cease absolutely. Now as to this action of quinine there can be no possibility of doubt. The atropine I have only experimented with once in a case of chorea; but the quinine I have used in a number of dogs and am positive that the quinine arrests the choreic movements in dogs, so that, as far as this goes, it carries out my theory.

My next line of investigation was to study the condition of the reflexes, such as the knee-jerk, in chorea. *A priori*, what would we expect to find in regard to the knee-jerk, in chorea? The motor-cells of the cord are in a state of weakness in a case of chorea; but the inhibitory cells are in a state of greater weakness. This would lead us to expect that in the first place, the reflexes would be less than normal. When, however, a voluntary movement is made, on account of the failure of inhibition, the motor impulses from neighboring cells would overflow, and reinforce the motor impulses beyond the normal amount and the reflexes would be increased. (Explanation of reinforcement, illustrated by drawing a diagram of spinal cord with motor and inhibitory cells, upon the blackboard.) In the normal condition, this overflow would be checked by the inhibitory cells, but when these are weakened experimentally, or by disease, it is not so checked and the reflexes are extraordinarily increased. I wrote to Dr. Wharton Sinkler requesting him to communicate to me his observation as to the condition of the reflexes in chorea. He replied that the phenomena are different from what might be expected, the reflexes are diminished in all cases of chorea; but that he had observed the curious fact that the knee-jerk in chorea is greatly increased by reinforcement. That is to say that, at the time the knee-jerk is tested, if some other muscular movement be performed, like extending the arms or tightly clenching the fists, the knee-jerk is greatly exaggerated. This I explain by the weakening of inhibition and the consequent overflow of motor impulse as already mentioned.

So far this is of scientific importance only. It appears to me as if, in the practical study of chorea, we have hitherto overlooked the phenomenon of inhibition. The phenomena of chorea, like those of hysteria, are not phenomena of increased excitement of motor centres; but of paralysis of inhibition. The conjunction of increased muscular and nervous discharge with evident weakness of the spinal centres is explained by the fact that the motor cells are weak; but the inhibitory cells are weaker still. Sometimes in chorea in the child, as commonly in the dog, the movements are rhythmical, and although they are constant the child does not get tired. No one in health could continue this motion for half an hour without fatigue. How can this be explained? In the anatomical rooms, you have learned to refer anomalies to a reversion to a lower type. You have seen how a stump is produced by evolution to a certain point for a certain purpose in the case of the animal, and that is altered by higher evolution in man. Now, I believe, that we may have a physiological reversion as well as an anatomical reversion, and applying this to the spinal cord, we may have a reversion of the function of the motor cells to those of the lowest type of nerve-cell in which the discharge of force is rhythmically continuous. Just as the beating of the heart never ceases during life, so it is the function of the primitive nerve-cell to unceasingly give off force. The strange phenomenon

of lack of tire in choreic movements, then may, in this way, be explained on the principle of reversion,

Applying these investigations to cases of chorea. It occurred to me to give quinine a trial. I may say, that it has been only during the last ten days that I have thought of this subject from the clinical standpoint. I have thus far had the opportunity of employing it in only one case in the human subject. It was a child with well marked chorea, brought by her mother to the Out-patient Department. She was ordered full doses of quinine, and was brought back in four days with the report that she was very much improved. I spoke to Dr. Pearson, of the Veterinary Department, and asked him to try the alkaloid in choreic dogs. He told me in the first place that he had never found anything that would do choreic dogs any good; his experience is that chorea in dogs is incurable. Here is an English setter dog suffering with chorea. One week ago he could not stand upon his feet, owing to violent choreic movements. He had quinine given freely by the mouth and within twenty-four hours, the movements decreased; he now walks about and is apparently almost well; at least, he has very little left of his chorea. So far as practical results go, it therefore looks as if the theory would stand the test of experience; but whether our present prospect is simply a mirage or not, time alone can tell.

I now bring before you two children suffering with chorea. The first one is seven years of age, and small and poorly developed for her age. The second is ten years of age and appears to be in a better nourished condition; but in the second, the chorea is more marked and of shorter duration than the first, in which, according to the mother, it has existed more or less for four years. I will put both of these patients upon the quinine treatment and will report the result at our next meeting.

ADVANCEMENT OF SURGERY.

A Paper Read before the Vigo County Medical Society, April 1890.

BY JOHN E. LINK, M.D.,
OF TERRE HAUTE, IND.

Why I should have been selected to read a paper to the Society on the "Advancement of Surgery" is incomprehensible to my mind, unless it was for the purpose of inducing me to post myself more thoroughly upon the literature of the subject. Sure it is, that I, probably of all the members, have paid less attention to the serial productions, as published in our overloaded journalism, than any other member here. And I think it is a well understood fact, that I read less of our periodical literature, as well as our secular papers, than any other member of this community. What has stood the test of ten years' popular favor becomes a part of our texts; and compared to-day with what has been introduced as novel and good, not one-tenth part bears the test of the decade. For this reason I have declined to place any of my thoughts or methods into the hands of publishers, and only a few of the things that presented themselves as original, from observation or thought, have found their way into print through the pen of others more ambitious to write. And I say to you to-night that I had far rather have come here before you, presenting a patient with oral explanation, than to attempt to write. It is generally understood that the only way for a man to bring himself into prominence

is to write, but a man's good works live after him in spite of silence. James R. Wood wrote little or nothing, yet his name stands out prominently as an original thinker and tireless worker. And so, if I criticise some of the newly accepted theories and practices, as appear in our medical journals, in surgery, adversely, I hope you will not lay the disappointment you realize in this paper at my door, but to the source—the appointing power.

Taking up the recent text-books of to-day and comparing them with those of the last fifty years, the enthusiastic student of journalistic surgery will surely be surprised, especially in the more common and frequent cases that the surgeon is called upon to treat.

From what I have said it might be inferred that I am a non-believer in progression in our science—in evolution. Such is not the case, I assure you. I believe not only in mind evolution, but in all organic—living, process-evolution—that all things that live a true and healthful life add something to the process of such existence, that for every healthful spear of grass that grows the element that produces it is made richer for the production of others of its kind, providing each has the advantage of improvement. For the advanced speed in training, the possibility of the next horse to improve is greater. Mr. Beecher, in a sermon preached in Plymouth Church, said, as one horse makes a given advanced record on the track, the whole herd comes up to it, and so another and another, attributing it to the will of the trainer. I attribute it to the cultivation of a process in nature—a cultivation of the soil of speed, as it were, and to me, as tangible as the fertilizer of the agriculturist and horticulturist.

I appear, therefore, before you to-night to present in conscientiousness' sake my views of what truly constitutes the advancement of surgery, and to protest, in some instances, against what I believe to be the fallacies of, and detrimental to our science and practice. To enable us to overcome the obstacles in our way and to reach our destination, it sometimes becomes necessary, like the school boy, who as an excuse for tardiness, said "the ice was so slick that for every step he made forward he slipped two back," and when the teacher reminded him that if such had been the case he never would have reached there, said, "Oh, but I turned around and went the other way." So to-night I ask your indulgence in the experiment of turning back in our efforts to advancement.

The fundamental principle of the practice of surgery and medicine is anatomy and physiology. This, of course, all will admit. The sun, Emerson says, shines in the eye of the man, but into the soul of the child. As we grow older in our science I fear the beauties of the underlying and overarching principles of our profession are overlooked in too many cases, and only the poet, the enthusiast in nature, stops to see, as Emerson again puts it, the "beauty in a corpse."

I was surprised to notice recently in one of our daily papers the faults and disadvantages of too much newspaper reading. How I should like to see the same good sense and frankness appear in some of our medical journals. I take but one—THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION. I think it is to their interest, and that they have the judgment necessary to select from among them all the best. I glance over each number, and at the end of the year

I again run over the index and select and read upon such topics as have presented themselves to my mind as of interest. I do not hold myself, or my methods, up before you as infallible or necessary to success. What one conscientiously believes to be right, one conscientiously desires others to know of and have the privilege of following.

I attended one full, and parts of two courses of lectures, devoting my whole time, outside of listening to didactic teaching, to the dissecting room, and never attended a dozen clinics in the hospital. I loved the study, though hard, that gave me the grounds for future thought and observation in after years of practice, and never, either in my military experiences in hospital or in civil practice, did I allow a winter to pass, for fifteen years, without a careful and thorough dissection of one or more human subjects. I believed then, and can now say that I am convinced, that with a clear insight into the human organism, a sure foundation for reflection and action is laid. I never now feel the least timidity as to myself, and never approach a patient without assurance and sympathy. The engineer who knows, as is often said, every bolt and screw of his engine, not only handles it well but loves it with a tenderness—else how should he have studied it so. And now the greatest regret I have is that opportunity has not made it possible for me, or more easy for me, to have continued my investigations and to have kept my memory fresh in the minutiae of anatomy. One of the first advantages, and consequent advancement in surgery as well as practice, is the facility afforded by our State, and many of the others, in obtaining material for dissection. The new beginner can have the unclaimed dead galore for filling in his leisure hours in improvement, and the gratification of his increasing taste for knowledge. When a thorough knowledge and familiarity with the dead subject is attained, whether in the practice of medicine or of surgery, the practitioner can, with good judgment, approach the sufferer confidently, without undue assurance. Therefore, I have seen fit recently, in the view of too much "antiseptic surgery," to designate most of my practice, "physiological antiseptic surgery, *versus* germacidal antiseptic surgery." Antisepsis has its place, I admit, but he who anchors his faith in it alone, or in most part, follows the shadow instead of the substance. What has been done by the leading minds in advancing the theory and careful methodical practice of antiseptic surgery is well; and careful, systematic work and thought is improvement. He who is unusually careful of the little things cannot well neglect the more important. All intelligence, all knowledge on any scientific and practical subject is advancement—is improvement. Anatomy is the great ocean of intelligence upon which the true physician must sail. Bacteriology is but one little harbor—with its present boom. All credit to the men who by days and nights of study, have unearthed the little fellows and made them visible to the eyes of all through the microscope, but pity to him and his patients who sees only through the lens of the microscope, neglecting the greater, seeable with the eye and tangible to the brain. That these microbes are the causes of disease, *per se*, is not proven, and that we should accept them as such, there is no more reason than that the maggot in the dead horse should be held responsible for his death, or that the wiggle-tail in the rain barrel should be

taken as cause for the turbid and generally changed condition of the water. A few years ago it was the popular belief that "bots killed the horse." I remember my first post-mortem. It was in the case of a fine three-year-old, which died after an illness of two or three days. I, then aged about fourteen, followed his remains with sharpened butcher knives to the woods over against the cliff, and made a kind of barn or trap door opening into his belly, where I found the contents of stomach promiscuously distributed. What at first looked like a spider's web, proved to be the shreddy perforated remains of a stomach. At the small remaining swallow, or œsophageal end, I found a mass, probably a pint or more of grubs—a living mass of bots. That settled it; the horse had died of bots. Then next, what will kill them? My father, the hired man, and a number of neighbors, began the experiment, first with lard and turpentine, the accepted treatment for bots. In this they lived and moved and had a being—yes, even in *pure* turpentine. Nothing, as I recollect it, seemed to be instant death, excepting pure nitric acid—that settled them. And so we, in our wisdom, in the ocular appearance of things, decided that for bots there was no cure. Now, need I say, we know all horses in perfect health have living bots in their stomachs, living happily with the horse as their friend, they even, the farrier, may tell you, his benefactors. When disease disturbs the secretion of the glands and they are starving, they take hold of the little glands, eating them for their nourishment, and after death destroy the organ—not before.

That bacteria are the cause of disease to my mind there is no proof. That they are scavengers, I take such data as above, for proof, together with my clinical experience and observation to the contrary, extending over twenty-five years, with at least a part of the time, as good opportunity to observe as any man living. My only sin of omission, punishable in ridicule by an ungenerous profession, is my living in a small city instead of London or New York. Antiseptic surgery, so-called, had its origin in Listerism, which was the carbolic spray, though now we are told that Lister does not now advise the spray, but other methods and appliances. To express myself plainly, in brief, everything that is cleansing is claimed as Listerism. That "cleanliness is next to godliness" I have never heard attributed to him, and yet we all accept it. But knowledge is godliness, and has no better exemplification to me now than in physiological surgery.

In the treatment of simple fracture and dislocation, there has been no marked advancement, excepting in appliances—each having a peculiar method of his own selection, but the text-books give us about the same—in fractural appliances Buck, Hamilton, and others more or less ancient.

Commerce has done much for us in the way of convenience. The rubber bandage, accredited to Esmarch—the rubber drainage tube—but little better than the old tent—which, had it been as universally applied, would have done much good in this line. The enthusiasm of men in advertising these things has caused a more general application of the principle and are an advantage in surgical practice.

The first thing that strikes me in the comparison of the old and new text-books of the last fifty years, is the illustrations; the artist having done a great part, commerce filling in the supply of conveniences;

the rubber coil for cold application to the head, the inhaler for chloroform and ether—largely the devices of Esmarch and a few others, whose names add to their popularity. Esmarch's bloodless operation is an innovation, and worthy of the name of advancement, though taking the place in principle, to some extent, of the old tourniquet. Surely this method of controlling the arteries high up in the extremities, the axillary in shoulder joint operations, the common iliac and abdominal aorta, are a great convenience to the profession, an improvement over the pressure by hand, entrusted to an assistant, as in my early experience.

Abdominal surgery has made wonderful strides in practice since the war; and we can only wonder at the blundering of our former negligence and oversight, the result of a kind of superstition as to sacredness in invasion, rather than any proof to the contrary. Antiseptic surgery too often gets the credit, though McDowell, in his successes, did not know or practice it. And to-day Tait is notorious for his ignoring it, though one of our most successful gynecologists.

But to traumatic surgery I wish to call your attention, more particularly to penetrating wounds of the abdomen. In relation to the thought as to the hindrance in superstition, I wish to call your attention to the unreasonableness of the argument used a few years ago—and even now for all I know—that women bore these operations—abdominal sections—better than men, maybe from the thought of the difference of the pelvic organs, in contradistinction to the higher viscera. I heard this argument advocated three years ago at the meeting of the International Congress, at Washington. I only now wish to say that it is absurd and will not bear the test of clinical experience any further than that woman's resolution often serves her a better part, in trying times, than man's.

If I were asked to name the part in surgical practice the most fully typifying the advancement of the profession, I should unhesitatingly say, the localization of certain centers of 'cerebrum' enabling us to locate pus cavities within the cranial cavity. This is of far more scientific importance, requiring a much more exact knowledge of the part than the abdominal viscera. In the latter, the novice may venture with but a cursory knowledge of anatomy. The antiseptic fad is here barred by necessity of a knowledge of exact science, not coverable by the cloak of ignorant assurance. The ambition of notoriety here stands halt, with cap in hand, doing reverence to the truly learned.

I have held in all my work before medical associations that there is little or no special knowledge of anatomy required to do abdominal surgery; and that promptness in action, in case of injury to the abdominal viscera—requiring surgical interference—was the great desideratum; that the general practitioner should be held responsible for prompt action in opening up the cavity, in cases of penetrating wounds, stopping hæmorrhage and sewing up the perforated bowels; that neither anatomical knowledge or surgical skill is required. The farmer does as much, with impunity and little loss of life, spaying pigs. With a butcher's knife he eviscerates the slaughtered animal, seldom or never cutting a gut. As for the ligating of a fold of mesentery or omentum containing bleeding vessels, one with skill to serve in sewing

a button on his trousers is sufficient. And in the sewing up of a wound in the bowel, the interrupted suture or any other, as well as the continuous, will do the work of preventing leakage, and any material for suture answers the purpose almost as well as the catgut or silk. Nature in her endowment, with resources to meet demands in the exudation of lymph with omentum for patch will cover effectually whipcord, if necessary, and sloughing finds its way in natural process into the cavity of the bowel.

I could cite instances of the remarkable tolerance of the tissues of the peritoneal cavity in wounds, that must have paralyzed the antiseptic surgeon of a few years ago. The case, more or less familiar to us all, of the man who attempted suicide by abdominal section in the pine woods of Michigan, is notable. But time requires that I must hasten, and one instance must suffice. A case in my practice occurred a few years ago of penetrating wound and recovery, where promptness in operating, not antiseptic surgery, saved the life of a little boy of this city. The case, as reported by me, has been published in several medical journals, and can be found in the transactions of the Ninth International Medical Congress, Vol 1, page 543. The central idea involved was, as above, that the surgical section of the Association should teach to operate in all cases of penetrating wounds, immediately.

You will, I hope, pardon me for having dwelt at some length upon the surgery of the cranium and abdomen; and yet much more needs to be said of our advanced knowledge of the tolerance of these parts, especially of the brain. But our recent text-books speak of these. So I will pass to one other subject as coming under my observation since the time of my attending lectures in 1861—the successful accomplishment of the ligation of the arteria innominate. The operation had been performed unsuccessfully by Valentine Mott, and others. Mott had left it as a legacy to the profession that it could be done successfully. Daniel Brainard, of Chicago, declared his faith in the judgment of Mott, and so it proved. In about the year 1863 or 1864, Dr. Smith, of New Orleans, performed the operation with success. The patient entirely recovered and lived for some years, but subsequently dying of disease, a post-mortem examination proved the accuracy of Dr. Smith's work, and the profoundness of an opinion based upon anatomical knowledge.

The processes of repair in the breach of continuity of bone substance was for many years a conjecture, more or less, and up to the time of 1876 and 1877 the theory, pro and con, as to the possibility of reunion in simple fractures without shortening, occupied a considerable part of the time of the deliberations of the Surgical Sections at the meetings of the American Medical Association. It had been long taught that no reformation of bone could obtain in cases of loss of substance where the periosteum was destroyed. I have always held to the contrary. As early as 1861, at the time of my attending lectures under Brainard's teaching, it was held that in the removal of diseased bone there could be new bone formed if the periosteum was saved. I argued that if bone would reform where the original periosteum was conserved, it would also be possible for it to reform without it, basing my opinion upon anatomical data, and I so declared myself at a meeting of the American Medical Association in Chicago, in

1877. It was published as a part of the discussion before the Surgical Section in the *Cincinnati Clinic* for June, I think, of that year. I then stated, and am still convinced of the fact, that bone will reform where the original track of the shaft is kept open, providing the surrounding soft parts are healthy, with regard to their usual blood supply, independent of periosteal conservation. Cell proliferation from the medullary substance will fill the space and calcification will, by natural habit, be supplied by the centering arteries. The periosteum having no osteoplastic rôle specific to its organization, constituted only of blood-vessels and connective tissue. I have removed as much as five inches of the tibia in one instance, and three or four inches in quite a number of cases, where there was no periosteum remaining, and have had perfect union with little, or no, shortening. As to what the opinion is now, or what work has been done in this line in the last ten years, I am not informed. I think antiseptic surgery has so completely absorbed the minds of surgeons and occupied the time of the deliberations of societies, that there has been no recent advanced thought in this most practical branch. Bone grafting held a prominent place in the favor of our journalistic literature a few years ago, but it has never had the backing of anatomical or physiological reason nor practical sense. As no notice appears, to my knowledge, in our recent text-books, I infer that it has been relegated to the antiquities of sheer nonsense and buncombe. Of skin grafting, I am happy to be able to testify to its physiological claims and practicable application. I have had some charming results, and observed others in the practice of other surgeons, that leave no doubt as to its having become a part of our practical business, in the great work of alleviating suffering and correcting deformities; and it is of recent date, having had its birth and growth within the time of my experience in practice.

Among the notable failures and absurdities, in claims to originality and advancement, I will call your attention to the hazardous practice of opening the knee joint and wiring the fragments of the patella. This was, I well remember, advertised as one of the triumphs of antiseptic surgery but a few years ago. It is an operation uncalled for and hazardous in the extreme, and universally I think, as it should be, discarded.

For the purpose of reaching the true Mecca of learning, let us turn back upon the slippery way for a little while, to look upon one of the oldest means, by far too little understood, even by those who practice it in surgery—bandaging. What does that practice involve as it is done in this day of antiseptic surgery—so-called? How many physicians recognize it as one of, if not the very most potent, means of antiseptic precautions and remedies? Has it ever been taught by the fathers and promoters of antiseptic surgery that it was the greatest of "microbe-killers" on earth? And yet I stand before you to-night to bear earnest and truthful testimony, that never in a four years' army surgical experience—a greater part of the time in hospital wards, where erysipelas was of common occurrence in gunshot wounds—never have I seen a case occur beneath a carefully applied bandage—a physiologically applied bandage—the bandage of even and easy support. And more than this, I have applied the roller bandage in many—in all—cases, when applicable, that I have

treated, both in military and civil practice, since 1863, and never saw a case resist such treatment for three days. The redness and swelling of the part subsides, and the patient's general condition improves, from the very first application. And therefore, from the antiseptic surgeon's standpoint, the roller bandage must necessarily be a microbe preventer and killer, worthy of no small amount of consideration. Dr. Dudley was probably the greatest advocate and most successful applicer of the roller bandage. It has been said, though, of his students, that they did much harm. This was their fault, but no detractor from the principle involved.

Of all the appliances and devices in surgery the bandage is the most potent, and if I were reduced to the extremity of giving up all others or it, I should unhesitatingly select the bandage alone. With it I can give perfect anatomical adjustment in fractures of the extremities, and physiological rest to diseased structures; not only of the extremities, but of the abdomen and chest. Even in pneumonia the most charming results have been obtained in my practice; and in gunshot penetrating wounds of the lungs, life and comfort at once have come back to the sufferer. I have seen the rigid muscles of the face, expressive of pain, gradually relax as layer after layer was laid gently around the chest; and the patient, grateful for the sweet comfort of relief, would say, "Doctor, I feel so much better," and gently fall asleep, with rapid recovery. As to the answer of my belief here in the bacteria theory—"you must read your answer in the stars." There are no humbugs there.

I will call your attention to the repair of lost structure, the healing of wounds, for the most part open wounds. Union by the first intention, requires no discussion here, as the process is unattended by any pathological process, and the question as to antiseptic treatment is not involved. To typify the healing process with necessary treatment in one class of cases, I think, will be sufficient for them all.

Early in 1863 I began the treatment of stumps openly. After the limb had been amputated by the circular method, in the usual way, I bandage well down to the edge of the wound, in such a way as to give perfect support to all the tissues involved in the trauma, extending the bandage up on to the limb, so as to embrace all the muscles involved in the cut; thus giving uniform support and quiet to the tissues. This is rest without restraint, which absolutely fulfils all the indications in physiological surgery. Within from five to ten days the slough, consisting of blood and clot, wounded tissue from the knife, etc., is thrown off, and healthy granulations obtain. For the first few hours there is a free discharge of bloody serum; then a small quantity of pus, just sufficient to flood off the foreign substance. From this time on, there is absolutely no pus discharge, providing—as I am able to do—no dressing other than water comes in contact with the wound. I say no other than water; I do sometimes use a slightly stimulating wash consisting of nitric acid, one drachm to the quart of rain, or other distilled water. The hollow, cone-shaped wound enables me to do this easily by merely throwing a damp cloth over the mouth of the wound. Here is a brief description of what I know to be a novel method of procedure. What seems the most startling to the profession, I claim there is absolutely no pain, no discharge, during the healing, and that these stumps usually close by

the process of granulation in two or three weeks, leaving only a small centrally depressed cicatrix, not larger than a five cent silver piece. Of over three hundred amputations so treated, not one has died from secondary causes. The bandage is seldom changed from the time of the operation and first dressing until the wound is healed. Others are applied over the first, so as to keep up the uniform support necessary in the contraction from shrinkage of the stump. This principle of permanent, undisturbed dressing, is as old as Larrey's practice. What is novel is the detail, I may say. The same processes and treatment are involved in the treatment of compound fractures, with loss of bone substance. The limb is maintained in its normal length, the track of the bone shaft left open to fill in by granulation.

Now can any of you see in this treatment Listerism? I have been told that the absolute drainage and consequent cleanliness of these open wounds is antiseptic surgery. This, truly, is evident from the results obtained. But is it Listerism—I being its originator? Frank Hamilton said to me that he told Lister that "we have a surgeon in Indiana whose wounds are antiseptic in their nature." At a meeting of the American Medical Association in Chicago in 1877 he (Hamilton) was acting as chairman of the Surgical Section, and after I had presented the case of a little negro boy, whose leg I had amputated five weeks before, bore testimony to having seen my cases in the army, and he stated that he had tested my method in Bellevue Hospital, and admitted that he was unable to account for the wonderful results.

Dr. Moore, of Rochester, says in an article read before the Section of Surgery, in the American Medical Association at a meeting in 1878, and published in the Transactions, entitled, "Prophylaxis of Septicæmia in Surgery": "This principle of outflow seems to me to be the explanation of the excellent results of the method of Prof. Link, of Indiana. The stump is the end of the limb, and the compression not only keeps the muscles quiet, but procures a constant outflow, and arrests septicæmia by arresting endosmosis. I have always employed his method since I heard his admirable paper at Louisville."

Again, in an address on surgery entitled, "A Sketch of the Progress of Surgery," delivered in the Section of Surgery in 1888, he says:

"Surgeons at different periods changed their methods, and open wounds were proclaimed as far more successful than those that were closed. But the term 'open wound,' as generally employed, is a misnomer. The wounded surfaces, it is true, are not pressed into contact, and provision is made for the drainage of the purulent matter, but these surfaces were still more or less in contact with each other. I do not hesitate to say that one of our own members, who made the first declaration of his method in the Surgical Section of this Association, has placed the question of the management of open wounds upon a perfect basis. It has usually been my custom to employ it since its announcement, and never with regret. There have been no failures, and little or no constitutional disturbances. I refer to Prof. Link's method, by which the bandage restraining the swelling causes the edge of the wound, which should be circular, to rise like an erectile tissue and stand up open to the air, thus making the only genuine air dressing that I know of."

I have never conceived for one moment that these

wounds with their soiled dressings were free from bacteria; believing, as I have from the first, that these microbes are only scavengers and common, or liable to exist, in all cases of death, decomposition and degeneracy of tissue. Consequently, I sent a sample of such bandages, removed from a compound fracture of the leg, of six weeks' standing, to Dr. Marcy, of Boston, for examination. The specimen was removed and at once placed in sealed bottles, some dry, others in alcohol and glycerine. The doctor wrote me—and I have the letter now before me—"These dressings literally swarm with bacteria."

The patient, Mr. Johnson, of Otter Creek township, suffered a compound fracture of the leg, middle and lower thirds, with the loss of the shaft of the tibia of $3\frac{1}{2}$ inches. I dressed the wound, or limb, with bandages stayed with the shavings used in packing buckets and tubs for shipping. The wound was left open. Whisky dressing and hot water was the treatment from first to last. In fourteen weeks the wound had closed entirely and bony union obtained with little or no shortening. No unfavorable symptoms of septic poisoning or traumatic fever supervened. Yet, as Dr. Marcy reports, bacteria literally swarmed around the wound in the dressings. Is this the cleanliness of Listerism—the outpouring of Dr. Moore—or is it the physiological treatment of support, making the conditions antagonistic to diseased action—the shutting out of disease? As in the case of erysipelas, did the bandage act as a germicide?

The contagion of germicidal pathology, I think, reached its climax when the fellow (I do not remember his name or where I saw an account of it) claimed in an article published in one of our journals, that "where the skin is not broken, and diseased action of a septic character is taken on, the germs must necessarily have gotten in at the back door, as it were." Yet it seems that, where the physiological indications of support are met, the "germs" stay out, though the front door is left open.

In the early stages of the wound Dr. Moore's reasoning might hold good, as to the flooding off by the serous discharge, but in a little while, and before the slough is removed or any pus formed, there is no such outpouring; the wound is comparatively dry excepting as moistened from time to time by the damp cloth, or water that may be poured over it.

Dr. Moore said that my showing that wounds, so treated, do not discharge pus, completely revolutionizes former ideas as to the healing process. Looking into one of those rapidly healing wounds with its masses of granulation processes, rolling together like scrolls; cicatrization so rapid that the surface shrinks to nothing in a few days; one notices first, within a few hours after injury, the swelling out of medullary substance, like new granulation tissue—as Virchow claims it is—bone tissue held in reserve; then following in a few days the soft parts exterior to the bone; the whole blending, presents a pinkish hue, more or less variegated in tinting like a rose bud; at places almost blood red; the new vessels easily discernible through the thin film of covering with an ordinary lense. One sees at once what Virchow, Cohnheim, Billroth and their contemporaries have taught of the identity of white corpuscle—the final cell—and their identity with the pus corpuscle; and in the cultivated mind's eye, easily learned by the every day student in what he may see through the lense of a microscope, in the web of a frog's foot, or the bat's

wing—like diligent workers climbing the ladder to the top of the wall, or, like busy ants repairing the breach in their home—come crowding upon each other through the delicate avenues of capillary new formation, the white cell to be laid like the brick in the wall, with mortar; cells and inter-cellular substance, all dumped to the great builder, Nature; each selected to its part. The white blood corpuscle making new tissue, rapidly coming in excess, not needed here, in pus, as ordinarily in the battle of fighting some offending substance, lays itself into the wall in repair, locking firmly in each other's embrace; they form new tissue, contracting as they solidify into the connective. This process being even, the surface contracts alike; not only puckering the edge of the skin towards the bone, but depressing the center, leaving the cicatrix well embanked around with original skin. We can have no tender stumps.

The thought that lies nearest all this is the part taken by the bandage—the only seemingly universal auxiliary, as all other treatment is incident to necessities as they may arise. First the stiffening of the skin covering; second, rest, as above; third, the uniform pressure that it exerts upon every vessel of the pathological tissue, preventing blood stasis (and venous absorption)—no swelling—no pain. The swelling is the result of congestion and exudate; pain of inflammation, the result of nerve tension or stretching in the tissues from swelling. The pressure exerted by the bandage, together with the free exit of serum, prevents congestion and infiltration. Later comes the other stage: inflammation cut short by other conditions, and only obtaining, in so far as a kind of inflammation process is necessary to the healing of the wound, not necessarily sufficient to result in suppuration. In these cases the white blood corpuscles are not called upon to act as pus to flood off the offending substance and are, therefore, utilized as tissue makers.

The ultimatum of surgery is not in the size of the Catlin knife, or the sharpness of the scalpel in dexterous fingers. The transcendentalism of surgical science is the footing on the pinnacle of the spire, that has its foundation in bone, nerve and artery, finished in capillary cells, molecule and protoplasm; the skilled hand and trained mind reaching out into the infinite of these materialisms.

In conclusion upon this subject, I wish to say that the roller bandage, slightly enforced, meets all the indications in the treatment of fractures of the extremities; putting the muscle to sleep, as it were; with flexion of the lower extremities, the limb rotated outward and laid level upon the bed; we have a perfect adjustment of the bone, with no spasms of the muscles or tendency to displacement; the patient rests easy and comfortable, bacteriology to the contrary notwithstanding.

The rubber bandage, as usurped by Martin, on its elaboration to the use of treatment of varicose veins and synovitis, is a little better than none, and only advantageous to the laity in its easy application by them.

The flannel bandage meets the true scientific requirements of physiological action, and is to be much preferred by the skilled in the use of scientific means for the relief of all chronic troubles.

It is a common principle in nature to resist any obstacles to its tendencies, even unhealthy ones. Apply the bandage for the above chronic condition,

and the first effect is irritation and a tendency to increased congestion. But nature, finding the environments unsurmountable, takes the only remaining course for relief; diminished congestion, and absorption, obtain, until the shrinkage leaves the parts loose and free. Consequently the rubber bandage is wrong, and Martin admitted that in arthritis it should not be used. Nature here finds no point of rest in the following up of the pressure of the elastic bandage; the irritation is continuous. But with the fixed bandage of flannel or old, well worn domestic, it is different. The thought that suggests itself to the "thinking"—which we seldom do until the necessity to account for facts pushes us to it—that the more seldom the dressings are changed the more rapid the recovery. So Larrey taught nearly a hundred years ago, and we, to-day, are forced to go back and admit a homicide and burial of one of our nearest and dearest, though commonplace friends, in the neglect in ambition of seeking the mysterious. Thus we are constantly stumbling over practical things lying around and near us in the blindness of egotistical-far-seeing-ambition. There is no more notable instance of this, than in the case of chloroform and sulphuric ether as anæsthetics, so called. Alcohol is to-day their superior, having this true principle more fully marked, as its very first effect is anæsthetic when given in large doses, and it meets all the practical necessities in far the greater proportion of capital operations, as I have frequently demonstrated.

Anæsthesia can be produced by the rapid administration of whiskey in less than one hour, and with far less general physiological disturbance than by chloroform or ether. The most serious disturbance is that probably of congestion or hyperæmia of the medulla oblongata; and this is counteracted by the loss of blood, mental impression and nerve shock incidental to all surgical operations. Whilst whiskey increases the blood supply to the base of the brain, chloroform diminishes it. The two used in conjunction—the one by the mouth, the other by inhalation—act in harmony anæsthetically; the one counteracting the unhealthy or dangerous tendency of the other, they should be used jointly. But with choice between the two—the one to the exclusion of the other—I should unhesitatingly select alcohol, as I am convinced that anæsthesia can be made complete, with less than one tenth part the death rate of volatile anæsthesia.

Therefore, I am in the habit of administering frequent doses of whiskey followed by small quantities of chloroform. A few inspirations is sufficient to quiet the patient. After which a prolonged operation can be practiced, the physiological conditions remaining through the severe trials of a capital operation nearly, to all appearances, normal. The florid or normal color of the surface, especially the countenance, respiration, heart-beat, pulse-wave, all leading to a feeling of assurance of minimum danger from anæsthetic causes.

LATER—November, 1892.—H. C. Wood's tests as reported to the Int. Med. Congress at Berlin, 1890, were correctly made and deduction proper. But the administration of alcohol hypodermically after profound anæsthesia by chloroform with failure to reinstate is liable to be misleading. Alcohol will prevent, under its primary influence, shock, mental depression and collapse, but will not restore from them, if at all profound.

SPECIFICS FOR THE CURE OF INEBRIETY.

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When any great truth begins to receive public recognition it is always first welcomed by the credulous and visionary enthusiast, who surrounds it with the most extravagant expectations. This brings out the charlatan and empiric who studies to turn all such facts and conditions to his own personal profit. In this way the credulity of the one and the charlatanism of the other envelop the truth with a confusion and mystery that often conceal it for a long time. Only the student and the scientist realize that behind this glamor and illusion there is a uniform evolutionary movement along different lines from that suggested to the popular mind.

The growth of the truth is through separate periods and stages. The first stage is that of indifference, neglect, and denial. Then follows the credulous period, in which the truth is partially recognized and accepted, with extravagant conceptions, associated with wild empirical efforts to incorporate it into practical life. Finally, it is fully understood, studied, and accepted, and becomes a part of the world's great possessions. This is the natural history of every new fact of science and every new discovery concerning the evolution of humanity. Often these stages extend over long periods of time and are unrecognized except by a few persons; or they follow each other rapidly, but always along the same lines.

The dawning truth that the drink evil is a disease, and curable as other diseases are, has passed the first period of neglect, indifference, and denial, and has come to the second stage of partial recognition and acceptance. The same army of the credulous, the enthusiasts, and marvel-hunters are welcoming this fact, and the same wild expectations of its practical possibilities fill the air. This is followed by the same old charlatanism and empiric efforts to make personal profit out of these truths by the use of the same old quackish means and methods.

These efforts are prominent by the same assumption of superior knowledge of discovery of new facts, of new remedies, and new methods, all of which are concealed. Then follow claims of extraordinary cures under extraordinary conditions, the proof of which depends alone on the statements of the cured.

Then comes the old story of persecution by physicians and scientists, and of posing as martyrs, public benefactors, and pioneer discoverers, with indirect appeals for sympathy from the broad and liberal minded. Back of all this is a pecuniary field actively tilled which yields rich harvests, and altogether it is the same old familiar history of empiricism, which is always to be found on the advancing frontiers of science. Within two years a large number of charlatans have appeared, claiming to have found remedies and specifics for the certain and permanent cure of the drink disease. A great variety of means and drugs are offered, each one claiming to be superior to all others. Recently one of these empiric specific cures has led all the others in boldness and prominence. Starting from an obscure Western village, it has spread out into many branches, all organized and conducted on one general plan, and federated together. Physicians have been enlisted to conduct each branch, companies have been organized, houses hired, and elaborated arrangements