

Contributions to the pathology, diagnosis, and treatment of angular curvature of the spine / by Benjamin Lee.

Contributors

Lee, Benjamin, 1833-1913.
Francis A. Countway Library of Medicine

Publication/Creation

Philadelphia : J.B. Lippincott & co., 1867.

Persistent URL

<https://wellcomecollection.org/works/zh2xvs3d>

License and attribution

This material has been provided by This material has been provided by the Francis A. Countway Library of Medicine, through the Medical Heritage Library. The original may be consulted at the Francis A. Countway Library of Medicine, Harvard Medical School. where the originals may be consulted. This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.



Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
<https://wellcomecollection.org>

ANGULAR CURVATURE
OF THE SPINE
LEE

Dr R. M. Hodges

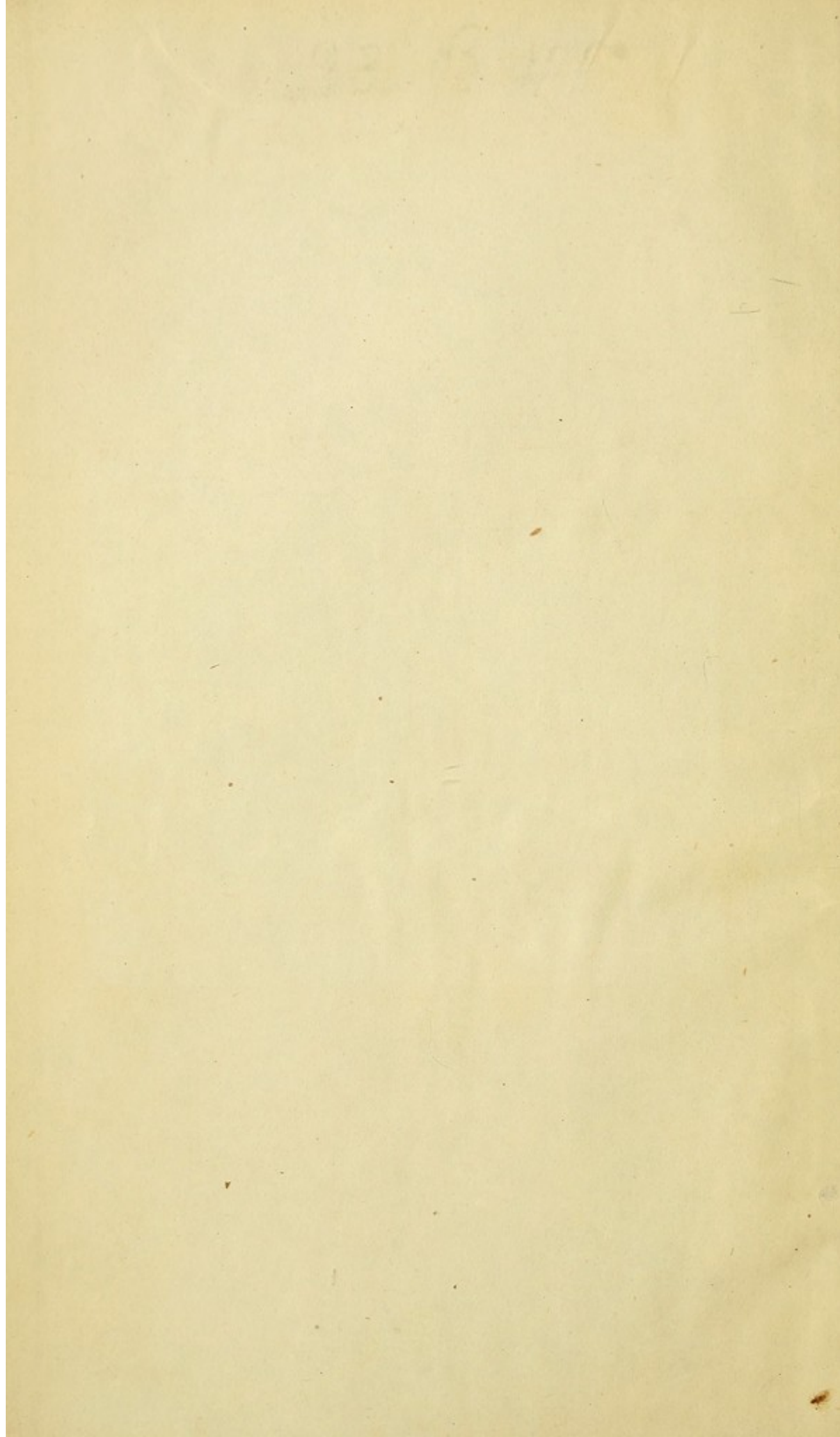
BOSTON
MEDICAL LIBRARY
ASSOCIATION.

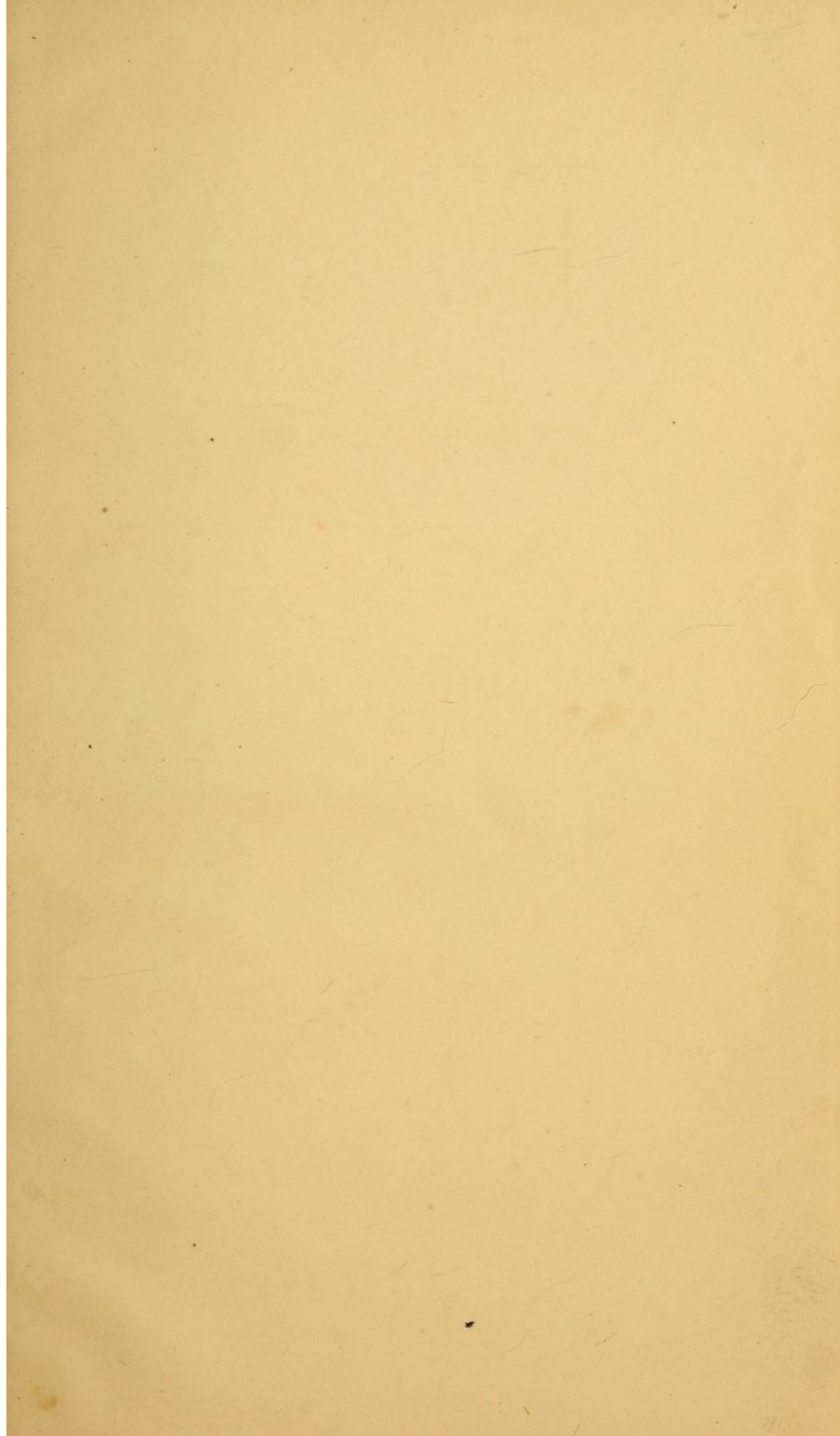
Section *23* Shelf *E*
No. *41*

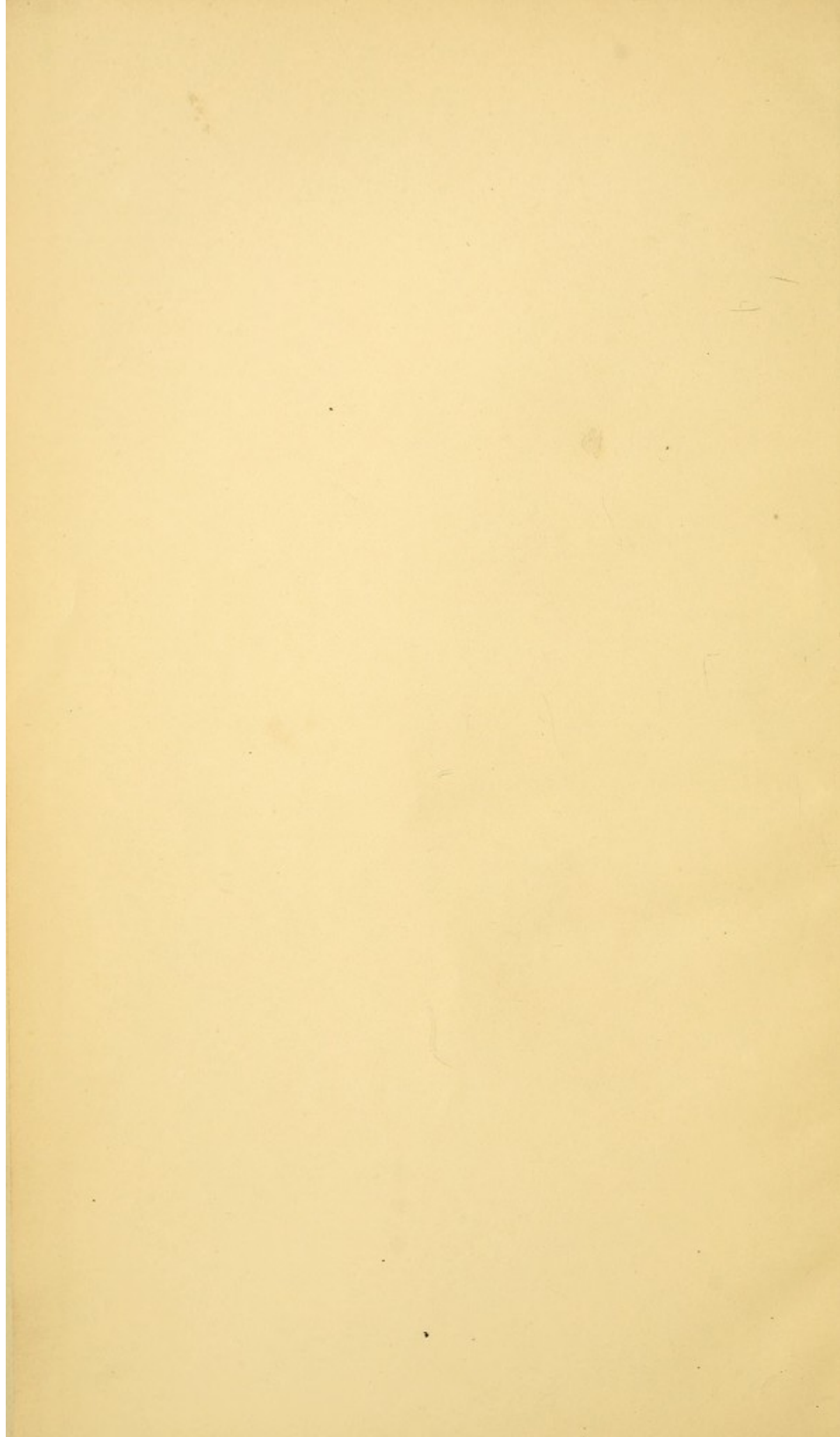
GIVEN BY

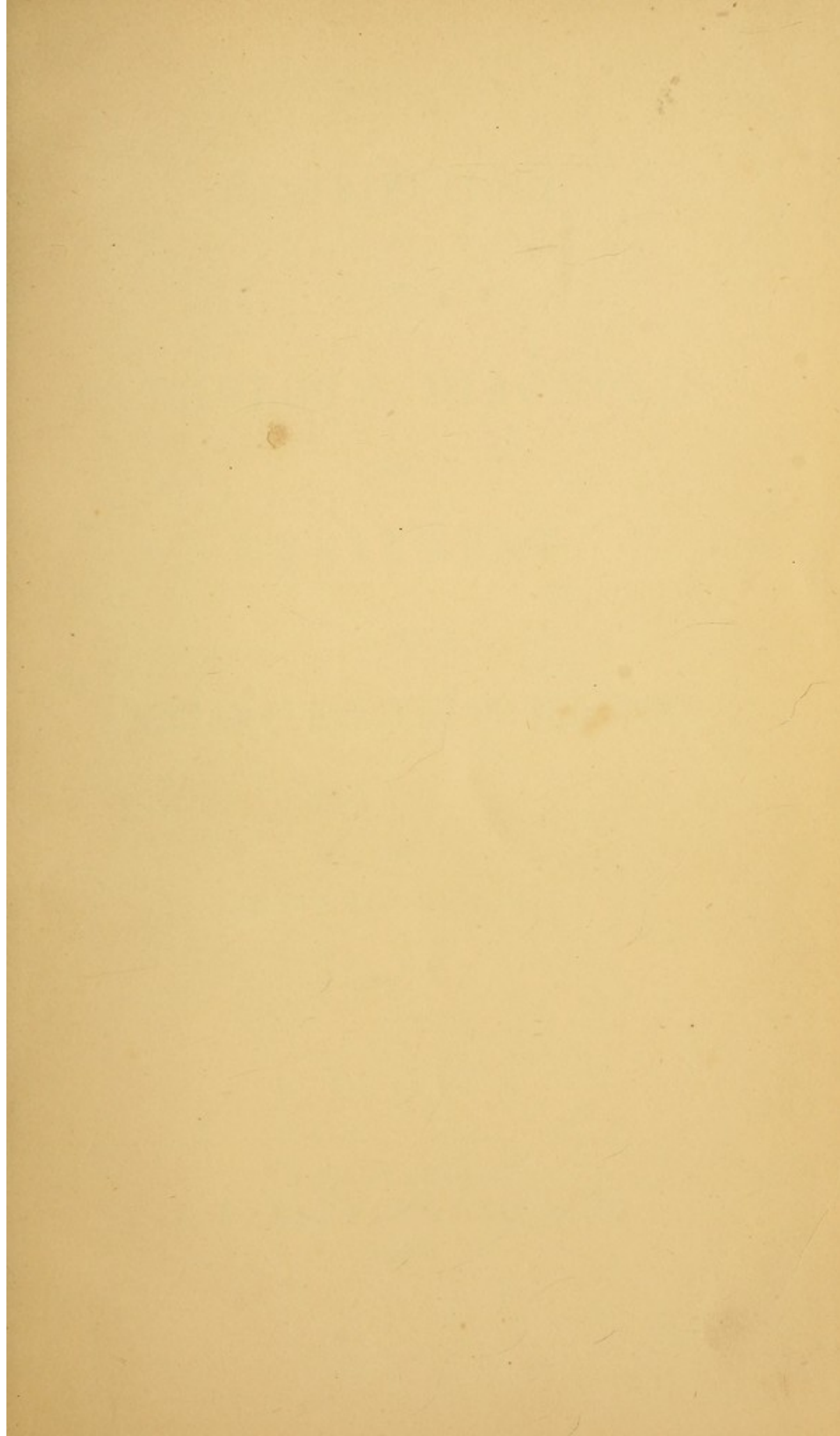
Dr. R. M. Hodges

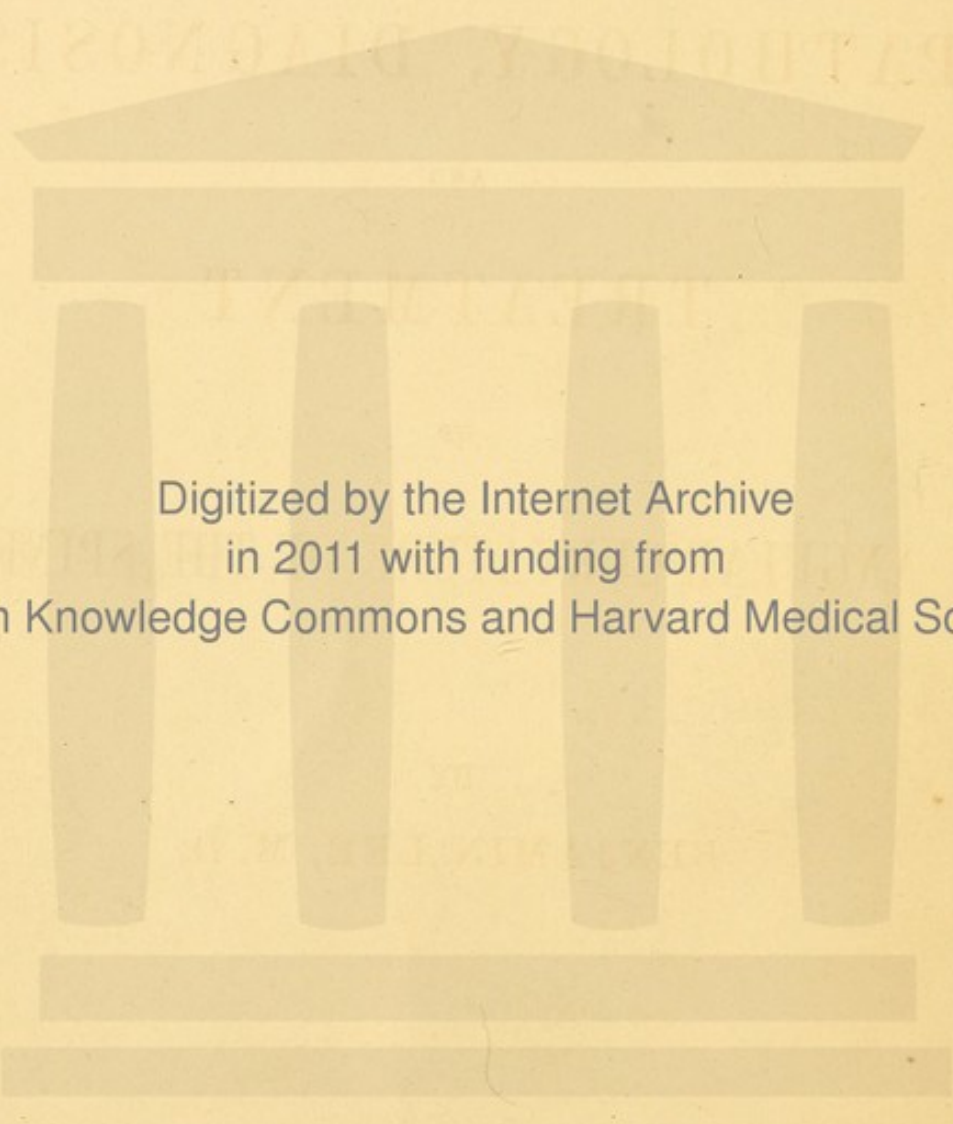










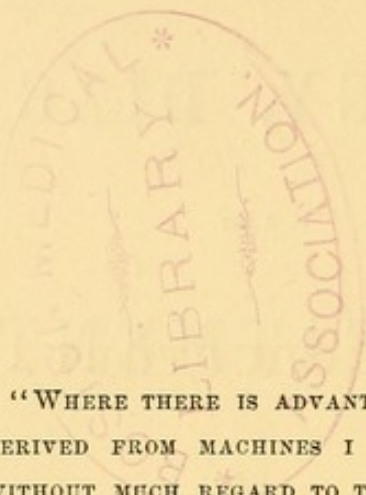


Digitized by the Internet Archive
in 2011 with funding from
Open Knowledge Commons and Harvard Medical School

CONTRIBUTIONS
TO THE
PATHOLOGY, DIAGNOSIS,
AND
TREATMENT
OF
ANGULAR CURVATURE OF THE SPINE.

BY
BENJAMIN LEE, M. D.

PHILADELPHIA:
J. B. LIPPINCOTT & CO.
1867.



"WHERE THERE IS ADVANTAGE TO BE
DERIVED FROM MACHINES I USE THEM,
WITHOUT MUCH REGARD TO THEORETICAL
OBJECTIONS."

PROF. J. K. MITCHELL.

Entered according to the Act of Congress, in the year 1867, by
BENJAMIN LEE, M.D.,
in the Office of the Clerk of the District Court of the United States in and for the Eastern
District of the State of Pennsylvania.

INTRODUCTORY.

MECHANICAL THERAPEUTICS.

THE LOST CITY

MY DEAR MARY

I have just received your letter of the 10th inst. and am glad to hear from you. I am well and hope this letter will find you the same. I have been thinking of you very much lately and wondering how you are getting on. I hope you are happy and contented. I have been very busy lately with my work, but I have managed to find some time to write to you. I have been thinking of you very much lately and wondering how you are getting on. I hope you are happy and contented. I have been very busy lately with my work, but I have managed to find some time to write to you.

I have been thinking of you very much lately and wondering how you are getting on. I hope you are happy and contented. I have been very busy lately with my work, but I have managed to find some time to write to you. I have been thinking of you very much lately and wondering how you are getting on. I hope you are happy and contented. I have been very busy lately with my work, but I have managed to find some time to write to you.

PROF. FORDYCE BARKER, M.D.

MY DEAR DOCTOR:—

It is now ten years since I had the honor to present to the Censors and Faculty of my medical *Alma Mater*, of which you, my preceptor then, always my friend, were an honored member, a thesis entitled "THE MECHANICS OF MEDICINE." This thesis, doubtless on account of the novelty and intrinsic merit of its subject rather than its mode of treatment, was, as you may possibly remember, considered worthy to receive one of two prizes offered for the two best essays by members of the graduating class. Pardon me if I recall its concluding sentences:—

"I have thus given, very cursorily and unsatisfactorily, a view of the principal mechanical means resorted to in the diagnosis and treatment of disease. I have shown that many of these are of recent date—that the tendency at the present day

is to the increasing use of remedies of this nature; and if I have succeeded in expressing my own convictions, that this tendency is proper, necessary, and founded on the dictates of sound reason and pure philosophy. I would not be understood as desiring to give this class of remedial agents an undue preference, or as depreciating, in their proper sphere, the valuable preparations of the *materia medica*, but I would have 'rendered unto Cæsar the things that are Cæsar's;'—I would have physicians recognize in this wonderful frame of man the composite piece of mechanism as well as the mysterious physiological being and the beautiful laboratory of chemical processes and affinities."

The opinions thus seriously held and unhesitatingly expressed at the outset of my professional career, time and experience have only served to strengthen. Catching a spark of the enthusiasm with which you infected your class for the branch of which you were professor, I at first found in the mechanical problems of obstetrical science a congenial study; and, during a residence of some months in Vienna, availed myself of the munificent facilities

afforded by the Imperial Royal General Hospital of that city and the valuable instructions of that good friend of the American student, Gustav Braun, with the intention of devoting myself more especially to the practice of midwifery and the topical and mechanical treatment of uterine disease. In pursuance of the same design, I discharged, for a period of two years after my return, the duties of physician to the Demilt Dispensary in New York, holding the department of "Diseases of Women," in an association with our mutual friend, Prof. E. R. Peaslee, which I recall as equally pleasurable and profitable. With a growing practice, however, and especially, perhaps, influenced by my observation in the very discouraging class of affections just referred to, I became more and more convinced of the importance, nay, the *necessity*, of a more complete, general, and intelligent adaptation of the principles of mechanical science to therapeutic ends in a large range of chronic affections. It was, therefore, with intense interest that I became acquainted, in 1861, with the Swedish system of Ling, as modified and practised

by Dr. Charles F. Taylor, under the designation of "Localized Movements." It was the realization and embodiment of the ideas which I had been so long incubating. I at once proceeded to test its claims to professional confidence, by placing some of my patients under Dr. Taylor's care, and, during the next two years, took constant opportunities of observing his method and its results. My *a priori* belief that the conception of a system of Remedial Mechanics was founded on "sound reason and pure philosophy," I found fully substantiated by the inexorable logic of facts. I thought that I saw here a field for investigation and observation as yet little explored, and determined to be among the first to occupy it. Your advice, as that of all my professional friends, was adverse to such a course. I preferred, however, to follow the unspoken admonition of your example, which was ever that of independent thought, fearless investigation, and an upholding of absolute truth at all hazards. I trust that you will find in the following pages some slight vindication of the wisdom of my decision. The papers which I have thus thrown together

under one general title are published with little variation as they at first appeared, and in the sequence of time rather than of logic. I am aware that they are liable to the charge of repetition; but they could not have been made homogeneous without destroying the individuality, and, therefore, as it seemed to me, diminishing the force, of each.

In regard to No. III., on "Correct Principles, etc.," I think you will agree with me that the unanimous action of the Prize Committee, numbering among its members such men as the elder Flint and James R. Wood, in recommending for publication a paper which was technically deprived of all claim to their consideration, is a most gratifying evidence of their appreciation of its merits. You may possibly feel inclined to question the accuracy of the diagnosis in those cases recorded in the fourth paper (which, although not before published, was already in the journalist's hands when I concluded to present it in this connection), in which deformity had not as yet declared itself. I can only reply that *cura probat morbum* is a dogma as old as the father of medicine, and point to the fact

that the relief afforded by mechanical support, after other means had failed, in all of these cases, was too immediate and too marked to be explained upon any other theory. The pre-ulcerative diagnosis of spinal inflammation appears to me to possess an importance which cannot be over-estimated. If I can but succeed in inducing any considerable number of the profession to share my earnest conviction upon this single point, I shall feel that it is not in vain that I have devoted myself to the study and development of MECHANICAL THERAPEUTICS.

Yours in grateful remembrance of all past kindnesses,

BENJAMIN LEE.

1503 SPRUCE STREET, PHILADELPHIA.

January, 1867.

I.

INITIAL GASTRALGIA.

Reprinted from the American Medical Times for July 16, 1864

G A S T R A L G I A,
THE INITIAL SYMPTOM OF CARIES OF THE VERTEBRÆ.

MY attention has been so frequently called of late to an important, early, and characteristic symptom of spinal caries, that I feel at liberty to claim for it a more careful consideration on the part of the profession than, I am convinced, they have heretofore given it.

I refer to acute, paroxysmal, often excruciating pains in the abdomen, generally so nearly in the neighborhood of the stomach that I have ventured to group them under the term of *gastralgia*, although if I should insist on the strict derivation of the word (from *γαστήρ*,¹ the belly), I might make it cover the entire region. My meaning, however, is sufficiently plain. I desire to indicate a pain originating in the majority of instances at the epigas-

¹ Epigastric and hypogastric evidently signify, respectively—*epi*, at the top of, and *hypo*, at the bottom of, *gaster*, the belly.

trium, less often at the umbilicus or between these two regions, and in the smallest number of cases in one side or the other.

This pain is almost invariably the first symptom of commencing caries, or perhaps I should more correctly say, of the inflammation, whether of the intervertebral cartilage or of the periosteum, which precedes the caries; for unhappily our pathology is not yet sufficiently advanced to enable us to say with confidence what the first organic change is. Whether the disease have a traumatic origin in a perfectly healthy system, or be the result of a vice of constitution, the fact is still the same, that in nine cases out of ten it is ushered in by long-continued and oft-repeated attacks of gastralgia.

The point at which the disease is situated exerts, indeed, a modifying influence upon this symptom, the mid-dorsal being the region in which it is most characteristic and most apt to be confined to the epigastrium; but at no point is there entire immunity. The pain does not take its starting-point at the seat of disease and radiate towards the anterior surface of the body, but, as I have stated, *originates* in front. The length of time during which the patient suffers from it before the ulcerative process has destroyed enough of the substance of the bone

to produce actual and unmistakable deformity is variable; but it has been noticed not unfrequently six months, and in some cases an entire year previous.

So constant is this phenomenon, that out of nearly a hundred cases which I have examined during the past year, I do not think that half a dozen failed to present it; and in some of these latter there was an entire absence of constitutional symptoms; (for, strange to say, the disease may, in rare instances, go on to produce very marked deformity without in the least affecting the general health).

In view of this fact, I have with astonishment observed the complete silence of surgical works upon this point. Some of them, indeed, speak of pains taking their rise at the spine and radiating along the sides; but even these are not assigned the place of importance which they deserve as the ushers of the disease.

Nor does the practising profession appear to be more familiar with the sign. Case after case presents itself with the almost stereotyped history of the first stage:—"doctored for worms,"—or "our family physician treated the case at first as inflammation of the bowels" (a mistake, by the way, which, when the disease is ushered in acutely with febrile reac-

tion, as may sometimes happen, is not singular)—or the physician himself frankly admits that for a long time he supposed that he had to deal with simple *gastralgia*, or chronic *gastritis*, and administered his remedies accordingly. Now, no man is to blame for at first taking the prominent symptom for the whole disease; but if the symptom persist, and resist the ordinary remedies, and especially if the pain be decidedly paroxysmal in its character, then let him look most anxiously for indications of spinal inflammation.

Pain in the *glans penis* attracts the attention of the physician, not to that point, but the neck of the bladder as the seat of irritation. The surgeon who, at the present day, would permit a patient complaining of constant or frequent pain in the knee to go without a careful examination of the condition of the hip joint, would be considered in the highest degree culpable. In the same manner, and as inevitably, should a persistent paroxysmal *gastralgia* draw the physician's mind, as by an intuitive inference, to the spinal column as the focus of irritation.

Let us suppose the observer fully alive to this fact and on the alert. He is led to suspect the true cause of the suffering. For what shall he look to corroborate his suspicion? First, I say emphati-

cally, NOT for pain or tenderness along the course of the spine; for if there is one law of this disease more fixed than the positive one which I have been affirming, it is the negative one that its earlier stages are not accompanied by pain at the seat of disease, or tenderness on pressure over the spinous processes. If, therefore, the physician relies upon this, I believe universally admitted, sign, he will be disappointed in his investigation, and will lose precious time.

Lesions involving nervous centres express themselves often, perhaps usually, through the general system rather than locally. Let him, therefore, carefully scan the carriage and gait of his patient. If he turn the toes in, if he hold the trunk slightly bent forward and rigid as though apprehensive of a concussion or jar, if he refuse to bend the back in stooping to touch the floor, then there is undoubtedly mischief going on between some of the vertebræ. But he may not yet feel satisfied without some "ocular demonstration." Let him then strip the patient's back, and place him in a good light. Let him examine first laterally. If he find at any point in the spine an angle, not necessarily a projection, but simply an angle, in place of the normal curve, he has found the seat of disease. This fail-

ing, let him take the full view of the back. If there be a lateral deviation of the spine, and that deviation present not a curve but an angle, he has then an evidence of *angular curvature* (so called) of the spine.

These instructions will serve to detect the disease very early in its history; so early that very little injury can have been wrought.

No intelligent physician will rest satisfied with a faulty diagnosis, even if no point of practice is involved; but in the disease in question the patient's entire future is at stake.

The dictum of the learned Dr. Miller in regard to both the affection under consideration and *morbus coxarius*, "that in but few cases a successful issue is to be expected," is happily no longer true. American ingenuity has afforded efficient means for the treatment of both these *opprobria* in their earliest stages, and the question of their early diagnosis is thereby rendered not simply a professional refinement, but a matter of the gravest practical moment.

The following case, as will be seen from the dates, had only just come under my notice when the above was written, and was not published at that time;

but it illustrates the subject so admirably that I now feel constrained to make use of it.

CASE. *Spinal Caries; Initial Gastralgia nine months previous to the appearance of Posterior Projection; Complete Paraplegia, with Rigidity and Reflex Contractions; Restoration of Health and Power of Locomotion; Diminution of Deformity.*—John R. F——, æt. eleven years, residing near Easton, Pa., was brought to New York on a stretcher, to be placed under the care of Dr. Taylor and myself, in the month of May, 1864. Previously to this step being taken, I had some correspondence with his father, a Presbyterian clergyman, who had watched the case with equal anxiety and intelligence. His history of it is so thoroughly typical in all respects, both as regards its management and its progress, that I give it with few exceptions in his own words, my own brief observations being in parentheses. I may premise that his health up to the date of this attack had been uniformly good, and that neither his parents nor his grandparents presented any constitutional taint.

“Our attention was first called to John’s case by very severe pains in the abdomen, which began on the 18th of May, 1862, and continued, at intervals,

for about ten days. These pains came upon him at the close of the day, and continued, generally, throughout the night. He had to be assisted in getting out of bed in the morning, and to be moved with care, as the movement of his limbs gave him much pain. After suffering with pains during the night he would bend forward in walking the next day, as I then supposed, merely to relieve the pain in his abdomen. Being at the time on a visit at a distance from my home, a neighboring physician was called in, who gave him cathartic medicine and ordered warm applications to the abdomen. After an absence of about three weeks, we returned home, but John did not regain his strength. His powers both of mind and body seemed to be getting less vigorous. Occasionally, during the summer, he would come running in from play and throw himself upon the floor and scream with the pain in his abdomen. This would continue but a few moments, when he would again run about, saying that he was well.

“He still maintained the drooping position when walking, and, by the middle of autumn, began to lean to one side. We now began to see more and more clearly that John was going down, and won-

dered much what could be the cause of his feebleness.

"Some time in the course of December we discovered, upon examination, that he had lateral curvature of the spine. Our family physician, as also several neighboring physicians, were immediately consulted, and by their advice he was given cod-liver oil and a preparation of iron, and ordered to have nourishing food. This treatment was continued during the winter. Early in the month of February, 1863, we discovered a slight posterior curvature, a single vertebra projecting a very little. On the 26th of the same month he was taken to New York, and shown to one of the most distinguished surgeons of that city, who pronounced the disease to be 'Pott's Disease of the Spine,' ordering, at the same time, that he have mechanical support immediately in connection with the medical treatment he was having." (Unfortunately this judicious advice was vitiated by the nature of the support suggested, which was simply) "a canvas stay, stiffened with whalebone, to be made by the child's mother with the aid of the family physician. This was immediately done, but the stay" (not only powerless to arrest deformity and the progress of the disease, but positively pernicious) "did not an-

swer a good purpose, as it confined his chest and caused him to cough almost constantly. He wore this stay until August, 1863" (when, the projection having steadily increased, and his health having failed in the same ratio, a brace which has been extensively advertised, and which, as a simple supporter in cases of muscular debility, appears to have accomplished good results, but which is altogether inadequate to the elevation of a carious spine) "was then procured, and did much better than the canvas stay. For a time, as we thought, he improved, but our fond hopes of his recovery were soon disappointed, for he began to decline more rapidly in the fall, and by the month of January, 1864, he walked with much difficulty, dragging his limbs, and having severe pains in his abdomen, and being excessively nervous and irritable. About the middle of February he took to his bed, and the brace which he was wearing was laid aside, as he could not wear it when lying down. Paralysis now made very rapid progress. Voluntary motion of the lower limbs soon ceased entirely."

(In the following May he was brought to New York. His condition was then as follows: The deformity was great, not less than six spinous processes in the lower dorsal region participating in the

projection, and there was a considerable deviation to the left, with corresponding distortion of the thorax anteriorly. His appetite was very poor. He was much emaciated. His nervous system was in that condition of extreme irritability which induces the childish fretfulness and impatience so characteristic of this distressing affection. Paralysis of the lower limbs was complete and was participated in by the expulsory muscles of the bladder and rectum; micturition being painful and tedious, and defecation never occurring naturally. There was much spastic rigidity of the muscles of the legs, and upon slight irritation they would be spasmodically flexed upon the thighs, although he was in the prone position, which he maintained constantly. His pulse was quick, irritable, and frequent, with occasional accesses of fever, and his countenance pale and exsanguine. He remained in New York three weeks, during which time he was seen by either Dr. Taylor or myself daily, often twice a day, the adjustment of the splint presenting considerable difficulties owing to the large size and peculiar shape of the prominence. The first indication of improvement was a diminution of the abdominal pains and increased ease in micturition. His father writes:—)

“The improvement was now very marked and

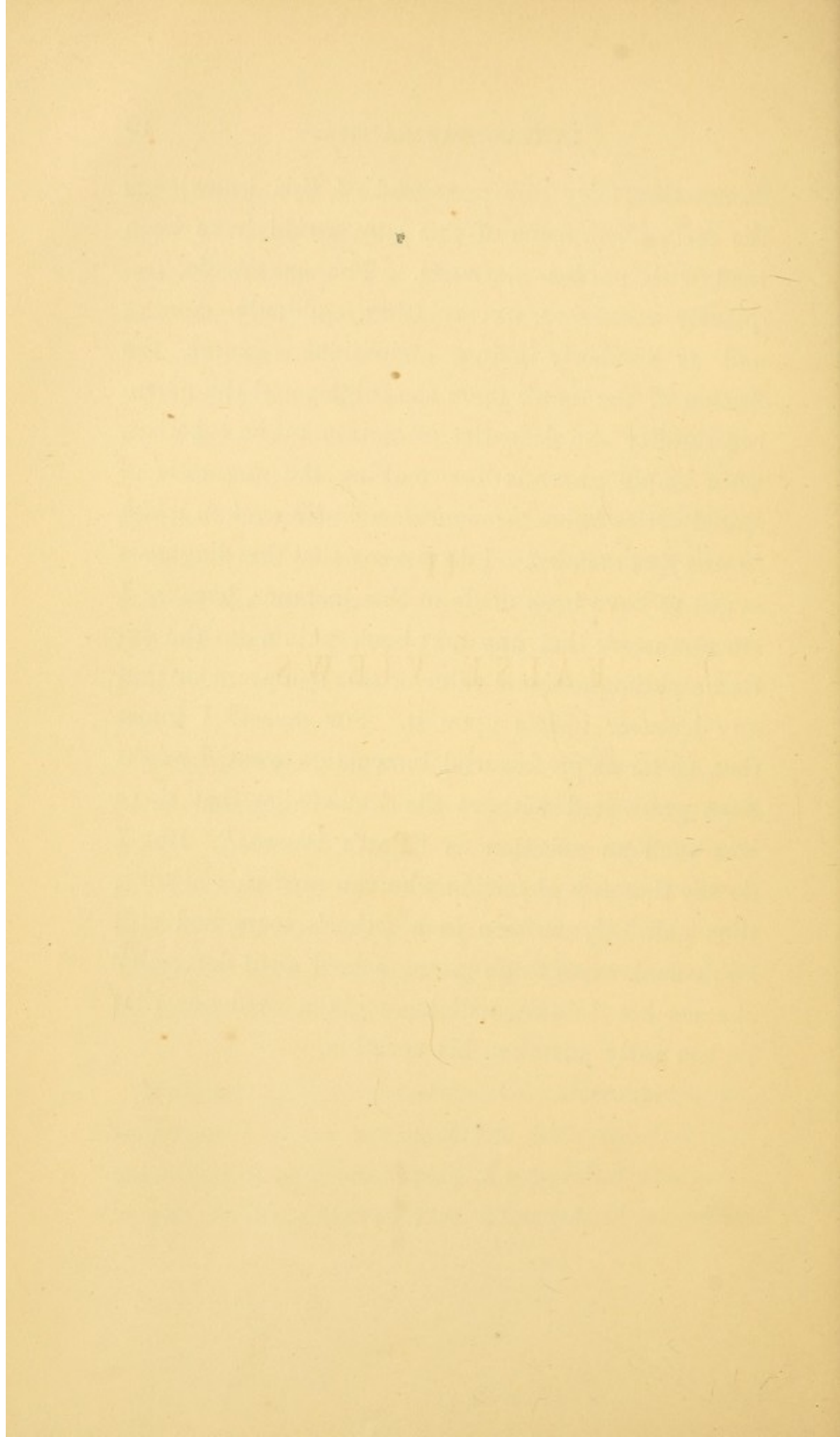
encouraging. Before leaving New York he could move his feet slightly; involuntary jerking of his lower limbs very soon wholly ceased; his bowels acted regularly and freely in a comparatively short time, and he could urinate without difficulty."

(It being very important that he should be saved the fatigue and jar of a trip by rail, I visited him two or three times at his own home in order to keep the instrument in an efficient condition (changes in the patient's form requiring corresponding alterations in the bearings of the splint), and on the occasion of each visit was able to announce a very decided improvement over his condition when last seen.)

"He gradually regained the use of his limbs, and in the early part of February, 1865, he began to walk. He has continued to improve until the present time, having walked a distance of two miles in several instances with comparatively little fatigue. There has been a very perceptible diminution of the curvature by actual measurement."

No case could more conclusively demonstrate the importance of an acquaintance with the fact that gastralgia or abdominal pain of a peculiar character, is, *par excellence*, THE INITIAL SYMPTOM of spinal in-

flammation. By one possessed of this knowledge the early phenomena of this case would have been read with perfect clearness. The spasmodic, frequently recurring, excruciating, suddenly coming and as suddenly going, abdominal seizures, the flexion of the trunk upon the thighs, and the morning rigidity and difficulty of motion, taken together, were ample grounds for making the diagnosis of spinal caries *before the expiration of the week in which he was first attacked*. I do not say that this diagnosis ought to have been made in this instance, because I am not aware that any text book points out the extreme pathognomonic value of this symptom, or that any lecturer insists upon it. For myself I know that, as far as professorial instruction went, I might have graduated without the knowledge that there was such an affection as "Pott's Disease." But I do say that any physician who can read this history, thus painfully written in a father's tears, and still allow such cases to go unrecognized until deformity shames his dulness, will have given evidence that he has sadly mistaken his vocation.



II.

FALSE VIEWS.

Read before the Medical Society of the State of Pennsylvania, at its
session at Altoona, June, 1865.

A BRIEF CONSIDERATION OF CERTAIN ERRORS IN REGARD TO THE PATHOLOGY AND TREATMENT OF ULCERATIVE INFLAMMATION OF THE SPINE, COMMONLY CALLED "POTT'S DISEASE."

I HAVE been led to prepare this paper by the frequency with which, during the past two years—in which I have been devoting myself more especially to the study of diseases of the spine and spinal cord—I have seen the integuments of the back seamed and scored and furrowed by the scars of the seton, the issue, the moxa, and the cautery, and by the remarkable regularity with which these appearances have been accompanied by serious, generally irremediable deformity. The question gradually forced itself upon me—Is this treatment, painful in its application, and exhausting in its operation, sustained by the test of experience or founded on the basis of reason? The numbers of unfortunates whom I saw, who bore unmistakable traces of having fully tested the benefits of this mode, and in

whom the disease was still unchecked, or checked only because the deformity had reached its natural limit before the patient had succumbed to its deadly power, gave a sadly eloquent negative to the first clause of the question. Let us briefly consider the second.

If we ask one set of practitioners what is the theory which leads them to adhere to a plan of treatment for the efficacy of which results tell so poorly, we shall be answered that this disease consists essentially in a strumous or tubercular deposit in the substance of the vertebræ, and that they rely on this process of counter-irritation and derivation to prevent this deposition if it has not already occurred, or to remove it if it has. As regards the first of these suppositions, I have only to say that I have seen but one case in which the disease had been recognized before a projection of one or more spinous processes had occurred. This projection can have but one cause, viz., destruction of the vertebral substance (if the disease be supposed always to originate in the osseous tissue); and this loss of substance presupposes the previous deposition and softening of the tubercle. As far as prevention goes, then, we may safely consider the treatment as chimerical, the opportunity almost never

presenting for its trial; although, even if it did, it is difficult to see in what way this irritative ulceration of dermis and areolar tissue could avert the blow which a vice of the constitution was aiming at the centre of a subjacent bone. How then is it proposed to eliminate this noxious material? Is it to be bodily extracted through the pus-exuding orifice in the skin? Is the theory with which a female hydropathic practitioner once startled and confounded me when I found fault with their terrible critical eruptions—"that the stuff is in there and must come out"—relied upon? Or is a part whose vitality was already so low that it could not resist the encroachments of this destructive stranger, to be strengthened and energized to expel it by exhausting the vigor of contiguous but utterly dissimilar tissues? Does any practitioner now-a-days attempt to drag the monster from its lair, by applying setons or issues over the chest in pulmonary phthisis, or over the abdomen in tubercular disease of the intestinal canal? Is not our aim rather, by husbanding every particle of the patient's vital energy, by providing food easy of digestion and assimilation, by surrounding him with favorable hygienic influences, and removing irritating causes, so to modify and improve the processes of nutrition generally, and

hence locally, as to enable the region affected to assert its inviolability, and render the intruder innocuous? Why then should those who believe in the tubercular essentiality of the disease in question adopt this singular mode of attack in this instance alone?

But there are those who deny this essentiality—who say that caries of the spine does not necessarily presuppose a vice of the constitution—who claim, on the contrary, that in the vast majority of cases it is the result of local injury, sometimes, it is true, aided and aggravated by a defective condition of the nutrition at the time of its receipt, but yet *primarily traumatic* in its origin—the local irritation *inducing* the cachexia, and not dependent upon or resulting from it. That a circumscribed focus of irritation, the result of external injury, is fully capable of inducing a purely cachectic condition even in the most robust individual, what one of our army surgeons, who has before his mind's eye the sad scenes of the past four years, doubts?

On the other hand, our most reliable recent authorities, among whom I may instance Mr. Barwell, question the possibility of tubercular deposits in bone, while some of the most eminent German pathological histologists even go so far as to deny altogether the

existence of such an element as a specific tubercle cell, declaring that inflammation is capable, unaided, of producing all the morbid formations generally considered characteristic of the tubercular degeneration. Without following them into their very free discussion, let me call attention to the remarks of Dr. BAUER, of Brooklyn, on this point, as more especially touching the disease in question. In the course of his "Lectures on Orthopædic Surgery," lately published, he holds the following language: "Before closing the chapter on the causation of posterior deformity, we propose to offer a few remarks on the constitutional causes of this difficulty. In every hand-book of surgery, scrofulosis is generally charged with the mischief. Now, gentlemen, it would be folly on our part to deny *in toto* such constitutional causes as derive their existence from bad hygiene and deranged nutrition. We acknowledge them to the extent of their reality, but consider it equally unjustifiable to enlarge their part in the disease by hypothesis or arbitrary adjustment, as is so frequently done. If we can clearly establish other plausible causes of the trouble, why should we recur to a strumous diathesis? A healthy child may meet with an accident; deformity of the spine may ensue in an insidious way; the constitution becomes neces-

sarily infringed; the patient anemic and attenuated from pain and loss of rest and of appetite. Thus we have the ordinary effects from ordinary causes, as we can observe them in daily pursuit of our vocation, a clear case throughout." Further on he says: "As a general thing the deformity has existed for some time; has considerably advanced, and has already made some impression upon the constitution of the patient when your attention is invited. The apparent absence of all external causation, and the constitutional derangement along with the curvature, have misled so many authors to presume the pre-existence of dyscrasia, or, as it is called, a strumous diathesis. These suppositions, we opine, are utterly devoid of foundation. Careful and patient investigation will mostly discover the fallacy."

For myself, I base my conviction that the disease is generally of the nature of a simple inflammation, often the result of external violence, upon one single fact, viz., the results of appropriate treatment. It is evident, as before remarked, that the mere presence of a tubercular deposit in the body of a vertebra is not of itself capable of producing deformity. To effect this result the tubercular mass must have begun to soften, the hard lamella of the outer surface must have been broken down and dissolved.

In other words, the tubercle is not encysted and undergoing the innocuous calcarization, but is passing into its second stage of destructive degeneration. Now, is it possible to conceive that mere mechanical relief from pressure and concussion at the seat of this actively and essentially destructive process, constantly stimulated as it is by a *vis a tergo*, the vice of the constitution, which not only sent out the advance guard of the disease, but with every pulsation of the heart is hurrying up reinforcements—is it possible, I say, to conceive that the simple relief from pressure and mechanical irritation at this point, without the slightest attempt to combat the constitutional taint by general medication, could cause an abrupt cessation of the immediate suffering, a rapid abatement of all the general constitutional symptoms, the complete disappearance of the cachectic diathesis, and final restoration to health? And yet this result I have seen over and over again, in every stage and every type of the disease. I cannot then bring myself to accept the generally received opinion that caries of the vertebræ must necessarily originate in tubercular deposit, or even in any so called diathesis.

Following a similar train of reasoning, Dr. LEWIS A. SAYRE, Prof. of Orthopædic Surgery in Bellevue

Hospital Medical College, New York, whose experience on the subject of which he is treating is probably as wide as that of any man in the country, says of the cognate affection, *morbis coxarius*, "The nature and causes of this disease have been of late years a matter of much discussion with the profession, the great majority regarding the disease as connected by necessity with, and originating in and from, the strumous diathesis; that scrofula and hereditary syphilis are the nidus whence alone this disease can arise. But this is a decidedly erroneous view of the truth; a view that is being rapidly dissipated by constantly developing facts.

"That *morbis coxarius* may arise in children whose constitutions have been vitiated by the sins of their ancestors, no one will attempt to deny; for such children are evidently more liable to the disease than those who stand upon a firmer constitutional basis. But that *morbis coxarius* may arise in a child whose constitution is uncontaminated by hereditary taint, and who is perfectly healthy, the observations of every day fully substantiate. I believe that many have attributed the source of this disease to a strumous origin simply from the *appearance* of the patient, whose emaciated, spanæmic condition is

regarded as the *cause*, when it is in reality the *result* of the disease.

"I have seen children of perfectly healthy constitutions, in whom the disease arose from an evidently traumatic cause, so reduced in the course of a few months by the pain and sleeplessness attending the disease, as to present in a very marked degree appearances which strongly simulate the strumous cachexia. And I have seen robust health and the ruddy cheek restored to these same children by timely surgical aid, together with proper constitutional treatment." After enumerating some of the direct causes of the affection, he says: "What I wish to establish is this—that although the disease in different individuals arises from very different causes, *yet it never arises in any individual from a purely idiopathic or constitutional cause.*"

But many of my professional brethren will say, "We concede you this argument from pathology. We do not believe any more than you do in the tubercular essentiality theory. We take you on your own ground, and admit that in the greater number of cases we have to combat a traumatic inflammation, whether of the bone itself, of its investing membrane, or of the inter-vertebral cartilage. Why is not counter-irritation in the manner animad-

verted on, allowable and advisable under these circumstances?" I answer—first, because a strict regard for the ethics of our art and an honest self-respect will not permit us to make use of any remedies, however harmless, upon mere theory, if experience has proved them to be inert. Still less, may we suffer the beauty of a theory to lead us to the adoption of means which, after a fair trial, have failed to establish their efficacy, if their employment is necessarily attended by excruciating pain, nervous irritation, and general exhaustion. The evidence of its utility should be ample and overwhelming, which could lead us to initiate a mode of treatment which is in itself a disease, and which, were any of us suffering from it, would often be sufficient to incapacitate us from the discharge of our ordinary duties.

Because a patient has gotten rid of a persistent pain in the back while a process of counter-irritation has been going on, we have no right to infer that a case of spinal caries has been averted; for, first, pain in the back may have many other causes; and, second, I assert it most positively, *pain in the back is not a characteristic symptom or even a constant accompaniment of true spinal disease*. In the earlier stages of the affection it is indeed rarely present,

generally resulting from the undue strain upon the posterior spinal muscles and ligaments, caused by the growing deformity, and to be classed with the ordinary backache of debility.

It is a well-known law that lesions of nerve-centres or of main trunks exhibit their earliest and often their only manifestations, not at or near the seat of disturbance, but at the extremities of the nerves which have their origin at this point, and a recognition of this law would lead us to anticipate what careful observation will confirm, that, with the exception of deformity, the symptoms of commencing caries of the vertebræ are all general in their character, and at a distance from their source.

But, secondly, this treatment has not even the apology of a plausible and well-reasoned theory to bolster it up. Our standard writers on *materia medica*, prominent among whom stands Pereira, are forced to acknowledge that all attempts to place counter-irritation upon a rational foundation have utterly failed; that it is based on the observed counter-action of certain diseases upon certain other diseases existing at the time of their incipency; is purely experimental and empirical; and is justified only by its ascertained results in certain classes of cases.

While I can readily admit the possibility of revulsion when we place the entire intestinal tract in a state of erethism, and excite a copious discharge from all its follicles—while I can understand how an agent which stimulates the capillary circulation of the entire lower extremities may exert a derivative influence from distant parts, it does tax my powers of comprehension to appreciate how a small circumscribed focus of suppuration, which possesses no controlling influence over the circulation, can have any other effect than simply to increase general nervous irritability. That it can restore a carious bone to soundness, appears to me the wildest of fancies.

Thirdly, and especially, this treatment is neither advisable nor admissible, because it consumes precious time, and prevents the employment of a means which is infinitely superior. The most that any man can claim for the results of his counter-irritation in any given case, is to fall back upon the miserable, conscience-salving subterfuge, "If it had not been used, the patient might have been worse." All that can be asserted for it is negative. But the physician who makes use of complete support and relief from pressure on the diseased surfaces of contact in this affection, will find to his delight a daily positive

improvement which he can trace directly to the treatment which he has adopted.

Let us take the most favorable possible case for the trial — the incipient stage of inflammation, whether traumatic or idiopathic. What condition have we here that does not exist in a case of simple fracture of a long bone? In both there is solution of continuity with inflammation of osseous tissue aggravated by motion and pressure. And yet, as Dr. Bauer pertinently suggests, "To what physician has it ever occurred to put a seton or an issue over the seat of a fracture?" Suppose the attempt to be made, and the splints thrown aside as "clumsy mechanical contrivances," who has any doubt as to the result? The parallel is not as forced as might at first sight appear. Did not humanity forbid, I would agree to take any case of simple fracture, of the thigh, for instance, and, subjecting it daily to the same amount of pressure and irritation that an inflamed vertebra receives, to develop, in the course of a few months or even weeks, locally caries, and generally, as complete a strumous cachexia, as is found in the average cases of Pott's Disease, and this even though the limb were girdled with setons and issues. The records of what hospital, the experience of what physician, do not display examples

of caries, hectic, cachexia, and even tubercular depositions in distant organs, as the result of compound and comminuted fractures in perfectly healthy individuals? From this analogy, if we are wise, we shall take our hint for the treatment of the spinal affection. But whatever other means be adopted, in the name of humanity, of conservative surgery, of rational medicine, of common sense, which is but another name for pure science familiarly expressed, and of the professional conscience, itself too often seared with the hot iron of routine, I respectfully but earnestly protest against the continuance of a practice based neither on sound reasoning nor successful experience, not only intensely painful and extremely disgusting, but confessedly capable of working injury to the general health, and which, lastly, entirely prevents the employment of the only rational and successful method of treatment.

Furthermore, I appeal to my professional brethren in behalf of an earlier recognition of this terrible disease. Why is it that our ears are so often pained by the story the mother sadly tells us, as her eyes rest on the poor little misshapen sufferer by her side, of the long period of invasion, during which all her maternal anxieties were aroused; how she

repeatedly called the attention of her medical adviser to the child's condition only to have her fears ridiculed; how her own suspicions as to the safety of the spine began to be awakened—she knew not why—only it would seem by a mother's instinct; how the physician's particular attention was invited to this question, and how he still refused to see anything beyond some trifling indisposition and the mother's nervousness; how he even perhaps sustained his opinion, when hard-pressed, by calling to his aid a fellow-practitioner who fully supported his view of the case, until at last the fatal projection began to show itself, and a perceptible and rapidly increasing deformity confirmed all her anxious forebodings, and convinced the unwilling doctor, before whose eyes all this time a train of symptoms had been slowly passing, as marked, as characteristic, and as easily recognizable to a practised observer, as the signs of invasion of measles or scarlatina, nay, even as the eruptions which distinguish those diseases.

In the present somewhat divided state of professional opinion on some cardinal points of treatment, caution may be advisable in condemning what seems erroneous to us in the therapeutics of others, but, in this day, when diagnosis is justly made so pro-

minent a part of a thorough medical education, it is greatly to the discredit of the profession, a veritable *opprobrium*, that the discovery of the existence of an affection so well defined in its symptoms, so disastrous in its results, and so amenable to treatment in its earlier stages, should be not only left to unprofessional acuteness, but so often positively and repeatedly denied by the professional attendant. It is no excuse for such remissness to say that mothers, in their hyper-anxiety, often fancy spinal disease when none exists. The very object of a physician's training, the very theory of his attendance, is that his science, experience, and sagacity will enable him wisely to decide between morbid fancies and well-grounded apprehensions; and he neglects his duty when he carelessly and sweepingly stigmatizes every suggestion of the devoted and anxious parent as the offspring of pure nervousness, and unworthy his sapient consideration. It is quite possible, in the vast majority of cases, for the physician to recognize the disease before any projecting spinous process attracts the attention of the mother, and confutes his deliberately expressed opinion. That this is the case, allow me to show by briefly detailing the symptoms, as nearly as possible in their sequence.

1. Prominent among the early signs—so prominent that I have ventured elsewhere to call it “The Initial Symptom,” is *pain*, *not* in the back, *not* along the spine—for as already said, that is not a symptom, and is scarcely ever seen at the outset—but in the *abdomen*, and generally so circumscribed that we may call it *gastralgia*, although it is doubtful if the intestinal canal be not as much concerned in its production as the stomach. The character of this pain is spasmodic and paroxysmal; I am led to suppose that it arises from spasm of the muscular fibres of the stomach and intestines. It may be excited immediately by the introduction of food into the stomach, by movement or shock to the trunk, as by being lifted, or it may come on without any apparent cause. It is intense and excruciating, often causing most piercing cries; commences suddenly, and as suddenly abates; may be controlled by opium, but yields scarcely perceptibly to ordinary remedies for *gastralgia* or *colic*. In some instances it extends to the sides, and very rarely finds its way round to the back and spine; but this is the exception. After the mother has exhausted her household remedies the physician is called in. If he belong to what we call among ourselves the old school, he gives a vermifuge; if to the new, bismuth;

and failing to relieve it, in either case, he goes on from experiment to experiment, until the actual disease either shows itself and discloses the true nature of the affection, or the pain gradually ceases spontaneously, which it not unfrequently does as the case progresses.

2. Irritability of temper to an excessive degree; nervous impatience and excitability, alternating with malaise and disinclination to exertion. The sudden change in the disposition when relief is procured, is one of the most noticeable features of its treatment.

3. An inability to hold the trunk erect; a constant aiming for support anteriorly; the child, if able to walk, frequently coming to lean on the mother's knee or against a chair, and disliking to be long on its feet.

4. A short, jerking respiration, often quite labored, and accompanied with a slight vocal emission during expiration; often severe and protracted hiccough. These affections of the respiratory muscles are more noticeable when the disease is in the mid-dorsal region.

5. A peculiar and altogether characteristic gait and carriage, having for its object the avoidance of shock and concussion to the spine, and its support

by the aid of the muscles of the trunk. To this end the feet are held rather wide apart, with the toes either direct or turned in; often very much so. There is a slight bending at the knee and hip, to give a greater opportunity for spring, in relieving the force of a descending or accidental step. The trunk bends slightly forward from the hips; the shoulders are thrown back and elevated, and the involuntary swing of the arms is somewhat repressed. The head is often thrown back, the occiput sometimes resting on the upper dorsal spine; this is very noticeable in infants. The patient objects to turning his head rapidly, especially if the cervical vertebræ are affected, moving the body with it when the attention is attracted. He avoids stepping down from any height, even that of an ordinary stair; will not run or jump; and when desirous of stooping does so by flexing the knee, the back not bending at all. The key to the aspect is rigidity of the spine—to the gait, avoidance of shock. The feet are raised but very slightly in walking, thus producing a kind of gliding motion, and also a tendency to trip or strike the toe.

The forward inclination of the body on the hips is sometimes so extreme, that the patient stands or walks habitually with one hand resting on the thigh

just above the knee; and as the right hand is generally in use, the left is usually the one which is thus employed in relieving the pressure from the weight of the trunk. This is often seen with but slight deformity.

6. Coupled with these characteristic symptoms, more than one of which are rarely absent, is usually observed the gradual development of a cachectic condition, pallor, emaciation or flabbiness of the muscles, tumefaction of the abdomen, loss or perversion of appetite, and very frequently, failure of the digestive power. In some rare cases, paralysis is the first premonition. Dr. STILLÉ, of Philadelphia, has recently related to me a case in which partial paralysis of the left arm, in an otherwise perfectly healthy, robust young woman, was the first thing to attract the attention of herself or her family. This was followed, at no very long interval, after excessive indulgence in dancing, by complete paralysis, both of voluntary and involuntary muscles, and death. Dr. S., with a rare acuteness, diagnosed caries of the last cervical vertebra, and a post-mortem examination confirmed his opinion, this vertebra being completely perforated by the ulcerative process, which had actually opened into the medullary canal.

With such an array of symptoms, all of which are more or less peculiar to the affection, at his disposal, it is not too much to ask that the physician should not calmly await the evidence that the disease has passed into the stage of ulceration and absorption, before he can make up his mind as to its existence.

One word of caution and I have done. Let no physician base his opinion as to the existence of the disease on the presence or absence of tenderness at the suspected point. Its occurrence is only less rare than that of spontaneous pain; and when present, it is accidental. The sufferings of the patient result from the vertical pressure produced by the weight of the head and trunk. A horizontal force applied to the projecting spine not only cannot increase it, but may, if it exert any action, diminish it, and hence prove grateful rather than painful to the patient. There is too much reason to fear that the tenderness which some physicians are so successful in discovering, is simply due to the bruising of the attenuated tissues by their own thumbs and knuckles.

We are fond of claiming it as one of the results which medical science has reason to be proud of, that the sad disfigurement of the human face produced by that once fearful scourge, smallpox, pains our eyes so much less frequently than it did those of

our fathers; and enthusiasts have even been found to express the conviction that one day the discovery of JENNER would render such a sight entirely unknown. What vaccination has done for variola—careful diagnosis, coupled with judicious mechanical treatment, may yet do for gibbus; and it is not too much to hope that we may live to see the time when the horrible deformities which almost daily meet our eyes, will become so rare as to be only objects of scientific interest.

III.

CORRECT PRINCIPLES.

Recommended for publication by the Committee on Prize Essays of the American Medical Association, the accidental disclosure of the author's name having excluded it from competition.

Extracted from the Transactions of the Association for 1866.

THE
CORRECT PRINCIPLES OF TREATMENT FOR
ANGULAR CURVATURE OF THE SPINE.

THE principles upon which angular curvature, or ulcerative inflammation of the spinal column is to be treated, are threefold:—

1st. PATHOLOGICAL.—Dependent upon the nature and seat of the disease.

2d. MECHANICAL.—Following necessarily from the laws of physical science, and

3d. ANATOMICAL.—Growing out of the conformation of the vertebræ and their mutual relations.

Each of these principles has so direct, logical, and essential a bearing on the other two, that they need but to be placed side by side in order to crystallize into an argument. Any attempt to ameliorate the disease in ignorance or neglect of these cardinal points, and of their relative interdependence, must fall very far short of that happy result which is, in most cases, attainable by pursuing a plan of treatment strictly based upon them.

First, then, we consider the *pathological* element of the problem.

The essential lesion of this affection is ulcerative inflammation or caries of the bodies of one or more vertebræ, or an analogous condition of one or more of the intervertebral substances, or both combined. This condition of the intervertebral substances is called "disintegration" or "softening," though it is difficult to conceive of a reason why the title Ulcerative Inflammation is not applicable here also. The disease may commence in either situation. Dr. Bauer, of Brooklyn, relates a case¹ in which the autopsy revealed advanced degeneration of cartilages which were remote from the carious vertebræ, while the diseased action in the vertebræ affected had evidently progressed from the surface towards the centre.

The progress and form of the curve, in many instances, seems to indicate these portions of the column as the sole seat of disease. Writers who deny the occasional origin of the inflammatory action in these substances on the ground of their cartilaginous nature forget that they are not simple cartilage, but *fibro*-cartilage, in which the fibrous

¹ Lectures on Orthopædic Surgery, p. 67.

element largely predominates. Not only this—they ignore the researches of one of the most distinguished of modern pathological anatomists. When Rokitansky pronounces the deposit found in a carious vertebra to be tuberculous, he is simply expressing an opinion as to the nature of this deposit, from which any physician, in the present state of our knowledge of this pathological element, has a right to dissent. But when he states that inflammation sometimes commences in the intervertebral substances and extends from them to the contiguous vertebræ, he is announcing a fact which he has the means of verifying, and which cannot be overthrown by the exhibition of any number of merely negative dried specimens on the shelves of a museum. That he does state this most unequivocally is apparent from the two following quotations. Treating of inflammation of the vertebræ, he says:¹ “It is very commonly the primary disease, but sometimes it is brought on by previous inflammation and suppuration of the ligamentous apparatus of the column and of the *intervertebral substance*.” Again, speaking of inflammation of fibro cartilages,

¹ Manual of Pathological Anatomy, vol. iii. p. 192.

he makes the following assertion:¹ "An inflammation is sometimes met with in the intervertebral cartilages which terminates sooner or later in suppuration, and is generally, in the end, combined with inflammation and caries of the bodies of the vertebræ." So careful a writer and close an observer would scarcely hazard a positive assertion of this kind, had he not actually seen that which he describes.

Mr. Bampffield says unhesitatingly² that "*dissections prove* that the most dangerous and fatal consequences ensue from inflammation of the intervertebral substance, terminating in its ulceration, which brings in its train caries of the surfaces of the vertebræ to which it is attached;" and, farther on:³ "I am induced to believe, from appearances on dissection, that the inflammation *primarily* attacks the intervertebral substance in the *generality* of cases of angular projection." Mr. Copeland⁴ and Sir Benjamin Brodie⁵ both advance the opinion that certain cases originate in intervertebral inflammation, which

¹ Manual of Pathological Anatomy, vol. iii. p. 215.

² An Essay on Curvatures and Diseases of the Spine, p. 150.

³ Loc. cit.

⁴ Copeland on the Spine, p. 42.

⁵ Brodie on the Joints, p. 180.

has always, in their belief, a strong tendency to ulceration.

This point, however, has not so material a bearing upon the treatment as the question of the simple or tubercular nature of the destructive action. Of course if we admit the presence of a foreign and noxious deposit in the structure of the bone as the exciting and promoting cause of the destructive inflammation, we at once strike at the root of all mechanical treatment, whether this consist in the wearisome confinement to the prone or supine posture, or the employment of instrumental support. Among the standard authorities, I find that Erichsen,¹ while prefacing his article on this subject, by stating his belief that this "affection consists essentially in tubercular infiltration of the bodies of the vertebræ, makes, subsequently, the following admission: "It must not, however, be supposed that abscess necessarily forms in all cases; indeed the formation of matter will, I believe, chiefly depend upon whether the disease of the vertebræ be tuberculous or not. *Simple congestive or inflammatory caries* of the spine may take place to a very considerable extent, and yet no suppuration occur, the

¹ Science and Art of Surgery, p. 640.

bodies of the vertebræ undergoing erosion and absorption, and coalescing so as to become fused together into one soft and friable mass of bone, across which bridges of osseous tissue are sometimes thrown out, so as to strengthen the otherwise weakened spine. In these cases, masses of porcellaneous deposit will not unfrequently be found intermixed with and adherent to the carious bone. Indeed, this ankylosis and fusion of the bodies of the diseased vertebræ may be looked upon as a natural mode of cure of angular curvature of the spine, the only way in which it can take place, when it has advanced to any considerable extent."

The evident meaning of this passage is, that only those cases are tubercular which develop abscess, and that these cases are generally fatal. Now as a majority of cases terminate in ankylosis, and spontaneous recovery with a greater or less degree of deformity, proportioned generally to the character and carefulness of the treatment, it follows that the majority of cases are those of simple caries. Quotations might be multiplied to show that the once universal belief in the necessarily tuberculous nature of this disease by no means receives the general assent of the thinking portion of the profession to-day. Mr. Barwell, whose work is now a classic, says,

in discussing bone tubercle generally:¹ "Tuberculous deposit in bone is, I believe, very rare; when it does occur it is a *result* and *not a cause* of osteitis. * * * * * Many an old and desiccated purulent deposit in bone has been mistaken for tubercle; the position in spongy bone which favors pressure, the assumption therefore of a peculiar form by the dried concretion, and the fact that such pus consists of broken-down and disintegrated cells with granules, etc., render the distinction extremely difficult. I must confess that I could accept no case as undoubted tuberculosis of bone unless some of the deposit was in a state of crudity. It must be remembered that when we find tubercles in other organs, even though most of the material may be in the farthest advanced stage of softening, some will very nearly always be crude; but I am not aware of any observations of crude tubercles in bone."

That the disease occurs oftener in those whose nutrition is enfeebled or depraved, as the result alike of hereditary vice of constitution, of exposure, or of deficient or improper alimentation, no one will deny; but the converse of this proposition, viz., that it may arise in those whose systems are entirely free

¹ Treatise on Diseases of the Joints, p. 231.

from taint, original or acquired, as simply the result of local injury, I am fully prepared to maintain.

The portion of the vertebra which is most frequently attacked by the disease has a very direct bearing upon the treatment. All authorities agree in telling us that its usual seat is the body of the vertebra and the intervertebral cartilage, the pedicles and the processes rarely being affected. Now a moment's reflection suffices to show that, in those cases where there is posterior projection, the *anterior* portion of the bodies must be destroyed to a greater or less extent; for it is impossible for such a projection to take place as long as the anterior surfaces of contact are integral. But posterior angular curvature does take place in by far the greater number of cases, at a very early stage of the disease, so much so that it has given the name to the affection. Hence the conclusion is obvious that the anterior portion of the bodies of the vertebræ or of the intervertebral substances is the most frequent point of invasion. There are two sufficient reasons why the bodies should be affected oftener than the processes: First, because they are composed almost entirely of soft, spongy, reticulated bone, well supplied with bloodvessels, which is, in all parts of the frame, more subject to congestion, inflammation,

and ulceration than the compact osseous tissue, of which the pedicles are almost entirely, and the processes to a considerably greater degree than the bodies, composed. The pedicles thus form an almost insuperable obstacle to the direct advance of the disease from the bodies to the oblique processes. Secondly, because it is on this portion of the spinal column that the entire weight of the trunk, head, and upper extremities is sustained, and hence on it must fall all vertical shock and concussion. The oblique processes, it is true, act to some extent as decomposers of shock, especially when it occurs somewhat out of the strictly vertical direction, but owing to the oblique adaptation of their articulating surfaces, and the fact that they admit of a slight degree of motion upon each other, they rarely suffer serious injury from this cause. The contiguity of the viscera of the abdomen and chest, and of those extremely vascular membranes, the peritoneum and pleura, may suggest a reason why the anterior portion should be more frequently attacked than the posterior; although the preponderance of the body anteriorly, producing increased pressure in that region of the column, might in itself be considered a sufficient cause.

Second, the **MECHANICAL ELEMENT** becomes of

consequence from the deformity to which the disease gives rise.

The natural support of the head and trunk failing, we must supplement it by means of artificial support. Not, it is true, with the object of removing the deformity—although that result may often be incidentally attained in the prosecution of the main design—but with a view to the relief of the irritation produced by the constant and severe pressure at the seat of disease, which pressure is the main obstacle to a natural process of healing. This pressure can only be relieved by diminishing the abnormal curvature, by placing the column in a position more nearly approximating its natural curves, and maintaining it constantly in that position. The mechanical problem, then, is simply to *straighten out the curved spine*.

The true method of applying force to restore a curved spine to its normal shape was first distinctly enunciated, so far as I am able to discover, by Mr. Lonsdale, in the preface to his work entitled *Observations on the Treatment of Lateral Curvature of the Spine*, published in the year 1847, and although he had in view simply the variety of curvature of which he was treating, the principle applies with even greater aptness to the angular deviation in con-

sequence of the anatomical peculiarities which I shall presently point out. "It appears to me," he writes,¹ "that the principle of extension is not the best to act upon to bring the spine from the curved into the straight position; nor do I think it the most scientific, for the force tells mechanically with the least advantage, and requires that most powerful means be exerted to produce the desired effect. All curves, no matter of what nature the body in which they exist, are more easily rectified by applying the force in an opposite direction, by *unbending* them rather than by pulling upon them at their two extremities; in the former, the advantage of a lever power is gained, in the latter an extending force only can be employed, at the same time that it tells in the least favorable direction. This principle is equally applicable to curvature of the spine where the vertebral column has been bent or thrown out of its natural erect line by mechanical causes only. The spine, though composed of many small bones, is similarly circumstanced to a single long bone, that may yield or become curved from its structure being too weak to resist any mechanical weight it may have to support, or that may be made to tell

¹ Page V of the Preface.

against it. The effect produced is the same in both cases, though the causes are not precisely similar. Taking this view of the subject, it appears to me that the treatment of a curvature of the spine, depending on simple weakness, unaccompanied with disease of the bones or ligaments, should be conducted upon the same principles as when the curvature exists in a single bone only."

Lonsdale was deterred, as we see, from applying the principle he thus clearly enunciates, to the case of angular curvature by the fear of injury to the diseased vertebræ, owing to a failure to appreciate the precise pathologico-anatomical conditions, and all subsequent English writers seem to have shared his apprehensions, for we find Mr. Heather Bigg, "Anatomical Mechanist to the Queen," etc., in a treatise on what he styles *Orthopraxy*, just issued from the press of John Churchill, London, after describing an instrument for making pressure against the dorsal curve, in cases of posterior curvature dependent on mere debility, saying of Pott's disease,¹ that "any attempt to make the same amount of pressure below the axis of curvature would here lead to most disastrous results."

¹ *Orthopraxy: the Mechanical Treatment of Deformities, Debilities and Deficiencies of the Human Frame*, p. 245.

Fortunately, American medical science is pretty well out of the leading strings of its European nurses, and dares to think for itself. The problem was now fairly before it in both its equations: the *Pathological*, the nature and seat of the disease, with the resultant deformity; the *Mechanical*, the true method of employing force in accordance with the laws of physics, in order to unbend the curve.

ANATOMY furnished the key to its solution, and it was grasped by an American physician. Dr. H. G. Davis, of New York, whose suggestions on this subject, as well as in relation to the treatment of the cognate affection, disease of the hip-joint, have laid the profession and humanity under a lasting debt of gratitude, published a paper in the *American Medical Monthly* for March, 1856, entitled "Deformities and their Remedy." In the course of this article he holds the following language: "The common mode of constructing apparatus to sustain the weight of the body on crutches is entirely useless, as the crutch impinges directly against the bundle of nerves and bloodvessels that meet in the axilla, upon which the weight of the arm cannot even be borne, much less that of any additional portion of the body. I think, however, that this difficulty has been seen by surgeons, but there was not found any other point

where support could be applied. It was rather a choice between two evils, that of no support, or in this way." In a continuation of the same article in a subsequent number of the *Monthly*, he enunciates, as I believe, for the first time, the true principles of treatment for "Angular Curvature," as follows: "As the treatment of angular distortion of the spine, the result of ulceration of the vertebræ, is mechanical, so far as restoring or retaining the figure erect, it will be advisable to examine cursorily the form and points of support of the vertebræ, as involved in this kind of surgical treatment. As far as our purpose is concerned, it will be necessary only to mention the body (the seat of the disease usually), the oblique and the spinous processes.

"The body and the oblique processes afford the only perpendicular support; the distortion is produced by the removal of the body of the vertebræ by ulceration. As the line of perpendicular support falls between the body and the articulation of the oblique processes, the weight of the trunk above approximates the bodies of the two adjoining vertebræ, as the diseased one is removed by absorption; the oblique processes, now sustaining the greater part of the weight, act as fulcrums upon which the vertebræ are tilted or rotated; thus the

spinous processes above and below are separated from that of the diseased one, the articulation of the oblique processes being the centre of motion.

"It is this form of the vertebræ which enables us to make use of the whole column as a lever to restore it. By apparatus we are enabled to throw the entire weight of the superincumbent body upon the oblique processes, and separate the bodies adjoining the diseased one from it, the contact of which was constantly irritating and producing absorption. By this mechanical arrangement the spinal line is brought into its natural position. This replacement is advantageous, not only by restoring the figure, but, by the removing of all mechanical irritation and pressure, it, in many cases, stops the disease at the same time; the process of reparation commences upon the application of the apparatus. The apparatus should confine the parts quite immovably in their normal position, and retain them there until recovery has taken place. Thus supported, I have seen a large majority of cases restored without the use of any constitutional treatment, with the exception of air, diet, and exercise. As the ulceration seldom extends to the oblique processes, we are always enabled to use them to sustain the weight of the body above."

Thus, we have the demonstration complete: *Pathological Anatomy* shows us an intervertebral cartilage in a condition of congestion or softening, yielding to the pressure from above; the body of an inflamed or ulcerated vertebra crumbling anteriorly under the superimposed weight of the head, trunk, and upper extremities, and thus producing a posterior projection of the spinal column. *Mechanics* indicates the true method of redressing this distortion, and thus relieving the pressure, provided the necessary conditions are present for applying the force; and *Physiological Anatomy*, scientifically interpreted, triumphantly steps in to point out the oblique processes, happily protected from the ravages of disease, as the precise means desired. More fortunate than Archimedes, we have found our fulcrum. A world of suffering and disease may now be moved. I say a world of suffering; and that I use the expression advisedly, let an English writer testify. Mr. Bampfield, in his essay already alluded to, says,¹ "When the perversion of the natural situations of the viscera, of the great bloodvessels, of the ganglionic system of nerves, and of the thoracic duct, is contemplated; when the structural alterations and de-

¹ Op. cit., p. 40.

viations of the lungs, heart, liver, and some other of the viscera, aorta descendens, venæ cavæ, thoracic duct, and some of the nerves are considered; when the derangements of the spinal cord and the spinal nerves, of the abdominal and intercostal muscles, and diaphragm, and the curved and shortened spine are weighed; when we view the spinal marrow, thus deranged, as the principal source of sensation and motion, and know the spinal nerves are distributed to all the viscera contained within the thorax, abdomen, and pelvis, and supply them with the nervous energy necessary to their important functions, as well as to the muscles of the upper and lower extremities, back, chest, diaphragm, and all the other constituent parts, besides possessing a connection with the nerves of the brain through the ramifications of the great sympathetic; when we reflect on the aggregate of disorder and displacement of the framework and the frame, we cannot be astonished at hearing an appalling catalogue of maladies which are attendants or consequences of spinal deformity and disease. A catalogue whose history and treatment to pursue and dwell upon in this dissertation, would make it almost endless, for I have known the head affected with severe pain, occasionally predisposing to *phrenitis* and death; the eyes affected

with convulsions and imperfect vision; the ears with deficient hearing; and I have witnessed as companions to curvatures of the spine, dyspnœa, asthma, congestion and inflammation of the lungs; imperfect oxygenation of the blood; palpitation of the heart; aneurisms of the aorta; a corded tightness across the epigastre; gastrodynia; indigestion; loss of appetite, or a vitiated state of it; torpor of the liver, or deficient secretion of the bile; constipation; discolored feces; morbid secretions of the kidneys, involuntary discharge of urine and feces; a variety of nervous feelings; epileptic fits; numbness and coldness of the extremities; *tic-douloureux-like* pains about the joints of the lower extremities and muscles, and of the posterior part of the *ilium*, paralysis of the upper and lower extremities, and an almost universal torpor." An appalling catalogue, truly, and yet for its correctness I can myself vouch in almost every particular, allowance being made for modern alterations in the nomenclature of disease.

But to return to our demonstration. The accompanying illustrations indicate the manner in which the oblique processes may be made to take the place of the bodies as the supporting column of the trunk. Figs. 1 and 2 are taken from an American reproduction of the anatomical plates of Bour-

gery and Jacob. The bodies of two lumbar vertebræ are here represented with the processes of the

Fig. 1.

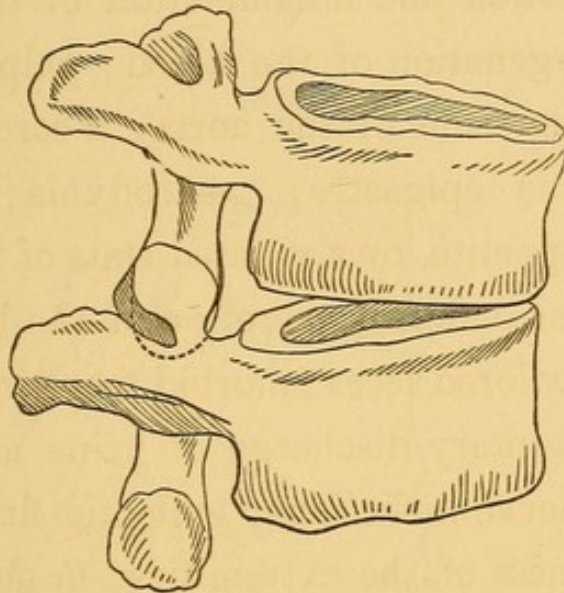
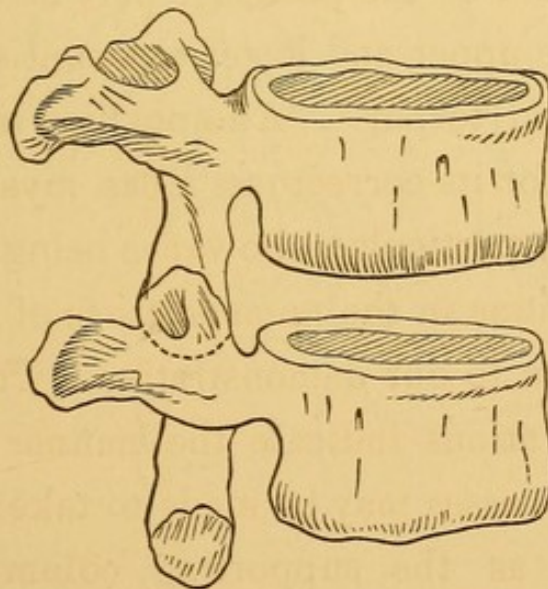


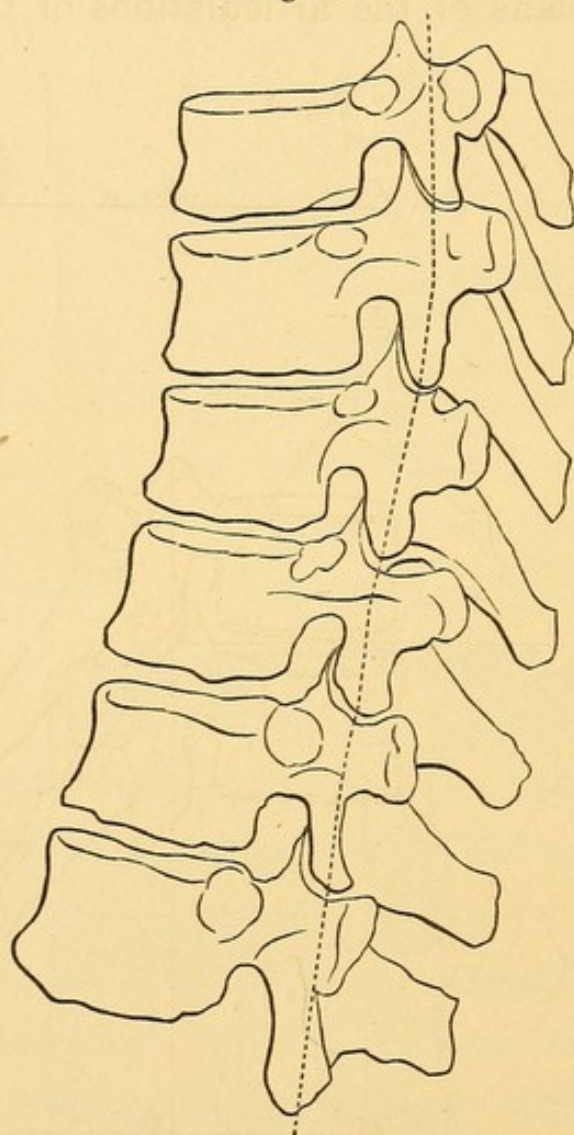
Fig. 2.



left side only. In Fig. 1 their position is such as would result from partial destruction of the inter-

vertebral substance anteriorly, permitting the opposing surfaces of the bodies to come in contact. In Fig. 2 they are maintained nearly in their natural position, the support being through the oblique pro-

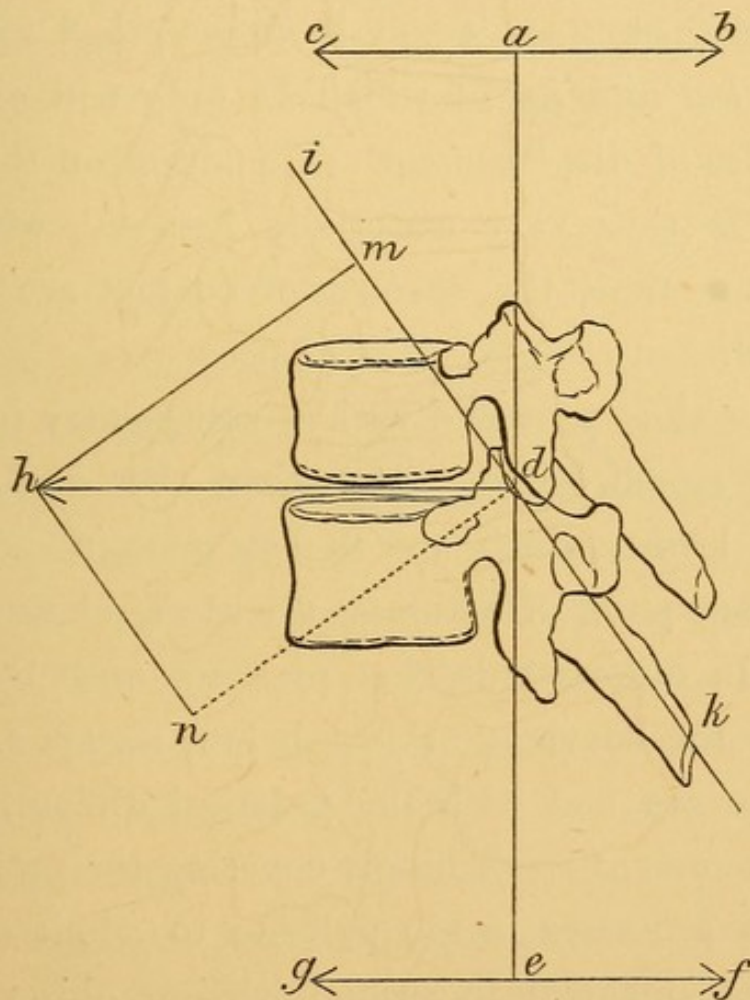
Fig. 3.



cesses. Fig. 3, from Richardson's *Human Anatomy*, gives a lateral view of six inferior dorsal vertebræ; a

dotted line shows the new column of support. The oblique direction of the planes of articulation of the oblique processes, well shown in this illustration, makes them more available as points of leverage for our antero-posterior force than did they present the horizontal plane of the articulations of the bodies.

Fig. 4.



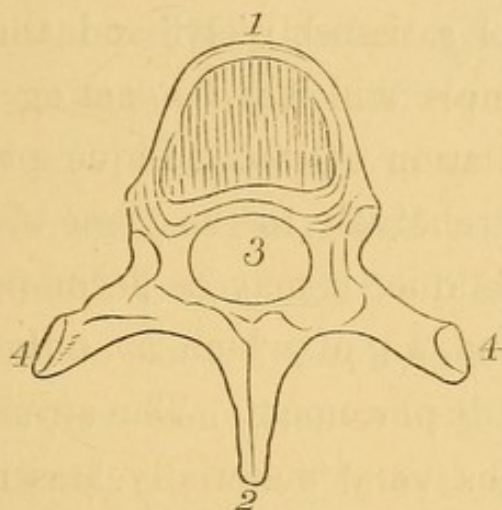
This will be understood by reference to the accompanying diagram, (Fig. 4.) Let the horizontal

lines ab and ef represent the forces exerted by an instrument at the extremities of the spinal column. On the principle that action and reaction are equal, the resistances to these forces will be represented by ac and eg , respectively, and the resultant of these resistances will be dh , acting at the centre of the articulation of two oblique processes. But its direction relatively to the plane of this articulation being oblique, it may be decomposed into two forces, hm and hn , of which hn only will exercise any force of displacement. The strain on the ligaments is thus very materially lessened, while, at the same time, the surfaces of contact are nearly doubled.

Being thus provided with a satisfactory fulcrum for our spinal levers, it is evident that our instrumental levers, which are to act upon them, must have their point of action at the same relative position. In other words, that pressure must be made against the curve at, or just below, its apex. But here we are met with the practical difficulty, that the integument immediately covering the projecting spinous processes is too delicate to admit of any pressure sufficient to accomplish our object. Can we avoid pressure upon these spinous processes, and still meet the indication? Anatomy again

helps us to a solution. In Fig. 5 we have the upper surface of a dorsal vertebra; (1) being the

Fig. 5.



body, (2) the spinous process, (3) the foramen for the passage of the spinal cord, and (4) the transverse processes. These latter, it will be noticed, project laterally far beyond the body of the vertebra, and being, moreover, protected by a thick cushion of muscles, which fills up all the interspace between them and the spinous process, afford an admirable surface of resistance on either side, leaving ample room for the spine to project between.

Having thus established our principles of treatment on a rational and scientific basis, it only remains to indicate the best means of applying them. I am not aware that Dr. Davis has published any

description of the apparatus which he makes use of to carry out the theory he originated.

The instrument which I am in the habit of employing, and with the results of which I have every reason to feel satisfied, was first introduced to the notice of the profession at large at the session of the Medical Society of the State of New York, in 1863, by Dr. Charles F. Taylor, of New York City, in a paper entitled the "Mechanical Treatment of Angular Curvature, or Pott's Disease of the Spine."

It is proper to remark, however, that Dr. Taylor had been, for several years previous to the publication of this article, engaged in perfecting his invention, and that most of the leading practitioners of New York were already familiar with his treatment. I give the description of the instrument, principally in his own words, introducing my own remarks in parenthesis.

"A broad band passes around the trunk low down, so low that in front it almost touches the thighs in sitting. It passes just above the pubis and entirely below the abdomen, so that the abdomen is sustained upward, instead of being, as in most instruments, pressed downward. There are two pieces or levers passing up the back, not over the spine, but each side of it, so that it is firmly held from

lateral deviations. At the top is a cross-piece, in the form of two T's, with the small ends united. The object of this arrangement is that the straps may pass directly forward and around the arms, and thus prevent a great loss of force by diagonal action; and also that they shall touch the person only where the pressure is needed, namely, on the forward part of the shoulders. This arrangement entirely obviates the painful and dangerous ligaturing of the arms which would occur if the straps passed forward from one point." (This object may be still farther promoted by making the lower arms of this scapular or cross-piece spread outwards until they reach the line of the axilla. I usually direct it to be made twice as wide at the bottom as at the top, thus producing no lateral pressure whatever, and removing all danger of abrasion in the axilla.) "At a part of the instrument opposite the seat of disease, the point where we make our fulcrum, the pads are placed. These pads are very important. They are made of chamois skin or Canton flannel, and are filled, not with cotton, which soon packs and becomes hard, but with long, elastic African or East India wool which has no felting qualities." (No small amount of labor and ingenuity has been spent in endeavoring to perfect this part of the instru-

ment. At one time the grand desideratum was thought to have been found in an India rubber air pad, but it proved impossible to make it strong enough to stand the pressure without leakage. At present we are experimenting in the use of granulated cork which is light, cool, and elastic, and thus far it appears to answer remarkably well.)

“These pads are not permanently attached to the instrument, but are made separate and tied on with strings, so that they can be removed as often as they become at all compacted. The shoulder straps and the band around the hips are likewise provided with similar removable pads to protect the skin from pressure and abrasion.” (The straps are now made of soft webbing with permanent wool pads, and are themselves removable, being simply buckled at each end.) “It will thus be seen that the instrument, like the spine itself, acts like a double lever with a common fulcrum at the curvature; this action is directly backward at the hips and shoulders, and directly forward at the middle of the back, or wherever the diseased part is located. Thus the posterior portion, the only healthy portion of the diseased vertebra, is made to support a part of the weight of the body, and the intervertebral cartilage and bodies of the vertebræ, where the disease exists, are re-

lieved of pressure . . . The instrument is provided with several hinges, stop hinges in front but free to bend backwards, which allows the most unrestrained use of the muscles of the back. Whenever the spinal muscles are brought into action, instead of acting against unyielding resistance, the instrument bends freely backwards, thus stimulating and encouraging muscular action, as the patient, when free to do so, involuntarily makes frequent effort to gain momentary relief from the instrument by attempting to straighten himself up. Indeed, the spinal muscles, by alternate action and rest, actually alternate with the instrument in sustaining the weight of the body and overcoming the curvature. It has proved to be useful in causing the development of the spinal muscles instead of binding them up and causing their atrophy, as results from the use of instruments which prevent muscular action."

In this last mentioned respect, Dr. Taylor's instrument goes a step in advance of Dr. Davis's proposed plan of treatment. The latter says, it will be remembered, "the apparatus should confine the parts *quite immovably* in their normal position, and retain them there until recovery has taken place;" thus making no provision for the exercise and develop-

ment of these important accessories. I have seen a back that was almost bare of muscular tissue, in consequence of the wasting strain produced by the deformed position of the trunk, become quite fleshy in the course of a few months under the simple use of this instrument.

The uprights or levers, described above by Dr. Taylor, should be made of steel, sufficiently strong to sustain the entire weight of the trunk, and thus resist completely any effort, voluntary or involuntary, at flexion anteriorly, while at the same time they should be of such temper that the physician can, if furnished with the proper appliances, bend them to suit the varying requirements of the case. Above all things, they should not be—what every instrument-maker is most desirous to make them—elastic. “Spring,” as they call it, is the very last quality to be sought in a spinal splint. In the treatment of this disease there can be no compromise. The instrument which fails to give complete support had better not be worn, as it will only embarrass and annoy the patient by its weight. It may seem a paradox, but it is nevertheless true, that, after reducing the weight to a certain point, every ounce taken off from the effective part of an instrument only makes it so much the heavier. As long

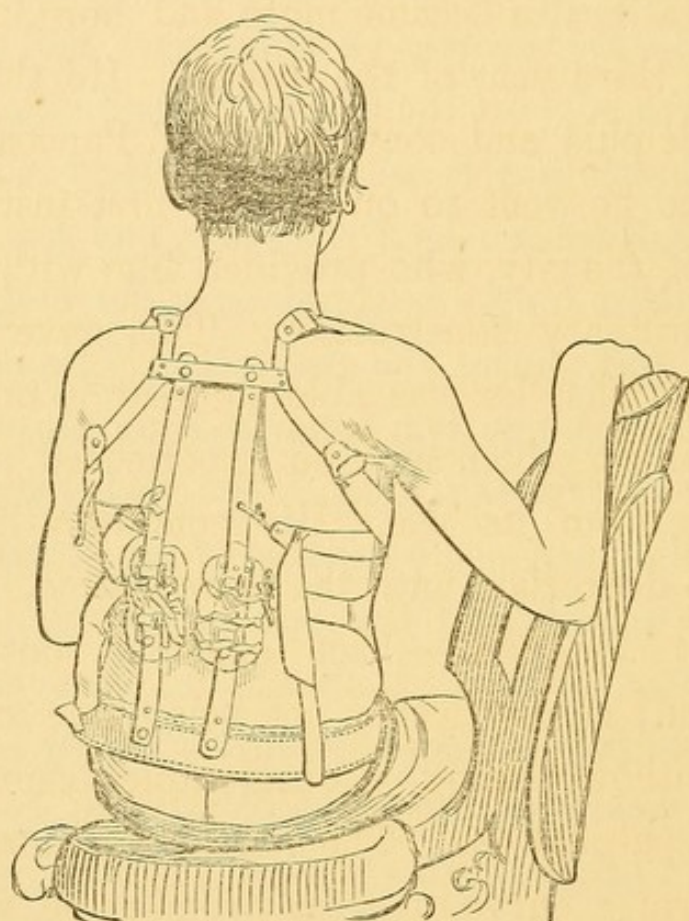
as the spine is well supported at the seat of disease, the weight of the instrument is unnoticed; but as soon as an irrational desire for lightness and beauty diminishes its strength below the point of due resistance, it at once becomes an annoyance, and the less efficient the support the greater is the intolerance of it. Each upright is usually furnished with two hinges, as described by Dr. Taylor, and the portion between these hinges being made wider and lighter than the rest, forms the pad plate. Immediately beyond each hinge is a screw passing through the upright and pressing against the pad plate. This renders the instrument capable of the nicest adjustment, the pressure of the pad being regulated by these screws. Support is afforded to the usually distended and pendulous abdominal walls by an apron attached below to the strap of the hip band, and buckling to the uprights behind. Where it appears desirable, this apron may be carried sufficiently high to exert a moderate amount of pressure on the projecting sternum and thorax anteriorly. Care must be taken, however, not to embarrass respiration.

The instrument is seen applied in Fig. 6, which is copied from a photograph of

CASE I. Joseph Armstrong, of Pottsville, Pa., July 21, 1865, æt. 17 years. Began to work in the

mines when quite a small boy. Had a "hard boss," and was obliged to lift heavy weights. After-

Fig. 6.



wards worked in a foundry, where also he had much severe lifting to do. About four years since, discovered a small projection of the spine about the middle of the back, and very soon after found that he was losing strength. At this time he began to suffer from pain in the right side and hip, and to be unsteady in his gait, frequently

falling. During the first six months, was subject to "cramping pains" in the stomach and bowels, at one time lasting a week and confining him to the bed. The deformity steadily progressed, and his general health became more and more impaired, until the third year of the disease. He then came to Philadelphia and consulted Prof. Pancoast. By his advice he went to one of the first instrument-makers of the city, who provided him with a brace of the ordinary construction. This gave him so much pain that he was able to wear it only four weeks, during which time he experienced no relief whatever from its use. His condition has continued to depreciate until the present time.

Present Condition.—Face anæmic, considerable emaciation; is very feeble, not being able to walk a square without resting. Considerable dyspnœa and frequent palpitations. The four lower dorsal vertebræ form a curve of great prominence, which is complicated by an extreme lateral deviation to the right. He walks much bent, with the right hand resting on the knee. Habitual position when at rest, the chest supported on the seat of a chair, while the knees are braced against the round.

I applied the splint at the above date. The accompanying photograph was taken six months

later, in January of the present year. At that time he expressed himself as getting "real strong." Had a good appetite; could walk a mile; his carriage was so erect that his old friends often passed him in the street without recognizing him. The lateral curvature was almost entirely corrected. Color better; gaining flesh. Suffers from neuralgic pains in both legs, more severe in the right. This has been a troublesome complication of the case, but is diminishing. The palpitations have ceased entirely. He now feels himself so far restored that he has opened a small store.

When the cervical vertebræ are the seat of disease, it becomes necessary to find a point above the level of the shoulders against which to exert pressure anteriorly. The only available point for this purpose is the chin. To reach it, the following modification of the instrument is necessary. The upper hinge is dispensed with. The pad plate is curved forward slightly at its top, and is then narrowed to the breadth of the upright, and again bent upward until it becomes vertical. The scapular is made with lower arms only, and the straps are attached above at the angle where the arms are given off. In the centre of the scapular is

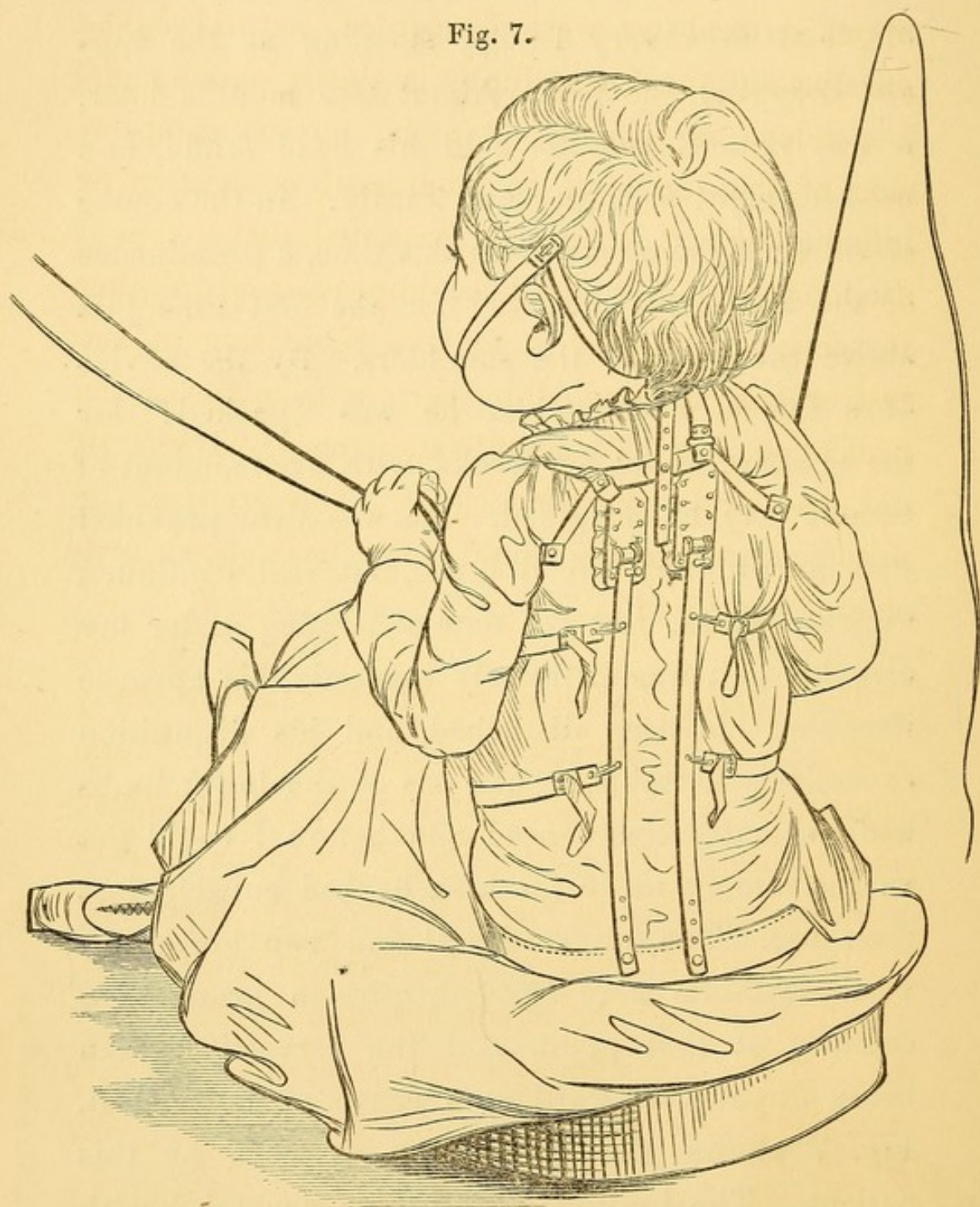
placed a keeper, for the reception of an upright which carries the occipital bow. This upright is three or four inches in length, and furnished with holes which, corresponding with a hole in the centre of the keeper, enable it to be securely fastened by a screw at any desired height. The occipital bow, covered with silk or velvet, and slightly padded, passes up under the *occiput* to a point a little above or below the level of the ears on either side, and is armed at its extremities with two small hooks or flat rotating buttons. Unless the atlas and axis are supposed to be involved in the disease, this piece rotates on the upright, thus giving ease and freedom of motion to the head; but if that be the case, all lateral motion should be avoided, for fear of rupture of the lateral ligaments, possibly weakened by ulceration. The chin piece may be either a leather strap or a light steel band, covered and padded where it makes pressure, and with an opening in the middle to receive the point of the chin. At either end of the strap are eyelet holes, or if the steel band be used, several narrow transverse openings, to admit the button on the occipital piece, which, being turned, makes it perfectly secure. I prefer the latter, as it can be made narrower than the leather, is more secure, and does not compress the cheeks so much.

The little fellow from whom the accompanying drawing was made presents the following history:—

CASE II. C. W. H., seen in consultation with Dr. S. Weir Mitchell, September 9th, 1865, native of Philadelphia, æt. 2 years 9 months. At birth was considered by the attending physician to be hydrocephalic. This tendency rapidly developed until, at the age of six months, the head had become very large, and there was evidently water on the brain. For several months his life was despaired of. From this condition, however, he at last began slowly to recover until his health became tolerably good. At the age of eighteen months, he fell to the floor from a high counter in his father's store, striking the back of the head and upper part of the spine. In the course of two months after this fall his mother observed that he seemed to suffer on being moved, so that soon every attempt to lift him, especially the movements incident to dressing and undressing, caused immediate and violent fits of screaming. His mother writes: "If laid upon his back, he seemed to suffer most intense agony—he was very restless at night, lifting his head and letting it fall again as if too heavy for the spine to bear, and crying out very often. Indeed, we never had a good night's

sleep until he began to wear your instrument." He made no attempt at walking until two years old, and then very feebly, stooping at the hips and dragging the feet. About two months later, it was noticed that he held his head stiffly, and used his right arm very awkwardly. In the course of six or eight weeks from this time, a prominence of the spine was observed for the first time just above the level of the shoulders. By the advice of a female hydropathist he was "packed!" for the space of about six weeks, with what amount of benefit may be imagined. He was then provided with an ordinary spinal brace, but still continued to grow worse. At the date of coming under my care his gait was extremely unsteady, his appetite irregular, his sleep disturbed, and his disposition excessively irritable. Paralysis of the lower limbs had evidently commenced, and before I could get an instrument made for him, he had entirely lost their use. The upper dorsal and two lower cervical vertebræ were affected, quite a prominence existing at that point, and the cervical column being directed forward at a sharp angle from it. Fig. 7 shows the instrument as worn by this patient. The improvement in his general health on its application was immediate and marked. He

Fig. 7.



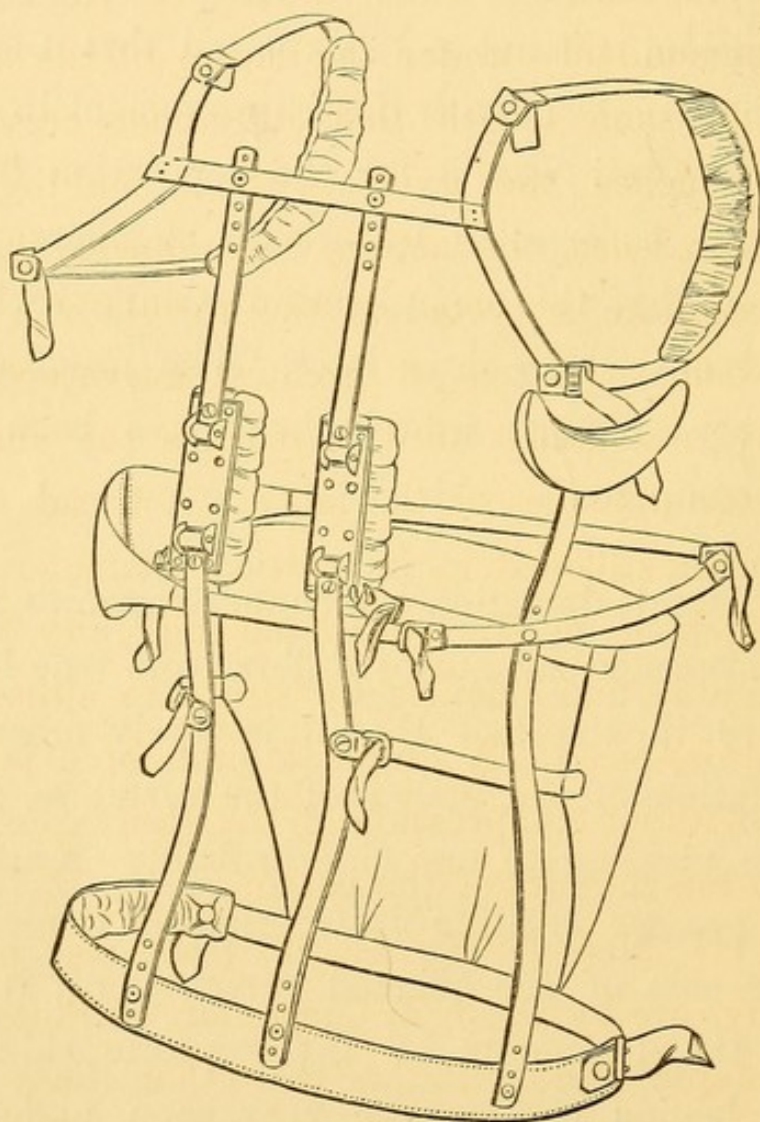
became cheerful, his nights restful, his appetite constant, and his movements, so far as the head and upper extremities were concerned, natural. The paralysis of the lower limbs is slowly passing off.¹ Dependent, as I believe it to be, not on compression of the cord, but on meningeal congestion or inflammation, it is not to be expected that it should diminish *pari passu* with the improvement in other respects. Well was it for the reputation of the instrument, as assailed by certain members of the profession, that this complication occurred when it did, and not a few days later. The proof of its mischievous agency would then have been considered complete.

The lateral deviation which accompanies many antero posterior curvatures differs from true lateral curvature in the fact that it is rarely associated with rotation of the bodies of the vertebræ. It is a simple yielding to one side probably on account of the greater relative destruction of the corresponding side of the affected vertebra, or, it may be, of the ligaments of the opposite side. It usually begins to improve very soon under the

¹ Since the above was written, this patient has entirely regained the use of his limbs, and the deformity both of the spine and thorax is notably diminished.

application of antero-posterior force, and often disappears entirely without any other appliance. Its presence, however, of course necessitates a greater degree of pressure upon the opposite side

Fig. 8.



of the vertebral prominence, and for the relief of this, as well as to hasten, in some cases, the restora-

tion to the erect posture, I sometimes add to the instrument the contrivance depicted in Fig. 8.

It consists of a firm steel upright having a broad padded crescentic top, and provided with a cross-piece. The upright is riveted to the hip-band on the side toward which the trunk yields, at a point immediately under the centre of the axilla, and is of such length that its upper crescentic border touches the axilla without making any upward pressure, the action being purely lateral. The cross-piece is riveted to the upright at a point a little below the seat of greatest curvature, and extends horizontally until it reaches the anterior and posterior planes of the body. A broad rhomboid binder stiffened in its vertical diameter, by a thin whalebone, passes around the convexity of the opposite side, and buckles by straps to either end of the cross-piece. A simple lateral force is thus exerted without compression of the thorax, usually much to the comfort of the patient.

CASE III. Miss A. K., æt. 13 years, was placed under my care by Dr. J. T. Carpenter, of Pottsville, Pa., in March, 1865. Rather more than three years before, her gait became stiff and peculiar, her strength notably diminished, and she evinced a constant desire for extraneous support by leaning

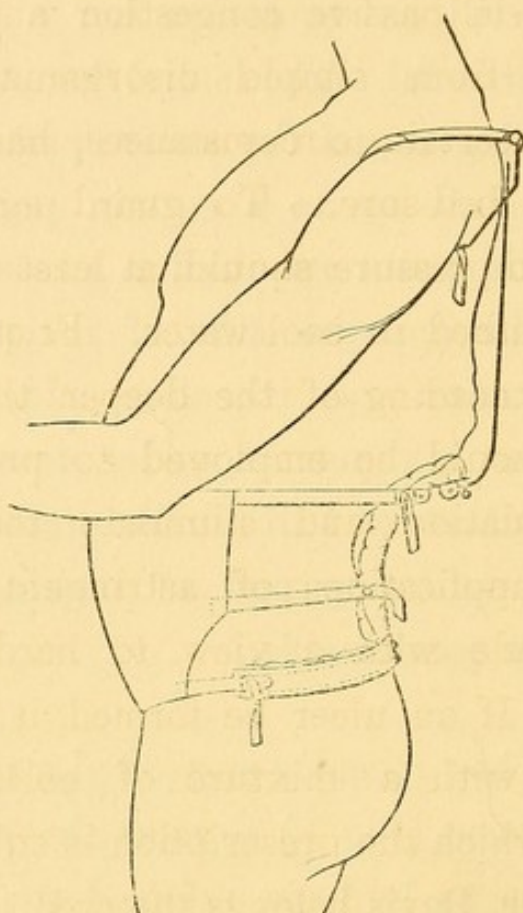
against articles of furniture. Before long a slight prominence was discovered in the lower part of the back, and in the course of a few weeks she began to suffer pain in both legs, especially the right, and to have cramps in the spinal muscles.

The deformity progressed steadily though not rapidly, the general health slowly deteriorating until she became quite feeble and emaciated. At the time I first saw her the spine presented a large irregular curve, involving the five lower dorsal vertebræ, with considerable tendency to lordosis, and extreme lateral deflection to the right. She walked habitually with the right hand resting on the right thigh, or dragging down her dress from the hips with both hands in order to support the trunk and shoulders. She walked with difficulty, and could not go a rod without being compelled to sit down and rest. The application of the instrument afforded relief to the pain and difficulty of locomotion in a most surprisingly short time, and her improvement has been constant ever since. To-day, January 27, 1866, ten months after it was first put on, she has walked three miles in the course of the morning, without any very serious fatigue. She has a good appetite, healthy color, and is gaining flesh. Her gait is firm and com-

paratively natural, although the tendency to lordosis, which still exists, makes her a little more erect than is graceful. The lateral deviation yielded in a marked degree to the antero-posterior force, as usual, but only up to a certain point; and to keep it at this point required a great degree of pressure on the opposite side of the prominence. The lateral action was therefore added after she had been about six months under treatment, and has had the effect of still further remedying this phase of the deformity and of making her considerably more comfortable.

Dr. Taylor has recently suggested a modification of the instrument (Fig. 9) to meet the peculiar deformity known as lordosis, referred to in the case above related. This consists in dispensing with the lower hinge, and causing the lower lever to fit in directly under the projecting shelf formed by the spine and ribs, following closely the curve of the lumbar column, except just at its centre. Instead of a small pad plate just at the seat of disease, the lower lever is provided for its entire length with a thin steel plate, which is well padded. The pressure is thus made upward, as well as forward, at the point of projection, and the tendency is to open out this secondary curve, as if by a wedge.

Fig. 9.



Whatever be the nature of the deformity, and whatever the modification of the instrument, it is essential that the latter should be kept acting forcibly in order to be of any service. If worn loosely it fails of its object, and is simply burdensome. To this end the pressure of the pads must be considerable, and much care is therefore requisite to keep the skin underneath them in a healthy condition. The danger is not of simple excoriation,

but of that diminution of the vitality of the skin, which results in passive congestion and solution of continuity from simple disorganization, and which, under certain circumstances, has received the name of bed-sore. To guard against this, parts subject to pressure should, at least once daily, be carefully bathed in cool water. Friction of the surface and kneading of the deeper tissues with the fingers should be employed to promote the capillary circulation and stimulate the sentient nerves, and applications of astringent solutions should be made with a view to hardening the integuments. If an ulcer be formed, it should be coated daily with a mixture of collodion and castor-oil, of which the prescription is subjoined.¹

While to Dr. Davis belongs the credit of having first distinctly pointed out the anatomical fact which enables us to treat successfully this most distressing malady, the fallacy of the prevailing style of apparatus, viz: that which relies for its action on counter-extension by transmitting the weight of the head and trunk from the axillæ to the pelvis was long ago exposed by Prof. J. K. Mitchell,

¹ R.—Collodion, ℥j;

Ol. ricini, ℥v. M.

S. Apply with a camel's hair pencil.

of the Jefferson Medical College of Philadelphia. In an editorial foot-note to Mr. Bampffield's prize essay *On the Curvatures and Diseases of the Spine*, already alluded to, and republished by him in this country, in 1845, he says: "I may here repeat that the axilla, being a movable point, affords no good means of support, and that there are many objections to throwing the weight of the head and shoulders on the pelvis." These objections he had alluded to nineteen years before in a communication which appeared in the first number of the *North American Medical and Surgical Journal*, asserting that this class of instruments "so bind down the muscles of the trunk, so compress the abdomen and chest as to be sometimes useless and often prejudicial." The plan of treatment which he adopted to avoid these difficulties, and which is fully described, with illustrations, in the article referred to, consisted of a revival, in a modified form, of the old method of suspension.

The apparatus may be found described, almost exactly, in the fourth volume of the *Mémoires de l'Académie Royale de Chirurgie de Paris*, in a contribution by M. Le Vacher, in the year 1768; the difference between his mode and that of Prof. Mitchell being, that he attached his mechanism

to a corset, worn on the person, while the latter found his point of support altogether outside of the body, and was thus enabled to make use of the entire weight of the trunk and lower extremities (and in some cases even of the upper) as an extending force. In no other way can the principle of extension be made available. That it can be made available in this way, both in angular and lateral curvature, the very interesting and successful cases published by Prof. Mitchell sufficiently attest. It is difficult to conceive why so valuable a means, so well introduced and so ably supported, should have been allowed to fall into such complete disuse. The apparatus, as I use it, consists of a simple steel rod bent at a right angle about a foot from its upper extremity, while the lower portion for the same distance is provided with ratchet teeth. This ratchet is received by two steel keepers, securely fastened two inches apart to a block of wood two inches wide and half an inch thick. The lower keeper is furnished with a lock for the introduction of a pinion key, and a spring-stop. The length of the rod, of course, varies with the height of the patient. Along the horizontal portion of the rod slides a socket, to which is attached a light, curved steel head-piece, armed

with hooks, to which is fastened a chin strap. Shortly below the point of attachment of the chin strap to the head-piece is a second strap, designed to pass around below the occiput, fastened permanently at one end, and buckled at the other. The socket is provided with a set screw, by means of which it can be fixed at any point over the centre of the head. The block is pierced at short intervals along each side to allow of the insertion of screws. Thus arranged, the apparatus can readily be adjusted to any chair or other article of furniture which the patient may desire to use. Prof. Mitchell especially recommended a "spine cart," that is, an ordinary child's go-cart, with the spinal apparatus attached, in which the patient could walk about, and thus at the same time relieve the tedium of confinement and enjoy the benefits of exercise. As my patients invariably wear the apparatus of Dr. Taylor, described above, which affords the same facilities to an indefinitely greater extent, I prefer to use a chair, except in cases where there is paralysis of the lower extremities. Dr. Mitchell was also accustomed to adapt it very ingeniously to a swing, a rocking-horse, etc.

There are three classes of cases in which it forms

a very useful adjunct to the other mode of treatment:—

1st. Those in which the cervical vertebræ are the seat of disease; for while we are generally able to arrest the progress of the disease in this region by antero-posterior force, we cannot accomplish so much in the way of correcting deformity, and partial suspension then becomes a valuable aid.

2d. Where, for any reason, whether caries of the transverse processes, abscess, ulcers resulting from the use (or abuse) of issues, moxas, *et id omne genus*, hyperæsthesia of the surface, or extreme delicacy, tenderness, and irritability of the integuments, the requisite amount of antero-posterior pressure cannot be borne, save for a limited time; and,

3d. Those cases which, while their destructive progress may be arrested, and the posterior projection may be somewhat diminished, exhibit a tendency to the phase of deformity already alluded to under the name of lordosis. This distortion is owing apparently to a yielding of the intervertebral substance posteriorly, or possibly to a partial absorption of the oblique processes, in the lumbar region, it being rarely seen higher up. It can scarcely be attributed to increased vertebral disease, as it is not usually accompanied by the rational

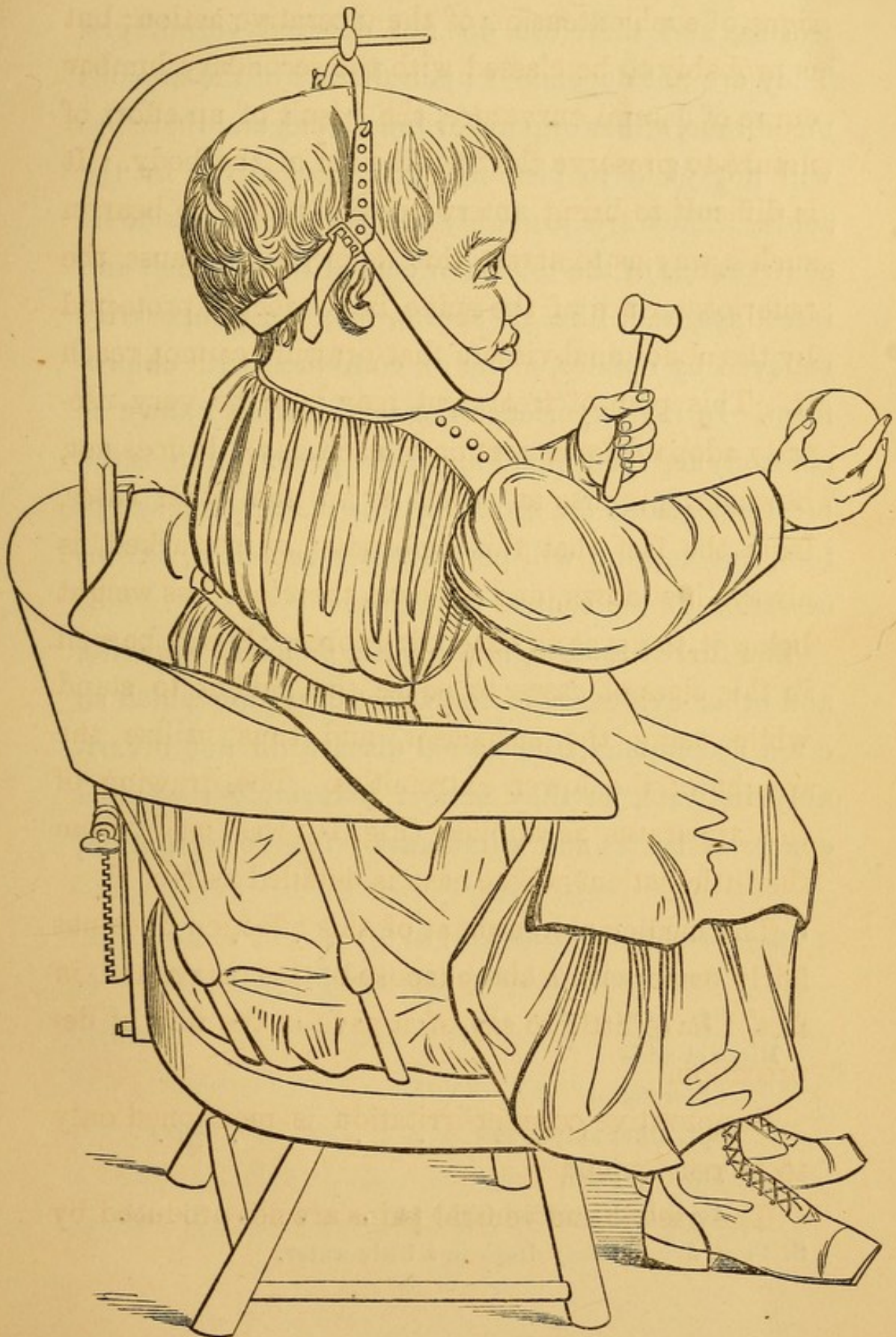
signs of such extension of the ulcerative action; but is probably to be classed with the secondary lumbar curve of lateral curvature, the result of an effort of nature to preserve the equilibrium of the body. It is difficult to bring antero-posterior force to bear in such a way as to arrest this deformity, because the anterior surface of the spine is so deeply protected by the abdominal viscera that pressure cannot reach it. This plan of treatment may here be very usefully adopted for a portion of each day. It does not, however, promise as much as in the other cases, from the fact that this deformity, as remarked, is always low down, and we have therefore less weight below it, to act as an extending force. It will be well in this class of cases to cause the patient to stand while using the suspensor, and thus utilize the weight of the lower extremities. The drawing of this apparatus as applied (Fig. 10) was made from the little patient whose case is detailed as No. II.

The medicinal treatment of this affection does not fairly come within the purpose of this paper, and, in fact, I have little to say of it save in the way of deprecation.

Suppurative counter-irritation is mentioned only to be condemned.

The gastric and ventral pains are not produced by

Fig. 10.



worms, and therefore do not demand vermifuges. They are not dependent upon disease of the mucous membrane, either organic or functional, and therefore will not yield to bismuth, nitrate of silver, or the acids. They are probably the result of spasmodic contractions of the muscular coat of the stomach and intestines, and, like all spasm, may be temporarily relieved by opiates, alone or combined with chloroform. In my experience the combination known as chlorodyne,¹ for which I append a prescription, is the most efficacious for soothing this distressing symptom, but nothing will permanently benefit it, except cessation of the central irritation.

The furred tongue, foul breath, deficient appetite, and other evidences of imperfect digestion which so often accompany true spinal disease do not invariably indicate, as they almost invariably receive a course of tonics and stimulants. Gentle purgation,

- ¹ R.—Morphiæ sulphatis (gr. j ad 3j) . . . 3ss.
 Tinct. cannabis Indicæ (gr. ij ad 3j) . . . 3j.
 Syr. gum acaciæ 3j.
 Misce et adde
 Chloroformi,
 Spt. ether sulph. āā 3ss.
 Tinct. capsici,
 Acidi hydrocyanici (dil.) āā 3j—M.
 S. From five to thirty drops in a little water.

systematically followed up, will often be attended with the happiest results when the other plan has failed. When a medicinal tonic is evidently required, some combination of cinchona, iron and phosphorus will be found to meet the indications most nearly. Phosphoric acid lemonade is a grateful beverage, and well calculated to supply waste both of bone and nerve. One tonic, however, may and should be administered very freely—*open air*. Large doses of this invaluable remedy (the action of which is much heightened by the stimulus of the direct rays of the sun), in connection with efficient mechanical support and a due regard to other hygienic precautions, have usually sufficed in my experience, to remove all the general symptoms without resorting to medication at all.

Such collateral or sequential affections as paralysis, psoas abscess, secondary abscess, etc., do not come within the scope of this essay. The former, however, I may be justified in alluding to, simply as it has been made the ground of a most unfair criticism upon the action of the instrument I have been describing; a criticism which would scarcely deserve notice had it not been uttered with much emphasis, before one of the largest classes of students in the country, by a professor whose well-

known ability as a surgeon entitles his opinion to considerable respect. Taking a piece of paper to represent the spinal column, a large wedge-shaped piece, having its base in front, is snipped out to indicate the portion destroyed by caries. The gap thus produced is exhibited to the students as the precise counterpart of that caused by the elevation of the anterior portion of the spine at the seat of disease by the action of Dr. Taylor's instrument. Into this gap they are assured, the spinal cord, loosely pendulous, protrudes, and between these opposing surfaces it will some day inevitably be caught (the edges of the paper gap are here suddenly approximated) and subjected to such a degree of pressure that paralysis will surely and suddenly follow. The demonstration is complete and convincing, and each student breathes more freely as he thinks of the danger to which he might have subjected some future patient had he not been thus faithfully forewarned.

But does the excellent professor take pains to recall to the minds of his auditors certain little anatomical points which have a bearing upon this subject? Does he inform them that at least one-fourth of the spinal column is composed of highly elastic fibro-cartilage—a portion of which is indeed

mere pulp—and explain to them that on the relief from superincumbent pressure, this elastic fourth portion would be the first to regain its normal position and consistence, and that, moreover, by virtue of its elasticity, expanding downward as well as upward, it would tend to retard this much to be dreaded gaping open of the diseased vertebræ? Does he point out to them the fact that not the vertebral column alone, but the entire thorax, participates in the deformity, that the ribs are approximated, one to another, and the thorax to the pelvis, and that the inter and intra-costal, and the powerful abdominal muscles, having become contracted from position must first be stretched out to their normal length, along the whole anterior surface of the trunk, before the spine can become again erect? That in like manner the prevertebral muscles in the cervical, and the psoas masses in the lumbar regions interpose to prevent this sudden, violent separation; and that the elastic anterior ligament is exerting a force in the same direction all the way down the front of the column?

Having thus shown the difficulties in the way of a dangerously rapid straightening of the diseased spine, does he allude to the fact that nature, ever watchful, is ready to take advantage of the slight-

est opportunity for repair; that, abhorring a *vacuum* as much in the interior of the body as externally to it, as soon as she finds relief from the pressure under which the inflamed vertebræ have been rapidly melting away, she ceases to busy herself with absorbing and removing *detritus*, and makes an effort, not always succesful it is true, but generally so, at building up a new structure to take the place of that which has been destroyed, and thus fill up the chasm as fast as the elastic cartilages and slowly yielding muscles and ligaments permit it to be produced?

And, having now indicated the obstacles which nature interposes to the formation of this ugly little trap for the unsuspecting cord, does he point them to the safeguards which surround that cord, reminding them that it does not hang carelessly swinging in space, but is firmly stayed in its central position by the dentate ligaments which pass from its dense, closely-fitting tunic, the *pia mater*, out to the *dura mater* (itself protected exteriorly by a layer of adipose and a venous plexus), as well as by those prolongations of its own substance which constitute the roots of the spinal nerves; while the interspace is filled by the reduplicated *arachnoid*, by areolar tissue, and by several ounces of fluid? Does he

assure them that so complete is this protection, that deformity may go on to the utmost limit, the spine being bent even at a right angle, and yet no compression of the cord, as indicated by paralysis, shall take place?

This last-mentioned fact indeed constitutes the dangerous point of the criticism. The paralysis which accompanies angular curvature is not, in ninety-five cases out of a hundred, caused by undue pressure of the bony envelope, but by inflammation or congestion of these membranous investments. This is proved by the fact that there is no relation whatever between the frequency of the occurrence of paralysis, and the growth or degree of the distortion, the most horrible deformity taking place, without disturbing in the least the function of locomotion in many cases, while in others complete paralysis may supervene before there has been the slightest deviation from the normal curve; by the rational signs, which are those of meningitis, rather than of compression of the cord; and by the fact that recovery from paralysis is often seen, even while the deformity is on the increase. Nor, on the other hand, will a diminution of the vertical pressure at the seat of disease, or even of the deformity itself, necessarily prevent an extension of the inflam-

matory action from the osseous to the membranous tissue. Any case, even while being rationally and successfully treated, is liable to an access of paralysis. How easy for the professor or his pupils to say in such a case, "Aha! we told you so; you've caught the cord!" I feel that this question may safely be left to the candor of the profession, and dismiss it with the following quotation from Prof. Mitchell's paper already alluded to: "Where there is advantage to be derived from machines, I use them without much regard to such theoretical objections."

IV.

TYPE CASES.

"CURA PROBAT MORBUM."

TEN TYPE CASES
OF
ULCERATIVE INFLAMMATION OF THE SPINAL COLUMN,
COMMONLY CALLED POTT'S DISEASE.

THE following cases have been carefully selected from a large number which have come under my observation, as presenting various phases or types of the disease to which they belong, and more especially in illustration of its differing and often insidious modes of invasion. I cannot but express the hope that a careful perusal of them will lead the general practitioner to be more on the alert for the initial symptoms of this terrible affection.

I consider that they sufficiently demonstrate—

1st, That unmistakable signs of invasion often show themselves many months before absorption has produced deformity; and,

2d, That in this stage of invasion, the disease is extremely tractable—perfect recovery being almost always attainable.

At the same time, encouraging testimony is afforded to the fact that no case is too desperate, unless ankylosis be already perfectly established,

to admit of hopes of ultimate and decided benefit. These cases were all treated by means of the spinal splint, of Dr. C. F. Taylor, of New York, an instrument which is now fully indorsed by all the scientific men in the profession of that city; but which, like every other surgical instrument, is serviceable only in competent hands, guided by an intelligent and well informed mind. No mere instrument-maker should ever be allowed to apply it. The mechanical treatment of a carious or inflamed spine requires at least as thorough a knowledge of anatomy as that of a fractured limb; and to delegate the one to an individual unpossessed of this requisite, is as unreasonable, and should be considered as unprofessional as to resign the other to the same untutored care.

CASE I. *Acute Inflammation of Intervertebral Substances, resulting from indirect violence, in a healthy individual, and simulating Muscular Lesion with Neuralgia; Complete Cure.*—Mr. N——, merchant, residing in China, whilst visiting in New York, in the spring of 1862, slipped on the side-walk. Being a man of powerful muscular development, he succeeded in saving himself from falling, but was conscious of a sharp pain in the back in consequence

of the effort. This soon passed off, and he paid no more attention to the circumstance.

In about a month from this occurrence, however, he began to experience a sense of pain in the chest, a little below the nipple on one side, which soon became so severe as to compel him to summon medical aid. The best talent in the city was consulted, but no relief was obtained from the agonizing pain which gradually shifted from its first position to the side, and thence to a point near the spine. So extreme was his suffering that, although a man of great endurance, his cries could be heard to a considerable distance from the house. For several months he was confined to the bed, and, indeed, scarcely able to move, gaining only occasional intervals of respite and repose from the employment of morphia hypodermically in large quantities. One of the physicians in attendance afterward mentioned to me the interesting fact, that when relief followed the injections, it was heralded and accompanied by loud *borborygmi*, thus indicating spasm of the muscular coat of the intestines, as one of the causes, if not the chief cause, of suffering in this instance. The fact that any attempt at motion on the part of the patient produced pain, led his physicians to suppose that there existed a hyperæsthetic condition of

the dorsal muscles, the result of the strain received in the spring; and hoping to find a remedy for this in a system of passive exercise, they sought the assistance of my late associate, Dr. C. F. Taylor. This gentleman, on a careful examination of the case, came to a different conclusion, regarding it as one of incipient Pott's disease. He, therefore, declined to treat it in the way suggested, but proposed instead the use of the spinal splint. Although hesitating to agree in his diagnosis, and seeing in the alteration of the normal curves of the spine which Dr. T. pointed out, only the results of confinement to the horizontal posture, and irregular muscular action, they courteously acceded to his proposal as a harmless experiment in a desperate case.

The result was as surprising as it was gratifying. The cessation of pain was almost immediate. The recovery was uninterrupted, and in ten months from the date of the application of the instrument his pristine vigor was completely restored, the spine having regained its normal shape and flexibility. His brother has informed me within a year past that he writes from China, that he never has the slightest sense of pain in the back or elsewhere, although, as a matter of precaution, he still keeps the instrument at hand, to which he owes so much.

CASE II. *Acute Inflammation of Intervertebral Cartilages, resulting from direct violence, in a previously healthy individual, and simulating Lumbago; Complete Cure.*—Col. P——, commanding a New York Metropolitan Regiment, while conducting a brigade drill at Baton Rouge, had the misfortune to have his horse rear and fall back on him. He experienced, instantaneously, a severe pain in the back, and on attempting to rise found himself powerless. He was conveyed to the hospital, where he remained several weeks paraplegic, but gradually recovering the use of his legs. On essaying to walk, however, he found himself extremely stiff, unable to straighten the back, and suffering pain both there and on the front of the trunk on making any effort to do so. This difficulty did not improve *pari passu* with the recovery of strength in his lower extremities; and, finally, despairing of being able to resume his post in the field, he obtained leave of absence and came North. His condition, on consulting me in the autumn of 1863, some four months after the date of the injury, was one of great mental despondence. His gait was slow and painful. He could not stand erect or remain standing for any length of time, and his general health was evidently suffering. He applied to me in the hope

that he might derive benefit from a course of Localized Movements. On examination it was observed that although no point of prominence could be detected, there was an alteration in the curves of the spine which could not be obliterated by changes of posture. The diagnosis of inflammatory action in some one of its constituents was, therefore, ventured upon. The regular character of the deformity led us to pronounce that the intervertebral disks were the portion affected, and probably a large number of them. We explained to the patient the uncertainty of the diagnosis, but at the same time declined to undertake the case under any other understanding, or by any other mode of treatment. He readily accepted our view, and the instrument was applied. He at once expressed himself as feeling stronger, "like a new being." His progress to recovery was rapid, and uninterrupted except by his occasional omissions to wear the splint, and in less than four months he was perfectly well, erect in carriage, vigorous in movement, buoyant in spirits.

CASE III. *Chronic Inflammation of Intervertebral Substances resulting in slight Vertebral Absorption, caused by Typh-Fever; Cure.*—John R. Tate, æt. 17. General health had been good up to the month

of September, 1863, when he was attacked with a typh-fever. From this he recovered favorably only up to a certain point, at which he remained for a short time stationary and then began to deteriorate again. He was brought to our notice by Dr. Underhill, of New York, six months after his attack of fever, with the idea that a new impulse might be given to the recuperative processes by a course of systematic exercise. Dr. Taylor, upon a careful examination of the case, pronounced it to be one of Pott's disease. Although it was impossible to detect any angular projection of the spine, the general signs were unmistakable. There was great rigidity of the spinal column through its whole length. Its normal curves were obliterated. There was a bulging in lumbar region with slight lateral deviation. There was some contraction of the flexors of the femur throwing the body forward; the gait was cautious, stiff, and painful, the toes being directed slightly inward. There was gastralgia with impairment of digestion, and considerable general disturbance of the economy with febrile movement. The instrument was applied with the point of leverage in the lower dorsal and upper lumbar regions with a sense of instant relief. Although at that time unable to walk more than a few yards, in the course of two

weeks he walked half a mile without resting. It was delightful to watch the rapidity of his cure and to witness his own joy at his suddenly new-found health. In less than a year he was able to maintain himself and contribute to the support of his mother by his own exertions as a clerk. An interesting feature in the case was the development of the spinal muscles. When he came under our care the emaciation of this region was excessive, quite out of proportion to that which existed generally. But in a very few months these muscles had acquired even more than their normal volume, thus bearing convincing testimony to the value of that provision of the splint which permits motion in a backward direction, inviting the dorsal muscles to action.

CASE IV. *Acute Inflammation of Vertebral Articulating Surfaces in a healthy child, of healthy antecedents; Rapid Absorption of Bodies of Vertebrae; Gradual Restoration of Health; Partial Reduction of Deformity.*—Joseph Bishop, æt. 4 years, native of Pottsville, Pa., was placed under my care in March, 1865, by Dr. J. T. Carpenter, of that town.

At the age of two years, having previously enjoyed invariably good health, and sprung of healthy parents, he was suddenly seized with an irritative

fever. The fact that respiration was hurried and labored led the physician in attendance to pronounce the disease catarrhal fever. As, however, from the outset acute pain on being moved, and especially on being lifted, was a prominent symptom, the inference is a fair one, coupling this fact with the subsequent history, that both the febrile movement and the embarrassment of respiration were symptomatic of acute inflammation of the spinal column. The probability is heightened by the fact that it was in the dorsal region, that the disease subsequently declared itself, the situation in which it is most likely to disturb the respiratory act.

On the ninth day the general symptoms began to abate, the fever diminishing and the respiration becoming easier, but the severe pain on being lifted continued, and he could walk only with great difficulty.

This attack took place in January, 1863. His health continued very feeble, with constant suffering all winter; and in the following March, his mother first noticed a slight prominence in the mid-dorsal region. This slowly increased, his condition being sometimes better and sometimes worse; his appetite in general poor and capricious; his sleep much disturbed, often waking with screams, so that his mother was frequently obliged to hold him in her arms the entire night.

At the time that I first saw him in March, 1865, he walked with extreme difficulty, the hands being held against the thighs. His treatment up to this time had consisted of stimulating frictions externally, and tonics internally. On the first application of the instrument he was very rebellious, so that for two or three days it was impossible to adjust it in such a way as to give him the full benefit of it. He soon, however, became conscious of the relief it was affording him, and submitted with a good grace. He now began to walk with ease in the erect posture; his appetite returned, and his mother assures me that he has not had a restless night since.

At the present date, June 14, 1866, the prominence has considerably diminished, and he runs, jumps, and plays as well as any of his playmates.

CASE V. *Slow Absorption of Bodies of Vertebrae, with Partial Paraplegia and Total Failure of Digestion; Complete Restoration to Health.*—Morgan Stuart, native of Philadelphia, æt. 6 years; parents in good health; patient's previous health good, with the exception of some disturbances during dentition. Attention of mother and nurse first attracted to a shrinking of left limb, which, without loss of power, or pain, became noticeably smaller than the right.

Soon after this was observed, he began to suffer from gastric pains.

Being in the island of Cuba at the time, he was treated by the first physicians of Havana for indigestion, but with no beneficial result. The pains continued unmitigated, and digestion became so enfeebled that, as his mother writes me, "his diet was necessarily of the most simple kind, consisting only of boiled rice, toast-water, and broth of either mutton or beef; any other kind of food passing from his bowels as he swallowed it, even the most delicate kinds of fruit." She continues: "A few months before we discovered the nature of his disease he was taken with lameness, and for days at a time refused to walk. At this time he had spells of faintness, accompanied by pain in his bowels, and a disinclination to rise from his bed.

"It was only on our return from Cuba in the spring of 1864, that a small lump in the middle of the spine revealed, for the first time, his disease. The attending physician pronounced his case incurable, as it was impossible to make use of the ordinary treatment with so delicate a child, giving it as his opinion that it would aggravate the symptoms and hasten the deformity."

This opinion was undoubtedly correct. I have

no hesitation in saying that a course of setons and issues would have very shortly ended the little patient's sufferings at the expense of his life.

He was placed under the care of Dr. Taylor and myself in June, 1864, soon after his return from Cuba, by the advice of Dr. Gescheidt, of New York. His condition at this time was pitiable in the extreme. He was pale and emaciated; his legs were shrunk and slightly contracted. He suffered from frequent attacks of gastralgia. For months before he had not been able to digest a morsel of meat, rice being almost the only solid that his stomach could manage.

The second and third lumbar vertebræ formed a decided, though not very large, angular prominence; but this was rapidly increasing.

Within a week from the application of the instrument he began to be clamorous for solid food; and his mother soon told me that he had eaten with great relish, and digested without pain, a piece of grouse. His convalescence was without a moment's interruption. Within a month he could walk with ease, and within six months he was actually "turning somersaults" with his playmates—a strong, active, well-nourished boy, with digestive powers quite as good as those of any of his brothers.

CASE VI. *Rapid Absorption of Bodies of Vertebrae in an Individual of Strumous Diathesis; Psoas Abscess; Restoration to Health; Absorption of Abscess.*— Arabella E. Barnes, æt. 5 years, the daughter of a physician residing in the interior of the State, came under my care August 28th, 1865. Her ill health dates back about a year previous to that time, when it was noticed that she became more easily fatigued than formerly, and also that her breathing was labored. Soon after she began to have spells of violent screaming, but did not locate the pain. Her appetite gradually failed and she had frequent attacks of nausea and vomiting. As was to be expected under such circumstances, she emaciated with considerable rapidity. Soon after the commencement of her illness, one of the spinous processes in the lower dorsal region began to project, and others were soon involved. The deformity increased apace, so that when I first saw her it was already very great. At least five dorsal vertebrae were to a greater or less degree destroyed, the most prominent spines being those of the eighth and twelfth, while between these two there was a considerable depression. This fact leads to the supposition that the disease commenced in these two distant vertebrae at nearly the same point of time, a condi-

tion not generally seen where the affection is simply the result of external violence, and confirming the supposition of a previous cachexy in this instance.

She walked with considerable difficulty, owing, in a great degree, to a psoas abscess of considerable size on the left side, the thigh of that side measuring, at the distance of one inch below the pubes, eleven inches in circumference, while the right measured but nine and a half at the same point. There was, of course, some contraction of the psoas and iliacus muscles on the same side. The progress of her case will best be gathered from the following extracts from her father's letters, which are valuable as being those of a professional observer. On examining her case, I had written expressing the opinion that while little could be expected in regard to reducing the prominence of the spine, its further growth might be checked, her figure made more erect, her general health improved, and possibly absorption of the psoas abscess be procured. If this last could not be effected, I advised its evacuation by means of a fine trocar and canula. In reply to this communication, he writes, "Allow me to say that your paper before the State Medical Society first attracted my attention to you in connection with my little daughter's case. The barbarism and inefficient

nature and effects of falsely-so called scientific treatment of 'Pott's Disease' long since satisfied me *ad nauseum*, so that I could not, and would not, subject my dear one to its tortures. If you are a father, your heart will better picture and feel my emotions, when I found mere constitutional treatment inadequate to the cure of one dearer to me than life itself. * * * * I would especially prefer that if the psoas abscess is likely to point at an early day, she should remain until the pus is evacuated, for I can hardly hope that absorption will prevent such an issue." In less than two months after the application of the instrument, Oct. 31st, 1865, he writes—in strong contrast to the despondent tone of his former letter: "You will permit me to say at this point, that my most ardent hopes are more than realized. Little Bell enters into the excitements incident to our rural life with zest, and seems almost insensible to fatigue. The psoas abscess remains about *in statu quo*, with, however, some indications of absorption that have thus far deterred me from tapping it. Her general health has rapidly improved since her return, and the erectness of her body and alacrity of her movements surprise all who knew her before she went to the city."

Just a year later, Nov. 5th, 1866, he writes: "Bell's general health has gradually and steadily improved, and there is no other limit to the amount of exercise she can take, with the instrument on, than that of age. The deformity has not increased a particle, and *there is no vestige of a psoas abscess.*"

CASE VII. *Slow Absorption of Vertebral Substance; Deep-seated Abscess Pointing Posteriorly; Restoration to Health; Absorption of Abscess.*—Carrie H——, æt. 8 years, native of Albany, New York. This little girl came under the care of Dr. Taylor and myself in the autumn of 1863. I have no notes of her case, but its main features are very clearly impressed on my memory. The symptoms were not acute, there having never been any very severe pain or paralysis. But there was impairment of the general health and nutrition, with disinclination to walk, and a slightly characteristic gait. The normal curves of the spinal column were, to a considerable extent, destroyed. The spine of the last lumbar vertebra projected slightly but noticeably, and from this point the entire column inclined gently to the left. On the right of the projecting spine, extending both above and below, was a diffuse swelling about two and a half inches in length,

and rather more than an inch broad. This tumor gave a distinct sense of deep-seated fluctuation to the touch, so deep seated that I felt confident it must communicate with the interspace between the sacrum and the last lumbar vertebra produced by the ulcerative process. With considerable hesitation the splint was applied, the pad making firm pressure directly upon the abscess—that being the only point at which it could be placed in order to be effective. She complained of no pain from the pressure. The lateral deflection disappeared at once. She soon began to improve in locomotion, and in six months' time there was no trace whatever of the threatening abscess to be found by the most careful examination. When I last heard from her she continued in perfect health.

CASE VIII. *Acute Inflammation of Vertebral Surfaces followed by Rapid Absorption of Bodies of Several Vertebrae, the result of indirect violence in a previously healthy individual; Initial Gastralgia; Rapid Reduction of Deformity.*—Lizzie H. G——, of West Chester, Pa., æt. three years and seven months. Parents both healthy, and of healthy stock. Up to the time of the accident about to be related was herself a robust, vigorous, and active child. In the

month of August, 1865, being then two years and five months old, she slipped backwards between the seat and the cross-piece which formed the back to the seat in a vehicle known in that section of the country as a "dearborn," wedging herself in with such force that her face and feet were in contact, and it required the efforts of two men to disengage her. The anterior portion of the articulating surfaces of the vertebræ and the intervertebral cartilages were thus subjected to great pressure. She at once complained of pain in the back, which continued for probably a half hour and then passed off. In a week from this occurrence, having seemed quite well in the interval, she began to cry with "stomach ache" several times a day and at night. This affection not yielding to household remedies, the family physician was called in. He at first suspected the presence of worms, but vermifuges called forth no evidence of their existence. Neuralgia of the stomach then suggested itself, but the whole course of anodynes, nervines, and anæsthetics afforded no permanent relief. The appetite began to fail, the gait became feeble, the paroxysms of pain were frequent and excruciating, constantly rousing her from sleep, and being more troublesome at night than during the day. At last, six months after the

receipt of the injury, her mother discovered a very small prominence on the spine at about the middle of the back. This grew rapidly larger, doubling in size in the course of a fortnight. The attention of the physician being called to it he at once recognized the true nature of the disease, and advised the parents to place the child under the care of Prof. H. H. Smith, of this city. This was done in the month of March, 1866. Prof. S. very judiciously discouraged the use of the seton which had been suggested by the attending physician, and advised instrumental support. The child was accordingly taken, *more majorum*, to an instrument-maker, who applied one of the old-fashioned crutch supporters, a class of instruments as inefficient and unscientific as anything that could possibly be contrived. For a short time she derived some relief during the day even from this very inadequate support, but at night her sufferings were unabated, and she was ere long worse than before its application. The projection continued to increase rapidly, and the general health was beginning to fail. In the month of July, Prof. S. became so much dissatisfied with the results of this apparatus as to have an addition made to it involving the idea of antero-posterior action, but his instructions were so clumsily carried out that

this well-designed improvement simply added to the discomfort of the little patient.

She came under my care the first day of October following. At that time she had almost entirely lost the use of her limbs, not walking so much as across the room in the course of the day, and this not unassisted. She had emaciated very fast in the last three months. Her appetite was small and capricious. Her temper excessively irritable. She was unable to sit up more than ten minutes at a time. Her attitude in standing was that of extreme stooping, the right hand resting on the knee of the same side, while the left shoulder was thrown up, a lateral deflection being thus super-added to the antero-posterior distortion. The projection was very large, involving seriously not less than four vertebræ from the mid-dorsal region downward. I applied the instrument on the fourth of October. Her improvement was somewhat retarded by the excessive fits of screaming which the very sight of a doctor induced, and which always resulted in a severe attack of gastralgia, the violent contractions of the expiratory muscles producing a forcible approachment of the bodies of the vertebræ. However, she slept better the first night, and each day saw a slight improvement. The following is

the memorandum of her case, October 25th, just three weeks after the application of the instrument: Stands erect. Walks with ease. Inclines to be much on her feet. Sleeps soundly all night. Has an excellent appetite. Temper much less irritable. Prominence of spine has diminished nearly an inch by measurement. Lateral deviation has disappeared entirely.

CASE IX. *Chronic Ulcerative Inflammation, Commencing almost Simultaneously at Two Different Points of the Spinal Column, and Simulating Disease of the Hip Joint; Relief; Antecedents Strumous.*—Emma P——, of Salisbury, Md., æt. 5 years, was brought to me, by the advice of Dr. J. F. Meigs, on the 30th of November, 1865. Her father had died of phthisis, and she presented the usual signs of inherited vice of nutrition. She had, however, always enjoyed tolerably good health until the January previous, when, without any apparent cause, she began to limp. The left leg was the seat of pain, not distinctly located always, but more frequently referred to the region of the hip-joint than elsewhere. There was a tendency to walk slightly on the toe of this foot, and in standing to draw up the heel. There was slight gastralgia, but not sufficiently severe to

require medical interference. Some four months after the appearance of this lameness, her back became the seat of pain, at times quite intense. It was about this time that her mother first noticed a slight projection in the mid-lumbar region of the spine. Her case was of a very mild type when brought to me. She was somewhat pale and emaciated, complained of fatigue on very slight exertion, and was apt to stumble and fall in walking. Her appetite was very variable. On examining the spine, a second point of disease was discovered in the mid dorsal region, apparently affecting only one vertebra. No evidence of coxalgia could be detected. The instrument was applied with the point of leverage opposite the lower projection, no anterior action being attempted at the upper. The effect of its application was at once to render her gait more certain and natural, and enable her to walk much longer distances without weariness. Her general health soon began to improve, and has continued to do so steadily, unless when after a long absence from the city her instrument has, from some cause, become inefficient. The case is reported as an apt instance of that class in which irritation and contraction of the psoas muscle on one side is one of the earliest symptoms, rendering the diagnosis ex-

tremely perplexing. The existence of gastralgia may always be considered as solving the problem in favor of the spinal affection.

CASE X. *Vertebral Caries slowly developing during a Period of Two Years; Probably Traumatic in Origin; First Symptom a Lateral Deviation soon followed by Gastralgia; Rapid Improvement.*—Sallie Thompkins, of New Mt. Pleasant, Monroe County, Pa., æt. 5 years, May 17, 1866. During her third year had frequent falls from a portico elevated about two feet above the ground, so that her mother always feared that she had injured herself, although there were no immediately serious consequences. For the past two years, however, it has been noticed that she leaned to one side in walking. Since the beginning of last winter she has suffered much from pains in the abdomen, supposed to be colic, for which she has "taken a great deal of peppermint." At the same time her powers of locomotion have become more and more impaired, and her figure more deformed. Her present condition is as follows: Appetite poor; is very easily fatigued by walking, and only goes up and down stairs on her hands and knees; the feet are held well apart, with the toes directed inwards in locomotion; the shoulders are thrown far

back, the attitude being that of *lordosis*. She complains much of pain in the limbs, especially the left. Holds the spine rigid in stooping to touch the floor with the hand. The spinal column deviates very considerably to the left from the eleventh dorsal vertebra, at which point there is a singular retrocession of the line of the spines with an approximation of those of the tenth, eleventh, and twelfth dorsal vertebræ. This peculiarity accounts probably for the resemblance to lordosis, the posterior curvature not being of the form usually seen in that variety. The spine of the last lumbar is the only one which projects posteriorly. The thorax is flattened at the top and projects below. The splint was applied a day or two after the above date, the fulcrum being opposite the posterior curvature at the lower extremity of the spine. A very few days sufficed to adjust it satisfactorily, and I did not see the case again until the fifth day of October, a period of four and a half months. During that time her improvement had been rapid and uninterrupted. I find the following note of her case at that date: Has a good appetite and sleeps well; suffers no pain either in abdomen or limbs; goes up and down stairs without assistance, and erect; can walk a mile without the

least fatigue; the left foot still points inwards, but not quite so much so as at first; the lateral deviation of the spine has disappeared entirely; the projection of the lumbar spine remains about the same.

