses.

Measles when four.

Acute Rheumatism 7 months before admission and was then three months in bed.

Scarlet Fever three months ago.

Present illness.

Patient has never been a strong child, but with great intellectual promise, and tends to pore over books at every opportunity he gets. He, however, never ailed seriously till his attack of acute rheumatism, and he was just getting over this when he developed Scarlet Fever. A month after his release from the fever hospital, choreiform movements suddenly started in his right arm. These have continued ever since getting more severe and spreading to his other arm. He also developed facial twitchings and at times movements of the whole of the body. A week before admission it was also /
also noticed he was beginning to speak very indistinctly, and so was sent to R. I. E. for treatment. His mother states that she took her child to a doctor who gave her two bottles which she affirms contained arsenic, with no noticable effect.

Patient is a small aenaemic child who lies in bed, his rest being disturbed by continual twitching movements.

Nervous system.

Sensory functions shew no change, sight, taste and smell all being excellent.

No Nystagmus.

Organic Reflexes.

Present normal.

Skin Reflexes.

Present, slightly exaggerated plantar reflex in right side.

Cilio spinal present.

Tendon Reflexes.

All present but the right knee jerk is a little exaggerated.

Voluntary Movements.

On being asked to extend his tongue, that organ is markedly tremulous, and is put out and withdrawn in /
in a characteristic manner. When told to button his jacket the right arm shews the movements very plainly and the operation is of extreme difficulty. His grasp with his left hand is firm, but with his right is extremely jerky.

Cerebral functions.

Intelligence good. Memory a little hazy. Speech is peculiar in that he at times stops in the middle of a sentence or word; no particular word or sentence seems to be at fault. Patient sleeps well and all movements cease at that time.

Circulatory system.

No subjective phenomena. Praecordia well formed with no noticable abnormality.

Auscultation.

Heart sounds all closed in the different areas. Pulse is regular but the pressure is low - no dicrotic wave is present. Other systems shew nothing noteworthy.

Progress.

Patient was given doses of Choral gr. V. Potassium Bromide gr. XV. on the first two nights, otherwise he was treated with Formic Acid starting with /
with m X 4 hourly and rising to m. XXV. He shewed only slight improvement till the larger doses were used when he rapidly got well. He was kept in for seven weeks and was perfectly cured when dismissed.

CASE 11.

J. C. Aged 5. Schoolgirl.

Family History.

Father dead, cause unknown. Mother alive and well. Two of family died of convulsions, one brother alive, age 8, said to be very nervous. No others in family.

Social Conditions.

Not very satisfactory. House consists of one small room in which family live. Food also deficient, and poor in quality.

Previous illnesses.

Measles and whooping cough three years ago.

No history of scarlet or rheumatic fever.

Present /
Present Illness.

Until three weeks ago the mother stated that the child was quite well. About that time she took a severe cough but continued going to school. A week later the mother noticed she began to have twitching movements of the arms, legs, head, and trunk, more marked on the left side. There is no history of the child having had a fright either at home or at school. She began to go to school three months ago, and no history of a similar complaint in playmates at school, or at home, can be elicited. Three days before admission the movements had become very marked and when trying to play with some friends she fell several times and knocked her head. The mother kept her at home for a day or two but as the movements were getting worse sent her to R. I. E.

Patient on admittance is an intelligent bright but excitable child. Well developed and well nourished. She has frequent azythmic involuntary and inco-ordinate movements of the head, and body, particularly of the left limbs and left side of the body. The face is unaffected.

Nervous system.

Subjective symptoms.

No pain, tingling, fornication, etc., As noted /
noted patient is an intelligent child but is troubled with choreiform movements. She has also great difficulty with phonation and articulation. No particular sentence seems to give marked difficulty.

Special Senses.

Sight is good. Pupil reacts to light and accommodation. No Nystagmus is present.

Hearing, taste and smell normal.

Speech - Patient as noted has difficulty with this function.

Reflexes.

Superficial. Present and shew nothing noteworthy.

Deep - Are also present. Slightly exaggerated in left side. No ankle or knee clonus.

Co-ordination is much impaired on both sides. Patient is quite unable to write the simplest letters. Her hands if extended are markedly tremulous and her grip is very spasmodic while her tongue if examined shoots in and out in a characteristic manner. Examination of child makes all her movements much more marked, her body practically never being still.

Circulatory System.

No pain or dispnoea.

Chest well formed with no visible pulsation. Palpation /
Palpation and Percussion reveal nothing noteworthy.

Auscultation.

Heart sounds closed in all areas.

Pulse regular pressure well sustained no dicrotic wave present.

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<th>Date</th>
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Other systems shew nothing to note.

Progress.

Patient was put on Formic acid m. VIIIter in dic and placed behind screens. She shewed slow but steady improvement, and at the end of six weeks all movement had disappeared and her speech was quite natural. She was kept in hospital for another fortnight and when she left the mother stated she had never seen the child in such excellent bodily health.

Conclusion /
CONCLUSION.

From the result of the preceding cases of Chorea treated with Formic Acid, the following facts deserve consideration.

(1) The cases were taken irrespective of Causal agency - thus there are patients with a definite history of Rheumatic Fever, others with a mere history of fright uncomplicated with any known febrile disorder, and others again evidently contracted simply from imitation.

(2) All cases during a fixed period, when definitely diagnosed as Chorea, were treated with Formic Acid and in none of these did it fail to cure the complaint.

(3) Each case has, as far as possible, been kept under observation since dismissed, and though as noted in this history, several patients under other treatment had had relapses, no single case has shewn the least tendency of recurring trouble.

Further one noted that none of the patients shewed any suggestion of mild or severe toxaemia. That the pure acid is in itself not toxic was well proved in a case in the Royal Infirmary where, due to a dispensing error, a patient suffering with severe Cardial disease, received 90 m. of a 25% solution of the drug three times a day, with no evidence of any toxic condition. In contrast to the
the unfortunate results, one at times gets with other drugs used in this disorder, this would seem to be a point of distinct advantage.

From the cases treated and tested regularly with a blood pressure instrument, one can substantiate the evidence of others that the drug acts as a Cardiac stimulant without giving any noticeable rise in blood pressure.

As a diuretic no quantitative change was observed in the patient's urine. Naturally the kidneys were, in practically all cases, not in a pathological condition, and its action would therefore differ from cases already discussed where such an increase was obtained.

As to the drug's action in the disease, one is necessarily beset with some difficulties. Chorea as a pathological condition, is extremely difficult to define. So many cases at post mortem examinations shew no definite nerve lesion except slight hyperaemia, and if in these cases which are naturally the most severe, no further central or peripheral change is observed, one can but doubt the theory that the central nervous system is greatly at fault. As has already been pointed out in this paper the grosser lessons found in some cases are quite able to be explained by the severe convulsive attacks so commonly /
commonly seen towards the close of the affected patient's earthly career.

Is it not compatible with clinical symptoms that the cortical cells are in a state of slight derangement due to a toxic action of an organism not yet separated. With that theory as to causal agency, we could understand the symptoms being widespread, or localised, according to the severity of the attack. Further we could explain the presumably authentic cases of cure, by absolute rest and hygienic measures without drugs. That Formic Acid acts directly on the Cerebral cells one would not suggest, but in a disease where all the symptoms cease during sleep, rest with the addition of a drug acting as a muscular tonic to both striped and unstriped fibres, is surely the correct treatment.

With open air, light diet, attendance to the alimentary tract, and precautionary measures to prevent any mental excitement, we have combined with a general muscular tonic that should, as has been practically demonstrated, cure what is always a troublesome, and occasionally a fatal complaint.

Further the preponderance of cases connected with cardial lesions is an additional factor for using a drug generally admitted to be a heart stimulant.

Naturally one cannot with so comparatively few cases /
cases, be too definite as to the drug being a specific in the disease we have considered, but in a complaint so commonly met with in private and hospital work, it certainly deserves a fair trial. A further point that adds to its interest and use, is that in all cases, the patients when leaving hospital stated that their general feeling of bodily strength and well being was tremendously in excess of their usual normal state. Granted that rest and general careful hygienic supervision may in part account for this, we must still bear in mind that several of the cases have been treated in a precisely similar manner in their own homes under medical care, with other drugs, and had shown absolutely no benefit thereby.