Report
of a small outbreak of
Epidemic Cerebro-Spinal Meningitis
or
Cerebro-Spinal Fever
with notes of six cases.

William [signature]
Glasgow
Ayrshire
Wigtown, Scotland, has been regarded as one of the few countries that has enjoyed immunity from this very formidable disease. Mr. E. W. Collins, in his very able Report upon Epidemic Cerbro-Spinal Meningitis or Cerbro-Spinal Fever, published in the August number of the Dublin Quarterly Journal of Medical Science (1868) goes deep fully into the history and geographical distribution of the disease. He then sums up his remarks. "If we now glance at the diffusion of Cerbro-Spinal Meningitis upon European soil during the present century, we find that Turkey, Greece, Belgium, Scotland, Iceland, and Russia alone so far as our present limited information warrant such an assertion have remained unscathed. Outside of Europe we hear of the disease only in Canada, the United States of America, and the North Western shores of Africa" (page 181). What was written by Mr. Collins in 1868 remained true so far as Scotland was concerned up till the spring of 1883, i.e. as far as the literature of the subject can guide us. In the Glasgow Medical Journal for Sept. 1883, Dr. J. A. Milrayon reported a case which as he says "agreed essentially with the description of this formidable disease both in its clinical and pathological characters" and...
which had come under his own observation in the wards of the Western Infirmary (Glasgow) in the preceding month of February. The patient, however, although he had been resident in Scotland for a year or two, was a native of the West Indies—a fact perhaps of some importance. True, Dr. J. MacAllan—then of Dundee now of London—wrote a letter in the Lancet for Feb. 9th 1878, in which he drew attention to case of Cerebro-Spinal Fever occurring at that time in Dundee, subsequently in the "Memoir of the same Journal for June 8. 1878 relates a case fatal from rupture of the spleen. There was in this case only slight evidences of inflammatory exudation in Brain or Spinal Cord whereas he admits had nothing to do with the death. The diagnosis was called in question at the time (Lancet Feb. 23. 1878) by Mr. J. T. Turner of St. Thomas' Hospital London, who suggested that the case were cases of Typhus Fever & not of Cerebro-Spinal Fever—a suggestion however which Dr. MacAllan did not accept. He (Dr. MacAllan) spoke at that time of subsequently reporting his cases, but apparently he has never done so. The profession is thus unable to judge as to whether his view of the case was correct or not.
Dr. Finlayson's case therefore remains
up till the present time the only unquestionable case of this disease, which has been reported as having occurred in Scotland.

It has been my fortune during the early months of the present year (1894) to be the witness of what may be called a small outbreak of this disease in the town of Salston, Ayrshire. Very small because the number of cases that could undoubtedly be diagnosed as such, only amounted to six. In two of these cases the diagnosis was confirmed by post-mortem examinations, in two recovering took place. The remaining four, the symptoms were as well marked that no reasonable doubt can exist as to the true nature of the illness. (Two of the four were fatal but one of them occurred before I was fully alive to the presence of the disease in the locality; in one, the examination was not asked for, in the remaining one a post-mortem examination was refused).

Besides these six cases, a few other cases occurred in the town about the same time where the initial symptoms of the illness resembled those of Cerebro-Spinal Fever to a considerable degree, but the disease seemed to abort & the patient made a speedy recovery. (One of these cases will be narrated subsequently). An abortive form of the disease
Disease has been recognized very generally in North America, as occurring in districts where the disease is epidemic (see article on C.S. Fever in Zinsser's Cyclopaedia). And St. Oscar Medina of Stockholm, who publishes an account of an epidemic in the County Hospital there, also recognizes an abortive form of the disease as occurring in infants (see abstract of his paper in London Medical Record Vol. 1881. Pp. 140-147).

Before narrating the cases observed by myself I may state that the town of Falkirk is situated in a valley through which runs the river Forth. The town lies on the left bank of the river, at a distance of about 8 feet in height, which stretches across the river at the lower end of the town, which has the effect of draining the bed of the river over the whole length of the town occasionally flooding the lower streets. The nearest town of any considerable size is Kilmaurs, 3 miles distant to the west. Glasgow is distant 31 miles to the north. The population of Falkirk is now chiefly a mining one, a class of people not particularly noted for attention to hygiene. The town is in general a moderately healthy one, the death-rate being usually from 15 to 18 per thousand, but during the Cholera Epidemic of 1852 it suffered very severely – more so than
the majority of the surrounding villages. The subsoil of the lower part of the town is gravel—certainly the old bed of the river, that of the higher part, rock, with clay above. The water supply is entirely from wells. The town has been a police borough for the last 30 years. In that time considerable improvements have taken place in the drainage, but of late years, the coal mines, which surround the town, have caused considerable subsidence of the surface. There was the task of preserving the drainage a very difficult one—in fact so difficult has this become that at the present time the Commissioners are considering the question of abandoning the old drainage scheme and adopting a new one. In several places the soil is literally a morass of sewage, and the wells are continually becoming contaminated.

Case I. The first case of Enterico-Splenic Fever, which I observed in the district occurred in one of a row of miners' houses, which stands about a mile west of the town. From which, in an open ditch, all the sewage from the lower part of the town flows. Close beside this row of houses a considerable subsidence of the soil occurred last summer, which interfered with the flow of sewage along this open ditch, and allowed it to seep into the soil under and
around the houses. The patient was a
girl, named Jeanie Alexander, aged 10 years.
She was in good health up to the evening of
Saturday 12 Jan., 1844, on which evening
she attended a Band of Hope meeting in
the Town. After returning from the meeting
about 9 p.m. she suddenly began to complain
of pain in the head and immediately
afterwards began to vomit. I was called in
to see her about 11 a.m. of the following
day. I found her in bed, complaining of
pain in the head and stomach. Her tongue
was coated, skin hot, pulse quick and full
but regular. (An accurate note of these was
unfortunately not made at the time). Vomiting
had been very frequent since the previous
evening as she was now vomiting greenish
fluid. She had great thirst. Ordered a
solution of
Sulphate of the Stomach & 2 powders, each
Containing 1 pr of Calomel & 5 of the Bicarbonate
of Bismuth. One of the powders to be given
every 2 hours. Water to be given only in very
small quantities for the thirst & a cloth wrung
out of cold water to be applied to the head.
Next morning (14 Jan.) found her appar-
ently somewhat better, the head was less pain-
ful & the vomiting less frequent. She had
retained one of the powders, but the bowels
had not been moved. I prescribed another
powder of 2 pr of Calomel & 5 of Bicarbonate.
of Bromide, to be followed in the afternoon.

It is possible by a dose of Castor oil. In the evening I was sent for to visit her, as she had become much worse. When I arrived I found her tossing restlessly in bed, crying loudly at short intervals, with pain on the head. The paroxysms of pain being accompanied by flushing of the face. Her temperature was 104. Pulse quick, full and slightly irregular. The bowels had not been moved once lately. My touch was not felt, but no careful observation was made on this point, as there was no dysenteric process. In the absence of dysentery, I ordered 6 Leeches. The application to the temples, with a cold compress, was ordered in the bath. The hair to be cut closely. The child to be kept very quiet. To have ice to suck for the throat, to small quantities of fluid nourishment to be given at regular intervals. Also the following mixture.

R. Potass. Lid. 3/8
Potass. Bm. 3/4

Symph. Spirit. 2/11
Opium 2/3

To 2/3 teaspoonful in water, to be given every 2 hours.

Jan. 15: The child appears to be in much the same condition as last night. Writing and reading continues. Principally the latter. She has been delirious during the night.
about in bed a great deal screamed out with the pain in the head. His restless condition continued, which rendered all efforts to take his temperature futile. The pulse was very quick and very irregular. The wrists moderately dilated, no squinting or suffusion of eyes. Treatment to be persevered with. In the evening she was much worse again, in fact she looked so bad that I did not expect to see her alive next morning. The delirium was worse: she still screamed out frequently with the pain in the head. The vomiting had stopped however. She lay finally with her face turned away from the light with the head thrown back. There was intermission on the lips and teeth, the extremities were cold. The pulse was extremely rapid and irregular. She had been moved freely by means of the medicine had been given very irregularly on account of the delirious condition, but the ice clothes had been kept very constantly to the head.

Mar. 15th Although there was no marked change I thought her condition not so desperate, as at last night visit. In the evening the improvement seemed to be maintained. She lay quieter, but remained delirious.

Mar. 17th Improvement more marked, although she had not regained consciousness. She taken small quantities of liquid nourishment, such
Afterward, Brady Soda water &c. &c. remained. There had been no return of the vomiting. Ice 
water applied to the head at intervals.

The child regained consciousness this morning. The temperature which could be taken for the first time since delirium set 
in was 101. Tongue cleaning, ordered the 
medicine to be repeated, but only in teaspoonful 
doses, along with Digitalis of Cinchona. 

Improvement from this state continued to go 
steadily, but in the case of it as suspicion 
gradually arose in the minds of the parents 
that she was deaf. It was difficult to decide 
the question for a few days on account of the 
apparently stupid condition in which the 
illness had left her, but ultimately no doubt 
was left on our minds that such was the fact.

In the course of two weeks she was able to be out 
of bed for a short time. She walked at first 
with a staggering gait, which gave herself 
there around. Some amendment, this 
staggering disappeared very slowly, continuing 
after her general health was very good. The 
deafness unfortunately remains to this day. 
Thane examined the ears with the speculum 
but found nothing abnormal. She did not 
appear to hear a tuning fork applied to the 
top of the head or to the teeth.

While satisfied during the progress of this 
case, that I was dealing with a meningitic.
peculiar in its symptoms of progress from anything I had previously seen in my experience. I frankly confess that I did not realize at the time the exact nature of the case. The question of its being Epidemic Cerebro-Spinal fever, although it did occur to my mind, did so only to be dismissed as an impossibility, or at least a very great improbability. This is not to be wondered at considering that we have been in the habit of excluding it from our minds. Circumstances, however, soon transpired which brought the question of such to my mind, which led me to form the opinion that I was dealing with a disease resembling in every respect that known as Cerebro-Spinal Fever, or Epidemic Cerebro-Spinal Meningitis.

Case II. was that of an infant named Annie Hardrock aged 1 year. I was asked to visit this child in the morning of the 14th February. It had taken suddenly very ill about 8 o'clock that morning when the mother noticed it trembling and drawing itself together every few minutes as if frightened. The child had also vomited several times, passed one or two loose motions before I saw it at 10 a.m. It was then lying on its mother's knee, with its legs flexed on the abdomen showing very ill. It cried much when moved. The skin was hot, pulse quick and full. The face alternately pale and flushed; the labor stage being
by an appearance of great weakness. The child was suffering from bloodying cough for examining the mouth I discovered two teeth which were very prominent to dullen. As I could discover no other cause for child's illness after a careful examination, I pranced the gums over the teeth ordered a mixture as follows:

By. Tinct. acmde 8 fl. oz.

Potass Bromide 3 fl.
Potass Citrate 3 fl.
Sfr. Silver Nitrate 3 fl.
Arsen Chloroform 2 fl.

1/8 atarropium to be given every 1/2 hr.

At 3 pm on the same day received a hurried message to revisit the child again as it had taken a fit, it was also taking very bad times. The child was manifestly worse. The temperature was 104° the pulse very quickly irregular, so as to make it quite impossible to count it correctly a faint redly looking rash was visible over forearms legs. The wind had continued so that none of the medicine had been retained. After examining the child carefully again I had to confess to the parents that as yet I could not tell the nature of the child's illness but that it was manifestly a serious nature and that possibly the child might die before the nature of the illness was fully declared. I advised them to persevere with the medicine, to apply linseed mustard over the...
epigastrium & gave them a few general directions. Unfortunately, I did not see the child again that night, having been called from home soon after calling early. The following morning, I learned that it had continued to get worse rapidly & died at 10 p.m. They also informed me that from the middle of the body, downwards over the legs, a dark column of jaundice had appeared. Thinking that this was probably related to hypostatic congestion, I did not ask to view the body. In this case, the whole duration of the illness was only 14 hours & I was inclined to attribute the death to some specific poison or virus, but there being an epidemic in the town that I was aware of, I could form no definite opinion.

Case III. Occurring very soon after threw light on the previous cases. The patient was a girl aged 12 years named Helen Murdock, sister to Case II. She was in good health up to Sunday the 17th, 3 days subsequent to the death of her sister. On the afternoon of that day, she was noticed to have a rigor, complaint of headache, pain in abdomen & general malaise. On Monday morning, she was admitted to complain much of pain in the head, abdomen & legs. Her mother procured a purgative powder which was administered, but it was immediately rejected. She was sent for early on Tuesday morning (19th) for visiting the child found her with a temperature of 103°.
9.103. Prince's health had not been marked
regularly. She complained of pain in stomach
headache. She was vomiting frequently - the
vomited matter being a greenish Coloured fluid.
The tongue was coated, and the Bowels had not been
moved since Sunday. On the 15th July regularly.
Examination of the Rectum revealed nothing
abnormal. I ordered her a few poultices each
containing 1/2 pt. of Calomel + 4 pts. of Bismuth.
Institute once to be given every 2 hours, her
urine which was very small to be restrained +
a poultice of dulse on the head + mustard to be kept
over the stomach. At 2 pm she appeared to
be getting worse, none of the powders had been
retained, from the persistence of the vomiting
+ other symptoms I was forced to the conclusion
that these arose from some disturbance of the
nervous centres. Case I flashed back into my
mind + I was struck with the similarity
of the two cases. I ordered Lecithis to be applied
to the temples to be followed by ice to the head +
to have ice to suck, also the following mixture

\[ \text{Potassa Potasii } 3 \text{ sp.} \]
\[ \text{Potassa Bismii } 3 \text{ sp.} \]
\[ \text{Iacta Digitalis } 3 \text{ sp.} \]
\[ \text{Aqua Chlor. } 2 \text{ sp.} \]

By a teaspoonful to be given every 2 hours.
The bowels were ordered to be cleared out by
Senna. At 9 pm the symptoms were all
worse with the exception of the vomiting which
had
had somewhat abated. She lay occasionally quiet for a few minutes as if asleep, then started up with flushed cheeks and cried loudly with the pain of the head, she tossed herself about in the bed and brought them to put out the gas as the light hurt her. Her pulse was by this time very rapid and irregular both in force and rhythm (about 160) and 104°. She answered questions sensibly but as if with an effort. The towels had been only moved.

Feb 20: Condition worse. She lies in bed with face turned from the light; the head retracted, the limbs partially flexed on the abdomen & the legs on the thighs. The buttocks project & this with the retraction of the head gives the appearance of spina bifida. There is some swelling of the neck on the left side & the thyroid gland seems prominent & enlarged. She complained of sore throat & evidently felt some constriction about the neck, as she begged her mother frequently to loosen her scarf. (three being done). She screamed out if touched or moved & shrank of the surface of the body to the cold air seemed to cause her suffering, as she would pull up the bedclothes & creep under them & try bitterly to be covered up. On this account she could not get her Temperature taken. The pupils were moderately dilated & sluggish. The tongue was coated, dry, brown in the centre, pale, weak & very rapid & irregular. The Cyanosis never altered.
flushed & pale, and a faint, but distinct pulse. The child was quite delirious, with staring eyes and twitching jaws. Touching her forehead, the skin was hot. At 11 pm, the child looked extremely ill, but her delirium was at its height. She screamed loudly. Oh! my head! Oh! my head! at short intervals. The head was much retracted, to the superficial & deep muscles of the neck being apparently in a state of tonic spasm. No observations on temperature or pulse could be taken. The condition looked very hopeless, but my experience in such cases prevented me from giving an entirely hopeless prognosis & enabled me to encourage the parents to persevere with treatment.

Feb 24th, 8 am. Condition no worse since last night. The vomiting which had continued up to last night has now ceased, although she still retches a good deal. She continues in the same delirious & restless condition. The medicine has consequently been given very irregularly, but the ice has been kept very constantly to the head. She still screams at intervals about her head. At 9 pm, I thought I could detect a slight improvement in some of her symptoms. From yesterday, today the extremities have been very cold necessitating the application of hot bottles & with the internal administration of brandy in small doses. A little beef tea is also given at short intervals.
At 22. 8 a.m. Improvement more marked.retching has stopped since last night the
trouble has been freely moved by Eunice.  
She is conscious but has a very stupid appearance 
The pain in the head less violent, but she now 
complains also of pain down the spine which 
is tender on pressure. I tried to bring her head 
forward, but could not manage on account of 
the spastic contraction of deep muscles of 
neck posteriorly (the superficial muscles being 
now relaxed). This attempt was manifestly 
unhappy. The swelling of left side of neck is 
gone but that of the thyroid remains, larger 
slightly. Marked. Cleaner at edges. The pulsation 
marked restless has disappeared. At 9 p.m. 
I found the improvement was being main-
ained.

At 23. 10 a.m. Improvement continues. I took 
pulse 120 weak irregular. The head is still re-
tracted but to a less extent. Does not complain  
of pain in the head this morning, but says her 
back is still sore. Tenderness of spine is more 
marked at upper region. Photophobia is still 
very great. There is slight injection of lower 
half of scleral tissue probably from the fact that the 
ties with her eyes are partly closed. Administered 
some of the urine today for examination found 
it free from albumen. Administered a colon 
purge which acted well. Is able to take 
food although to some small quantities. the medicine 
was
been given more regularly.
Feb 24: 10 a.m. 102. Pulse 120 irregular. acted tolerably well during the night. The bowels acted well of their own accord this morning. The tongue is clean and there is some slight return of appetite. She occasionally complains of pain in the head again.
Feb 25: 10 a.m. T 104. Pulse 120 irregular weak. complains more of the pain in head along the spine. Ordered a blister to be affixed to upper part of spine & to have the ice applied to head at intervals.
Feb 26: T 100.3. Pulse 120, irregular & weak. Improvement continues to go on satisfactory.

I will here interrupt the narrative of this case (which proved a very tedious one with frequent relapses) to record a very rapid and fatal case which now occurred in the district of the post-mortem examination of which enabled me to confirm the diagnosis which I had already arrived at that I was dealing with cases of Epidemic Cerebro Spinal Meningitis.

Case IV was that of a girl aged 8½ years named Maggie Rooney, this girl went to bed quite well on the evening of Feb 26. Shortly afterwards she got out of bed & left by the fire for some little time complaining of toothache. She returned to bed without attracting any particular attention. At 4 a.m. of the 27th her mother awoke...
and heard the child moaning. She immediately went to her and inquired as to what was wrong, but she had great difficulty in getting an answer. After some time however she did answer, and complained of her throat. She asked for a drink. She drank the water which was given to her very precisely. She drank immediately, and it was again. Her mother then noticed that she had been vomiting in bed previously. The vomiting was repeated several times, she continued to drink water freely. About 6 A.M. she got out of bed (probably in her delirium) and walked across the apartment to get admittance to the water when up she vomited again and was noticed to walk with a staggering gait, taken to be shaking all over. After this she seems to have become rapidly worse. I was sent for about 8.30 A.M. but before I reached the house (about 9 o'clock) the child had died. The death was reported to the Procurator Fiscal & a post-mortem examination of the body was made on behalf of the Crown by Dr. Sirmore Rankin of Kirkcaldy. 3 hours after the death, he found the cerebral spots, ranging in size from a three-penny piece up to a crown piece scattered over the legs, lower part of the body, especially below the knees. The membranes of the brain & spinal cord were exceedingly hyperemic. A layer of recently effused lymph was spread over the surface of the convolutions.
in the upper surface
of the brain, especially near the inferior
commissural fissure, at which place the two
surfaces of the dura mater were adhering together.
The effusion was chiefly under the dura mater.
The brain condition existed under the membranes
of the spinal cord, along its entire length.
The brain tissue seemed healthy. Hence, as to
find no other morbid condition to account
for death, we had no hesitation in certifying
the death as one of Epidemic Cerebro-Spinal
Meningitis. As a confirmatory proof, however,
I forwarded a portion of the Spinal Cord
to Dr. Joseph Laid, Glasgow, who reported
that he found "clear indications of inflammatory
exudation beneath the membranes of the cord."
I subsequently discovered that this poor Rosy,
who had visited the girl Helen Humeeth, had
been playing in bed beside her on the Saturday
preceding her death, i.e. on the 23rd Feb. The
girl had been schoolmate. The exact
time of the commencement of this girl's
illness is uncertain, but granting that it
was an hour or two before her mother observed
her, it still takes rank as one of the shortest
on record. It is a typical example of the flamboyant
variety of the disease, where the patient at once
passes into a state of collapse, and rapidly succumbs.
Having narrated the case in its chronological
order, I will now return to the narrative of
Feb 28. T 104.2. Pulse 104. Irregular. Complains again of pain across abdomen. In other respects her condition is similar to that of yesterday.

Feb 29. T 104.5. Pulse 130. Toluidine not moved since 27". Ordered a dose of Castor oil to be given, also a mixture of White Rhubarb of Potass. Throat, Dejection, and defecation of mucus. To be given 3 daily.

Two ulcerous areas of little finger of left hand.

Mar 1st. T 104.5. Pulse 120. Complains again of headache. Photophobia is still present to a considerable degree. The Castor oil acted well. Ordered another blister to be applied along the spine in upper dorsal region, where the tenderness remains to remain most distinct.

Mar 2nd. T 101.8. Pulse 136. Tongue more clear. The constipation persists strongly. The pain in the head is worse & the head is again more retracted. She vomited once at 9 am. The vomiting matter consisting of concord mass mixed with bilious fluid. Tongue coated. Ordered her to have a Calomel prep.

Mar 3rd. T 101. Pulse 132. The bowels have been moved freely. She says the pain in the head is not so bad as yesterday. The complaints still amount of pain in abdomen & of the arms being sore. Has vomited a good deal yesterday.

March 5: I, 1917. Pulse 132. Irregular. The child passed a very restless night. Vomited, Complains of pain in head, threatens to lose head. The bowels have been moved twice after taking castor oil, and she had also some return of the vomiting. She is getting very nauseated. Has a dull, stupid appearance. She does not answer questions readily, even when she does, it is in a dazed kind of manner, as though she is inclined to doubt the correctness of her answers. This condition lasted for a number of days. I gave rise to doubts as to the condition of the sense of sight and hearing. I am inclined to think that neither of these senses was ever really affected, although in my original notes of the case such doubts are several times mentioned.

March 6: I, 1917. Pulse 120. Passed another restless night. Today is a much the same condition as yesterday.

March 7: I, 1917. Pulse 136. Has mumbled frequently since yesterday. Faint and was very restless during the night. The mouth was said to be streaked with blood at times. She complained of dizziness and throat. Complains at one time of feeling hot and throws the bed clothes off, at another of being cold and has to be covered with a cloak. She has driven the bed clothes. The feeling of heat is accompanied by flushing of the cheeks. The thyroid gland is now not so prominent & swollen.
ordered another cloak to be applied to offer

March 8. I 100.3. Pulse 170. She had another

very restless night. She became very excited, screaming, and

Oh! Father! Oh! Mother! Oh! my head!

Oh! my leg! She hr. mother says that

she suddenly straightened herself out in bed, and

appeared to shake all over. This lasted only for a

few moments. The puffs are still red, she does not

answer questions, yet she protrudes her tongue when

asked to do so. All the bed clothes are turned down

down her body. She draws them up close around her.

Her face is cold. She has

been every little minute. The stools have not been moved

for 2 days. I ordered her 1/2 oz. of

senna and 1 oz. of
calling at 6 p.m. found that she had slept quietly

almost continuously since getting it—only waking

up occasionally asking for a drink.

March 9. I 100.8. Pulse 130. The patient has

continued quiet, has slept a great deal. She is

easily awakened but seems to be in a kind of stupor.

general condition same as yesterday.


During yesterday afternoon she appears to have had

some chronic pain of legs' veins as her mother

informs me that she kept moving them up and
down in bed. She is now lying still.
Phthisis moderately dilated. Pulse 72. Appears to be in an almost insensible condition, but partake of milk\textendash;time when very weak. Ordered her to have two teaspoonfuls of brandy every hour. Inquire more coated. Have some works on the teeth.

March 13. I 98. Pulse 72. Condition very similar to that of yesterday but appears to be rather more sensible. Has again been vomiting a good deal. Bowels have not been moved since yesterday.

March 13. I 98. Pulse about 90 irregular to very weak, occasional vomiting. No improvement. She continued in this very low condition for several days, during which time her friends hourly expected her death, the temperature falling to 97.8. During this time she only partook of a little brandy and water at intervals. Vomiting occurred at intervals. An emulsion was given on the 17\textsuperscript{th} which acted well, and by the 17\textsuperscript{th} she seemed to be slightly more sensible. On the night of the 17\textsuperscript{th} she noticed some blood in a small portion of her mouth. A small purplish rash appeared over a small surface on the front of both legs above the ankles on the backs of both forearms above the wrist.

On the 18\textsuperscript{th} the signs of improvement continuing ordered her to have 3 oz. of Feunina strongly a day and a small quantity of milk\textendash;she drank water every half-hour.

On March 20. I 74. Pulse 150. Her general appearance was much better. She did not complain of any pain in the head. Her mouth once only. Yesterday, the vomiting matter being impregnated with blood.
blood. She has also been allowed to pass water. The tenderness over the spine still persists. There seems to be hyperesthesia of the skin of the legs. On pressing the skin over right thigh, reflex contraction of the muscles of left thigh is observed to occur.

March 26. I 1964. Pulse 110. Improvement is maintained. Retraction of head which has been greater during the last 8 or 10 days, is not so marked today. The superficial neck muscles are quite relaxed but if an attempt is made to bring the head forward they come strongly into action.

From the 24th until the 26th, improvement continued to go on slowly but steadily. On the evening of the latter day I received a message to visit her again on account of a return of head pain & vomiting. This had been preceded by a report from her with all extremities but a I in a Giller of 101.2, pulse 120. The complained bitterly of cold when her body was exposed by turning down the bed cloths. Cold cloths had been applied to the head but these seemed to cease her more pain, so I advised the application of cloths being mix of warm water which appeared to be more peaceful. Ordered her to have 2 spoons of licorice in powder.

March 27. I 1964. Pulse 120. Has waked frequently during the night—present microscopy is very thin. Complaints of pain down the side on the region of the diaphragm. Cold feeling continue to the complaint of of body's exposed.

March 29. I 101:8. Pulse 114. Some tedium...
If the muscles at the corners of the mouth were observed during the night, also turning of the eyeball, but no squinting. No vomiting. No vomiting since yesterday March 29 'T 100'. Pulse 140. General appearance better all the. She has vomited once otherwise passed a very restless night. She complains of pain in the head which seems to come in sharp attacks, to be accompanied by flushing of the face. Torque more moist.

March 30 'T 97'. Pulse 138. regular. She smiled frequently yesterday. This morning (bilious fluid) had an eruption last night which was retained, and she feels much better. No pain in head.

March 31st. Improvement continues. No pain in head. Torque clean. One appetite returning. There is still slight retraction of head if she sits up it falls back, still further. 'T 99. Pulse 116.

From this date she has continued to make steady progress, with the exception of one or two slight returns of the headache, vomiting. She became very constipated, but this was easily remedied by administering night morning a teaspoonful of the syrup of Rhhamnus frangula.

By the middle of April she could sit out of bed. Was very playful, lively. Her legs remain however very weak, so that even at this date (April 28) she cannot support her own weight upon them. There is no distinct evidence of paralysis.

The next case I am allowed to narrate by the kindness
Kindness of a neighboring medical gentleman, Dr. R. Lyon, of Dalweir (a village 4 miles from Falkirk), in whose practice it occurred, by whose kindness also I was allowed to make an expert post-mortem examination of the brain & spinal cord, himself assisting. The case was one of the eclampsia variety, & the patient was a boy aged 3 years 10 months. Dr. Lyon was not called in until the superintendence of unconsciousness, so that the early part of the illness could only be gathered from the parents, as follows.

Case V. David Caldwell aged 3 years 10 months, a healthy looking boy up to the time of his illness. He had Scarlet fever in the Summer of 1882, & had been very ill but ultimately made a good recovery. On March 6th, 1882, he had a sudden vomiting of bilious matter. On the 7th he continued sick, his mother administering a camomile beverage, which operated. Afterwards he complained of headache, & was observed to be jerking all over the body. Dr. Lyon was called in on March 8th at 1.30 pm, found him lying in bed, breathing regularly, with a T of 103°. Pulse 110. He paid no attention when spoken to. He lay calmly & occasionally rolled his head on the pillow. The mouth was firmly closed, the teeth dry & covered with phlegm. This had been his condition since morning. For such a young child, weakness was noted in the limbs. The parents said that on the previous day they had
affixed a cold wet cloth along the upper part of the spine which had stopped the quiverings.

Dr. Lyon ordered a unwrapping triangle of wet cloth prescribed a mitis antifebril rectum mixture. At 6 a.m. he received a hurried message to see the patient again as found him much worse. The pulse was scarcely perceptible 40 per minute & the breathing seemed about to cease. His cheeks were a mottled purple, lips blue, eyes closed & extremities cold. After the administration of a few small doses of brandy & the application of warm wet to the extremities he seemed to revive. At 9 a.m. the patient was lying in bed, pulse 100 regular, T. 100°. Lips half closed. Small quantities of brandy ordered to be continued given regularly.

March 9 the hypn was continued at 9 a.m. as the patient was convulsing, which had already lasted for an hour. The head was hot & burning, hands & face with perspiration & both his provinces lay on the forehead & face. The eye were opened, widely open & quite insensitive to the touch, nostrils dilated widely, & a white froth coming from the mouth. There were constant convulsive twitchings of the muscles at the left angle of the mouth & also occasionally at right angle. The right arm lay motionless while the left arm kept jerking frequently & choreic-like movements. Rales heard all over the chest. Pulse regular 115, T. 103°. Rectal pulse 38. At 5 a.m. chloral hydrate was administered for the coma.
Convolutions, which however seemed to induce a collapse condition which again passed off when the inhalation was stopped. The patient gradually sank & died at 13th Monday. The convulsions persisted till death, the illness having lasted 3 days. Leave was obtained to examine the brain with cord only which we did about 4½ hours after death. The external surface of the body presented no trace of any inflammation or of anything abnormal. On reflecting the scalp a small ecchymosis was observed with inner surface about the size of a shilling, and situated over the frontal region. The calvarium presented a striking appearance being of a bright pinkish tinct. Doctor Medin has previously recorded the same observation in the published account of the epidemie in the Franklin Hospital at Stockholmen to which I have formerly referred on page 5. The pinkish tint was evidently due to the intensely hyperemic condition of the blood vessels of the bone. On opening the calvarium & dura mater, the surface of the brain presented a peculiar blushish gray appearance, due to the thinness seen to be caused by the intensely congested state of the blood vessels on the surface of the brain. In the presence of a relatively prevenient coagulation, which extended over the whole superficial surface of the brain, and filled up the sulci between the convolutions. The two surfaces of the brain were where it differed down.
hlot the superior longitudinal fissure, were
plugs together loosely by recent lymph. In
removing the brain from the skull cavity
the same gelatinous-purulent exudation was
seen to cover more or less deeply the inner
surface also. Its extent along the medulla
oblongata was the whole length of the spinal
cord. The effusion was sub-arachnoid and
well described by the term gelatinous-purulent
where it seemed to be most abundant was over
the frontal region especially on the right side.
The brain substance was much softened
as was also the nervous substance of the
spinal cord.

I inquired inquiries as to whether there
con't be traced any connection between the
cases. I had been seeing in Salton & this case
in Danel with the following result. I
learned that the boy was related to a butcher
in Salton who lived that his shop directly
opposite to the house inhabited by the family
of Murdoch, in which house a cancerous oc-
curred, one of them being then in progress.
The Murdochs were visiting their shop daily for
their meat supplies - Mr. Murdoch generally
making the purchase herself. The butcher
had visited Danel with his meat cart
on the 4th March (two days before the boy's
seizure) & had taken the boy in his cart with
him while making his rounds. The case is
the
the only one which has occurred to Daniel up to this present time.

Case VI was that of a young child named Mary McKelvie who during the day resided with her grandmother, who lived in the same block of houses as that in which the girl Rooney did. The child's mother was a factory worker and took it home with her to a different part of the town at nights. The case alluded to above occurring in a young child, in whom the differential diagnosis is necessarily more difficult, will be seen to resemble Case V very closely. The child was apparently in good health up to the midday of March 27, 1874, when it suddenly collapsed. The vomiting continued at intervals during the afternoon of Sunday, and the child had a hot skin. On the following morning it was apparently much better, it was taken as usual to spend the day at its grandmother. About midday however the sickness returned and continued at intervals until I was called to see it at 7.30 a.m. same evening. Found the child lying on its mother's knee breathing quickly and rapidly. The mother said that it seemed to be in pain when moved in any way & clutched at her as if frightened. The temperature was 102.8° but about 1.0° (the child was very irritable of touch which made examination difficult) with the exception of 203° small ecchymotic patches along the joint of left tibia nothing was observed.
the chin. The mother thought they had been there for some little time. With the exception of slight inflammation of the throat nothing could be discovered to account for the illness. The child's bowels had been rather relaxed for some length of time, but no reliable information could be got regarding their condition on that day. The gum over the two front milk teeth was swollen, which condition I ascribed, with the scarificator ordered a mixture as follows.

R. Iod. Acet. st. x 0 1

Iod. Bellad. st. x 0 1

Potas. Citrat. 3 d

Syrup. Sirup. 3 d

Agnus 2 3 d

By atropinum the pain as hours
for 6 hours. Afterwards every 2 hours,
also to have cold cloths applied to the head
for 3 minutes (mild) over the stomach.
March 29th. This morning the child appeared
very much better and not vomiting since its
previous evening. I gave 100. Ordered
a slight purgative powder to be followed by
Codie. Oil. Medicine to be continued.
March 30th. Was called to see the child at 3 am.
on account of convulsions having set in. It
was still convulsed when I reached the house.
The convulsions were moderately dilated, but
aenestjsas. 3 pm. Chloral. It had the feet
wrapted.
wrapped in clothes warming out of hot water. I then had the hair to be cut short and the clothes to be applied to the head. When an attempt was made to make the child swallow the medicine, the convulsions became worse. I found on inquiry that it had relapsed about the same time as on the previous days, vomiting and retching going on all the afternoon. The bowels had been more freely - the motions being offensive and dark brown in color. After the fits had been controlled somewhat, I took the temperature to be 105. I found it to be 105. After the fits were somewhat controlled, I took the temperature to be about 106. During the fits, the right side of the mouth was drawn outwards and downwards. The eyes were drawn into the right corner of the orbit. The convulsions were very severe and controlled until after 2 or 3 doses of chloral had been given. I informed the parents that I considered it a case of Cerebro-Spinal Fever, of the worst type, and that all hope of recovery was lost. The eye of the child made the case less hopeful. I left directions to administer more chloral if the convulsions threatened to recur. I also ordered a mixture of Eire and Roponic of Potash with Tincture of Belladonna, a dose to be given every hour. At 11 a.m. the child was lying quiet, breathing very exaggerated, eyes greatly protruded, and moderately dilated. The fits had threatened to recur about 7 a.m. and more chloral was given. The pulse was weak, very rapid, and regular. 1033.
1. am. General condition unchanged, except that the child appears to be sleeping soundly. Pupils are contracted. It appears to move weakly when the face turns the lips become pale, the pulse becomes very rapid, weak and irregular and the breathing becomes shallower. The condition lasts for about 15 to 20 minutes. Then there is off- to occur again in a shorter time.

Was continued to be quiet, breathing rapidly and heavily (60 per min). Wakes up occasionally to ask for a drink. Has no vomiting. Looks very thirsty. The facial appearance is changed—

a darkly blue tarry skin. Pupils con-

tracted almost to a pinpoint. Suggesting abnormal occasionally. I 101/2. Pulse 150.  

Dr. Macfarlane, who saw the case with me then 

make an ophthalmoscopic examination of the 

eyes after dilating the pupils with atropine. 

Thence distinct hyperaemia, but no evidence of 

hemorrhage. The hands had been twice more since 

last visit. The chloral had been repeated twice 

an convulsive twitchings appearing 

March 30th 8.30 am. The child is much worse, 

quite incoherent. Pupils widely dilated (the effect 

of the atropine) twitchings of mouth at the 

corners of the mouth. Abdomen tympanitic. 

Bowel movements twice since last night. The dose 

d of chloral has also been given but since five 

a.m. nothing has been swallowed. The breathing 

is notlaboured. Pulse 140. I 103.8. Death 

occurred
occurred about 11.30 a.m. Saw the body about 5 p.m. Found rigor mortis very well marked. A post mortem examination was persistently refused. I ---

The foregoing 6 cases were in my opinion typical cases of this fatal disease, but besides these 6 cases, I have three occurred in the town at the same time as other cases, which I have said might be considered as abortive cases of the same malady. The onset of the disease simulated the others very closely, but in a few days the symptoms suddenly moderated and recovery took place rapidly. The following case may be related as an example.

A man, aged 43 years, a healthy boy, suddenly became sick on March 19th. On the following morning he seemed better, but again became sick and vomited on the afternoon of the 20th. I saw him about 7.30 the same evening. There was a bright flush on his cheeks, which his mother informed me was not constant, the face becoming pale by turns. The child is backward in speech for his years, does not make complaints, he starts frequently however, when asked by "What, Sir? (Sore, Sore)?" but gives no indication where he is sore. He has a quick pulse, hot skin, and coated tongue. Examination did not reveal any disease in chest or abdomen, nor in his stomach and containing 150 Carat and 3 gro.
during the subsidence, one to be given three-quarters of an ounce every hour.

The following orders have been given:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rose Belladonna</td>
<td>3 fl.</td>
</tr>
<tr>
<td>Tinct. Acetate</td>
<td>1/2 x 1/4 fl.</td>
</tr>
<tr>
<td>Potass Bromide</td>
<td>3 fl.</td>
</tr>
<tr>
<td>Potass Iodide</td>
<td>1/2 x 1/4 fl.</td>
</tr>
<tr>
<td>Syr. Scopolii</td>
<td>3/4 fl.</td>
</tr>
</tbody>
</table>

Aperine 1/3 and 1/8 fl.

The temperature has been taken every hour.

March 21st 102.1. pulse 134; tolerably regular. No vomiting since last night. The head is retracted slightly. If an attempt is made to bring it forcibly forward, he screams. The retraction is more apparent when the child is sitting up. The flexion of the face continues. If he scream, he sweat at times as if in pain. His mother thinks he swallows with difficulty, and as if it caused him discomfort. In the evening, 7 P.M., there is nothing to be seen on examination. No rash to be seen on the body.

March 22nd 11:00 A.M., pulse 96. Temperature 102.5.

March 23rd 10:30 a.m., pulse 96. Temperature 99.5.

The child appears to be much better. Head less retracted. Tongue cleaning.

March 23rd. The child appears to be nearly well. Retraction of head slight. Toward evening, moved naturally.
went on quickly

Cause of the Outbreak. Etiology. The town of Sæby at the present time is notoriously in a deplorable sanitary condition, the reasons for which I have already alluded at the commencement of this paper. Around the row of miners' homes where Case I occurred the ground is soaking with sewage, which gives off a very offensive smell in dry weather. In the corner of a field almost directly opposite to the house where Case II & III occurred a similar state of matters existed. At the other row of houses where Case IV and V occurred I had noticed for many weeks that the principal drain was choked in wet weather (of which we have had a considerable quantity during the last winter) quite a little lake of sewage formed near its entrance and remained thus for days. With regard to Case I which occurred in Damel, the sanitary surroundings of the house seemed very good, the house itself in the inside a model of cleanliness.

Some observers have failed to trace any connection between the presence of the disease and sanitary conditions. Koch however, in giving his opinion favors this view. (see Transactions of the Epidemiological Society Vol. II. p 372)
in the paper of his to which I have formerly referred. Of late years this opinion has been
failing ground, and in the two articles published in the New York Med. Record for Nov. 24, Dec. 1,
3, 18, 1883 by Dr. J. L. Smith on the
Stiology of the disease the predisposing causes are distinctly stated to be anti-hygienic
and insanitary conditions. So far as my
limited observation goes it is an opinion with
which I am inclined to agree, for not only
were the sanitary conditions outside the
dwellings bad, but 5 out of the 6 cases which
I have recorded occurred in the homes of
the lowest class of winiers, where little attention
was paid to such matters.

The season of the year has almost always been
recognized as an important factor in the
Emission of the disease. Nearly all the
Sufficies recorded having occurred in the
Cold months. (See article in Reports System
of Medicine, Vol. II, page 695.) Dr. Lewis
Smith also confirms this observation, and
my cases are no exception to the general
rule.

Age. Dr. J. L. Smith says that the liability
to attack is greatest between the age of 3 and
7, and that after 10 the danger diminishes.
An observation which the cases I have
narrated confirm.

Sep. It has generally been considered that
the
Male 20% were more liable to be attacked
than the female. In some instances this
was very markedly the case. In the cases
recorded in this paper 14 were females and
2 males. Other 2 cases known which I looked
upon as abortive cases were in males, but
the cases are too few to generalize upon.

Food. Dr. Richardson in England & Baker
in America have thought that the disease
could be traced to the eating of diseased
grain (wheat) I investigated this point
carefully, but could find out nothing to sup-
port the observation. Mr. Murdoch thought
that the flour which she was using at the
time was bad, but I procured some of it
myself, through her, and it baked at home
but could find nothing wrong with it. Dr.
J. C. Smith, in his recent papers, does not
refer to this as a cause as he thinks that
improper food may have some Causative
Relation. (Dr. Richardson's paper appeared in the
Social Science Review for May 1865, and a leading
article upon Dr. Baker's report from Sweden
in the New Register, Deeside, Deepfield & Blaefield in
Michigan, U.S. in which he promulgated the
theory of the relation of the disease to disease,
which appeared in the Lancet, Vol. II 1874,
page 37, from which I quote).

Great diversity of opinion exists regarding its
Communicability from the sick to the well.

Stille
Stille of Philadelphia gives a decided opinion in his work on the Subject in favour of its non-communicability. J. Sanderson formed the same opinions from the inquiries he made in connection with his report on the Epidemic which prevailed in the Tower Hotel in 1865. On the other hand Hiller in his paper formerly referred to recommends caution in forming a judgement on this point. Simon thinks if it is communicable it is so only in a low degree and Professor Stieff has also expressed himself as doubtful. Dr. Frey who published a paper in the Vienna Medical Press on this subject, of which an abstract is given in the London Medical Record, Vol. 1879, page 311, says that the question of its infectiveness is not satisfactorily answered. Dr. Dear Riedel (formerly referred to) believes it to be an infectious mechanic disease, the malarial morbus of which resides in the air and enters the system, through the lymph spaces of the nasal mucous membrane, which according to Hey and Retzius communicates with the air on the one hand and the Subarachnoid space at the base of the brain on the other. Dr. Louis Smith (in paper formerly referred to) which is the most recent publication on the subject gives it as his opinion that it is probably very feebly contagious. I might just refer to the opinion of Dr. Collins, who finds
Report on the Epidemic which visited Dublin in 1866-67. I have referred to at the commencement of this paper. He gives it as his opinion that the question of communicability is a very difficult problem that he himself was not able to trace a communication between any two cases which had come under his own observation (See Dublin Jour. Med. Aug. 1866, p. 308). He says, however, that facts have been observed by M'Intyre, Stokes, especially by Bond, which taken alone would go far towards determining the communicability of the disease. In this connection I may notice that recently in the United States two gentlemen, Selden and S. Gardiner, assert that they have discovered the micro-organism which causes the disease. But Dr. Herron Smith, who mentions this to the chief of the peers, is wanting that this germ bears a causative relation to the disease. (I quote from an abstract of Dr. H. Herron Smith's papers which appeared in the Archives of Pediatrics for Feb 15th 1884.)

In the case I have narrated, which occurred in a small country town where inquiries can be prosecuted with more success than in large towns, it was possible to trace a communication between the cases, which occurred after the first one. Some of these facts I have already narrated in the report of these cases. 1854-6.

In Case II. the communication seemed to be transmitted through the medium of a sister to the patient who
from the subject of Case I. This sister, during the whole of the first patient's illness, called regularly at the house where Cases II and III occurred for milk, which was left there for her. In Case IV the communication was very direct; the development of the disease followed in 3 days after. In Case V the development of the disease followed upon the communication mentioned, in about the same space of time. And Case VI occurred quite continuously to where Case IV had occurred but after the lapse of a much longer time. Many people however, chiefly grown up, came into contact with the case and remained unconscious. While therefore Lambrichine 1 believes that the disease is an infectious one, it can only be so under certain peculiar conditions if these conditions are found most readily in children under 10 years of age. The diagnosis in well pronounced cases where you have characteristic features of the disease plainly developed there is no difficulty. Lambrichine however that single case, even where the disease was typically developed, occurring in private practice, might frequently be mistaken either for case of Sub-acute Mononueta or Simple Meningitis, from the fact that Cerbro-
Special Fever has hitherto been looked upon in Scotland as out of the question or almost so. The chief difficulty occurs in young children who are unable to give us any information, but
even here we can generally observe one the disease is fully developed that we are dealing with a disease which produces a powerful impression on the nervous centres. The leading points in the diagnosis are: 3 Impetigo, either Herpetic or Pellechus, the sudden onset, spasmodic vomiting, headache, violent delirium coming on in the course of 2 or 3 days, or its analogue in children, Convulsion, and hyperaesthesia of the cutaneous surface. In one of the cases which I have reported there was distinct enlargement of the thyroid gland a fact which I have not seen mentioned in the reports of other observers. Considering however that the whole glandular system seems sometimes affected in the disease this is not singular. Retraction of the head is a symptom to be deplored and if present which is generally the case. In rarer cases the diagnosis may be a matter of some difficulty if it may be mistaken for Typhus fever or Single Cerebral Meningitis. The knowledge of the presence of the disease in a locality is a great help.

Progress. On this point Dr. I. S. Smith remarks that "The more severe & intense the onset of the disease, the less favourable for life. The first week is the time of greatest danger, if life is prolonged to the end of the second week recovery is probable." These are remarks with which I entirely agree.

Sequelae. Loss of sight & loss of hearing are well-known sequelae of the disease. The latter occurred in Case I. It was, I think, the worst striking.
feature in the case of the one which struck me most forcibly. Sometimes a kind of idiozy remains for a considerable time & may be permanent. Also Paralysis of certain groups of muscles. I have not observed either of these.

Duration. Cases have been recorded as short in their duration as 2 hours. The shortest of my case, was 3 hours (known duration) the longest has now extended over 2½ months & will probably be a considerable time longer before she can be considered well. The longest case which I have seen recorded is one of 6 months.

Treatment. In the two cases which recovered the principal treatment consisted of Leeches to the head, followed by Ice Cloths. Medicines were also administered but there were given no irregularly during the critical period of the disease that little credit can be attached to them. In fulminant cases no treatment is of any avail.

The greatest good is to be expected from sanitary care, such as the improvement of the sanitary condition of infected districts, & attention to general hygiene. Plain wholesome food & regular life.