Spinal disease and spinal curvature : their treatment by suspension and the use of the plaster of Paris bandage / by Lewis A. Sayre.

SPINAL DISEASE

AND

SPINAL CURVATURE:

THEIR TREATMENT BY SUSPENSION AND THE USE OF

PLASTER OF PARIS BANDAGE.

SAYRE.

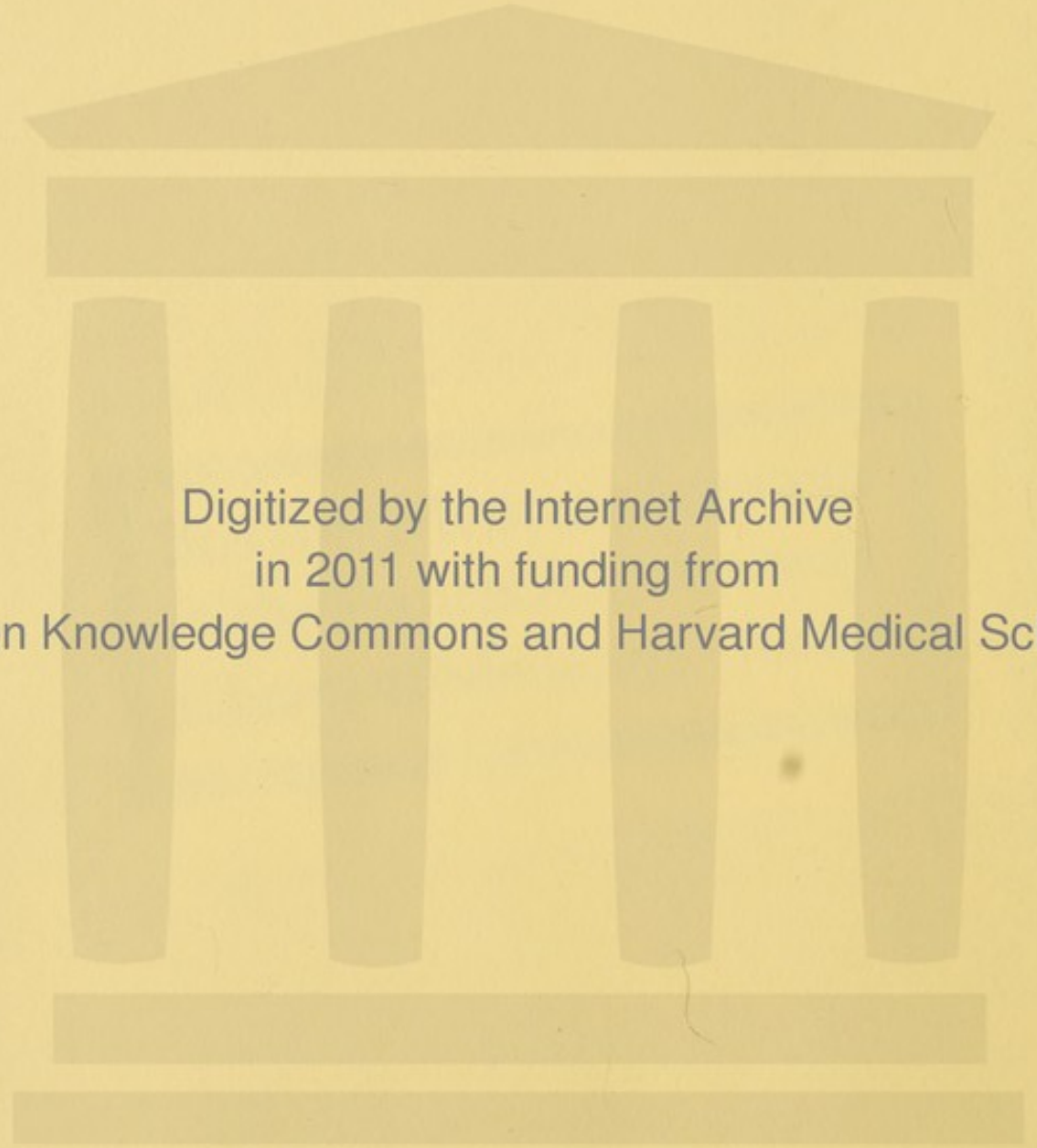

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Fig. 1.

Frontispiece.

Fig. 2.

See p. 107.

Fig. 3.

Fig. 4.

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LONDON
SMITH, ELDER, & CO., 15 WATERLOO PLACE
1877

PREFACE.

THE FOLLOWING WORK is a brief compilation of the more important facts contained in some recent contributions of my own to American surgical literature.[1] With the conviction that my views as to the pathology of spinal curvature have stood the test of free discussion, and with a full faith in the efficacy of the plans of treatment which I have of late devised and carried out, I venture to supplement a recent course of personal demonstrations in London and other large English cities by this succinct statement of my teaching on the subject. I further propose, by a short selection of clinical cases, to show the excellent results that have in my practice attended the

[1] 'Orthopædic Surgery,' Dr. Lewis A. Sayre (Appleton & Co., New York, 1876, and Churchill, London). 'Sayre on Pott's Disease' and 'Transactions of American Medical Association,' 1876 (Richmond and Louisville Medical Journal, May 1877). 'Sayre on Rotary-Lateral Curvature' (The American Practitioner, 1877). 'Sayre on Rotary-Lateral Curvature of the Spine' (Transactions of the Medical Society of the State of New York, 1876). 'New York Medical Record,' March 27, 1877.

CONTENTS.

POTT'S DISEASE

OR

ANGULAR CURVATURE OF THE SPINE.

BEFORE dealing with the main object of this short essay, and stating some facts of interest and importance with regard to a method of treating curvature of the spine which has been employed by myself to the exclusion of all other methods of local application during the past three years, I propose to review, briefly, some other points connected with Pott's disease. Holding, as I do, views that are somewhat at variance with those of the standard authorities, concerning the nature of *caries* or *Pott's disease* of the spine, it will not be unprofitable, I think, to preface my remarks on the treatment, by a short discussion of the pathology, etiology, and symptoms of the disease. It will be necessary also for me to describe my method of examining the subjects of the disease, as this is a point to which I attach much importance.

Pathology.—The deformity of the spine, known as Pott's disease, or posterior angular curvature, is a result of slow inflammation and consecutive loss of substance in the bodies of certain vertebræ, and in the corresponding intervertebral discs. This form of curvature differs from that in a lateral direction, in which there is no disease of bone, but which is dependent upon abnormal and irregular muscular contraction. With regard to Pott's disease, I have held for many years that it is

almost always, if not always, produced through some injury to the bone or cartilage, and that, in common with carious diseases of other joints, it is essentially of *traumatic* origin. The almost constant primary cause, I believe, is some injury sufficient to disturb the nutrition of the bodies of certain vertebræ and the intervertebral cartilages, and to induce inflammatory softening and disintegration of the structure of these organs. I reject altogether the view held by the profession in general, that Pott's disease is above all others one of essentially strumous origin, that it is necessarily dependent upon a tuberculous diathesis, and never met with save when constitutional dyscrasia is present. In my own judgment, this disease is more frequently due to injury than to any constitutional affection. It frequently occurs, I admit, in tuberculous subjects, but even in these *traumatism* is a necessary condition for its development. A very much slighter injury may cause the disease in a person with tuberculous tendencies than in one of a sound and vigorous constitution; but even in the tuberculous patient, I believe, the spinal affection is the result in most cases, if not in all, of some concussion or blow, or other form of injury. This conclusion as to the traumatic origin of Pott's disease is based upon an extensive and carefully recorded experience, and is supported by well-known facts concerning its development. It is generally acknowledged that spinal *caries*, though it may occur at any period of life, is much more likely to occur in childhood, and especially in children who are reckless and careless, and expose themselves to all sorts of accidents. It also occurs more frequently among boys than among girls, because the former are more exposed to accidents. Lateral curvature, on the other hand, is more frequently met with in girls.

Etiology.—The most frequent causes of Pott's disease are concussions and blows. A child unusually active and playful may, in some careless prank, jump from a height in such a manner as to come down straight, with the lower limbs quite rigid at the knees and hips, and thereby give a sudden concussion to the bodies of the vertebræ and the intervening cartilaginous

discs, thus disturbing some centre of ossification to such an extent as to result in inflammatory action, and finally in softening and disintegration of bone. In consequence of a blow or fall, the heads of some of the ribs may be violently driven against their articular facets. In many instances direct blows are received of sufficient force to injure the vertebræ, and to excite disturbance of a serious character. Pott's disease occasionally originates in fracture of a transverse process of a vertebra, the injury remaining unsuspected, until at last it may be discovered quite by accident, in the *post-mortem* theatre, or the dissecting-room. In many cases of angular curvature, the fact that any injury had been received prior to the development of the disease has passed entirely unrecognised, by either the patient or his friends, and has been revealed only after the most careful questioning. After such disturbance of one or more vertebræ, several months may elapse before attention is drawn to the case, and probably during this interval the bones may have been partially destroyed through inflammatory softening and disintegration, and more or less distortion may have been developed. Any signs of exhaustion that may now be presented are regarded as evidences of constitutional cachexia, but erroneously so, since the exhausted condition of the patient is simply the result of long-continued suffering from a local disease, dependent upon some direct injury to the parts involved.

Symptoms.—The symptoms of spinal *caries* in its early stages are sometimes very obscure, and consist mainly in transmitted and reflex nervous disturbances. The nerves that make their exit from the spinal canal at points corresponding to the seat of the disease become more or less involved, and will manifest such disturbance by symptoms developed at their peripheral extremities. Thus the earliest symptoms of a diseased process affecting bone in the neighbourhood of the foramina through which the spinal nerves pass, are manifested in remote parts of the body. When the disease affects the cervical portion of the spine, the patient, long before the appearance of any distortion, usually complains of one or more of these symptoms: dysphagia

and a sense of constriction around the neck, a troublesome and frequent cough from laryngeal irritation, pain over the upper portion of the thorax. Such symptoms are sufficient to arouse suspicion regarding the existence of spinal *caries:* if disease of the larynx or lungs be disproved by the use of the laryngoscope and physical examination of the chest, such suspicion will be greatly strengthened, and should lead the surgeon at once to make a careful examination of the spine. In the earliest stages of *caries* in the dorsal region of the spine, the only symptoms that may be complained of are a feeling of constriction around the trunk, pain along the boundaries of the chest and abdomen, ill-defined pains within the thorax, especially in the region of the heart, more or less flatulence, and some other symptoms of indigestion. It will often be found, on inquiry, that the subject of dorsal curvature has, on account of these symptoms, been treated for heart disease, for rheumatism, or for dyspepsia. When Pott's disease is commencing in the lumbo-dorsal region, the earliest symptoms are such as may be referred to the abdomen. The patient may have a feeling of constriction in this region, and may suffer from flatulence and constipation. If the patient be young, a very common diagnosis in such cases is that of worms. When the spinal disease has originated in a still lower part of the column, the leading symptoms are usually manifested by the bladder and rectum. The chief and earliest complaint is that of a frequent desire to relieve the bladder. The patient suffers occasionally from pains radiating from the pelvis along the thighs. When any of the above-mentioned symptoms are present, and they cannot be explained by the presence of some well-recognised disease, the surgeon should always extend his investigation to the points where the nerves distributed to the seats of pain and uneasiness make their exit from the spinal canal.

Reflex Muscular Contractions.—Reflex muscular contractions constitute another early symptom that may lead to the recognition of spinal *caries*, at a time when suitable treatment may render much service in bringing about a complete cure.

At an early period of the disease, muscular tension, due to reflex action, will produce a noteworthy change in the appearance and action of the patient. Every joint of the lower limbs is bent for the purpose of preventing any concussion from affecting the bodies of the inflamed vertebræ. The body is brought into a peculiar position ; the chin projects, the shoulders are elevated, the dorsal muscles are kept rigid, in order to prevent any movement of one vertebral body on another, and the trunk is moved with the utmost precision, in order to prevent any concussion from being communicated to the diseased bones. The back is never bent, as such movement presses the bodies of the vertebræ together, and gives rise to pain. The patient is unable to stoop down and pick up any object from the floor. If requested to do so, he first bends his hips, then his knees, and finally reaches the object by 'squatting' down to it.

There is another symptom of spinal *caries* that is often met with in the early stages of the disease, and before the appearance of any distortion. When the subject of caries in the dorsal or lower cervical portion of the spine is walking about, he breathes in a short grunting manner, because of the constant effort on the part of its muscles to keep the trunk at rest. The pressure upon the intercostal nerves is sometimes so great as to produce almost spasmodic respiration. The patient's body is kept rigid by, as it were, a *muscular splint*, which prevents motion of the spinal column, and thus a valuable and unmistakable indication for treatment is presented by this short and noisy breathing. You now put the patient on a stool or chair, and ask him to jump down on the floor. If there is any disease in the bodies of the vertebræ or interarticular cartilages, he will not jump so as to strike upon his heels, but will come down in such manner as to avoid concussion ; and it therefore becomes necessary to examine the spine.

Examination of the Spine.—In the method that I recommend as the most convenient for examining the spine, the child —for it is usually in early life that Pott's disease occurs—should be stripped, and so placed across the knees of the surgeon, that

its face looks downwards, its arms resting over one thigh, and its legs over the other. The surgeon, by separating his thighs, is then able to make a gradual extension of the trunk and spine of his little patient. This gradual extension should be kept up until it has served to relieve the nerves from pressure, and the muscles from irritation; but care should be taken that it is not carried so far as to produce reflex muscular contractions. When the trunk has been thus extended, the first result that will probably be noticed is, that the child takes a full and complete inspiration, and that there is a long-drawn sigh of relief. So long as the surgeon keeps his knees apart the child will remain quite comfortable, and will breathe easily; but when the extension of the trunk has ceased, the child's muscles are again excited to contract, and the short catching respiration and 'grunting' are renewed.

More or less muscular spasm extends over the whole of the child's body when extension across the knees of the surgeon has been discontinued. If such diffused spasmodic action is not observed, it may be readily produced by placing one hand on the top of the child's head, and the other under the sacrum, and then pressing the bodies of all the vertebræ together. The instant this is done, if the anterior portions of the vertebral bodies or the intervertebral cartilages be diseased, the child will cry out on account of pain, and there will be slight spasm probably of both its legs and arms. Pott's disease, however, is not always confined to these particular parts of the spinal column, and does not always commence either in the bodies of the vertebræ or in the intervertebral discs. I hold that a child may be suffering from this disease without having any of the above-mentioned parts affected. In disease of the dorsal portion of the spinal column, it often happens that the parts primarily and most extensively involved are the sides of the vertebral bodies, near the articular facets for the heads of the ribs. In such cases the anterior portions of the bodies of the vertebræ and the intervertebral cartilages may become subsequently involved. Here the blow or injury which gave rise to the disease was probably

received upon the sides of the affected vertebral bodies, or the heads of certain ribs were driven against their corresponding vertebræ with such force as to have established a starting-point for inflammation. The surgeon, therefore, in his examination of the spinal column, should not be content with testing the condition of the anterior surfaces alone of the vertebræ, but he should also prove the condition of their sides, by pressing the heads of the ribs against their articular facets; for it very often happens that no symptoms of spinal disease will be manifested before this is done. The spine may be quite straight, and the surgeon may be able to press it down and 'percuss' it without giving the patient pain; and yet Pott's disease may exist. Pressure upon the ribs, so directed as to force their heads into contact with the articulating facets, when it gives the child pain and causes muscular spasm, has afforded good evidence of inflammation of the spine, and if applied to each rib separately, will indicate the exact seat of the disease.

When the child is placed across the surgeon's lap, and extension of a diseased vertebral column is made, moderate downward pressure on the spinous processes will relieve pain and uneasiness, in consequence of removal of compression from the anterior portions of the bodies of the vertebræ. The fact that pressure can be made upon the spinous processes without causing pain cannot be regarded as positive evidence that no vertebral *caries* exists. For when the anterior portions of the vertebral bodies are affected, such manipulation tends to liberate the diseased surfaces from immediate contact, and hence to relieve pain. When the carious portions of the vertebræ give way, the spinous processes begin to project posteriorly to an abnormal extent, and it is by depressing these displaced processes that we reduce the mutual pressure of the diseased surfaces, and so diminish the sufferings of the patient.

Application of Cold or Heat over Spine.—If, in cases where Pott's disease is suspected, no definite symptoms can be obtained by adopting the methods already described, the application of a very cold or a hot body may be made with advantage. The

nerves, made irritable by the disease, will receive external impressions much more readily than they would do under normal conditions. When a piece of ice, or a vial or thimble containing hot water, is passed along the spine, no response is obtained until the point opposite the disease is reached, when an apparently involuntary effort will at once be made on the part of the trunk to get away from the irritant. In this manner the surgeon will sometimes be able to spell out cases which would not have been easily explained in any other way. Any slight elevation of surface temperature over the diseased portion of the spine may be detected by means of the delicate thermometer recently devised by Dr. Seguin of New York.

Paralysis of Limbs.—Partial or complete paralysis of one or both lower extremities sometimes occurs during the process of Pott's disease, but is met with more especially when the disease involves the lower portion of the spine, and when the nerves that are given off to the lower extremities have become affected. The paralysis depends either upon effusion into the cord or upon pressure through displacement of the vertebræ. In the former instance the condition of the paralysed limbs will gradually improve as absorption of the effusion takes place; in the latter instance the prognosis, so far as restoration of power is concerned, is very unfavourable.

Principles of Local Treatment.—The great object in the direct treatment of Pott's disease is to maintain *rest of the affected parts*, by such means as will not debar the patient from the benefits of fresh air, sunlight, and change of scene. The patient should not be permitted to assume the upright position before he has been fitted with some artificial support capable of removing all pressure from the bodies of the diseased vertebræ. This object may be attained by straightening the spinal column in such a manner that the weight of the body is borne by the *transverse* processes, and not by the bodies of the vertebræ. These processes, having a denser structure, can bear pressure without much danger of undergoing erosion. The idea involved in the construction of some instruments, of lifting the bodies of

the vertebræ apart by placing a belt about the hips and a support under the arms, is simply absurd, because the mobility of the scapulæ is so great that they can be elevated as far as the endurance of the patient will allow, without relieving the weight of the body upon the spine. This can be done only by an accurately fitting apparatus applied to the *body* itself when extended.

Treatment.—Until nearly the end of 1874 I had for several years been in the habit, in the treatment of Pott's disease, of 'turtle-shelling' patients, as I called it, with plaster of Paris, thus encasing the spine and half or two-thirds of the body in an immovable apparatus, after having made the proper amount of extension with the patient lying across the lap. The edges of the shell were then united by means of elastic bands passing across the front of the body, support being thus given, and the respiratory movements permitted to go on unrestricted.

In November 1874 a little boy, four years of age, was brought to me having a sharp posterior curvature of the three last dorsal and the first lumbar vertebræ, together with partial paralysis of the rectum and one leg. The parents were too poor to buy any mechanical apparatus, and as it was impossible to send the child to the hospital, I felt compelled to devise some plan by means of which he could be made comfortable whilst being transported to his home, nearly one hundred and fifty miles distant from New York. Having studied the subject for some time, and carefully considered the propriety of completely encasing the trunk with the plaster dressing, I had finally resolved to make the experiment as soon as a suitable opportunity presented itself; and it seemed to me that this opportunity had now occurred, and that the circumstances of the case justified the adoption of the treatment. Accordingly, I directed one of my assistants to suspend the boy by the arms, in order to see what effect would be produced; and I noticed that, as soon as the body was made pendent, there was more motion in the paralysed limb than before, that the pain was very much relieved, and that the patient was breathing with greater ease. While he was suspended in

this manner, I pulled down his shirt and tied it between his legs, thus making it fit the body closely and smoothly; and then, commencing at the pelvis, I applied rollers saturated with plaster of Paris around the entire trunk. At first I was anxious concerning the effect that would be produced on the respiration, but inasmuch as the boy cried lustily, all my fears in that respect were quickly dispelled: so I went on, reversing the bandage, bringing it back to the pelvis, again carrying it upwards, &c., until the body was completely encircled by four or five thicknesses of the roller. The child was then laid with his face downwards on a sofa, and was instructed to remain there until the plaster had become firmly set. When I returned shortly afterwards, I found, to my surprise, that the little fellow had got up from the sofa and walked across the room to a window. Still fearing that respiration might be too much interfered with, I cut through the dressing from the top of the sternum to the pubis, thus allowing it to gape considerably, and permit a more complete expansion of the chest. *The boy, however, did not feel as comfortable after as before the incision through the front part of the jacket.* I then applied a roller bandage around the pelvic portion of the jacket, and again brought its edges together, but left the upper portion to separate as much as the movements of respiration seemed to require. In order to give security to the upper or thoracic portion, the edges of the jacket were tied together by strips of elastic bandage. When this dressing had been completed, I requested the parents to bring back the child after an interval of ten days, when I proposed to apply and adjust a Taylor's brace. The above-described plaster jacket had been put on simply for the purpose of rendering the child comfortable whilst being carried home. I did not see either the child or its parents until the following February.

In the meantime, the little patient had grown considerably, looked healthy, was able to walk without mechanical aid, and could support the upper portion of the trunk without placing his hands upon his knees. Without staying to make any further examination, I at once took the boy in my carriage, and started

for my clinical lecture at the College. As the streets were beset with holes and elevations formed by ice and snow, the jolting was almost intolerable. I was anxious for my patient, but, strange to say, he made no complaint whatever. That fact of itself showed the efficiency of the dressing for securing absolute rest to the diseased parts. At the College the jacket was removed in the presence of my class, when it was found that the curvature had been much reduced. The boy was then unable even to sit up, but as soon as the dressing had been reapplied, the mother pointed out to me that he could again sit up and walk.

This, in brief, is the history of the first case in which I applied the dressing called by me the 'Plaster of Paris Jacket.' Since that time this plan of applying a plaster dressing completely around the body, from the pelvis to the axillæ, has constituted almost the only treatment which I have adopted for Pott's disease. I have used it in more than 300 cases, and in each instance with great benefit.

Nearly three years ago I suggested that it was not altogether improbable that this simple dressing would supersede all the complicated and expensive apparatus previously employed in the treatment of spinal curvature; and by the results of my own experience up to the present time, this view has been much strengthened. I have, I may now state, made several essential improvements in its adjustment, and to these allusion will subsequently be made.

When the disease is situated in the dorsal region the jacket *should not be opened*, for the reason that if the respiratory movements of the chest are permitted to go on without restraint the heads of the ribs will necessarily move freely in their articular facets, and the disease will be increased rather than diminished. But if the ribs be held still, and the diaphragm thus made to act more fully, the breathing, instead of being thoracic, is rendered diaphragmatic and abdominal, and all that short grunting, catching respiration ceases. Although the respiration is deeper and more prolonged, it is carried on without any pain whatever

to the patient. I believe this to be a practical point of great importance, especially in those cases in which the disease has commenced at the sides of the vertebræ. At first I was afraid that the thoracic compression would interfere with respiration, and therefore divided the jacket in the median line as soon as the plaster had set, the edges being subsequently brought together with bandages and elastic bands, in order to allow wider lateral expansion of the chest. Practical experience, however, has demonstrated that this is not necessary, and that the complete encircling of the thorax in the immovable plaster bandage gives the greatest relief. When the thorax is thus firmly secured, the anus and the perinæum will rise and fall synchronously with the diaphragm, and the respiration be carried on without difficulty so long as these parts are free from pressure. If manual pressure be applied to the perinæum, a feeling of suffocation is produced. It is therefore necessary, in some cases, when the thorax is thus secured, that the patient should sit upon a chair with a hole in the seat, like a close-stool, or use an inflated india-rubber ring, like the ordinary life-supporter.

The jacket is to be worn so long as it is easy, from one to two or three months, or until the patient has grown to such an extent as to make it necessary to remove it, and to apply another. Or again, if it becomes necessary to take it off for purposes of cleanliness, it can be easily removed by making an incision through it in the middle line of the body, from the top of the sternum to the pubis, by means of a knife, finger saw, or, better still, the cutting pliers devised by Mr. Coxeter. The division having been made, the edges of the opening should be seized and gradually separated. When it has been removed from the body the cast will shut up like a piece of stiff stove-pipe.

In some cases, when recovery is nearly complete, it is advisable to remove the jacket, wash the body, and replace it, supporting it in place with a firmly applied roller bandage. But in the acute stages the patients invariably complain that the jacket is never so comfortable after it has been divided as when it remains whole.

The advantages which the plaster jacket has over other dressings, in the treatment of Pott's disease, are: first, it affords the means by which absolute rest is secured, motion of the parts diseased not being permitted even in the slightest degree, so long as the apparatus is properly adjusted. The result is that consolidation takes place more readily than in plans of treatment where motion is permitted by the daily change of the appliance. The usual treatment of a broken leg is thus applied to a carious spine; as in one case so in the other, union is apt to be much more prompt on the use of a fixed dressing securing absolute immobility than when an apparatus is frequently changed. Another advantage is this: the local pressure attending the use of other forms of apparatus is avoided. The chief way in which most patients have hitherto been kept straight was by means of some mechanical apparatus pressing directly upon the sides of the projecting spinous processes, forcing them inwards, and at the same time making traction in the opposite direction at other points for the purpose of rendering the spinal column straight. In other words, the fulcrum of pressure is usually just over the projecting part, and produces pressure that interferes with the deep-seated circulation, disturbs nutrition, and retards consolidation and recovery.

In addition to the perfect comfort of the jacket and the absolute immobility which can be obtained through it, it has this further advantage, that it may be easily applied in any part of the country without the trouble and expense of resorting to any instrument maker.

In a number of instances in which other apparatus had been used, although accurately adjusted, the disease had steadily progressed, and was progressing when the patients came under my observation, serious deformity having been produced at the end of two, three, or four years, even after wearing iron braces carefully adjusted; but the dressings having been removed, I have had the satisfaction of seeing the further progress of the disease arrested by the application of the plaster of Paris jacket. In two such cases consolidation became perfect—in one at the end of four,

and in the other at the end of six months—and remained permanent. It may be said that those cases were of so long standing that they were nearly ready to get well of themselves, and that therefore the cure cannot be attributed really to the assistance afforded by the plaster of Paris jacket. I do not mention them, however, because I regard them as test cases, but prefer to take the results obtained in those instances in which the disease has been treated throughout by means of the plaster jacket, in order to prove its value. It will be seen hereafter that the same favourable termination has been effected in every case. Such results demonstrate the value of the plaster dressing in the treatment of the disease in its early stage.

Having recently understood that Dr. Joseph Bryan, of Lexington, Kentucky, had used plaster of Paris in this way, in the treatment of Pott's disease, prior to my first application of it, and not being able to find any printed statement of his system, I wrote to him, on May 23, 1876, asking for information upon the subject, and where I could find any published account of his mode of treatment. He replied in a letter, dated Lexington, Kentucky, May 29, 1876, 'Some time during the months of July or August 1874 I applied my first plaster of Paris splint to the back for Pott's disease of the spine . . . . An account of my splint has never been published. . . .'

The case was shown, according to Dr. Bryan, to Drs. Erskine Mason, Stephen Smith, V. P. Gibney, and B. J. Harlan, who were much pleased with it; but as no account of it was ever made public, and as none of the gentlemen mentioned seem to have been sufficiently impressed with the importance of this mode of treatment to adopt it in practice, I must at least claim priority in bringing it before the profession and into general use. Moreover, I was not aware of Dr. Bryan ever having applied it until I received his letter of May 29, 1876, or I should have given him credit for it in my previous publications upon the subject.

Mode of Applying the Plaster of Paris Jacket.—The bandages used in the making of this apparatus must consist of some loosely woven material, such as cross-barred muslin, musquito

netting, or crinoline. This should be torn into strips three yards long and from two and a half to three inches wide, according to the size of the patient upon whom it is to be used. Its meshes may be completely filled by drawing the bandage through very fine and freshly ground plaster of Paris that has not been long exposed to the air—this plaster at the same time *being rubbed into* the material. Each strip should then be loosely rolled up so as to form an ordinary roller bandage. Several of the bandages thus prepared may be kept ready for use in an air-tight tin vessel. When required, they are *set on end* in a basin containing sufficient depth of water to *cover them entirely*. A free escape of bubbles of gas through the water will be observed for a short time; when this has ceased the bandages are ready for use.

For the purpose of strengthening the jacket I make use of narrow, thin, and flexible strips of tin, roughened on both sides, like a nutmeg grater, which are placed round the sides of the body between the turns of the plaster bandage. These obviate the necessity of increasing the weight of the apparatus by the application of a larger amount of plaster.

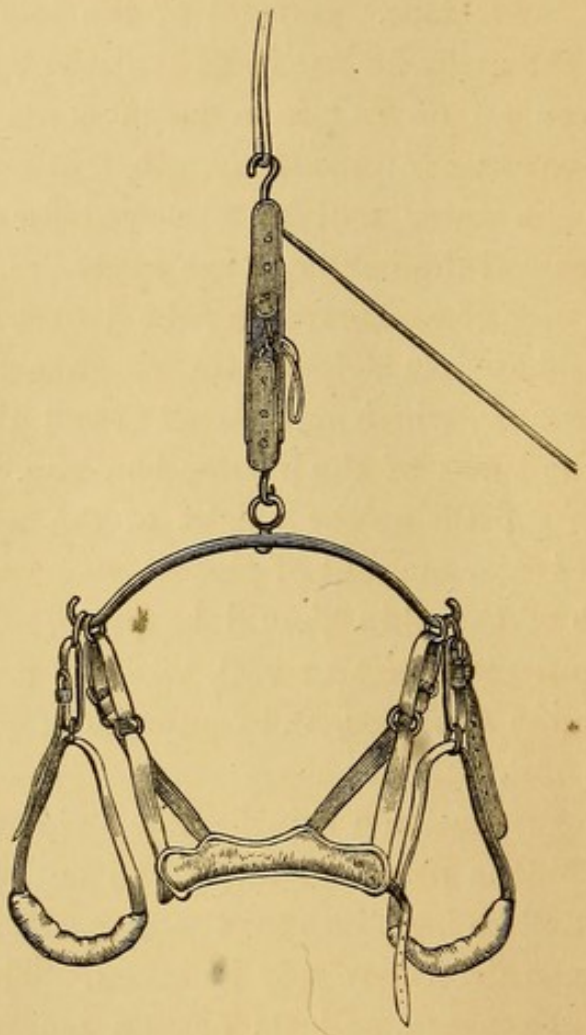
The surface of the skin should be protected by an elastic but closely skin-fitting shirt or vest, without armlets, but with tabs to tie over the shoulder, and composed of some soft woven or knitted material.

Previous to suspension a thin flexible strip of lead should be laid upon the spinous processes along the entire length of the spinal column, and be bent into all the sinuosities, so that a perfect outline of the deformity may be taken. This strip should then be laid upon paper, and its outline marked with ink, so that an accurate contour is presented of all the irregularities along the spinal column. After the patient has been suspended, the same strip of lead should again be closely applied along the spinous processes, and another tracing made upon paper by the side of the first. Thus we have a means by which comparison can be made, and are enabled to determine exactly what changes have taken place in the curve.

As it is difficult for an assistant to hold the patient sus-

pended during the application of the dressing, I make use of a very convenient apparatus, contrived by Mr. Reynders of New York,[1] which consists of a curved iron crossbeam, to which is attached an adjustable head and chin collar with straps fitted to axillary bands. To a hook in the centre is fixed

FIG. 1.



a compound pulley, the other end of which is secured either to a hook in the ceiling or to the top of an iron tripod about ten feet in height.

The Dinner Pad.—The head and chin collar and the axillary supports having been carefully adjusted, the patient is

[1] This apparatus (fig. 1) can now be obtained from any of the London instrument makers

gradually drawn up until the feet swing just clear of the floor. Before applying the plaster bandage I place over the abdomen, between the shirt and the skin, a pad composed of cotton folded up in a handkerchief so as to form a wedge-shaped mass, the thin edge being directed downwards. This is intended to leave room when removed for the expansion of the abdomen after meals, and so I call it the 'dinner pad.' It is important to make it thin where it comes under the lower edge of the jacket, or else the jacket would fit too loosely about the lower part of the abdomen. It should be taken out just before the plaster sets. It is always a good plan to get the patient to eat a good dinner before the jacket is applied, but this precaution of allowing room for meals should never be neglected.

If there are any very prominent spinous processes which, at the same time, may have become inflamed in consequence of pressure produced by instruments previously worn, or from lying in bed, such places should be guarded by little pads of cotton or cloth, or little glove fingers filled with wool placed on either side of them. Another detail which I have found to be of practical value in some cases, is the application over each anterior iliac spine of two or three thicknesses of folded cloth three or four inches in length. If these little pads be removed just before the plaster has completely set, such bony processes will be left free from pressure.

If the patient be a female, and especially if she be developing at the time, it will be necessary to apply a pad under the shirt over each breast before the plaster bandage is put on. These pads should be removed just before the plaster sets, and at the same time slight pressure should be made over the sternum for the purpose of indenting the central portion of the plaster jacket, and of thus giving form to the body and of removing pressure from the breasts.

The skin-fitting shirt having been tied over the shoulders and then pulled down, and kept stretched by means of tapes applied, one in front, the other behind near its lower edge, and tied tightly

over a handkerchief placed on the perinæum, the patient is to be gently and slowly drawn up by means of the apparatus (see fig. 1), until he feels perfectly comfortable, *and never beyond that point*, and while he is retained in this position the plaster bandage is to be applied. A prepared and saturated roller, having been gently squeezed so that all surplus water is removed, is now applied around the smallest part of the body, and is carried round and round the trunk downwards to the crest of the ilium, and a little beyond it, and afterwards from below upwards in a spiral direction until the entire trunk from the pelvis to the axillæ has been encased. The bandage should be placed smoothly round the body, and must not be drawn tight: it should be simply unrolled with one hand whilst the other follows and brings it into smooth close contact with all the irregularities of the surface of the trunk. After one or two thicknesses of bandage have been placed around the body in the manner described, the narrow strips of roughened tin are placed parallel to each other on either side of the spine, with intervals of two or three inches, and in numbers sufficient to surround the body. Over these another plaster bandage is applied. In a very short time the plaster sets with sufficient firmness, so that the patient can be removed from the suspending apparatus and laid upon his face or back on a hair mattress, or—what is preferable, especially when there is much projection of the spinous processes or sternum—an air bed: before the plaster has completely set the dinner pad is to be removed, and the plaster gently pressed in with the hand in front of each iliac spinous process, for the purpose of widening the case over the bony projections. While the patient is lying to dry, it is sometimes necessary to wet the jacket with a little water, and then to dust it with some more plaster. The surgeon often leaves some few weak spots that need to be strengthened in this manner.

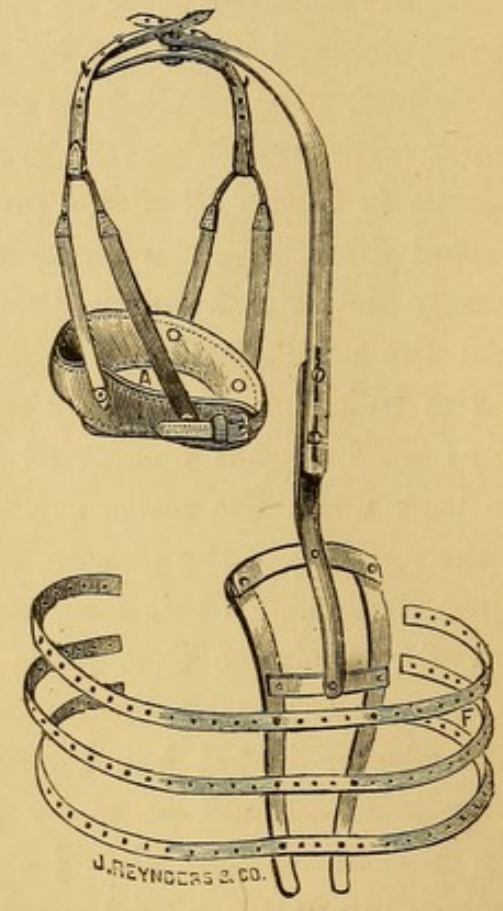
Treatment of Abscesses and Ulcers.—If any abscesses be present they must be freely opened antiseptically at the most dependent part, and their contents completely abstracted.

The surgeon will occasionally find large masses of sloughing connective tissue, having the appearance of wads of wet cotton; all these should be removed. After each abscess has been thoroughly evacuated, fill the cavity with Peruvian balsam; oakum should be placed over the opening, and be then covered by a piece of oil-silk, before the tight shirt is pulled down over the body. A hole should then be cut in the shirt, in order to indicate the size of an opening to be subsequently made in the plaster jacket, and in this hole should be set a folded piece of pasteboard of the same size, and carrying a long sharp pin thrust through its outermost leaf. Now each turn of the bandage can be carried over the pin, without forcing it into the abscess cavity below, and the surgeon is furnished with a guide in making an opening that shall lead directly to the diseased surface. When the plaster has nearly set, the bandage should be cut away around the pin until the pasteboard is reached and an opening made of sufficient size to allow of its easy removal. The oil-silk, which is then exposed, should be starred or cut into strips from the centre, so that when the strips are reversed they will cover the edges in the opening of the plaster, where they can be glued down with gum shellac. In this manner the surgeon will establish a fenestra for drainage that leads directly to the abscess. (See figs. 25 and 51).

As soon as the plaster jacket has become hardened, the patient is able to walk about, and in many instances, where paralysis had been present before the jacket was applied, the sufferer has been able to walk without difficulty after the application was made. In all cases in which patients have been unable to walk at all without catching hold of their knees, or of a chair or table, or whatever might be within their reach, they have been able, after the adjustment of the jacket, to walk erect and without any support whatever. In every instance in which I have applied it, the pain from which the patient had suffered so continuously has been immediately relieved, and has not returned so long as the bandage remained

correctly adjusted. In some instances indigestion has been the chief thing complained of previous to the use of the jacket, but all symptoms of dyspepsia have disappeared at once after the application of the bandage. In others, a difficult respiration and painful cough have been immediately relieved and have not returned. In short, all the symptoms referable to irritation at

FIG. 2.



the distal extremities of the nerves have been removed by giving proper support to the spinal column.

The 'Jury-mast Apparatus.'—There are some cases of Pott's disease in which the cervical or upper dorsal vertebræ, or both together, are involved. In these cases treatment by the plaster jacket alone can do but little if any good. It then becomes necessary to treat the disease by the use of an instrument which I call the 'Jury-mast Apparatus.' This consists of two pieces

of malleable iron bent to fit the curve of the back. To the lower portion are attached three or more roughened tin strips long enough to go nearly around the body. From two cross pieces of the upper extremity of the iron pieces springs a central shaft, carried in a curve over the top of the head and capable of being elongated at will. To this is attached at its upper extremity a swivel cross bar with hooks, from which depend straps supporting a head and chin collar (see fig. 2). The apparatus is thus applied: the patient having been encased, in the usual manner, in a few thicknesses of plaster roller, the jury-mast apparatus is put on over this, care being taken that the malleable iron strips are bent so as to conform to the surface of the plaster, and that the shaft over the head be kept in the same line with the spinous processes. The perforated tins are carried round the body, their ends, however, not being allowed to meet. The apparatus having been thus carefully adjusted, fresh layers of plaster bandage are now applied, in order to hold the instrument firmly in its place. (See figs. 39, 40, 44 and 45.)

The best constitutional treatment consists of giving the patient plenty of fresh air and all the good food that he can properly digest. He will doubtless require some remedies in order to regulate the stomach and bowels, and to invigorate the appetite. These objects are best attained by some of the ordinary stomachics and tonics, and a little champagne or brandy will occasionally be required. Cod-liver oil, cream, and milk, will all be found serviceable; in short, anything may be given which might possibly serve in building up the system. It should not be forgotten, however, that these measures are resorted to, not with the idea that there is constitutional taint to be overcome, but because they constitute the only way in which the system can be brought into the condition that best favours the processes of repair.

Before narrating the cases illustrative of the principles of treatment herein advocated, I wish to give, or rather repeat, a word of caution, fearing that I may not have enforced it with sufficient distinctness already. It is this: do not attempt

the impossible—do not try to straighten curved spines the result of caries, that have become partially or completely consolidated. If nature has already thrown out ossific matter, and adhesions are beginning to take place, *do not break them up* by too severe extension, but simply extend the patient very slowly, so that the contracted muscles alone will yield, *until the patient says he feels comfortable*, and *never extend beyond that point.*

If it is a child who cannot talk, watch his countenance, and as soon as the expression of *pain* is changed to one of *pleasure*, *then stop*, and *secure* your patient by the plaster of Paris bandages, keeping him in that position until the plaster has set: he will then retain this sense of comfort so long as the bandage is properly adjusted.

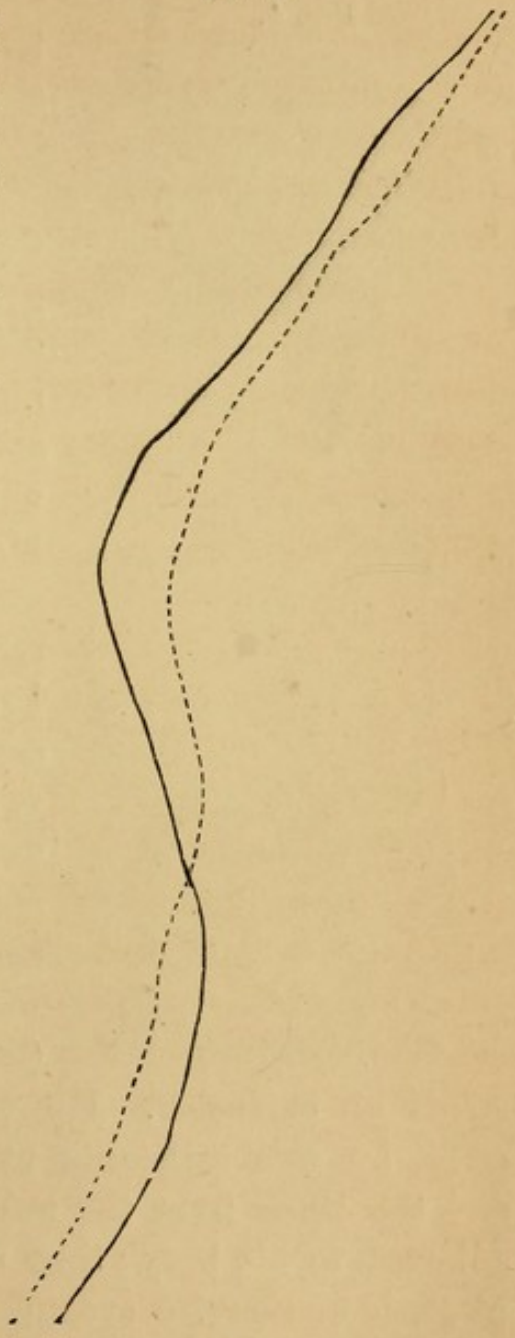
I append the histories of some of the cases I have treated, and the results obtained; I would advise a careful study of each case, and of the *modifications* of treatment applicable to each, as they will then be much better understood than by recording them in the descriptive text.

Case I.—*April* 15, 1875.—Matilda Bennett, aged 13 years. Parents healthy. Two years ago child had measles, following this had inflammation of right knee-joint and ankle; under treatment she has entirely recovered from these, and has now Pott's disease; 7th, 8th, and 9th dorsal vertebræ; 9th, very prominent; can be traced to no very distinct cause.

Treatment. — Taylor's brace was advised, and worn till Sept. 10, 1875. When it was found that the pressure on the sides of the prominent vertebræ, caused by the uprights, had produced two large excoriations, it was removed, and

she went without support for a week, so as to allow these sores time to heal. During this period she was kept in a recumbent position.

Fig. 3.



September 16.—The plaster of Paris jacket was applied to-day, affording her perfect relief, but, owing to the carelessness of its application, giving her a slight lateral curve, as seen in the cast.[1]

September 29.—Patient came to me to-day for the first time since the jacket was applied, and says that she would not exchange it for all the iron braces in New York; she was urged to have it removed on account of the lateral curve, but would not.

November 2. — Patient returned to-day feeling very well, and would not have the jacket removed, although advised to do so.

December 10.—For the first time she complained, saying that the jacket was getting too tight; it was removed and a new one applied, giving complete relief and a very perceptible improvement in her position.

May 1, 1876.—She has worn the jacket without removal since December 10th, and seems quite cured, but refuses to have it removed.

[1] This cast was presented to the American Medical Association, but has not been engraved.

Fig. 4 gives a correct idea of her present condition. I regret that I have no photograph of her before the 'jacket' was applied, but a comparison of the two curved lines (see fig. 3) will show the difference in her deformity.

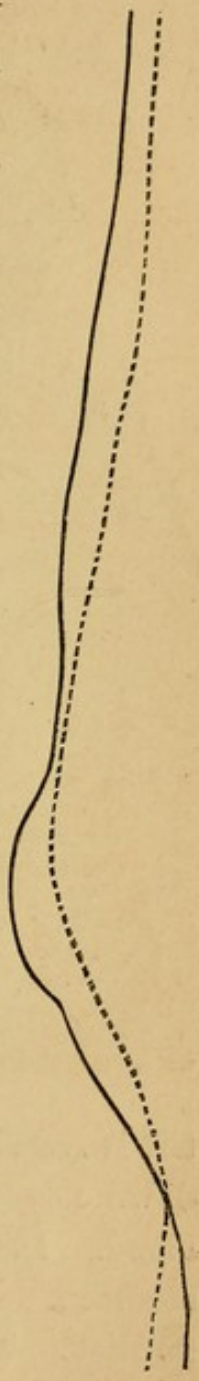
Fig. 4.

Case II.—John Jordan, aged five years, of perfectly healthy parents. In January 1873 Pott's disease appeared in the lumbar region, for which no cause could be assigned. A wheel crutch was used until April in the same year. In May 1874 a raw-hide jacket was fitted to the child, which gave great relief. He was again seen in 1874, when he looked well. He continued to run about until June 4, 1875, during which time he had outgrown his jacket, which was removed and a plaster of Paris jacket applied. At that time his curve was as represented in the dark line (see fig. 5); the dotted line shows the result of extension. He was held out as straight as possible by two assistants pulling, one from the shoulders, and the other from the ankles, a flannel shirt having been adjusted to his body; then a bandage saturated with plaster of Paris was carried around the pelvis and up to the axillæ.[1] The plaster dried readily, and the child was sent home feeling quite comfortable. I was sent for that evening in great haste, the mother saying he could not 'lay or sit,' and found him suffering from too great compression of the thorax. I

[1] I have abandoned this plan, as it is not so good or safe as suspension.

therefore made an incision of about three inches from the top through the plaster, which gave instantaneous and perfect relief. The dressing was worn until July 26, when it was found that a fold in the shirt had produced uneasiness. It was then taken off, and a slight abrasion over the crest of the left ilium discovered. The child came to me on July 30, when the abrasion was found healed, and was told to return the next day, when the dressing would be reapplied. On July 31 another dressing was applied, the child being placed in the sling, the body being the extending power.[1] The change in his curve whilst suspended is represented in the dotted line (fig. 5). The dark line represents the curve while unsupported. The plaster of Paris was applied as before. After the plaster had dried, the child walked about the office, feeling very comfortable. The following Tuesday he went on an excursion.

Fig. 5.



September 22, 1875.—Was present at the clinical lecture; his jacket, which had been applied July 31, was removed. The boy could bear concussion, even when the instrument was off, without pain, and appeared to be perfectly well, the dorsal and lumbar vertebræ being anchylosed, with but slight deformity, as seen in engravings from photographs (see figs. 6 and 7). Another plaster jacket, however, was applied (before the class) to guard against any possible accident. On November 1, the jacket was sawed open and removed. Boy apparently well, firm consolidation having taken place. He is allowed to wear his jacket as a matter of convenience to satisfy himself, although not necessary.

January 1, 1876.—Perfectly well, and needs no support.

[1] This is the plan I now adopt in all cases.

CASE III.—*June* 6, 1875.—Minnie O'Brien, aged three years. Parents healthy; child very well developed; always healthy

FIG. 6.

FIG. 7.

till November 1874, when she fell out of the arms of her aunt down eleven steps and was so severely hurt that she could not stand. In a few days she began to complain of pain in her stomach. Mother examined it and found it very hard and swollen. The child has not been able to stand erect since; the mother states that she was always comfortable when lifted by the arms; three months ago a small lump appeared in the lumbar vertebræ, about the size of a hickory-nut. On July 28, 1875, she was brought to me, examined and found to have Pott's disease. Dark line shows deformity while standing, dotted line during suspension (see fig. 8).

August 4.—Plaster of Paris dressing was applied, since which time the child has been perfectly comfortable and free from pain.

September 1.—Child complained of pain for a few days;

FIG. 8.

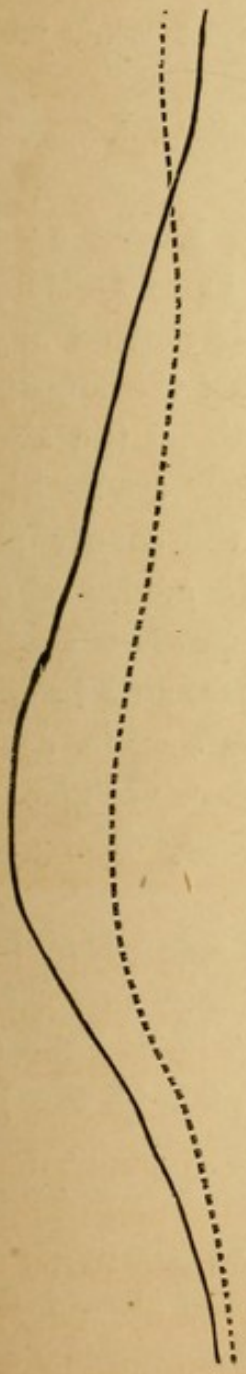
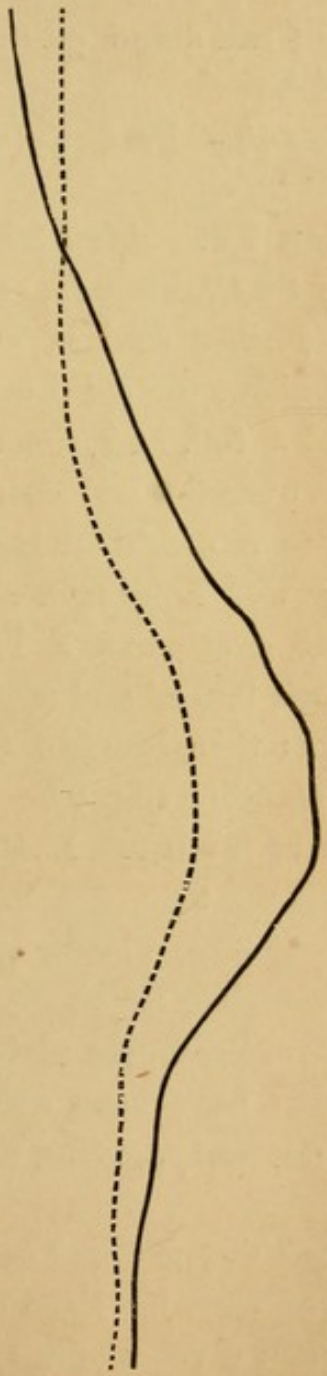


FIG. 9.



jacket removed; found a small abrasion from a fold in the shirt.

September 5.—Abrasion healed; child re-dressed.

October 7.—Child returned, having been in the country four weeks, very much improved in health.

October 28.—Jacket removed, child complaining of its being tight.

October 29.—Jacket renewed; child very comfortable.

January 20, 1876.—Jacket reapplied; the child much improved; can stand quite erect without support when jacket is removed.

May 10.—Perfectly well, and but very slight deformity.

Case IV.—*April* 30, 1875.—Eliza Ann Moyer, aged nine years; St. Catherine's, sent by Dr. Mack. Family history passable. Father died of consumption. Never noticed anything wrong about the child until two years ago last Christmas, when she had a fall, and shortly after a lump about the size of a marble over the last dorsal vertebra was discovered. She was taken to a neighbouring town, in which the county medical society was holding a meeting, and on the advice of several medical gentlemen a brace was made somewhat similar to 'Taylor's brace,' and applied. But the disease still progressed. She was then brought to me; condition as seen in dark line while standing (fig. 9). Five vertebræ are involved; two dorsal and three lumbar. Dotted line shows deformity during suspension (see fig. 9).

April 30.—Plaster of Paris jacket was applied, giving the child complete relief.

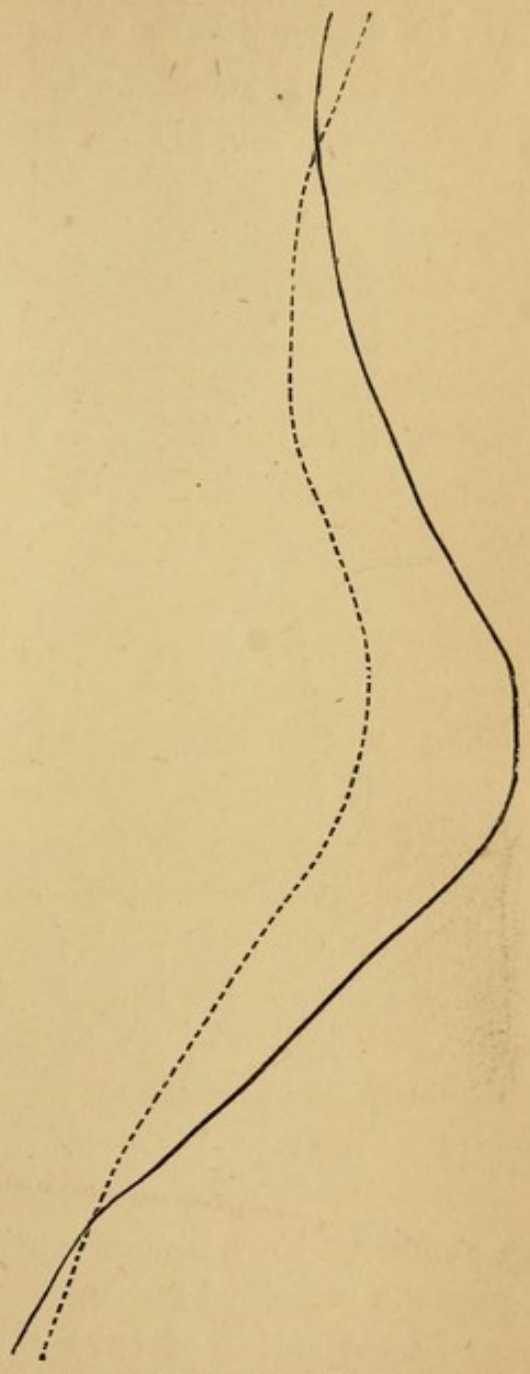
August.—Uncle states in his letter that he and the family physician have been able to remove and reapply the plaster when necessary, giving the child perfect comfort.

Case V.—Maria Louisa Diago, aged ten years (niece of Dr. Zayas of Cuba). Born of healthy parents, and always healthy. Fell when 6 years of age, and hurt her back. In a few months deformity developed, and, although she has constantly worn an iron brace, is now as seen in fig. 11, engraved from a photograph.

September 10.—The dark line shows the deformity when

standing, the dotted line when suspended (see fig. 10). Applied plaster of Paris bandage, which made her quite comfortable, and she could walk without support.

Fig. 10.



November 16.—Has gained flesh. New jacket applied. Deformity much less.

The child left for Cuba November 20, 1875, and I saw her in Cuba, on the sugar estate, in January 1876, in perfect health, and much stouter. The same jacket was on her which I applied November 16, 1875, but she was growing so large that it required removal. Before taking off the plaster jacket, Dr. Zayas had a photograph taken (see fig. 12). The profile should have been taken on the opposite side to correspond with the other picture.

The following cases are good illustrations of the advantages of the plaster of Paris jacket over the Taylor brace. The previous histories in each case are copied from my notebook, as they were taken at the time they first presented themselves, and the results of the treatment are given from letters of the parents. I would call especial attention to the *dates* in the following cases —as they will better explain the relative value of the different kinds of treatment employed.

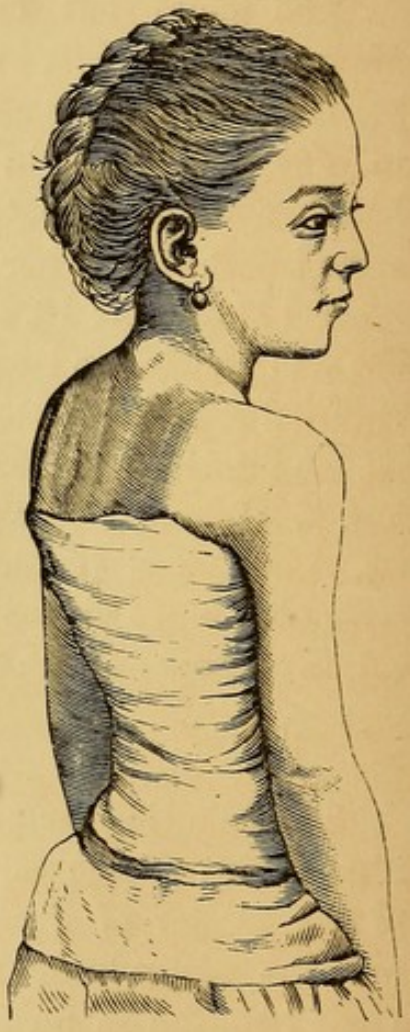
Case VI.—Hattie A. Myrick, aged 4½ years, came under my

care November 11, 1872. Parents healthy; three years ago fell from second story of a house to the ground, striking upon her nates. She apparently experienced no injury at the time.

In January 1870 was quite sick with inflammation of the bowels (the physicians attributed it to her having eaten bitter

FIG. 11.

FIG. 12.



almonds). This illness continued for two months, and for a year she remained feeble.

In the spring of 1871 there was a time (about six weeks) when she could not use the left foot at all, owing, it was thought, to a sprain.

About a year ago pain in the stomach was noticed, which radually increased in frequency. This pain was aggravated by jolting, riding, &c.

Last winter she walked, leaning her hands upon her hips.

Was treated for worms and for some kidney disturbance. About the end of August a prominence was noticed upon the spine, and she was at once ordered to lie still in bed.

Present Condition, November 11, 1872.—Projection of tenth, eleventh, and twelfth dorsal vertebræ.

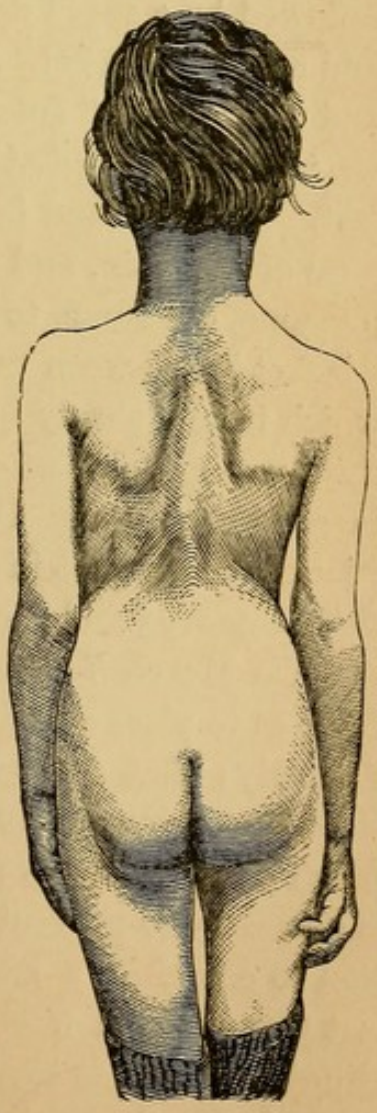
Treatment.—Taylor's brace. Rest on back in bed.

January 21, 1873.—Greatly improved. Can bear slight pressure on head without pain.

October.—Still improving, but has grown so much that the brace has to be lengthened.

December 17, 1875.—Last summer she was allowed to play croquet and take much more exercise than before, as she had improved so much. Last fall she was noticed to be losing strength, and complained of pain in her back. Brace has caused excoriations over projecting vertebræ, which have become much more prominent; has also slight lateral curvature to the left. To-day, December 18, 1875, applied plaster dressing after extension by suspension. Condition was as seen in fig. 13.

FIG. 13.



The result of the treatment, as well as the comparison of the two methods of giving support to the spine, viz., 'Taylor's brace' and the plaster of Paris jacket, are well described in the following letter from her father, dated

'Fort Hamilton, N.Y., June 1, 1876.

'*Dr. L. A. Sayre, No.* 285 *Fifth Avenue, N.Y.*

'Dear Doctor,—I have the satisfaction to report a decided improvement in the condition of my daughter Hattie, under treatment for spinal curvature, angular and lateral, by application of the "plaster of Paris jacket."

'As you will recall, she was placed under your care in November 1872; a "Taylor's brace" was ordered and applied on the 15th, which she continued to wear until early in November 1875.

'Her condition during the "Taylor brace" treatment may be briefly stated as a steady improvement for about a year, then retrograding, which was checked by putting her on her back, and after a while lengthening and readjusting the brace; a new but slow improvement, until late in the summer of 1875, then a decided and rapid deterioration, an increase in the lateral curvature, and the appearance of a severe pain apparently in the side, at first evident only when turning suddenly in sleep, but soon displayed on the slightest jar to the body, or change of position, followed by a rapid decline in general health, loss of strength, and a highly nervous state. The "brace" was then abandoned and the "jacket" substituted.

'The first "jacket" was applied on the 18th of December last. The first and immediate effects were the total disappearance of the pain, and an apparent increase of strength, due, I presume, of course, to the support given by the "jacket." This "jacket" was worn until about the middle of February, during which time a steady improvement in the general health of the child was noticed, when it was opened and the skin found to be in good condition. During a period of about two weeks the "jacket" was kept in place by use of a bandage; it was almost daily removed and the parts covered by it bathed.

'On March 7 the second "jacket" was applied, so successfully as to place the child in a much more erect position than formerly; that "jacket" is still worn, and the result is a decided improvement in the appearance of the patient. She is much stronger, quite free from nervousness; a constant check is necessary to prevent her from gratifying her natural inclination to exercise; a marked improvement, especially during the last two or three weeks, is shown in her figure; the head, inclined to droop, is carried more erect; the right shoulder, formerly badly dropped, is assuming its natural position. In a

word, her condition, under the present treatment, is, in my opinion, rapidly improving, satisfactory, and highly promising.

'No marked inconvenience from the use of the "jacket" is noticed; the breathing is natural, except after an extra exertion, when short breathing is perceptible. Irritation of the skin, sometimes complained of in hot weather, is allayed by allowing the child to draw in her breath and then moving the under-garment up and down under the "jacket."

'In my opinion the advantages of the "jacket" over the "Taylor" or any other "brace" consist in the uniform support of the "jacket" to the whole of the upper portion of the body, its inflexibility and the freedom allowed to the shoulders. The straps of the "brace" depress the shoulders, giving an unnatural appearance to that part of the body, and appear to me calculated to effect a permanent injury.

'Very truly,

'John R. Myrick,

'Capt. 3rd Artillery, U.S.A.'[1]

Case VII.—Charles Woodworth, aged three and a half years, Fort Washington. Came to me November 20, 1875. Fell down seven steps upon a flagstone about six months ago; in a few months complained of pain in the stomach, &c. He was examined by Dr. S. A. Raborg, who diagnosticated 'Pott's disease,' which I confirmed. Plaster of Paris jacket applied November 21, 1875.

December 31, 1875.—Plaster jacket renewed; child perfectly comfortable. This jacket was worn till March 27, 1876, when it was removed; a little redness was found over the eleventh and twelfth dorsal vertebræ, which was protected by felt plaster, and a jacket of plaster of Paris was applied, which gave perfect relief, and enabled him to walk well without support.

May 20, 1876.—Jacket removed, child much improved in flesh and strength; can stand erect when jacket is removed, and bear quite firm pressure on the head while standing.

[1] January 15, 1877. Entirely well.

Apparently cured, but another jacket was applied as a precaution.[1]

The following case is interesting as showing that any physician can apply the treatment who chooses to do so, and thus save his patient the expense and trouble of being taken to some particular specialist :—

Case VIII.—Annie D. Stewart, of Chambersburg, Pennsylvania, aged eight years, was brought to me on October 29, 1875. Parents healthy ; child always healthy till five years of age ; while playing with other children she was pushed from a curb-stone, falling on her back among a lot of loose cobble-stones. A few days after this she complained of more or less pain about the abdomen and right side ; mother states that she was not near so lively as before the fall, would cry out at night, could not lie on her back without great pain, was more comfortable while lying on her stomach. Was examined by two physicians, who could not decide on the disease. In March 1875 the father accidentally put his hand on her back and found a lump about the size of a hickory-nut ; she was then taken to a physician, who pronounced it Pott's disease.

Treated with a Taylor's brace. Father thinks the back is more crooked than before the use of the brace. October 19, 1875, my assistant, Dr. Robert Taylor, applied plaster of Paris jacket, which gave compelte relief : child made the remark that this was better than all the iron braces.

Dark line (see fig. 14) shows deformity while standing ; the dotted line when suspended,

In February 1876 I received the following letter from the attending physician :—

'Chambersburg, Pa.

'Mr. Stewart and I succeeded in reapplying the plaster bandages to his little daughter, who, I am happy to say, is doing finely. Her health has been very much better since her visit

[1] June 1877. Remains perfectly well and no perceptible deformity.

to you than it had been for years. If you had done nothing else for surgery than adapting the plaster apparatus to any curvature, you would be entitled to the gratitude of the profession.

FIG. 14.

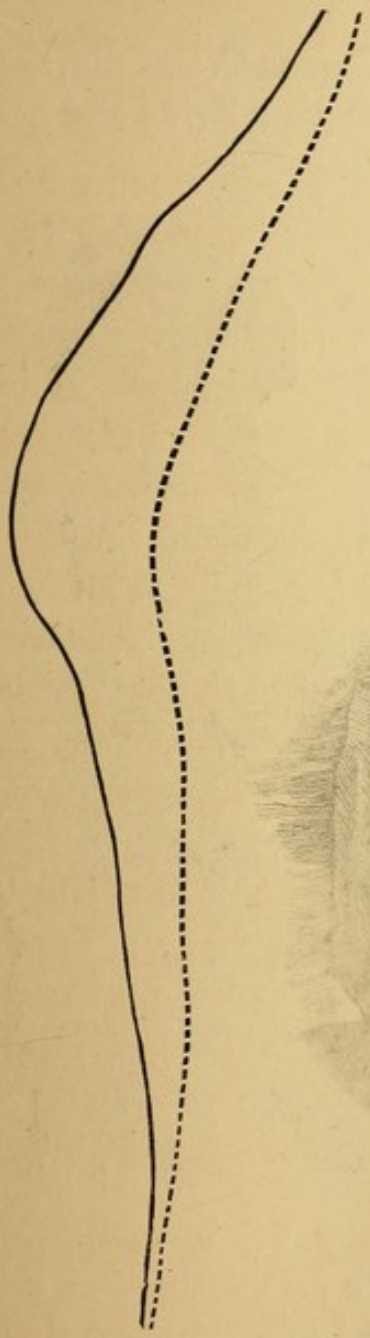


FIG. 15.

When I consider how many children you will rescue from deformity and physical and mental suffering by means so simple and inexpensive that the poorest people and the most inexpert physicians can avail themselves of it, I feel as if we must

include you among the great benefactors of the race. Had you lived in the days of Pope, you would be immortal.

'Gratefully yours,

'SAMUEL G. LANE, M.D.'

CASE IX.—*January* 12, 1876.—Theresa C. Egnelin, aged five years. The father died of phthisis; mother living and healthy.

FIG. 16.

FIG. 17.

Child was always strong and healthy till last fall. Mother states that while she was playing on a cart with other children she fell to the ground, striking on her back. A short time after this she began to complain of pain while being dressed and undressed, and also to stoop while walking. Was taken to Dr. Yale in October 1875, who pronounced it 'Pott's disease' in lumbar vertebræ, and advised Taylor's brace. Was brought to me January 12, 1876, and diagnosis confirmed. Dark line in-

dicates deformity while standing; dotted line after suspension (see fig. 15). Fig. 16, engraved from a photograph, shows position when standing. Plaster of Paris jacket applied, which gave complete relief. When the plaster had set, she walked around the office without any support whatever, which her mother states she has been unable to do since the time of the injury. This jacket was worn till April 10, 1876, when she began to complain of its being tight; it was then removed, and as there was a slight excoriation on the side of the vertebræ produced by a strip of adhesive plaster, she was not re-dressed till May 2. Mother states that the child is improving, but cannot get along without the jacket.

May 23.—As she has complained of some pain over hips, the jacket was removed and a new one applied, giving perfect comfort. Her present condition is seen in fig. 17, with jacket on.[1]

Case X.—George W. Curtis, aged 6 years 6 months, was brought to me on February 1, 1876, for supposed hip-disease. His peculiar walk and stiffness of the spine led me to suspect Pott's disease.

Upon stripping the child and examining his spine, my suspicions proved to be correct. There was a marked prominence of the 8th, 9th, and 10th dorsal vertebræ, with intense pain when pressure was made on the sides against the ninth ribs.

He had fallen out of a bed the summer before when in Switzerland, striking his back against the edge of a crib, which hurt him very badly at the time; but as the pain passed off in a few days the fall was almost forgotten.

'Some weeks after this fall he began to complain of pain in his stomach and bowels, which was attributed to indigestion and dyspepsia. He was recommended to the different waters of Germany by various physicians. In the autumn, he had another severe fall, and soon after began to complain of pains in

[1] June 1877. Another jacket was applied in July, and one in October, which last was worn until December 1876, when consolidation was complete, with very slight deformity.

one knee. These pains were slight at first; but increased week by week, until he began to have great difficulty in walking, his legs seemed to drag, and he had great difficulty in raising his feet from the ground. He complained very much of feeling tired, and seemed to be losing his strength.'

I suspended him in the sling from the armpits, chin, and occiput: and when his feet were swung clear from the floor the spine became *almost* perfectly straight; there was only a very slight prominence over the ninth dorsal spinous process.

His flannel shirt, which fitted him quite snugly, was pulled down firmly until it fitted him like a tight glove, and a dinner pad passed under it.

The plaster of Paris bandage was then applied smoothly from hips to axillæ, and when it was firmly dried, the dinner pad was removed, and he could run without any dragging of his legs, and without any pain in his knees. The pain in his stomach and bowels and all symptoms of indigestion ceased from that day, and have not returned.

FIG. 18.

The short 'catching' respiration, and the peculiar stiffness of his head and neck, disappeared the moment his trunk and spine were firmly secured, and his breathing was deep and full, although entirely diaphragmatic. His health and strength improved daily, and in a month he could exercise and walk almost as well as his brother.

He attended a fancy dress ball in costume (as seen in fig 18), and no one suspected that he had Pott's disease, or could detect any difference in his movements from those of the other children. I have repeatedly urged him to let me remove the jacket, as I was desirous

of seeing what progress he was making, and was also anxious as to the condition of his skin, after so long a confinement in this impervious apparatus; but he will not consent. He says he is 'afraid that I cannot fix him so good next time, and that he is perfectly comfortable.' He has now had it on four months, and refuses to have it removed.[1]

[1] Since my report was made in Philadelphia, the little fellow has returned from the country seat of his parents at Long Branch, and 'wants his jacket taken off, as it is too tight.'

On June 12, 1876, I removed it, in the presence of Prof. Darby of New York; Drs. Benham, of Pittsburg; Formento, of New Orleans; Logan and Willman, of Georgia; Cullen, of Richmond, Virginia; and some others who happened to be in the office at the time.

None of the gentlemen present had the slightest suspicion that he was suffering from Pott's disease, or that he was using any support, until his clothes were removed.

When stripped, his form was perfect with the jacket on, and, at the request of Dr. Darby, he jumped firmly upon his heels without the slightest evidence of any pain.

Firm pressure could also be made upon his head and shoulders with the same result. Four months previous he could not bear the slightest jar upon his heels or pressure upon his head.

On sawing down the jacket and removing it, his skin was found to be quite healthy. But on turning him over to examine his spine, fortunately we found a black spot the size of a finger-nail over the projecting ninth dorsal vertebra. This was like a hard corn, and was readily lifted off by the finger-nail, the integument underneath being sound. This place was still a little tender when strong pressure was made upon the sides of the ribs, or on crowding upon the head and sacrum.

I say 'fortunately' we found this one tender spot, or, in the language of one of the surgeons present, 'if I had not done so, they would all have thought that nothing was the matter with him, and that he had never had the disease at all; but the difference in his actions when the jacket was removed satisfied them that I was correct.' I have a letter from his mother dated,—

'Ocean Crest Cottage, Long Branch, July 6, 1876.

'*Dr. Sayre:*

'Dear Sir,— . . . . You put on your "plaster jacket" on March 1, and from that time George has been steadily improving, and, strange to say, he has never had a single pain in his knee since. About two

CASE XI.—Thomas Cochran, aged seven years. The mother states that he is a very nervous and excitable child. When three years old he fell down a flight of steps, since which time

FIG. 19.

he has complained of pain in his stomach, sometimes in his back. The mother noticed a bunch upon his back while he was

weeks ago the bandage was changed for a fresh one, and the skin was found to be in a perfectly healthy condition.

'George has never complained of the "jacket" hurting him, or being uncomfortable in any way. . . .

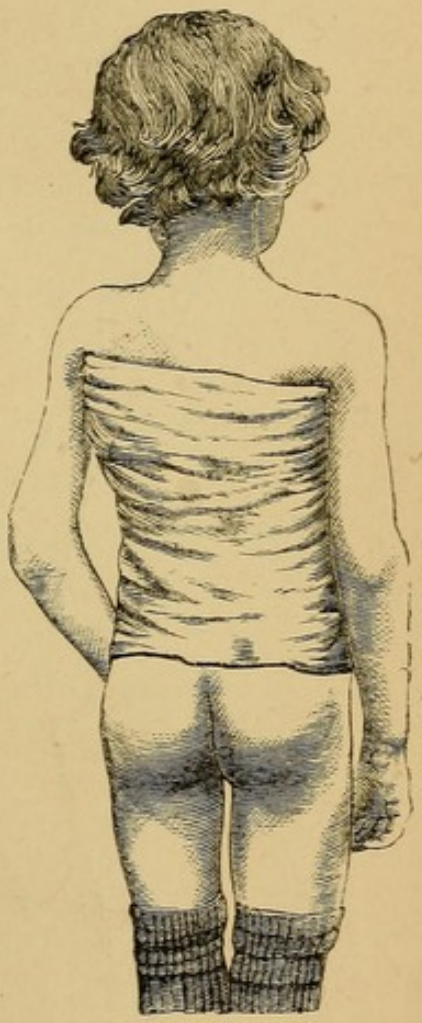
'Very gratefully your sincere friend, ELIZA M. CURTIS.'[1]

[1] January 15, 1877. Entirely well, and no deformity.

still confined to his bed. This bunch was painful. Has been under treatment by iron braces for four years, and has gradually grown worse. Has been to a Philadelphia hospital, also hospital for ruptured and crippled, Forty-second Street, New York; and Dr. Sweet, of Newark, has seen him.

His present condition, March 16, 1876, is: Tolerably well nourished, but unable to stand without support; posterior curvature of seventh, eighth, and ninth dorsal vertebræ. The eighth projecting very prominently (see fig. 19). Great pain when pressing on head and sacrum. When suspended, the projection diminished very perceptibly.

FIG. 20.



March 16, 1876.—Plaster of Paris jacket was applied.

May 20.—The boy returned to have jacket seen to. Has been perfectly comfortable since last date. Has improved considerably. Jacket not disturbed, as it is still in good condition, as seen in the engraving from a photograph (see fig. 20), and the boy exercises freely without pain or inconvenience.[1]

CASE XII.—*February* 10, 1876.—W. A. Lyon, aged four years, 127 Morton Street, Jersey City, sent by Dr. Craig, with Pott's disease, eighth, ninth, and tenth dorsal vertebræ, of eighteen months' standing, caused by falling downstairs. Taylor's brace applied July 20, 1875; has worn it ever since. At that time deformity very slight (as the parents say). Present

[1] January 8, 1877. Perfect consolidation, with scarcely perceptible deformity when naked, and imperceptible when dressed. Is in robust health, and very active.

condition as seen in curved dark line (fig. 21); has two sores on prominent vertebræ. Removed brace, and when extended in sling straightened to dotted line (fig. 21). Applied plaster of

FIG. 21.

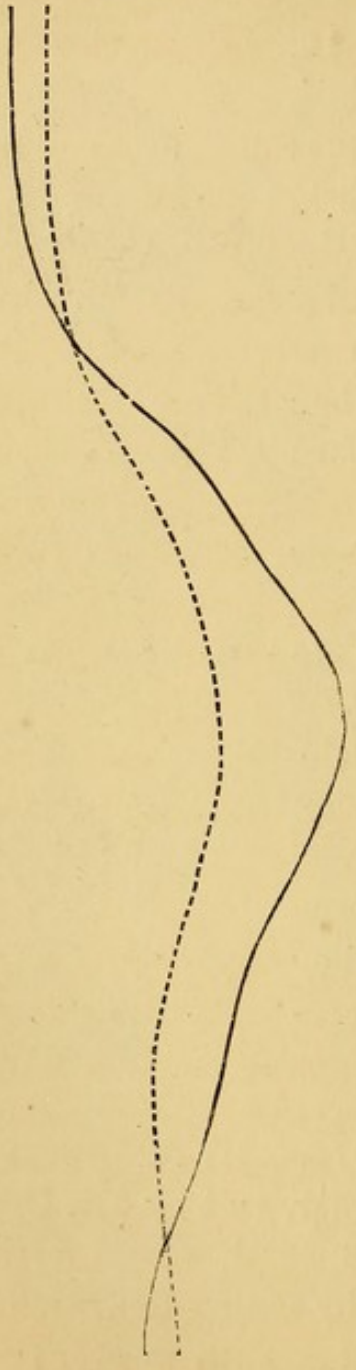
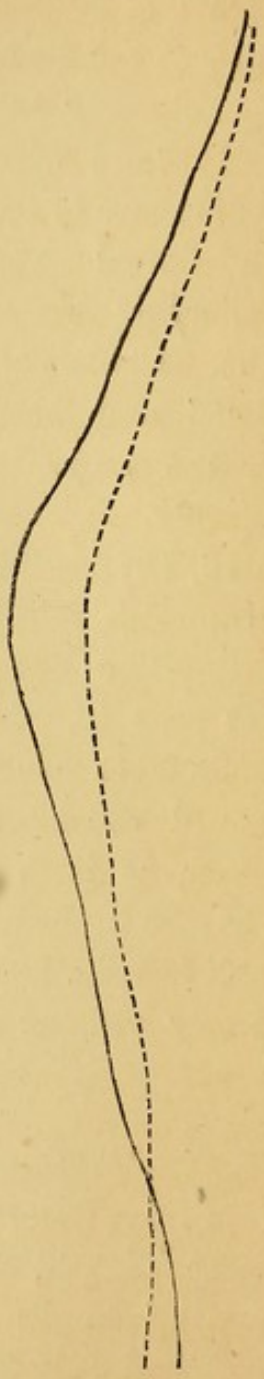


FIG. 22.



Paris dressing, after which he could walk and was comparatively straight.

May 10.—He has been perfectly comfortable since the application of plaster bandage. Exercises freely; has no indiges-

tion or pain; no pain in bowels, of which he formerly complained constantly.

July 1.—Much improved, another jacket applied.

October 1.—Consolidation apparently complete, but another jacket applied as a means of protection.

January 1, 1877.—Perfectly well, with slight curve.

Case XIII.—*March* 27, 1876.—Edith S. Groot, aged seven father and mother healthy; has three sisters healthy. About the middle of June 1875 she was thrown from a trotting sulky, and from that time the father dates the disease, and knows that that was the cause. Direct pressure on the knuckle produces no pain, but when lateral pressure is made intense pain is produced.

The dark line (fig. 22) shows deformity when standing; dotted line when suspended. Plaster of Paris jacket applied with entire relief. The child was brought to me by her father, Dr. C. A. Groot, of Westbury, Wayne County, New York.

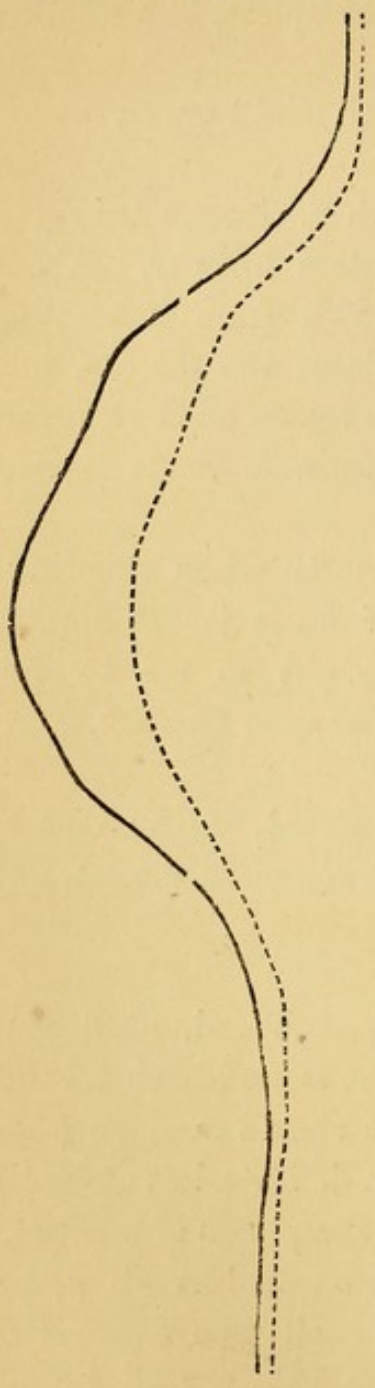
Have since received a letter from Dr. Groot, saying that he had been able to reapply the jacket with complete success, and that the child is improving.

Case XIV.—*March* 4, 1876.—Mary S. Ward, aged four years, Bloomfield, New Jersey, was brought to me March 4, 1866, with the following history: Fell out of a child's carriage when twenty-two months old. Has always been delicate, but never ill.

Six weeks after fall, parents noticed symptoms of lassitude, and disinclination to walk, and in six months lost all power of walking, when a swelling in her back was discovered. She was bathed in salt water and put on cod-liver oil by advice of Dr. Parker. At the present time she is unable to stand. Has a posterior curvature of ninth, tenth, and eleventh dorsal vertebræ. Very tender on vertical pressure, and easier when extended by the feet or lifted by the arms. Advised horizontal posture and applied Taylor's brace on May 20,

1868. With the brace on she can walk with assistance, and stand without resting her hands upon her knees or any other support. Curvature not quite as prominent. Child was not seen again by me until April 5, 1876, eight years after, when she presented the appearance shown in fig. 24. The curvature has increased, although she has worn the supporter constantly. An abscess formed in the back some months ago, which was opened. Several small pieces of bone have escaped. Dark and dotted lines in fig. 23 show diminution of curvature when suspended. Applied plaster jacket with perfect comfort, cutting a fenestra over the abscess. May 22, 1876—Child has improved very much since jacket has been applied. Abscess has been closed for three weeks: position as seen in fig. 25. Jacket removed, and a new one applied without fenestra.

FIG. 23.



The following letter from her father, the Rev. Dr. Ward, will give a very good idea of her present condition, as well as the advantages of the plaster jacket over the Taylor brace:

'Bloomfield, N.J., June 1, 1876.

'*My dear Dr. Sayre*,—Find herewith a photograph of my daughter's back, supported by your plaster corset. You have the one taken previously. She has, you know, worn mechanical braces (Dr. Taylor's) since she was about three years old, until the appearance of a cold abscess on her back, and she could wear them no longer. She is now nearly twelve. Your

plaster corset has been a great comfort to her, and, we think, is proving a permanent benefit to her; certainly she has improved remarkably since you applied it. Several reasons commend your corset to us over the brace.

'1. By your pulley the form is lifted, near as may be, to its

FIG. 24.

erect position, and the corset retains it in its place. Mary is an inch taller at once by it.

'2. The corset so completely fits the form as to distribute its support evenly about the whole body, and thus relieve the spine.

'3. It proves comfortable to wear. Its close adjustment

seemed confining for a few hours, but after a night's sleep Mary began to speak of the great comfort it gave her, and then of her gratitude to you, and, from that time on, her pleasure has been enthusiastic in it. She breathes easily and naturally with her diaphragm, without any of that short, jerking respiration she

FIG. 25.

had before it was applied, and has been very unwilling to have the corset removed on any consideration : she has worn it now more than six weeks unchanged, and in her gratitude wants everybody to know about it.

'4. The corset can be removed and replaced to meet any con-

tingency or change which may require it, and without so large an expense as to be burdensome to those of moderate incomes.

From the day you first applied it, Mary has improved in form, strength, and agility, and in healthful appearance. We have prepared a swing on the principle of your elevator pulley, in which Mary amuses herself daily, and we think, with benefit.[1]

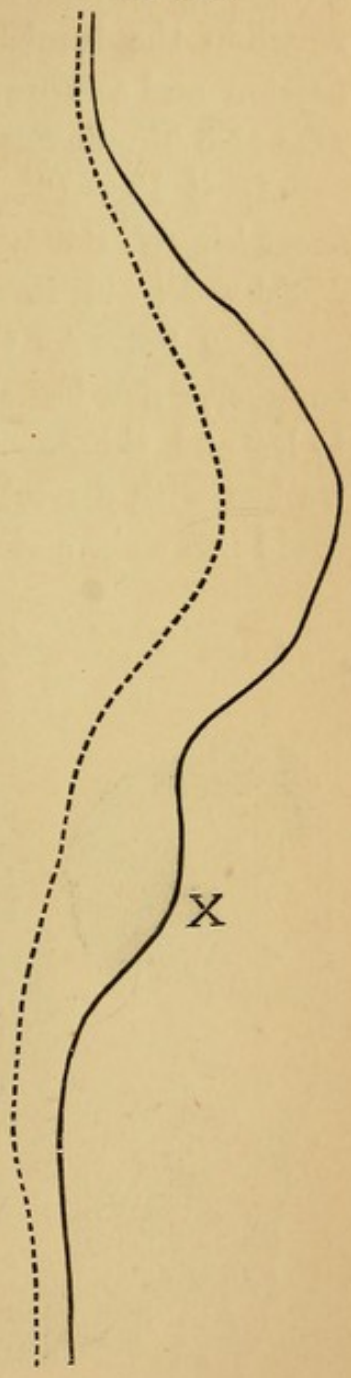
In conclusion, let me reiterate the desire of my daughter, that in some way you should let the world know the comfort and benefit secured to the afflicted by this method of treatment.

'Very gratefully yours,

'JOHN WARD.

'*Dr. L. A. Sayre.*'

FIG. 26.



CASE XV.—Nellie B. Molloy, aged five years, 2202 Third Avenue, New York, was brought to me April 13, 1876. Had always been healthy until about one year ago, when she fell upon her hands and knees. The day following she was seized with a severe pain in the stomach. This confined her to bed, and a physician was called in, who examined her, but said nothing had developed. Remained in bed three days on account of the pain experienced when standing or sitting. After this she got up, presenting nothing unusual, except a stiff manner of walking now and then, which

[1] In this case the father allowed the child to use daily suspension without my advice, and as the bones were pretty well consolidated, it fortunately did no harm. But in Pott's disease as a rule I only use suspension when I apply the plaster bandage, the object being perfect rest of the part for consolidation.

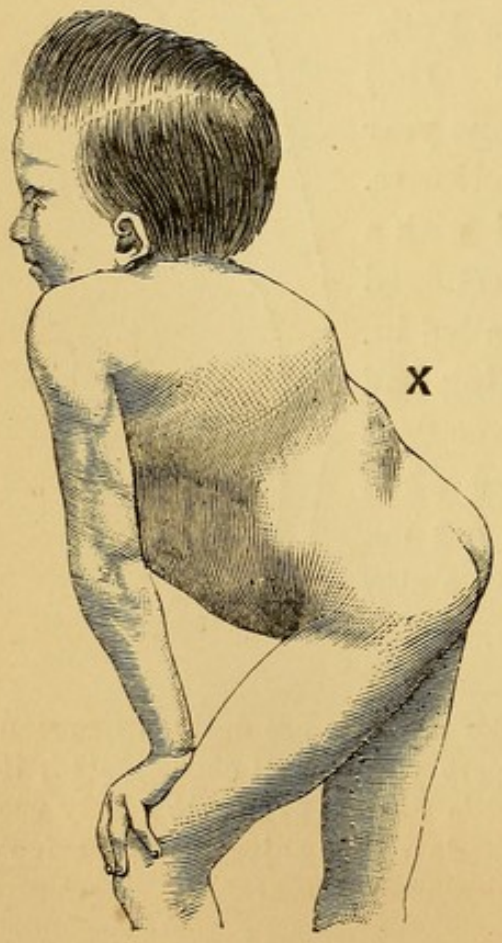
came and went without any apparent cause. During March 1876 she gradually became worse, and was sent to me by Dr. Farrington, of Harlem, in the following condition: Large, well-developed child, walks with a peculiar gait. There is a prominence in the lumbar region, which is very painful upon concussion and compression, and which is diminished by extension. Has also hip-disease (first stage) of right side.

April 13.—Plaster of Paris jacket applied to trunk, and short hip-splint applied to right thigh with entire relief, and she could walk well immediately.

May 22.—As the child is going to the country for the summer, a new jacket was applied, and new plasters and bandages to leg and thigh. As soon as the plaster had become set she walked with perfect ease, but when the jacket was removed she could not walk a step or stand without support.

CASE XVI.—*April* 17, 1876.—Anthony Ryan, aged eight years, 84 Tenth Avenue, of healthy parents, and always strong. When 2½ years old had a slight fall from a bed. Noticed trouble in back almost immediately. He was taken to Dr. Knight's Hospital in 1870, and has worn a brace since October of that year. Nevertheless, curvature has gradually increased until it is as represented in fig. 26, dark line. Opposite X is a small opening, into which a probe passes to the right three and three quarter inches, to the left two and a half inches, and one and a half inch in an upward and downward direction (see fig. 27). Dotted line in fig. 26 is that of suspension; dark line of standing.

FIG. 27.

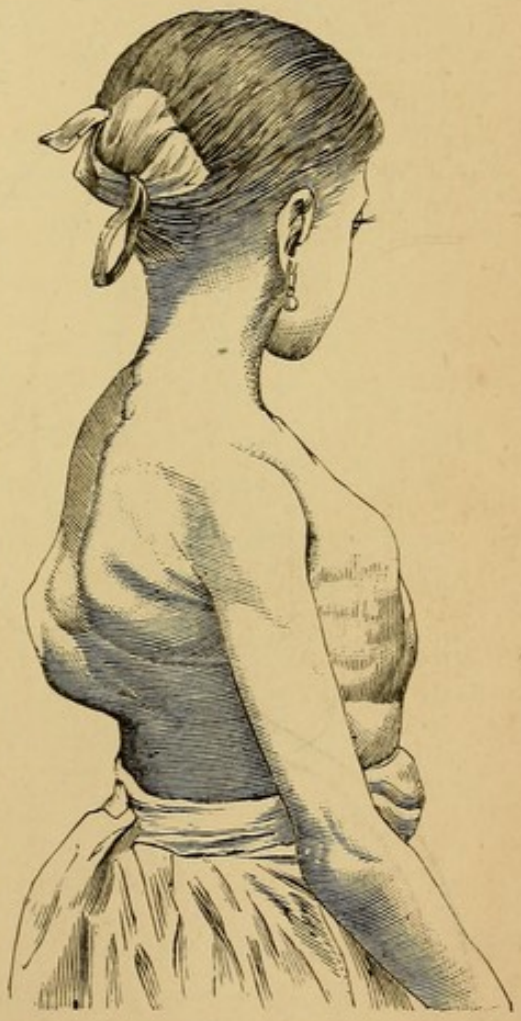


April 18.—Opened abscess very freely; dressed with oakum and Peruvian balsam.

April 19.—Applied plaster of Paris dressing, cutting fenestra for the escape of pus, giving him perfect relief, and enabling him to walk without support.[1]

Case XVII.—Annie T. Camak, aged 13 years, Athens, Georgia, was brought to me March 16, 1876. Father and mother dead; cause of their death unknown. The following history is obtained from her aunt: 'At five years of age she had a fall, followed by intense pain in the back and bowels; this continued for some months, when the pain ceased; soon after a bunch appeared on her back. She was taken, in August 1868, to Dr. Mann, of New York; he rubbed the spine, and made a brace, which, however, she could not wear constantly, as it gave her great pain. Then a Banning's brace was procured, but this seemed to press the breast out so much that it was thrown aside. Kolbé's brace, of Philadelphia, was then recommended, and worn for two years; an ulcer then appeared on each leg at the top of the thigh, which prevented any brace from being worn for some time.'

Fig. 28.

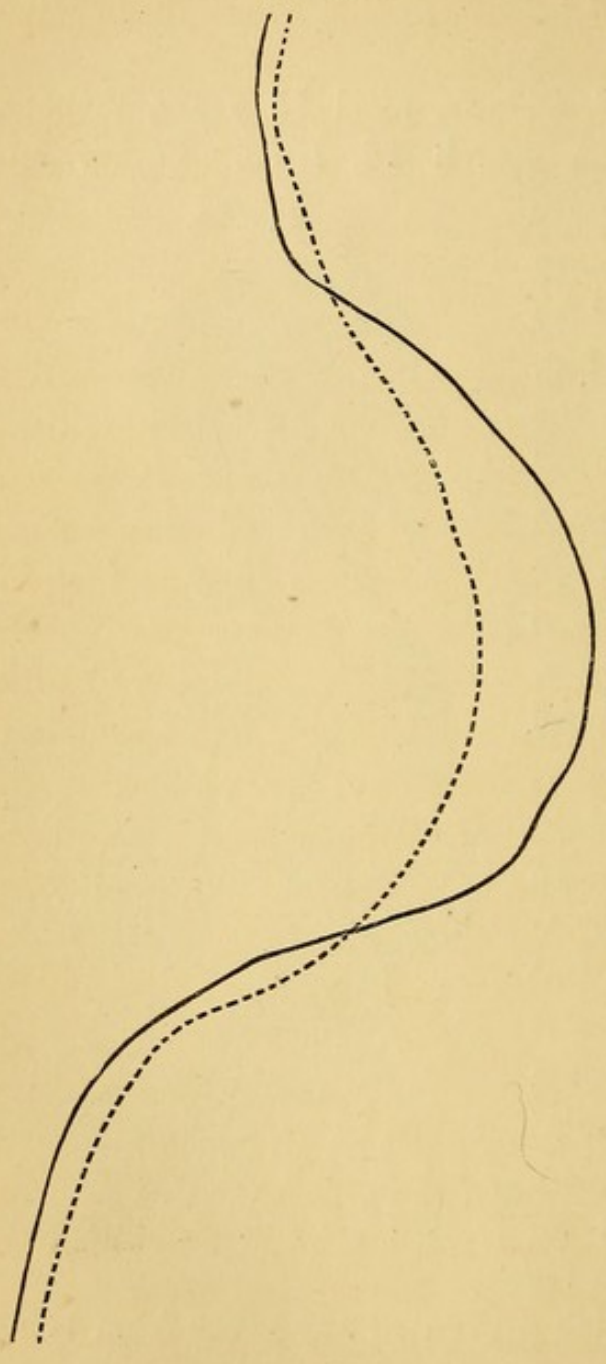


October 1874.—Dr. Knight, of 42nd Street, applied a brace

[1] January 18, 1876.—Has continued to improve; abscess healed in November. Still wearing the plaster jacket, but without fenestra. June 1, 1877.—Entire recovery, but with some deformity.

which was much lighter and more comfortable than any before used, but the curve in her back continued to increase, and her breast-bone became more prominent. Her present condition, March 16, 1876, is as shown in fig. 28, engraved from a photograph.

FIG. 29.



A fistulous opening exists on the right thigh just below Poupart's ligament, discharging quite freely all the time. The aunt says this opening has discharged constantly for four years; she also had a similar opening on the opposite side, but this has been closed for two years. A flexible probe passes into the sinus on the right side below Poupart's ligament, upward and backward eleven inches, without touching bone.

The tracing of the back by the flexible lead tape, while standing, is represented by the dark line (see fig. 29). The dotted line represents the tracing of the curve when suspended, March 16, 1876. After suspension, the plaster of Paris jacket was applied and worn with entire comfort till April 22, when it was removed on account of the child having measles. During the time of her wearing the jacket, the pain in the stomach after eating, which before had been a constant trouble, had not annoyed her at

all, and her breathing was much freer and deeper when the jacket was on than when she was without it.

May 12, 1876.—Reapplied plaster of Paris bandages; child much straighter than when they were first applied; this jacket is still worn with entire comfort; she can run up and down stairs without support, and suffers no inconvenience whatever.

Present condition, June 1, 1876, is well represented in figure 30, taken from a photograph just sent me by her aunt, with the following letter:

'Glen-Ridge House, Cornwall, June 1, 1876.

'*Dr. Sayre:*

'Dear Sir,—I write to tell you what a wonderful success you have made of the plaster jacket that you applied to my little niece; she finds it entirely comfortable and pleasant, sleeps and exercises in it without any difficulty whatever. She has worn a variety of braces of the best kind, but I think this the best application. Before wearing the jacket she suffered greatly from dyspepsia after eating; no medicine seemed to relieve it; had to be quiet for an hour after each meal; as soon as you put the jacket on, all that trouble disappeared, but comes on again if she is without the jacket for a day. This relief would be enough if nothing else, but I find her waist longer and the bump on the back flatter. All of our friends here noticed the improvement since last summer. I think now I am in the right path, and feel so relieved and happy.

'Yours most sincerely, ANNIE CAMAK.'[1]

CASE XVIII.—Mary T. Brown, aged 26 years, 348 E. 32nd Street. Mother died of phthisis; father healthy. Always strong and healthy till two years ago last winter, when she had a severe fall on the ice. Has never been well since, and the least cold would give her severe pain in the back and stomach. Since January 1, 1875, has been unable to do work of any kind, or walk without assistance, it having taken her three hours to

[1] June 1, 1877.—Perfectly well and much less deformity than in fig. 30.

come from home to my office, a distance of a quarter of a mile, she having to rest on each step and railing on the way. The patient states that pain is constant in her back, and at times very intense in her stomach. Condition as seen in fig. 31.

FIG. 30.

April 8.—Applied plaster of Paris jacket, with great relief.

April 26.—Returned, saying that she could walk a great deal better with this jacket, but it was not high enough on her back, and asked to have a new one applied a little higher up. The old one was removed and a new one applied, going well up to axillæ; when dry, she walked a quarter of a mile, had photograph (fig. 32) taken, and returned home, having walked more than half a mile within an hour and a half from the time this jacket was applied.

June 1.—She returned, feeling very well, and without the slightest pain or discomfort whatever. Is able to do moderate housework.[1]

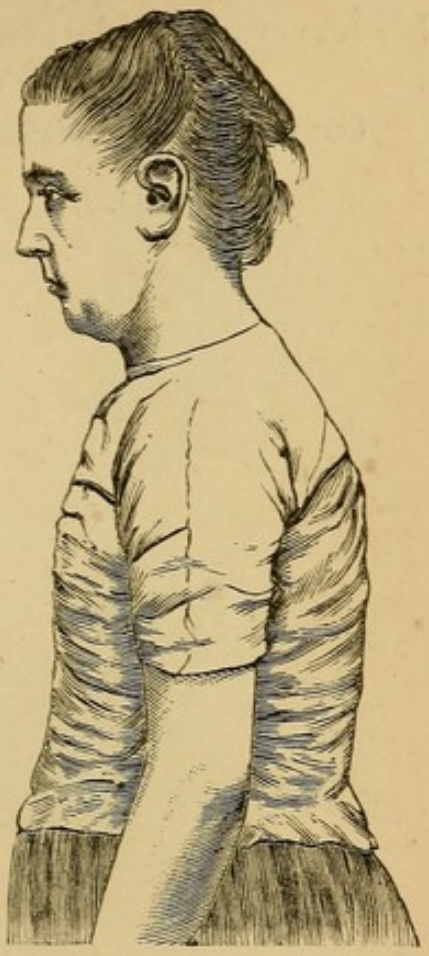
CASE XIX.—*April* 14, 1875.—Chas. E. Webster, aged 19 years, Binghampton, New York. When about three years of age he first complained of pain in the back. Does not know of any injury; was then placed under the care of Dr. Wood, of Boston, and has been treated with corsets constantly until two or three years since. Curvature was then nearly about the same as dark line (see fig. 33); corset was then left off. A year ago last fall again noticed trouble in the spine; has since worn corset.

[1] January 8, 1877.—Can walk without support, and has but slight deformity; consolidation apparently complete, but advised to wear the jacket a few months longer for security.

The dark line indicates his deformity while standing; the dotted line after being suspended five minutes (see fig. 33).

FIG. 31.

FIG. 32.



While suspended I applied the plaster of Paris dressing with a piece running up under the occiput, which gave perfect relief.[1] His height increased three-fourths of an inch by actual measurement.

April 26.—The plaster under occiput having cracked, the jacket was reapplied without head extension piece.

May 17.—As the jacket causes pain over the hips, it was removed and a new one applied, with pads over the anterior superior spinous processes. The pads were removed when the

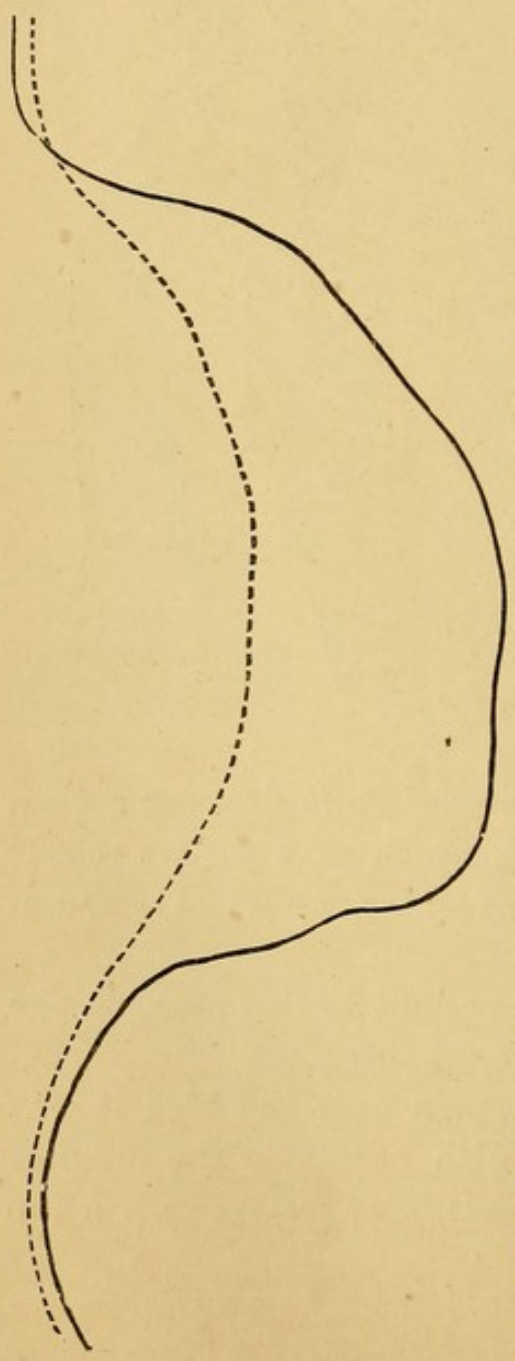
[1] Since that time I have devised the 'jury-mast apparatus' for extension of the head, which is much more satisfactory, and which is fully described in another place.

plaster set, and he said that the jacket gave him complete relief from pain. Patient returned to his home to-day.

By comparing the annexed engravings from photographs taken before and after the application of the plaster jacket, the change in his curvature will be seen to be quite obvious (see figs. 34, 35).

Case XX.—Florence Boyle (see fig. 37). The following case is a very instructive one, as showing the importance of an early diagnosis before any deformity has occurred, and yet a number of very eminent gentlemen examined the case without detecting the disease.

Fig. 33.



I think a careful study of the earlier symptoms, and the mode of examination which I have endeavoured to illustrate in the earlier part of this work, would render such an error almost impossible.

I quote the mother's letter entire, as it is a typical history of the majority of such cases, merely omitting the names of the medical gentlemen referred to :—

'No. 19 East 46th St.,
'New York, May 14, 1876.

'*Dr. Sayre:*

'Dear Sir,—According to promise I will try to give you a minute detail of the illness and treatment of my little girl up to the present time.

'Florence Boyle is the second child of Wilbur F. and Fannie L. Boyle, of St. Louis, Mo. The parents and grandparents were

particularly free from any bone or blood diseases. The other two children are unusually stout and healthy. Up to the time of her injury I never saw a more active, stout, healthy child. When she was two years and three months of age, on July 4, 1868, while playing on the stoop, she fell one step, and I think she fell across

FIG. 34.

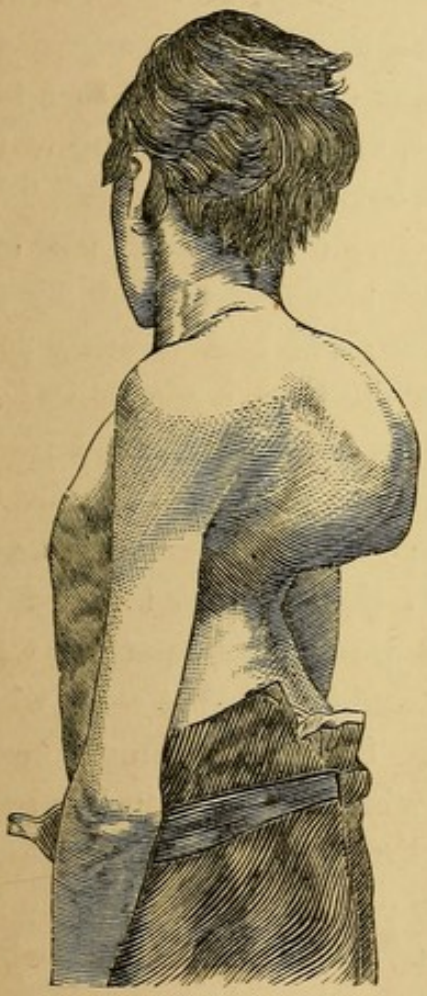
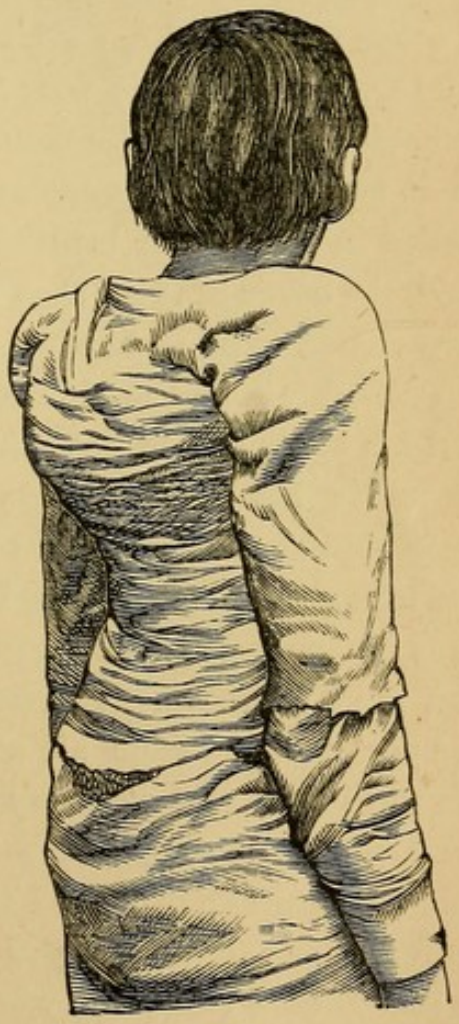


FIG. 35.



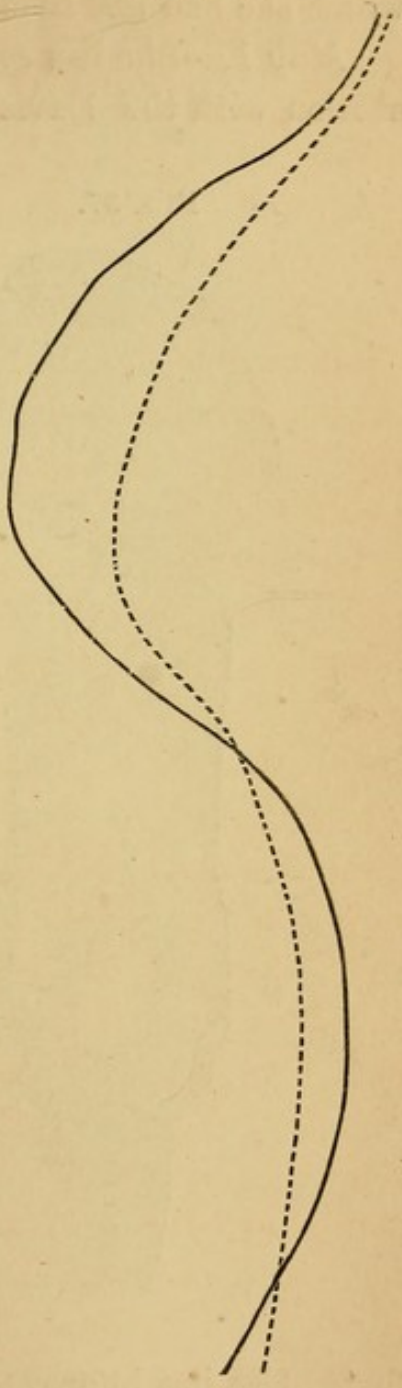
an iron foot-scraper, as she cried out as if in great agony; did not cry long, and went out again to play, but played with very little spirit, and wanted to be held. The next day she had a slight fever and was very cross; complained of no pain. In the next few days complained that her wrists and ankles hurt her. Then, when playing, would stop suddenly and put her hands to the lower

part of her bowels and say it hurt her; it would not last long, but occur often during the day.

'I had a friend whose child had spinal curvature, and these symptoms rather alarmed me. I examined her spine one night, at the end of three weeks after the injury, and she winced decidedly when I touched two places, one at the waist and another between the shoulders. Next day I took her to town and had her examined by four physicians separately, neither knowing the other had seen her; each one said these were symptoms of spinal trouble, but must wait for further development; so I took her home and waited for four months, symptoms getting worse, and at last a small knuckle appeared between shoulders. Then I called in two of our leading surgeons; one advised use of a brace, the other advised that child be confined to bed for one year. Then went to another physician, who had recently come from Brooklyn, and made diseases of the back a speciality; advised his brace and to keep the child on her back too. I placed her under his care, because this plan agreed with both the others, and at the end of ten months she was totally paralysed from hips down, feet drawn back till they almost touched the calves of her legs; curvature much worse, and spot at waist much more sensitive. Leeches were applied at that spot, which gave perfect relief from all soreness. She never complained of pain anywhere, and was very fleshy while confined on her back. The doctor then wanted to put both limbs in iron braces, but I could not approve of it, so I took her out of his hands. She was paralysed for three years. I next took her to Boston, where she remained a year; she was so much relieved that she could crawl, but not stand an instant, or walk. This new doctor's brace failed also to arrest the increase of curvature; still she did not suffer. Becoming discouraged, I took off this brace. Her paralysis became worse until the end of three months, when she one day pulled up by the window and walked across the room, and has walked some ever since. She did not wear a brace for two years, walking and running around like other children, only

bending forward terribly, the curvature getting worse. Then I took her to a doctor from Indianopolis, who applied his brace, which has been of great and positive injury to her; she has suffered a great deal this past winter; would have to take off the brace and stay in bed three or four days at a time. The muscles in back would swell up and be exceedingly sensitive to the touch.

FIG. 36.



'I sincerely regret I delayed so long coming to you. The improvement by to-day's treatment far exceeds the wildest hope I ever had of her recovery. The straightening of the curvature by this one "hanging up" is really just twice as much as I expected to have accomplished in three years' treatment. Whether you believe in prayer or not, I shall most certainly ask God's blessing to rest upon you and reward you eternally, as well as in this world.

'FANNIE L. BOYLE.'

April 28, 1876.—Dark line (see fig. 36) shows deformity while standing; dotted line shows the decrease of the deformity during suspension. While the child was suspended a plaster of Paris jacket was applied, which did not give perfect relief; it was removed and replaced by a new one, but this had to be taken off, as it caused pain over the prominent points of the spine. As there was a very sensitive point over the second dorsal vertebra, leeches were used with marked success. A new jacket was applied on the 4th of May, and, as the disease was so high up, a 'Davis's

head supporter' in conjunction with it, affording complete relief. Child walked two blocks, and can sit up, stand, and run about, which she had not been able to do for months (see fig. 38).

May 1.—She has continued to wear the last jacket, in connection with the Davis's head supporter, without any discom-

FIG. 37.

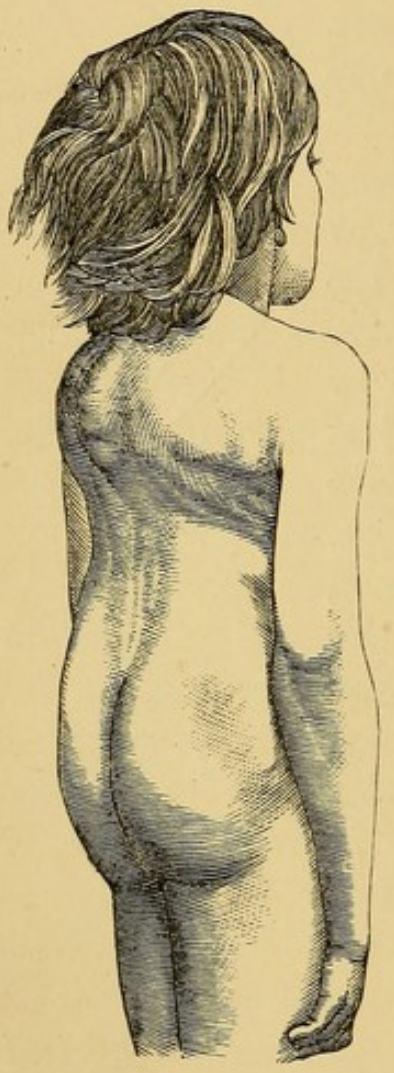


FIG. 38.

fort. She has improved in flesh and spirits, has become rosy-cheeked and playful; in fact, is so completely changed as to attract the notice of all her friends. She was three-fourths of an inch higher by accurate measurement immediately after the suspension, and the jacket and head rest have retained it.

August 4, 1876.—Very much improved, but the Davis's

head supporter gives her pain in the shoulders, and I therefore changed it for the 'jury-mast support,' which she says is much

FIG. 39.

FIG. 40.

more comfortable, and greatly improves her position (see figs. 39 and 40).

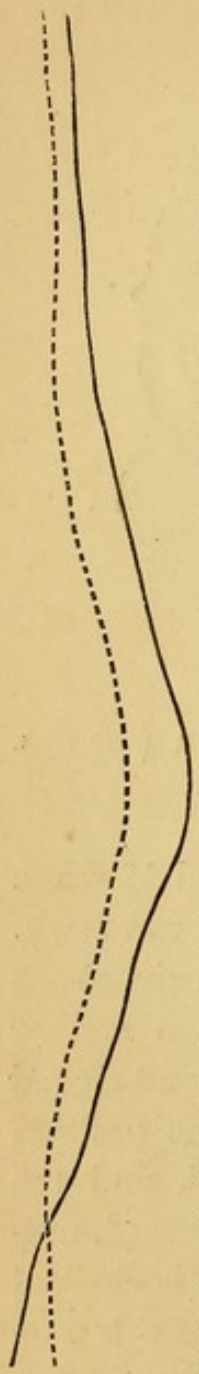
CASE XXI.—*May* 15, 1876.—Elvira Arango, aged 12 years. Father healthy; mother's history passable. Cause unknown. When eight years old complained of more or less pain about the spine. Noticed nothing till two years ago, when mother found a small knuckle about last dorsal and first and second lumbar vertebræ. She has been treated by the prone position more or less ever since the deformity was noticed, and the uncle, Dr. Arango, says 'that the deformity has increased, notwithstanding she has been most of the time in the horizontal position.' Present condition as seen in fig. 42. Dark line in fig. 41 indicates the curve when standing; dotted line shows deformity during suspension.

May 20.—Plaster of Paris jacket applied after suspension of the body, giving perfect relief, and a marked improvement in her figure.

June 3.—Has been quite comfortable since last date. Has

taken a great deal of exercise, and has had no pain. Has menstruated for first time, and the mammæ have increased so much that the top part of the plaster had to be cut out to accommodate them. Position as seen in fig. 43.

FIG. 41.



The following note from her uncle, Dr. Arango, explains her condition, and also the effect of the plaster jacket:

'When taken to Dr. Sayre on May 15, 1876, there is an enlargement of the lumbar region, with protrusion of the spinal process, and deviation of the spine to the right; when hanging, the angle diminishes greatly, as well as the deviation of the spine to the right.

'After the bandage has been applied she walks with perfect ease, and is straight (see fig. 43).

'D. A. ARANGO.'[1]

CASE XXII.—Arthur A. Hessler.—The following case is one of such extraordinary interest that I should hesitate to publish it, were it not that I have the confirmatory evidence of competent surgeons who had previously attended the patient during the four years of his illness, and whose letters are annexed. As the result of the treatment has been so nearly marvellous, any one would be liable to the charge of having made an error in diagnosis, unless sustained by competent witnesses who had also personally examined the patient. I therefore wrote to each of the medical gentlemen who had attended him, asking for their diagnosis of his case.

Unfortunately Dr. Otis was absent from New York for some months, and the books of the Strangers' Hospital, where the

[1] This patient had another jacket applied in July 1876, which she wore until October 1, when consolidation was complete, with the least perceptible deformity even when stripped.

patient was first treated, cannot be found, since that hospital has been destroyed. But I have received replies from a sufficient number of competent judges confirming my diagnosis, so that I feel justified in introducing the case to the notice of the pro-

FIG. 42.

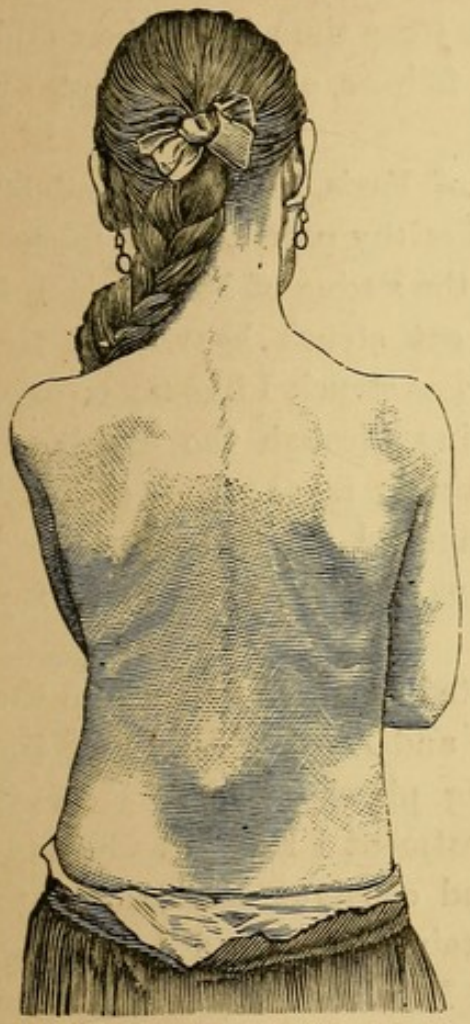


FIG. 43.

fession, calling particular attention to the opinion of Dr. Gibney, who probably examines more cases of Pott's disease every year than all the other physicians in New York.

On May 10, 1876, A. A. Hessler called on me with the following note:

'My dear Doctor,—This man will tell you his story, and I feel sure you will admit him to your wards at Bellevue.

'I would willingly furnish him with a brace, but he has not where to lay his head. You would prefer plaster of Paris, and consequently I have taken no measure for a brace.

'Yours respectfully,

'*Dr. Sayre.* V. P. GIBNEY.'

When the man came to me his countenance was expressive of great pain ; he could not stand erect, but was very much bent forward, resting both hands upon his knees, and he had a hurried and short respiration. He was so exhausted in coming from Forty-second Street to my office that I had to give him brandy and let him lie down for some time before he could be examined. His history was as follows, as written out by himself :

'Arthur Alex. Hessler, native of Paris, France ; aged 32 years ; musician by profession ; of healthy parents, and myself always robust and very active until the spring of 1872, when I was playing with a comrade, and got struck heavily in the abdomen and back. At the time I was struck I lost my breath, and felt a very painful sensation going through the backbone, and since that day have been complaining all the time of great weakness in my back, that has compelled me to keep my bed for many months, on several occasions feeling powerless in my legs and paralysed in my back.

'In February 1873, I was admitted by application into the Strangers' Hospital in Tenth Street and Avenue D, under the treatment of Professor Otis, visiting physician ; Dr. Kearny, house surgeon of the ward. The treatment I received was cupping and blistering on my back, and constant confinement to my bed. This relieved me to a certain extent, and I was discharged as cured in May 1873, by Prof. Sands (then visiting surgeon to the hospital). I went to my business for a few days, but had to go to bed again, and have been unable to do anything for the past three years.

'I was under treatment of a great many doctors until I spent all my money, and then went to Roosevelt Hospital, Fifty-ninth Street and Tenth Avenue, in March or April 1876, and was put in ward No. 4, and treated for diseased kidney for about one month, when Dr. Thompson, then visiting physician, examined me, and told the doctor I was not a case for the medical ward but the surgical ; telling him that I had an enlargement or projection of the lower dorsal vertebræ.

'I was immediately transferred to surgical ward No. 2, Dr. Rice, house surgeon, and Prof. Wier, visiting surgeon. I was put to bed and cupped on my back, and extension was made of my feet, which gave me considerable relief. After some time they sent me to Dr. Shaffer, 52 West Twenty-eighth Street, for a steel brace, but as I could not pay him $35 for it I returned to the hospital.

'Two days after this Dr. Rice informed me that it was useless for me to remain in the hospital any longer, as my case was incurable, and advised me to go to Dr. Knight's Hospital for Cripples in Forty-second Street, and Dr. Gibney sent me to you.'

This is the man's history as written by himself, and of course must be received with all due allowance. I have endeavoured to make it correct as far as possible by corresponding with the surgeons in the various hospitals referred to, their letters in answer being given below.

When he came to me he was unable to stand erect, and complained of an intense pain in the back, 'as if a hot wire was binding him around the lower part of his belly.' Upon stripping him, the tenth, eleventh, and twelfth dorsal, and the first lumbar vertebræ where found very prominent; the two last dorsal and the first lumbar making quite a sharp angle with each other.

When he was suspended in the sling he expressed the greatest delight as soon as his heels were lifted from the floor, and said the hot band around his bowels was loosened, and that he could breathe much easier than he had done for months. The extension was continued very slowly and gradually until his feet swung clear, when he almost instantly exclaimed, 'That's the first full breath I have had in two years; if I had my cornet now I could play as well as ever.' It is very probable that if I had applied the plaster bandage *at that time* and retained him *exactly in the position in which he was*, he could have played his cornet that evening, as he stated he would. And from what I have seen of him since, I am still more convinced he could have done so.

Being anxious that Dr. Gibney should see the application of the plaster dressings, I took him from the suspending apparatus and laid him on the floor on an air-bed, and immediately sent my servant for Dr. Gibney, who returned in a few minutes with the following note :—

'Out-door Department,
'Hospital for the Relief of Ruptured and Crippled,
'N. W. Cor. 42nd Street and Sixth Avenue.

'My dear Doctor,—This has proved to be one of our "field days," and I will not be able to get through before 1 o'clock, consequently have to ask you not to save anything for me to-day. Thanking you for your kindness, I am, hastily, yours,

'*Prof. Sayre.* V. P. GIBNEY.

'May 10.'

The man still insisted that if I could only fix him in the position that he was in while hanging and keep him so, he could play his cornet as well as ever, and could then earn his $10 a night and need not go to the hospital. He was so positive on this point that he refused to go to the hospital, and, as I was anxious that Dr. Gibney should be present, I refused to apply the dressings until the following day.

The man said he had not a cent of money, but he had a friend in Washington Street near the Battery, where he could stay for one night, and if I could fix him as he was when hanging, he could make money enough to take care of himself. I therefore arranged to apply the dressings on the following day at 12 o'clock. This was an unfortunate mistake, as the exercise of going to the Battery and back was too much for him, and when he returned the following day he was so completely exhausted that it was with great difficulty that my assistant, Dr. Taylor, and myself could get him in the suspending apparatus: and before the dressing was completed he swooned, and we were compelled to lay him down, with an insufficient amount of plaster on him for support, so that in taking him down a little too soon it cracked, and our experiment to enable him to blow the cornet that night was a failure.

After resting some hours I took him to Bellevue Hospital; but the following day, the plaster jacket having cracked, pained him so much that it had to be removed. He was placed upon a water-bed, and freely cupped over the tender portions of the spine, with great relief. The cups had to be renewed once or twice, and the recumbent posture on the water-bed, with extension at the feet, kept up for some weeks.

After this another plaster jacket was applied; but, the plaster not being good, it did not afford him the relief I expected, and was removed. Another one was put on him at the hospital, which enabled him to walk about tolerably well, *but did not give him the support requisite to make him perfectly comfortable.* He therefore came to me about July 1, and I removed it. After washing him thoroughly and putting on him a very tightly-fitting flannel shirt, I suspended him and applied another dressing. In this case I used, as I now always do, the bandages made of crinoline or cross-barred muslin, the meshes of which, being much larger, will hold more plaster than the ordinary roller hospital bandages.

This suspension and application happened to be *exactly right*, and as soon as the plaster had hardened or set, he jumped up on his feet, and capered around like a wild man. He could take the deepest possible inspiration, and 'concuss' himself upon his heels without the slightest pain or inconvenience.

A short time after, this jacket was sawed down the front and eyelets put in it, so as to admit of its being laced like a corset, and removed and reapplied at will.

With this jacket properly laced he could play his cornet as well as he ever did, and no one looking at his ruddy face, and watching his elastic step, would ever dream that he was suffering from Pott's disease, or any other infirmity.

How long before anchylosis will take place, and a cure be effected, of course I cannot say; but that the man is changed from wretchedness, pain, poverty, and intense suffering, to per-

fect comfort, and enabled to earn his living with cheerfulness and pleasure, is apparent to every one who has seen him.

Hessler called to see me at the West End Hotel, Long Branch, on July 13, and I did not recognise him. His form was erect, and his face florid, with the ruddy hue of perfect health. He stated that he was returning from Philadelphia, where he had played the cornet in Gilmore's Band, at the Centennial, the night before until 12 o'clock, and that he was then on his way to fulfil his engagement to play at the Hippodrome in New York, at 8 o'clock that evening. I have seen a number of persons that were present at the concert, who told me that, with the exception of Levy and Arbuckle, they had never heard the cornet played better than by him.

I am well aware that this sounds more like a 'fairy tale' than a statement of actual facts, and therefore have had it corroborated by the annexed letters of well-known physicians who are familiar with the case.

Looking at the unsatisfactory results hitherto obtained from the various modes of treating this disease, and comparing them with the present case and a number of others that I have seen, it can scarcely be maintained that Prof. Alfred C. Post, in saying of the new treatment that 'it marks an era in the history of surgery,' has used words that are not warranted by the facts.

'Hospital, 135 East 42nd Street, July 17, 1876.

Lewis A. Sayre, M.D.:

'My dear Doctor,—At the time I saw Arthur A. Hessler, May 9, 1876, I had no hesitation in diagnosticating *caries* of the spine. The history and the signs would admit of no other diagnosis. He had great difficulty in walking, was stooped far forward, and the spinous processes of the last two dorsal and first lumbar vertebræ projected about three-fourths of an inch. I regarded him as unfit for out-door treatment, and sent him to you, who kindly admitted him to Bellevue, and returned him to me for inspection, July 9th, or thereabouts. He then walked erect, was active, and had so changed in appearance that I

failed to recognise him. From him I learned that on the morning of May 10th, you applied a plaster of Paris jacket in your office, and sent him to the hospital; that you called the next day and found him in such pain that the jacket had to be removed; that leeches and ice were applied to his spine, and that he lay on a water-bed for three weeks; that a jacket of poor plaster was applied and no benefit followed; that two weeks later another was applied (better plaster), and perfect relief was afforded; that he had been improving in every particular since. Two weeks later I saw him at Gilmore's Garden, no sign of relapse having occurred. He still wore the jacket.

'Very truly yours,

'V. P. Gibney.'

'35 West 33rd Street, August 9, 1876.

'Dear Doctor,—I am sorry that I cannot enlighten you concerning the patient referred to in your note; but I think you will find his case recorded in a case-book which is in Dr. Otis's possession. When the Strangers' Hospital was disbanded, the records were divided among the attending staff, and I am pretty sure Dr. Otis got the book belonging to his service. You will have no difficulty in consulting the records at the "Roosevelt."

'Yours truly,

'*Dr. L. A. Sayre.* 'H. B. Sands.'

'No. 19 East 32nd Street, July 24, 1876.

'Dear Doctor,—Dr. Rice is absent in Europe, and my recollection of Hessler's case is very imperfect. From the hospital records I find that he was admitted to my ward May 2, and discharged from the hospital May 8. I only remember the point that attention was attracted to the apparently rapid progress of the dorsal tumour.

'Dr. Rice will probably return in August.

'Yours very truly,

'*Dr. L. A. Sayre.* 'R. F. Wier.'

The following is the record from Roosevelt Hospital :—

'Arthur Hessler, musician, France; single; aged 31; admitted April 27, 1876. Up to 1871 patient says he was a healthy man. Does not know whether he had the lump on his spine before that time or not. At that time he had the gonorrhœa, but denies all other venereal symptoms. Soon after had a severe pain in his shoulders, back, and arms, which he attributed to exposure to cold. The pains all settled in his back, and he was compelled to go to the Strangers' Hospital. He was there some months, and was then discharged cured. From that time he has been comparatively well at times up to the 3rd of April, when he was attacked with shooting pains along the spine, and had night-sweats at the same time; has been growing weaker ever since.

'On admission, find a prominence of the spine of the eleventh or twelfth dorsal vertebra, and patient unable to stand. Complains of pain and weakness in the back. Cups were applied, and patient much relieved.

'*May 2nd.*—Patient transferred from the Medical to the Surgical Division. Can now walk, but still complains of the pain and weakness. Cups again applied.

'*8th.*—Patient discharged unimproved.

'S. W. Budd,

'Sen. Assist. Sur. Roosevelt Hospital.'

'Bellevue Hospital, July 31, 1876.

'Dear Doctor,—Your note was duly received, and in accordance with your request I enclose Hessler's history, as recorded by my senior assistant, who is the historian. I think it is an excellent case; such a marked improvement. Came to see me a few days ago; he was as lively as a cricket; no one would ever suspect Pott's disease; he was looking very well.

'Very respectfully,

'Henry M. Silver, M.D., House Surgeon.

'*Dr. L. A. Sayre.*'

'Arthur A. Hessler; aged 30; single; French; musician; admitted May 10, 1876; residence 194 Varick Street. On admission he had on a splint, which had been applied at Dr. Sayre's office. He was able to walk, but was suffering from pain in the chest, back, and thighs. This splint was cut down on the day after admission to relieve the irritation, and that evening six cups were applied by the side of the spine at diseased point; this treatment afforded much relief. About a week after another exacerbation of pain was overcome by similar treatment. The patient was then placed on a water-bed, upon which he lay for five weeks, feeling more comfortable, as he said, than he had for some time. At the end of this time another plaster splint was applied; this fitted the patient well, and while wearing it he was able to walk in an upright position without difficulty. This was taken off in two weeks, as it had broken down, too little plaster having been placed in the bandage. The patient was obliged to go to bed again, as he could only stand by placing his hands upon his knees. The third splint, which was applied a few days later, was cut down on the third day, as it was too long below, hurting patient's hips. During its application he fainted. The fourth was applied at Dr. Sayre's office; and four days afterwards this cracked, and was removed. On July 7, the fifth and last splint was put on at Dr. Sayre's office: this was a good fit, the patient being perfectly easy in it; goes about the grounds at will; is up all day, and has improved wonderfully in general condition. This splint was cut down in front, and a piece taken out; eyelets were then made, and the splint converted into a plaster corset.

'When he came in, patient was suffering greatly at all times, and was unable to stand erect except when supported by a splint; he was pale, and showed the marks of great suffering. He is stout and healthy, and free from pain. Now, even when the splint is removed, he can stand erect and walk; the splint being now used rather as a precaution than from necessity.

'He was discharged July 14, and is now playing a cornet at Gilmore's Concert Garden.

'HENRY M. SILVER, M.D., House Surgeon;
'ARTHUR PELL, M.D., Senior Assistant;
'MARTIN BURKE, M.D., Junior Assistant.

'*Third Surgical Division, Bellevue Hospital.*'

The following case, out of a number in which this treatment has been applied, is a good illustration of the *immediate* relief that is given to the patient when the support has been accurately adjusted.

CASE XXIII.—Lewis Easton Flournoy, aged nine years, residence St. Louis, Missouri, was brought to me on October 27, 1876, by his father, with the following history: Father and mother both healthy, and boy always healthy and strong until December 25, 1873, while playing in a hayloft, he fell, head first, down a hole in the hay-mow to the barn floor, a distance of eight feet. He cried for an hour after the fall, saying his back hurt him. He was tolerably well for some three or four weeks; then began to complain of pain in the shoulder; was treated for rheumatism for some weeks without any relief, and it was then discovered that he had a lateral curvature. Drs. Schoaley and Payne applied a brace. This brace was worn fourteen months, when it was discovered that he had a double lateral, and a very prominent posterior curve.

Dr. Franklyn, of St. Louis, applied a new apparatus, which gave very little relief. This was worn for six months; but the posterior deformity continued to increase, and his 'breast bone' became more prominent. The father noticed about ten days since that he had great difficulty in walking, and for the past three days could not walk at all, or stand without support. When he attempted to stand he had a very short, grunting respiration, and very marked convergent strabismus of both eyes.

I suspended him and applied a plaster of Paris jacket on October 28, 1876, and in half an hour after, when the plaster

became set, he could stand without assistance. The next day the father stated that he had slept better than he had done for two years, and had eaten a better breakfast than he had known him to eat since he was hurt. He could walk without assistance, could poise himself on either leg by simply steadying himself with one hand on a chair, and could raise the other limb so as to put his foot in a chair. He still

FIG. 44.

carried his head forward in a constrained position, had a peculiar catch in his respiration, and the convergent strabismus continued.

I placed my hands under his chin and occiput, and lifting his head very slightly, the strabismus immediately disappeared, and he exclaimed, 'That's what I want.' As soon as I released my support, the strabismus returned.

I sent him to Mr. Reynders', 309 Fourth Avenue, to be measured for an outside support, or 'jury-mast,' such as I have described, to be applied over the 'plaster jacket.'

On November 8, before a large party of physicians and students in the amphitheatre of Bellevue Hospital, I applied this outside support for head suspension, as seen in figs. 44 and 45; and, as soon as the plaster was set and the head properly

FIG. 45.

suspended, his respiration became natural, the strabismus disappeared, and he said he was perfectly comfortable. In less than half-an-hour after the adjustment of the apparatus, he ran up and down stairs in the amphitheatre without the slightest inconvenience. He went to Philadelphia the following day, and his father states that he spent two days in walking around the Centennial Buildings without fatigue or inconvenience. He left

for his home in St. Louis on November 13, but before he left I persuaded him to go to O'Neil, the photographer, and have his picture taken, from which figs. 44 and 45 are engraved. I regret that I have not a picture of him on October 27, but it could not be taken, as he was unable to stand for it.

I will add a case of Pott's disease, of long standing, as it illustrates the tediousness of consolidation under the instrumental treatment, and shows also that improvement in position

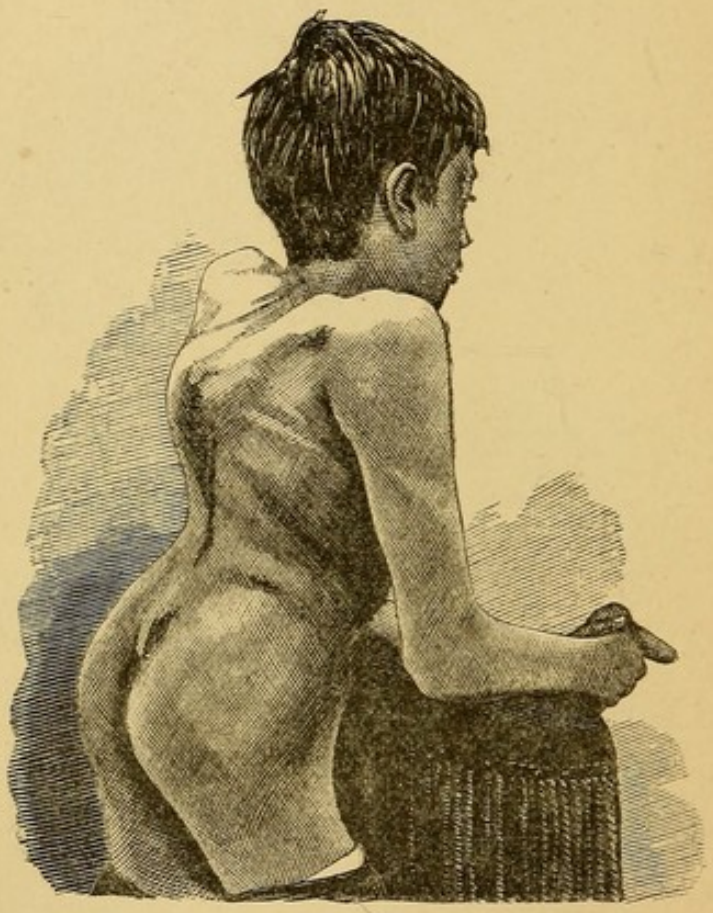
FIG. 46.

and great relief from pain can be given even in cases of many years' duration.

CASE XXIV.—T. F. Owens, æt. 18, of Bedford, Indiana. Father healthy; mother died of phthisis. When 3½ years old, the nurse was lifting him up and down by the arms, and let him fall accidentally on the floor, injuring his back so that he could not walk. After a while he began to walk with his hands on

both knees. He was examined by a number of physicians, but no one could tell what was the matter, until the lump began to appear, when he was told that he had spinal disease. He was kept on his back for one year, and then wore a brace obtained in Cincinnati (does not remember the name of the maker). Could not wear it, on account of the pain and difficulty of breathing. Underwent no treatment for eight or nine years

FIG. 47.



except being kept in bed. Could not go about without supporting himself by placing his hands on his knees.

Went to the Indianopolis Institute in 1873, pretty much in the same condition that he is in at present, 'except that the hump is a little more prominent.'

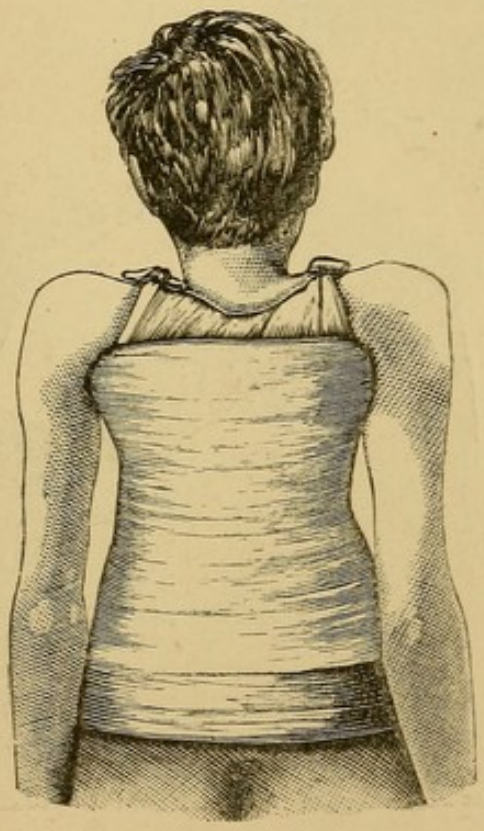
A brace was applied, which has been worn constantly ever since, and for the last two years uninterruptedly, day and night.

This brace gives support, 'but makes my back very sore, and I cannot breathe so well when it is on as when it is off.'

The skin was often chafed, and always red over the breast-bone, and very much galled under the arms.

The picture (fig. 46), engraved from a photograph by Mr. Mason of Bellevue Hospital, shows that, even with the instrument on, he requires support from his arms; and the

FIG. 48.



head rest under his chin increased the pain so much in his back that he was compelled to remove it.

The photograph without the instrument (see engraving, fig. 47) gives him almost, if not quite, as good position as the one with it, and he says he feels more comfortable without it.

He was suspended by the head and the axillæ, and the plaster jacket applied, on March 22, 1877, and in two hours from that time walked, without even a cane, to his hotel, and left for his home in Indiana the same evening.

His height was increased a little over 1 inch, and he was perfectly free from pain.

He sent me the photograph, from which fig. 48 has been engraved, April 25, 1877, and in his letter states that he has entered college, can do a full day's work with the other students,

FIG. 49.

is perfectly free from pain, and can walk two or three miles without the slightest fatigue.

The following case, from another physician, affords conclusive evidence that these patients can be treated at home by any competent medical man, if he will only follow the instructions given, with just as good results as I have obtained, and without the expense and trouble of sending the poor sufferers long distances to some particular specialist, instrument-maker,

or institution devoted especially to the treatment of this and kindred deformities.

'Massillon, Ohio, January 22, 1877.

'*Dr. L. A. Sayre:*

'Dear Sir,—Last spring I wrote to you asking for information how to treat a case of Pott's disease, the result of an injury. Your son was kind enough to write me the desired information, and I now send you the accompanying photographs to show the result of the treatment.'

Case XXV.—'A little girl nine years of age, with Pott's disease of two years' standing, the result of a fall. She was unable to stand without support, as seen in fig. 49. She had been treated by Dr. Weber of Cleveland, Ohio, with iron and leather braces, without improvement. After my return from Philadelphia, where I saw you apply the plaster jacket before the Medical Association, I put her in the same after having suspended her, and she began to improve from that moment, and can now walk without any assistance two miles every Sunday to Sunday school, and is almost perfectly straight, as seen in fig. 50, while before she could not even stand.

'Very gratefully yours,

'A. W. Ridenoux.'

Fig. 50.

The following case is exceedingly interesting and instructive, as it illustrates how easily spinal deformities can be relieved by the plaster jacket, even when complicated with abscesses.:—

Case XXVI.—Pott's disease with abscess. Michael N., aged three years, of healthy parents, and always healthy and very active until December 1874, when the mother noticed a stiffness of the right side. He was treated at a public institution for hip disease, but without any relief.

In March 1875 the mother noticed a swelling on the right side of the spine, which gradually increased to the size of a hen's egg. Was examined in my clinic, and aspirated. The pus be-

Fig. 51.

ing too thick to flow through the aspirator, a free incision was made, giving exit to quite an amount of pus, and a large slough of tough connective tissue, which was removed by the forceps; after its removal there was a more extensive flow of unhealthy curdy pus. The probe detected carious bone on the right side of the lumbar vertebræ. The wound was poured full of Peruvian balsam and covered with oakum and oiled silk.

A closely fitting shirt was then drawn over the child, and a visiting card, folded in its middle and a long pin passed through the upper fold, was placed over the oakum covering the open wound, the shirt then carefully adjusted, and the dinner pad put in proper position; the child was then carefully suspended by the head and axillary straps, and the plaster of Paris bandage applied as usual. Each turn in going over the pin was pierced by it, and thus a guide was made to cut out the fenestra when the plaster became set, and left a place for the free escape of pus. In less than an hour from the time of the dressing the child was quite comfortable, and able to stand without assistance.

He wore the dressing six weeks, when he began to complain of pain. The plaster jacket was then removed, and it was found that another abscess had formed below and to the right of the old one. A free incision was made, connecting these two abscesses, and afforded great relief. The wound was filled with Peruvian balsam and oakum, a piece of oiled silk put over it, and his shirt drawn firmly over all and made smooth, when the plaster jacket was applied as before, while the child was suspended; the pin and pasteboard having been adjusted as in the first instance. When the plaster had become nearly set, a fenestra, three inches wide and about five inches in length, was cut around the pin, until it came down to the oiled silk. This was cut in lines from the centre of the opening, and the triangles thus made were turned over the plaster and glued down to it by some gum-shellac, thus making a nice drain for the discharge from the abscess (as seen in fig. 51).

The wound was kept clean with oakum and Peruvian balsam dressings, and a tight roller passed over it every day. The child was able to run about without any assistance on the day after the last dressing was applied, since which time he has been perfectly comfortable and free from pain.

He was brought to me again on October 20, 1875, the mother saying that he was getting so fat that his jacket was too tight. The wound had stopped discharging for more than a

fortnight, and the child had the appearance of almost robust health.

The jacket was removed, when he could stand erect without any support, and seemed almost consolidated.

Another jacket was applied without any fenestra, which he wore until the middle of January 1876, when he was perfectly well, and with scarcely a perceptible deformity.

The following illustrative cases are a few of the many that have been treated by myself and others since my arrival in England; and although sufficient time has not elapsed to report the ultimate result in any of them, yet the fact that in every instance the sufferers were immediately improved, and made more comfortable, sufficiently attests the value of the treatment. Of course it is time alone that will show the ultimate result to be satisfactory in all those instances where a cure is possible. Even in those cases that are incurable, and which might terminate fatally, either from an inherited bad constitution, or from the effects of long-continued suffering and suppuration, the patients can be made more comfortable and free from pain, while at the same time they are enabled to enjoy exercise in the fresh air instead of being confined to their beds in a hospital—a boon to these poor unfortunates that can scarcely be over-estimated.

By the advice of my publishers I have had photographs of some of the cases printed, rather than engraved, as it will then be impossible to question their accuracy.

The notes of the following case were furnished me at the request of Mr. Heath, of the University College Hospital:—

Case XXVII.—'Arthur Ransome, æt. four years. History: Patient fell downstairs when about two years old, but apparently was none the worse for the accident, being able to walk as well as usual after it. Some few months after this a table fell on him, and in a short time the mother noticed his "back growing

out," and he was unable to walk. He was taken to a hospital, where an ordinary spinal support with crutches was applied, and worn for three or four months; and no material benefit resulting—if anything, the patient becoming worse—the mother removed it. Nothing more was done beyond keeping him in bed and giving cod-liver oil, until his admission into University College Hospital.

'Patient was admitted on June 19, 1877, with a marked angular curvature of lower cervical and upper dorsal vetebræ —chest bulged anteriorly and shoulders shrugged, lower limbs wasted, and the sufferer unable to walk. Has the peculiar grunt —scarcely amounting to a cough—usually present in Pott's disease. Appetite bad.

'On June 20, by Mr. Heath's direction, the House Surgeon put on a plaster of Paris jacket, the patient being suspended from his arms during the application.[1] The child improved somewhat in appearance after this, and his appetite also, but he was still unable to walk.

'About two or three weeks subsequently (July 15), Dr. Sayre applied a jacket himself with the addition of a head support, *immediately* after which the child expressed himself as "*better*;" and, on being supported by the hand, could bear his weight on his legs, and advance one before the other, which he could not do before.

'His mother took him home, and reports that in a few days he could walk by himself, holding, however, to a chair; and his appetite improved even more.[2]

(Signed) 'H. Blaxland,
'House Surgeon, U.C.H.'

[1] He should have been suspended from the head also, as well as from his arms, and the 'jury-mast,' or head support, applied in addition to the plaster jacket, as the cervical vertebræ were involved.

[2] Three weeks after, this child was attacked with double pneumonia, and the jacket was removed.

Case XXVIII.—A short account of the previous case appeared in the 'Lancet,' July 21, 1877, and attracted the attention of Dr. Gooding, of Cheltenham, who immediately requested me to see his little daughter, 10½ years of age, who had been suffering from Pott's disease of the cervical and upper dorsal vertebræ since she was 19 months old—the result of a fall. When I first examined her I declined to attempt any treatment, for I feared it would be useless. The child could neither sit nor stand except by bearing her weight upon her hands, as seen in Photograph I.; and the pain was so great upon the slightest touch of her back that I feared any attempt to apply the jacket would be useless, and therefore bring the treatment into discredit; consequently I advised them not to try it.

The parents had abandoned all treatment for many months, and had become nearly reconciled to the inevitable, when their hopes were again revived by reading the case in the 'Lancet' above referred to; and when I dashed these hopes by stating that I feared I could do the child no good, the mother was very sensibly affected. Besides, the little girl begged me to 'try,' with such an imploring look, that I fixed up the tripod over the mother's chair (the child was lying in her lap), and after very carefully adjusting the head rest and axillary straps, so as to make the tension even, I pulled her up very slowly from her mother's lap, *telling her all the time to let me know if she had the least pain anywhere* (as I should then have stopped). She made no complaint whatever, but, on the contrary, seemed very much pleased, and in a few minutes she was completely lifted from her mother's lap: as she swung off, and was entirely suspended by the head and axillæ, she almost instantly exclaimed, 'Mamma, that is *so comfortable.*'

The result of this experiment on both the mother and myself can be much better imagined than described. Mr. Howard Marsh happened to come in at the moment and had the satisfaction of seeing the child's delight, as she was thus suspended, for nearly half an hour, while I sent a messenger to Mr.

Photograph I.

To face p. 82.

Mayer, in Great Portland Street, to come and measure her for the head support or 'jury-mast.'

The mother then stated that Dr. Gooding wished me, if I could do anything for the child, to do it in Guy's Hospital, so that his professional brethren might profit by his misfortune, and thus be enabled to relieve any of their own children or patients in future.

This was done on July 25, 1877, in the presence of a number of the most distinguished surgeons of London; but as there was no air-bed to lay her on while the plaster was getting set, an undue pressure was made over the hump, and a small piece had to be cut out after the plaster became hard.

The following history of her case was written by her father and sent to me:—

'A. M. G., aged 10½ years; when 19 months old fell backwards from the arm of a high chair. Four months after a "knuckle" about the middle of the dorsal vertebræ was just visible, and *explained a series of hitherto obscure symptoms.*[1]

'*Absolute* recumbency was enforced for 20 months, during which an attack of dysenteric diarrhœa and measles tried her severely. She was then allowed to sit up, wearing an instrument, with the view of supporting the head and shoulders on the pelvis. This, though an ingenious piece of mechanism, was perfectly useless, nay, injurious.

'The spine became more bent, and symptoms of paraplegia evident, the paralysis becoming nearly absolute when five years old.

'Recumbency restored power to the lower extremities; but

[1] The italics are mine. It is to these very obscure symptoms that I wish to direct especial attention, as by giving them their correct interpretation, the disease may be arrested before any "knuckle" appears, and thus cured without deformity.

as soon as strength returned, the desire to move about became uncontrollable, and coincidently the curvature increased.

'At eight years old an abscess of considerable size formed to the left of the spine; was treated antiseptically, and healed in three or four months. The rest, enforced during the healing of the abscess, again improved her health and strength, and, as usual, more exercise was taken, but never standing or walking without supporting herself on some article of furniture.

'She has never been able to sit, but has been in the habit of kneeling on a chair, with her elbows on the table, and a hand under her chin, or of taking up a similar position in a favourite corner of the room, crouched on all fours, with the hand under the chin, and a book beneath her eyes—pitiful to see.

'When about ten years old, failure of strength again became evident, and soon very severe pain in the thighs and legs, but especially along the course of the sciatic nerves, sorely tried her; the spine being obviously more curved, and there being great tenderness over the hump on the right side, as also in the groins; the pressure of the bed-clothes on the spine even causing pain, and the process of dressing the last month having to be prolonged and intermittent, from the pain attending the necessary movements.

'Struck with a report of Dr. Sayre's treatment, I asked him to see my child, and he said, aggravated though the case was, he felt sure that he could make her comfortable.[1]

'On July 25, at Guy's Hospital, the bandage and head-piece was applied, and after some considerable pain on the tender hump[2] was relieved by excising a small piece of the

[1] This assurance was given because the child had said she was comfortable when suspended; it being only necessary to retain her in the position in which she was comfortable. This is what the plaster of Paris does, and what constitutes the whole secret of the treatment.

[2] The hump was unduly pressed upon while the plaster was soft and she was laid upon a mattress. If she had been laid upon an *air*-bed, this would not have occurred.

bandage, there has been perfect ease. The tenderness of the back and groin has greatly diminished, so that palpation can be practised.

'The child's breathing has been deeper, a fact independently noticed by her mother and myself. And there is certainly more colour in her hitherto pale cheek. She has been able to walk about the garden, as well as her slender legs would allow her, *free from pain*, and to drive, sitting unsupported in the carriage; but Dr. Sayre, not satisfied with the casing which he had applied at Guy's Hospital, while demonstrating, to-day, August 4, removed it and applied another. By comparison with the photograph a decided improvement in the condition of the curve is obvious, and there appears to me every indication that a life of patient suffering and sadness will be made one of cheerfulness and comfort.

'Dr. Sayre must forgive me for expressing, only too feebly I fear, my gratitude and admiration for his enthusiastic zeal and great kindness, and for the skill that has rescued this class of patients from the well-meant but almost fruitless efforts of the instrument-maker, to whom they have for the most part hitherto been subjected.[1]

'J. C. Gooding.'

The following letter, with accompanying photograph, from Dr. Gooding, at the seaside, two weeks after the last application of the bandage, is an evidence that the improvement continues:—

'7 Belle Vue Terrace, West Cliff, Whitby
'August 17, 1877.

'My dear Dr. Sayre,—I am very glad to be able to tell you that Mabel has been free from pain—with two or three exceptions—since we saw you, the exceptions being a kind of

[1] In this last sentence some allowance must be made for an impassioned father's feelings.

"pricking pain" in the left groin, of which she occasionally complains. She is able to walk about best when we take her hands, but she can walk alone; after a short time she complains of pressure on the hips and sides—I take it, merely due to the weight of the head transmitted to the hips. You will see in the likeness [1] that she rests the left arm on a chair; this she finds necessary in standing, because without some support she feels the pressure on the hips from the case "slipping" down, as she describes it.[2] Her legs carry her better than they did, the exercise which she has been able to take developing the muscles; and you would, I know, be pleased, as we have been, to see her, stockings off, clothing tucked up, puddling in the briny pools.

'Believe me to be, very gratefully,

'J. C. Gooding.'

The notes of the following case, as well as the photographs, are from Mr. Balkwill, of the Royal Orthopædic Hospital:—

Case XXIX.—'The benefit of the plaster jacket to secure the patient in position, after extension had been made to relieve pain in a case of Pott's disease, was most strikingly illustrated at the Royal Orthopædic Hospital, Oxford Street, in the case of George Moody, of Bath, aged 20 years. He had suffered from an acute pain for over three years, in the back and loins. A considerable curve, the result of Pott's disease, occurred two years ago, and nothing gave relief until he was suspended, and the plaster jacket applied by Dr. Sayre on July 26, 1877.

'Immediately the pain was removed, and the man tells me to-day that it has not returned. He can now walk about and enjoy life, and the difference not only in his walk, but also in the expression of his face, is most marked; he looks, in fact, too well to be in the hospital. The first jacket applied became somewhat

[1] See Photograph II.

[2] It needs to be renewed, and put on tighter, or else a slip being cut out in front, it should then be drawn together by a bandage.

Photograph II.

To face p. 86.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Plate I.

To face p. 87.

loose after the first fortnight; but, without removing it at all, Dr. Sayre simply cut out a couple of inches in front its entire length, and pressing the shell together put a fresh bandage outside; and, in much less time than it takes to write this, a fresh close-fitting mould was the result; of course, bringing with it renewed comfort. It is worth remembering that when this man was self-suspended the curve in his back was perceptibly diminished.

'The condition of the man before your treatment, as well as the difference in effect of being suspended under the axillæ and by the chin and occiput, and self-suspension, as well as the result of the treatment, showing his present condition, can be much better understood by referring to the accompanying photographs, by Mayall, than by any description I can give. (See Plate I.)

'Wm. E. Balkwill.

'August 21, 1877.'

The notes of the following case were kindly furnished me by Mr. Marcus Beck, of the University College Hospital, who had applied the treatment, at the request of Mr. Erichsen, on one of his patients:—

Case XXX.—'The patient, an overgrown youth of 17, was under the care of Mr. Erichsen, and at his request I applied the plaster of Paris apparatus. The history of the patient was briefly this: About a year ago he was laid up, while at school in Switzerland, with severe pain in the back, which was called rheumatism. He was confined to his bed for many weeks. From that time he was never able to walk except for very short distances without the help of crutches. Any attempt to do so caused pain. Even with crutches he was able to take but little exercise. There was very slight angular projection of the spines of the last dorsal and first lumbar vertebræ. The apparatus was applied at University College Hospital. The patient

arrived in a cab, and walked down the passage of the hospital on crutches. He stated at the time that he could not possibly have gone that distance without them. As soon as the apparatus was applied he walked to the door of the hospital, carrying both crutches in one hand. The apparatus was applied on July 14. On Monday, July 16, he appeared to show himself, and had entirely given up his crutches, and on the same day went to the seaside. On August 17 the following statement was received in a letter from his father: "He seems much improved in every way, walks about all day, eats much better, and never complains of pain anywhere. The shell does not seem to annoy him at all, and as yet does not seem to be too tight."

'MARCUS BECK.'

The notes of the following case, which was one of a number in which I had the privilege of applying the treatment before the British Medical Association at their meeting in Manchester, August 9, 1877, were kindly furnished me by Mr. Bradley, secretary to the Surgical Section :—

CASE XXXI.—'I first saw T. W. on July 2, 1877. He was a slender lad of 18, and had suffered from symptoms of spinal *caries* for about 18 months. Little by little he had lost the use of his legs, and when he came under my care he was almost completely paraplegic. On examination the tenth and eleventh dorsal spines slightly projected, and much pain was elicited on pressure. More in the light of a palliative than anything else, I encased him in a gutta-percha tunic, moulding it as well as I could to the boy's body. The immediate result of this treatment was that the boy was able to walk about the wards, though in a stumbling manner, for a little time without pain.

'On the occasion of Professor Sayre's visit to Manchester at the meeting of the British Medical Association, he kindly saw this patient, and in the presence of a large assemblage demonstrated his method of treating angular curvature of the spine

with a plaster of Paris bandage, after having suspended the patient. The day following I found the lad in high spirits, walking about the grounds of the Infirmary with perfect ease and comfort. Previously, even with the assistance of the gutta-percha support, he was compelled to rest the spine by placing his hands upon his thighs from time to time; but now he walked erect, and told me that he felt no fatigue after half-an-hour's brisk walking.

'S. M. BRADLEY.'

The following brief history is from Mr. West, of Birmingham, and is another proof of my statement that any competent surgeon can apply the treatment successfully if he will strictly follow the instructions I have given :—

CASE XXXII.—'Lottie Warrenton, æt. 9, had suffered from Pott's curvature for four years, which had been followed by lumbar abscess. Rest and aspiration, with antiseptic treatment, had cured the abscess, and arrested the acute mischief in the spine, but the curve was gradually increasing, and the child could only walk a few yards without discomfort, and without seeking support from some chair or other body.

'Dr. Sayre saw her on July 24, and while the father held the child up by the arms, he placed one hand under her chin, and the other under the occiput, and almost instantly the child said, "That's better." He therefore recommended adoption of his treatment. The parents were very anxious to have him apply it. He declined, and said that Mr. West, having seen him use the plaster bandages in several different cases, was quite competent to apply them.

'Mr. West therefore applied them on July 28. The height of the child was increased $1\frac{1}{4}$ inches, and she was able to walk a mile within a week of the application of the bandage, without assistance.'

I have a letter from her father, nearly three weeks after the bandage was applied, in which, among other things, he says, 'She is so very comfortable, and enjoys her walk every day.'

Equally good results as in the examples above stated have been obtained by many other surgeons in London and different parts of England, who have applied the treatment with that accuracy and attention to minutiæ which are absolutely essential to success. And, without wishing to make any comparison or distinction, I may be permitted to mention some of the cases that I have had the privilege of seeing in the charge of Mr. Berkeley Hill, Mr. Christopher Heath, Mr. Arthur Edward Durham, Mr. John Croft, Mr. Richard Barwell, Mr. Howard Marsh, Mr. William E. Balkwill, and some others whose names I have forgotten, the result being most satisfactory in every instance.

ROTARY-LATERAL CURVATURE OF THE SPINE.

For the term *lateral* curvature, I propose to substitute that of *rotary-lateral* curvature of the spine, as in this deformity the lateral deviation is always accompanied by rotation or twisting of the bodies of the vertebræ upon themselves.

The spinal column is held in its normal position by the equally balanced contraction of muscles situated on either side of it. If for any reason one set of muscles overcomes the set on the opposite side, the spine yields, and a curve is produced, the concavity of which is directed to the side on which the stronger set of muscles is placed.

The rotary-lateral curvature depends entirely upon irregular muscular contraction, and occurs independently of disease of the vertebræ and intervertebral cartilages. These are rarely, if ever, primarily affected in the disease. In even the most severe cases the bodies of the vertebræ remain of nearly their normal thickness. There is usually some compression of the posterior, and some expansion of the anterior portions of the intervertebral discs, but very rarely if ever any actual disease of these bodies, or of the bones. The only change is interstitial absorption from undue pressure.

The true pathology therefore of rotary-lateral curvature of the spine is abnormal muscular contraction. By this contraction two curves are generally produced, one in the dorsal, the other in the lumbar region. Of these curves one is primary, the other secondary or compensatory. Sometimes the lumbar curve

is the one first developed, and then the dorsal curve is subsequently formed, and is regarded as compensatory. It is important to ascertain which is the primary, and which is the secondary curve, for it is in the pathological condition through which the first curve has been produced that the surgeon is chiefly interested. It is a noticeable fact that this deformity never occurs in those persons who are compelled to maintain an erect position. Those who are accustomed to carry weights upon their heads, such as baskets of clothes or pails of water, do not become the subjects of lateral curvature of the spine, simply because they are obliged to maintain the body in a perfectly erect posture, thus causing the muscles of the trunk to contract with equal force on both sides.

Rotary-lateral curvature in a large number of instances is due to sheer want of energy on the part of the patient, and a deficiency of will to sit up straight.

It is seen very commonly in that class of careless apathetic persons who are in the habit of sitting with their backs twisted in a half curved position. Indulgence in such habits frequently develops a curve at some point of the spinal column; this is sufficient to establish the deformity, and then in a very short time a secondary curve will be developed.

Fracture of femur or tibia, when followed by such shortening as to cause the body to lean towards the side of the fracture, may be sufficient to establish lateral curvature. Shortening of one of the lower extremities may be the result of paralysis and subsequent arrest of development. The consequence of this is an unequal support to the sides of the pelvis; hence one side drops down, and with this depression is associated a corresponding deviation of the spine. These are the usual causes of rotary-lateral curvature when it exists in the lower portion of the spinal column.

The production of this deformity in the dorsal region of the spinal column was formerly explained by me as follows: the serratus magnus, the great external respiratory muscle, which is attached by fleshy digitations to eight or nine ribs, and then

passes upward and backward to be attached into the base of the scapula, acts upon those ribs to which it is attached in the same manner as upon the long arm of a lever. The fulcrum of this lever is at the point where the rib comes in contact with the transverse processes of the vertebræ, and the short arm is the remaining portion, embracing the head and neck. Now, when the attachment of the serratus magnus to the scapula is made firm by the action of the trapezius and rhomboideus muscle, drawing the scapula back near the spinous processes, the muscle has the power to act upon each of the ribs to which it is attached, and through them as levers it brings its action to bear upon the bodies of the vertebræ, causing them to rotate upon themselves with every inspiration.

Rotary-lateral curvature in the dorsal portion of the spine occurs much more frequently in girls than in boys. At its very commencement it may be due to any apparently trifling cause that may favour the undue contraction of certain muscles; as, for instance, slight relaxation given to the muscles of one side of the trunk, by assuming an uneasy posture while sitting, or standing habitually in a half-leaning, careless position, with one arm frequently thrown behind the body, making the serratus magnus of that side more tense than its fellow. Any of these seemingly slight actions, through approximating one scapula nearer to the line of the spinous processes than the opposite bone, render tense the serratus magnus of that side, and thus place it in a favourable position for undue action on the ribs on that side, and so give rise to distortion. The curve when once established has almost invariably a tendency to increase.

Not long ago, Dr. A. B. Judson, in a paper read before the New York Academy of Medicine,[1] presented a valuable contribution as to the direct anatomical changes that take place in rotary-lateral curvature, and gave the most convincing reasons why rotation occurs among the bodies of the vertebræ. As

[1] Transactions of the New York Academy of Medicine.

Dr. Judson's explanation is so very lucid, and as my own plan of treatment fulfils to a certain extent at least the indications in accordance with his theory, I will take the liberty of quoting to some extent from this paper :—

FIG. 52.

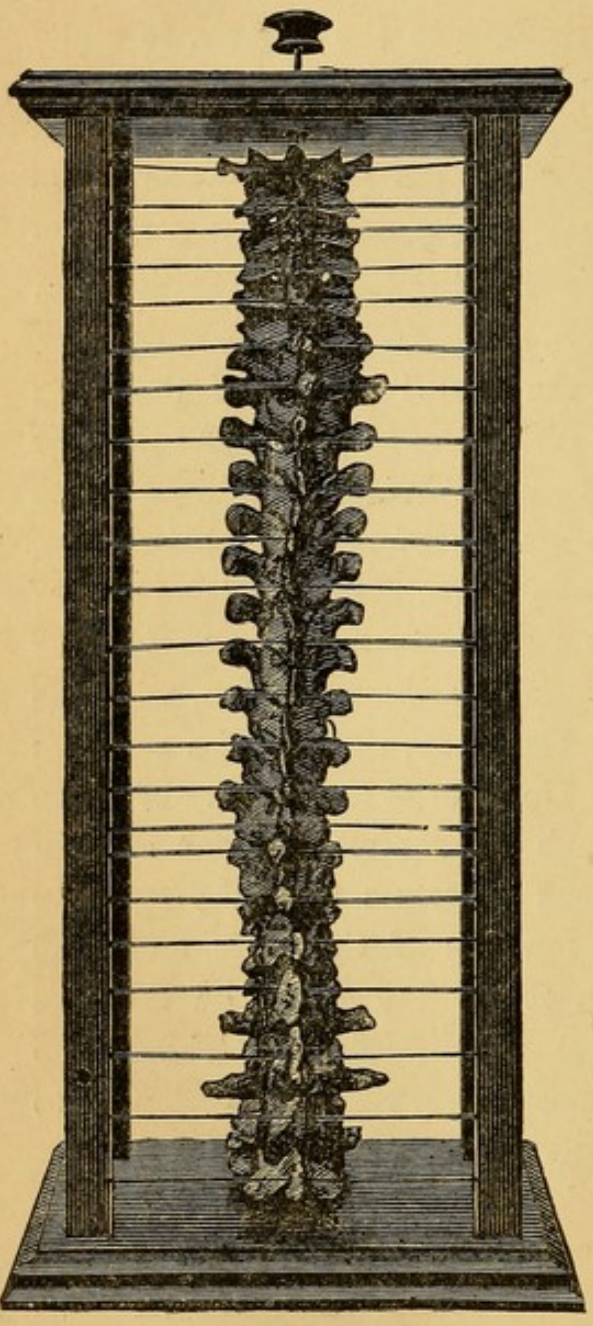
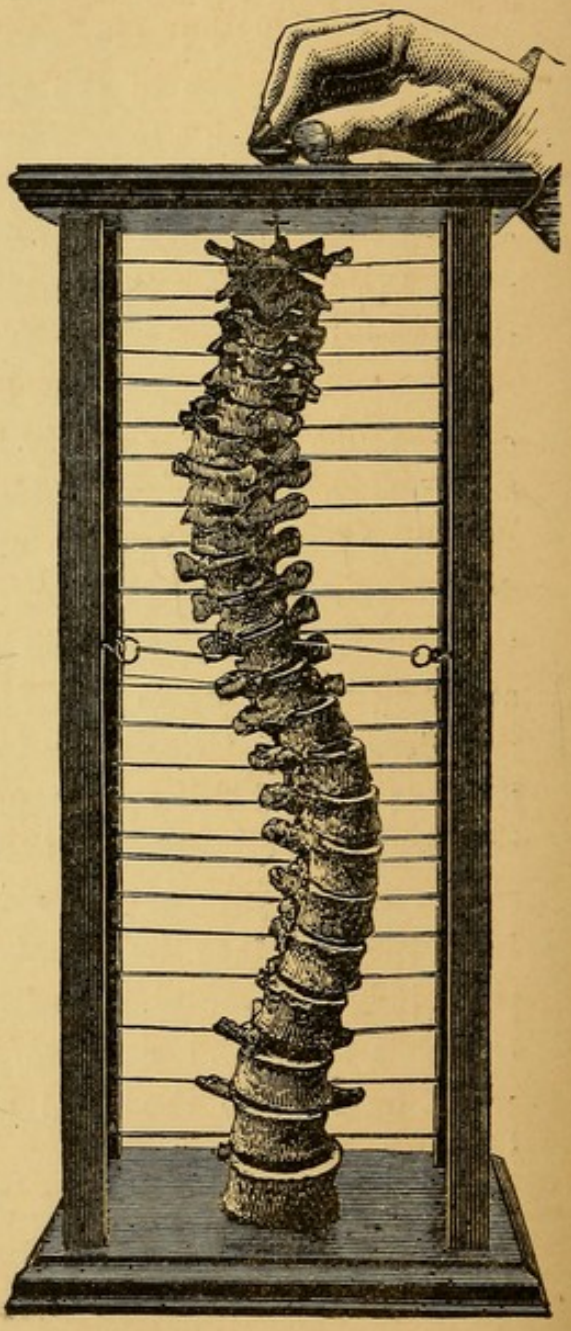


FIG. 53.



'The distinguishing feature of the explanation of rotation here proposed, is the recognition of the fact, heretofore overlooked so far as I am aware, that the posterior portion of the

vertebral column, being a part of the dorsal parietes of the chest and abdomen, is confined in the median plane of the trunk; while the anterior portion of the column projecting into the thoracic and abdominal cavities, and devoid of lateral attachments, is at liberty to, and physiologically does, move to the right and left of the median line.'

The production of rotation and lateral curvature on the theory here presented, is well illustrated by a contrivance made by Dr. Judson, the construction and action of which are shown in figs. 52 and 53, which represent a spinal column, through which runs a brass rod tempered by the hammer, a few inches longer than the column, and terminating in a knob. It has lateral, but not antero-posterior flexibility, and is retained in the perpendicular by a wooden frame, from the sides of which elastic bands are fastened to the spinous processes.

'To produce lateral curvature of the column, with rotation of the vertebræ, the knob at the summit of the rod is to be depressed. Double curvature, with rotation in each curve, may be produced by confining one of the dorsal vertebræ with the silk check-loops, and depressing the knob, as in the first instance (see fig. 53).

'The explanation here proposed answers all the difficulties that have arisen in the study of the phenomena of rotation in lateral curvature. Rotation occurs in all forms of lateral curvature, except that caused by collapse of the ribs from pulmonary or pleural disease. In these cases rotation is absent, because the muscles attached to the spinous processes on the side of the concavity, the trapezius, latissimus dorsi, rhomboidei, and serrati postici, together with the vertebral aponeurosis, all have their points of origin and insertion respectively approximated by a collapse of the chest on that side, and the spinous processes move toward the opposite side together with the bodies of the vertebræ, and rotation is annulled.

'Rotation has been thought to occasion great difficulty in the mechanical treatment of lateral curvature. The treatment of lateral curvature is indeed beset with difficulty, not so much

from the presence of rotation, however, as from the fact that the portion of the column which departs farthest from the normal position (the bodies of the vertebræ), cannot, from their situation within the cavity of the trunk, receive direct mechanical support. Lateral curvature has a resemblance to Pott's disease of the spine in that, in both of these affections, the anterior portion of the column is subject to a departure from its normal conditions. In one case the vertebral bodies are carious; in the other, they are thrown off the normal position. In the one case, the caries is prolonged and extended by the weight of the parts above; in the other case, the deviation is directly produced and aggravated by the same superincumbent weight. In Pott's disease the morbid process is arrested by transferring the injurious weight from the anterior and diseased portion to the posterior and sound portion of the spinal column. In lateral curvature, would not a degree of relief be afforded by a similar application of antero-posterior force, by which a part of the weight would be transferred to the posterior portion of the spinal column, which is prevented, by its muscular and fibrous attachments, from deviating far from its normal position?'

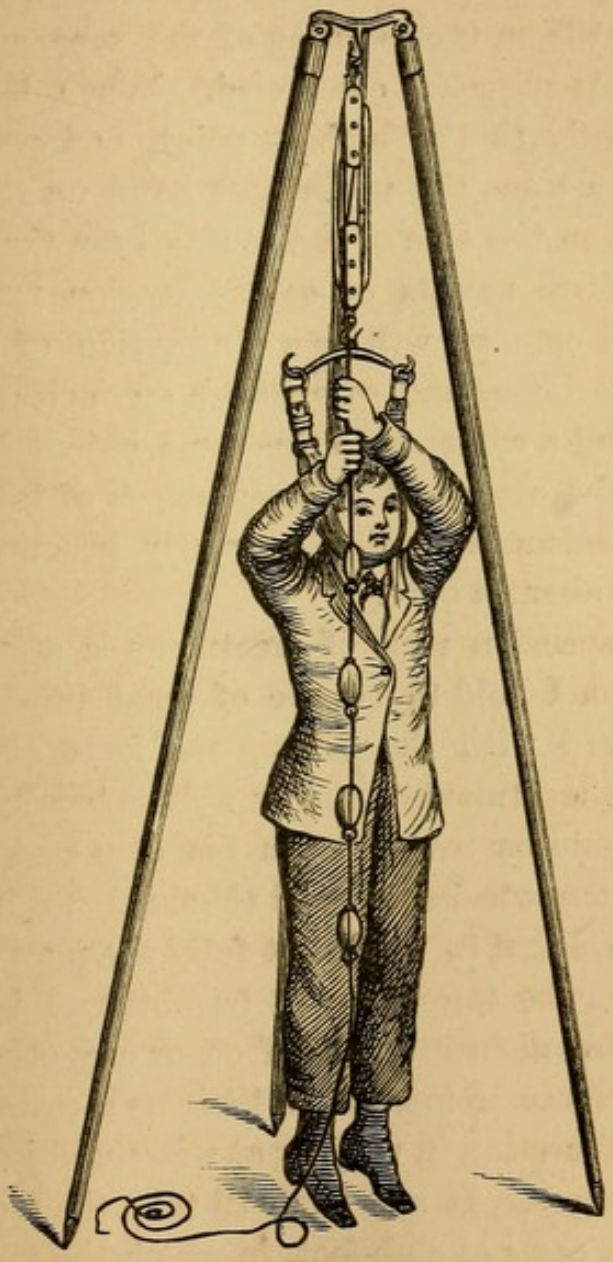
To Dr. Judson's question I say, yes; but with this qualification, that the superincumbent weight should be removed from the bodies of the vertebræ, and be transferred, not to the posterior and comparatively immovable part alone, but to the irregularities of the surface of the entire trunk. This indication is fulfilled, as I believe, to a very considerable extent by *self-suspension* and the *plaster of Paris jacket.*

Self-suspension.[1]—To a hook at the upper portion of an iron tripod about ten feet in height, is suspended, by means of com-

[1] The late Prof. Mitchel, of Philadelphia, used to treat cases of lateral curvature by suspending them under the arms, and causing them to suspend themselves by the hands. But Dr. Benjamin Lee, of Philadelphia, was the first person who caused his patients to practise *self-suspension*, by climbing up a rope which passed over a pulley and was attached to the patient's head by straps, passing under the chin and occiput.

pound pulleys and tackle, the iron crossbeam devised by Mr. Reynders. To this the patient is attached by the head and chin collar only, and not by axillary straps (fig. 54). The patient should be taught to suspend himself by means of this apparatus,

FIG. 54.



and be requested to take several deep and full inspirations during suspension. Great care should be taken that *the hands be kept above the head;* so long as this is the case, the great thoracic muscles, as the pectoralis major, latissimus dorsi, serratus magnus, &c., are brought into play, and the ligaments of the

neck are relieved of the greater part of the strain. If the hands be allowed to descend below the level of the head while the patient is self suspended, there will be a risk of too much strain being thrown upon the ligaments of the neck, and of consequent serious damage. During the self-suspension some one should be at hand, especially if the suspended patient be a child, to guard against accident from the twisting of the rope, and to see that the operation is properly conducted. When the patient has elevated the body to the highest point, and proposes to rest suspended for a time, the uppermost hand on the cord should always be that on the side of the concavity in the dorsal region.

The immediate results of self-suspension practised in the above-described manner, will be a diminution of the abnormal spinal curves (primary and secondary), an increase in the girth of the chest, and a decrease to the same extent in that of the waist. In slight cases and in early stages of lateral deviation of the spine, self-suspension, if regularly practised, will alone suffice to bring about a cure.

The self-suspension plan of treatment is attended with an advantage which I hold to be one of great importance. It is entirely in accord with the principle I have always tried to inculcate in the treatment of any curable deformity, namely, that the patient should be interested in his own case, be instructed with the fullest knowledge of detail the surgeon thinks it right to afford, and be induced to carry out fully the plan of treatment. I believe that the best results will be obtained by causing the patients of spinal deformity, club-foot, or any other remediable distortion, to take some interest in their own cases, so that they may use their discretion in varying at will the adjustment of the necessary appliances. If any one will take the trouble to look at my results in cases of club-foot, in which the patients or their parents have been made to take an active interest in the treatment, it will be seen at once, I think, that it is a correct principle. If the reader will refer to the model of the spine by Dr. Judson (see figs. 52 and 53) he will see that it is absolutely impossible to straighten the spinal column without *elongating* it.

So long as the finger is pressed upon the knob at the top, thus preventing the spine from elongating, no amount of pressure upon the sides of the column can straighten it; but the moment that the pressure is removed, and the rod pulled up, the spinal column is immediately made straight without any side pressure at all.

It is exactly the same with the human body. You may apply to it the nicest-fitting pelvis belt, and from it your arm-supports or crutches to lift the shoulders, then your side levers to force the ribs in and bring the body straight by the most ingenious mechanism, and with the most terrible power that screw and lever are capable of producing, even to the crushing in of the ribs, as I have seen done: yet the curvature is not removed, and cannot be, so long *as the bands go over the shoulder and thus keep the spine from extending.* You might as well take a piece of wire in the shape of the letter S, and nailing fast the two extremities to a board, attempt to straighten it by lateral pressure and counter pressure upon either side: you will not succeed, without loosening one or the other of the extremities, and thus allowing it to be extended.

Exactly the same principle is involved in the treatment of rotary-lateral curvature of the spine, as is plainly seen by referring to the various photographs which are here presented, or as any one can easily prove by allowing his patient with lateral curvature to suspend himself or herself, according to the rules here laid down, and watching the result.

It seems to me that to attempt the impossible (as I have shown above that it must be) by the application of a force which is kept under lock and key, to be used by the surgeon *only*, thus compelling the patient to submit to the torture of undue pressure, it may be for hours or even days, until he can return to have the key applied and be set free from his misery, is a cruelty to human beings that should be suppressed by legal enactment.

The Plaster of Paris Jacket.—Until 1876 I made use with fair success, in cases of *slight* lateral curvature, of the in-

strument described and depicted in the twenty-sixth chapter of my work on orthopædic surgery. When, however, the deformity was advanced, and the osseous tissues had become involved, I usually transferred the patients to those practitioners who professed to be able to effect more than I could. All these patients subsequently came back to me, and in every instance in a worse condition, although they had been using instrumental treatment during the interval. I then commenced, in cases of this kind, to apply the uninterrupted plaster jacket after suspension, although, as has been stated before, I remained in doubt as to the exact principle of its operation, until I heard Dr. Judson's explanation of the rotation of the bodies of the vertebræ in lateral spinal curvature. The plaster of Paris jacket is applied in cases of this deformity precisely in the same manner as in the treatment of Pott's disease. The patient is suspended, points where undue pressure is liable to be made are carefully protected, a 'dinner pad' of suitable size is placed over the upper part of the abdomen, and in the case of a female the mammæ must also be protected by pads—which are to be removed just before the plaster sets—and a slight indentation made over the sternum to give it form. This jacket, I am warranted in saying, may be worn with perfect comfort if it be properly applied, and if care be taken to protect the points where continuous pressure is likely to be made, the normal irregularities of the surface being left as little disturbed as possible. Still further, I believe, that if the apparatus does give the patient any distress or discomfort, this will be found due to the fact that it has not been properly adjusted. In cases where the parts over the sternum or angles of the ribs are tender, unless care be exercised in applying the jacket, it may prove so uncomfortable as to require removal. It sometimes becomes necessary to remove the jacket in consequence of the presence of some skin disease. As much care as possible should be taken to avoid padding the surface, for it is in the adaptation of the jacket to the existing irregularities on the surface that its greatest efficiency consists.

The jacket must be removed from time to time for the sake of comfort and cleanliness, and in order to permit the growth of the patient. When the recovery is nearly complete, the old apparatus may be replaced and supported by means of a firmly applied roller bandage or laced like a corset. So long as there is marked lateral curvature, however, the patient will feel uncomfortable unless the chest is completely surrounded by the jacket.

The patient, whilst wearing the plaster of Paris jacket, should practise self-suspension every day once or twice, and from three to five minutes at a time, by slowly climbing the rope until the toes just touch the floor, and retain that position while he takes three deep full inspirations; he should then let himself slowly down, and after resting a few seconds, repeat the exercise three times. This should be done night and morning.

If the patient pulls himself clear from the floor, some one should be present to keep him from turning round, and thus twisting the rope, by which means he might be in danger of permanent suspension. Children very soon become fond of the amusement, and should therefore always be watched while taking the exercise.

In cases in which the deformity is not very severe the application of the jacket is at once followed by good results. The sufferer is able to breathe with ease, to sit erect on a chair, and to walk. In instances both of lateral curvature and of Pott's disease, one of the most striking results of the treatment is, that within a few hours, certainly within the second day after the application of the jacket, there is observed a most marked difference in the colour of the skin, especially that of the face. The patient appears much less anæmic, and the skin presents a ruddier and more natural tint. This change I attribute to the fact that an increased amount of oxygen is taken into the lungs. In one case the lung capacity, as tested by the spirometer, was found to be 140 cubic inches on expiration, and 100 cubic inches on inspiration before the application, and 200 cubic inches on expiration. and 140 cubic inches on inspiration, after the application of the jacket. This plan of treatment affords, I hold, the

following advantages: support to the spine, additional strength to the whole muscular system, increased lung capacity, improved condition of blood, with a more vigorous circulation, improved digestion, and warmth in cold weather.

In cases which are not severe, the patient, if he suspends himself daily by the arms, and if the jacket be occasionally renewed, will become comparatively, if not entirely, straight. If the bony structures have not undergone any permanent change, some rectification of the deformity may be brought about. It is important to detect the disease early, and if possible, before much rotation has been developed. Then is the proper time to adopt the means of treatment, and in such cases the plaster of Paris jacket has, in my practice, served a most excellent purpose. There is practically no such inconvenience attending the use of this method in warm weather, as that of other forms of apparatus that have been devised. In some instances, especially in patients of middle age, it will be found necessary, in order to completely overcome the deformity, to make a subcutaneous section of the latissimus dorsi muscle.

When the curvature has progressed very far, and there is angular bending of the ribs, very little can be expected from the jacket, self-suspension, or any other plan, towards rectifying the deformity; nevertheless, the sufferer may be rendered much more comfortable by an application of the jacket. In that class of cases in which the curvature of the spine depends upon shortening of one of the lower extremities, the indication is to increase, by means of some artificial appliance, the length of the shortened limb until it reaches the same length as the other. When this can be done, the cause and the deformity itself will both be removed.

The following are a few of the many examples of lateral curvature which I have treated by 'self-suspension' and the plaster jacket, and they sufficiently attest the correctness of the views I have here advanced. The first is that of a young lady in

Albany, New York, upon whom I applied the jacket before the State Medical Society in June 1876. She was a patient of Dr. Vanderveer, of Albany, who has kindly furnished me with the following account of her case and the result of the treatment, six months after the application of the bandage.

Case I.—'Miss M——, aged 14½ years, of healthy parents and good family history; not compelled to do heavy labour;

Fig. 55.

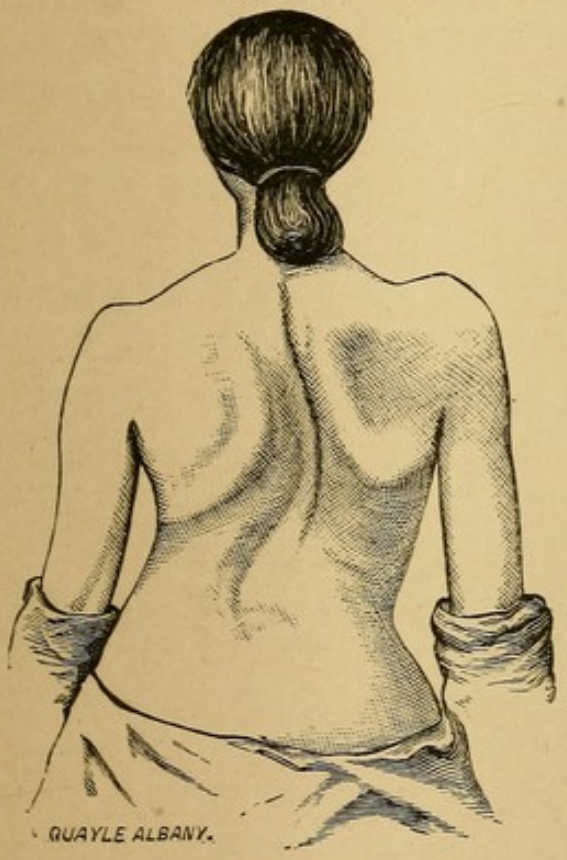


Fig. 56.

never suffered from any serious illness. Had a severe fall when four years of age, but it was thought at the time no permanent harm would result. When ten years of age her sister observed some trouble of her spine when fitting a dress. About a year after it was noticed that she carried one shoulder somewhat higher than the other. As she did not complain of pain, no uneasiness was felt. She was chided, and told to be more careful when sitting, &c.

'*July* 1, 1874.—She consulted a surgeon, and was told to go to the country, enjoy the fresh air, exercise, &c., and that she would soon improve. Feeling some pain, and the deformity

becoming noticeable, she was brought to me September 15, 1874. There was then present distinct and well-marked lateral curvature of the spine, the thorax being thrown to the right. The ordinary spine supporter was ordered, and applied October 1, 1874.

'Reported herself as feeling better after the brace was applied, wearing it also at night as much as possible. The brace was worn faithfully until May 3, 1876, and though never willing to go without its support, yet the deformity seemed to be as great as when she first came under treatment.

'In June 1876 she was in the position seen in fig. 55, from a very accurate sketch by Dr. Balch of Albany.

'Dr. Sayre then suspended her, before the State Medical Society, which immediately produced a marked change in the curves of her spine, and after fitting her with a very tight shirt, and protecting the mammæ by cotton pads, he applied the plaster of Paris bandage, which retained her in this improved position.

'When the plaster became set he removed the pads over the breasts, and she said she was perfectly comfortable.

'From this time she felt very much better, and has improved in her general health. For the past six months her menstrual periods have been regular. I have applied the plaster dressing twice since June, the last time September 11, and since then she expresses herself as feeling better than at any time during the past three years; she looks stronger, appears more erect, and the shoulders are more even; sleeps well, enjoys plenty of outdoor exercise, and in every way expresses herself as being greatly improved. I had her photographed the day after you applied the bandage before the State Society, and fig. 56 is a wood engraving from it by Mr. Quayle.'

The two succeeding cases are those of Dr. V—— of Orange County, New York, and John W. White, of the City of New York, who were suspended and fitted with the bandage before the Surgical Section of the New York Academy of Medicine, March 23, 1877.

Fig. 1.

To face p. 161.

Fig. 2.

Fig. 3.

Fig. 4.

Case II.—Dr. V., of Orange County, New York, aged 28, very pale and delicate, never had been robust, began to develop lateral curve when about 12 years of age, while attending school. Various braces were worn without much benefit, but continued to be used, as he was unable to attend to his business without some support. Since his entrance into the medical profession, nearly every new device invented to cure lateral curvature has been brought to him, and fairly tested, but without any improvement in his case, although the instruments were applied with so much power as to excoriate the skin (fig. 1, Plate II.). He was self-suspended before the Surgical Section of the Academy of Medicine in New York, on March 23, 1877 (fig. 2, Plate II.), and the plaster bandage applied (fig. 3, Plate II.) with the result as seen in fig. 4, Plate II. By comparing it with (fig. 2, Plate II.), it will be observed that his form has *not* been retained in the improved position which self-suspension gave it. By carefully examining fig. 3 the reason of this will be apparent; it will be observed that the axillary straps are not suspended evenly on the cross-bar; and also that in putting on my bandage I have not carried it up sufficiently high on the left side, and thus failed to give him the requisite support. I have therefore preserved this plate, as a most valuable lesson can be learned from it, viz. how very easy it is to be unsuccessful, by neglecting to be accurate in the details of the application.

Another bandage was accurately applied while he was properly self-suspended, and the result was most satisfactory. He was increased in height $\frac{3}{4}$ of an inch, as measured by Dr. Stephen Smith, Chairman of the Section, who also tested his lung capacity, both before and after the application, with the following results, viz. :

	Expiration Cubic inches	Inspiration Cubic inches
Previous to suspension	140	100
After jacket was applied . . .	180	130

I may mention that this was the first time I had applied the plaster bandage, while the patient was self-suspended; and I

found it so much more satisfactory than when he was held suspended by the axillæ and head-straps by another person, that I have since that time adopted this plan in all cases when I could do so.

I received a letter from Dr. V. three weeks after the application of the last bandage, in which he states that he is now able to do a full day's work without fatigue, a thing he could never do before; that his formerly pale cheeks had become rosy, his appetite much increased, and his digestion, which had always been weak, was now perfect.

The fact, however, which had attracted his attention most was his increase of temperature, that he was nearly as warm now without an overcoat as he had been formerly with one, and that the coldness of his hands and feet, from which he had before suffered constantly, had disappeared entirely. I attribute this fact to the increased oxygenation of his blood, on account of his improved capacity for respiration.

Case III.—John W. White, aged 16, 130 East 32nd Street, New York, came to me, March 16, 1877, with lateral curvature. Father died of Bright's disease, mother healthy, sister also healthy. Always well as a boy, until about eighteen months since, when he began to observe that his back was getting crooked, the result, as he thought, of sitting on an uncomfortable bench in school. His mother attributed the deformity to his having carried heavy weights in one hand (*e.g.* a ton of coal, some months previous, in a pail).

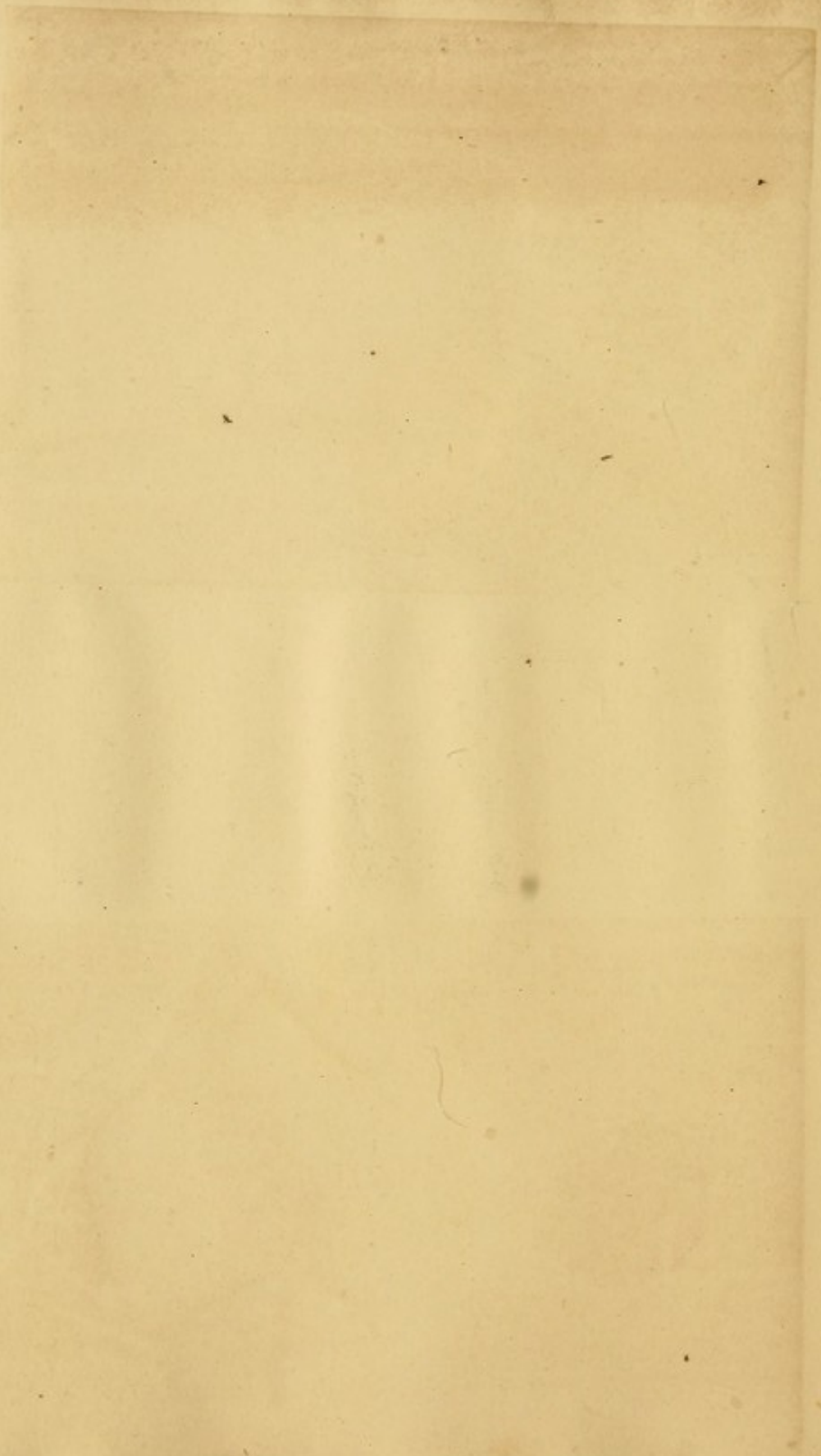
He was immediately fitted with an iron brace, at a public institution in the city, and has worn it constantly during the day, and most of the time at night also. Notwithstanding this constant use of the brace, the deformity has increased until he is as seen in Photograph III., fig. 1, and he is very pale and weak—as he says, 'very short-winded.' Was suspended at the Academy of Medicine, before the Surgical Section, March 23, 1877, and the plaster bandage applied, with the result as seen in fig. 2, taken shortly after by Mr. Mason, of Bellevue Hospital.

Fig. 1.

Fig. 2.

Photograph III.

To face p. 106.

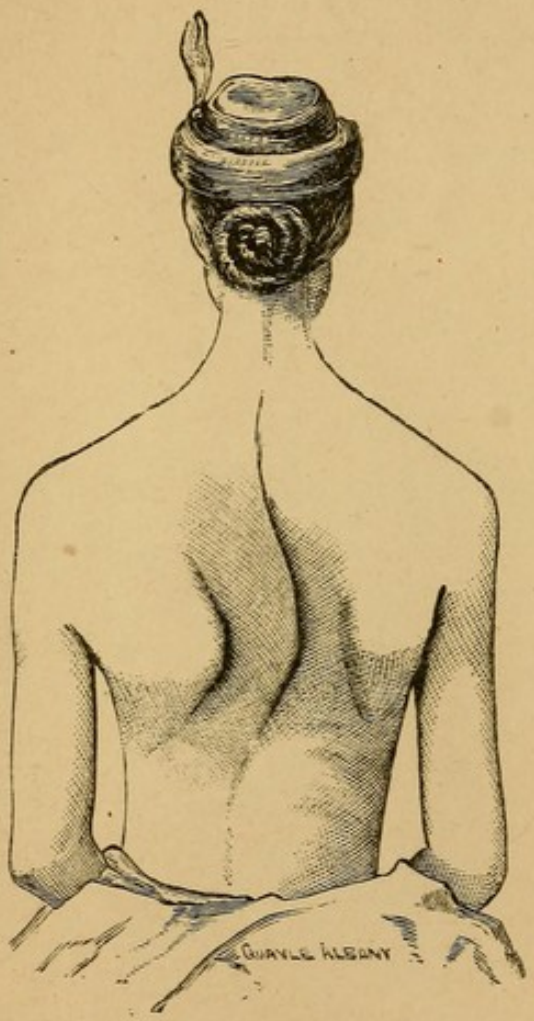


The difference in his complexion within an hour was most marked, and observed by all the members present.

The boy said he was perfectly free from pain, and could breathe more freely.

His height, as measured by Dr. Stephen Smith, was increased $\frac{3}{4}$ of an inch, and his respiration 14 cubic inches.

FIG. 57.



This case is also represented in the frontispiece, which is given in order to show the entire plan of treatment at a glance.

The following case shows the advantage of extension and the plaster of Paris jacket over Banning's braces, which had been previously worn by my advice :—

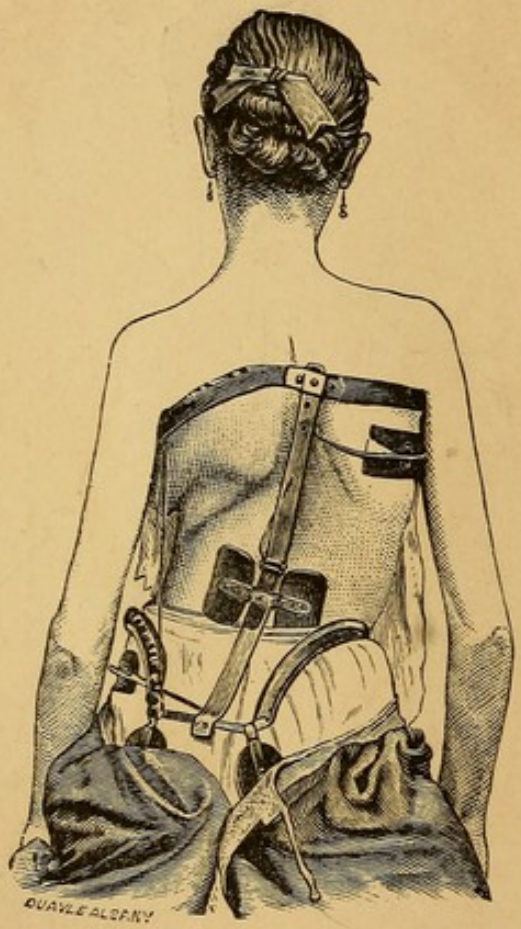
CASE IV.—Miss Nellie Pierson, aged 15, Providence, Rhode Island. Came to me January 30, 1875, with a very marked

rotary-lateral curvature, which her mother thought had been developed within the past year. She attributed it to sitting sideways at school, six hours daily, and taking music lessons.

Her condition at that time was as seen in fig. 57, from a sketch by Dr. L. M. Yale. The amount of distortion at the maximum is to the right about $1\frac{1}{2}$ inches; there is very considerable rotation.

Raising the patient from the floor, so that the entire weight

FIG. 58.



is supported by the arms, diminishes the curve about half.[1] The rotation is unchanged; the spine seems consolidated; the anterior spinous processes of the ilium are nearly level.

Up to this time I had not tried self-suspension by the head and arms, in cases of lateral curvature; and the result of all treatment by braces of different kinds that I had employed was so un-

[1] I did not at that time suspend the patients from the head, or allow them to suspend themselves, as I now do.

satisfactory that I refused to treat any cases that were so far advanced as this was, and was glad to send them to any one who thought he was more successful than I had been. I therefore sent her to Dr. Banning, who applied one of his braces, see fig. 58. This she wore constantly day and night for more

FIG. 59.

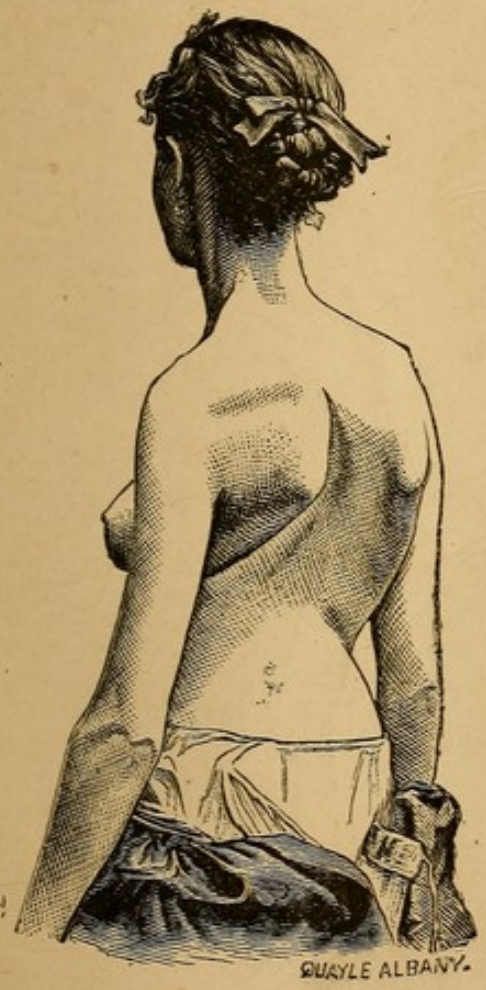
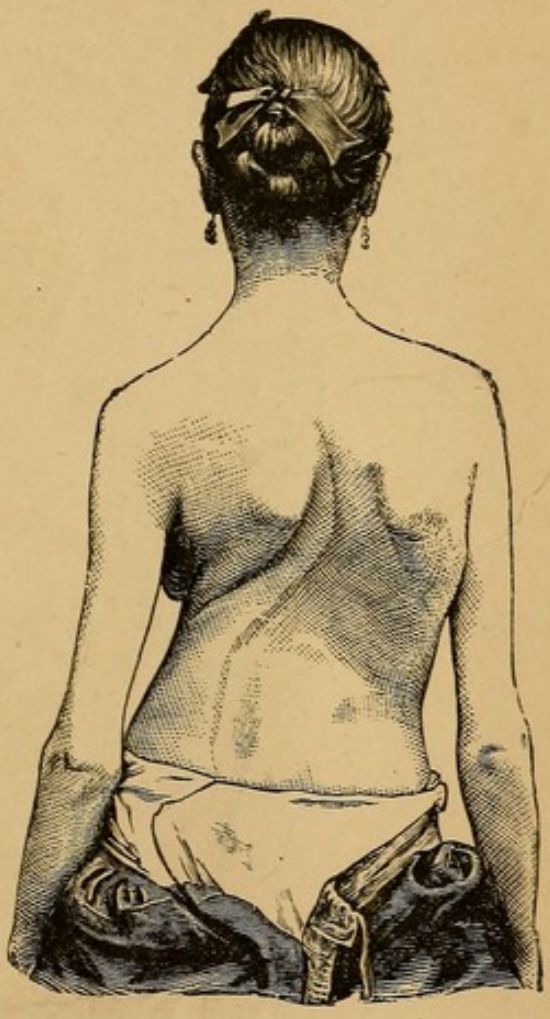


FIG. 60.



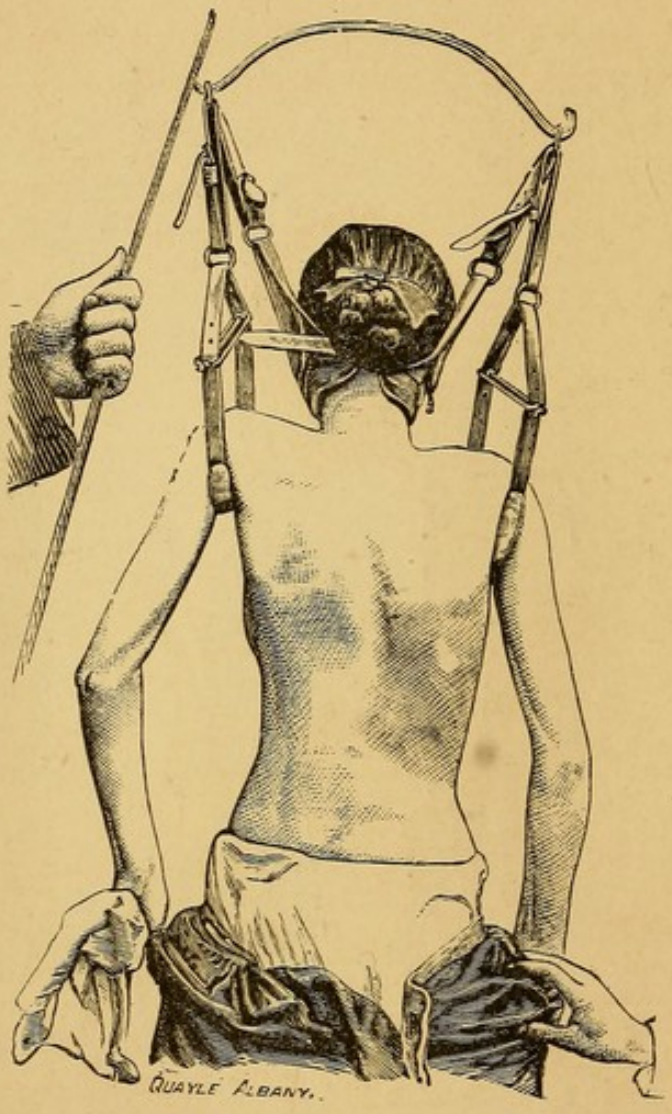
than a year, Dr. Banning himself attending to the different adjustments of it as occasion required.

She returned to me April 1, 1876, more crooked than when I last saw her (see figs. 59 and 60). When she was suspended, the curvature became very greatly diminished (see fig. 61).

April 2, 1876.—Applied plaster jacket (see fig. 62), which was worn until June 6, 1876, when it was removed, on account of her increased size making it too tight. She was self-suspended for a few minutes every day until June 10, when a new jacket was applied. Her position was very much improved.

She has continued practising self-suspension twice every day, for a few minutes at a time during the past year, has had two new applications of the jacket; and when I saw her last, in May 1877, she was quite erect, the shoulders even—simply wearing an ordinary corset that was fitted for her, by my advice, while she

FIG. 61.



was self-suspended. This is removed every night, like any other corset. After she practises her self-suspending exercises in the morning, her maid applies the corset while she is in the extended position.

Of course, in these cases the under-garment is put on before the corset is applied.

Within the past five months I have adopted the plan of cutting out an inch or two of the jacket, its entire length in front, then cutting the shirt and glueing it over the jacket, eyelet-hooks being inserted on either side; and the jacket and shirt thus used I find much better and more accurately fitting than any contrivance of the corset-maker.

Case V.—Gabriella Snow, æt. 14, Nyack, New York. Parents healthy; child always strong and active. Six months

Fig. 62.

ago, while fitting a dress, mother noticed a very slight lateral curvature, which has increased rapidly within the past few weeks. Dr. Polhemus, of Nyack, was requested to see her, and he advised the parents to bring her to me for treatment.

Her condition when I first saw her, May 23, 1876, was as

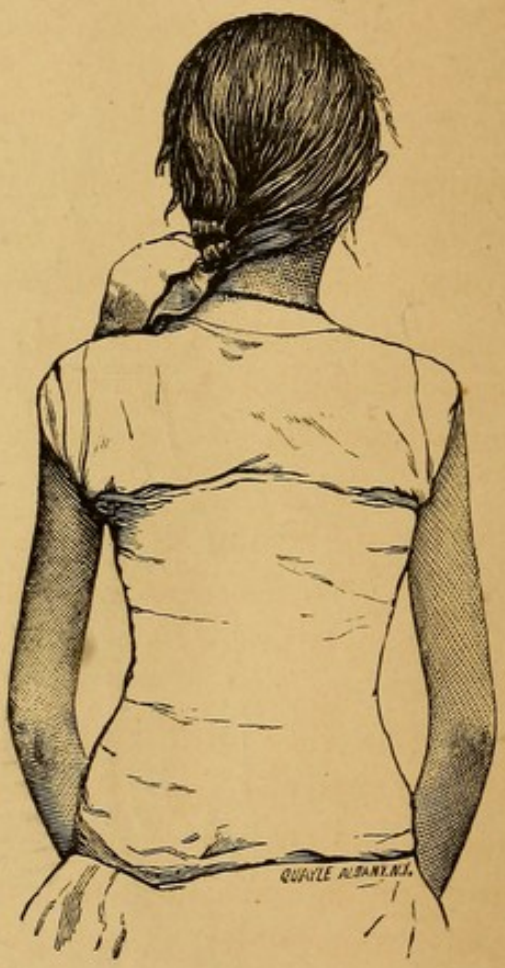
seen in fig. 63, from a photograph by O'Neil. When she was self-suspended she became almost perfectly straight.

A plaster of Paris jacket was applied, with the result as seen in fig. 64, from a photograph by O'Neil taken the same day as the first picture. She was 1 inch taller with the jacket on than before it was applied.

June 10, 1876.—Called to-day to ask if she could ride on

FIG. 63.

FIG. 64.



horseback. Has suffered no inconvenience or pain whatever, has improved immensely in the colour of her cheeks and general appearance, and says she feels much stronger. Has suffered no pain or inconvenience from jacket whatever.

June 24.—Removed jacket, curvature very sensibly diminished; has practised self-suspension twice daily, and is very much improved in every way. Reapplied the jacket, carrying

Fig. 1.

Fig. 2.

Photograph IV.

To face p. 115.

it higher up under the axillæ : she is $1\frac{1}{4}$ inches taller than before the first jacket was applied, and $\frac{1}{4}$ inch taller than while the first jacket was on.

July 20.—Can ride on horseback for hours, and has become very much stronger. Can walk and exercise all day without fatigue ; formerly she was compelled to lie down after very slight exercise. Jacket renewed ; she is almost perfectly straight. Continues self-suspension.

October 1, 1876.—Jacket cut down in the front on account of slight pressure on mammæ—which had become very much developed within past few months. General health perfect.

December 20, 1876.—Jacket removed, spine almost perfectly straight, advised to continue self-suspension daily, and use an ordinary corset, which was to be fitted to her when self-suspended and applied daily when in same position.

May 1, 1877.—In robust health, and figure perfect. Takes a great deal of horseback exercise, and continues practice of self-suspension, as a matter of choice and amusement.

The following case is one of extreme distortion, yet the patient was immensely benefited by self-suspension and the plaster jacket.

Case VI.—Miss Katie A. Bowlsby, aged 14 years, of West Liberty, Iowa. Was born with ribs of right side twisted, and breast-bone projecting (so says the mother) ; was always frail and delicate, but within the last two years has grown more and more crooked, and is now rapidly getting worse.

Present condition, April 20, 1876 : Very much emaciated, the spine greatly distorted, more so than as seen in fig. 65.

On suspending her in the apparatus, she extended $1\frac{1}{8}$ in. ; and the curvature which was at the point marked X did not return, as I expected it would.

Before she was suspended at all, there was another curve in the lumbar region at the point marked X, which did not

return after the first suspension, although nearly two hours elapsed before the photographer took her picture.

In fact, when they sent me the picture a few days afterwards, I did not recognise it, as there was as much difference between

FIG. 65.

her figure before suspension and fig. 65 as there is now between figs. 65 and 66.

April 21, 1876.—Suspended her, and applied plaster of Paris jacket, with the result as seen in figs. 66 and 67, from photographs by O'Neil, showing front and back view two days after the application of the bandage.

A few days subsequently menstruation appeared for the first time, lasted five days without any pain whatever, and she felt much stronger in every way; could sit up for an hour and a

half at a time, while she had previously been only able to sit up for a few minutes. She practised self-suspension twice daily, for three minutes at a time, and improved rapidly in her general health.

May 15.—Applied a new dressing. Very much improved.

June 1.—Had grown so much better that the casing was loose, and a new one was applied. There was a very marked im-

FIG. 66.

FIG. 67.

provement in her figure when the jacket was taken off, so much so that her mother, thinking herself capable of carrying on the treatment, left for Iowa on June 8.

CASE VII.—'Miss Lizzie Wolfe, aged 16, No. 22 East 12th Street, New York, came to me February 20, 1877, with lateral curvature, as seen in Photograph IV. fig. 1. The deformity began to develop when she was about 13, and had increased rapidly, the

mother thought, within the past year, although she had worn braces constantly night and day for three years past. The lever power of the brace had been applied with great force, as can be seen by the excoriations over the angles of the ribs on the right side; another, equally bad, galled surface was in front, and on the outer side of the left hip; and quite a deep sulcus in front and under the axilla of the right side.

She suffered constant pain from the pressure of the brace, and said her breathing was getting shorter and more difficult all the time. She was very languid, easily fatigued, and could not go upstairs without getting out of breath.

After the photograph (IV. fig. 1) was taken by Mr. O'Neil, she suspended herself, and the plaster bandage was applied, which gave her perfect relief from pain, increased her height $\frac{3}{4}$ of an inch, and her capacity for inspiration, as tested by the spirometer, 18 cubic inches. The improvement in her figure is seen in Photograph IV. fig. 2, by O'Neil on the following day.

April 1.—Has practised self-suspension twice daily, and so much improved as to require a new jacket, the curve in the angles of the ribs quite perceptibly changed, and the back much straighter. Says she feels stronger, and can work all day without fatigue.

The notes of the following case of lateral curvature were kindly furnished me by Mr. W. E. Balkwill, Surgeon to the Royal Orthopædic Hospital, London :—

Case VIII.—'Jessie Brown, of Glasgow, aged 20, a fairly nourished and tall woman, has been troubled with lateral curvature of the spine for some years, and for which she has worn the usual spinal supporter.

'She came under Dr. Sayre's notice at the Royal Orthopædic Hospital about the middle of July. On examination there was found a considerable right-dorsal curve, and another in the lumbar region—an ordinary case of lateral curvature (vide Plate III. fig. 1).

Fig. 1.

Fig. 2.

Fig. 3.

Plate III.

To face p. 117.

'She was allowed to suspend herself, when fig. 2 was taken, which shows the change produced in her form.

'The plaster of Paris bandage was then applied, while she was self-suspended; and after it had become perfectly hard, she was quite erect, as seen in fig. 3, and expressed herself as feeling very comfortable: she had increased in height one inch and one eighth, by accurate measurement.

'She practised self-suspension every day for a few minutes, according to the plan recommended by Dr. Sayre, and at the end of three weeks it became necessary to apply a new bandage, to fit her improved form. This was done on August 17, 1877, in the presence of Dr. Sayre and Mr. Baker. The improvement in her form at this second application was even more marked than at the first, and she expresses herself as greatly gratified at the result, and perfectly comfortable, without the slightest pain or inconvenience.

'Sufficient time, however, has not elapsed to justify me in giving any opinion as to the ultimate result.

'Wm. E. Balkwill.

'August 20, 1877.'

Lateral Curvature, with Structural Shortening, or contractured Latissimus-Dorsi Muscle, requiring Section.

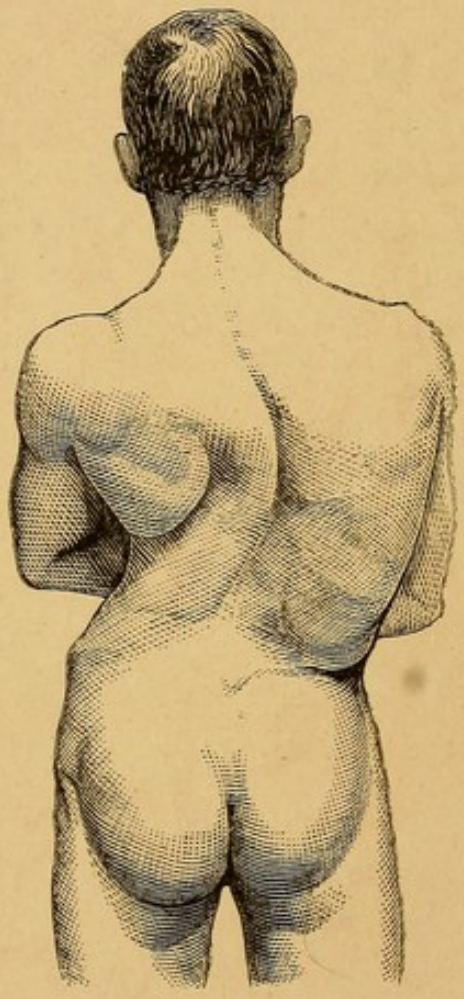
Case IX.—Hugh Gillen, aged 19, Mulberry Street, New York, butcher's boy, came to Bellevue Hospital, November 1875, suffering from lateral curvature of the spine. He was a remarkably stoutly built boy, and very muscular. Had been accustomed, as he stated, to carry heavy baskets of meat on his left shoulder, holding the basket in place by passing his right arm over his head, and it was to this habit that he attributed the curve in his back.

The curve commenced about three years before, and he immediately had a brace applied, but, as he says, without any benefit. The instrument was changed from time to time, and new ones applied with more powerful levers and screws; but

they all failed to give him any relief, and his deformity rapidly increased until he was unable to follow his occupation, and was admitted into Bellevue Hospital as an incurable—as seen in fig. 68, from photograph by Mason.

Upon suspending him[1] the latissimus-dorsi muscle was brought very prominently into view (see fig. 69, from photograph

FIG. 68.

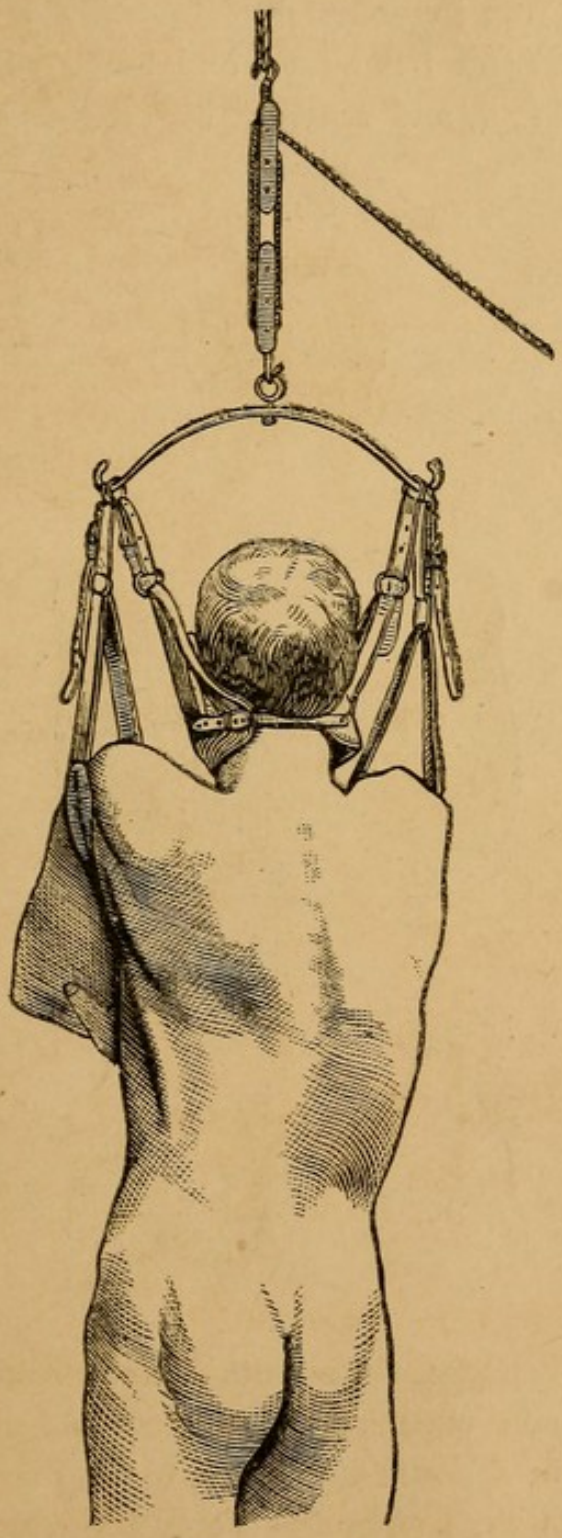


by Mason of Bellevue). This muscle remaining equally tense after some minutes of suspension, and showing no tendency to elongate, I simply pressed my finger upon it, when he immediately had a spasm of almost all the muscles in his body—showing reflex irritability from contractured tissue, and that it could

[1] I had not at the time tried self-suspension.

not be elongated or stretched, and must therefore be severed either by rupture or section.[1]

FIG. 69.

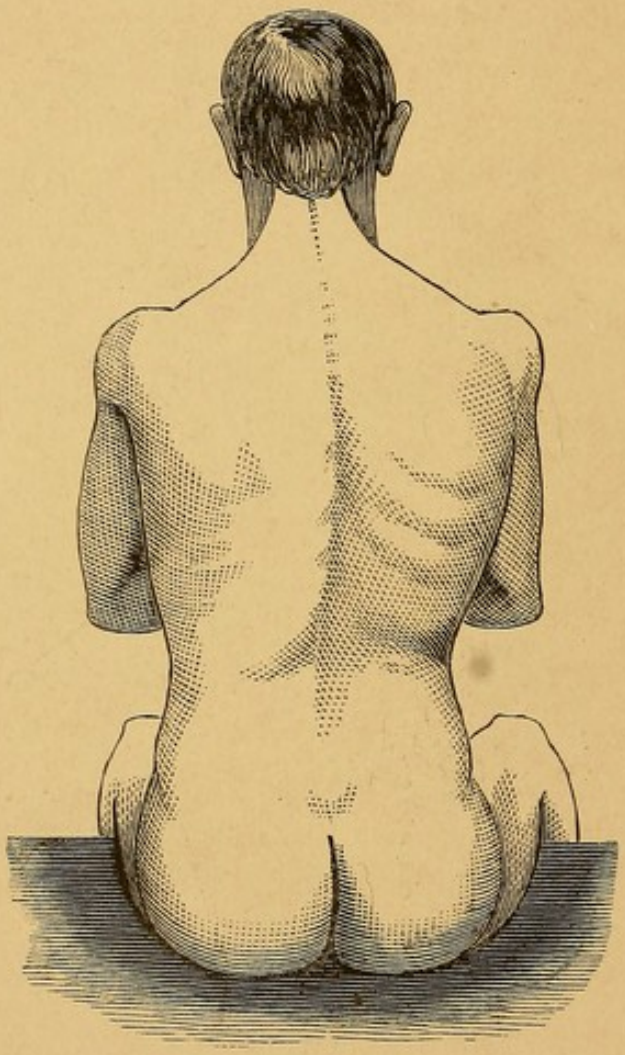


[1] For a fuller explanation of this principle of reflex spasm when point pressure is made on stretched *contractured* tissues, see author's work on Orthopædic Surgery (Appleton & Co., New York, and Churchill, London, 1876).

I therefore divided the entire latissimus just opposite the lower angle of the scapula, subcutaneously, while he was suspended, and almost instantly the spine became nearly straight.

The wound was immediately hermetically closed, and the patient removed from the swing and laid upon his bed, with weights to each foot, and axillary bands going over the head

FIG. 70.



of the bed, for the purpose of maintaining extension of the spine. Two elastic bands were also placed around his thorax and pelvis, drawing in opposite directions, to keep the body straight.

After he was thus extended he said he felt perfectly comfortable, and could breathe better than he had done for many months.

He had no constitutional disturbance whatever, and in twelve days he could sit up quite straight in bed unsupported (as seen in fig. 70). The curve in the angles of the ribs on the right side is not entirely removed, and I presume never will be.

At the end of two weeks he was suspended, and the plaster jacket applied, after which he left the hospital and resumed his business.

He was requested to wear it for some months if necessary, and to practise self-suspension daily.

When last seen, in November 1876, he was greatly improved, and simply used his jacket as a corset, lacing it in front.

THE END.

LONDON: PRINTED BY
SPOTTISWOODE AND CO., NEW-STREET SQUARE
AND PARLIAMENT STREET

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