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ARTICLE XX.

An Essay on Bloodletting, read before the Medical Association of the State of Georgia, at their Annual Meeting, held at Rome, April 11th, 1860. By ROBERT SOUTHGATE, A. M., M. D., of Augusta, Ga.*

[Continued from July Number, Page 505.]

Motto.—*Nil remedium, nisi tempestivo usu sit.*

We come, now, to the Eruptive Fevers, upon three of which—Measles, Scarlet Fever, and Small Pox—I will make a few remarks. These we all know are composed of two elements, the febrile or inflammatory, and a specific blood poisoning. I hope it will not be deemed presumptuous in me to suggest, that, at the present time, we direct our attention to the last mentioned element, to the too great exclusion of the first from our thoughts; and that we thereby throw upon the system, the duty, often oppressive, not only of eliminating the poison from the blood, but of overcoming the sub-acute inflammations, that are so frequently attendant upon them. No one can look upon a case of Measles, without being convinced that the poison is an irritant of a very decided character, expending its force, principally, upon the mucous membrane of the air passages; and that

* See also pamphlet published by the author.

the danger of the disease consists in the establishment of irritation and inflammation in those structures. Hence the physicians of the olden time did not hesitate to let blood, when the eruptive fever was high, and the pulmonary irritation great; for they knew, that when the latter was very intense, it would interfere with the efflorescence on the surface, which is one of the natural, and if I may so express myself, healthy features of the disease. I had an opportunity, a few weeks since, of witnessing the salutary influence of what might be demed excessive purgation, during the eruptive fever of Measles.

I was called to visit a young gentleman who was somewhat alarmed by the sudden appearance on his skin, of the most vivid rash I had ever seen in a case of that disease. Four days before it appeared, he had experienced chilly sensations, followed by fever, hoarse cough, tender and watery eyes, and all the other symptoms that lead us to suspect the disease to be present in the system. Thinking he had taken a severe cold, he administered to himself a large dose of Epsom salts and rhubarb, (how he managed to swallow such a dose, I cannot conceive,) which, for two successive days, had produced frequent liquid evacuations from the bowels. His pulse was 200, and soft; he complained of some rawness and soreness in the chest, which, however, was less than it had been the preceding day. Thinking the purging had continued quite long enough, I prescribed a Dover's powder, and the use of slippery-elm tea. This was all the treatment required. The disease went through its stages, without calling for any interference. During the disappearance of the rash, a moderate diarrhœa set in, with which, as it was clearly carrying out of his system the dregs of the disease, I did not interfere. It ceased as soon as nature had completed her work in her own way. He returned speedily to his business, without a remnant of pulmonary irritation, and with scarcely an appreciable diminution of his strength. Now the sedation of the circulating forces, by active purgation by the saline Cathartics, is scarcely second to that produced by general blood-letting.

Far from interfering with the eruption, it was more vivid than any I had ever seen. I have no doubt, that general blood-letting would have had an equally salutary effect, and with far less inconvenience to the patient.

With respect to the Scarlet Fever, whilst it is very clear, that the poison is intensely irritant, there seems to be combined with it a septic quality which makes the practical man cautious, as to the use of active sedative treatment. Experience has taught us, that cases commencing in a mild manner, have suddenly assumed a gravity that calls for the most devoted efforts of our skill. We see in the same family, children of equally good constitution and health, affected very differently; some having the very mildest form of the disease, whilst others may fall victims to putrid sore throat; and the only satisfactory way we can account for it is, (for a reasoning mind must have some explanation) by supposing, that in these last, the peculiar poison of Scarlet Fever, meets with some accidental element in the blood, with which it forms a destructive compound. But whether this be so or not, every practical man is cautious how he proceeds, holding himself prepared for any emergency.

I was lately called to a case that gave me some anxiety, more especially as it was the first time I had been summoned to attend the family. A little girl, aged six years, after some twelve hours of indisposition, complained of chilliness, which was followed by fever. Two spells of vomiting had taken place, followed by three dark, watery, offensive evacuations. I was summoned on the morning of the second day of its sickness. I found it with a small, rapid pulse, elevated temperature of surface, tongue slightly coated, with here and there a red point showing itself; the fauces were of a scarlet tint, and the breath exceedingly offensive; there was some tenderness of the abdomen, on pressure. I had no difficulty in diagnosing Scarlet Fever; for in addition, there was a scarlet rash on the surface. The child had had a dark, offensive evacuation, the morning of my first visit. Thinking, from the character of the breath, and the fœtid evacuations, that nature might be expelling some

deleterious matter from the system, I determined not to interfere with it. I directed a light warm poultice for the abdomen, a mild sinapism for the throat, and toast-water acidulated with lemon-juice, for a drink. At my evening visit, I found that, after three additional evacuations, the diarrhœa had ceased; the breath had lost its heavy and offensive odor. The fever being high, and the child restless, I prescribed a pleasant solution of the citrate of potassa, which was continued through the night and following day. On the morning of the third day of my attendance, finding the pulse somewhat more feeble, a small ulcerated spot on one tonsil, with enlargement of the lymphatic glands of the neck, I prescribed, as an admirable unstimulating tonic, one grain of quinine, in solution, with five drops of dilute sulphuric acid, every fourth hour; a gently stimulating liniment for the throat, and a solution of chlorate of potassa with tincture of myrrh, as a gargle. But I will not tire you with the details of the treatment. Suffice it to say, that the child went safely through the disease; a result which hardly could have been expected, had I rashly checked the diarrhœa, through a puerile fear of debility, and resorted either to a stimulating or actively sedative treatment.

Whilst, then, reason and experience teach us the propriety of some such course as the above, there is not wanting testimony to show that in the severe anginose forms, bloodletting and other sedative treatment is successful. I quote from Wardrop, the following case. The heroism of the practice, although it was eminently successful, seems hardly justifiable; but it shows that there is not that great danger from active depletion in Scarlet Fever which, in these latter days, we are so much disposed to attribute to it:

"A gentleman, between fifty and sixty years of age, was seized with shivering, succeeded by hot skin, and other febrile symptoms. On the evening of the same day, I visited him. His mind was restless and excited; his skin hot and burning; his tongue white and loaded; his pulse frequent, and the action of his heart tumultuous. His countenance was flushed, the tint of which, along with a slight

redness of the throat, made me suspicious, that he had an attack of Scarlet Fever. He was immediately bled from the arm; at first the pulse rose, and a considerable quantity of blood was abstracted, before he became faint. Calomel, combined with antimony, and a purgative medicine, were then given alternately every two hours. Next morning, the febrile symptoms were much subdued, but his throat had become very painful. Twenty-four leeches were now applied to the external fauces with relief. In a few hours afterward, he was again bled from the arm, a slight return of headache with fever having come on. These symptoms never returned; a fœtid slough separated from the tonsils, and he was rapidly restored to health. From the decided success of the treatment, doubts were entertained of its having been really a case of Scarlet Fever; those doubts vanished, when that disease made its appearance, a few days afterwards, in two children of his family."

We sometimes lose these anginose cases; is it because the fear of debility deters us from the use of blood-letting?

As regards Variola or Small Pox, we all know how terrible was the loss of life, under the old heating and stimulating system. A great fire occurred in London, which wrapped in flames the Small Pox hospital, rendering necessary the hurried removal into the open air, during a cool night, of the miserable inmates. Humanity shuddered at the inevitable loss of life, it was thought, must necessarily result from the exposure. But how short sighted is man! that great fire taught a great lesson in therapeutics. The poor festering wretches were mostly benefitted by the change. Many recovered who, it was thought, must necessarily die. Sydenham was there, a true disciple of the Coan sage. He instantly took the hint. General bleeding, cooling cathartics, cold drinks and fresh air, were substituted for the horrible system of aromatic confections, hot stimulating drinks, red blankets and a hot stifling atmosphere, which converted the body into a great manufactory of poison, and hurried so many to the grave. Thanks to Edward Jenner, that once great pestilence is shorn of its

power! and it is a lasting reproach to the profession, that the 17th of May, the day of his birth, is not celebrated in every city and town and village throughout the world. It is a day, on which wealth and intelligence and refinement, should assemble around the festive board, to do honor to his memory. And female loveliness should be there, with its consecrating presence; for to Jenner, female loveliness owes a debt of gratitude! We have the record of a blooming young beauty, who a few weeks before, had stood before the mirror, and smiled upon the reflection of her lovely self, innocently conscious of "all those endearing young charms," that had brought so many ardent young lovers, prostrate suppliants at her feet; a few weeks after the pitiless malady had folded her in its embrace, presenting herself before the same mirror, and beholding the scarred and furrowed phantom of her former self, being instantly changed into a howling, shrieking maniac. We should read, now and then, the history of its ravages, its heartless immolation, year after year, of thousands upon thousands; and when it did not kill, marring the human face divine, converting female loveliness into hideous deformity; a pestilence that called forth the exhibition of the best, as well as the worst feelings of the human heart; presenting, here, the spectacle of the mother, pressing to her bosom the dying child, and self-oblivious, inhaling from its expiring breath, the vapor of her own destruction; and there, the spectacle of the heartless wretch, fleeing from the presence of those who had brought him into the world, in a storm of agony and distress, protected his helpless infancy, comforted him in the sorrows and disappointments of childhood, guided him gently, and affectionately, and forgivingly through the waywardness of youth, and finally led him up to manhood! We should think of all this; and then we should turn our thoughts to the village of Berkely in Gloucestershire, England, and think of Edward Jenner, a modest, unpretending, but most able country surgeon, beloved for the amiability of his character, and admired for his unquestioned skill, taking hold of a tradition, that had been floating, imme-

morially, around the stable yards and dairy farms of his native county, experimenting and proving and reasoning upon it, month after month, and year after year, until he was ready to publish to the world the great generalization—falsified by any exceptional instance, I verily believe, only through the criminal neglect of his successors—that in vaccination we possessed a sure, safe and certain preventative, against the contagion of Small Pox. In a letter that has come down to us, he touchingly portrays the feelings, that at times almost overpowered him, as returning from his professional duties, he mused upon the great central object of his worldly thoughts, and the possibility of his being, under the guidance of the "Great Physician," the instrument of a mighty benefaction to his race! What a temple for the abode of true philosophy, was that man's soul! Humble, reverent, full of calm, deep thought! and as if nothing might be wanting, to invest his memory with interest, the fragrant wreath of Poetry encircled his philosophic brow; his Address to the Robin, and other pieces that have come down to us, were the emanations from a pure heart, instinct with the tenderest sensibility to all the beauties of nature. I know you will excuse this digression; it is refreshing and profitable, to dwell upon the characters of those who, in other days, illustrated the dignity and value of our profession.

The only time I ever felt disposed to be seriously vexed with Homœopathy, was when one of its writers claimed the great discovery, as an illustration of the Homœopathic law. We see no shadow of a shade of philosophical analogy to countenance the idea. Let them take everything else from us—sweep from under our feet the foundations of the magnificent fabric of Philosophical Medicine, and lay it prostrate in the dust—in the midst of the ruins we will cling to this; for it was a revelation vouchsafed to the visions of true genius and pure philosophy.

In acute Rheumatic Fever, with severe inflammation of the joints, it used to be the practice to take blood from the arm, not with the idea of curing the specific part of the

disease by depletion, which is utterly impracticable, but with the view of moderating the general excitement and common inflammatiou associated with it, and preparing the system to respond to the eliminating treatment—the true treatment of the disease. Now, we all know that it would be worse than folly to attempt to cure Rheumatism by letting blood; that it would have a tendency to give a fixedness to the disease. But seeing no good and satisfactory reason why the turbulent movements of the circulation, which must, by their continuance, lead to secondary prostration, should not be moderated in this as well as in other forms of morbid action, I cannot but regard the entire disuse of bleeding as a retrograde movement, even in the therapeutics of Rheumatic Fever. Some years ago, in some medical periodical, the use of large doses of quinine was recommended as a royal road to the cure of the disease; it was tried, and some cases did get well after its use; and one medical gentleman who used it in full doses, did suppress, as it were, by magic, the articular inflammation, but stood aghast at seeing his patient struck with horrible convulsions, followed by coma and death. The proposer, doubtless, thought he was recommending something new; whereas, it was nothing more than the treatment recommended by a clear-headed English physician, by the name of Haygarth, many years before the proposer was born, who administered the Peruvian bark with a view to its invigorating action upon the nerves, which he clearly saw were implicated in the disease. But Haygarth, if I remember aright, did not recommend its use during the febrile commotion of the first stage of Rheumatic Fever. It would be interesting to know what may have been the condition of the heart, two or three months after some of these marvellous cures, by the suppressing power of large doses of quinine; whether some of the patients felt as comfortable in the cardiac region as before; whether they could ascend a flight of stairs with as little sense of palpitation and fatigue as before the attack; whether, in a word, there were not some symptoms indicating that a lesion of the central organ

of the circulation might have been sustained. We must be well informed upon this point before we can endorse any such therapeutics.

The treatment by opium and the alkalies, &c., so ably advocated by Dr. Todd, of London, commends itself to us, as admirably adapted to its treatment, by its powerful anodyne and diaphoretic action—the cutaneous exhalents being the great eliminating agents by which the blood is freed from the acid elements with which it is charged. Preceded, in robust and inflammatory habits, by bleeding, cathartics, or other sedative treatment, I should think the system would be placed in the best possible condition, to be thoroughly cleared, by a continuance of the eliminating treatment, of those dregs of the disease that prove so vexatious alike to physician and patient. Dr. Todd's lecture on Rheumatic Fever will amply repay perusal; for it is based upon the clinical experience of a clear-headed and independent thinker.

In many of the distressing symptoms of the pregnant state, general bleeding used to be employed with marked benefit. Many of us know how intractable they sometimes are, and how wretched the existence of many females become, almost from the very moment of conception to the end of gestation. I quote the following case from Wardrop, in illustration of the great benefit resulting from venesection:

"A lady, in a state of pregnancy, had been greatly debilitated, having vomited every kind of food and drink she had taken for upwards of twenty days. I saw her at this period. She was so emaciated and feeble that her recovery, by those around her, was considered hopeless. She had distinct tenderness, on pressure, in the epigastrium, and her pulse, which at first gave the impression of great languor, on more minute examination, was very contracted, feeling like a thread, and very incompressible, whilst the heart's action was vigorous. This state of the vascular system assured me that I should afford her relief by bloodletting, which was immediately resorted to, though with

hesitation, by her other medical attendants. No sooner had a few ounces of blood flowed from the vein, than the pulse began to rise and acquire volume, and upwards of twenty ounces were abstracted before its vigor was subdued. The result of this treatment was, that with very small doses of the sulphate of magnesia, repeated at short intervals, the stomach no longer rejected food, the alimentary canal was unloaded, the patient's recovery was progressive, and she was delivered of a healthy child, at the proper period."

Now, when we reflect upon the formidable dimensions that uterine pathology has assumed, within a few years past, may not a reasonable suspicion be entertained, that it may be partly due to the almost entire disuse of blood-letting, in the distressing irritations, irregular determinations and congestions of the pregnant state. In days long past, the practice was common; and our mothers and grandmothers, having fulfilled the duties of their holy mission, still live in our midst, in the enjoyment of health, the objects of our veneration, our admiration and our love. But in these days, scarcely is the young wife the second time a mother, when she presents, too frequently, a wreck of her former self. Intra-pelvic irritations and pains harrass her by day; congestions, inflammations, and ulcerations of the cervix uteri, and their sympathetic accompaniments, destroy her bloom; and we hear doctors boasting of how often they have leeched and cauterized the delicate structures. We know, from experience, that these proceedings are sometimes absolutely necessary; that after having relieved constitutional irritation and sympathetic suffering, as far as medical treatment will answer, we are compelled to conclude that some local trouble exists, demanding local treatment. But what true-hearted gentleman is there who does not lament the sad necessity; and even when called to minister to one whose purity is swallowed up in crime, who does not wish it might be otherwise. We know that the gentlest and the sweetest of the sex, whose heart is the throne of purity, having full confidence in her medical adviser, will submit with resignation to his judgment. But if he does not feel that it is

an alternative to be, if possible, avoided—if otherwise, much to be lamented—he is unworthy to minister to the infirmities of the sex. Now, may it be possible that much of this distressing ill-health is due to the fact, that we let the sufferer go through nine long months, with her headaches and flushings, her febrile movements, her intra-pelvic pains, her gastric irritations, her bloated limbs, and the other afflictions of her most interesting state, when experience has proved that the occasional loss of a few ounces of blood from the arm would sooth her troubled system, into peace and comfort. Passing by other morbid conditions, in which blood-letting was formerly practiced, I come to the subject of Inflammation, for which, in former times, it was considered, *par excellence*, the remedy.

Whatever theory we may adopt, to explain the process of Inflammation, two or three positions respecting the state of an inflamed part, have been universally admitted: First, that it contains more blood than one in a natural condition; second, that its vessels are distended or dilated; and third, that minute branches, which previously only allowed entrance to a colorless fluid, now contain colored globules. That there is some change in the nervous sensibility of a part, anterior to all other phenomena, must likewise be admitted; all the subsequent changes being, in some way or other, related to this condition of things. The microscope has revealed to us, "that the first change in the application of a stimulus to a vascular tissue, is the momentary contraction followed by the dilatation of the artery, the flow of blood through it and the capillaries is accelerated, retardation from congestion then ensues, and lastly, stagnation at points." Let us add to this, that there is, to every inflamed part, a determination, and we have an abstract of what is really known about the process. In the language of Mr. Erichsen, "we have an increased size of the vessels, an increase in the quantity and rapidity of the blood; but conjoined with this, we have a tendency to its arrest, to its stagnation at points;" and as Nature is very uniform in

her processes, we have a right to infer, that in all internal inflammations we have essentially the same phenomena.

Let us now take a glance at the effects of general bleeding, in a common sense way, and see whether it may be, reasonably, brought into requisition against the process. We open a vein, and abstract, say twenty ounces of blood. As the blood flows away, the blood-vessels slowly adapt themselves by a vital contraction, to their diminished contents; and we have the very best evidence, that this vital diminution of size takes place throughout the whole system—the inflamed parts, as well as those in a healthy condition. After the flow has continued for some time, we witness manifestations of sedation of the circulating forces, a diminution of the injecting power of the heart and arteries, unless there has been oppression, when we find the pulse to rise, indicating a more free and vigorous circulation. I have sometimes thought, in reasoning upon the subject, that the direction to take blood in a full and bold stream was faulty; except in obstetrical practice, where we wish to relax the rigid and unyielding soft structures, or in obstinate constipation, when we wish to relax spasm; the delicate vessels being, as it were, taken by surprise, and not so surely contracting on their contents, as when a more gentle flow was established. Be this as it may, can we look at the conditions of an inflamed part, as above described, and then reflect upon the effects of general bleeding, without being persuaded, that in it we possess an agent, admirably adapted to overcome inflammation? It must likewise be remembered, that general bleeding leads, secondarily, to a rapid absorption of effused fluids, which we know exist in all inflamed tissues. Now reverting, for a moment, to inflammation of the lungs, and reflecting upon the vast importance of their functions, no less than the supply of duly oxygenated blood to the nervous centers, without which their functions must soon cease, and life become extinct; is it not very reasonable to believe, that in abstaining from general bleeding in Pneumonia, we are depriving ourselves of one of the most reliable means of saving the structures from fatal disorganization?

Every now and then, the voice of lamentation comes up from some of your plantations, that fifteen or twenty valuable negroes have been carried off by Pneumonia; are we sure that oppression has not, sometimes, been mistaken for true debility? Dr. Billing, in his admirable little work of 300 pages, which should be in the hands of every young practitioner, for his study by day and his meditation by night, illustrates the subject of vital oppression in Typhus, and severe inflammation of the lungs and bowels, by comparing the system, under such circumstances, "to a tired horse in a loaded cart, reaching the foot of a hill, but unable to ascend it. The stimulus of the whip may make him struggle to the attempt, but if urged, he will at length sink. If, however, some of the load be removed, he can ascend the hill, and if some of the load of blood be withdrawn, the pulse will rise, as is well known and admitted in its sunken state, in severe inflammation of the lungs or bowels."

Can it be necessary, in addressing such an audience as this, to extend the illustrations of my subject? Shall I still farther trespass upon your attention, by picturing to you the brain, the stomach, the liver, the intestines, or the kidneys in a state of inflammation; their tissues gorged with blood, their delicate vessels distended to the bursting point, their fine network of nerves pressed upon and so irritated that they appeal successfully to the entire system for sympathy; effusions taking place, points of stagnation forming, and leading to still farther obstruction; every inflamed point, a point of determination, to which there is an increased flow; important functions interfered with or suspended. Will not this state of things, unless arrested, lead to disorganization and death, or a lingering and crippled convalescence? and has general bleeding no power against the above described condition of things? Can it not diminish the amount of blood flowing in and to the organ, take off the injecting power of the heart and arteries, and promote the absorption of the fluids that have been effused? Can we doubt that it possesses these powers, and shall we give it up without full and due reflection?

In dealing with an inflamed extremity, we place it on an inclined plane; for what purpose? to take off the injecting force of the *vis a tergo*, and promote the returning current through the veins, and thereby relieve the limb of its excess of blood; this we cannot do in inflammation of internal organs, but is it not equally important, that they should be relieved of their excess of blood? We can cover the same extremity with cloths, moistened with cold evaporating lotions, and thereby constringe the dilated vessels, reduce heat, and diminish the inflammation. We have no such resource as this in internal inflammation; or we can bandage the engored extremity and strap the inflamed testis, and by mechanical force extinguish the inflammation. This we cannot do with an inflamed lung or liver. In phlegmonous Erysipelas we pursue the practice introduced by Mr. Hutchinson, and endorsed by the high practical authority of Mr. Lawrence, make incisions, let out the blood and effused fluid, and save the limb from gangrene and death. We cannot deal in this way with an inflamed lung or kidney. But in general bleeding we have a remedy equal to the emergency. Shall we lay it aside without at least a deliberate reconsideration of its claims?

And how perfectly under our control is the remedy! With a finger on the pulse, and an eye directed to the expression of the patient's countenance, we at once appreciate the effect, and as quick as thought, can check the flow or permit it to continue.

Other therapeutic agents will disappoint us—general blood-letting rarely will. Other agents take time to affect the system; this is prompt. Guided, then, by reason, observation and experience, I will, in defiance of statistics and the infallible numerical method, open a vein, in the early stages, be it remembered, of inflammation of vital or delicate organs, when I find the pulse oppressed and smothered, or tense and vigorous, persuaded that I should, by such proceeding, place the suffering organ most promptly on the road to health.

And suppose it should produce some debility, what have

we to fear from it? If all the spiritual bodies of those who have departed this life since disease first attacked the race could be summoned before us, and the countless throng with one voice respond to the question—What was it that prematurely separated you from those bodies which encased you on earth, now commingled with the elements from which they sprang? Would the answer be debility? Would it not rather be fever and inflammation?

Now, with reference to debility from loss of blood, will not your experience sustain me when I assert, that in a large, a very large, majority of instances, the recoveries after large losses of the circulating fluid are remarkably prompt? Will not the accoucheur bear witness to the fact? Will not the surgeon confirm the testimony? Mr. Wardrop says, (and his experience was very great) "That having generally observed that the wounds of all those patients who had lost much blood during an operation, healed most promptly by adhesion; he was in the habit, when he operated, of letting a considerable quantity of blood flow from the smaller vessels that were divided, and he never regretted the practice."

And Professor Dugas, a few weeks since, showed me a case in which he had performed the operation of Staphyloraphy—the union of the lips of the wound being prompt and perfect, although the patient, being of the hæmorrhagic diathesis, lost an amount of blood that gave the Professor great anxiety. Is prompt, perfect and beautiful adhesion of the lips of a wound, after a copious loss of blood, evidence that the loss has seriously lowered the restorative energies of the system? By one who is anxious to support a foregone conclusion, it will be at once objected, that the prompt recovery from loss of blood, under the physiological states I have referred to, cannot be considered a fair expression of the powers of the system under acute disease. I might reply by demanding proof of the fact. Now, I believe every practical man will agree with me when I assert that the states of the system that render blood-letting expedient—the state of vital oppression, as admirably

described in the quotation from Sydenham, and that of violent febrile re-action—are eminently hostile to the recuperative movements of the system. Can any better proof of the fact be needed than that presented by the change that takes place in a wound when fever attacks the patient under treatment? We have been, perhaps, admiring observers, day after day, of the healing process in an extensive solution of continuity. The patient is attacked with fever, we remove the dressings, and find the lips of the wound that had nearly united, gaping, and instead of the bland cream-like fluid, that gave such maternal shelter to the delicate and florid granulations, we find a serous, unhealthy fluid issuing from the surface. What course will the medical surgeon pursue under such circumstances? He will remove the dressings, substitute, perhaps, the tepid water dressing and use means to subdue the febrile excitement, knowing that when that is relieved the wound will recommence its process of repair. He must have been a very poor observer who has not witnessed frequent illustrations of this fact. And it will, doubtless, also be objected that when the system is suffering from the influence of a blood poison, its power of repairing the loss of blood is lowered, and, therefore, the circulating fluid should not be abstracted.

Now, is it not a truth that some of these blood poisons are intense irritants, exciting high fevers and inflammations, and producing thereby prostration of power; and shall we, through fear of their influence, leave these fevers and inflammations to themseves; all our principles being swallowed up in the single idea that there is a poison to be eliminated, and that the powers of the system are to be sustained and stimulated to that end. This idea of blood poisoning is looming up into fearful proportions. It is a wonderfully convenient thing to satisfy the friends of a patient who is struggling through a long, tedious illness; its tediousness being cavalierly laid to the charge of a blood poison, whilst the sub-acute inflammations and fever are almost entirely lost sight of. Now, upon any physician who, in these days, should advocate exclusive solidism or exclu-

sive humoralism, a commission "*de lunatico inquirendo*" should be appointed. Look at the human body—every microscopic point of the soft solids bathed in fluid, and every atom of fluid bathed, if I may so express myself, in soft solids, and how can any rational man entertain exclusive views! And then the nervous system seems at times almost to be forgotten in the Quixotic hunt after the blood poison! The nervous system, whose great office it is to receive and reflect all impressions; the system that places us in relation with the world and with ourselves, which comparative anatomy and physiology tell us, becomes more and more complex, as we rise from the lowest form of animal life, through its various progressions up to man. The nervous system, that makes us just what we are, and which, if I may venture into the field of physiological speculation, is the material frame-work by which the spiritual body, that shall exist hereafter, is placed in existing relations with the present order of things. And as regards this blood poisoning, there are some facts that make the reflecting mind receive it with some reserve, as regards its primary operation in producing disease. A man is struck instantly dead by a stroke of lightning, or the shock of a powerful galvanic battery! We open the body and we find the brain, lungs, liver, spleen, stomach and bowels, loaded with blood, with a great deficiency of it in the cavities of the heart.

Now, in some of the worst forms of fever, that kill in a few hours, we find just the same state of things; and it is in these very fevers that the phenomena of the nervous shocks are so intense; requiring, in the first instance, the most powerful stimuli to keep the patient alive. If my memory serves me, I think it was Dr. Robert Jackson, Deputy Inspector General of army hospitals in the British West Indies, who described a form of fever in which sentinels, who, a short time previous, had been posted in perfect health, were stricken down, as it were, by apoplexy, which, if they rallied, was followed by the most intense febrile reaction, requiring copious general bleeding to place them in a state of safety. The nervous system, I cannot help

regarding as the recipient of the first morbid impression—the starting point, from which proceed all the subsequent phenomena of fevers. Now, do not suppose that I ignore the pathology of blood poisons. I know there are some so virulent that, under their influence, the whole system seems ready to crumble into ruins, and that we dare not use lowering treatment. But when it takes such possession of the mind as to prevent us from using sedative treatment in the earlier stages of continued fevers, I cannot help regarding it as exercising an influence out of all proportion to its intrinsic importance. If the medical history of the past teaches any truth in reference to the future there is a destined reaction to take place in medical opinion. Another petechial fever may break out, in which indirect will be mistaken for direct debility. Another Rasori, captivated by the simplicity of the doctrine, will resort to stimulation, and be awe-stricken by the frightful mortality. Is it not the duty of each one of us to give this subject a thoughtful reconsideration ?

The object of this paper is to encourage a review of the subject of General Bleeding as a means of cure, and not to thrust my views upon you as worthy of adoption. We have met together for mutual improvement; and if each member of the Association would, at each annual meeting, place his offering on the altar, can we doubt that it would promote the great end and object of our union. Let not the youngest member withhold his contribution, through fear it might not be received with fraternal consideration and respect. Like the widow's mite, it might seemingly be the least of offerings; but flowing from heartfelt devotion to truth and science, it might prove of more real value than all the rest; like the grain of mustard seed, the least of all seed, it might contain within itself the germ of a beautiful tree, under the future shade of whose leaves and branches many a disease-stricken sufferer may repose in peace and comfort.

I am well aware that, as general bleeding is an agent of great power for good, so must it be for evil; and that it should be used under the guidance of a sound discretion;

that age, and sex, and temperament, and previous state of health, and prevailing epidemic influence should all be duly weighed and estimated. But as there is a strong tendency of the medical mind to run into extremes; may it not be that we are verging to a point that may terminate in total neglect of the practice.

Our justly placed confidence in the powers of quinine, doubtless, has had something to do with the disuse of blood-letting. No one sets a higher value on it than I do. I have tested its powers from the great lakes of the North to the San Saba river in Texas, and from regions far beyond the Mississippi, to the shores of the Atlantic, and have been rarely disappointed. As the great tonic and anti-periodic, how matchless are its powers! Even in inflammations, with what advantage may it be applied, when we detect a paroxysmal increase of general excitement, which must react unfavorably on the original disease.

Powerless, with a rare exception, to arrest the march of a Continued Fever, how admirably does it act in the latter stages of the disease, when administered in moderate doses in solution, in a form acceptable to the stomach, and easy of absorption; being circulated to the organic nerves of the delicate blood-vessels, (for I will not dishonor the remedy by supposing that it has an elective tendency to any other than the nervous tissue,) giving them tone, and thereby bringing back the languid capillaries to a state of health; co-operating with the silent yet ever-acting energies of the system, in the direction of its health and safety. And when administered in doses proportionate to the threatened emergency of one of those terrible chills which sometimes extinguish life, with what commanding power does it step in, taking hold of the organic nervous system, as it were, bodily, lifting it up to an elevation, at which the dreaded sedation becomes well-nigh a vital impossibility, and holding it there, with a steady hand, until the great crisis has passed! Yet, with all its power, can we rightly and justly regard it as a substitute for blood-letting, in those terrible inflammations, that threaten disorganization and death?

And may we not have been somewhat influenced to its almost total neglect, by the popular current against it, set in motion by a learned but visionary German enthusiast? I do not mention the system of Hahnemann, to revile or denounce it; the cause of truth never was advanced by such a course. We should not judge of it, as professionally represented by many of those whose ignorance, arrogance and pretension affect us with sentiments of loathing and disgust. There are intelligent and worthy gentlemen who have professed conversion to its faith; and ordinary courtesy demands that we should give them credit for honesty and truth. We do not comprehend how it is possible that one, thoroughly educated in the science of his profession, and who has experienced the triumphs of its art, can abandon its well-tried resources. No! We have seen the flag of regular medicine floating triumphantly over too many battle-fields, to lower it at any such bidding; but there may be some truth in the system, and if so, is it not our duty to examine, test, and find it, and when found, apply it for the benefit of our race? Acquainted as we are, with the natural history of disease; cognizant of the restorative powers of the system, witnesses at the bed-side, at which we have sat, anxious yet patient, observers of the struggling system, of sudden improvements, which, had they been preceded by inert medication, a peurile logic would have attributed to it; we surely are qualified to discern the true from the false. It is our duty, then, to examine and test the system in the spirit of candor, and if there be truth in it, to use it for the relief of suffering. If we should so act, I think the occupation of many would be gone; for those with whom we have smiled in the sunshine, and sympathized in the cloud, from whom we have often received the tribute of grateful hearts, who have, perhaps, addressed to us the touching appeal, "Doctor, we know that you have done all that man can do, we know our child must die, but it will be a comfort to us to have you near until the dreadful agony is past," would hardly give us up for strangers, who have no such claims upon their hearts.

There is an impression on the medical mind, that for some years past, we have been in a cycle of influence that has rendered the system intolerant of depletion. If so, will it last always; have we had any evidences that we are approaching the circumference of a different circle, during the revolutions of which, a more anti-phlogistic medication may be demanded? As faithful sentinels, is it not our duty to be on the alert, so that we may not be surprised by a sudden onset of the enemy?

However this may be, the question I have so imperfectly discussed in your hearing, is worthy of calm consideration. I lean to the opinion, that we are making a retrograde movement in the growing tendency to give up general bleeding in the treatment of disease. You may differ with me, for honest differences of opinion will exist as long as we are what we ought always to be, free and independent thinkers. But there is one point on which we can unite in full communion of spirit and feeling—the advancement of our profession. Assembled together from different sections of this great State; leaving behind our professional joys, sorrows, hopes, and disappointments, and I trust all unworthy feelings; let us register a common vow of future devotion to its honor; and when we consider the precious interests intrusted to our care, is it not worthy of our most faithful study? Whenever we cease to realize the great responsibility that rests upon us, we are worthy, no longer, to minister to its altars. Let us, then, for the future, so study and practice our profession, that it may be exalted in the estimation of the world, and be still more worthy of the grateful tribute paid to it by the Roman orator, as it was illustrated in the person of his physician and friend.

"*Homines ad deos nulla re proprius accedunt, quam salutem hominibus dando.*"

ARTICLE XX.

A successful Operation of Staphyloraphy. By Professor L. A. DUGAS. Reported by DESAUSSURE FORD, M. D., Prosector to the Professor of Surgery in the Medical College of Georgia.

The operation of Staphyloraphy, for congenital division of the soft palate, was first performed by Prof. Græfe, of Berlin, in 1860; contemporaneously, or soon after, Prof. Roux, of Paris, by his great success, and more efficient mode, excited much interest in it throughout Europe, as well as in this country. Though the honor of the first operation is due to Prof. Græfe, yet the profession is more indebted to Roux, of whom Dr. Mettauer says: "No one seems to have enjoyed such extended and ample opportunities for cultivating an acquaintance with it, or the infirmity demanding it, as a means of relief, as must have fallen to the lot of this distinguished operator, and, down to the present period, it would seem that he may still maintain a decided pre-eminence, if we are to decide from the many cases reported to have been treated by him, amounting to fifty in number."* Dr. Diffenbach, of Berlin, conferred great benefit by the introduction of the leaden suture in place of the thread ligature, claiming that, by this means, in the event of the contingency of tightening the ligatures, it could be more readily accomplished. He also suggested instruments for retaining the lips of the fissure while they were denuded; for a greater improvement in this latter respect, however, greater facilities were added by Drs. Warren and Hosack, of our own country, the former claiming precedence in operating in the U. S., which claims, however, are not fully established above those of Prof. Smith, of Yale College.

No satisfactory causes have been ascertained for congenital cleft palate. "The infirmity may result from power acting upon the fœtus in utero, through the imagination or feelings of the mother, or it may occur associated with cer-

*Amer. Journ. Med. Sciences, Vol. XXI, 1837.

tain congenital and hereditary diseases in the relation of cause and effect." "It, doubtless, is the result of imperfect development of the part involved in the fissure, or of an arrest in the process, by which the organs are unfolded, and as the causes of such arrest are only conjectural, all is hypothesis both as to them and the palatine fissure itself."*

The soft palate being the septum immediately anterior to the pharynx, and a guard to the posterior nares, *a priori* reasoning would alone conceive in its total or even partial obliteration exactly the abnormal states which exist, viz: increasing the difficulty of speech, causing nasal articulations, this more or less imperfect, in proportion to the difficulty of closing the passage from the fauces, into the nasal cavity, during the effort to enunciate; and deglutition is much impaired, especially in infants, causing, in many instances, death by inanition, and its attempts embarrassed by accidents of the most disgusting nature, the solid food lodging in the pharynx, causing most noxious and nauseating emanations.

Dr. Mettauer, from whose valuable essay I have taken many ideas, says: "The parts involved are disposed to excessive secretions of mucous, which, accumulating on the surfaces, become thickened, adhesive, and finally muco purulent, causing fœtid breath and the expectoration of prodigious quantities of tough mucous."

The infirmity may exist under three divisions—*first*, where simply the uvula is divided; *second*, by division of uvula and soft palate: *third*, division of uvula, velum, palatine bone, and often palatine process of maxillary bone, often laying the floor of the nasal cavity entirely open; in either of these cases the patients are peculiarly prone to affections of the throat, such as catarrh and inflammations about those parts. For a more particular account of the last named variety, I refer to the paper from which I have quoted.

A case of the second variety, the uvula and soft palate alone implicated, the greatest width of the fissure being

*Amer. Jour. Med. Sciences, Vol. XXI, 1837.

about three-fourths of an inch, presented itself February 27th, 1860, to Prof. L. A. Dugas, of the Medical College of Georgia, for operation. The roof of the mouth was unusually concave, with general deformity of the face, the lower jaw protruding in front of the upper a half inch, with much elongation of the head. The patient was of hemorrhagic diathesis; as evidence of this, while a child his finger was slightly cut, which healed, but five days after profuse hemorrhage from the wound ensued; a similar circumstance occurring after the extraction of a tooth.

The patient, Mr. H——, aged 23, was placed in a sitting posture, well supported and secured, a speculum ori then introduced, pressing the tongue, and keeping the mouth effectually opened. The edge of the right side was supported by a double hook, and a sharp pointed bistoury plunged *above* the angle of the fissure, and carried down to the extremity of the uvula; the left side was denuded in a similar manner. The hemorrhage was so profuse that some time elapsed before the introduction of the sutures. Five thread sutures were applied, as detailed in the operation of Dr. Warren.* To one end of each of these was fastened small silver wires, which were drawn through the edges of the fissure and twisted by the *serre nœud* until the edges were approximated, the remaining ends cut off—some bleeding continued six or eight hours. Five days after the operation there was profuse bleeding for twenty-four hours consecutively. The blood seemed to flow from the posterior surface of the wound. Ligatures were applied to the superior and inferior extremities. The patient suffered from this alarming bleeding, was prostrated and reduced nearly to a state of syncope, administered wine of ergot and tincture of iron. In an attempt to inject water and tincture of iron, violent sneezing ensued, threatening rupture of the parts. The hemorrhage ceasing, he was put upon gallic acid for a few days, and then a return to tincture of iron. On the

*Smith's Operative Surgery, page 203.

sixteenth day the sutures were removed, perfect union throughout having been effected.

It will be remarked that Prof. Dugas did not deem it necessary to divide the levator palati and palato—pharyngeus muscles, as suggested by Mr. Ferguson; also, that the sutures were not introduced before denudation. Of this Dr. Mettaner says: "We prefer denuding the margins of the lips before inserting the ligatures, for several reasons, but chiefly because, by that means, the possibility of dividing them is precluded; the sutures may be inserted at more equable distances from the margins, and because the most painful step of the operation is reserved for the conclusion of it." "Hemorrhage, from the denuded margins, cannot be adduced as an objection of any weight to this or the first step of the operation, as it ceases in a few moments after the incisions are formed."

A Series of three Lectures on Rickets, delivered at the Hospital for Sick Children, in December, 1859, and January, 1860. By Wm. Jenner, M. D., Physician to University College Hospital, and to the Hospital for Sick Children.

LECTURE II.

Summary: The Thoracic Deformity in Rickets due to Atmospheric Pressure—Elasticity of the Lung merely retards the entrance of the Air—Oval Chest in Tubercle etc.—Deformities of the Pelvis in Rickets—Circumstances which determine the Differences in the Form of the Pelvis—Deformities of the Head in Rickets, and their Causes—Mistake to suppose the Tibiæ are invariably bent in Rickets—Bones suffer as if one Organ—Arrest of Growth—Late Dentition—White Patches on the Heart—Evidence afforded by Rickety Subjects of the Truth of the Attrition Theory—Pulmonary Vesicular Emphysema and Collapse of the Lung both due in Rickets to a Common cause, and not related to each other as Cause and Effect—Mechanism of their Production—Most Common Cause of Emaciation in Rickets, Albuminoid Infiltration of Lymphatic Glands, Spleen, etc.—Anatomical Characters of the Lymphatic Glands and Spleen when the Seat of Albuminoid-Infiltration.

Gentlemen,—At the conclusion of my last Lecture I was endeavoring to prove to you that the deformity of the chest in rickets, of which we have so many specimens on the table, is produced immediately by atmospheric pressure—the seat of the circular groove being determined, not by the contraction of the diaphragm, but by the position of the upper margin of the liver, stomach, and spleen; the seat of

the vertical groove being determined, not by the loss of power of the respiratory muscles attached to the outside of the ribs, but by the softness and want of resilience of the ribs themselves.

That atmospheric pressure is the immediate cause of the thoracic deformity seems to me to be further shown by the following experiment:—Apply to the abdomen of a child having a rickety thorax pressure so directed as to retard very decidedly the rapidity of the descent of the diaphragm during inspiration: the result is, even though the child inspires deeply, that the recession of the chest walls is very considerably diminished; remove the pressure, and cause the diaphragm to act suddenly and rapidly, and then the recession of the chest walls is not only greater than it was when you retarded the descent of the diaphragm, but greater than it is in ordinary inspiration. Again, if any cause impedes the free passage of air into the lungs,—as, for example, narrowing of the glottis,—the recession of the chest walls during inspiration is enormously increased. Under these latter circumstances, you will note that the inspiratory muscles attached to the ribs are called powerfully into play: they put forth all their force, and yet the vertical groove is deeper than it is when the orifice of the glottis is of proper size and the inspiratory muscles are acting normally. As to the part played by the elasticity of the lung in producing the thoracic deformity: In ordinary respiration the elasticity of the lung has to be overcome before the air can enter its substance. The elasticity of the lung is the same in the rickety as in the healthy child. The elasticity of the lung aids then in the production of the thoracic deformity only by the normal impediment which it offers to the ingress of air, and consequently to the rapid dilation of the thorax. Lateral curvature of the spine will considerably modify the shape of the posterior part of the thorax, causing the side to which the convexity is directed to bulge; but it has little effect in modifying the special deformity of which I have been speaking.

It is interesting to compare the shape of the thorax in extreme rickets, with that which it presents in a non-rickety child, when the free entrance of air into the lungs is impeded for a considerable time, as from tubercular bronchial glands compressing the trachea or the largest bronchial tubes, or from chronic laryngitis, or chronic spasm or paralysis of the larynx. There is a boy in the Hospital at the present time, suffering from long continued laryngeal spasm,

depending, I believe, on tuberculisation of the bronchial glands, who illustrates the point in question. In the rickety child, the ribs are softer than their cartilages; in the healthy, and still more so in the tubercular child, the cartilages are softer than the ribs. The consequence is, that when any chronic impediment to the entrance of the air into the lungs exists in the healthy or tubercular child, the thorax obtains a very oval form; the antero-posterior diameter being less than in health, the lateral diameter greater. If the impediment be very considerable, or the cartilages softer than natural, the sternum may be forced by the atmospheric pressure backwards, so far as to be placed on a level lower than the point of junction of the ribs with the cartilages.

In the majority of cases where this deformity of the thorax has been produced during childhood, it is said in after life to have been congenital. I doubt altogether the existence of such congenital deformity of the chest.

The rickety thorax is constant in shape, not so the rickety pelvis. It has been said, that while the pelvis of mollities ossium is triangular, that of rickets is oval; but in fact, the pelvis in rickety children is much more frequently triangular than oval. Its form will vary, first, according to the direction in which it is compressed by the spine, and its superincumbent parts, on the one side, and the heads of the thigh bones on the other side,—and the direction will vary as the child is the greater part of its time lying, sitting, crawling on all-fours, walking, or shuffling along on the floor; and secondly, according to the age at which the compressing forces are brought to bear on the walls of the pelvis, and the consequent differences in the degree of ossification of the pelvic bones. The cartilages being in the pelvis of the rickety, as we have seen they are in the thorax, less yielding than the bones.

The rickety head is distinguished,—

1st. By the length of time the anterior fontanelle remains open. In the healthy child it closes completely before the expiration of the second year. In the rickety child it is often widely open at that period.

2ndly. By thickening of the bones. This is usually most perceptible just outside the sutures, the situation of the sutures being indicated by deep furrows.

3rdly. By the relative length of the antero-posterior diameter.

4thly. By the height, squareness, and projection of the forehead.

The two first of these peculiarities of the rickety head are the result of the affection of the bones; the two last are due chiefly to disease of the cerebrum.

In consequence of the arrest of growth of the bones of the face and the sinuses, the forehead, as mentioned by Mr. Shaw, in his most able papers on rickets, seems to project more than it really does. Guerin supposed that the rickety deformities were developed from below upwards, *e. g.* that the inferior extremities always suffered before the trunk. But they are not so. If a child is the subject of rickets before it walks, the ribs, clavicles, and upper extremities, certainly become deformed; while the tibiæ, unless the child sit so as to press on them, escape bowing. It must be borne in mind, that if a very heavy child be placed on its legs at too early an age, the tibiæ may bend a little, be a little more bowed outwards than natural, though there be no reason to suppose the child to be the subject of rickets. A child then, may be, nay, often is, rickety in the highest degree—its ribs softened so as to endanger life, its clavicles bent at an acute angle, its wrist swollen so as to measure as much in circumference as the length of the forearm, and yet its tibiæ be as straight as in health; and again, as I have just observed, the legs may be slightly bowed outwards, and the child not be rickety.

The enlargement of the ends of the long bones, and the softening of the bones, do not always proceed in an equal degree—the softening being very often out of proportion to the enlargement; the enlargement being sometimes out of proportion to the softening.

It is not uncommon to see the thoracic deformity lessen at the time the legs are bending. I think this is due to the disease having greatly diminished, and the muscular power increased so as to permit of the child walking before the bones of the leg are strong enough to bear the weight of the body.

Rickets being a general disease, the bones are affected as one organ, just as the arterial system is in the degeneration of age; the consequence of this is, that no one bone is ever affected without all suffering, and that whether the disease manifest itself chiefly by enlargement of the ends of the bones, or by softening of the bones, or by both in a porportionate degree.

I have described the deformities that result from the severest form of rickets, a form which is very common among the poor, and not so uncommon as has been sup-

posed among the rich. We see, however, all degrees of softening, from that in which the ribs only yields to extraordinary pressure, as during bronchitis, and then only sufficiently to flatten the antero-lateral surfaces, to that in which they yield at every inspiration, as was the case in the child from whom this model was taken. We see all degrees of enlargement of the ends of the ribs, and of the other long bones, from that where one might maintain the enlargement was only that proper to the child, to that in which the projections on the anterior wall of the thorax and the enlargement of the wrist would strike the most careless observer.

Arrest of growth of the bones and of the parts in relation with them, is a very important consequence of rickets. This arrest of growth commences during the progress of rickets, but it continues after the general disease has terminated. Hence, not only are children stunted in growth while the subject of the disease, but they never grow into ordinary-sized adults.

All the bones in the adult whose skeleton shows the effects of rickets are diminished in length; but the lower limbs, including the pelvis, are, according to Mr. Shaw's researches, disproportionately diminished in size, and the face is small in proportion to the skull.

I must refer you to Mr. Shaw's most able papers for further details on the arrest of growth of the bones (a).

When speaking of the deformity of the head in rickets, I mentioned one important consequence of the arrest of growth—viz: the late closure of the anterior fontanelle. There is another most important consequence of the arrest of growth in rickets, which, though it is well known, does not appear to me to exert sufficient influence on practice—I mean the late period at which rickety children cut their teeth.

Healthy children commence teething pretty constantly between the seventh and eighth month, and cut the last of the first set of teeth between the twenty-fourth and twenty-fifth month. As a rule, children brought up by hand, supposing them not to be rickety, and children the subjects of tuberculosis, cut their teeth early.

If a child pass over the ninth month without teeth, you should carefully inquire for the cause. It may be, that an acute illness has retarded dentition. It may be, but this is

(a) Medico-Chirurgical Transactions, vols xvii. and xxvi.

very rare, that there is some condition of the gum which interferes with the advance of the teeth. It may be, and this is infinitely the most common cause of late dentition, that the child is rickety; fail not, then, when called to a child in whom the teeth are late in appearing, to look if it be rickety, for if you do fail to look for rickets, you will most likely attribute to the irritation of teething symptoms which are the consequence of the rickety diathesis; the late dentition in rickets being itself merely a symptom of the general disorder.

The rickety deformities may be very trifling, and yet the teeth considerably retarded in their development.

You are familiar with the "white patches" so common on the visceral pericardium in the adult. These "white patches" are not common in children. The more advanced the age of the subject, the more frequently are they found (b).

I use this term "white patch" to signify circumscribed opacity of the pericardium itself, and patches, limited in size, of organized lymph, seated on the surface of the pericardium. In some cases the patch is composed of a thin, smooth layer, of more or less perfect fibrous tissue, in others it is highly villous—the interior of the villi being perfectly formed fibrous tissue, containing vessels; the exterior a layer of epithelium. (Drawing microscope, etc., on table.)

We find every stage between the opalescent spot due to a little thickening of the pericardium, and the most shaggy growth from its surface.

Two theories have been advanced to explain the origin of the "white patch."

According to the pathological anatomists whose opinions have the greatest weight in this country, white patches are produced, in the vast majority of cases at least, by inflammation of the pericardium.

Dr. Hodgkin is said to have advanced the second theory. He attributes the origin of white patches to "pressure, aided by the movements of the heart." (c) Dr. Wilkes, in

(b) Bizot examined sixteen male subjects under 17 years of age without finding in a single case a white patch on the heart; while one-third of twenty-four male subjects, between the ages of 18 and 30, had white patches on the heart, and three-fourths of thirty-two subjects between the ages of 40 and 79.

(c) Lectures on the Morbid Anatomy of the Serous Membranes. 1836, p. 98. Five-and-twenty years before the Lectures on the Serous Membranes were published, Corvisart wrote: "On a attribue la formation de ces plaques blanches a

his recently published valuable Lectures on Pathological Anatomy, has termed this the "Attrition Theory." Now, I told you a little while since, that "white patches" are not very common in children, speaking generally. They are, however, very common in children whose chests are deformed from rickets. But, while in those advanced in years by far the most common seat of the white patch is about the centre of the anterior surface of the right ventricle, in children with rickety chests the chosen seat of the "white patch" is on the left ventricle, a little above its apex; in fact, just as the spot which impinges against the fifth rib where it projects or knuckles inwards.

The white patch is here evidently produced by attrition; and these cases form important links in the chain of facts which unite the white patches and friction to each other as cause and effect—and they afford the strongest grounds for believing that circumscribed opacity of the pericardium, the smooth, thin layer of fibrous tissue on the pericardium, and the villous-looking tuft, are mere varieties of one pathological state, and due to one and the same cause—that cause being, I believe, friction of the spot where the white patch is found against some hard, resisting substance.

You may say, "But how comes the apex of the heart so far to the left in the young child as the junction of the fifth rib with the cartilage, seeing that in the healthy child, as in the adult, the apex of the heart impinges inside the nipple?" The answer is, that the sternum of the rickety thorax being forced forward, the relative positions of the chest-walls and of the heart, are no longer those of health; and the apex usually strikes outside the nipple.

Unless you bear this in mind you may suppose in such a case, as I once did, from the apex impinging outside the nipple, that the left ventricle of the heart is dilated; and this mistake is favored by the chest-walls in the rickety thorax being pressed so closely in contact with the *apex* of the heart that the force of the impulse seems to be greater than natural.

In children whose chests are oval, the antero-posterior

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l'impression des parois de la poitrine sur le cœur, quand sa contraction le porte vers les cotes." Essai sur les Maladies du Cœur. Par J. N. Corvisart. Second Edition: 1811, p. 42. Corvisart recognizes the pathological identity of the white patches on the heart with the white patches found on the liver, lungs, arachnoid, etc. He doubts their origin being inflammation—"Le mot inflammation doit-il meme etre prononce pour donner un air de verite a l'explication de ce phenomene, dont la cause, je avoue, me parait absolument inconnue?—P. 44.

diameter being small, you may often, by moderate pressure with the stethoscope, force the sternum far enough backwards to compress the pulmonary artery; and thus you may produce a systolic basic murmur. In consequence of the length of the antero-posterior diameter of the chest of the rickety child, you cannot by any amount of pressure on its sternum produce a basic systolic murmur.

In children whose chests are greatly deformed by rickets, we sometimes find a white patch on the spleen, identical in structure with those which are found on the heart. In such cases the white patch on the spleen owes its origin to the same cause as the white patch on the heart, viz: friction against one or more ribs projecting inwards—the spleen rising and falling, you know, with the inspiration and expiration.

There are two lesions of the lungs constantly present when the thorax is deformed from rickets, and which are, in fact, direct consequences of the softened state of the ribs, and the deformity which accompanies it. These two lesions are emphysema and collapse.

I need scarcely remind you that pulmonary vesicular emphysema has been considered by some to be always secondary to collapse of lung-tissue; and the frequent conjunction of the two lesions in the rickety thorax, at first sight seems to lend support to the theory; for when found conjoined it has been pretty generally admitted that the emphysema is related to the collapse as effect to cause.

A careful study, however, of the lungs and thorax of a child who has died while the subject of extreme rickety deformity of the thorax, proves that the two lesions may coexist in the same lung without having any such relation to each other.

With the abnormity of the thorax to which I have referred, there is, I say, always conjoined as consequences, pulmonary vesicular emphysema and collapse of lung-tissue. The emphysema is that variety which has been termed insufflation. It is mere over-distension with air of the vesicular tissue of the lung. It invariably occupies the same situation in the lungs of the rickety child, viz: the whole length of the anterior border of both lungs, extending backwards for about three-quarters of an inch from the free margins. The emphysematous portion is separated from the healthy part of the lung by a groove formed by collapsed lung. The groove of collapsed tissue corresponds to those projections

of the ribs inwards, which are situated at the points where they unite with their cartilages.

On the table, illustrating these facts, are a wax model of the inside of a thorax; a wax model of one of the lungs from the same thorax; and the thorax and lungs from which the models were made. The mechanism of the production of the lesions in question is as follows: The softened ribs, instead of being drawn outwards at each inspiration, are forced inwards by atmospheric pressure; the consequence is that not only are the lobules of lung beneath not expanded, but they are compressed. The compression of the lung, aided by its elasticity, causes the collapse.

The common cause of collapse of lung-tissue is undoubtedly obstruction of the bronchial tubes leading to the collapsed portions; it has been confidently affirmed that it is the sole cause. The facts I have brought before you refute the assertion.

The emphysema of the anterior border is produced thus: The lateral diameter of the thorax is diminished at the part corresponding to the line formed by the junction of the ribs and cartilages. Here, as we have seen, at each inspiration the ribs recede; but in proportion as the ribs at this part are forced inwards, the sternum must be thrust forward; and just as less air, or no air, enters into the tissue under the receding ends of the ribs, so an excess of air is drawn, as we commonly call it, into the lung-tissue subjacent to the abnormally-advancing sternum and cartilages of the ribs.

The collapse is directly consequent on the recession of the ends of the ribs during inspiration; the emphysema is directly consequent on the thrusting forward during inspiration of the sternum.

The groove of collapsed lung-substance, and the border of emphysematous tissue, are all the lesions of the lungs *invariably* present in the rickety thorax. But we so often find a very large portion of one or of both lungs collapsed, and that collapse is so directly connected with the defective mechanism of the inspiratory power of the rickety thorax, and is so *very, very* often the cause of death in rickets, that I must here especially direct your attention to it.

The collapse of the lung, of which I am now about to speak, occupies especially those parts of the lungs which are the seats of bronchitis—*i. e.*, the posterior and inferior portions, now and then the greater portion of the inferior lobes of one or of both lungs, and some part of the superior lobes.

If we call to mind the mechanism of the process by which we expel mucus from the bronchial tubes, we readily comprehend why a child with a rickety thorax, when the subject of bronchitis, is sure to suffer, and must often die, from collapse of the lung. When we desire to expel mucus from our bronchial tubes, we inspire deeply, and so fill the pulmonary tissue with air to the utmost; we then close the glottis, compress, by the aid of the muscles of expiration, the air contained in the lung; when the compression has reached a certain point, we open the glottis. The air is, of course, driven from the vesicular tissue of the lung with a force proportionate to the compression it was experiencing at the instant the glottis was opened. The greater the force with which the air is driven along the bronchial tubes, the more certainly, other things being equal, are they cleared from their secretions.

Mucus in the bronchial tubes, when in any quantity, impedes the entrance of the air into the vesicular structure of the lung. But the free entrance of the air into the vesicular structure of the lung is essential for the expulsion of the mucus from the bronchial tubes; hence the violent inspiratory efforts made when an adult or a child is the subject of bronchitis. Watch an adult or child, past infancy, the subject of severe bronchitis; note how every muscle of inspiration is brought into play. He sits upright, he catches hold of the arms of his chair; he takes instinctively the position that enables his muscles of inspiration to act with the greatest results. Now one can reason why the healthy-formed young child so frequently dies from bronchitis, is the flexibility of the lower part of its thoracic parietes, and the consequent mechanical difficulty under which it labors in overcoming the resistance to the entrance of the air into the pulmonary tissues of the lower lobes, when mucus is secreted in quantity into its bronchial tubes.

If the flexibility of the chest-walls in the young child normally built, has this influence on the termination of bronchitis, what must be the influence of the extraordinarily flexible chest-walls of the rickety? Reduce the human chest-walls to a membranous state, and the diaphragm would be as useless as a muscle of inspiration to a man as to a frog. In extreme rickets, the chest-walls have more resisting power than have those of the frog, but they have infinitely less than those of the healthy child. Observe a child the subject of extreme rickets, but otherwise healthy. See the business it is to him to breathe. The chief occupa-

tion of his life is to get by effort the air into enough of the air-cells of his lungs to enable him to live. You will see at once that the least obstruction in the bronchi must suffice to render all his efforts useless.

He has bronchitis; you strip him, and see that all the recessions of the chest-walls which accompanied inspiration before the attack of bronchitis are doubled in degree. The air cannot be drawn into the vesicular tissue beyond the obstructing mucus, and, as a necessary consequence, the mucus cannot be expelled. By the elasticity of the lung and the action of the abdominal muscles the air can be expelled. It cannot, from the defect in the inspiratory apparatus, *i. e.* the softening of the ribs, be drawn into the lung. Correctly speaking, we should not say, in these cases, that the child dies from the collapse; the collapse being the result merely of that which causes death, viz: the want of power in the inspiratory apparatus to overcome the mechanical impediment to the entrance of the air offered by the mucus in the bronchial tubes. The loss of power which the muscles of inspiration experience, in common with those of the body generally, in rickets, increases, in some degree, the difficulty of overcoming the resistance to the entrance of the air. This want of inspiratory power, and the consequent accumulation of mucus in the bronchial tubes, affords an explanation of the extraordinary mortality of measles, whooping-cough and bronchitis, in rickety subjects.

The lesions of structure hitherto considered stand in direct relation to the affection of the bones; those to which I am now about to advert are dependent on the constitutional disease. Whoever sees rickets on the large scale, must be struck with the fact, that while some highly rickety children are extremely emaciated, others are so well covered with adipose tissue that they might have awarded to them, if weight decided the question, a prize at a baby-show. At first I thought that the emaciated children were probably the subjects of a deposit of tubercle: but a few post-mortem examinations showed me that such was not the case. I found emaciation carried to the highest degree, as it was in the boy J. H., whose spleen, liver, etc., is on the table, and whom some of you probably saw in the wards; and in J. F., lately out-patient of this Hospital, and part of whose spleen is exhibited; and yet not a vestige of tubercle could be found in the body.

The emaciation in rickets is almost always due to albuminoid infiltration of one or several organs. Commonly the

lymphatic glands and spleen are the chief seats of the disease; but I have not unfrequently seen the liver, kidney, brain, heart and thymus suffer in a high degree.

I strongly incline to the opinion that in rickets this exudation is never limited to one or two organs, but that in all cases every organ, and may be every tissue, is more or less its seat. The lymphatic glands are, in regard of albuminoid infiltration, to be regarded as one organ—just as I told you the bones in rickets are to be regarded as one organ. And as in the osseous system we never find one bone only affected with softening, and the other lesions characteristic of rickets, so in the lymphatic system we never find one gland only, or one set of glands only, the seat of albuminoid infiltration. The knowledge of the oneness, so to say, of the glandular system, in reference to albuminoid disease, is of much practical importance; inasmuch as we can readily ascertain the state of the lymphatic glands in the groin, axillæ, and neck, while it is difficult to determine by the eye or touch during life the condition of the mesenteric and other internal glands.

During life we feel the lymphatic glands, if they be infiltrated with albuminoid lymph in the groins, axillæ, and neck, varying in size from that of a large pin-head to that of a sweet-pea, hard, and very moveable. The skin over them is natural in color. There is no sign of inflammation. On examining the body after death in such a case, we find the deep glands of the neck, the mesenteric, the lumbar, the bronchial, etc., resembling those seated in the superficial regions. The cut surface of the glands is singularly pale and transparent, compact, smooth, tolerably moist, and, to the unaided eye, uniform in appearance. The substance is tough, and the gland heavy in proportion to its size. In rare cases, instead of being pale, the glands may be purplish in color.

I have never examined a rickety subject after death in which the lymphatic glands were the seat of this albuminoid disease without finding the spleen more or less extensively infiltrated with the same substance (d).

As to the size the spleen may attain when the subject of albuminoid infiltration, it may be that the organ is only just perceptible to touch when the child inspires—*i. e.* when the

(d) It is a point of interest that the spleen, the lymphatic glands, and Peyer's patches experience decided atrophy about the same period of life, and that diseases of the spleen, of the lymphatic glands, and of Peyer's patches are infinitely more common in the child than in the adult.

diaphragm descends and detrudes somewhat the spleen; it may be that it reaches nearly to the middle line just below the umbilicus, and downwards to the crest of the ilium.

I have never seen this extreme enlargement of the spleen in the child as the consequence of a deposit of the tubercle in its substance; it has always, in my experience, depended on albuminoid infiltration. And albuminoid infiltration of such a degree as to cause very great enlargement of the spleen in children is rarely seen except in those of the rickety diathesis. Sometimes the bone disease is extreme, in others, as in the two cases to which I have before referred, the bone disease is moderate, or even trifling in degree. One of those children certainly, and the other probably, had the bone disease developed after their spleen; lymphatic glands, etc., were the seats of albuminoid infiltration.(e)

The albuminoid spleen of ricketty children presents after death the following characters: It is increased in size; the increase may be trifling or extreme. Thus I have seen it little larger than in health, and I have seen it measure as much as eight inches from above downwards, over its convex surface, and four inches from side to side. It is never adherent to the parts adjacent, as a spleen containing tubercles often is, and its capsule generally is scarcely, if at all, thickened. Its anterior border is pretty sharp; it is firm to the touch, and smooth on the surface; its weight, regard being had to its size, strikes one as considerable.

The substance is tough, but elastic, and the thinnest sections can be cut with facility. The cut surface is remarkably smooth and transparent. It is not unlike one might suppose would be its appearance if the whole organ were infiltrated with glue. Only a little pale blood can be expressed from the cut surface.

Usually the organ is pale red, but occasionally it is dark purple. The more transparent any given part is, the paler it is; the most transparent parts are almost colorless.

The splecnic corpuscles are sometimes more readily seen than in a healthy spleen; they may be mistaken for grey tubercles. I have never seen in the spleen of rickety children the sago-like little masses so often present in the spleens of those who die of phthisis.

(e) February 2, 1860.—I have now under my care a child, aged 3 months only, whose spleen reaches below the level of the umbilicus. The child is suffering from catarrh. There are no signs of rickets or tubercle.

The parts of the spleens of the boys H. and F., now on the table, afforded, when recent, good specimens of the disease. They have now lost much of their transparency, still they preserve many of their characters, *e. g.* hardness, elasticity, smoothness. I have never seen this disease conjoined with ascites.—*Medical Times and Gazette.*

The Correlation of Physical, Chemical and Vital Force, and the Conservation of Force in Vital Phenomena. By Joseph LeConte, Professor of Geol. and Chem. in the South Carolina College, Columbia. Read before the American Association for the Advancement of Science, at the Springfield Meeting, August, 1859.

Matter constantly changes its *form*—but is itself indestructible except by the same power which called it into being. The same quantity of matter exists in the universe at all times. So also force changes its *form* constantly, but is itself indestructible, incapable of increase or diminution, and the same absolute amount of force exists in the universe at all times and forever. The mutual convertibility of the various forms of force is called "correlation of forces." The invariability of the absolute amount in the midst of constant change is called "conservation of force." This principle of correlation and conservation of force must be looked upon as one of the grandest generalizations in modern science, a principle startling at first, but when clearly understood and firmly grasped, almost axiomatic. It must be considered a necessary truth, and as such is a legitimate basis of deductive reasoning.

The correlation of *physical* forces is universally recognized as a principle in science, and not only so but has already been productive of many beautiful and useful *results;* but the correlation of physical and *vital* forces while generally recognized as a probable fact has only been speculated on in a vague and as yet unfruitful manner. The science of life is scarcely yet ripe for the legitimate extension of this principle over its domain. The most elaborate attempt of this kind which I have seen, is contained in the very remarkable and suggestive paper of Dr. Carpenter entitled "mutual relation of physical and vital forces," and published in Phil. Trans. for the year 1850.

In the present paper I wish simply to present a few thoughts, which have originated in my own mind, in the course of reflection on this subject, in the hope that they may prove suggestive to others. They have at least the merit of being un-

influenced by the writings of others—and therefore perhaps of presenting the subject in a somewhat new light. I sincerely wish I could present the matter in a more definite form, but it is certain that where a subject is not perfectly understood, the attempt to give our ideas more definiteness also makes them more questionable. We are obliged to be content with a certain vagueness, in the hope that by the use of right methods a clearness will come after. We must gratefully accept the twilight in the hope that it marks the approach of the full light of day.

There are four planes of material existence which may be regarded as being raised one above the other. The *first* and lowest is the plane of elementary existence, the *second* the plane of chemical compounds, or mineral kingdom, *third*, the plane of vegetable existence, and *fourth*, of animal existence. Now it is apparently impossible for any known force in nature to raise matter through all these grades at once. On the contrary there is a special force adapted for the elevation of matter from each plane to the plane above. It is the special function of chemical affinity to raise matter from plane No. 1 to No. 2. All the changes too which take place upon plane No. 2 by the mutual reactions of bodies situated on that plane are under the guidance and control of this force. It is the special prerogative of the force of vegetation—of vegetable life, to lift matter from No. 2 to No. 3, i. e. from the condition of mineral matter to the higher condition of vegetable matter. All the changes which take place upon this plane, the laws of which constitute vegetable physiology, are under the guidance of this force. Finally, the force of animal life and that alone enjoys the privilege of lifting matter still higher into the 4th plane, i. e. the plane of animal existence. No force in nature can lift from No. 1 to No. 3, or from No. 2 to No. 4. Plants cannot feed entirely upon elementary matter, nor can animals feed upon mineral matter. The reason of this will be seen in the sequel. Thus it seems that after matter is raised from the elementary to the mineral condition, it requires an additional force of another and peculiar kind to raise it into the vegetable kingdom, and again, another accession of force to raise it into the animal kingdom. These kingdoms are, therefore, truly represented as successive planes raised one above the other, thus:

No. 4, *Animal Kingdom.*
No. 3, *Vegetable Kingdom.*
No. 2, *Mineral Kingdom.*
No. 1, *Elements.*

If then it be admitted that this is the relative position of these planes—that it requires a greater and greater expenditure of force to maintain matter upon each successive plane, then it follows *that any amount of matter returning to a lower plane by decomposition must set free or develop a force which may, under favorable circumstances, raise other matter from a lower to a higher condition.* Or to express it by a mechanical illustration, a given amount of matter falling from one plane to any plane below, develops a force sufficient to raise an equal quantity of matter an equal height. Thus, *decomposition* must in every case *develop force*, which force may take the form of heat as in combustion, or electricity as in electrolysis, or may expend itself in forming chemical compounds or *even in organizing matter.*

Again, in the same manner as matter may be arranged in several distinct and graduated kingdoms, so it seems to me the forces of nature may also be properly divided into distinct groups arranged in a similar manner one above the other. These are the *physical*, the *chemical* and the *vital* forces. And as in the case of matter, so also in the case of force, it is impossible to pass directly from the lowest to the highest group without passing through the intermediate group. The conversion of *physical* into *vital* force seems impossible without passing through the intermediate condition of *chemical force.*

These are the simple principles upon which are based all that follows—principles which may possibly seem fanciful to some unfamiliar with the principle of conservation of force, but the number of phenomena which they consistently explain will I hope entitle them to serious thought.

1st. It is well known that chemical elements, in what is called the "nascent condition" i. e. at the moment of liberation from previous combination, exhibit a peculiar energy of chemical affinity not exhibited under other circumstances. It seems to me that this is readily explicable on the principle of conservation of force. At the moment of decomposition the chemical affinity which bound the elements together and which was before satisfied is suddenly left unsatisfied. There is an attraction *set free* which was before *disguised*—a force *liberated* which was before *latent.* If conditions favorable are present this force may preserve the form of chemical affinity, and expend itself in forming other chemical compounds; or even as we shall see hereafter in organising matter. But if favorable conditions are not present, then it may take some other form of force, e. g. heat or electricity, and *therefore no longer exist as chemical affinity.* The chemical

affinity is said to be lost. To return to the mechanical illustration used above. Matter falling from plane No. 2 to plane No. 1 develops force sufficient to raise other matter from plane No. 1 to No. 2, but which in the absence of such matter may expend itself in heat or electricity or some other form of physical force.

2nd. It is a fact, now well established, that the *seed* in germination forms carbonic acid, and in doing so loses weight. That is, the organized matter of the seed is *partially decomposed*, a portion of its carbon uniting with the oxygen of the air to form carbonic acid. Now it is this *decomposition* which develops the force by which germination is effected. A portion of the organic matter of the seed is *decomposed*. This decomposition sets free a force which suffices to organize the rest. The force necessary, and therefore the amount of decomposition necessary in this case, is small, because the work to be accomplished is simply the change from one form of organic matter to another, or rather from *organic* to *organized* matter—to recur again to the former illustration, merely shifting a certain quantity of matter from one place to another upon the plane No. 3. "But how," it may be asked, "is this decomposition brought about?" This seems to be effected by the heat, and perhaps, (according to Hunt) by the actinic rays of the sun.* Heat and actinic rays have been spoken of by many writers, e. g., by Carpenter and by Robert Hunt, as the physical force which is changed into organizing force, by means of the "substratum of an organized structure:" but the peculiarity of the view which I now present, is that this conversion does not take place *immediately*, but only *through the mediation of another force more nearly allied to the vital*, viz: *chemical force*. The food is laid up in the seed mostly in the form of starch. In the act of germination this starch is changed into sugar. Starch, as is well known, differs from sugar in two important respects, viz: it is *insoluble* and it is more *highly carbonized*.† Now according to the ordinary view, the only object of the partial decomposition is to change the food from an insoluble to a soluble form—and this can be done only by elimination of a portion of the carbon, in the form of carbonic acid. According to the view which I now present, *the food is always laid up in a more highly carbonized condition than is wanted, in order that force may be set free by elimination of superfluous carbon.* According to the ordi-

* See Report by Robert Hunt on the growth of Plants, Rep. Brit. Assoc, 1846, p. 33, 1847, p. 30.

† Robert Hunt, Rep. Brit. Ass., 1847, p. 20–22. Carpenter, Comp. Phys, p. 288. Mulder, Chem. An. and Veg. Phys., pp. 208, 230.

nary view, if an insoluble food could be found, capable of conversion into the soluble form, without loss of carbon, then germination of the seed might take place without loss of weight, by the direct conversion of heat into vital force. According to my view, *decomposition*, and therefore *loss of weight, is absolutely necessary to develop the organizing force*, the loss of weight being in fact the exact measure of that force.

3rd. As soon as the plant develops *green leaves*, a complete change takes place in its mode of development. It no longer loses weight, but increases in weight. It not only develops, but *grows*. The reason of this is, that the organizing force is no longer developed by decomposition of food laid up within its own tissues, but by the decomposition of food taken *ab externo*. Sunlight is universally admitted to be the physical force concerned in this decomposition. Farther, it is generally supposed that there is a direct and immediate conversion of light into vital force in the green leaves of plants. But evidently this is impossible, since the *work done by the light is the separation of the two elements carbon and oxygen*. Light is therefore converted into *motion*. It is therefore the chemical affinity thus set free which is the force immediately converted into vital force. The food of plants consists of carbonic acid, water and ammonia, (CO, HO and NH) or, in some cases, according to M. Ville, of CO, HO and N.* Sunlight, acting through the medium of the green leaves of plants, has the remarkable power of decomposing CO. The *force thus set free from a latent condition*, or the chemical affinity of *carbon in a nascent condition*, is the force by means of which C, H, O and N are raised to the organic condition.† To return to my former illustration, matter (oxygen) falling from the second to the first plane, develops force sufficient to raise other matter from the second to the third plane. Thus it is evidently *impossible on the principle of conservation of force that plants should feed entirely upon elementary matter;* whereas, according to the ordinary view of the direct conversion of light into organizing force, there is no reason

*See review of the controversy between Boussingault and Ville on this subject Bib. Univ. Arch. des Sci., vol. 30, p. 305. Also Phil. Mag., 4th ser., vol. 13, p. 497. Ann. des Sci., 4th series, vol. 2, p. 357. Am. Jour. Science, vol. 19, p. 409. Bib Univ. Arch. des Sci., vol. 28, p. 335. Ann. des Sci., 4th series, vol. 7, p. 5.

†Ammonia is also probably decomposed in the tissues of the leaves of plants. (Carpenter, correlation of physical and vital forces, Phil. Trans. 1850, p. 732. See also Morren, Bib. Univ. Arch des Sci., new period, vol. 5, p. 81.) This would of course produce additional organizing force.

why plants should not feed entirely on elements, except that one of them, carbon, is insoluble.

4th. There are many other phenomena of vegetable life which receive a ready explanation on this theory. I have said that sunlight has the power of decomposing carbonic acid only in the *green* leaves of plants. *Pale plants*, such as the Fungi among cryptogams and the Monotropa among phænogams, have no power to decompose CO. These plants, therefore, cannot feed upon chemical compounds—mineral matter. They *must feed upon organic matter*, which organic matter *in its partial decomposition furnishes the force necessary for organization*. If so, then this decomposition, as in the case of germination, must be attended with the elimination of CO. Both of these are known to be facts. Pale plants do feed upon organic matter, and do evolve CO. The necessary connection of these facts with one another, and with the principle of conservation of force, is now for the first time, as far as I know, brought out. The phenomena of nutrition in these plants, is similar to that of seeds in germination, except that the latter contains the organic matter already laid up within its own tissues, while the former derives it from decaying vegetable or animal matter taken *ab externo* into its tissues. In this case, too, as in germination, heat is apparently the physical force which effects the decomposition of the organic food, and which is therefore converted indirectly through chemical into vital force. Light is actually unfavorable to this process, for light tends to decompose, not to form CO. In both cases, therefore, the conditions favorable for nutrition are first, abundance of soluble organic matter, second, absence of light and presence of heat. This is then apparently the true reason why germinating plants and pale plants avoid the light. These plants grow by the *oxydation* of carbon and formation of CO. Light *decomposes* CO, and must therefore be antagonistic to its formation, and consequently to the growth of these plants. Whether or not this property of light is entirely limited by the condition of its acting through an organic tissue, is a question yet undetermined. Heat we know is favorable to the oxydation of carbon, (combustion, fermentation, putrefaction, &c.) under all circumstances. Has light an opposite property also under all circumstances, or is this opposite property of light limited to the condition of its acting through the medium of an organism? I hope the experiments already commenced, and still in progress, by my brother, Prof. John LeConte, and published in the last proceedings, and in the American Journal of Science and Arts, vol. 24, p. 317, will eventually furnish the means of solving

this very important problem. I do not wish to anticipate the final results of these experiments, but it seems to me that the negative results thus far obtained, rather support the view that the action of light is not thus limited. In all experiments on this subject, the light and heat of the sun have been combined. Now heat we know is favorable to combustion. The fact, then, that combined light and heat produced no effect, would seem to indicate that light counteracted the effect of the heat of the sun.

5th. *Etiolated plants*, or plants artificially blanched by exclusion of light, exhibit the same phenomena, and for the same reason. These plants cannot receive their organizing force through the decomposition of CO by sunlight: therefore they are obliged to obtain it from decomposition of organic matter. Hence these plants require organic food, hence, also, they evolve CO instead of oxygen. In this case, also, decomposition of organic matter, with a separation of a portion of the carbon in the form of CO, furnishes the organizing force. In the absence of any external organic matter in the form of humus or manure, etiolated plants, like germinating seeds, will feed for awhile upon organic matter, previously accumulated in their tissues in the form of starch, and actually *lose weight* of solid matter.*

6th. In a most interesting and suggestive article in the Bibliotheque-Universelle (Archive des Sciences,†) on the subject of humus, M. Risler shows in the most conclusive manner that organic matter in a soluble condition (soluble humus) is taken up by *almost all plants*. This fact had been previously proved experimentally by Th. de Saussure, but having been denied by Liebig, it has been very generally neglected by vegetable physiologists. The doctrine of Liebig and of physiologists generally, is that, except in case of pale plants, organic matter is decomposed into CO, HO and NH, i. e. must fall into the mineral kingdom before it can be absorbed and assimilated by plants, and therefore that organic manures only supply the same substances, and in exactly the same form, which are already supplied, but in insufficient quantities, by the atmosphere. But M. Risler repeats with great care the experiments of de Saussure, and confirms the accuracy of his conclusions. Hyacinths and other bulbs were placed with their roots suspended in water colored with soluble extract of humus. When these plants were placed in the sun, the water became rapidly decolorized. Other roots, such as carrots,

* Carpenter, Comp. Phys. p. 285.
† Bib. Un. Arch. des. Sci. new period, vol. 1, p. 305.

also germinating grains of wheat, were observed to produce the same effects. An extract of humus was exposed at a somewhat elevated temperature to sunlight under a bell glass. Microscopic plants developed in great abundance. As long as these plants continued to develop the infusion was transparent and did not putrefy in the slightest degree; and yet there was a constant evolution of CO as shown by analysis of the air in the bell glass. "Now the cellules formed in the liquid contained carbon. This carbon did not come from the CO of the air, for the liquid, far from *absorbing*, disengaged CO. Therefore the soluble humus must have furnished the carbon *directly* to the vegetable cells." It could not have furnished it *indirectly* in the form of CO derived from decomposition of the organic matter, otherwise *oxygen* instead of CO would have been eliminated. M. Risler thinks moreover that the *embryo* in germination takes up soluble organic matter in the form of humus in addition to the soluble organic matter contained within the cotyledons, and that the evolution of CO by germinating seeds is due in part also to the oxydation of humus. Finally, according to the same author, the formation of roots in all plants, but particularly those containing much starch or sugar, is due to the direct absorption of humus, and not, as is generally supposed, by the fixation of carbon by means of light. "In order," says he, "that CO of the air should form these substances, it is necessary, in the beet and the potatoe, that there should be a descending sap which there is not." Moreover if the carbon was taken from the soil in the form of CO, there should be elimination of oxygen instead of evolution of CO; but the converse is the fact as has been proved in the most indisputable manner by de Saussure and Boussingault.*

Mulder is equally explicit in affirming that plants absorb soluble organic matter which is converted in the roots, by elimination of a portion of the carbon, into starch and sugar. Mulder, pp. 620, 664, 682. Thus according to these authors *sap is actually elaborated by the roots* from organic manures.

Now, according to the theory which I propose, *this change from humus into starch, sugar or cellulose, furnishes an additional life-force.* Humus is a more highly carbonized substance than either starch or cellulose. By the *partial decomposition of humus* in the tissues of the plant, with the elimination of a portion of its carbon (removed by oxydation) *a chemical force is set free which serves to assimilate the remainder.* Hence, this process of evolution in CO as we

* Bib. Un. Arch. des Sciences, new series, vol. 1, p. 5.

have already said, is opposed by light but favored by darkness and heat. Light favors the formation of chlorophyll, of woody fibre, of essential oils, gums, &c.; darkness, heat and organic manures, favor the formation of sugar, starch, &c. Hence the explanation of the well-known fact that by covering up the lower portions of potatoe plants by heaping earth around them, many buds which would otherwise form leafy *branches* develop into *tubers*. Hence also the explanation of the equally well known fact that the roots of plants seek and grow most rapidly in the direction of most abundant food. If the sap is elaporated entirely in the leaves, it is difficult to understand why the descending sap should flow in greater abundance in one direction than another. But if sap is elaborated in *the root itself* it is easy to see why growth is most rapid in the direction of most abundant manure. It is easy to see, too, why roots avoid the light; since light decomposes CO and therefore must be unfavorable to the formation of this substance.

7th. It is a well known fact that the so-called *respiration of plants* consists of two distinct and apparently opposite processes, 1st, the absorption of CO by the leaves and also in solution by the roots, the decomposition of this CO by means of light with the fixation of the carbon and the elimination of the oxygen: 2nd, the recomposition and evolution of CO. The *decomposition* of CO undoubtedly takes place in the leaves, but where the recomposition of CO takes place is not so well ascertained. It is exhaled, however, like the oxygen, from the leaves. The process of decomposition of CO takes place only during the day as light is absolutely necessary for this process. The *recomposition* of CO takes place night and day, although its exhalation, according to some observers, seems to be more abundant during the night. The process of decomposition of CO is well understood—of that of recomposition, our knowledge is very imperfect. M. Risler's explanation of this latter process seems most probable. Plants, we have seen, undoubtedly absorb soluble organic matter, i. e., humus. Humus, we know, is a more highly carbonized substance than cellulose or starch. This humus is therefore oxydized in the roots and interior of the trunk, away from light, by means of oxygen also absorbed by the roots, and thus forms CO. This CO then circulates in the sap to be exhaled by the leaves, or perhaps to be again decomposed by sunlight in this organ. In the absence of light, the whole is exhaled undecomposed. This readily accounts for the apparently

greater exhalation of CO during the night. A series of well conducted experiments would test the truth of this view. If it is true, there should be a relation between the richness of the soil in organic manures and the amount of CO exhaled. For a given amount of growth, the amount of CO exhaled is the measure of the amount of food taken up in the form of organic matter, and the amount of oxygen exhaled is the measure of the amount of food taken in the form of mineral matter. Or if the exhaled CO is decomposed in the leaves during the day, then of course the difference between the amount exhaled during the night and day would enter as an element in the calculation. Also it would seem that those plants, especially, which frequent rich shady spots, should exhale proportionally more CO and less oxygen, than those loving thin soils and sunny places.

In plants, then, there are *two sources of organizing force*, the relative proportion of which varies infinitely, according to the amount of light, heat, color of the plant and richness of the soil in organic matters. The two sources are *immediately*, 1st, the decomposition of CO, 2nd, the decomposition of soluble highly carbonized organic matter; *remotely*, the two sources are *light* and *heat*. In plants which first take possession of desert spots, bare rocks, &c., the *first* is the only source. In pale plants and fungi the *second* is the only source; but in most plants the two are combined in various proportions. The first must of course be considered the most fundamental and necessary, the second being evidently supplementary. The decomposition of CO by sunlight may be considered as the original source of all vegetation, but in most of the higher order of plants, the process of nutrition is expedited by the re-absorption of organic matter before it again returns to the condition of CO, HO and NH.

8th. The *egg* during incubation, absorbs oxygen, evolves CO, and probably HO, and loses weight. As the result of this evolution of CO, we find the egg *developes*. What it *loses in weight it gains in organization*. Now what is the source of the organizing force? It evidently bears a direct relation to the loss of weight. Here also, then, we have *partial decomposition furnishing the necessary force*. A portion of the organic matter, falling from the organic to the mineral plane, sets free a force which raises the remaining portion into a slightly higher condition. Heat is evidently the physical force or agent which is transformed, not directly but *indirectly, through chemical affinity*, into vital force. In

other words, heat is the agent which effects the necessary decomposition. The phenomena of development of the egg is, therefore, very similar to that of the seed.

9th. *After the hatching* of the egg, the animal no longer loses weight; because recomposition of food taken *ab externo* proceeds *pari passu* with decomposition. But in this case, also, *decomposition supplies the force by which recomposition is effected*, and growth and development carried on. As this is an important point, I will attempt to explain it more fully.

It is well known that in the animal body there are, going on constantly, two distinct and apparently opposite processes, viz., decomposition and recomposition of the tissues; and that the energy of the life is exactly in proportion to the rapidity of these processes. Now, according to the ordinary view, the animal body must be looked upon as the scene of continual strife between antagonistic forces chemical and vital; the former constantly tearing down and destroying, the latter as constantly building up and repairing the breach. In this unnatural warfare the chemical forces are constantly victorious, so that the vital forces are driven to the necessity of contenting themselves with the simple work of reparation. As cell after cell is destroyed by chemical forces, others are put in their place by vital forces, until finally the vital forces give up the unequal contest and death is the result. I do not know if this view is held by the best scientific minds at the present day, as a fact, but it certainly is generally regarded as the most convenient method of representing all the phenomena of animal life, and as such has passed into the best literature of the age. Certain it is, however, that the usual belief, even among the best physiologists, is that the animal tissue is in a state of unstable equilibrium; that constant decomposition is the result of this instability, and that this *decomposition, and this alone, creates the necessity of recomposition*—in other words, creates the necessity of food. But according to the view which I now propose, decomposition is *necessary to develop the force* by which organization of food or nutrition is effected, and by which the various purely animal functions of the body are carried on—that decomposition not only creates the *necessity*, but at the same time furnishes the *force* of recomposition.

But it will no doubt be objected that according to the principle of conservation of force, decomposition of a given amount of matter can only effect the recomposition of an

equal amount—that a given quantity of matter falling a given height, can only raise an equal quantity an equal height: the whole force developed by decomposition seems to be expended in maintaining the body at a given position. How, then, can *growth* and *animal activity* go on? The answer to this question is obvious enough when we recollect the nature of the food of animals. Animals, it is well known, cannot feed upon mineral matter, but only on food already organized, at least up to the vegetable condition. But when decomposition takes place, the animal matter returns no longer to the vegetable condition from which it was immediately raised, but to the mineral condition. It is decomposed into CO, HO and *urea*. This last substance, though not strictly a mineral substance, is far below the condition of vegetable matter. Thus it is evident that *a given quantity of matter falling down from the condition of animal to that of mineral matter*, i. e., from the 4th to the 2d plane, *would develop force sufficient to lift a larger quantity of matter from the vegetable to the animal condition*, i. e., from the 3rd to the 4th plane, and yet perhaps leave much residual force unexpended. Thus it is possible, and not only possible, but certain, on the principle of conservation of force, that decomposition of animal tissues should set free, a force, a part of which is consumed in the recomposition of a *larger* amount of new matter, and thus maintaining growth; a part in animal heat, and a part in animal activity of all sorts. In this view of the case, we see at once the absolute necessity that the food of animals should be organized. Upon the principle of conservation of force, growth and animal activity, in a word, animal life, would otherwise be impossible.

It follows also from the above, that the higher the organization of the food, the smaller the amount of force necessary to effect assimilation, and therefore the larger the amount of residual force to be expended in animal heat and animal activity. In this we find a ready explanation of the superior activity of *carnivorous* animals, and the loss of animal activity which results in a state of domestication from the use of vegetable diet; also of the supposed superior activity of men fed upon meat diet.

10th. I have spoken thus far of only one source of vital force in animals, viz., the *decomposition of the tissues*. I have attempted to show how, upon the principle of conservation of force, this is sufficient to carry on the growth and the activity of the animal organism. But decomposition of the

tissues, though the fundamental source—the source characteristic of and peculiar to animals—of immediate and universal necessity in this kingdom, and in many cases sufficient of itself, is not the only source. There is also in animals as in plants a supplemental source, viz., *the decomposition of food.*

It is well known that the food of animals consists of two kinds, the nitrogenous, such as albumen, fibrin, casein, &c., and the non-nitrogenous, such as fat, starch, sugar, gum, &c. According to all physiologists since Liebig, the nitrogenous alone are used in the repair and growth of the tissues. The non-nitrogenous are either quickly consumed in respiration, or else are laid up in the form of fat for future consumption in the same way. Now there can be no doubt that animals may live entirely on nitrogenous food; in which case the whole vital force, whether for assimilation of food or for animal heat and animal activity, is derived from the decomposition of the tissues. This is the case also, apparently, in the starving animal, particularly if lean. But in almost all cases, much food in the form of fat, starch, sugar, &c., (non-nitrogenous) is never transformed at all into tissues, but is taken into the blood, gradually decomposed, oxydized in the course of the circulation, changed into CO and HO, and finally removed by exhalation, from the lungs. Now what is the object of the non-nitrogenous food, since these do not form any part of the tissues, but are again decomposed and thrown out of the system? The answer usually given is, that such food is used in the animal economy solely as fuel to keep up the animal heat. On this view it is difficult to see why this class of food should be used at all, especially in warm climates. But according to the view which I propose, we have here an *additional source of vital force.* The decomposition of these ternary compounds sets free a force which is used in organizing and assimilating other matter, (nitrogenous,) and in producing animal activity and animal heat. As in plants, although the decomposition of CO by sunlight, is all that is absolutely necessary for growth and development, yet the decomposition of organic food supplies an additional force which greatly increases the vigor and rapidity of vegetation; so in animals, although *decomposition of the tissues* is all that is absolutely necessary to furnish the force of growth and the phenomena of animal life generally, yet the decomposition of non-nitrogenous organic *food* furnishes additional force by which growth and animal activity may be maintained without too great expenditure of the tissues.

11th. In what, then, consists the essential difference between animals and plants? There can be no doubt that it consists, generally, in their relation to one another and to the mineral kingdom. Plants occupy a middle ground between the mineral and animal kingdom—a necessary halting place for matter in its upward struggles. But when we attempt to define this relation more accurately, the problem becomes much more difficult. It is indeed probable that no single distinction will be found free from objection. The commonly received, and, to a certain extent, very correct idea is, that the essential distinction consists in their relation to CO. Plants *de*compose and animals *re*compose CO. The beautiful manner in which the two kingdoms stand related to each other through these converse processes, is familiar to all. But it is well known that most plants carry on both of these processes at the same time, while some, as fungi, pale plants, &c., only recompose CO like animals. It seems to me that at least an equally good fundamental distinction may be found in this, that in plants the fundamental and necessary source of vital force is the decomposition of its *mineral food;* while in animals the fundamental source of vital force is the decomposition of its *tissues.* It is true that in what I have called the supplementary source of vital force, they seem to meet on common ground, viz., the decomposition of *organic food;* but even here there is this essential difference, that in plants this decomposition of organic food is only partial, and therefore furnishes not only *force* but *material* for organization; while in animals the decomposition is complete and therefore furnishes only *force.*

As a necessary result of the above, it would seem that the "*vortex*" of Cuvier is characteristic of animals. There seems no reason to believe that a tissue once formed in plants is ever decomposed and regenerated, as is the case in animals. When plant-cells decompose, the tissue dies. Hence the absolute necessity of *continuous growth* in plants. In this kingdom *life* is synonymous with growth. There is no possibility of life without growth. There is no such thing as determinate size, shape or duration. There is no such thing as maturity, or if so, death takes place at the same instant. As cell life is necessarily of short duration, and as there is no regeneration of tissues in plants, it is evident that the life of the tissues must be equally short. Thus plant life can only be maintained by the continual formation of *new tissue* and a constant travelling of the vital force from the old to the new. In exogenous plants the direction of travel is from the interior to the exterior; in endogens from exterior to interior, and still more from below upwards by the continual addition of new

matter at the apex. In fungi where there is no such superposition of new tissue upon the old, where growth takes place by multiplication of cells throughout the whole plant—in other words, a true intertitial growth as in animals—since there is no regeneration of tissues, the duration of the life of the plant is limited by the duration of cell-life.

The *respiration* of animals, also, differs essentially from that of plants. At one time the absorption of CO and exhalation of O was called the respiration of plants. It is universally admitted now, however, that this is rather a process of assimilation than of respiration. The recomposition and exhalation of CO as soon as discovered, was very naturally likened to animal respiration, and is in fact looked upon by many, as for example the physiologist Carpenter, as a true respiration. But there is an essential difference between this and animal respiration, which I have already pointed out. Its very significance is radically different. The essential object of animal respiration is the removal of poisonous decomposed matters from the organism. The so-called respiration of plants, on the contrary, is rather a process of assimilation, since by it the too highly carbonized organic food, by the elimination of a portion of its carbon, is brought into a proper condition for organization. A true respiration is necessarily connected with a change of the matter of the tissues—with the vortex of Cuvier—which has never been shown to exist in plants. It is true the exhalation of CO has been looked upon by some physiologists as indicative of a regeneration of tissues, but I have already shown that this is probably not the case, but on the contrary that the CO is formed by the partial decomposition of highly carbonized organic *food*.

12th. The most natural condition of matter is evidently that of chemical compounds, i. e., the mineral kingdom. Matter separated from *force* would exist, of course, only as elementary matter or on the *first plane;* but united with force, it is thereby raised into the *second plane* and continues to exist most naturally there. The *third plane* is supplied from the second, and the fourth from the third. Thus it is evident that the quantity of matter is greatest on the second and least on the fourth plane. Thus nature may be likened to a pyramid, of which the mineral kingdom forms the base and the animal kingdom the apex. The absolute necessity of this arrangement on the principle of the conservation of force may be thus expressed. *Matter*, *force* and *energy* are related to one another in physical and organic science somewhat in the same manner as *matter*, *velocity* and *momentum* in mechanics. The whole *energy* remaining constant, the greater the *intensity* of the

force (the elevation in the scale of existence) the less the quantity of matter. Thus necessarily results what I have called the pyramid of nature, upon which organic forces work *upwards* and physical and chemical forces *downwards*.

13th. As the matter of organisms is not created by them, but is only so much matter withdrawn, borrowed as it were, from the common fund of matter, to be restored at death; so also organic forces cannot be *created* by organisms, but must be regarded as so much force abstracted from the common fund of *force*, to be again restored, the whole of it, at death.* If, then, vital force is only transformed physical force, is it not possible, it will be asked, that physical forces may generate organisms *de novo?* Do not the views presented above, support the doctrines of "equivocal generation," and of the original creation of species by physical forces? I answer that the question of the origination of species is left exactly where it was found and where it must always remain, viz., utterly beyond the limits of human science. But although we can never hope by the light of science to know *how* organisms originated, still all that we do know of the laws of the organic and inorganic world seem to negative the idea that physical or chemical forces acting upon inorganic matter can produce them. Vital force is transformed physical force, true, but the necessary *medium* of this transformation is an organized fabric; the necessary condition of the existence of vital force is therefore the previous existence of an organism. As the existence of physical forces cannot even be conceived without the previous existence of matter as its necessary *substratum*, so the existence of vital force is inconceivable without the previous existence of an organized structure as its necessary substratum. In the words of Dr. Carpenter, "It is the speciality of the material substratum, thus furnishing the medium or instrument of the metamorphosis which establishes and must ever maintain a well marked boundary line between physical and vital forces. Starting with the abstract notion of force as emanating at once from the Divine will, we might say that this force, operating through inorganic matter, manifests itself as electricity, magnetism, light, heat, chemical affinity and mechanical motion; but that when directed through organized structures, it effects the operations of growth, development and chemico-vital transformations."

The Adulteration of Tea.—Dr. Hassall has detected large quantities of the fæces of the silk worm in an inferior quality of tea.

*Carpenter, Phil. Trans. 1850, p. 755.

Blood-Letting in Disease. Dr. Markham.

The author, apologizing for the wideness of the subject, drew a complete distinction between the effects of local detraction of blood from an inflamed part, and the effects of venesection upon it. Local abstraction of blood, as by leeches applied to an inflamed joint, generally reduces the chief characteristics of the inflammation—the pain, the heat, the redness and swelling. But venesection has no such influence over those inflamed parts, nor any influence at all, except such as is always manifested when large quantities of blood are taken. Now, if these facts be true of external inflammation, he urges they must, by strict analogy, be true of internal inflammations, and, therefore, local abstraction of blood is useful in all those cases of internal inflammation in which there is a distinct vascular connexion between the skin and the inflamed part beneath it, as, for instance, in pleuritis and peritonitis. He contends, however, from what we see of its action in external inflammation, that it has no beneficial influence over internal inflammations. How comes it, then, that the wisest of our profession have in all ages deemed the remedy so useful in all such internal inflammations? Are we to believe they have all been mistaken? The author answers this in a decided negative, and thus solves the difficulty. He calls attention to the fact, that the chief (and only) battle-field in which the blood-letting controversy has ever been fought, is pneumonia. This, then, is the disease in which the benefits of bleeding must have been most beneficially exemplified, and the practice may have been right, though the theory may have been wrong. Men thought that bleeding had a directly beneficial influence over the progress of the local inflammation in the lung; but it was not so; it simply relieved the pulmonary and the cardiac congestion, which necessarily arises, in a greater or less degre, as a complication of pneumonia. This is the only relief it gives; it frees the partially arrested pulmonary and cardiac circulation, and gives intense relief. Its benefits, therefore, are great and immediate, and its dangers all lie in the future. The greater the extent of the inflammation, the greater the asphyxiating congestion, and the more urgent the necessity for venesection; but, unfortunately, the greater also is the danger of the practice. Recollect, the lungs are the chief blood-making organs of the body, and this all-important function is arrested in proportion to the extent of the

inflammation. The loss of blood is, therefore, under such circumstances, an irreparable loss. He ridicules the fear which many have of large losses of blood, and asserts that the body will lose such with impunity, provided the lungs remain unaffected by disease—i. e., so long as the lungs can make fresh blood from the food to supply the wear and tear of the tissues. As a striking proof of this fact, he instanced the large hæmorrhage borne by women in childbed—by fever patients with abdominal symptoms. As a corrollary of his views of the indirect uses of venesection, it follows that it is an excellent remedy in all those diseases, whatever their nature, which occasion a congestive condition of heart and lungs, as in pneumonia; and he instanced diseases of the heart, peritonitis, and injuries of the head, as cases in which this condition of the pulmonary circulation obtains, and which require venesection. The author concluded by stating, that if his views of the effects of venesection are accepted—viz., that it has no beneficial influence over the inflammation *per se*, but only in those cases in which pulmonary and cardiac congestion arises, it must generally follow that a very different signification from that generally adopted, must be attached to the remedy. It also follows, he thinks, that the remedy is now-a-days much less frequently resorted to than sane therapeutics require. The change of type-of-disease theory in no way affects the position he here assumes as to the uses of bleeding. Whether that theory be true or false, the action of bleeding in disease, be it good or be it bad, must be physiologically the same. That theory can only affect the necessity or otherwise of our resorting to the remedy in given cases; it cannot alter its mode of action. He therefore thinks the discussion unnecessary.—*London Lancet.*

On the Physiology of Digestion.

Professor Busch, of Bonn, has had the opportunity of making experiments on digestion upon a woman who had been tossed by a bull, and presented, in consequence of the accident, a fistulous opening communication with the small intestines. The fistula was so complete that the bowel was divided in two perfectly distinct halves. The upper portion consisted of the stomach, the duodenum, and of a probably minute piece of small intestine; the lower portion was composed of the remaining part of the small intestine,

the colon and rectum. Through the upper half, the food introduced into the stomach, as well as the digestive fluids of the latter organ, the liver and the pancreas, escaped, no part of them finding their way into the lower half. This state of things was therefore favorable to the study of the action of the stomach, of the biliary and pancreatic secretions, and also of intestinal secretions independently of the liquids just named.

One of the first effects of the pathological state of this woman was a considerable loss of flesh, as observed when she came into the hospital six weeks after the accident. Her appetite was, however, insatiable, though she was as weak as those animals in whom artificial fistulæ are made. She was also very drowsy and cold; but this low temperature was merely objective, for a thermometer introduced into the intestine marked a normal heat. All these symptoms disappeared when the patient recovered a little strength, in consequence of a generous diet.

She used to swallow an enormous quantity of food without feeling satisfied; but by thus eating largely she felt better, though still hungry. When the stomach was empty she felt ill! The woman was so thin that the coils of intestines could be seen through the parietes of the abdomen; and it was observed that their peristalic movements were as energetic as those of that portion of the intestine situated above the fistula and open to view.

As the intestinal secretion of juice was perfectly pure and unmixed with any chyme, which latter all escaped by the fistula, a good opportunity was offered for studying the nature of that juice. Professor Busch found the quantity always small, and tried its effects upon protein compounds, starch and cane-sugar, these being the first experiments of the kind ever made. The patient was at the same time fed by the introduction into the lower part of the intestine, through the fistula, of beef tea, beer, soups with flour, meat, hard-boiled eggs, &c. Soon after these injections were resorted to, she had numerous stools, a circumstance which had not been observed since the accident. The The evacuations had a well-marked smell of putrefaction, without any undigested portions of meat or hard-boiled eggs being noticed in them; this being a clear proof that the intestinal juice acted as a solvent upon the food passing through the canal.

M. Busch used to wrap the various substances introduced in a piece of muslin, after having carefully weighed them.

in order to observe the action of the intestinal juice. He noticed that it was principally upon starch that this juice exerted an energetic solvent power.

An interesting point was to find out what would become of fatty matter without the assistance of bile or pancreatic juice. According to expectation, fatty substances passed without being absorbed, or at least but a very small quantity of them disappeared.

M. Busch also examined the state of the substances which escaped by the upper portion—namely, those which had been subjected to the action of saliva, the gastric juice, bile and the pancreatic juice. A very extraordinary fact observed, was the rapidity with which the alimentary substances escaped. In from fifteen to thirty minutes after the ingestion of the food by the mouth, it was observed to escape by the fistula; hard-boiled eggs appeared in from twenty to twenty-six and thirty-five minutes; cabbage took from fifteen to nineteen minutes; meat from twenty to thirty minutes; potatoes fifteen minutes. When the meal was plentiful, complete digestion required from three to four minutes. (?)

The substances which escaped by the upper end of the divided canal, seemed at first sight to have undergone but little change; they were, however, considerably softened, and the meat presented both longitudinal and transverse cracks or slits. M. Busch thinks that the fluid in which these substances were suspended contained no longer any saliva.

We add a few of the propositions which the author considers as proved by the experiments above enumerated:

1. The peristaltic movements of the intestines are as vigorous when the bowels are covered by skin as when they are exposed to the air; they withstand the pressure of a column of water two feet high.

2. The intestinal tube has periods of rest and motion.

3. The intestinal juice is secreted in small quantity; its reaction is always alkaline; and it contains, on an average, 5-47 per cent. of solid matter.

4. It decomposes starch and protein compounds.

5. It changes starch into grape-sugar.

6. It decomposes protein compounds with the phenomena of putrefaction.

7. It does not change cane-sugar into grape sugar.

8. Cane-sugar, when wholly absorbed, does not re-appear in the urine.

9. Fat which has not been brought in contact with the bile or pancreatic juice, is either not absorbed, or, if so, in in very small quantities.

10. The first portions of the food introduced into the stomach reach the first third of the small intestine, on an average, in from fifteen to thirty minutes.

11. Cane Sugar held in solution disappears almost entirely at the beginning of the intestinal canal; any such cane sugar which reaches the small intestine is changed into grape-sugar.

12. Unboiled white-of-egg is absorbed in the stomach or the first part of the intestine; the portion which goes beyond has not undergone any change.

13. Gum is not changed into sugar; it passes into the intestine without alteration.

14. Gelatine becomes dissolved, and loses the faculty of coagulation.

15. Traces of casein in solution are found in the intestine after the ingestion of milk.

16. Fat forms an emulsion with the fluids which find their way into the small intestine, when these fluids have an alkaline reaction; the emulsion is incomplete when they are acid.

17. The mixture of juices in the small intestine has a digestive action on protein compounds.

18. The minimum of the digestive juices, which reach the upper part of the small intestine in twenty-four hours, weighs more than one-seventeenth of the whole body.—*Archiv. fur Path. Heilk. & Gaz. Med de Paris.*

Two Cases of Tracheotomy for the Removal of a Foreign Body from the Trachea.

Case I. August 11, 1858, I was called to visit a child of Mr. Inman, about two years old, who had, it was supposed, on the day before got a watermelon-seed into the air-passages. On the following day I visited the patient, who lived at a distance of about twenty-five miles. I found, on arriving, that she was about her play as usual. When quiet, there was very little disturbance. A little exercise at play, however, produced shortness of breath and wheezing respiration, which could be distinctly heard at some distance. There was no difference in the respiratory murmur on the two sides of the chest. There had been but little

cough. The mother informed me that, while playing with some watermelon seeds, she was suddenly seized with great dyspnœa and coughing, which lasted for half an hour, and that during the paroxysm the face was livid. As it was late in the evening when I arrived, no interference was proposed until the following morning. The child slept well through the night. I advised tracheotomy, which after some hesitation on the part of the parents, was assented to. Having thoroughly etherized the patient, I opened the trachea in the usual manner. A watermelon-seed was immediately coughed out with considerable force. The wound healed rapidly, scarcely abridging the amusements or convenience of the patient.—*Dr. A. Newman, of Lawrence, Kansas.*

Case II. On Saturday, the seventh of January last, happening to be in the neighborhood, I was called in to see a child of Nathan Hackett, a boy about three years of age, who, I was told, was suffering from a foreign body in the trachea, or in one of the bronchi. I found him sitting in his mother's arms, emaciated, and in a very feeble condition, not being able to walk a step, or even stand. The circumstances, as related to me, were as follows:—

At about the middle of last October, while amusing himself with his sister about the house, he got at some "burnt coffee" which had been set away to cool, and, crying with his mouth full, accidentally drew into the air passages one of the grains—as was supposed at the time—which threw him into violent paroxysms of coughing and choking, accompanied by the usual phenomena attending the presence of a foreign body in the larynx and trachea. After a short time, however, he got easier, and in a few days was about his play as usual, though still suffering more or less from cough, and a peculiar wheezing when at play. Nearly two months thus passed away, during which time there was considerable failing of the general health. About the month of December, he became worse, and the family physician was called, who pronounced his disease pneumonia. This lasted about two weeks, and was said to have been very severe.

On the seventh of January, as before stated, the case first came under my observation, when I made a careful examination of the chest by auscultation and percussion. The lungs appeared healthy excepting the lower two-thirds of the right, on its anterior aspect, where there was almost entire absence of the respiratory murmur, without dulness

on percussion, save over a small space, just beneath the fourth rib. At this point a blowing sound could be distinctly heard, which proceeded, I had no doubt, from some obstruction in the right bronchus or some of its subdivisions. After expressing my convictions touching the case, I took my leave.

The next day (Sunday) at about two o'clock, P. M., I was summoned in haste, and found Dr. Barker, the family physician, in attendance—the case having assumed a much more serious and alarming aspect. The child was thrown into the most violent paryoxysms of coughing, of a peculiar ringing and croupy nature, together with most distressing efforts to breathe; in short, it seemed that life could be maintained but a little while longer. These alarming symptoms, however, lasted but a short time, when suddenly respiration became easier, and the patient gradually sank into a quiet slumber. It was now dark, and I left, promising to return the next morning.

Monday, January 9th.—Returned in company with Dr. Albert Newman, of this city; found Dr. B. present, and the patient much worse than when I left him—he having had two or three severe paryoxysms during the night; cough frequent and croupy; respiration labored and difficult; voice hoarse; pulse frequent and feeble; lips livid and skin cool; in short, all the symptoms indicative of a speedy unfavorable termination. Tracheotomy was urged as affording the only chance of recovery, and was performed at about 12 o'clock, Drs. Newman and Barker assisting. We attempted to produce anæsthesia with a mixture of one part of chloroform to three of sulphuric ether, but owing to the dyspnœa, this, not acting favorably, was abandoned. Upon opening the trachea, a violent paroxysm of coughing ejected first a teaspoonful or more of muco-purulent matter, followed by a whole "*coffee-grain*" of ordinary size, apparently in as good state of preservation as when taken in.

This was followed with a very little relief, so extensive and serious was the disease of the larynx and trachea left behind.

Tuesday, 5 o'clock, A. M.—Dyspnœa and lividity increased; all the symptoms of croup, in its last stages, present. I now hastily constructed two hooks by bending two pieces of common iron wire into suitable shape, which I applied to the wound, and bending them round on each side, secured them on the back of the neck, and in this manner very effectually and safely established respiration

through this new channel, it being now almost entirely cut off by the larynx. The breathing immediately became free and easy, and all the symptoms rapidly improved.

12 o'clock—Patient doing well; in a gentle and quiet sleep, breathing easily and freely, 40 times per minute. Blood now perfectly aerated; pulse 132. An attendant is constantly sitting by, with a small piece of sponge to keep the opening in the trachea clear of mucus which is ejected in the act of coughing. One grain of calomel was ordered to be taken every four hours, and beef tea from time to time.

Wednesday, 11th.—Had a comfortable night; slept at one time four hours; has paroxysms of coughing every two or three hours. The mucus coughed during some of the paroxysms has been a little bloody. The treatment of yesterday to be continued.

12th.—Pulse this morning 100, regular and full; respiration 40, and easy as through the natural channel. At about 8 o'clock, patient became quite restless and uneasy, indicating the cause as well as well as he could (not being able to speak) to be pain in the bowels, which were hard and tympanitic. Hot fomentations were applied to the bowels, and stimulating anodynes taken by the mouth; but, notwithstanding our best endeavors, there was more or less suffering for some two hours, when, after several alvine discharges, it passed away and gave us no further trouble. This afternoon, considerable irritation and much more swelling than usual about the wound in the trachea, which caused some narrowing, and consequently more or less difficulty of breathing; but by changing the position of the hooks, and carefully removing some lumps of dried mucus adhering to the bottom and sides of the opening, the respiration was relieved, and the irritation and swelling soon began to subside. The pulse at this time rose to 120. Calomel to be omitted.

13th.—Patient comfortable; wound looks better, but no air yet passes by the glottis; any attempt to close the artificial opening causes intense suffering. Pulse 96 to 104.

Removed hooks from trachea, which remains open without them. Patient breathes a little through the nostrils, and, on closing the wound, is able to articulate a word or two, for the first time since Tuesday.

15th.—Doing finely; calling often for food. Takes beef tea and broth with crackers, also a little milk. Respiration nearly re-established; voice yet hoarse, and cough rather tight and ringing.

17th.—Closed wound with adhesive strips, when respiration was easily performed through the glottis.

20th.—Wound nearly healed; appetite good, and patient gaining strength rapidly; some irritation and cough remain. Dismissed the case, but have heard from patient from time to time up to the present date, (March 9th,) when he is in perfect health.

It should be borne in mind that this case was treated under the most unfavorable circumstances. On the night after the operation, the weather turned suddenly cold and windy. Our patient was in a "*log cabin*" with but one room, in the heart of Kansas Territory, which, though as comfortable as Kansas farm-houses generally, would hardly compare with the poorest of New England tenements. The cold wind whistled through its many crevices, and with the hottest fire that could be kept, one could not possibly keep both sides warm at the same time. Hence, anything like a uniform temperature was out of the question. No tracheal tube could be obtained, but the apparatus used, though not as elegant, was, I think, quite as convenient and efficient; and were I to treat another case of the same kind, I believe I should use the hooks instead of the canula, though each were alike at hand.—*L. C. Tolles, of Lawrence, Kansas.*

Lawrence, March 14th, 1860.

Pathological Society of London. Clot of Blood in the Pons Varolii. Mr. Fergusson in the Chair.

The following history was given:—On the night of Oct. 21, Mr. W. left his mother, aged 66, in her usual health, alone, cleaning her house. On his return in an hour he found her lying on the floor insensible, with a large quantity of green bilious matter beside her, which she had vomited. She vomited also after his return. She was carried to bed. She did not move during the night. She had had more than one severe bilious attack, of which this was supposed to be a repetition. The following morning Mr. Nunneley saw her. She was lying in an easy position, with the countenance calm and natural, as though in a very deep sleep, breathing regularly, quietly and naturally. The pupils were both equally and completely contracted. They were also insensible to light, and continued so during the whole time she lived. It was impossible to rouse her.

Both sides of the body were equally powerless. Only on taking a small portion of skin between the nails and using much force, did she give any signs of perception. In a basin beside the bed was a quantity of green bilious matter which she had thrown up the previous night. The head was rather warm, other parts of the body natural. She lived sixty-six hours after the seizure, without any alteration in the symptoms, except that the entire surface of the body became hot. On examination of the head forty-eight hours after death, the scalp was found dry and bloodless. The veins of the dura mater full. The blood-vessels of the pia mater were congested. The cerebrum and cerebellum were firm and healthy, except dark from congestion. In the centre of the pons varolii, perhaps rather more to the left than the right side, but not showing itself upon either of the surfaces, was a clot of blood, filling a broken-down space of the size of half a walnut.—*Medical Times.*

Pathology and Therapeutics of Typhus Fever.

The No. of the Glasgow Medical Journal for January, 1860, contains an interesting paper on this subject by Dr. Jos. Bell, one of the physicians to the Glasgow Infirmary. The following are his concluding propositions:

1. That in numerous cases of typhus, about the fifth, sixth or seventh day of the attack, the impulse and systolic sound of the heart becomes feeble and ultimately imperceptible.

2. That these symptoms indicate a morbid alteration in the structure of the muscular tissue of the heart, especially in the walls of the left ventricle.

3. That this alteration resembles the usual changes which result from congestion and inflammation of the muscular structure.

4. That the nature of this pathological change requires further examination and research, because the evidences on which the doctrine of its non-inflammatory origin rest, are not conclusive; the circumstances on which Louis and Stokes have placed reliance, not being uniformly present.

5. That the beneficial influence of stimulants does not prove the non-inflammatory nature of the morbid change, because in asthenic inflammatian a stimulating treatment is always necessary.

6. That whether or not the pathological alteration be

owing to inflammation, the softening must be regarded as one of the secondary effects of typhus.

7. That the proper treatment is to maintain the action of the heart by stimulants.

8. That in cases of cerebral and pulmonary disturbance arising in connection with the symptoms of cardiac softening, a stimulating plan of treatment is indicated.

9. That the presence or absence of the physical symptoms diagnostic of softened heart, may be relied on as affording trustworthy evidence, by which the sthenic or asthenic nature of these cerebral and pulmonary affections can be determined.

From these propositions, it follows as a *corollary*, that it is the duty of the physician to devote the strictest attention to the action of the heart, especially as regards its impulse and sounds, throughout the course of every case of typhus.—*Am. Jour. Med. Sci.*

On the Importance of the Functions of the Skin, in the Pathology and Treatment of Tubercular Consumption. By A. Toulmin, Esq., (St. Leonard's.)

The author commenced by offering as the proximate cause of tubercle in all cases, the breathing of impure air, and air in so small a quantity as to render it impure, especially during the night. Wherever this was the continuous state of existence, the result must be a deficiency of oxygen in the red corpuscles of the blood, and as the consequence of this, the deposition of plastic fibrine in an incomplete state of oxygenation, and therefore of organization, and thus incapable of being ultimately got rid of by change of matter. It consequently remained as an extraneous adventitious substance in the system offering to the observer all the characteristics of tubercle.

To explain the discrepancy which appears in the rich (who have no want of oxygen in the air they breathe,) being equally subject to phthisis with the poor, he drew attention to the importance of the respiratory functions of the skin, as proved by the almost instant death that occurs on closing the cutaneous pores by artificial means, as by varnishing and gilding the skin of rabbits and other animals; and he observed that, in consequence of the coldness of our climate and other causes, the better classes of society were certainly not in the habit of making the washing the whole surface

of the body a part of their daily toilet; and consequently that the exuviæ momentarily forming on the surface of the skin—the joint production of the sordes from within, combined with the *debris* of the cuticle—soon became more or less impervious, although the individual might be in the habit of changing his linen daily.

As an illustration of this state of skin, the author referred to acne so frequently seen on the face, as being in reality the general state of the skin of a large proportion of society especially in the earlier periods of life, when phthisis generally shows itself. The free entrance of air, as well as the exit of carbonid acid through the skin, being thus impeded, the same imperfect oxygenation of the blood ensued, as was produced in the poorer classes, by breathing mephitic air. For the removal of this state of the skin, the only means of cure were to be found in the instituting a full and free diaphoresis by the aid of artificial heat; the result of which in first softening and then expelling large quantities of inspissated sebaceous matter, after the surface of the body had been washed clean with soap and water, was most surprising.

The use of hot air bath, as a therapeutic agent, was no innovation on the established practice of the profession, as it was the mode of bathing practiced by Hippocrates. Galen and Celsus; and the universality of the practice was shown by the fact that the remains of such baths had been found in every colony of the Roman empire.

If tubercle be imperfectly organized fibrine, then it should be looked upon as a blood disease; and, seeing it is found in other parts besides the lungs, without destroying life, its deposition in them should not be considered as disease either of the lungs or air-tubes, but as an accidental circumstance, killing mechanically, by its ulceration extending to the surrounding lung tissue. The author called in question the propriety of sending consumptive patients abroad to a warm climate during any stage of the disease; as although in the later stages of the complaint, when the air tubes sympathized with the tubercular irritation, a warm atmosphere seemed more congenial to the patient's feelings; still in the earlier stages, when a cure was practicable, the breathing the open air of our winter, (at least on the south side of the island,) was most important. He instanced, as proof that the breathing cold air did not cause the complaint, the fact that tubercular consumption is not to be met with in high northern latitudes.

The treatment of phthisis was considered under its hygienic and medical aspects. Under the former, and particularly in the earlier stages, the patient was recommended to live in a high, dry and marine atmosphere, on the Downs, rather than under them; to be as much as possible in the open air; to use all sorts of athletic exercises, (avoiding such as accelerate the pulmonic circulation) suitable to the strength and sex of the patients, by which a more rapid change of matter is effected, together with absorption of already deposited tubercle; as well as the deposition of more healthy—*i. e.*, of more highly organized matter. Medically, the treatment was comprised in a few short aphorisms, which were: 1. The keeping the functions of the skin in healthy action by means of the hot air bath. 2. The annointing the whole surface of the skin daily with some oleaginous matter. 3. The keeping a local ulceration always patent by means of an issue or seton; and 4. The use of some one or more of a large variety of tonic and antiseptic medicines; all admirable adjuvants in improving the general health, (if selected in conformity with the function most sympathising with and reacting on the disease,) but powerless in arresting the specific lesion in question, without the previous "Open Sesame," of the hot air bath, followed by aspersion of cold or tepid water.—*Brit. Med. Journal.*

Chlorodyne—History.

Chlorodyne was invented in the year 1848, by Dr. Browne, while officiating in his medical capacity during the prevalence of cholera and diarrhœa among the English troops in India, and was introduced to the notice of the faculty in England by him as "a combination of perchloric acid with a new alkaloid."

Preparation.—From Dr. Ogden's analysis, it appears to be composed as follows: "Chloroform, six drams; tincture of capsicum, half a dram; oil of peppermint, three drops; muriate of morphia, eight grains; perchloric acid, twenty drops; Sheele's hydrocianic acid, twelve drops; tincture of Indian hemp, one dram; treacle, one dram. Dissolve the morphia in the perchloric acid; then add the tincture of hemp, capsicum, peppermint and chloroform, and lastly, the treacle and prussic acid."

Properties.—Chlorodyne is a volatile liquid, possessing a pungent smell and taste. It is soluble in alcohol, but insoluble in water; but may be conveniently administered in that liquid by suspending it in a little mucilage. The alkalies and alkaline salts decompose it. In color it is dark brown; and in weight, it is equal to twice its bulk of water. It is anodyne, sedative, diaphoretic, astringent, antispasmodic, diuretic, etc. Unlike the preparations of opium it does not produce headache, giddiness, prostration of strength, nor stupor; but in large doses, and for a consti pated state of the bowels, it is liable to produce nausea, which, in the former case, may be relieved by a small dose of sal volatile, and in the latter by recourse to aperients.

Therapeutic Effects.—The changes produced by this preparation on the system, are—1st, a gentle heat at the stomach, followed by a general glow and total absence of pain; 2d, a calm and refreshing sleep; and 3d, an increase in the pulse from a small, weak, thready, hurried or bounding one to a full, yielding, elastic, natural sort of one, decreasing in frequency of beats as well as resistance, to a healthy condition." Of its powers in the cure of consumption, Dr. Stonehouse remarks: "The cases (among others) in which I have employed it, have been twelve cases of phthisis; eight of these patients had been examined by other medical men, and had been regarded as genuine cases of consumption, so that the nature of the disease does not rest upon my testimony alone. They were all well-marked cases; for I do not mention several others in an incipient stage. Two of the cases were in the last stage—*i. e.*, cavities had formed in the lungs; two others were bordering upon this stage. The remaining eight were in the second stage, that of softening; in five of these hæmoptysis was a prominent symptom. All these cases have done or are doing exceedingly well. Five of them have quite recovered; the others, with one exception, are in a fair way towards recovery."

Doses.—The dose of this preparation must be regulated according to the nature of the complaint. As an anodyne for febrile, inflammatory or neuralgic affections, the dose is from ten to thirty drops; diaphoretic in cases of coughs, cold, etc., ten to twenty drops; sedative in consumption, etc., twenty to fifty drops; antispasmodic in gout, rheumatism, etc., twenty to forty drops; astringent in cholera, diarrhœa, etc., fifty to one hundred drops. It is best administered on lump sugar, and given at intervals from every half hour to every four hours.—*Chemist and Druggist.*

EDITORIAL AND MISCELLANEOUS.

CAFFEINE IN OPIUM-COMA. *The Second Case of the Injection of Caffeine, by the Rectum, in Extreme Narcotism of Opium.* By HENRY F. CAMPBELL.

In the May number of the *Southern Medical and Surgical Journal*, of the present year, we reported the particulars of a case of Opium-Coma, of a very grave character, in which *twenty grains of Caffeine*, injected into the rectum, produced the most surprising and satisfactory results. At the close of that former paper, we expressed the wish that some member of the Profession would repeat the treatment applied by us in that case, and either confirm or disprove our confidence in the remedy. The various medical journals of the country have commented upon the paper, and have generally approved the rationality of the measure, but, as yet, we have not been gratified by observing the report of any second trial of Caffeine under the circumstances, or any additional evidence in support of our favorable conviction in regard to the antidote. A case which occurred to us on the 10th of July instant, affords us the privilege of being able to report the second case of the application of Caffeine for Opium-Coma. Although the following case was not attended by the same happy results as that reported in our May number, we think that the details of the phenomena, so far from weakening our confidence in the remedy, will go far to confirm it.

July 10th, 1860, 3½ o'clock, P. M., called in haste to the U. S. Hotel, in this city, to visit a gentleman, said to have been found in a dying condition in one of the rooms. The patient was Mr. Moses Pike, a Jew, aged about 28 years, of good constitution apparently, and well developed corporeally. On entering the room, we found him in the following condition: He was entirely unconscious; face of a dark purple hue; hands and feet also purple from congestion; nails on fingers and toes of an indigo color. There were also patches of venous congestion, presenting a darkened hue all over the surface. His respiration was fearfully slow when counted, *not quite four to the minute.* The attendants were slapping and shaking him each time between the inspirations, to excite him to breathe. His respiration seemed greatly obstructed by the accumulation of mucus. Pulse very feeble, and about 100 per minute. The muscular system

was completely relaxed, so that his head would fall about by its own weight, and his arms and legs obeyed only the influence of gravity.

Immediately on our arrival, a paper was found, on which the unfortunate man had recorded the fact that he had taken laudanum at 12 o'clock the night previous, with the intention of self-destruction. Two empty vials, labelled laudanum, one of 2 ounce capacity, the other of 1 ounce, was found on the table. One of these vials had the neck knocked off, apparently with the view of opening it hastily—and some of the laudanum had escaped so as to leave a stain upon the label. It is probable, therefore, that the entire three ounces had not been taken. Once or twice during the morning, the servant stated, that he had approached and tried the door, with the view of entering, but had desisted when he heard the occupant snoring deeply, as he did not wish to disturb him. Some what after 3 o'clock, P. M., the servant became alarmed and looked into the room through the transom-light from a chair, and observing his condition, called for assistance.

From the above circumstances, as well as from the written statement of the patient, it was highly probable that near 3 ounces of laudanum had been in his system nearly fifteen hours—that so large an amount had not produced death in so long a time, is truly unaccountable.

The condition of the patient, the necessity of constantly provoking respiration, and also the little probability that any laudanum yet remained in the stomach, caused us to abandon the idea of using the stomach-pump. Emetics of course were out of the question, and we at once resorted to the application of ice to the scalp, and pouring ice-water, from a distance, upon the head, while we sent for a drachm of Caffeine, and a small syringe. As soon as these arrived, we poured out in the palm of the hand what we supposed to be about twenty grains of Caffeine, dissolved it in two ounces of cold water, and introduced it into the rectum by means of the syringe. The syringe being small, three applications were made at short intervals. The whole of the alkaloid was not dissolved. By an estimate made subsequently, calculating what had been lost, the patient had taken near *twenty-five grains of Caffeine* in the three applications.

The Caffeine was administered at twenty minutes before four o'clock, at which time, as we have said, the respiration of the patient was *scarcely four to the minute*, and constant efforts were necessary, in the way of slapping and shaking to provoke him to inspire. At fifteen minutes after four, (35 minutes after the injection) his respiration was found to be effected with less effort and more regularly—and, on count-

ing it by the watch, it numbered eight to the minute. The skin, even now, began to present less of the cerulean tint. In one hour after, the respiration had risen to twelve, and shortly rose to sixteen to the minute, when the skin was nearly of the natural hue, though the nails on both hands and feet remained still of a purplish cast.

Slight spasmodic movements in the fingers were now observed, and also some occasional subsultus in the muscles of the forearm—the under lip, which before was hanging, now became elevated and slightly compressed against the teeth. When the hand of the patient was held, and an attempt made to extend the arm at the elbow, decided muscular resistance was observed. The lid of the left eye was also observed to be raised and let down rapidly once or twice.

The pulse had now become full and somewhat resisting, and the action of the heart, as observed at the chest, tumultuous. On being raised, the patient, once, made a noise slightly resembling a groan, but, from the beginning to the end, he did not once manifest the least consciousness.

For a short time after the improvement in the respiration began, the mucous rale seemed somewhat to diminish, and his breathing, were it not for a certain jerking, resembled very nearly a man in deep, healthy sleep. The rale now, however, ($\frac{1}{2}$ past 7 o'clock) became more and more obstructive, the gurgling reaching up into the throat and threatening momentarily to strangle the patient. It was now plain that he could not survive, and, on turning him upon the right side, a bloody mucus bubbled out of the nostrils. The number of the respirations was at this time twenty to the minute, when counted by the watch. The entire surface of the body was intensely hot and remained so to the time of the patient's death, which took place at 15 minutes before nine o'clock, P. M. He seemed to die from the accumulation of the bloody mucus, in the bronchial tubes and larynx. During the whole time, from the first moment of our seeing him till the time of his death, the application of ice was made constantly to the head of the patient, and also mustard plasters were applied to the spine and to the extremities.

A superficial glance at the foregoing case might perhaps impress the reader with the conviction that the confidence which we expressed, in our former report, in Caffeine as an antidote in Opium-Coma, was somewhat hasty and misplaced. A more deliberate consideration, however, will remove such an impression. When we reflect on the amount of the opium taken, the length of time during which the patient had been left to its toxic influence, and the destructive ravages which had been made during that time, we certainly, on the other hand, must feel great sur-

prise at the amount of modification the Caffeine was seen to produce under such disadvantageous circumstances. The respiration, in a space of time, less than one hour, was raised from four to sixteen in the minute. The color of the skin, under its influence, was changed from an almost indigo hue, to that of the natural complexion, and the muscular relaxation was replaced by a fair degree of tonicity accompanied by occasional twitchings. The mode of death, too, was not such as is seen in the demise from the unmodified effects of opium, when the respiration becomes gradually slower and slower till it ceases altogether, but at the time of our patient's death, his respiration numbered twenty per minute, and he died apparently *drowned* by the accumulation of the viscid mucus in the air-passages, doubtless the result of the long-enduring pulmonary congestion occurring previous to the administration of the Caffeine.

In conclusion, we feel confident in saying that we feel greatly encouraged by the developments of this second case, and shall use the remedy hereafter, with even more confidence than before. We again express the hope that some of our professional brethren will add their published testimony to ours so as to establish the true amount of value that should be attached to Caffeine as an antidote in Opium-Coma.

We intend shortly reporting the results of experiments, with the two drugs, Opium and Caffeine, as made by us, on the lower animals.*

Proceedings of the American Medican Association.

Not being among the privileged number who attended the meeting at New Haven, we transfer from our valued exchange, the *Maryland and Virginia Medical Journal* the following Proceedings. The space occupied by them excludes our Editorial, and much interesting matter. We must also defer our comments upon certain important measures adopted by the Association. This last meeting must certainly have been one of the most interesting since the foundation of the Society :

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*In the above case, at no time, did we find it necessary to resort to artificial respiration. The patient could always be incited to inspire naturally by shaking or pushing against his shoulder. The mode of artificial respiration described in our own report of the former case, has been supposed by some (our friend, Dr. E. Bland, of Edgefield) to be identical with that described by Dr. Sylvester, and reported in Braithwaite's Retrospect for 1859. We had not then seen Dr. Sylvester's method; we now admit that the mode of procedure is nearly similar in both, but his involved the horizontal position, while ours presented the advantage of being applicable in the sitting posture, where the weight of the patients body was made subservient in effecting the vacuum to cause the ingress of air into the lungs. As we have heretofore promised, we will hereafter give a full description of both methods, when the reader will be able to recognize the peculiarities of each.

Thirteenth Annual Meeting of the American Medical Association.

FIRST DAY.

The Convention met in the College Chapel, and at 11 o'clock was called to order—President Dr. Henry Miller, of Kentucky, in the Chair.

Prof. Fisher, of Yale College, opened the Convention with prayer.

Dr. Chas. Hooker moved the Committee on Reception report. Dr. Knight, as chairman of the committee, made a most felicitous salutatory to the Convention, and was received with considerable applause. He spoke ably, and showed the lofty character of such a Convention. His remarks on the advance in remedial agents, and the progress of medicine, and especially of the art of surgery, were received with marked attention. He reviewed with his remarkable liveliness and interesting manner the more wonderful improvements, such as the ligature of the greater arteries, the introduction of anæsthetic agents in the greater operations, thus relieving that stinging pain and great anguish to which patients were formerly subjected. He closed by welcoming the profession here, describing most graphically our city attraction by way of literary institutions, &c., and welcoming them all to our open homes and hearts.

Dr. Chas. Hooker then followed in a welcoming address, and was frequently applauded. He spoke as follows:

Mr President and Gentlemen of the American Medical Association:—It is with unwonted gratification that the Committee of Arrangements welcome you to the city of New Haven. And we only bespeak the common feeling of our fellow-citizens in saying that we are delighted—nay proud—to receive you as our guests. We feel that any city is highly honored to become the chosen place of meeting of the American Medical Association—a select delegated national Congress, representative of forty thousand members of a learned and humane profession. As a city, we appreciate this honor, and should be ungrateful did we not receive you with a generous and cordial welcome. You meet, gentlemen, for a great and noble object—for the promotion of a science vitally linked with the interests of humanity. Your meetings have a most happy influence in strengthening those ties by which the great fraternity of medicine are bound in social compact. Another salutary incidental benefit of your meetings, results from their affording an annual period for relaxation and social enjoyment.

Too many physicians prematurely break down in their career of usefulness, in consequence of unremitted and arduous application to their professional duties; and many of you now present, whose exhausted physical and mental energies need recruiting, could hardly have been drawn away from your routine of toil and care had, but for your sense of bounden duty to aid in the great object of this Association. We congratulate you, therefore, brethren, on this annual recurrence of our national medical jubilee. In behalf of the faculty of Yale, we welcome you to the halls of this ancient seat of learning, in which you are invited to hold your sessions; and in behalf of the citizens generally of New Haven, we tender you the hospitalities of our city.

We hope that to all of you this meeting will be a season of pleasant social intercourse long to be remembered for the many friendships here formed; and we trust that the harmony and wisdom of your counsels will efficiently promote the great benevolent objects of our organization."

The President ordered as the next business the calling of the roll. This occupied some half an hour, which the galleries and the Convention to some extent used as a recess.

The whole number of delegates who answered to their names was between 275 and 300. When all are present the whole number of delegates will probably exceed the last figure. Twenty-seven States and the District of Columbia are represented in the Convention. There are also a few from the United States Navy.

Dr. Charles Hooker here gave notice of the five divisions and their respective rooms, as follows:

1st, Anatomy and Physiology, President's Lecture Room.

2d, Surgery, Geological Cabinet.

3d, General Medicine, Geological Cabinet.

4th, Chemistry and Materia Medica, Chemical Laboratory.

5th, Meteorology, Chemical Laboratory.

Dr. James Hadley, of Mass., moved that if any surgeons or physicians from the navy be present, they be invited to take seats on the floor of the Convention; carried.

Dr. John Bronson asked if seats had been reserved for the ladies attending the Convention with their husbands; also, for ladies in general

Dr. Charles Hooker stated that a committee was formed from the State and city medical societies to make themselves useful to the ladies—also that the galleries of the college chapel would be open every morning at 8 o'clock, and the delegates could be present at college prayers who so wished. The President stated that the committee on parliamentary rules were ready to report; ordered.

Report was read.

Dr. Brodie moved, before the resolutions be acted on, they be printed.

Dr. Cox moved an amendment that 500 copies be printed. Amended again by the motion that 1,000 copies be printed.

Here an exciting discussion took place in regard to the necessity of having them printed, merely for acting upon, and after an indiscriminate debate urging the prevalence of pet motions and amendments, a motion to lay the whole affair on the table prevailed by a small majority.

A motion for a recess of ten minutes was then carried, the object being to give each State an opportunity to choose its member of the nominating committee.

At a quarter before one o'clock, the Convention re-assembled, when the nominating committee was declared.

A motion was made and carried, inviting the Legislature to be present at the opening of the Convention in the afternoon to listen to the address of the President, as it would have some reference to medico-legal topics.

AFTERNOON SESSION.

At 3 o'clock the Convention came together, and notwithstanding the unpleasant weather, the galleries were filled, including quite a number of ladies.

Convention called to order.

Gov. Buckingham and Lt. Gov. Catlin appeared on the stage, and were introduced to the Convention amidst applause.

The Secretary, Dr. Bemis, of Kentucky, then gave the names of the Committee on Credentials.

When the House had become still, President Henry Miller was introduced and delivered his Valedictory Address. Quite a number of the members of the Legislature were present. Most of it was a bold exposition of personal opinions regarding the moderate and limited standard of medical education. We could see, as he advanced his views regarding preliminary instruction and the duties of Medical Colleges in raising their standards of requirements, that he had the cordial support of the Convention by the earnest attention and frequent applause attending his suggestions.

The Nominating Committee here reported the names of officers for the Convention, as follows:

President—Eli Ives, Conn.

Vice Presidents—Wilson Jewell, Pa.; A. P. Palmer, Mich.; Joseph P. Logan, Ga.; I. N. McDowell, Mo.

Secretaries—Not reported.

Treasurer—Caspar Wistar, Pa.

The various Committees were then appointed to wait upon the different grades of officers to the stage.

Several invitations to visit prominent public places and factories of the city were read and times set apart for such visits. At 5 o'clock, this (Wednesday) afternoon, the Convention will visit Messrs. G. & D. Cook & Co.'s carriage factory.

Motions were made of acceptance of the invitations, &c.

Motion made to suspend business and receive the officers just elected. They were received with great and prolonged applause.

President Dr. Ives made a very short address, of which the following is nearly a verbatim report:

"All he had, all he was, owed to his profession. He loved it. He had two sons in the profession, also a grandson; and he, like a very distinguished physician of the present century, could say he would visit the sick as long as he could go, and when he was unable, he would be carried to the bedside."

He was followed by first Vice President, Dr. Wilson Jewell, who will preside over the deliberations of the Convention.

Dr. Davis, of Indiana, offered a series of resolutions to the specific business of morning and afternoon sessions, as follows:

Resolved, That the general meetings of the association after this day, shall be restricted to the morning sessions, and the afternoon sessions, commencing at 3 o'clock, shall be devoted to the hearing of papers and discussions in the several sections.

Resolved, That each section shall choose its own officers and make its own rules of order.

There were other resolutions of this same series which are not reported, because not finally acted upon. The third one, relative to the referring of public essays, addresses, &c., to their respective sections, caused a long and exciting debate, in which Drs. Watson, Reese, Miller and Palmer figured conspicuously. After the discussion had run over an hour, without seeming to come to any mutual understanding in the matter, a motion to table this section of the resolution was almost unanimously carried, with the proviso that Dr. Davis should have an opportunity to revise it, and at his own time to bring it again before the Convention.

Dr. Little, of California, was then announced, and, although not a regular delegate, was invited to a seat on the floor of the Convention, there being no delegate from California.

A committee on Voluntary Communications was then appointed, viz: Drs. E. D. Force, of Kentucky; T. W. Blatchford, of New York; N. S. Davis, of Illinois; R. LaRoche, of Pennsylvania; Rochester, of New York.

At his own request, Dr. LaRoche was excused from serving on this committee.

Dr. Ruschenberger, of Pennsylvania, was appointed in his stead.

The report of the Treasurer was then called for, read and adopted, then referred to Committee on Publication.

The Committee on Publication then reported. Report accepted.

Committee on Prize Essays was called on to report, but failed to do so through absence.

Adjourned.

SECOND DAY—WEDNESDAY.

The Convention was called to order by the first Vice-President, Dr. Wilson Jewell, of Penn.

The minutes of the Convention of yesterday were read and approved.

The President announced that the subscription list for the publication of the Sydenham Society was on the Secretary's table.

An opportunity was now given for delegates to name physicians from States not represented, also from the Army and Navy, as members by invitation.

Dr. Gardner moved that the rules of order be suspended for Dr. Logan, of Ga., to tender his resignation as Vice-President. Resignation accepted.

Committee on Education reported—Dr. Reese chairman.

This was far the most lengthy and deep-studied report yet made, being a most able exposition of the necessities of our Medical Colleges. We hope to give this in full hereafter. He ably supported his argument in favor of lengthened terms of study, with a less number of lectures per day—four being the maximum.

Dr. Bodie moved that the report and resolutions connected with it be received and referred to the Committee on Publication. Received.

On motion, the House went into a Committee of the Whole on the resolutions—H. F. Askew, M. D., in the Chair.

Dr. McDowell, of Mo., spoke against the first resolution, and immediately the galleries were densely crowded, and every effort made to get a sight of the witty and wiry Missourian. Almost every sentence drew forth roars of laughter. He was loudly cheered and often interrupted by the repetition of applause.

Dr. Henry Miller, of Ky., replied.

Dr. Palmer, of Mich., continued the discussion.

Motion made that the whole subject be laid on the table.

Motion made and carried that the committee rise, report progress, and sit again.

Committee on Medical Literature called upon.

The Committee on Nominations reported that the Convention will meet at Chicago on the 1st Tuesday in June, 1861. Amendment offered that it be changed to the 1st Tuesday in May.

Dr. Davis, of Illinois, spoke for the Illinois delegation, urging June as the proper month—furthermore, he welcomed the Convention to the hospitalities of the citizens of Chicago.

Motion made to change the time to the 2d Tuesday of June. Unconstitutional.

The whole list of officers was not reported yesterday. The Committee on Nomination here concluded their report, as follows :

In place of third Vice-President, Dr Logan, of Georgia, resigned, Dr R. D. Arnold, of Georgia.

Secretaries—S. G. Hubbard, Conn.; H. A. Johnson, Ill.

Committee of Arrangements—N. S. Davis, G. W. Freer, Dr. Laski Miller, E. Andrews, H. W. Jones, Thomas Bevan, J. Bloodgood, all of Illinois.

Prize Essays—Daniel Brainard, Ill.; D. L. McGugin, Iowa; M. L. Seaton, Mo.; John Evans, Ill., A. S. McArthur, Ill.

Committee on Publication.—S. G Smith, Penn.; Caspar Wistar, Penn.; S.' G. Hubbard, Conn.; R. J. Breckenridge, Ky.; Ed. Hartshorne, Penn.; H. F. Askew, Del.

Dr. Davis, of Ill., called for a suspension of the rules, that he might reintroduce his resolution laid upon the table yesterday. Carried. The resolution having been revised was reported and carried.

Report of Committee on Prize Essays was called for. Prof. Worthington Hooker, of Conn., Chairman. Three essays had been handed in, two of which had considerable merit, and showed much research. The Committee had concluded not to award any prizes this year. Report accepted.

Moved a suspension of the rules to give Dr. Wilbur, of New York, an opportunity to report the protest of Dr. Ignatius Langer, of Iowa, against the action of the Committee of Arrangements in not accepting his credentials as a delegate. The President stated he held in his hand a letter stating that Dr. Langer had been expelled from the Scott County Medical Society of Iowa, and, therefore, the rules of the Society would not permit his acceptance as a delegate here.

Motion to suspend lost, almost unanimously.

Reports of Special Committees were then called for and disposed of in various ways.

One o'clock, the hour of adjournment, having arrived, a motion to continue five minutes longer, prevailed. A little general business was then transacted, and the Convention adjourned.

AFTERNOON SESSION.

The Convention was called to order by the chairman at 3 o'clock.

According to the resolution carried the day previous, the Convention adjourned to the various sections as follows:

Anatomy and Physiology—President Woolsey's Lecture Room.

Chemistry and Materia Medica—Chemical Laboratory.

Practical Medicine and Obstetrics—Geological Cabinet.

Surgery—Geological Cabinet.

Meteorology—Chemical Laboratory.

THIRD DAY.

The Association was called to order at 9 A. M. by the President, Dr. Eli Ives: afterwards, Dr. Jewell, of Philadelphia, presided.

The minutes of the previous day's proceedings were read by the first Secretary, Dr. S. G. Hubbard, of New Haven.

A list of newly registered delegates was read, making the number over five hundred.

On motion of Dr. Arnold, of Georgia, it was resolved that no communication read before the Association should occupy more than ten minutes in its reading, and no speaker should occupy the floor longer than ten minutes.

On motion of Dr. Shattuck, of Massachusetts, the rules of order were suspended, in order to allow Dr. Bowditch, chairman of the committee appointed to take into consideration the propriety of contributing in the erection of a suitable memorial to John Hunter, in Westminister Abbey, to present his report. On motion, it was resolved that the Committee on Nomination be requested to consider the report and resolutions attached to it, and report thereupon, presenting the names of one from each State represented, who shall be empowered to take such action in the matter as may be hereafter agreed upon by the Association.

The Committee of Conference appointed to confer with the Committee of Medical Teachers reported through their chairman that they had had several meetings in New York and New Haven, during which the subject of medical education had been fully discussed.

The Committee offered the following resolutions for adoption:

Resolved, That it is the duty of medical colleges to require of every candidate for the degree of Doctor of Medicine, certificates of study during the full period of three years, under the direction of a regular practitioner of medicine, recognized by the American Medical Association, who shall certify, under his own hand, as to an attendance on two full courses of lectures, with an interval of at least three months between the termination of the first and the commencement of the second course.

Resolved, That every medical college shall keep a volume, in which every medical student presenting himself, shall enter his name, his age, the period of his commencing the study of medicine, any diploma he may have received in evidence of previous education, with the name of the college or school from which he received such diploma; and the name of the preceptor with whom he has been studying.

Resolved, That hospital clinical instruction constitutes a necessary part of medical education, and every candidate should be required to have attended such instruction regularly for a period of not less than four months.

Resolved, That the professors of every medical college should recommend to their trustees, or board of managers, the adoption of a rule authorizing them to allow the attendance of two or three delegates, from the State Medical Society, at all examination of candidates for the degree of the doctorate, and accord to these delegates a vote on the question of recommending such candidates for a degree.

Resolved, That every State Society be recommended to choose proper delegates at its annual meeting, to attend the examination of candidates for the degree of M. D., at all the medical colleges within their respective States.

Resolved, That this Association will not recognize as a regular organization, any college which does not require evidence of suitable preliminary education from all applicants for collegiate medical instruction.

Resolved, That we commend the use of all proper efforts, by which the attention of persons of means and liberal disposition, as well as legislative bodies, shall be directed to the propriety of endowing such medical colleges, and professorships thereof, as shall be recognized by the association.

Resolved, That this Association recognize as a regularly organized medical college, one which has been represented at any meeting of this association, and which complies with the preceding rules and directions.

Resolved, That this Association recognize as regular practitioners of medicine, all who have been members of this Association, and have not forfeited their rights and privileges, and all members of State and county Societies, in full standing.

The report was received and taken up by sections. When the first resolution came up, a motion was made to amend, by striking out that part requiring an interval of three months to elapse between the termination of the first course and the commencement of the second; the objection being that the resolution, if adopted as offered, would do an injustice to summer schools, whose sessions would have to begin three months after the closure of the winter sessions, in order to graduate students, thus throwing the session into July, August and September, and crowding upon the next winter session; and that such a course would drive students altogether from the summer schools.

Dr. McDowell, of Missouri, spoke in strong terms against the amendment. He despised the plan of some professors, who, teaching at a winter school in the South, immediately the winter session closes, bring

their half fledged brood to a Northern summer school, and there delivering a second course of lectures, foist their hastily hatched students upon the medical profession. He was entirely opposed to the practice of pushing and forcing, which was becoming so rampant.

The discussion was further participated in by Drs. Shattock, of Boston, Austin Flint, of N. Y., Brodie, of Mich., Palmer, of Mich., Morse, of Me., Atlee, of Pa., McCaw, of Virginia, and others, and the resolutions were finally adopted and referred to the Committee on Publication, for publication in the forthcoming volume of Transactions.

The fifth resolution gave rise to a good deal of discussion as to the propriety and the right of placing medical schools under the censorship of the State Medical Societies.

Dr. Timothy Childs, of Berkshire, Mass., stated that forty years ago he called for a board of examiners to be present at all examinations for a degree, and that he had never ceased to urge the propriety for so doing. He had never passed a student without such a supervision.

He stated that he was the first man to introduce into medical colleges a Professorship on Pathology, and he was always in favor of enhancing the dignity and worth of his profession, and as long as he was able to raise his voice, he would oppose to the utmost all those who attempt to lower the standard of medical excellence, regardless of the motives that prompt them to do so.

Dr. Worthington Hooker, of New Haven, Ct., explained, that Yale College, further back than forty years ago, had, of its own accord, adopted the plan contained in the resolution under consideration, and during his connection with the College, there had not been one whisper of disapprobation regarding it. There was harmony between the State Medical Society and the institution, which feels the genial effects of that harmony, which gives it its strength and position.

He thought that all medical colleges should be closely watched by the State Medical Societies of their respective States.

The Committee on Nomination then reported the following appointments on Standing and Special Committees, which was received and adopted, and the nominations accepted:

Committee on Medical Literature—Frank H. Hamilton, N. Y., Chairman.

Committee on Medical Education—L. S. Joynes, Va., Chairman.

On the Surgical Treatment of Strictures of the Urethra—James Bryan, Pa.

On Drainage and Sewerage of Large Cities—their influence on public health—A. J. Semmes, La.

On Puerperal Tetanus—its statistics, pathology and treatment—D. L. McGurgin, Iowa.

On Anæmia and Chlorosis—A. P. Ayres, Ind.

On Alcohol and its Relations to Man—J. W. Dunbar, Md.

On Milk Sickness—Robert Thompson.

On Microscopic Observations on Cancer Cells—G. W. Norris, Pa.

On Blood Corpuscles—A. Sager, Mich.

On the Hygenic relations of air—C. C. Cox, Md.

On Quarantine—D. D. Clark, Pa.

On Medical Ethics—Paul F. Eve, Tenn.

On Tracheotomy in Membranous Croup—A. N. Dougherty, N. J.

On the effect of Perineal Operations for Urinary Calculi upon Procreation in the Male—J. S. White, Tenn.

On Mercurial Fumigations in Syphilis—D. W. Yandell, Ky.

On the Cause and Increase of Crime, and its Mode of Punishment—W. C. Sneed, Ky.

On the Microscope—R. C. Stiles, Vt.

On Gangrene of the Lungs—C. L. Allen, Vt.

On the Relation which Electricity sustains to the Courses of Disease—Isaac Casselbury, Ind.

On the Morbid and Therapeutic Effect of Verbal and Moral Influences—Alfred Hitchcock, Mass.

On the Causes of the Extinction of Aboriginal Races, more especially of the Red Men of America—Geo. Suckley, N. Y.

To report on the practical workings of the U. States law relating to the Inspection of Drugs and Medicines—E. R. Squibb, N. Y.

On the Causes and Treatment of Ununited Fractures—E. K. Sanbone.

On Diptheria—Alonzo Clark, New York.

On the Effect of Stimulants in the Treatment of Fractures—John W. Russell, Ohio.

On Dislocation of the Hip and Shoulder Joints—Moses Gunn, Mich.

To investigate the conditions demanded for a Diploma of Doctor of Medicine in the various Medical Schools and Universities of Europe—J. Baxter Upham, Mass.

In regard to the Committee on the Memorial to John Hunter, the following resolutions were adopted:

Resolved, That it be recommended to the different States to collect subscriptions, of not more than one dollar each, from every regularly educated physician. All money so collected to be forwarded by the Chairman of the Committee hereby appointed, to the Treasurer of the Hunter Medical Fund in London.

Resolved, That Drs. Henry J. Bowditch, Mass.; Charles Hooker, Conn.; Henry D. Bulkley, New York; Wm. Elmer, N. J; John L. Atlee, Penn.; C. C. Cox, Md.; J. B. McCaw, Virginia; Cornelius Boyle, D. C.; James H. Dickson, N. C.; H. K. Frost, S. C.; J. C. Nott, Ala; R. J. Breckenridge, Ky., and others, be a committee to collect subscriptions.

A resolution was adopted to send a copy of the resolutions passed to each Medical School in the country.

The order of the day was suspended by consent, and the following resolution was offered by Dr. McCaw, and made a part of the Report of the Conference Committee:

Resolved, That this Association shall prepare a conspicuous seal to be appended to the diplomas of every Medical College which shall comply with all the requirements of the foregoing resolutions—this seal to be withdrawn whenever there should be any failure on the part of such institution to carry out its provisions.

[TO BE CONTINUED.]