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With a Report of Five Cases.

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ALTHOUGH frequent enough in many parts of Europe, tetany is of sufficiently rare occurrence in this country to warrant the report of the following instances, and to render interesting a review of the cases published in America.

Considerable confusion exists regarding the exact application of the term "tetany." Certain writers would confine it to those cases in which there is a very marked intermission in the spasm, reserving the word "arthrogryposis" for those in which the contraction is more continuous. The condition described as "carpo-pedal spasms" is by some writers considered quite distinct from tetany, and by others, as, for instance, Fagge, viewed as a minor form of it. Strümpell denies the existence of tetany in early childhood, and Hensch draws the line sharply between the disease as seen in children and in adults. Others, as Schlesinger, speak of a tetany and a pseudo-tetany, making the distinction largely on etiological grounds. Some would exclude all cases which do not exhibit marked increase of the mechanical and electrical excitability of the nerves and muscles, while others, admitting the great frequency of these conditions, do not consider them as essential to diagnosis.

Finally, several distinct varieties of tetany have been described—as, for instance, rheumatic tetany, chronic tetany, tetany following thyroidectomy, and tetany due to dilatation of the stomach.

The more one studies the subject the more impossible does it seem to establish any line of demarcation between the different forms of the disease. There are numberless gradations between the conditions of well-marked, widespread, intermittent contractions, and of the continuous or intermittent carpo-pedal spasms. Then, too, some cases exhibit intermittent contractions at one time and continuous at another, or intermittent in one part of the body and continuous in another part. Not every case shows all the cardinal symptoms, including those described by Trousseau, Chvostek, and Erb. While, therefore, it is very possible that two or more diverse conditions may be included in the term, in the

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present state of our knowledge it seems best to define tetany as a disease consisting of tonic spasms either continuous or paroxysmal; usually symmetrical; affecting especially the extremities, but often widespread or sometimes confined to one limb; not accompanied by unconsciousness and not depending upon any irritative lesion of the brain, cord, or nerves, or upon hysteria.

Tetany has been so thoroughly described in other countries during recent years that any account of its symptoms would be out of place before this body, and I may now simply present the clinical histories of the cases which I have seen. I regret that the details are in some particulars far from complete.

CASE I.—Willie McG., aged nineteen months; fairly well nourished; had several eclamptic convulsions when about two weeks of age; pneumonia at about one year. No note made of the existence of rickets or other form of ill health. About March 17, 1886, he began to vomit and continued this until the 21st. On the 20th he commenced to scream and his eyes turned up and often crossed. The thumbs became flexed into the palms; the fingers firmly bent at the metacarpo-phalangeal articulations, but straight elsewhere and adducted; the wrists flexed; the feet and toes extended. The hands and feet had a somewhat blue and swollen appearance. By the next day all spasm was gone, but by the afternoon of the 23d (two days later) all the symptoms had returned. The abdomen was swollen and tender. During the night following there was some stridulous breathing after cough, and on the 24th the spasm of the extremities was still present, although the eyes were now unaffected. Effort made forcibly to overcome the contraction caused screaming. The bowels were constipated; the tonsils enlarged, and they and the pharynx somewhat red; some mucous râles were audible in the chest. The record made on April 1st, one week later, states that the contractions were still present to some extent. The child let the hands hang most of the time with the wrists flexed, and he could not seize a pencil at all easily. He would crawl on his hands and knees instead of on his hands and feet, as was his custom when well. On April 14th it was recorded that full power had returned. About April 21st he developed rubella, which was preceded and accompanied by severe diarrhœa. April 22d, he awoke screaming, the contractions having suddenly returned in full force. The screaming lasted only a short time, but efforts forcibly to straighten the limbs brought it on again. In about three hours the spasm passed away. There was no further trouble until June 14th, when vomiting and diarrhœa with cough set in and continued, and on the morning of the 18th crying with flexion of the thumbs and wrists and extreme extension of the toes developed. The child kept putting his hands to his feet as though the latter were the seat of pain. He was better in the afternoon, worse at night, and on the next day much as when first seen, except that the fingers were straight and separated from each other. There was no pain except on passive motion. Nothing further was heard of the patient for some years, when I learned that there had been attacks of tetany on several occasions. About three years ago he died of some obscure meningeal affection in the Children's Hospital of Philadelphia. No autopsy could be obtained.

This case illustrates well the close etiological association of tetany with gastro-intestinal disturbance. Pain, it will be noticed, occurred only when the attacks began or when the parts were handled. The stridulous respiration heard on one occasion indicated a tendency to laryngismus, the close connection of which with tetany is so well understood. The separation of the fingers seen in the attack in June is worthy of remark, as it differed from the accoucheur's position more commonly witnessed. For the most part the contractions in this case lasted several days or a week or more, and should therefore be called continuous. On other occasions they were of short duration, lasting but a few hours or a day, and cannot be placed in this category.

CASE II.—Charles S., light mulatto, aged two years, was brought to the out-patient department of the Children's Hospital, May 1, 1889. The mother stated that for five months he had had difficulty in swallowing, solid food being taken more easily than liquid. The latter made him choke so that he grew "black in the face" and had to be beaten on the back to make him breathe again. He had also at times difficulty in breathing, the inspiration having a distinctly crowing character. The mother further stated that he sometimes had "spasms" in which the fingers were drawn inward and the wrists flexed, and that this condition would last for "some time." Examination of the child showed him to be a well-marked case of rickets. While in the clinic room his respiration was distinctly noisy, but the clinical notes indicate that it was rather the expiration than the inspiration. This may have been an error. He was ordered cod-liver oil and rock-salt baths, but he did not return. Several futile attempts were later made to see him in order to study his symptoms more fully. About a year later I learned that he had continued to have the attacks of tetany at intervals.

The brief and incomplete notes of this case serve at least to illustrate the close connection between rickets, laryngismus stridulus, and tetany. The nature of the difficulty in swallowing is not clear. Very probably there was a spasm of the muscles of deglutition accompanied by a spasm of the larynx.

CASE III.—Peter W., aged forty-eight years, a well-developed and muscular negro, was brought by the police patrol to St. Agnes Hospital, July 15, 1890, the attack having come on him suddenly while at work. His family history was good, with the exception of the death of his mother from phthisis. He had had "typhoid pneumonia" nine years previously, and had had the ordinary diseases of childhood. He stated that ever since birth he had suffered from "cramps" about once a year, but that for the last few years they had occurred more frequently. He had an attack in the autumn of 1889, another in May, 1890, and a third two weeks before coming to the hospital. They consisted of muscular cramps which were sometimes very painful and which usually began in the hands or feet and extended throughout the body.

The feet would be drawn into dorsal flexion, the knees and hips extended and stiff, the thumbs bent into the palms and the fingers closed tightly over them, the wrists flexed, the elbows flexed and drawn to the

sides, and the head held stiff. The jaws would be tightly closed, or sometimes could be opened and not shut again. The breathing would be painful and difficult, and the man feel as though each moment would be his last. The attack would come on slowly and increase in severity. At its height the spasms would be somewhat remittent, lasting some minutes, and then partially relaxing, while the greatest intensity of the pain shifted from one part of the body to another. The whole duration of an attack would be four or five hours.

When admitted he was in great pain and bathed in profuse perspiration. He had a temperature of 97° F., and a full and strong pulse. He was unable to pass water. The spasm and pain made walking impossible. The muscles of the neck, back, and extremities were involved, but particularly those of the latter. The neck was stiff and there was occasionally slight arching of the back, the weight resting mainly on the shoulders and the nates. The muscles of the calves were as hard as iron and the pectorals stood out like eggs under the skin. The individual paroxysms lasted one or two minutes and were followed by complete relaxation, lasting five or ten minutes. An exceedingly anxious expression of face accompanied the onset of the convulsions, which the man dreaded greatly. The spasm never seemed to be present with equal severity everywhere at once, but showed its greatest intensity now in one portion of the body and now in another. The upper extremities, however, were much more frequently attacked. A curious feature of the case was the fact that if the forearm or leg happened to be in the position of extension at the time of the onset of a spasm, the member stiffened in that position; and the converse was true if it was in flexion. There was no affection of speech. The patient appeared able to open the mouth and move the tongue readily. Percussion of the pectoral muscles during the intermissions produced a momentary vigorous contraction. There was marked anesthesia of the lower portion of the body as far upward as the umbilicus, the man being unable to feel the prick of a pin.

The spasms diminished in intensity in the course of a couple of hours, after hypodermatic injections of morphine and atropine had been administered; but they returned later in the day, and appeared even through the next day, the 16th, although with less severity and frequency. On the 17th he felt sore all over and the muscles were tender, but there was no more spasm. Nothing abnormal was found on physical examination of the chest and abdomen. The thyroid gland was unaltered. On the 19th it was observed that compression of the upper arm produced a cramp-like pain in the forearm and a flexion of the wrist. This was relieved when the pressure was removed and friction of the muscles employed. The abdominal, cremasteric, and plantar reflexes were normal. The knee-jerk was absent, even with reinforcement. Efforts to induce ankle-clonus produced slight cramp in the calf muscles. Pressure over the exit of the facial nerve was followed by slight twitching of the muscles of the face.

The man had no more trouble while under observation. On the 23d, eight days after admission, it was noticed that there was no longer any anesthesia of the lower extremities. The knee-jerk was still absent. The course of the attack had been afebrile. About a week after his entrance into the hospital, Dr. G. Betton Massey kindly tested his electrical reactions for me. There was found distinct quantitative increase

of the general electrical excitability of the muscles. This was not more marked in any one muscle than in others. No qualitative changes were discovered and the normal formula was invariably present. There was "a decided increase in the electro-muscular sensation, a gentle contraction causing a pain that resembled that of the tetanic attacks."

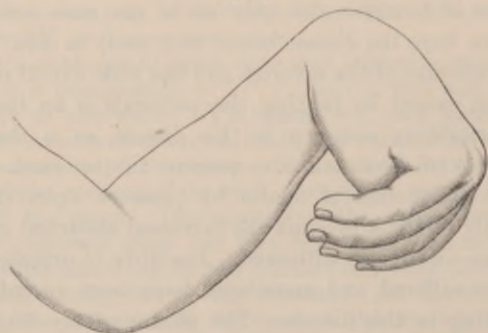
This instance of tetany is the only one of my cases occurring in an adult, and even here the disease began very early in life. The case is of interest on account of the severity and the wide extent of the spasms. The contraction caused by tapping the pectorals is an instance of the mechanical irritability common in this disease, as is the well-known facialis symptom of Chvostek, also present in this case. Trousseau's symptom—the production of spasm by pressure upon the artery or nerve, especially of the arm—and the increased electrical excitability—Erb's symptom—were also witnessed. Inability to urinate, from which the man at first suffered, and anæsthesia have been recorded by others also as occurring in this disease. The closing of the fingers over the thumb is not so common as the extension at the metacarpo-phalangeal joints.

CASE IV.—Emily W., aged three and one-half years. She was stated to have had good health until the occurrence of severe diphtheria four months before. As she was convalescing palsy set in, involving principally the muscles of the pharynx and lower extremities. Nearly fatal heart-failure is said to have occurred on several occasions. There was no history of the existence of any pain. She recovered very slowly from this condition, and by the end of twelve or fourteen weeks from the onset of the diphtheria she could walk only a few steps. Soon after this she was taken while in church with a severe attack of fainting and had to be carried home. In the afternoon of the same day fever developed and continued during three days. Then, for three days she suffered constantly with great pain, especially when handled. She seemed unable to get into any comfortable position. The pain then suddenly and entirely ceased and simultaneously the hands passed into the bent position, which was, it is said, as marked at the beginning as when I first saw her. Pain did not recur except on passive motion. This condition persisted without intermission for three weeks, during which she was kept in bed; and she was then placed in the wards of the Children's Hospital, October 11, 1892.

On examination, she was found to be a well-developed though decidedly irritable and somewhat delicate-looking child. There was no evidence of rickets. She sat in apparent comfort in bed. The hands were flexed at the wrist to quite a right angle, as shown in the illustration, and the skin over the joint was tense, red, and somewhat œdematous. The fingers were flexed at the metacarpo-phalangeal articulations, but extended elsewhere. They were also decidedly adducted toward each other, the middle and ring fingers overlapping the others to some extent. The thumb was flexed into the palm, but its terminal phalanx was in extension and protruded between the middle and ring fingers. The feet were extended; the effort to flex them seemed to give pain, but the irritability of the child rendered it difficult to determine how

much actual suffering was produced. It was clear, however, that the manipulation of the hands was very painful. The knee-jerks were absent. Rest in bed and bromide of potash were ordered for about a week, but without benefit, and iodide of potash was equally useless.

FIG. 1.



No change could be observed in the condition for some weeks. Even during sleep the contraction continued, and attempts made to overcome it roused the child with the pain. The patient's irritability and the constant contraction at the wrist prevented at this time any successful attempt to bring on a spasm by compression of the upper arm. Tapping or stroking the face in front of the ear was not followed by muscular contraction. On several occasions the endeavor was made to determine the electrical reactions, but without success, owing to the fear and crying which resulted.

On November 2d, six weeks after the onset of the attack, the child permitted the extension of her hands to a considerable degree and without complaint, if her attention were diverted. She kept them, however, when at rest, in the same position as at first, and was as little able to use them. Persistent careful efforts were now daily made to straighten the hands by manipulation and by placing large balls of raw cotton in the palms. By November 8th there was decided lessening of the spasm, perhaps the result of great improvement in the general health. By November 14th, eight weeks after the onset, the hands were almost entirely relaxed, and, although the thumbs were still in the palms, the child could handle a doll awkwardly. On this date firm compression of the upper arm caused complaint of pain and a slight increase in the flexion of the hand. The feet were no longer extended.

She now improved rapidly, and by December 1st was practically well. When she first recommenced walking, on November 20th, she complained of pain in the feet and cried when they were handled. Later, she developed at different times measles, pertussis, and severe ulcerous stomatitis, but without the return of the tetany, and on May 15th she was in excellent condition, hearty, and well-nourished.

This case is in some respects an interesting one. The position of the wrists in constant flexion, combined with the history of former paralyses, suggested the possibility of a wrist-drop resulting from the diphtheria. A brief study of the patient, however, showed that there was positive

contracture. Other interesting features were the sudden cessation of a three days' severe pain simultaneously with the development of extreme contraction; the persistent absence of the facialis symptom and of any discoverable cause for the tetany other than the diphtheria weeks before. The presence of œdema of the articulations is a common feature where the flexion is persistent.

CASE V.—Emma S., six weeks old, was brought to the Children's Clinic of the Hospital of the University of Pennsylvania on December 6, 1892. She had been fed at the breast and was fairly well nourished. She had had no illnesses, except occasional colic and eructation of gas, and she had not been fretful. Two weeks previously the mother had noticed that the child cried whenever picked up or when its legs were moved, and that its knees were constantly held flexed. She stated that this condition had persisted without intermission, and that the effort to straighten the joints caused crying.

The examination made on December 6th showed that the knees were partially but not rigidly flexed, and that efforts to extend them were painful and caused the hamstring tendons to stand out as hard cords, and the tissues over the knee-caps to appear baggy and wrinkled—apparently the result of stretching by the constant flexion. The kneejerks were normal. Further physical examination revealed nothing out of the way. The child was ordered bromide of potash and anti-pyrine, with inunctions of warm oil over the tense tendons. By December 13th, one week later, the legs could be extended more easily and with less pain. Former treatment was replaced by a cough mixture, which a slight bronchitis demanded. By December 19th the legs were decidedly better and the child could herself extend them to a considerable degree. By December 28th, three weeks from the first visit, the legs were still improving, but the baby was losing weight. It had been suffering for a week from diarrhœa, vomiting, and colic, and the mother's milk was rapidly growing so thin and insufficient that artificial feeding was deemed necessary. After this date the legs continued to improve; the gastro-enteric symptoms became temporarily better, but soon returned with increased force. On or before January 11th—*i. e.*, about a month after the first visit—the legs were completely relaxed; but on this date the arms became rigidly flexed at the elbows, the wrists slightly bent, and the thumbs drawn into the palms. When seen two days later the condition was a little better: the flexion of the left elbow had ceased, the fingers were freely movable, but the thumb was still incurved. On the right side the elbow was still bent, the wrist not so much; the fingers overlapped each other and were strongly flexed over the thumb. Efforts to straighten the right arm caused pain. Compression of the left arm was not followed by contraction, and neither pressure over the exit of the facial nerve nor stroking with the finger in front of the ear had any effect. The knees were still free from spasm. There was severe bronchitis in addition to the vomiting. Electrical examination made about this date by Dr. Evans, of the Clinic for Nervous Diseases of the University of Pennsylvania, showed a quantitative diminution of both faradic and galvanic contractility, but no alteration of the formula.

For two months from this time, *i. e.*, until the middle of March, the child lost ground steadily in health and became greatly emaciated,

although vomiting occurred only occasionally and there was no diarrhoea. A flat, papular, widely-diffused syphiloderm had made its appearance. The tetany had returned in the left arm, and the elbows of both sides remained always more or less flexed, the thumbs always bent in and the fingers generally clasped over them, and only movable with considerable force. The wrists were not flexed and the knees were only occasionally bent. The feet had assumed the position of marked dorsal flexion, and retained this much of the time. Efforts to straighten the arms always caused pain. After the middle of March the child's general health began to improve rapidly and the tetany grew much less evident. By March 27th, three and a half months after the first visit, it had gained much in nutrition and weight, although still a miserable specimen. The eruption had spread. The elbows were still slightly flexed; the thumbs were constantly in the palms, and the child cried when they were forcibly withdrawn. There was no spasm elsewhere. Trousseau's and the facialis symptoms could not be obtained.

Up to May 1st the baby had continued to improve, and the contractures by this date were entirely gone except in the thumbs, which were still always flexed into the palms, although not so firmly as before. The eruption was disappearing under the influence of mercurial inunctions. Soon after this a change in the food brought on a return of vomiting, together with a reappearance of the contractures in both elbows. The weather was now hot, and the patient became exhausted, although vomiting had ceased. It died on May 24th, six months after the onset of the tetany. There was no autopsy.

This case is peculiar in several respects. The contracture starting at the knee-joint and persisting there for weeks without involving other parts is certainly an unusual mode of onset. The suspicion was at first aroused that the condition was one of congenital contraction of the tendons; but the later development of contractures at the wrists and elbows, apparently consecutive to gastro-enteric disturbance, made the diagnosis of tetany reasonably sure. Possibly the quantitative diminution of the electrical excitability may have been due to the great muscular wasting. The case is, for the most part, an instance of continuous spasm. The flexion of the wrists lasted scarcely two days and may be called intermittent. The contraction at the elbows was continuous, although with decided remissions and exacerbations. The contraction at the knees was continuous until they gradually assumed the normal position, after which it became distinctly intermittent. The flexion of the thumbs was obstinately continuous for at least four months.

One is surprised at the paucity of records of tetany to be found in the medical literature of America. I have made a somewhat extended search for cases, both under the heading of tetany and under those of trismus, laryngismus, spasm, and so on, lest some instances of the first-mentioned disorder should be concealed under the names of the others. Undoubtedly numerous cases have occurred which have not been recognized by physicians, and still more, although recognized, have never been

published. Undoubtedly, too, I have overlooked the reports of many. Still, the results of the search prove that tetany is undoubtedly comparatively rare in this hemisphere.

For reasons already indicated I have included cases of so-called carpo-pedal spasm, except such as were clearly the immediate prodromal evidences of eclampsia and certainly attended by unconsciousness; for the study even of the few American cases shows that it is impossible to regard carpo-pedal spasm as other than a mild exhibition of tetany.

The following are brief abstracts of the 72 cases which I have been able to collect, arranged, as far as possible, in chronological order—at least as far as the year of publication is concerned. It has been found impossible in these abstracts to make a sharp distinction between “continuous” and “intermittent” contractions. For the sake of convenience I have rather arbitrarily denominated those spasms as continuous which appear to have lasted uninterruptedly for more than two days, and those as intermittent which did not last longer than two days without permanent or temporary disappearance.

The Roman numerals are employed to designate the cases reported with more or less detail. The capital letters, in parentheses, indicate the brief references without description which have been made to cases other than these.

I. 1833. Eberle (*Diseases and Physical Education of Children*, 1833, 527).—Healthy child of nine months. Repeated attacks of laryngismus. “Spasmodic affection of the respiratory muscles” and opisthotonos lasting ten to twelve minutes. Feet and hands in typical continuous contraction.

II. 1844. A. F. Axson (*New Orleans Med. Journ.*, 1844, i. 45).—Girl, four months. Dentition thought to be cause. Attacks of laryngismus, sometimes with retraction of head; flexion of thumbs into palms; flexion of toes. Spasms last one-half to two minutes; occur often in day. Treated by cold to head.

III to VI. 1844. J. P. Epperson (*West. Journ. of Med. and Surg.*, 1844, 2d S., ii. 25).—Four children in one family; colored; all under one year. Frequent attacks of laryngismus, lasting few seconds or minutes; later with strabismus, continuous characteristic spasm of feet and hands, and occasionally slight spasm of arms and legs. Treated successfully with stramonium.

(A.) Three other children in this family had earlier died from same condition.

VII. 1848. J. F. Meigs (*Diseases of Children*, 1st ed., 1848, 424).—Boy, seven months. Chronic intestinal derangement. Continuous spasm of hands and feet, with swelling, lasting four months. Occasional spasmodic movements of face, arms, and body. Laryngismus frequent.

VIII. 1848. J. F. Meigs (*Ibid.*, 429).—Child, two years. Attack of tonic flexion of toes lasting a few hours; relieved by purgative.

IX. 1850. C. D. Meigs (*Diseases of Children*, 1850, p. 167).—Boy, six months. Frequent attacks of laryngismus simultaneously with intermittent contractions of hands and feet, opisthotonos, turning of head

to right, general rigidity, and finally with development of general convulsions. Death in couple of weeks or less.

X. 1853. J. F. Meigs (*Diseases of Children*, 1853, 2d ed., 463).—Child, nine months; delicate; persistent digestive disturbance; open wound. General convulsions followed in few days by painful tonic characteristic spasms of hands and feet, nearly continuous for two months, with occasional remissions. Occasional tonic, chiefly intermittent, spasm of arms and thighs, and retraction of head and trunk. Later a relapse with laryngismus.

(B.) In a later edition Meigs and Pepper (*Diseases of Children*, 1870, 4th ed., 529) refer to "two other cases" in which the contraction was decided, but lasted a short time only. One of these is possibly Case VIII., detailed above.

XI. 1858. W. J. Kincaid (*Transac. Ohio State Med. Soc.*, 1858, xiii. 69).—Boy, four and a half months. For weeks had had laryngismus badly; then also began to have hands and feet spasmodically flexed in some severer attacks. Cured by cannabis and chloroform internally.

XII. 1859. R. R. McMeens (*Cincin. Lancet and Observ.*, 1859, ii. 457).—Boy, twelve months. Well developed. Dentition and digestive disturbances considered the cause. Subject to laryngismus. Developed in addition characteristic [continuous?] spasm of hands and feet, with persistent flexion and partial paralysis of upper and lower extremities. Recovered.

XIII. 1862. V. J. Fourgeaud (*Pacific Med. and Surg. Journ.*, 1862, v. 303).—Girl of nineteen months. No cause discoverable except general weakness and emaciation. Nearly persistent, tonic spasm of lower half of body; momentary partial relaxations. No evidence of pain. Spasm present during sleep. Spasm gradually became intermittent. Whole duration about six weeks. Disease at first simulated a spinal spastic palsy, as legs were crossed.

XIV. 1866. L. H. Carpio (*Gac. Méd. de México*, 1866, ii. 222).—Blacksmith, fifty years old. Superficial wound of abdomen, and few hours later abundant sweating; slight trismus of left side with powerful painful contractions of left side of neck. Paroxysms intermittent; induced by moving head or coughing. Entire relaxation and no pain between paroxysms. Attacks ceased in five days.

XV. 1871. Arnold (*Balt. Med. Journ. and Bull.*, 1871, ii. 347).—Nursing woman of thirty-two years. [Appears to have been intermittent] tetany of left side of face, right arm, and slightly of right leg. Sometimes pain in nape of neck. Trousseau's sign present. [Report very incomplete.]

XVI. 1871. Zuñiga (*Gac. Méd. de México*, 1871, vi. 377).—Blacksmith, twenty years; old suppurating wound. Exhibited trismus, tetanic physiognomy, copious sweating, spasm of muscles of abdomen, neck, trunk, and lower limbs. Difficult respiration [spasm of intercostal muscles?]. Trismus chiefly persistent. Other contractions more intermittent. Condition had lasted twenty-four days when reported, although improving under chloral.

(C.) Zuñiga (*Ibid.*) says that another case of tetany had been in the hospital a few days before.

XVII. 1872. W. R. Nichols (*Canada Med. Journ.*, 1872, viii. 161).—Boy, sixteen years. Gradual onset; no cause given. Trismus, contortion of face, spasm of muscles of neck and back [opisthotonos], ab-

domen, and limbs. [No notes regarding hands and feet.] Pupils dilated and oscillating; strabismus; difficulty in swallowing. Spasm continuous, with remissions only. Excitement made worse; no cramp-like pain. Trousseau's symptom present. Recovered after three weeks' treatment with iodide of potash followed by bromide of potash.

XVIII. 1875. M. Alfaro (*An. Asoc. Larry, México*, 1875, i. 97).—Healthy man, thirty years. Slight faintness and tingling in lower limbs ushered in general tetanic rigidity with trismus, distorted features, contracted pupils, adduction of thumbs, extension of feet, legs, thighs, and arms. Respiration interfered with. Four attacks in a few hours, each lasting ten to fifteen minutes. Similar attacks since age of fifteen; first shortly after death of mother; others usually after psychic disturbance.

XIX. 1876. J. S. Green (*Transac. N. Y. Obstet. Soc.*, 1876-78, i. 160).—Delicate girl, four years old. After an attack of diarrhoea there developed intermittent spasms of feet, legs, hands, and forearms, lasting two to five minutes, with some degree of persistence between them. In one paroxysm there was opisthotonos. Position of hands characteristic. Paroxysms so painful that anæsthesia with chloroform required for six hours. Disease lasted in all about forty-eight hours.

XX. 1877. N. B. Emerson (*Transac. Amer. Neurolog. Assoc.*, 1877, ii. 179).—Girl, twelve years. After suppression of first menstruation there was pain in right arm and leg followed by continuous contraction lasting a few days. Hands and feet in characteristic position. Then similar attack of left side, preceded by numbness and tingling. Salicylic acid followed by recovery. [As a result?]

XXI. 1877. N. B. Emerson (*Ibid.*).—Male, eighteen years; delicate. Disease began at age of four years, possibly then associated with some affection of brain or cord. Painful spasm, sometimes one arm, sometimes whole body; oftenest arm and leg of one side. Contraction continuous night and day and characteristic; lasted usually two to three days up to ten days. Respiration sometimes difficult. Attack generally preceded by numbness and evidences of indigestion. Trousseau's symptom not obtained; perhaps result of chloral given. Recovery under use of conium.

XXII. 1879. S. Weir Mitchell (*New York Med. Record*, 1879, xv. 604).—This and the following case seem very probably anomalous instances of tetany. The writer gives them no name, but describes them as due to obscure functional conditions.

Boy, seventeen years; fair health. Forty-eight hours after exposure to intense heat had dull pain in the legs followed next day by great, continuous rigidity of legs. Passive motion caused pain. Recovery in three weeks.

XXIII. 1879. S. Weir Mitchell (*Ibid.*).—Man, forty-three years, well developed. Pain in back and legs, with increasing stiffness, followed in a few hours by fully-developed attack. Legs extended, moderately stiff; but least handling caused severe, intensely painful spasms of legs, feet, and abdominal muscles. Recovery in sixteen hours under narcotics. Two previous similar attacks.

XXIV. 1879. C. K. Mills (*New York Med. Rec.*, 1879, xvi. 218).—Girl, thirteen years. Rheumatism, and later diarrhoea. Painful continuous spasm of extremities; elbows flexed; wrists flexed and abducted; thighs and feet extended. Handling left parts painful; knee-jerks in-

creased. Recovered in two weeks with cure of diarrhoea by silver and opium.

XXV. 1879. H. P. V. Petershausen (*Detroit Lancet*, 1879-80, iii. 248).—Man, twenty-eight years; healthy; history of blow on head, possibly connected with the tetany. Disease had lasted six years. At one time there had been a very persistent hemiplegic condition, which finally disappeared. When seen were intermittent paroxysms of left arm and hand, neck, and facial muscles, every three or four minutes, lasting thirty to one hundred seconds. [Not clear whether legs involved.] Some œdema of hands and face. Attacks preceded by stiffness and pain. Some paralysis of left arm and difficulty of speech during paroxysms and intermissions. Recovery in four weeks under chloral.

XXVI. 1880. A. H. Sowers (*Proc. Nebraska Med. Soc.*, 1877-80, 186).—Adult male; subject to severe dyspepsia; had a fall and suffered some shock, and a few days later tetany developed. Intermittent spasm of whole right side, with slow respiration. Pain in head and staring expression; disposition to sleep. Disease had lasted three months.

XXVII. 1882. J. O. Hirschfelder (*Pacific Med. and Surg. Journ.*, 1881-82, xiv. 385).—Adult male; fall in elevator five days before first attack. Symptoms not detailed, but Hirschfelder showed to his class that pressure on axillary nerve produced general rigidity, retraction of head, and well-marked tetanic convulsions; relieved when pressure was removed.

XXVIII. 1884. I. W. Smith (*Amer. Journ. Obstet.*, 1884, xvii. 438).—[Case reported under title "Trismus Nascentium;" possibly an instance of tetany.] Child three days old. Continuous flexion of lower limbs; inversion of feet; distortion of features; fingers variously distorted; spasm increased by efforts at passive motion. [No trismus mentioned, and] child could suckle and swallow from a spoon. Humeri dislocated forward.

XXIX. 1885. J. Stewart (*Med. News*, 1885, xlvii. 50; later, more completely, in *Transac. Assoc. Amer. Phys.*, 1889, iv. 33).—Male, thirty-nine years; long suffered from chronic diarrhoea. No trace of thyroid gland. Attacks exhibited double vision; intermittent characteristic spasm of hands, adduction of arms, flexion of forearms; contraction of facial muscles, and occasionally spasm of lower extremities. Numbness, pain, swelling, and sometimes herpes of hands. Attacks recurred for about ten days. Disease had lasted eight years. Increase of galvanic and of mechanical excitability. No reaction of degeneration. Knee-jerk increased during an attack; later, absent or weak.

(D.) W. A. Hammond states in a clinical lecture (*N. E. Med. Monthly*, 1885-86, v. 479) that he has seen a few cases; also, that he is not aware of any cases reported in America.

(E.) G. Ross (*Med. News*; 1885, xlvii. 51) states that he has seen but few cases.

(F.) Godfrey (*Ibid.*, 51) says that he has seen several cases.

XXX. 1886. H. M. Lyman (*Transac. Assoc. Amer. Phys.*, 1886, i. 99).—Delicate man, twenty-eight years. Attacks apt to follow over-eating. Spasm of arms and legs; opisthotonos. Respiration sometimes difficult; occasionally severe headache. Attacks lasted from one to four minutes, and recurred every five to thirty minutes for one or two days; six to eight in a year. Each attack began with forcible beating of right arm against chest.

XXXI. 1886. H. M. Lyman (*Ibid.*).—Nervous man, twenty-two years. Attacks of cramp in left hand, forearm, and sometimes shoulder and side of neck. Intermittent.

XXXII. 1886. H. M. Lyman (*Ibid.*).—Hysterical girl, nineteen years. Exhibited Trousseau's symptom in hand and wrist. [No other note of case.]

XXXIII. 1886. H. M. Lyman (*Ibid.*).—Boy, nine years. Intermittent, painful contractions of flexor muscles of hand and forearm. Fingers flexed over thumb.

XXXIV. 1886. H. M. Lyman (*Ibid.*).—Girl, seven years. Spasm of muscles of neck, arms, hands, feet, and legs, and sometimes of thorax, abdomen, and face. Sometimes laryngismus. Attacks began in hand; three to fifteen paroxysms a day.

(G.) H. M. Lyman (*Ibid.*) states that he has seen the "milder variety of tetany" in young children usually suffering from diarrhoea; characterized by flexion of thumbs into palms, often with fingers flexed over them.

XXXV. 1886. A. Jacobi (*Transac. Assoc. Amer. Phys.*, 1886, i. 106).—Young man in whom act of masturbation always brought on attack. Disease did not appear until age of puberty.

XXXVI. 1886. J. T. Carpenter (*Transac. Assoc. Amer. Phys.*, 1886, i. 105; later, more exactly, in *Ibid.*, 1889, iv. 44).—Boy, thirteen months; abscess. Turning of eyes to one side; typical contraction of arm and hand, first on one side, then on the other; trismus persistent. All spasm relaxed about third day, then returned; death in a week. [This case is very powerfully suggestive of tetanus.]

XXXVII. 1887. F. C. Shattuck (*Boston Med. and Surg. Journ.*, 1887, cxvi. 497).—Healthy boy, nineteen years; had stiffness of jaw for year. This suddenly grew worse, and there appeared numbness, [intermittent (?)] spasm of hands and arms and slightly of legs. Hands in characteristic position. Masseters hard. Pain only on passive movement. Considerable mental excitement. Speech difficult. Trousseau's symptom and increased electrical excitability could not be obtained. Condition relieved in three days under chloral and potassium bromide.

XXXVIII. 1888. H. Hun (*Med. News*, 1888, liii. 415).—Woman, twenty-six years. Suppressed menstruation cause of first attack. Deficient mental power. Disease had lasted two years. At first intermittent spasm, usually in arms and legs; position of hands and feet characteristic. Later continuous, tonic spasm of all the muscles, excepting those of face, persisted even during sleep. Were also paroxysmal painful augmentations of the spasm. Trousseau's symptom present. Facialis symptom absent. The persistent contraction interfered with the study of the reflexes and electrical reactions. No improvement when case published, after nine months of observation.

XXXIX. 1889. J. T. Carpenter (*Transac. Assoc. Amer. Phys.*, 1889, iv. 45).—Girl, eleven months; suppuration of shoulder. Laryngismus and "muscular contractions of tetany." [The paroxysms were evidently intermittent.] Recovered, but liable for several years to attacks after diarrhoea or taking cold.

(H.) F. P. Kinnicutt (*Transac. Assoc. Amer. Phys.*, 1889, iv. 47) remarked in a discussion upon the subject that he had seen two cases of intermittent tetany in connection with great dilatation of the stomach.

(I.) S. Weir Mitchell (*Ibid.*, 50) said that he had seen but two cases. These may have been Cases XXII and XXIII, already detailed.

(J.) W. Pepper (*Ibid.*, 51) stated that he had seen only one case, that being in a child.

(K.) A. Jacobi (*Ibid.*, 48) stated that he had met with five cases, and possibly a few more. It may be that one of these was that referred to by him in 1886 (Case XXXV.).

XL. 1889. F. T. Miles (*Transac. Assoc. Amer. Phys.*, 1889, iv. 48).—Woman, twenty-two years. Dilatation of stomach; extreme emaciation. Had had numbness of fingers and toes on several occasions. Developed an attack of tetany with classical position of hands and feet; contraction about face and mouth; rigidity of eyes. Died in twenty-four hours.

XLI. 1889. C. W. Earle (*Transac. Amer. Pædiat. Soc.*, 1889, i. 153).—Girl, two and a half years; indigestion. Characteristic contractions with pain and swelling of hands and feet; muscles of posterior part of legs involved. Spasm continuous. Well in five days. Fomentations and nerve-sedatives.

XLII. 1889. C. W. Earle (*Ibid.*).—Girl, six months. Painful continuous spasm and swelling of hands and feet, lasting ten days.

XLIII. 1889. F. C. Shattuck (*Boston Med. and Surg. Journ.*, 1889, cxxi. 231).—Girl, twenty-one years. Diphtheria when sixteen, followed by tetany. At first attacks in one hand and arm, occurred rarely, lasted one to two minutes; gradually all extremities, more frequent, sometimes lasted an hour. Trousseau's symptom present. No inversion of electrical formula.

XLIV. 1889. S. L. Abbott (*Boston Med. and Surg. Journ.*, 1889, cxxi. 230).—Robust longshoreman, forty-three years. Spasm of all flexors of extremities, and to some extent of muscles about shoulders and abdomen. Occurred often every half-hour; lasted about a half-minute. Excited by muscular effort. Only slight pain. Improved rapidly under urethan.

XLV. 1889. J. L. Smith (*Arch. of Pædiat.*, 1889, vi. 374).—Boy, eleven months; improperly fed; constipated; one tooth. Had had disease for four months. Spasm [apparently continuous] of muscles in all extremities. Characteristic position of hands. At times spasm of legs and thighs. Attacks of laryngismus. Spasm continued during sleep. Recovered under potassium bromide and relief of constipation.

XLVI. 1889. J. L. Smith (*Ibid.*, 376).—Well-nourished child, twenty months. Dentition thought to have been the cause. Five teeth prominent at once under swollen gums. Flexion of left leg and thigh; [apparently continuous] for three weeks. Spasm present during sleep.

XLVII. 1889. J. L. Smith (*Ibid.*, 469).—Woman, thirty-nine years. Exposure to cold, wet, and fatigue. Intermittent pain from ankles to knees; in four months, constant; shortly after had continuous flexion of fingers, extension of feet, and flexion of toes. Spasm present during sleep. Sensation in toes nearly lost. Sphincter ani paralyzed for a time. Perspiration of extremities. Spasm of hands well in six months; that of feet still continuing after a year.

XLVIII. 1889. J. L. Smith (*Ibid.*, 472).—Girl, ten and a half months. Severe acute diarrhœa, followed by characteristic spasm of hands and feet with œdema. Several paroxysms during six days, each lasting a day or two, and present during sleep. Had attack of eclampsia on fourth day of disease. Treated with bromides and chloral and attention to bowels.

XLIX. 1889. J. L. Smith (*Ibid.*, 473).—Boy, fifteen months. Rickets; tendency to diarrhœa; earlier, an inclination to hold breath. Had had nearly continuous characteristic spasm of hands and feet for three months. Spasm present during sleep. Recovery under attention to diet and administration of zinc and atropine.

L. 1890. A. Abrams (*Ogcid. Med. Times*, 1890, iv. 14).—Man, twenty-four years; excessive smoker; dilatation of stomach. Painless spasms in left arm and sometimes also in left leg; rarely right arm alone. Sometimes occurred every day at hourly intervals. Violent movements provoked them. Impairment of all forms of sensation in left arm and leg. At times formication and coldness constituted prodromes. Left knee-jerk slightly increased. Trousseau's and Chvostek's symptoms and increase of electrical excitability present. Great exhaustion after attacks.

LI. 1890. J. Schneck (*Journ. Amer. Med. Assoc.*, 1890, xv. 387).—Girl, ten years. Disease had lasted two years. At first vertigo, with spasm of lower limbs; later only spasm of upper extremities, neck, jaws, and occasionally opisthotonos. Swallowing and speech interfered with; some pain attended. Hands and arms in classical position. Paroxysms averaged ten daily, each lasting a couple of minutes. Tinnitus, formication and numbness followed them. Trousseau's and Chvostek's symptoms and knee-jerk absent. Argyll-Robertson's pupil present. Disease disappeared in five or six weeks under conium and nitroglycerin.

LII. 1891. E. H. Small (*St. Louis Med. and Surg. Journ.*, 1891, lx. 271; also in several other journals).—Boy, eleven months. Rickets; digestive disturbance. Characteristic continuous spasm, at first painful, of hands and feet, with œdema and cyanosis. In week recovery under fomentations, potassium bromide, and attention to bowels.

LIII. 1892. N. E. Remmen (*Chicago Med. Recorder*, 1892, iii. 240).—Girl, fourteen years. Adenoid growths in naso-pharynx, with poor mental development. Painful spasms of extremities and rigidity of whole body, lasting five minutes and occurring every two months. Disease had lasted two years. Trousseau's and Chvostek's symptoms well marked.

LIV. 1892. S. S. Adams (*Arch. of Pædiat.*, 1892, ix. 881).—Boy, four months; digestive disturbances, phimosis, possibly rachitis. Laryngismus and, several times, eclampsia. Later "snapping of lids," rolling eyes, flexion of thumbs into palms, and general rigidity attending laryngismus. These attacks several times daily. Death shortly after from laryngismus.

LV. 1892. W. S. Bowen (*Med. News*, 1892, lx. 434).—Girl, six days old, when she developed attacks of laryngismus with spasm of nearly all muscles of body; opisthotonos and characteristic position of extremities. Lasted about one minute; repeated frequently. [Clearly no trismus. No cause, unless wound left by dropping of cord on fifth day.]

LVI. 1893. B. E. Vaughn (*New York Med. Journ.*, 1893, lviii. 757).—This and the following six cases are instances of epidemic tetany; five of them were in one family; all were Italians living under most unfavorable conditions of dampness and bad air.

Woman, thirty-five years. Nursing; damp, close dwelling. Formication in feet extending to head, neck, and finally hands, with constipation and abdominal pain. Then characteristic spasms in upper extremities, and later in feet, three to four a day, each about one hour. Increased electrical excitability. Disease had lasted three months when first seen. Quinine cured in eighteen hours.

LVII. 1893. B. E. Vaughn (*Ibid.*).—Girl, fourteen years; just beginning to menstruate. Daughter of Case LVI. and developed disease two weeks later. Same exposure to dampness. Formication preceded onset of spasms, which were nearly continuous, relaxing only once or twice a week for a couple of hours. Position of hands and arms characteristic. Rapid recovery under quinine.

LVIII. 1893. B. E. Vaughn (*Ibid.*).—Girl, three years; rickets; same exposure to dampness as with mother (Case LVI.), and disease began about same time. Spasm in upper extremities twice a week only. Recovery under quinine.

LIX. 1893. B. E. Vaughn (*Ibid.*).—Girl, twelve years; menstruation recently established; lives in damp house with mother (Case LVI.). Formications, abdominal pain, and constipation as in that case; then continuous characteristic spasm of upper extremities. Trousseau's symptom present. Disease had lasted about two months. Recovered in less than twenty-four hours under quinine.

LX. 1893. B. E. Vaughn (*Ibid.*).—Woman, thirty-three years. Nursing; damp dwelling. Formications, as in Case LVI., for three weeks. Contractions [apparently continuous] began two days before seen. Were increased by pressure on brachial plexus. Disappeared after sixteen grains of quinine in two doses.

LXI. 1893. B. E. Vaughn (*Ibid.*).—Woman, twenty-five years. Damp dwelling; nursing; anæmic, looked sick, had fever and enlarged spleen. Formication as in Case LVI. Contractions [apparently continuous] in fingers and hands began four days before seen. Trousseau's symptom present. Recovered in less than twenty-four hours under quinine.

LXII. 1893. B. E. Vaughn (*Ibid.*).—Man, working in damp place; had typical spasm in both hands and feet.

(L.) B. E. Vaughn (*Ibid.*) states that quite a number of other cases came to the morning Italian class of the New York Dispensary; those reported above having been seen in the afternoon hour.

LXIII. 1893. A. S. Fraser (*Canadian Practitioner*, 1893, xviii. 500).—Man, thirty years. Severe dyspepsia due to cirrhosis of stomach as shown by autopsy. After acute indigestion developed intermittent spasm of muscles of face and extremities, with characteristic position of hands. Spasm lasted one to two minutes; had four in an hour; fifth stopped by puncture with hypodermatic needle. Then occasional slight spasms of extremities for some months, with declining health. Then death, preceded by severe spasms of extremities during three days.

LXIV. 1893. J. W. McConnell (*Journ. Nerv. and Ment. Dis.*, 1893, xx. 418).—Woman, thirty-three years. Took general cold. Numbness, pricking, and vague pain, followed by spasm of extremities, neck, abdomen, and zygomatics; tongue stiff, speech and respiration difficult. Muscles alternately relaxed and contracted during about one hour. Voluntary motion increased the spasm. Trousseau's symptom present. A second attack within twenty-four hours.

LXV. 1893. A. Jacobi (*Arch. of Paediat.*, 1893, x. 1042).—Boy, three years; poorly developed; convulsions at seven months. Fingers bent and thumbs flexed into palms. [Not stated how long this lasted.] Considers chronic meningitis the cause.

LXVI. 1893. A. Jacobi (*Ibid.*, 1055).—Colored child [baby?]; disturbed digestion or exposure apt to be followed by muscular spasms

especially in the hands, with a "peculiar forced position of the limb lasting a day or two." Spasm returning perhaps in a week.

LXVII. 1893. D. J. Evans (*Montreal Med. Journ.*, 1893, xxii. 183).—Girl, seventeen months, colored; rickets. Characteristic spasm of hands and feet, with œdema, continuing ten days, then gradually relaxing. Facial reflex present; knee-jerk exaggerated; no pain. Tonic and dietetic treatment.

LXVIII. 1893. D. J. Evans (*Ibid.*).—Girl, ten months. Chronic diarrhœa, debility, probably syphilis. Five other children had died of convulsions. Continuous spasm of hands and feet, with exacerbations, lasting five days. No facial reflex. Dietetic treatment and potassium bromide.

LXIX. 1893. S. Brown (*North Amer. Practitioner*, 1893, v. 66).—Man, twenty-four years. Exposure to wet and fatigue. Painful spasm in calves and feet, lasting about half an hour, and occurring frequently for three days; worse at night. Increased galvanic excitability. Inversion of formula. Trousseau's symptom absent.

LXX. 1893. S. Brown (*Ibid.*).—Young man. Tingling of whole right side and spasm of right arm with flexed elbow and closed hand. Spasms lasted one to two minutes, and usually occurred four to five times before breakfast, and occasionally one or more times during the day. Increased galvanic excitability, inversion of formula and Trousseau's symptom present. Disease had lasted six weeks. Recovery in six days under potassium bromide and galvanism.

LXXI. 1893. S. Brown (*Ibid.*).—Man, twenty-seven years. Exposure to bad weather. Spasm on both "sides" [probably legs meant], lasting several months. [Not stated whether intermittent or continuous.] Says symptoms were well marked, and electrical examination confirmed the diagnosis.

LXXII. 1894. M. H. Fussell (*Univ. Med. Magazine*, 1894, vi. 229).—Girl, five years. Indigestion apt to induce laryngismus and painful characteristic contraction of hands and feet with flexion of elbows, retraction of head, and strabismus. Spasm continuous during a few days, then disappearing a few days. Exertion made worse; diversion of mind caused nearly to disappear. Trousseau's symptom and knee-jerk absent. Chvostek's symptom present. Disease occurred during several years, especially in spring and fall. Typical epilepsy later in course of case. Death from atelectasis resulting from laryngismus.

Some little analysis of these cases may be of value. Those which offer themselves as at all suitable for this purpose are the ones designated by the Roman numerals. They equal 72 cases in all. I have not included my own cases in this analysis, since they do not come in the category of those already published.

Conclusions drawn from the cases can only have a relative value, particularly where figures are concerned. This is true both because some doubtful instances of the disease are included in the list, and because many of the reports are incomplete or the meaning of the writers obscure.

In considering the etiology of the published cases we find that 34 of the patients were of or above the age of puberty when the disease first

developed, including 3 girls in whom menstruation had just been established; 13 were children from two years of age to puberty; 25 were under two years of age, and 20 of these less than one year old.

33 of the patients were male, 29 female, and in 10 the sex is not stated.

Among the possible causes mentioned or implied, I find lactation (4 cases); open wounds (6); psychic disturbance, including 2 instances of shock from falls (3); menstruation, developing or suppressed (4); possible affection of the brain (3); digestive disturbances, including 2 cases of dilatation of the stomach (23); rheumatism or exposure to cold and wet (13); exposure to heat (1); diphtheria (1); dentition (3); syphilis (1); masturbation (1); absence of the thyroid (1); rickets (5); adenoid growths of the naso-pharynx (1); phimosis (1). Sometimes two or more of these causes were operative in the same case.

Under the heading of symptomatology we find it stated that pain in the affected part, apparently due to the spasm, was present in 21 cases, and that it was absent or trivial in 6 cases. In the others no reference is made to the subject. Further, we find among the principal symptoms or complications, faintness (3 cases); vertigo (1); herpes (1); tingling, numbness, formication, etc. (15); temporary paralysis (3); anæsthesia (2); disposition to sleep (1); tinnitus (1); epilepsy (1); laryngismus (17); eclampsia (4). European observers find laryngismus and tetany very frequently associated; and Loos, indeed, has maintained that the former is simply a laryngeal manifestation of the latter disease. Cheadle views laryngismus, tetany, and eclampsia as but different expressions of the same morbid condition. Possibly the association of tetany with one or the other or both of these allied affections has occurred in America oftener than the reports would indicate. It is interesting to notice that 15 of the 17 cases of laryngismus were witnessed in children under one year of age. Also, that in 11 of the cases the contractions were chiefly continuous and in 6 paroxysmal.

No numerical analysis can be made of the position of the spasm in the body, since it varied from an almost universal diffusion to a limitation to one limb. Trismus was present in probably 6 cases; possibly in a few more in which the reports do not make it quite clear. So, too, it is difficult to draw any conclusions with regard to the nature of the spasm, since we find all gradations occurring, and the writers, too, have not always expressed themselves clearly on this point. As nearly as I can determine the spasm was intermittent, in the sense already defined, in 38 cases and continuous in 25 cases. In 1 case (XIII.) it was at first continuous and later intermittent; in 1 (XXXVIII.) it was first intermittent and then continuous; and in 4 cases (I., VII., X., and XXXVI.) it was continuous in one portion of the body and intermittent

in another. In 3 cases (LXII., LXV., LXXI.) the authors do not give even a clue to the nature of the spasm.

In only comparatively few cases is there any reference to the presence or absence of Trousseau's symptom and of increased electrical or mechanical excitability as described by Chvostek and Erb respectively.

The treatment, so far as it has been reported, has consisted chiefly in remedies employed as sedatives to the nervous system, or directed against the exciting cause of the disease. But very few cases have been fatal, and these only as the result of complications.

Finally, we can but conclude that the cases reported in America entirely uphold the view enunciated earlier in the paper, viz., that there is no essential difference between the tetany of adults and that of children, or between the continuous and the paroxysmal forms of the disease. The cases quoted in considering the nature of the spasm are all in evidence here. Moreover, continued spasm may exist in persons past the age of childhood (Case XVII.), contrary to the statements of some writers; and intermittent spasms, exactly similar to the commoner tetany of adults, are frequently seen in children. But were there no other instances in proof of the point advanced, the remarkable series of cases published by Vaughn would of themselves be sufficient. Here we find in one family, and at one time, one case (LVI.) of a truly intermittent type, another (LVII.) of a somewhat more continuous form, and a third (LIX.) showing very continuous contraction, yet with Trousseau's symptom present as proof of its true nature.

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