

## ORIGINAL ARTICLES.

## MODERN TREATMENT OF TUBERCULOSIS.

Presented to the Section of Materia Medica, Pharmacy and Therapeutics at the Forty-ninth Annual Meeting of the American Medical Association, held at Denver, Colo., June 7-10, 1898.

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DENVER, COLO.

I am requested by our Chairman to formulate the theories and conclusions on the modern treatment of tuberculosis. The object is to bring out your thoughts and excite discussion, and I trust I shall not fail in this purpose. As there are no two cases of tuberculosis in a thousand alike in all their various phases, so I might almost say there are no two physicians who will treat these manifestations in the same way, even if they are all recognized, which is a question. Our mental appreciation of this most important of the diseases which afflict the human race is in a formative state. I fancy one would only have to announce a set plan of management, which he would carry out as suitable to the great majority of his own patients, and the desired controversy would at once be set in motion in opposition thereto.

Taking 100 per cent. as a basis of what we, as physicians, can do by advice and treatment, and allowing a margin with regard to the great variety in cases, the accompanying table gives the estimate of treatment which I propose for your consideration. You may say it is my own conclusion based upon my personal experience with the disease and twenty-five years' practice in Colorado. You may also assert that experiences all differ and you can not vote as I do. That is just the kind of discussion I am after.

Since it is assumed—in which I trust you all agree with me—that the best make-up of the "modern treatment of tuberculosis" is a composite affair, I may state the divisions or heads, with this admission, namely, that they naturally run into each other, consequently some concession is needed in making any divisions at all. Notwithstanding the difficulty in pinning medical men down to positive conclusions, which peculiarity may have been brought to your notice, I have tried to make these divisions of our topic fair and just for the purpose in hand, namely, to bring out discussion and, if possible, arrive at some definite conclusion as a basis of a successful fight against this terrible scourge.

TUBERCULOSIS TREATMENT TABLE; APPROXIMATE ESTIMATE OF RESULTS.

Proportion of benefits due to	Range of per cent.	Average per cent.
1. Climate and change, involving mental influence.	15 to 45	30
2. Exercise and out-door life . . . . .	10 to 20	15
3. Good feeding, special dieting and attention to alimentary canal . . . . .	10 to 20	15
4. Medical supervision and medical treatment . . . . .	5 to 25	15
5. Inhaling, local medication and surgical interference . . . . .	5 to 25	15
6. Specific medication, based upon anti-toxin treatment . . . . .	0 to 20	10
Totals; per cent . . . . .	45 to 155	100

I shall devote most of the time allotted to me to the consideration of the last two divisions of this combined treatment. Therefore let me save the repetition of my own arguments in substantiation of

so large percentages given to the first three of these means by referring to papers I have written.<sup>1</sup>

It must also be borne in mind that the physicians' services extend all the way through the last four of these remedial means; *i. e.*, have to do especially with a calculated 55 per cent of all that can be done in the way of treatment.

The third and fourth divisions should naturally be grouped under a combined head, giving an average of 30 per cent. of the total benefit. This is perhaps a sufficient concession to this important part of the individualizing process, which it is the duty of the medical adviser to see to in every case.

To the fourth division—medical supervision and medical treatment—to which a proportion of 15 per cent. is given, it may be objected by some that too little credit is given the professional adviser for what can be done. The physician at best is but an aid or guide. Mostly all is due to the energy, faithfulness and perseverance of the patient himself. To be sure, tonic treatment, strychnia, arsenic, hypophosphites, etc., for "toning up," and guaiacol or creosoted preparations for antiseptic effect, chiefly in the upper portion of the alimentary canal, are entitled to recognition and should be granted a limited per cent. of the good we can do. The possibility of so saturating the blood with an antiseptic or germicidal agency, such as creosote, that the tubercle bacilli will be stopped in their sporing or growth, and the patient not be injured thereby, is a mere speculation. The efficiency of this method, which is at the present time very attractive to a large proportion of the profession, has not yet been demonstrated, further than to show an antiseptic effect in the alimentary canal and upon the lining membrane thereof.

The fifth division of our aid—inhaling, local medication and surgical interference—naturally covers a more uncertain field, for not all cases are equally suitable for their employment. When the tuberculosis is centered in the upper air-tract, it has been very generally admitted that through inhaling and local treatment medicaments may be made to reach the affected parts, and a staying of the progress of the local disease be accomplished.

The doubt has been, however, whether inhaled antiseptic or germicidal agencies ever reached the alveoli and bronchial terminals, where the disease is oftenest located and has its strongest intrenchments. This futility of the ordinary and old-fashioned plan of inhaling is a fact. It is true that the more a lung is diseased with tuberculosis and the usually accompanying infiltrating and shrinkage process, the less possible is it that inhaled medicaments can reach the affected parts. The treatment, whether it be pure or ozonized air, or etherealized or atomized germicides, all goes to the flexible, the healthy, lung.

Here again, for lack of time to fully elaborate the argument, I shall have to refer to papers I have written upon this subject.<sup>2</sup>

<sup>1</sup> For the first means—climate and change, involving mental influence—see article on "The Climate of Colorado for Respiratory Diseases," published in the JOURNAL for May 7 and 14, 1898. I believe this argument warrants the 30 per cent. of advantage allotted to this agency of climate.

For the second means—exercise and out-door life—to which 15 per cent. of the total benefit is given, reference is made to the essay on "Exercise for Pulmonary Invalids," read before the Congress of Medicoclimatology of the World's Fair Congress, June 1, 1893.

For the third division—good feeding, etc.—to which an average of 15 per cent. of all good is attributed, reference is made to "Food for Chronic Pulmonary Invalids," read before the Colorado State Medical Society, June 20, 1894.

<sup>2</sup> "Exercise for Pulmonary Invalids," op. cit. "The air-pressure Inhaler and Exhaler," N. Y. Medical Record, Feb. 10, 1894; "New uses of the Inhaler and Exhaler," Dietic and Hygiene Gazette, June, 1897; and espe-

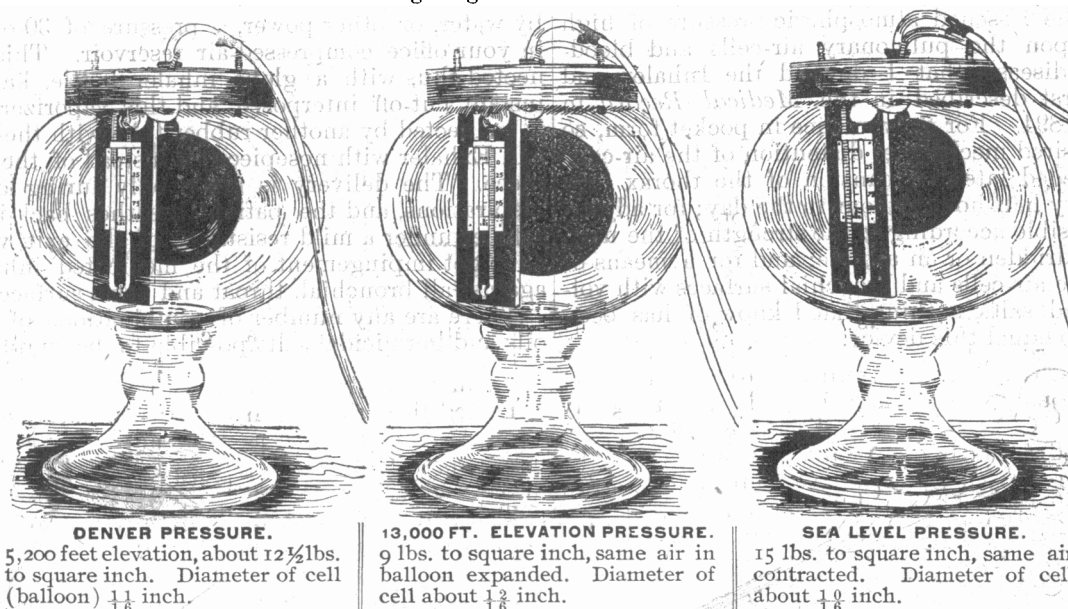
I desire to demonstrate more clearly than has been done heretofore the fact that the correct system of inhaling, or more properly, exhaling; altitude above the sea, and rightly directed gymnastic training, all work upon the same principle, namely: the *mechanical distention* of the air-cells. The reciprocal relation of diseased and healthy lung in the same thorax, and of the air and blood within a given chest with reference to respiration, does not seem to me to have been sufficiently recognized by anybody that I know of; unless it be Dr. T. N. McLean of Elizabeth, N. J., in his late paper "Personal Observations in Pulmonary Phthisis."<sup>3</sup>

This is perhaps a bold statement, but I believe it is fundamental to a proper understanding of the incipency, the progress and the control of pulmonary consumption. It is quite possible that our inability hitherto to account for the localization of so much of tuberculosis in the lungs, is due to our own fault, because we have failed to recognize the mechanical conditions within the chest which govern respiration and blood circulation.<sup>4</sup>

Now, I blow up the air-cell, and the condition of air-pressure in the globe, but outside the air-cell, is exactly similar to the pressure upon the blood current within our chests, *i. e.*, greater during expiration than during, and in fact, the reverse of, inspiration. To prove it pull out the plug and hear the whistle in the vessel's exit opening. How well this shows that the blood does not flow alone because the heart pumps it, but because the lung mechanism draws it in and forces it out again. How strikingly it shows the preponderance of the expiratory over the inspiratory power of any individual, indicated by the manometer records, proving that it is only during expiration that we have any power at all to distend the air-cells, mechanically closed either by inaction or disease. How important then is the use and control of expiration (not inspiration) to maintain the health of the lungs. You see how it is that gymnastic training and any system of inhaling, to be of use, must depend upon the habitual mechanical distention of the air-cells, and that from the nature of things, can only occur

#### THE ILLUSTRATING AIR-CELL. (DENISON.)

To show the expanding effect of lessened atmospheric pressure upon the pulmonary organs by toy balloon and manometer inside a sealed glass globe.



The *illustrating air-cell*, which I here show you, I have devised to suggest more clearly to the mind these intrathoracic mechanical conditions. This three-gallon glass globe is to represent the thorax. It is, as you see, rigid and should be air-tight. The muscular force, to represent living conditions, is transferred to the interior of the globe by an air-pump or by our own breathing power. The record of that force, or air-pressure, is given by a manometer inside the globe. There is an opening in the cover to represent the exit or entrance of the blood-vessels which are in the thorax. This has a valve in it which will whistle when the current is outward. Finally, in the center, connected by a tube with the outside, is this rubber balloon representing a flexible air-cell, which you may imagine, if you will, to be one of your own air-cells magnified a million times, more or less.

during expiration. The will power given us to prolong and intensify expiration with a fixation of the chest and a lateral expansion of it, due to muscular effort, is our main reliance. It enables us to imitate, yes and to healthfully exaggerate, the natural remedial effect of high altitudes in phthisis.

A total increase of expiratory power, more than any other agency, can account for the benefit which results to an invalid arriving at the height of 6000 feet in a climate like ours. You can see by this illustrating air-cell how it is that he *has* to breathe a fifth more air than he did at sea level to get the same amount of oxygen here as there.

It only remains for us to draw out about three pounds of the pressure there is in our glass globe, and you will see the air-cell expand nearly to the approximate conditions on top of Pike's Peak. I can then show you the biggest jump that an air-cell ever took—from the summit of Pike's Peak into the Atlantic Ocean! It is simply done by letting into the globe again our Denver air-pressure, and then adding three pounds.

cially one just read before the American Academy of Medicine upon "The Advantage of Physical Education as a Preventative of Disease."

<sup>3</sup> Journal of the American Medical Association, Feb. 5, 1898.

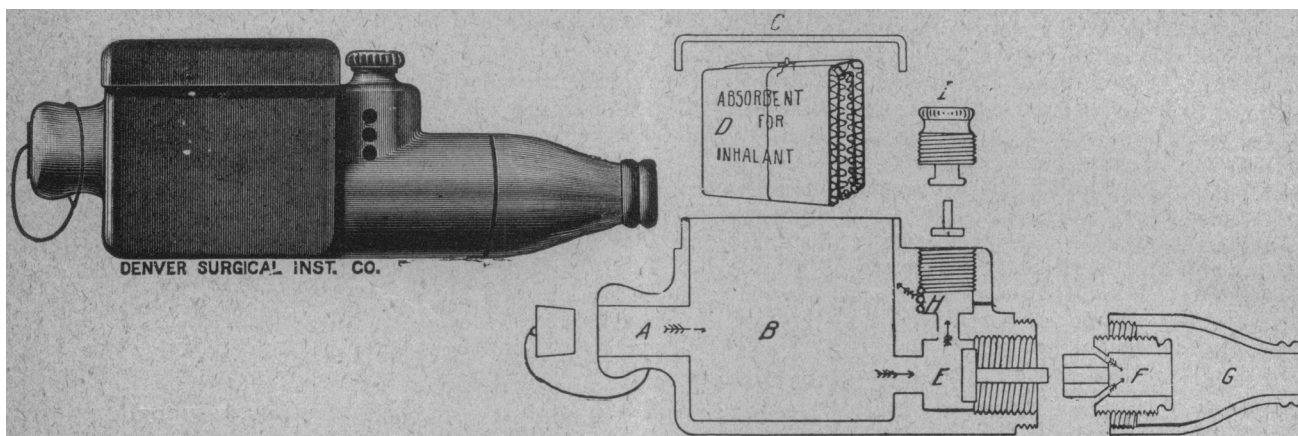
<sup>4</sup> "Abnormal Intrathoracic Air-pressures and Their Treatment," by the author. President's address, American Climatological Association. See Transactions for 1890.

thereto. The contracted air-cell shrinking from the increased pressure around it, immediately suggests to the mind why it is that low altitudes favor lung inactivity, as it also suggests why it is that the contents of closed cavities, the brain and spinal cord, become congested with blood in the caisson disease.

It was not only as a possible substitute for, but as an imitation of and an aid to, the good mechanical

effects upon the spirometric capacities and manometer records of invalids, who have used it according to directions as to persistence and energy, have been indeed gratifying.

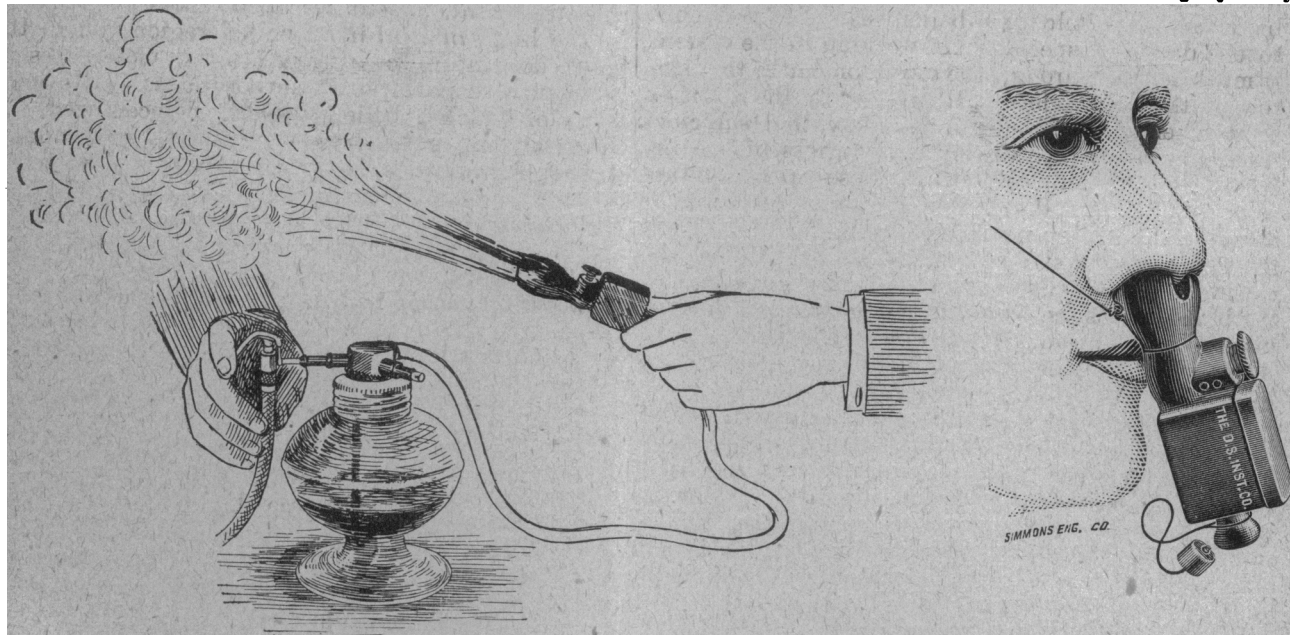
I have to show you here my own modification of the inhalation of finely atomized volatile oils, a method which is very popular with some physicians as an office means of treatment. Suppose you have



effects of the lessened atmospheric pressure of high altitudes upon the pulmonary air-cells and blood-vessels in disease, that I devised the Inhaler and Exhaler<sup>5</sup> first described in the *Medical Record* in February, 1894. For convenience in pocket form, so that the desired mechanical distention of the air-cells and the needed lateral expansion of the thorax may be had every half-hour or hour in the day; for adjustability, possible according to the strength of the user, whether bedridden or an athlete; and for a means of reaching the air-cells and bronchial surfaces with volatile oils and salts, nothing that I know of has been contrived to equal this device.

by water, or other power, a pressure of 30 or 50 lbs. in your office compressed-air reservoir. This is connected thus with a globe inhaler bottle, having an instant cut-off interposed, and this vaporizer in turn is connected by another rubber tube with the Inhaler and Exhaler with nosepiece on instead of the mouth-piece. The delivery is made only during long, full inspirations, and the patient breathes back into the inhaler under a mild resistance of the exit valve, so as to get impingement of the medicated inhaled air against all bronchial, throat and nasal surfaces.

There are any number of combinations of volatile oils and germicidal salts possible to be employed by



Physicians who have faithfully used this inhaler, have asserted that 15 per cent. of the benefit a pulmonary invalid may get from an average treatment, such as here outlined, is too small an allowance for the good received from this method of inhaling. The

<sup>5</sup> The Denver Surgical Instrument Co.

this method, but something like the following combination I have found to be most satisfactory for average cases:

R. Ol. eucalyptus (Tyndale's) 20 to 40 per cent. ; carbolic acid crystals 10 to 30 per cent. ; oleum pinus Pumilio (Merck's) and liquid guaiacol (Schring & Glatz), of each 5 to 10 per cent. ;

oil of cloves and cedar, of each 2 to 5 per cent. ; and formalin one-half to one per cent.

With this combination medicate your vehicle, whether it be liquid vaselin, glymol or albolin, to suit mild, ordinary uses. Then, for extra antiseptic or stimulating effect, the absorbent in the medicament box can be additionally medicated with formalin or other germicidal means for temporary use. This finely atomized spray you can see, as one who breathes it can feel, reaches all open spaces even to the ultimate air-cells, for considerable of the vapor returns with expiration, thus showing that some of the medicament has not been condensed. What proportion of it has been we do not know, but the results in tubercular affections, especially with "grip cold," hypertrophic rhinitis, ozena, laryngitis, bronchitis, etc., are quite satisfactory.

I have included an allowance for surgical interference, which is an important field in bone and joint tuberculosis, so-called scrofulous gland affections, lupoid skin diseases, laryngeal ulcerations, adenoid growths, tubercular pleurisies, etc. I must, however, here put in my protest against the surgeon's hasty interference in operating upon fistulæ-in-ano while tubercular infection is at all active in the lungs. I believe we should consider these fistulæ as eliminating means on the conservative order, and unless substitutive elimination is provided for, an operation should not be performed.

There is certainly no lack of opportunity for discussion with reference to our sixth and last subdivision of treatment, that of specific medication, for the very fact of there being any specific or antitoxin treatment of tuberculosis will be called in question. This opposition exists, notwithstanding there are on every hand around us, instances of acquired immunity to tuberculosis, though perhaps limited in degree. Wise professors will confidently state that it is "a will-of-the-wisp" to even seek such an agency as may be termed a specific for tuberculosis. Yet if the disease is due to a special toxin working in the system, it must be only through the development in that system of the appropriate antitoxin, or by the addition of it when created outside the body, that sufficient resistance can be had to stay the progress of the disease. Such resistance is what these opponents are after, whether by the means of tonics, exercise, or climates. Yet they would seemingly call in question the very source of that natural resistance, namely: the natural or artificially created antitoxic condition of the blood or tissues, which is antagonistic to further tubercular infection. These opponents then seem to admit the existence of a toxin, but deny that of an antitoxin.

Leaving open for discussion the question of fact as to the existence of an antitoxin or specific (for tuberculosis), created or existing outside the human body, I am going to assume that the creation of such an antitoxic agency in the affected or infected system is admitted, and that that existence or mode of resistance is in perfect harmony with nature's methods in eliminating other specific diseases.

We will then divide the antitoxin treatment of tuberculosis into two distinct methods: the *direct* and the *indirect*. These two should not be confounded with each other, as is the habit of some men in speaking of the tuberculin treatment.

The former, the direct method, is that inaugurated by Koch as the outcome of his discovery of the bacil-

lus—the reputed cause of tuberculosis. Under the limited knowledge of the agency and of the disease it was to cure, this remedy soon demonstrated the need of an advanced chemistry in the technique of its preparation, and an enlightened skill in its administration beyond anything which existed in the scientific world. Since this discovery, the eight years of study and investigation of a few faithful observers, under most difficult and discouraging conditions imposed upon them by an onlooking and rather belligerent professional brotherhood, have served to develop a limited improvement in the particulars just named. I might say that this improvement in chemical technique, and afterward in administrative skill, had been considerable, if any due recognition of it had been manifest on the part of the medical profession as a body. This I will say, however: I firmly believe that tuberculosis could be held in check, if not cured, by this means, up to the proportion of, and even beyond, the 10 per cent. allotted to it in our table, if, with the present advanced technique in the manufacture of these direct tuberculin preparations the physician using them had the required knowledge to discriminate what patients could be treated by this method, and how far the treatment should be pushed. He should not only know the strength of his remedies, but also the *percentage of infection* with which he has to deal. It is a most gratifying and successful method of treatment if the condition favorable to its success can be secured. But the technique must be exact, and the general and individual objections to the use of such an antitoxin-creating remedy must be recognized. Thus, a knowledge of the applicability of the treatment narrows down its use to a small field. For instance, if the powers of nature are already overtaxed in an antitoxin effort, as in acute or miliary tuberculosis, nothing but harm can come from any increase of nature's burden.

It is likewise absurd to expect to reach with this treatment, closed or open spots, as cavities in the lung, or shut-in ulcerated regions where the blood does not circulate. And yet, most cases of pulmonary consumption harbor these conditions, many of which I believe are never recognized. If the treatment is inadvisable in caseous pneumonias and acute conditions, then I conceive it is quite possible that in some serious cases not acute, the massage, first recommended by the Germans as an auxiliary aid, may do damage by loosening up toxic material, and surcharging with it the blood already overloaded. However, if either incipency of tuberculosis, or a chronicity, which is its equivalent—and chronicity brings equivalence because of some already acquired immunity—is known to exist, there is then no question but that the direct tuberculin method is the natural method of cure.

If time permitted I would elaborate this theme. However, I trust it will be acceptable to show a few of the cases I might call upon in this vicinity, who have become pretty thoroughly immunized against tubercular infection chiefly through this method. I have chosen ten cases, mostly those treated with Koch's crude tuberculin, from three to over six years ago, and have asked them to be present that you might verify their healthy appearance. These cases are purposely selected as those upon which the influence of climate has been very slight.

*Case 1.*—Miss N. S. over five years ago treated with Koch's tuberculin. Diagnosis then made with tuberculin, there being



no expectoration. Physical diagnosis then indicated: First stage both apices, and tubercular disease of the right hip-joint, due to injury four years previously; took as high as 160 mg. of tuberculin to the dose before a four months' course was ended. Had walked on crutches for over three years previously, but soon, and while under treatment, discarded them. Finally could step up-stairs, raising the injured limb first, something she had been unable to do for four years. Weight, strength and all symptoms improved during treatment—weight then 110½ pounds, now 146 pounds, and she walks without the limp she used to have. She has lived in Colorado since 1881, and climate had very little to do with it. This case is the same reported as case 2, "Favorable Results of Koch's Tubercular Treatment in Tubercular Affections that are not Pulmonary," in the *New York Medical Journal*, Aug. 3, 1895.

Case 2.—C. F. M. had been four years ailing, and had lived in the Rocky Mountain regions most of that time, when I first saw him in July, 1892. He was shown to be tubercular by microscopic examination of sputum; had a large cavity in right infrascapular region, say 2 by 4 inches in size and softening to the extent of excavation on opposite side, from which spots he was bleeding on any exertion. Had been confined in bed five weeks on that account. His hemorrhages were stopped by mechanical means; a properly adjusted harness or chest corset and tuberculin treatment was gradually instituted. This was distributed over different periods during the following two years, and he took as high as 240 mg. crude tuberculin for the largest dose. Accidents have occurred from mechanically straining the large cavity in his right lung, which cavity two or three years ago assumed the shape of a cucumber or banana. Three years ago, when, under protest, he went to live in Leadville, Colo., he had hemorrhages, and they have been repeated at other times, but his remarkable vitality and considerable immunity each time have brought him through. Of late years, without tubercular activity, this case has assumed the conditions of purulent bronchitis, *i. e.*, coexisting contracted cavity and bronchiectasis. There are now purulent evidences, but seldom any tubercle bacilli found in his abundant expectoration. Both of these cases are remarkable, and each by itself sufficient for a whole paper had we time to elaborate them.

Case 3.—S. T. B., in April, 1893, was brought to me by his father, who had come to take him home to Pennsylvania, as in Colorado Springs hope of his recovery had been abandoned. He had reached the stage of tubercular softening in both lungs and had been affected three years, the last six months of which time he had lived in Colorado. The susceptibility to crude tuberculin was gradually overcome and he took considerable quantities of this or the antiphrasin (Kleb's). Since his immunity became established he has enjoyed excellent health.

Case 4.—F. E. D. Period of incipency uncertain, perhaps two years. Arrived in Colorado in July, 1895, when he had "mixed infection" bacilli in sputum and first stage of tuberculosis in left lung. Soon thereafter a small nodule came on scalp, in which, when it softened, a tubercle bacillus was found. While undergoing the first immunization with tuberculin he injured his elbow in a fall and that joint became tubercular during the resulting inflammation. The periosteum of the ulna was affected, with probably some implication of the elbow joint, as, in a subsequent operation performed by Dr. C. A. Powers, some of the joint fluid exuded. After laying bare and scraping the bone, healing was greatly aided by a continuation of the immunizing process. This did not entirely remove the difficulty, and some two years ago a second operation was performed, at which time the ulna was drilled through and quite a piece of necrosed bone removed. The recovery under antiseptic packing and the treatment with antiphrasin was most excellent, only slight evidences of bone and joint disease remained and no trouble whatever with his lungs. A year ago he returned to his Vermont home. On coming back to Colorado last winter he had an attack of la grippe and that focusing agency in tuberculosis seemed to excite the latent disease of the affected elbow joint into activity. The swelling, immobility, pain and ulceration portended the possible necessity of resection or amputation. A very satisfactory test was made with crude tuberculin, warranting a renewal of specific treatment, this time with Von Ruck's purified tuberculin and ending with the "watery extract." Nothing could be more positively demonstrative of the good effect of the course pursued than the subsidence of swelling, soreness, lessening of the local discharge and general improvement which immediately resulted, in fact apparent complete recovery. Here is a study for those surgeons who scoff at tuberculin. It should convince them that there is a mild and immunizing power in this agency beyond their ken—something which may prevent the necessity of the use of the knife in many cases and perhaps warrant its use in others previously considered inoperable.

Case 5.—Miss N. McK. is another surgical case in which the influence of climate seemed to have already been exhausted, for she had nearly recovered from the lung disease for which seven years previously she had come to Colorado. This is the scrofula gland and first stage case previously reported.<sup>5</sup> In February, 1896, Dr. Powers, assisted by Drs. O'Connor, Pedersen and myself, removed from the right side of this woman's neck sixteen or seventeen glands which together filled a teacup. On that side they had commenced to ulcerate and there were nearly as many more on the left side, filling the depressions from the ear to the clavicle. These latter not being so far advanced, were deferred for a future operation. Encouragement to continue this immunizing process was afforded in the gradual shrinkage of the remaining glands and general improvement of the patient as treatment progressed. You see now, after two years only the remnants of those scrofular swellings on this left side.

Case 6.—J. T. U., treated March, 1892, for tuberculosis (bacilli in sputum), which seemed to have reached the second stage in the rear base of left lung. He had had some trouble, combined with pleurisy there, coming on for four years. Now he is a fine specimen of health. His treatment with considerable doses of crude tuberculin was before the discovery of any improved modification of the drug.

Case 7.—G. T. S. Treatment commenced before the last-named, six and one-half years ago. Reacted profoundly to 2 mg. crude tuberculin giving from the normal a temperature rise to 103 degrees F. The treatment was pushed and there were no reactions to the 20 mg. dose. It was continued to 50 mg. and then stopped. He has had little medical attendance since.

Case 8.—C. R., affected half a year when he came to Colorado, three and one-half years ago. He had pleurisy at base of left lung, in the apex of which softening had occurred, and there were first stage symptoms on right side, bacilli in sputum, etc. Since immunization three years ago he has gone through typhoid fever. His condition of health at the present time is something to recommend any course which will accomplish so much, even admitting climatic influence, physical exercise and faithful co-operation of the patient as aids.

Cases 9 and 10.—Husband and wife. Wife first treated four years ago and husband two years. Both had excavations; wife in apex of right and husband in upper part of the left lung toward axilla. Wife first treated with crude tuberculin; husband with antiphrasin. Both of these, for seeming loss or insufficiency of immunity, were again treated last fall with Von Ruck's "watery extract of the dead bacilli." Others of this list besides these two have shown the happy return to the tuberculin effect when a renewal of the treatment seemed necessary. A patient once benefited by tuberculin may in three months to two years reveal a certain loss of his acquired immunity, thus showing how relative to one's infection is his own resistance.

If a reason is required why so small a ratio of possible relief is attributed to this specific treatment by one who believes in it as I do, let it be understood that only a small proportion of the tubercular cases coming to Colorado are selectable for this method. It ought also to be recognized that the failures with tuberculin have been due not so much to inefficiency as to the lack of knowledge on the part of the physician how to discriminate cases fit for its use, as well as to a disinclination to attend to needed details in the technique of its administration.

I regret the lack of time to go more fully into details, and the necessity, therefore, to somewhat summarily dispose of the second method of the antitoxin treatment. This is the indirect method, wherein, instead of exciting in the human body a resisting antitoxin to a given disease, it is created in an animal and then given gratis to the invalid. In the former (the indirect) method there are two speculations which are severe enough tests to be sure: 1, the toxin remedy, and 2, the uncertain patient; while in the latter (the indirect) method there are three additional speculations. These are: 3, the choice of the animal, chiefly with reference to its natural immunity to tuberculosis, *i. e.*, whether the dog, goat, ass, horse or lion is best. In fact, to what extent a natural immunity to this disease, admitting that it must be relative to surrounding conditions, can be conferred

<sup>5</sup> The Microscopic Proof of a Curative Process in Tuberculosis, Transactions Colorado State Medical Society, twenty-sixth annual meeting.

through the blood serum to a human being, is an open and undetermined question. 4. The quantity and quality of the immunizing toxin to be administered to an animal whose serum is to be used. This is a reasonable speculation not yet removed from the realm of uncertainty. 5. The time said animal should be treated, both before the injections are stopped and afterward, before the blood is drawn, is an important speculative point. Dr. G. T. Hunter, who is present, has kindly presented me with some lion's serum, which was taken from an animal kept under the most favorable immunizing conditions up in the mountains of Germany. Treated nine months, at first with highly virulent doses of tuberculin toxin, with gradual cessation as immunity was reached, and a whole month allowed to intervene between the last injection and the taking of the serum. Whether that procedure is the proper one or whether with different animals this may not be waiting too long for the best results, is a question of speculative nature. The burden of proof as to these three extra objections rests with the advocates of this indirect method. My own good success with horse serums during the first four to six weeks' treatment of a dozen or more patients was perhaps due to personal precautions, *i. e.*, not increasing any dose which gave a reaction to the previous treatment, and not, as directed by the manufacturers, giving daily, but instead, every-other-day injections. The after evidence of the possible cumulative effect of such mixed foreign substances, introduced into the blood of a patient, led to a fear that the resistance to the disease in individual cases was overtaxed. The unfavorable results of other physicians, who crowded this treatment according to recommended rules in printed directions, served to confirm the conclusion that an antitubercular serum is a mixture, the exact proportions of the converted toxins or antitoxins in which we do not fully understand. The serum treatment of tuberculosis, as yet, is a beautiful dream, which I for one profoundly hope will be realized.

Pardon the extension of this paper and do not lose sight of the arbitrary divisions of treatment given in the table presented for the purpose of bringing out in discussion your various views.

To sum up, the following conclusions are advanced:

1. As a part is greater than the whole, the combined method is superior to any given branch of the treatment. The individualizing process, and the adaptation of all methods to the needs of a given case, is the preferable plan.
2. The seasonable change of residence to a well-selected high-altitude climate, with its dryness, sunshine, possibilities of out-door life, and its stimulating qualities, gives the best possible resistance to the advance of consumption.
3. Exercise is most essential and necessary to promote both cell activity and the needed mechanical distention of the air-cells.
4. Local treatment and proper inhaling methods bear important relation to exercise, cell stimulation and the climatic effect by the high altitude method.
5. A great and most valuable addition to our curative means comes through the skillful determination of the proportion of infection, in order to know the balance between bodily resistance and the disease. This balance is the key to the as yet preferable—the direct—method of specific treatment.
6. It is a mistake to overwhelm the body with fre-

quent injections of undetermined animal serum, thereby producing either a severe reaction or a possible cumulative toxemia.

### ANTITUBERCLE SERUM (PAQUIN) IN TUBERCULOSIS.

Presented to the Section on Materia Medica, Pharmacy and Therapeutics at the Forty-ninth Annual Meeting of the American Medical Association, held at Denver, Colo., June 7-10, 1898.

BY WILLIAM HUTSON PRIOLEAU, A.M., M.D.

SUMMERVILLE, S. C.

At the forty-seventh annual meeting of the South Carolina Medical Association, held in April, 1897, I had the pleasure of making a detailed report of cases of tuberculosis treated with antitubercle serum (Paquin); this report was afterward published in the *New York Medical Journal* of June 26, 1897. In this paper I shall endeavor to add to that report by giving my conclusions as drawn from a three years' experience with this serum. I shall try to point out when to use it and when not to use it; also that it is not a specific, but a treatment of inestimable value when used in conjunction with good climate, diet, etc.

A careful observer can not fail to notice that one by one the diseases which in years gone by have produced the greatest mortality are now slowly but surely yielding to science and scientific treatment. This is all the more true because we are giving up empiricism for rationalism; drugs are used less and antitoxins more. All of us rejoice in the antitoxin for diphtheria, and use it because the American Pediatric Society has put the stamp of approval on it; many of us use antitubercle serum (Paquin) because we have tried it and found out its value from clinical observation and by actual experience. Dwelling as I do in a winter resort for consumptives, naturally I see a great many cases each year. Since beginning the practice of medicine at Summerville, S. C., I have been anxiously looking for some treatment to benefit these poor unfortunates, if not cure them. Various kinds of treatment have been vaunted to the skies, but none has given me the real satisfaction that antitubercle serum (Paquin) has. I have used it for three years, and during that time I have alleviated the sufferings of many, prolonged their lives and seemingly in some cases have produced cures. I say seemingly, because three years is too short a time to say positively whether one has been cured or not. In order to test the serum thoroughly, I used it on all cases that came into my office, irrespective of the stages. In this manner I treated twenty or more, only one being in the incipency; out of this number all but two were benefited, some being temporarily cured, others apparently cured. The cases were pulmonary, laryngeal, glandular and joint, and the serum acted equally well on all. It is, however, as well to know when not to use the serum as when to use it, because on its proper application depends its value. From my own experience I have come to the following conclusions, *viz.*:

1. That antitubercle serum (Paquin) is nearer a specific for all kinds of tuberculosis than any other treatment.
2. That it is most valuable in pure, unmixed tuberculosis; that is, tuberculosis uncomplicated with some infection.
3. That it ought to be used in the pretubercular or incipient stage and in the beginning of second stage.
4. That it ought not to be used with great hopes