

**On tetany in young children : a thesis for the degree of M.D. in the
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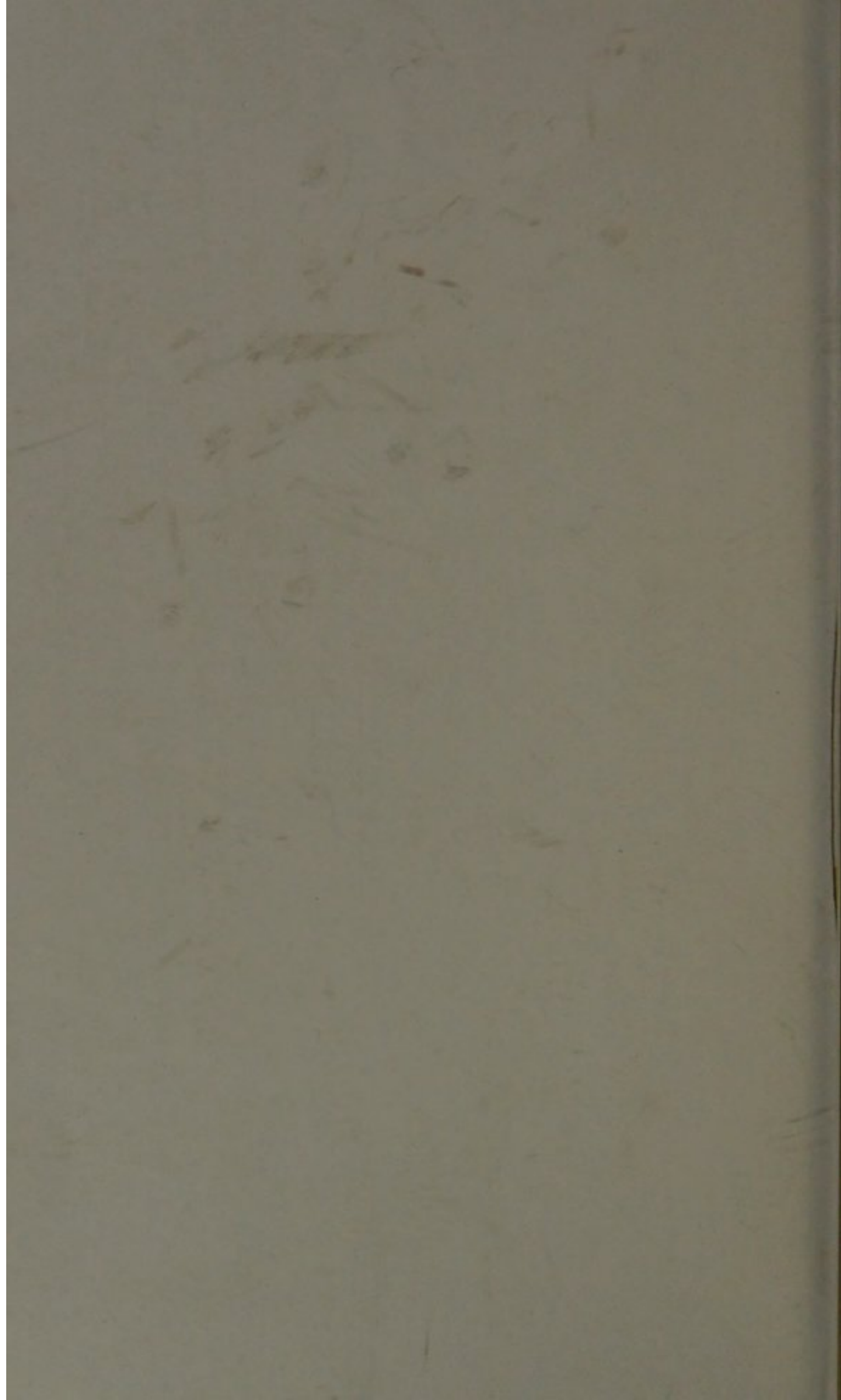
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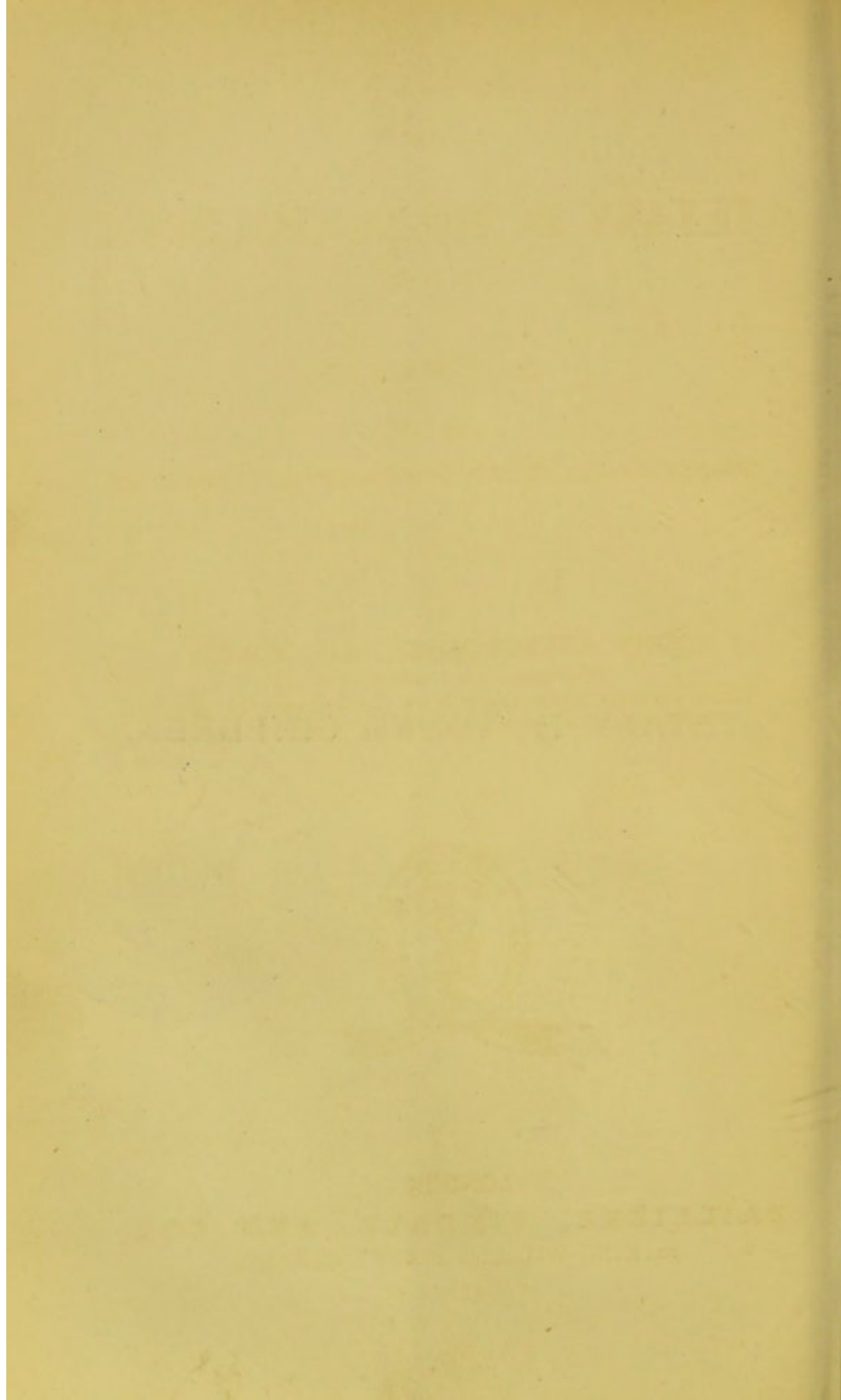
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ON  
TETANY IN YOUNG CHILDREN.





ON  
TETANY IN YOUNG CHILDREN.

A THESIS

FOR THE

*DEGREE OF M.D. IN THE UNIVERSITY OF CAMBRIDGE.*

BY

JOHN ABERCROMBIE, M.D., M.R.C.P.

OF GONVILLE AND CAIUS COLLEGE, CAMBRIDGE,

MEDICAL REGISTRAR TO THE HOSPITAL FOR SICK CHILDREN, GT. ORMOND ST.

FORMERLY HOUSE-PHYSICIAN TO ST. BARTHOLOMEW'S HOSPITAL.



LONDON:  
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1880.

THE HISTORY OF THE

REIGN OF

CHARLES THE FIRST

BY

JOHN BURNET

OF

THE UNIVERSITY OF OXFORD

IN TWO VOLUMES

LONDON

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## P R E F A C E.

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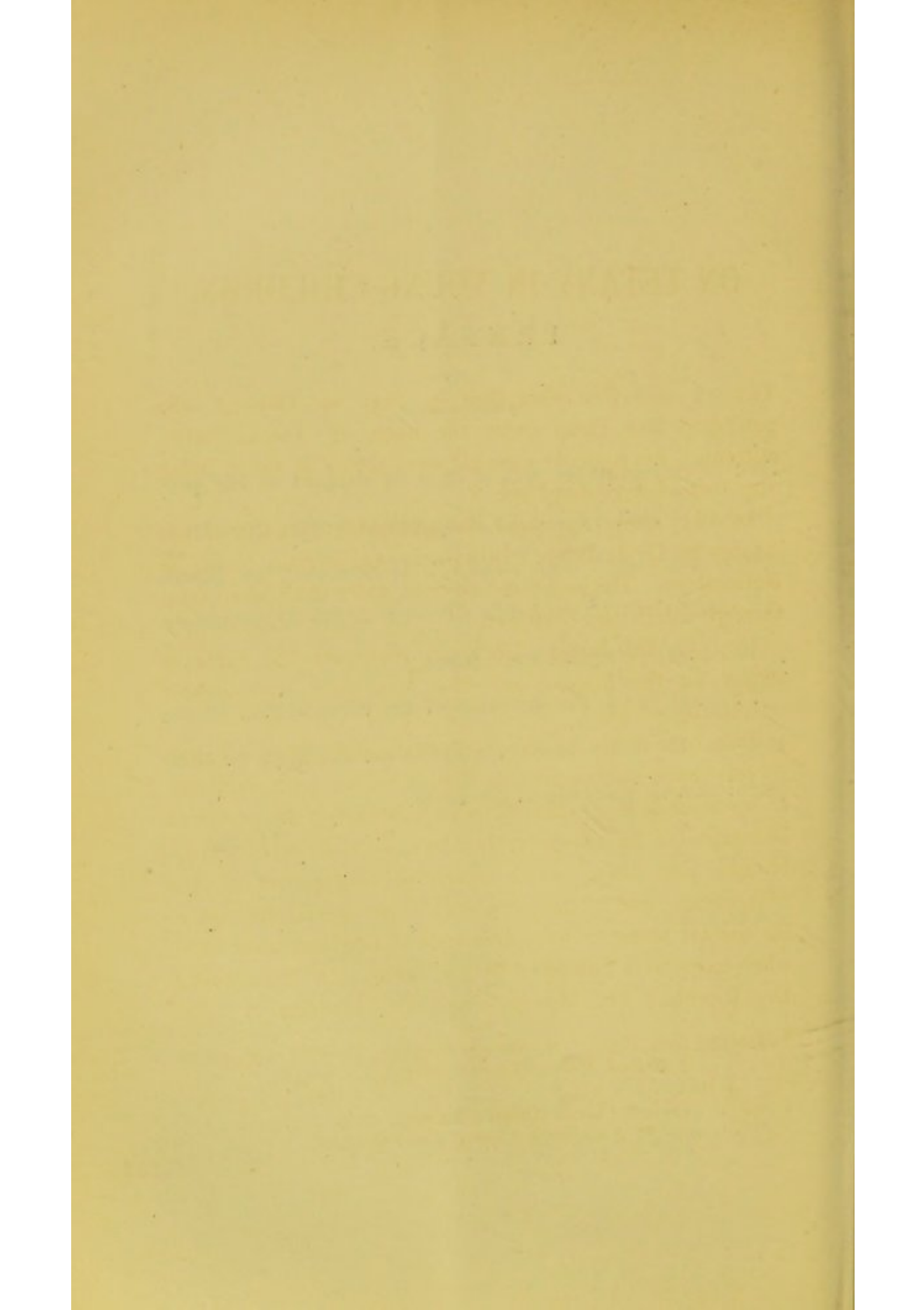
THE following paper was written in support of the proposition, 'That Tetany, as it occurs in young children, is closely associated with rickets.' It was read on March 4th, 1880, and is now published with slight modifications justified by subsequent experience.

I have to thank the members of the medical staff of the Hospital for Sick Children, Great Ormond Street, for their permission to make use of the cases.

J. A.

*May, 1880.*





## ON TETANY IN YOUNG CHILDREN.

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TETANY was first described in 1831 by Dance,\* who published four cases under the name of 'Tétanos intermittente;' his patients were all adults, two of them being over forty-five years of age.

In 1835 there appeared an admirable account of the disease by De la Berge† in a paper 'On certain Muscular Retractions.' His paper records two cases in children fatal through cough and diarrhœa.

In 1852, Dr. Lucien Corvisart proposed the name of tetany for the disease, and this has since been almost universally adopted.

Trousseau in his earlier descriptions of the disease called it 'rheumatic contraction in nursing-women,' the majority of his cases having occurred in women during the period of lactation, but he subsequently adopted the name of tetany. It has also been called 'essential contracture of the extremities,' and 'arthrogryphosis.' No special account of the disease seems to have appeared in England until 1870, when cases were published by Dr. Wilks,‡ Dr. Broadbent,§ Dr. Ritchie,|| Dr. Moxon,¶ and Dr. Haddon.\*\* The

\* *Archives Gen.*, 1831. † *Journal Hebd. des Sciences*, 1835, vol. iv.

‡ *British Medical Journal*, 1870, vol. i. p. 598.

§ *Ibid.*, vol. ii. p. 138.

|| *Ibid.*, p. 354.

¶ 'Guy's Hospital Reports,' 1870.

\*\* *Edinburgh Medical Journal*, 1870.



patients of Drs. Wilks and Moxon were children, and the rest, with the exception of a boy, aged 13, and a girl, aged 14, were adult women.

In 1876, an epidemic of tetany occurred at Gentilly ; the following brief account of it is taken from the report of M. J. Simon.\* The outbreak occurred in, and was confined to, a day-school for girls. The first case was that of a girl, aged 10 ; it seems to have been a typical case, the attacks lasting several hours at a time, and not passing off during sleep. A few days later another case occurred ; this patient was also aged 10, and she had had an attack of tetany about three months before. A few days later two more were attacked aged 12 and 10. These cases all occurred towards the end of October, 1876.

On November 6, eleven fresh cases occurred, and during the next ten days there were thirteen more. The governess was herself affected for a few moments with contracture of a single finger. After this the school was closed, and no fresh cases occurred ; by November 29, all the patients were well, except the two who were first attacked. It should be noted that it was especially at the time for the meeting of the class, or soon after this, that the attack (in several of the children) used to come on. M. Simon discusses at some length the ætiology of this outbreak, and rejects the hypothesis that it was due to atmospheric influences, as there was a boy's school close by, where the conditions were precisely the same, yet no case occurred. He concludes that the first four cases might be considered to be due to spinal congestion, consequent upon cold, and that the others were due to involuntary imitation resulting from nervous shock.

M. Hilairet, who also investigated this epidemic, came

\* *Progrès Méd.*, 1876, p. 833.



to the conclusion that in at least a dozen the tetany was due to simulation, and not imitation. In dealing with adult women the possibility of hysteria would always have to be considered, and would be with difficulty eliminated. But in the case of young children the question of hysteria may practically be put on one side.

This paper is based upon a study of fourteen cases that have come under my observation during the past year. In order to give a general account of the disease, I quote in full one typical case.

#### CASE.\*

Henry W., aged 2 years, admitted January 21st, 1879, under Dr. Cheadle. The following account was given by his mother. He was quite well in general health till Christmas. On Christmas-eve he had a slight fit, face convulsed, fists clenched, forearms flexed on arms, and arms twisted behind back, legs drawn up and rigid, was unconscious for about half-an-hour. Seemed in great pain all that night, no sleep. Next day, face was noticed to be swollen and red, and he could not open right eye; left eye was turned in. These symptoms persisted more or less for a week; thus the strabismus was more or less constant, *i.e.*, would last for a couple of hours, and then disappear for a bit. Since this date he has had difficulty in swallowing fluids; they return directly he takes them, but not through his nose. Has no difficulty with solid food. Up to last week fingers were clenched, but since then they have been gradually getting extended; no change in the feet. Is not losing flesh. Appetite good. Bowels regular. Sleeps well. No change in the condition of his extremities during sleep. He seems to prefer lying on his knees and face. Has not had any fit since.

Last March had a somewhat similar illness, beginning with a fit, which was slight, lasting only ten minutes, leaving his hands and feet much in the same condition as at present,

\* *Vide Med. Times and Gazette*, March, 1880.



only not so bad. He had quite recovered in about a fortnight. Never any other ailment. Born at the full time, the sixth child. No symptoms of congenital syphilis. Weaned when a year old, but after the first fortnight mother used to give him bread and milk, and corn flour, as well as the breast. Mother has often noticed that he perspires very much during sleep about his head. Began to try and walk at age of thirteen months, but cannot walk yet. Six other children living, healthy; none have had fits; one died, aged six months, of convulsions, and one at birth. Mother healthy; her father died insane. Father healthy; his father died of tetanus.

*State on admission.*—Well nourished. Head rather big, anterior fontanelle closed. No facial paralysis, no otorrhœa. Pupils large, equal, sluggish, no strabismus or ptosis. Tongue clean. Has all his teeth except the canines. Glands enlarged in left side of neck. Ends of radii slightly enlarged. P. 96, small, regular. Temperature not raised. Ribs beaded, no transverse constriction of chest. Chest natural to percussion and auscultation. Abdomen natural shape, spleen just palpable. He is in a state of tonic carpo-pedal contraction. The hands are flexed at wrists, and slightly abducted. Thumbs strongly adducted, so that the ball of the thumb is applied to the palm of the hand, but the terminal joint is not flexed. The fingers are a little flexed at the metacarpo-phalangeal joint, and then extended and approximated; at the second joint they are slightly over-extended, and the terminal phalanx is a little flexed. Both hands are very much the same. The muscles of the forearms feel somewhat rigid. There is an elastic swelling on dorsum of hands and feet, but no pitting; skin tense and shining. Hands and feet feel hot. The feet are slightly flexed, and a little abducted; the great toes are very little flexed. The muscles of the calves, and the peronei feel rigid. Manipulation increases the muscular rigidity both in the arms and legs. The muscles of the neck, pectorals, and muscles of the abdominal walls become rigid on handling. Lower ends of tibiæ slightly enlarged. Urine not albuminous.



R. Chloral Hyd. . gr. ij.  
 Pot. Brom. . gr. v.  
 Syr. Tolut. . ℥v.  
 Mellis . . ʒj. 4tis horis sum.

Jan. 24. No rise of temperature since admission. When left to himself, he lies on face and knees. Slight nasal catarrh. Swallows semi-solid food better than fluids. When drinking he makes several gulps in swallowing each mouthful. Feels the prick of a pin both in hands and feet. Reflex excitability on tickling the soles of his feet is about natural. No 'spinal epilepsy.' Hands are rather more abducted than at time of admission, ring and little fingers especially, so that they are a little separated from the other fingers. When asleep there is no relaxation in the rigidity of his hands and feet. Bowels act once daily, motions not offensive. This afternoon I put him under the influence of chloroform, and though he was kept under its influence for half-an-hour, and was so deeply under that he did not feel a strong continuous current, yet there was no relaxation of his spasms. The muscles of his arms act naturally to the constant current.

R. Pot. Brom. . gr. x.  
 Sp. Chlorof. . ℥v.  
 Aquæ . ad ʒij. 4tis horis.

Jan. 28. On roughly passing the back of the nail over the skin just in front of the left parotid region, the orbicularis palpebrarum, levator alæ nasi and levator anguli oris twitch smartly. This twitching can also be observed on the right side, but here it is not nearly so marked. This phenomenon I propose to call 'facial irritability.' Compression of the left ulnar nerve does not seem to exert any influence over the spasms. When he drinks, it seems to be with difficulty, and causes him to cough.

Jan. 30. The nurse noticed that he squinted very much this morning. At times certainly his hands are not quite so rigid; this morning he took hold of a piece of bread. No pain on handling him.

Feb. 1. No fever. No more squinting observed. The



'facial irritability' continues. Yesterday his right hand was put into warm water for a few minutes; no change was observed. This morning I tied an Esmarch's bandage firmly round his arm on the right side for over a minute, but no change was observed, either during its application or afterwards. He often makes a crowing noise with inspiration, but otherwise there is no dyspnœa. Practically there is not much change in the condition of his hands and feet since admission. The muscles do not become so rigid on manipulation as they did. Bowels rather loose.

R. Pot. Brom. . gr. x.  
 Bism. Subnit. . gr. x.  
 Pulv. Trag. co. . gr. x.  
 Aquæ . ad ʒij. 4tis horis.

Feb. 5. Diarrhœa is a little better. No change in the condition of hands and feet. Sometimes he swallows better than at others. Laryngismus still very frequently present, both when awake and during sleep. He was put under chloroform to-day, but without any effect upon his spasms. The muscles of his legs respond well to both continuous and interrupted currents, the muscles on the left side of the face were also tested, and responded naturally.

R. Ext. Physostigmatis . . . gr.  $\frac{1}{8}$  ter die.

Feb. 15. The dose of Calabar bean has been gradually increased; he now takes an eighth of a grain.

R. Mist. Ol. Morr. c. Vin. Ferro . ʒj. ter die.

Feb. 17. At no time any fever. Fingers are not so stiff, and can be flexed on metacarpal bones easily; the over-extension of the joints is less marked. Laryngismus still very marked at times.

Feb. 19. Drinks without any difficulty now. The 'facial irritability' has disappeared. Thumbs still adducted, but not so strongly; fingers almost natural, wrists slightly flexed. Toes still flexed on soles.

R. Ext. Physostigmatis . gr.  $\frac{1}{8}$  ter die.  
 March 1. Auge dos . . . ad gr.  $\frac{1}{8}$ .  
 Raw meat.



March 3. No laryngismus for more than a week. Takes his food very well. Right hand almost natural, left wrist slightly flexed, and thumb a little adducted. Bowels rather loose, but not open too frequently.

R. Mist. Ol. Morrh, c. Ferro et Glycerino . ʒij. ter die.

March 12. No trace of tetany left now. I saw him occasionally during the next two months, and he remained quite well.

He was readmitted on October 29, 1879. Was quite well until four days ago (October 25). Had been restless all night, and when he woke up that morning, mother noticed that his thumbs were firmly adducted into palms, and toes flexed on soles; there was swelling on the back of hands and feet. Mother put him into a warm bath, which made him all right, and he seemed quite well during the rest of that day. The next day he had a slight attack in the morning, but it passed off. On the following day his hands were 'drawn' all day, and he made a 'croupy' noise with his breathing at times, especially when he drank anything. Yesterday he was very bad all day, and last night had 'croupy' breathing; hands and feet were much swollen, hot, and very painful. No vomiting or diarrhoea during this attack.

*On admission.*—Very fat. Head large, anterior fontanelle closed. Slight convergent strabismus. 'Facial irritability' well marked on both sides as regards the orbicularis palpebrarum, and on the left side as regards the angle of the mouth also. Tongue very thinly furred. Has all his teeth. Glands in neck slightly enlarged. Ribs not obviously beaded. Abdomen soft, spleen not palpable. Thumbs adducted to middle of palms, but not strongly; palms of hands slightly hollowed, fingers a little flexed at extremities, then straight; very slight swelling on dorsum of hands and feet; during sleep hands are partially but not entirely relaxed.

R. Ext. Physostigm. . gr.  $\frac{1}{12}$  ex aq. ter die.

Nov. 17. Had been improving very much, could stand and walk, 'facial irritability' had disappeared, 'crowing' had



only been noticed once or twice, and there was only the slightest trace of tetany left in the hands until to-day. But on this day fever and diarrhoea set in, and on the next day the following note was taken. 'Very restless last night, has been crowing much. The tetany in hands and feet is extremely marked, wrists flexed, dorsum of hands a little swollen, thumbs strongly adducted to palms, fingers approximated and extended, excessively so at first joint. Hands feel hot, moving them causes pain. Toes flexed on soles, dorsum of feet swollen. There is marked laryngismus coming on in paroxysms, and also difficulty of swallowing.' During the next few days he was treated actively; subnitrate of bismuth was given every four hours, at first in five grain, afterwards in ten grain doses. The ext. of physostigma in quarter-grain doses, and large doses of bromide of potassium and chloral hydrate; but he did not improve at all, and on November 22nd a measles rash came out. There was no relaxation during sleep in this attack. From the onset the measles was exceedingly severe, the eruption was very abundant all over the body, and of a pale livid colour; he very soon fell into a state of coma, which gradually became more and more absolute, until his death, which occurred on November 26th. The tetany position of his hands and feet remained to the last. No autopsy was permitted.

Of the fourteen patients, nine were boys. Their ages ranged from nine months to two and a half years, which would correspond with the period during which the changes due to rickets are taking place.

In seven cases there had been previous attacks. In five cases the complaint was ushered in suddenly with convulsion, in seven others the onset was more or less sudden.

As regards the season of the year at which they commenced, the attacks began in January in two cases, February one, March four, April two, July two, October,



November, and December, one each. Dr. Gee\* has published some observations showing how much more common laryngismus stridulus is during the first half of the year. The above statistics do not in any way contradict his results, for during 1879 (the year when these cases were observed), the cold weather in London lasted fully to the end of June. But I cannot lay any stress on the above figures, for the following reasons :

(a) Half of the patients had suffered from previous attacks of tetany, the exact dates of which I cannot give; and

(b) I cannot be certain that I saw all the cases of tetany that were brought to the hospital during 1879.

*Analysis of the chief symptoms.*—The main feature of the disease, and the one which has chiefly attracted the attention of writers on this complaint, is the *muscular spasm*. As will be seen from the case narrated above, there is rigid contraction of the flexor muscles of both upper and lower extremities, so that the elbows are slightly bent, the hands flexed at the wrists, and slightly abducted, the knees bent and heels drawn up; but it is only in the more severe cases that the affection is so general a one, and in milder cases the arms and legs may be quite relaxed and natural, the hands and feet alone being affected, and it is the position of these, but especially of the hands, that constitutes the chief feature of the disease.

The thumb is adducted to the middle line of the hand, but the terminal phalanx is not at all flexed, thus differing remarkably from the position in the ordinary convulsions of children; the palm of the hand is hollowed, the fingers are slightly flexed at the metacarpo-phalangeal joint, then extended excessively so at the first phalangeal joint, and approximated; in some cases the terminal joint is a little flexed.

\* 'St. Bartholomew's Hospital Reports,' vol. xi.



The attitude of the hand during a severe attack is most striking, and cannot be mistaken for anything else, but of course there are varying degrees, and in the slightest form the thumb alone is adducted to the palm, the fingers being quite natural, and the thumb is not at all firmly held in position. The return of the thumb to the normal position indicates the disappearance of the last sign of tetany and as a rule it may be said that where there is no adduction of the thumb there is no tetany ; but in one patient, swelling on the backs of the hands and feet, laryngismus, and facial irritability, persisted for three weeks after the muscular spasm had entirely disappeared.

Sometimes the position of the hand is a little different, the ring and middle fingers being separated instead of approximated. Rilliet and Barthez\* say that the fingers are separated, but I have never seen this except where the attack was passing off.

Next to the hand, the foot is most frequently affected, though not always so soon or to so great an extent. It is strongly arched, and the toes are flexed on the sole ; sometimes the great toe is extended, the other toes remaining flexed ; sometimes also the sole of the foot is hollowed by approximation of the metatarsal bones, but in slight cases there is often no appreciable affection of the foot.

The following muscles would seem to be the ones concerned in the production of the typical attitude of the hand, viz.—(1). The adductor pollicis and inner head of the flexor brevis pollicis, which would give to the thumb its characteristic position. (2). The palmar interossei, which would produce the hollowing of the palm, the slight flexion at the metacarpo-phalangeal joint, and the over-extension at the first phalangeal joint ; when the fingers are

\* 'Mal. des Enfants,' III., p. 326.



separated, this would be due to the action of the dorsal interossei. All the above muscles are supplied by the ulnar nerve. The occasional slight flexion at the terminal joint would show that the lumbricales may be involved. So far as my experience goes, there is no cutaneous anæsthesia.

In one patient who came under my observation, there was very well-marked fibrillary tremor in the muscles forming the ball of the thumb, and I have found it mentioned occasionally by various writers. It is certainly not a common symptom, and its explanation is by no means easy. In my case it was quite an early symptom, so that it could not be attributed to exhaustion of the muscle from long-continued cramp; and in truth if this were the case, the symptom ought to be a much more common one. It would rather seem as if the muscular fibres had been imperfectly put on the stretch and were in a state of extreme instability, so that this tremor may be looked upon as analogous to that which can be produced in the leg when the tendo Achillis is suddenly made tense in certain diseases of the spinal cord. Opisthotonos and trismus have been noted in rare cases, but I have never seen either symptom.

There is one point about this muscular rigidity which is well worthy of note, and that is its persistence during sleep, of the truth of this I have had repeated opportunities of satisfying myself. Those writers who have mentioned this symptom do not lay much stress upon it, but it seems to me that it is a very strong argument in favour of the spinal origin of the spasms, as were they in any way due to cerebral influence, they would surely disappear during sleep. I have twice tried the effect of chloroform on one patient, and once on another, without producing any relaxation at all, though the anæsthesia was in each case pushed to a considerable extent. Of course this is a very small experi-



ence, but it is in direct opposition to Trousseau's statement, that in severe cases chloroform always relieves the spasms. All the earlier writers who have mentioned this disease have laid stress on the intermittent nature of the spasms. My experience does not at all agree with this; I have never seen any complete intermissions: it is true there have been remissions and periods of exacerbation, but during the remission there has always been a sufficient amount of rigidity to enable one to recognise the complaint without difficulty.

Coincidentally with the muscular spasm there is *swelling on the dorsum of hands and feet*; in severe cases this may be considerable, and the skin is then tense, shining, hot, and sometimes red; there is no pitting on pressure, and the skin is dry. In such cases there is always acute *pain*; there is no doubt that in severe attacks the children suffer much; they are very fretful, and cannot bear to have their hands or feet touched. In mild cases there is slight puffiness on the backs of the hands and feet. So far as I have seen, this symptom is a constant one, though varying in degree; it is generally proportionate to the amount of muscular spasm, but I have seen two cases where it was the most prominent feature, and in one of these cases the child had been treated for some time by a doctor for 'dropsy.' This condition would appear not to be of rheumatic origin; there is no affection of the joints themselves, or of the fibrous tissues in their immediate neighbourhood, and the changes are in all probability due to vaso-motor disturbance. This view is borne out by the fact that the swelling increases with an exacerbation, and diminishes or disappears during a remission.

*Laryngismus* seems also to be a constant symptom of this disease in children. It was present in all my cases, and in



some it was the symptom which most attracted the parents' attention; it is essentially intermittent, coming on during the exacerbation, and disappearing during the remission. Sometimes it is brought on when the child attempts to swallow anything; perhaps in such cases there is at the same time a similar spasm of the muscles of the pharynx; in one of my cases this certainly seemed to be so. The connection between laryngismus and rickets has long been noticed. In more than one of my cases the patient had been the subject of laryngismus for some time before any attack of tetany occurred. In reference to this subject I quote the following passages.

Dr. Hillier,\* in speaking of laryngismus stridulus, says: 'Another symptom which often accompanies these attacks, is a rigid contraction of the hands and feet.' Dr. Ley† mentions a peculiar contraction of the thumbs, fingers, wrists, ankles, and toes of a continuous character. Mr. Lawson Tait,‡ writing on laryngismus stridulus, says: 'Foremost and most constant in their attendance are those carpo-pedal contractions. . . . It has been present in all the cases I have seen, and I have as yet heard of no case where it was noticed to be absent.'

Dr. West§ has given an excellent description of tetany in his article on spasm of the glottis. Dr. Moxon|| has also related a case of tetany, which was associated with laryngismus. Meigs and Pepper,¶ under the head of laryngismus stridulus, describe a typical case of tetany. But I must admit that in regard to some of these writers, they have not been sufficiently explicit to make it certain whether they referred to tetany, or only to the ordinary form of carpo-pedal contractions.

\* 'Diseases of Children,' p. 378. † 'Laryngismus Stridulus,' p. 12.

‡ *Dublin Quarterly Journal of Science*, 1871.

§ 'Diseases of Infancy and Childhood.'

|| 'Guy's Hospital Reports,' 1870. ¶ 'Diseases of Children.'



The phenomenon of *facial irritability* was first pointed out to me by my friend Dr. Barlow, who had observed it in a case of induced tetany in an inmate of the Salpêtrière at Paris. I have sought for it in every case of tetany that I have seen except one, and have always found it. I have not been able to find any mention of it in any recorded case. I believe it is a constant and necessary symptom of tetany, occurring in mild cases only in the upper eyelid, on one side perhaps; in severe cases occurring on both sides in the levator muscles of the corner of the mouth and ala of the nose, as well as in those that close the eye.

It is usually more marked on one side than the other. In severe cases passing the finger ever so lightly over the nerve is sufficient to produce it. It occurs instantaneously, and on the hypothesis that the nerve itself is irritated, it could not be a reflex act, as the facial nerve contains no afferent fibres, and it must therefore be due to direct irritation of the nerve-fibres.

I have looked for this symptom in a great many children, both rickety and not, but have never found any trace of it except in cases of tetany; from this I conclude that in this disease the facial nerve is in a state of extreme irritability. Whether the other nerves, both cranial and spinal, are in this same state or not, I am unable to say. One would be inclined to expect that those concerned in the production of the typical position of the hands and feet would be, but the only nerve that is at all accessible is the ulnar, and the only way that this can be affected is by compression against the humerus, a different kind of stimulation to that practised on the facial.

I have compressed the ulnar nerve in several cases, and I have never observed any effect either in increasing or diminishing the spasm, though Trousseau says that



pressure on the nerve-trunks will always induce a spasm.

Erb,\* in speaking of this disease, says that there is increase of electric excitability in the peripheral nerves to both constant and induced currents, but not in the facial nerve; and he lays considerable stress upon this point. I have only tried the effect of the battery once, and then I did not find much difference between the facial and peripheral nerves as regards electric excitability. But seeing that the finger produces as much effect in these cases as a weak continuous current does in health, I cannot but consider that during the attack the facial nerve is in a state of extreme irritability.

As regards the *temperature*. In six cases it was taken in the axilla every night and morning, and no elevation above the normal was noted, but slight pyrexia is mentioned in some of the recorded cases.†

The *duration* of this disease is somewhat variable. In slight cases it may pass off in a day or so, but in more severe cases it passes off very gradually, and may last two months, or even more.

There is a great tendency to relapse.

The fact that in one case an intercurrent attack of measles did not cut short the tetany, but on the contrary aggravated it, is worthy of note; for had the patient been suffering from one of the other forms of neurosis (*e.g.* chorea), so severe an attack of measles would almost certainly have put an end to it.

Associated symptoms. 1. *Rickets*.—All my patients presented some of the active signs of the rickety process, such as patency of the anterior fontanelle, sweating about the

\* Ziemssen's Encycl., New. Syd. Soc., Transl. vol. xiii.

† *Vide* Report of Medical Registrar London Hospital for 1876.



head, beading of the ribs, enlargement of the ends of the long bones, and irregular dentition.

2. *Diarrhœa*.—In seven cases diarrhœa was present at the time the attack commenced, and in three, constipation, so that in ten out of the fourteen patients there was evidence of intestinal derangement; and I think that more careful inquiry into the character of the stools, especially as regards offensiveness, might have made the proportion still higher.

In the case recorded above, however, neither attack was ushered in by diarrhœa, and when first under treatment he had an attack of diarrhœa which was checked without any change in his tetany, so that although in most cases intestinal irritation may be the actual exciting cause, it is not absolutely necessary.

3. *Teething*.—In all my patients dentition was delayed, or proceeding in an irregular manner; but in only one case was the child said to be cutting any teeth at the onset of the complaint. This child was aged one year and ten months; he had twelve teeth, and was said to be cutting four more. One child cut several teeth whilst in the hospital, but his tetany was in no way relieved thereby.

Attacks of tetany are frequently, I might almost say generally, attributed by the public to teething, and on this view the doctor who is called in sometimes lances the gums; this had been done in the case of one of my patients, without benefit. Seeing that in rickets dentition is always more or less interfered with, is it not more reasonable to refer the phenomena of tetany to the rickety condition itself, rather than to an outcome of this? I do not wish to assert that in children grave nervous symptoms may not result from dental irritation, but the special group of symptoms we are



considering will not, I believe, be found in cases of teething where there is no rickets.

As regards other sources of peripheral irritation, I may mention that one of my patients had eczema of the scalp, and another tinea tonsurans.

As regards the *family history*, particulars were obtained in twelve cases. Almost all the children were members of large families, and came late in the family—in fact only two were earlier than the fifth child. Two of the patients were the subjects of congenital syphilis. In three cases, other members of the family had had tetany. These were :

1. Jane A., the ninth child. The seventh, eighth, and tenth have had tetany ; the fifth and present case have got contraction of the left sterno-mastoid muscle.

2. Alice P., the fifth child. The second, third, and fourth have had tetany.

3. W. L., the sixth child. He died in a fit of laryngismus ; an older one died of tetany and laryngismus, and the seventh child has had tetany.

I also know of another family (not alluded to in this paper) where three children have had tetany. In two cases there was a history of insanity on the mother's side, and in one, on the father's. In four cases the mother had been subject to facial neuralgia, one of them for a period of seven years.

I think the above facts justify these inferences, viz. :

1. When one child in a family has had tetany, the subsequent members will be liable to it.

2. In a certain proportion of the cases, there is a neurotic tendency in the parents.

TREATMENT.—If the case is a mild one, the probability is that if left to itself a spontaneous cure will ensue. In any case, however, it will be well to treat the rickets, and



pay especial attention to the diet. Diarrhœa, when present, should always be treated ; though I must admit, that in one case the patient, when he first came under observation, had a good deal of diarrhœa with very slight tetany, and that when the diarrhœa was diminished his tetany became worse ; however, I believe this result to be quite exceptional.

The castor-oil mixture of the Hospital for Sick Children, containing five drops of castor oil with some mucilage and syrup, has I think on the whole proved the most efficacious ; but bismuth is also useful. The severe cases are exceedingly obstinate, resisting all treatment, and passing off very gradually after some weeks. I do not feel confident that I have ever seen any benefit from the administration of bromides, either alone or in combination with chloral, although this line of treatment has been strongly recommended for laryngismus stridulus.

In the case recorded above where Calabar bean was administered, the child was taking the drug for five weeks before he was quite well ; and moreover, during the greater part of this time he was also taking cod-liver oil and steel wine, so that it is not easy to say how far the result was influenced by the Calabar bean. In another case in which this drug was used, after taking it for four weeks the patient went home improved, but still with well-marked tetany ; he was then ordered cod-liver oil and steel wine, and in a week's time he was quite free from his complaint ; he continued to show himself from time to time for a month, and there was no return of his tetany.

I have never seen any benefit derived from putting the patient in a warm bath, nor have I found that on plunging one arm into cold water there was any diminution of the spasm. I have not tried the application of cold bandages,



as recommended by Dr. Wilks,\* but in any future case I should certainly do so, feeling confident of relieving the patient thereby. In several cases I have tied a band round the arm, or compressed the brachial artery digitally, without observing any change in the position of the hand, though Trousseau says that compression of the vessels will at once arrest the spasm. Altogether the disease, as I have seen it, presents so many points of difference from that which Trousseau designated by the name of tetany, notably in the continuous character of the spasm in my cases and its intermittent character in his, that it may reasonably be doubted whether they are one and the same disease.

What is the essential nature of tetany? Trousseau† regarded it as rheumatic. Buzzard‡ considers it to be of central origin, and refers to Dr. Hughlings Jackson's views on the antagonism of the cerebrum and cerebellum, according to which temporary suspension of the cerebral influence would be capable of producing these phenomena, and inclines to accept this hypothesis. Erb§ says: 'It is impossible to determine at present whether the disease of the spinal cord is primary, and the trophic disturbance of the peripheral nerves is only secondary, or whether it is a disease extending uniformly along the peripheral and spinal motor nerves.' In one case I have had an opportunity of making an autopsy; a careful examination was made of the spinal cord and medulla oblongata after hardening in Muller's fluid, but no abnormal appearance could be detected, either in the grey or white substance.|| Langhans¶ has recorded a fatal case of tetany in a woman aged 48. Microscopical changes were found in

\* *British Medical Journal*, 1870, vol. i.

† 'Clinique Med., Trans.,' vol. ii.      ‡ *Practitioner*, July, 1877.

§ Ziemssen's 'Cyclopedia,' Trans. vol. xiii.      || *Vide Appendix.*

¶ 'Archiv. für Path. u. Anal. und Phys.,' t. lxiv.



the spinal cord, especially in the cervical enlargement. They consisted in a thickening of the tunica adventitia of the small arteries and veins. The anterior white commissure was the especial seat of this change. This thickening was due to the presence of groups of rounded lymphoid cells spread in a reticulated stroma. The perivascular lymph-spaces appeared normal. Further observation will be necessary before any attempt can be made to make any positive statement as to the pathology of this disease.

The symmetry of the affection, its wide-spread distribution, involving as it does not only some of the great nervous trunks that supply the extremities, but also the seventh and part of the eighth cranial nerves, and the sympathetic nervous system, point to some central disturbance. This, however, cannot be of the nature of a gross lesion, owing to the transient character of the symptoms, and the complete recovery that usually takes place. Relapses are, as I have shown, very common, and this affords another argument against the idea of any permanent central nervous lesion. The lesion then is probably temporary ; its exact nature cannot at present be determined.

The next question then is, is this lesion primary or not ? If it were primary, it would almost certainly be of an inflammatory nature, and we should then have not unfrequently some permanent result, which never happens.

This would not be the case if it were reflex, and moreover, we have in many cases a ready source of reflex irritation in the intestinal trouble which is so often present.

The absence of cerebral symptoms, and the continuance of the spasm during sleep, or anæsthesia produced by chloroform, would seem to exculpate the brain from any share in the morbid process. This being the case, it seems



that the grey matter of the cord and medulla would be the parts involved.

The peculiar condition of the facial nerve would make me incline to the hypothesis put forward by Erb, 'that the disease extends uniformly along the peripheral motor nerves.'

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## APPENDIX.

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THE following notes were taken during life—Jas. C., æt. 15 months, admitted into the Hospital for Sick Children, January 15th, 1880:

His illness commenced about seven weeks ago, at the time of mother's confinement, so that she is unable to give any particulars as to the onset, but she noticed at this time some redness and tension of backs of hands and feet, with some affection of the fingers. He had had a fit a short time before. These symptoms passed off until six weeks ago, when mother noticed one day that his hands were 'set fast,' and feet 'drawn.' Has always had 'crowy' breathing since hooping cough a year ago, but much worse during this illness. Bowels are always troublesome, but latterly they have been much relaxed and very offensive. His hands did get better, so that he could handle things, but not quite well; they have been bad again ten days. No previous tetany. Had fits when three to four months old. He is the fifth child, born at full time, had a rash about buttocks in early infancy. Weaned at the age of three months. There had been four previous pregnancies: 1st. Child still-born. 2nd. A miscarriage. 3rd. Child died, æt. 13 months

—fits, no tetany. 4th. Child died, æt. 11 months—fits, no tetany. The baby, æt. 7 weeks, has a rash about buttocks. Mother subject to winter cough. Father died of phthisis. On admission the child was very thin. The ribs were beaded, and there was slight transverse constriction of chest. The hands and feet were in the typical position. The rigidity could only be overcome by the use of considerable force, and there was swelling on the backs of the hands and feet. There was facial irritability on both sides. Laryngismus was a marked symptom. There was no fever until two days before his death. The tetany and laryngismus persisted throughout. There was no relaxation during sleep. He had obstinate diarrhœa, with very offensive motions. He gradually sank, and died on February 9th. The autopsy was made twenty-five hours after death. The rigor mortis was marked, the hands and feet still retaining the tetany position, the feet especially to a high degree. The brain and membranes were natural. The medulla and cord seemed rather firmer than usual, and the grey matter was, if anything, too pale. Peyer's patches were unduly prominent, but not red. The remaining viscera were natural.







