nent depression in place of the malleolus, and the motion of the joint is growing more and more free.

Sept. 1846. A trifle more than two years from the time of the accident. Miss K. walks well without crutch or staff; performs all kinds of domestic employment with facility, and ascends and descends a long flight of stairs without difficulty. Motion of the joint quite free. My own gratification in an event so favourable is only equalled by her gratitude for the preservation of the limb.

Nov. 5th, 1847. I met the young lady this day on the side walk in our borough, three miles from her home. She walks, apparently, as well as any one; says her limb is continually becoming stronger, and that the joint is nearly or quite as flexible, and admits of as much freedom of motion, as that of the uninjured limb.

Remarks.—This case adds another to the list of those which mark the triumphs of modern surgery. I was probably more sanguine in my hope of saving the limb, and possibly more persevering in my efforts, from the fact that I had just been reading the reports of Sir Astley Cooper upon the same subject. I am, however, disposed to think I should have saved myself much trouble, and considerably shortened the period necessary to a complete cure, had I resected the extremity of the tibia the length of half an inch or so previous to the reduction. Whether the removal of the extremity of the tibia would not be advisable in all cases, where reduction cannot be effected with facility, is an important question which the wise and experienced of the profession should decide. The cases reported by Sir Astley Cooper, in which it was done, seem to have terminated most favourably.

NORWALK, Conn., Nov. 8, 1847.

ART. IX.—*Successful Treatment of a case of Traumatic Tetanus, in which the Vapour of Sulphuric Ether was employed.* By E. W. THEOBALD, M. D., of Baltimore, Md.

ON the 17th Sep., 1847, I was requested to visit Jacob Fifer, aged 27, a native of Germany, and by occupation a quarry-man. Some hours previous to my visiting him, he had received a severe injury of the left hand, by the accidental explosion of a blast. The little finger and its metacarpal bone, together with the soft parts covering it, had been blown off; the first phalanges of the ring and middle fingers broken; the metacarpal bone of the ring-finger, broken and exposed; and the soft parts in the palm of the hand torn across from the ulnar side to the metacarpo-phalangeal articulation of the thumb.

The wound had been dressed immediately after the accident, by my friend Dr. Vennibben, who transferred the case to me. As there had been considerable loss of blood, I removed such dressings only as interfered with the proper application of my remedies.

The first question, which naturally enough presented itself to my mind, was, should an attempt be made to save the remaining portion of the man's hand? The dorsum of the hand had received no injury; the thumb and index finger were perfect; the circulation throughout the extremity was

good; the patient possessed a fine constitution, and was greatly averse to the removal of the hand. Under these circumstances I felt justified in making an effort to save the member.

Accordingly, I ordered the cold water dressings to be unremittingly applied; protochloride hydrarg. grs. x, and tinct. opii gts. l, were administered, with instructions to repeat the anodyne in five or six hours if the pain continued severe. In the course of a few hours, however, the pain for the most part subsided, and the anodynes were omitted except at night.

The calomel produced the desired effect; and the symptomatic fever did not run high.

On the 19th, suppuration was established, the water dressings were set aside, and the hand placed in a warm poultice of bread and milk.

On the 22d, the sloughing process commenced, and the fermenting cataplasm was substituted for the bread and milk poultice. Although my patient's suffering had not been great since a few hours after the occurrence of his misfortune, yet, in consequence of his inability to sleep at night, and a desire on my part to ward off tetanus, which I had reason to fear might supervene, I had allowed the quantity of laudanum to be gradually increased, and at this time he was taking 200 drops in the course of the night. Under this plan of treatment my patient appeared to be steadily improving; the wound was granulating, and suppurating freely and healthily, and the cut beginning to cicatrize.

Upon inquiry, on the morning of the 30th, I learned of my patient that he had been suddenly awakened out of sleep the night previous, by a slight twitch of the muscles in the palm of the wounded hand. Alarmed at any symptom which might be considered a forerunner of tetanus, I investigated his case with more than ordinary care for further evidences of the approach of that fearful malady, but could elicit none. I visited him in the afternoon of the same day, and was pleased to learn there had been no return of the spasm.

On the 1st October, however, the attendants informed me he had had several very slight spasms in his hand whilst asleep. At this period he appeared to be doing remarkably well in every respect, and, but for those slight muscular twitchings, I should not have felt the least uneasiness about his case.

Unwilling at this time, to sacrifice his hand, without a more positive assurance of the approach of danger, I determined to place my patient under a course of treatment similar to that which might be adopted, were I convinced tetanus existed. I therefore directed a pill composed of calomel, grs. iij, and pulv. opii gr. i, to be given every two or three hours; acetum opii gutt. xx, three times daily, and sinapisms to the abdomen and along the spine.

The case progressed without further advance of the tetanic symptoms, until the night of the 4th. I was called to him early on the morning of the 5th; the spasms in the hand had increased, and extended to the muscles of the arm. He complained of an uncomfortable feeling about his neck, and of difficulty in swallowing. His skin was bedewed with a warm perspiration, and his pulse 100. On examining the wound, I found the granulations flat and dry. I determined to take the hand off immediately, but before doing so, requested the family to call in Prof. N. R. Smith, that I might have his counsel in the case. In a short time I had the satisfaction to meet Dr. Smith, who agreed with me in opinion, that the symptoms were decidedly tetanic, and that the operation was expedient. I proceeded

at once to amputate the hand, assisted by three of my pupils. After the stump was dressed, there were two or three spasmodic contractions in the arm, at distant intervals, which, however, ceased entirely by night. Just before the operation, I gave the patient forty drops of acet. opii, with instructions to repeat the dose at bed-time, and to continue the pills of calomel and opium.

6 *P. M.* Patient calm and comfortable; when he falls asleep, he is annoyed by slight spasms of the muscles of the neck, and says there is some degree of stiffness in that region. No pain at the præcordia, but hardness of the abdominal muscles to a limited extent. Sinapisms were ordered to be applied to the abdomen and spine, and as his bowels were confined, an enema was directed to be given.

6th, 9 *A. M.* Had a comfortable night; bowels moved, and stump easy; increased amount of spasm and stiffness about the neck, with some degree of trismus. Skin wet with perspiration; pulse 120. *R.*—Anodynes and calomel. 6 *P. M.* More spasm; slight opisthotonos, with increased hardness of the abdomen; deglutition very difficult; jaws nearly closed; pulse 120; great despondency and restlessness, and free perspiration. *R.*—Anodynes increased; calomel continued; mustard applications renewed, and nourishing broths as diet.

7th, 9 *A. M.* Rested badly last night; symptoms all aggravated. Dressed the stump; it looks pretty well, one-fourth united; pulse 120. On this occasion I provided myself with sulph. ether and an inhaler, as I felt disposed to make trial of this new and powerful remedy. I proceeded to administer it without explaining to my patient the nature of the agent, or the objects I had in view. At first there was some difficulty attending its exhibition, in consequence of the irritation it inflicted on the glottis. This, however, soon subsided; he then began to complain that "it made him feel bad," and very shortly pushed the tube from his mouth, and said everything looked black, and refused to breathe it any longer. I persuaded him, however, to breathe it again for a short time, when he fell asleep; the time occupied from the commencement of inhalation until insensibility was produced, being about two minutes. His pulse was accelerated ten beats; breathing perfectly easy; whole muscular system relaxed; and no lividity or unnatural expression of the countenance. I permitted him to sleep fifteen minutes, when I aroused him by wiping his face and forehead with cold water. When consciousness returned, he stated he had been dreaming; drowsiness remained for an hour after. *R.*—Anodynes and calomel. 6 *P. M.* I find my patient evidently better; has had very little spasm through the day, and only when asleep. *R.*—Anodynes and calomel.

8th, 9 *A. M.* Rested well last night; is rather stupid, and disposed to sleep, and is troubled with frequent yawning, which is exceedingly painful, as he cannot open his mouth. For fear of narcotizing him, I directed the anodynes to be discontinued, and ordered strong coffee and nourishing broths to be given him. Omitted the ether also, on account of the apparent cerebral oppression. 6 *P. M.* The spasms have materially increased; there is more stiffness about the neck and jaws; some contraction of the corrugator supercilii and levator labii superioris æque nasi muscles, giving to the countenance a very distressed and painful expression; deglutition more difficult; pulse 100; not so drowsy. *R.*—Acet. opii gr. xl at bed-time, and repeat it in the course of the night if he should not rest well; and apply mustard poultice to the abdomen.

9th, 9 *A. M.* Has had a bad night; suffered very much with the spasms

in his back and extremities; abdominal muscles as hard as a board; jaws firmly locked; scarcely able to swallow anything; and great despondency. Administered the sulphuric ether; a few inspirations rendered him insensible; pulso unaffected; expression of the countenance greatly improved; no lividity or paleness of the lips and face; breathing easy; and muscles relaxed. He slept in this condition for fifteen minutes; drowsiness remained for half an hour after. *R.*—Hydrocyanic acid *gtt.* xxiv; aqua distill. *℥i.* A teaspoonful to be taken every five or six hours; a blister to the nape of the neck; sinapisms to the abdomen; and as I discovered slight fetor of the breath, I discontinued the calomel and opium pills. 5 *P. M.* Symptoms all improved; pulse 90; countenance bright and cheerful; has had a comfortable day, and regrets he cannot eat more, as his appetite is good. Four or five inspirations of the ether vapour were sufficient to put him asleep; no unnatural expression of the face, or discoloration of the lips; breathing perfectly easy and natural; pulse unaffected. He slept for half an hour under its influence without spasm; just as its effects were passing off, however, he had two very slight ones. *R.*—As before, and the blister dressed with a bread and milk poultice.

10th, 9 *A. M.* Patient rested very well through the night; had a few trifling spasms, and those only when asleep. There is less rigidity of the muscles of the neck and jaws; he complains of some pain in the stump, accompanied by starting of the muscles of the arm. Upon examination, found a superficial slough about the size of a shilling on the lips of that portion of the stump which had not united. Applied fermenting cataplasma to the stump; directed the acid to be continued; and chicken soup diet. No unusual circumstance resulted under the employment of the ether this morning. 5 *P. M.* Patient about the same as at last visit; his bowels had been moved twice in the day. Sulphuric ether administered with similar effects. *R.*—Acid, and acet. opii *gtt.* xxx, if the bowels were too frequently acted upon.

11th, 9 *A. M.* He does not feel so well this morning; thinks he slept too much; bowels had been moved twice in quick succession, and he took too much of the acid as instructed. Pulse 92; expression of countenance improved; rigidity of neck and jaws about the same. On account of the drowsy condition in which I found my patient, I omitted the ether, and diminished the dose of the acid to one-half. 5 *P. M.* Pulse 84; slept a good deal through the day; more pain in the stump, and increased spasm; bowels moved once. Ether given. *R.*—Acid.

12th, 9½ *A. M.* After visit, and his breathing the ether last evening, he appeared decidedly better, and was more than usually cheerful until 9 *P. M.*, at which time he had a chill, succeeded by cold perspiration; he remained in this condition for an hour, when he became warm, the perspiration continuing. So soon as warmth returned, he became stiff all over (to use his own expression). From this time he rested tolerably well, and had very little spasm or pain in the stump. Pulse 90, soft and full; tongue clean; appetite and spirits good; bowels moved in the night.

He expressed himself as much pleased with the effects of the ether the evening before; thought it was benefiting him very much, and says he has had no bad spasms since. He took the ether this morning cheerfully, indeed asked for it, and breathed it well. Pulse, lips and face unaffected by it, except so far as it relaxed the muscles of the angles of the mouth and eyebrows, removing that peculiar frown and distressed expression which have existed throughout. For fifteen minutes he did not move

a muscle; he then yawned, and remained in a gentle quiet sleep for fifteen minutes longer, when he had three slight spasms; so slight, indeed, that although I was standing over the patient, carefully watching for any phenomena which might occur, I should scarcely have observed them, had not his wife remarked, "that is the kind of spasm he has now." About this time there were several gentle starts in the muscles of the stump also, which appeared to be unconnected with the former. In five minutes more he awoke, feeling, as he said, very comfortable. *R.*—Acid. 5½ *P. M.* Passed a pleasant day; no change in condition since morning visit. *R.*—Acid. Among other objections urged against the employment of sulph. ether vapour in surgical practice, that of its inducing a gangrenous coadition of stumps, mentioned in a letter from Dr. James H. Pickford, and published in the Oct. Number of the *Amer. Journ. of Med. Sci.*, occurred to me; and fearing the ether might have some agency in the production of the slough on the stump of my patient, I left it off. *R.*—Acid, and if much pain or restlessness come on in the night, to give acet. opii gtt. xxx.

13th, 9 *A. M.* About midnight patient took 30 drops of acet. opii, and slept pretty well until morning. In the course of the night, however, he had three slight chills, two trifling hemorrhages from his nose; his bowels were moved, and there was a material augmentation in the number and violence of the spasms. This morning he complains of more stiffness of his jaws and neck than he has had for several days past; pulse 95; tongue clean; distressed countenance; and he is very drowsy. *R.*—Acid, and the opiate should circumstances require it. 5 *P. M.* Pulse 118; jaws closely and firmly locked; deglutition almost impracticable; bowels have not been moved; has taken no nourishment since last visit; spasms very severe and frequent; considerable degree of opisthotonos. *R.*—A dose of oleum ricini; hydrocyanic acid gtt. ij every four hours, and acet. opii gtt. xxv at bed-time.

14th, 9 *A. M.* Slept a portion of the night only; spasms still more frequent, violent, and exceedingly painful; bowels moved by the oil; pulse 120; some pain in the stump; slough has not extended beyond its original limits. In consequence of the aggravated condition of all the tetanic symptoms, and the conviction on my mind that my patient must die if something more was not done for him than I was then doing; and as the ether had appeared to mitigate the violence of the symptoms whilst I employed it, I determined to have recourse to it again, regardless of any pernicious effect it might exert upon the stump. Accordingly I administered it. The immediate effects did not deviate in the slightest degree from those I had observed invariably to attend its exhibition in the case. *R.*—Hydrocyan. acid gtt. ij every four hours. 5 *P. M.* Has had a comfortable day; several light spasms, but not severe enough to awaken him when asleep. Jaws not so closely locked; could pass my little finger between his teeth with ease; pulse 82, and natural; stump improving. *R.*—Acid, as before.

15th, 9½ *A. M.* Slept much better than the night before; had several pretty strong spasms; has had good deal of pain in the stump; easier this morning; there is less trismus; deglutition improved; bowels moved this morning, and he is quite cheerful; pulse 95. Healthy granulations have taken the place of the slough on the stump. Breathed the ether vapour; whilst under its operation, his pulse fell to 86. *R.*—Acid. 5 *P. M.* Slept half an hour this morning after inhaling the ether, and has appeared better ever since; but little spasm, and that confined to the stump and arm; com-

plaints of severe pains in the stump; appetite good, and he has taken freely of nourishing broths. Pulse 80. R.—Acid.

16th, 9½ *A. M.* Comfortable night; pain in the stump rendered him a little restless for a time, but this morning it is comparatively easy; has had but few spasms. He still complains occasionally of that universal stiffness which came upon him on the night of the 11th; says whenever he attempts to move himself, his muscles all become stiff; bowels have been moved; tongue clean; appetite very fair, and pulse 90. Inhaled the ether. R.—The acid. 5½ *P. M.* Easy all day; spasms fewer and lighter; pulse 82; expression of countenance almost natural; less trismus and difficulty of swallowing.

17th, 10 *A. M.* Rather restless last night; some increase in the number of spasms, but none in their force; they are somewhat altered in character; they do not come on suddenly and extend rapidly as heretofore, but begin very slowly and extend gradually from the stump to all the voluntary muscles. He indulged in a supper of meat pudding last night. Not much pain in the stump; much less trismus; pulse 100. Administered ether, slept for half an hour. R.—The acid. 5 *P. M.* Spasms confined to stump all day; appetite good; tongue clean; slight pain in the stump; pulse 85.

18th, 9½ *A. M.* The pain in the stump did not permit him to sleep well last night; had a few weak spasms whilst asleep, but not severe enough to awaken him; less trismus; bowels moved; pulse 85. Took ether. 5 *P. M.* Pulse 88; bowels moved; stump painful; spasms very weak. Discontinued the hydrocyanic acid.

19th, 10 *A. M.* Did not rest well in consequence of pain in the stump; good many weak spasms; trismus, stiffness of neck and difficult deglutition almost entirely disappeared; bowels moved; pulse 90; skin cool and pleasant; tongue clean, and patient in fine spirits. By accident, omitted taking the ether out with me. R.—Hydrocyanic acid gr. ij every four hours. 5 *P. M.* Has had less pain to-day; but few spasms; bowels moved; pulse 90. Deferred giving the ether. R.—Acid.

20th, 9½ *A. M.* Had a dreadful night; severe pain through the stump and arm; great increase of spasms; pulse 88. Inhaled the letheon. 5 *P. M.* Is better in every respect.

21st, 9½ *A. M.* Rested far better than the night before; had less pain and fewer spasms. Ether vapour administered.

22d, 9½ *A. M.* Rested very easy all day yesterday and last night; had a few very slight spasms; complains he cannot get enough to eat; bowels moved; pulse 90. Sat up in a chair for half an hour yesterday evening. From this time, I left off all remedies; the tetanic symptoms which had grown almost imperceptible, disappeared altogether by the 29th. I continued my visits until the morning of the 4th of November, when I found him as follows:—No spasms or pain since 29th ult.; bowels regular; sleeps well all night; appetite excellent; pulse natural; gaining his strength very fast, and has been visiting his friends in the neighbourhood.

As Prof. Smith felt considerable interest in the case, he honoured me with his presence and counsel on several occasions in the progress of the treatment.

BALTIMORE, Nov. 30th, 1847.