

*Wirt (W. E.)*  
COMPLIMENTS OF

DR. WILLIAM E. WIRT

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SEP. 13-1899

643.

THE USE OF DRY HEAT OF HIGH TEMPERATURE IN THE TREATMENT OF CHRONIC JOINT AFFECTIONS, WITH REPORT OF CASES

BY

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Something over three years ago I began experimental work in the use of dry heat in the treatment of chronic joint diseases. I was led to believe that a high temperature could be borne from my studies in physics, and from a knowledge of the high temperature borne by iron-workers. My first report on the subject was made in a paper read before The Mississippi Valley Medical Society, in October, 1895.

The apparatus used in applying the heat consists of a copper cylinder open at both ends, having four holes in the circumference for ventilation. Fitting into each end of the cylinder is a wooden ring or disc, to which is attached a hood which encircles the limb subjected to the heat. This hood, which is made of double coated rubber cloth, is drawn firmly about the limb by means of puckering strings, and in this manner retains the heat in the cylinder around the joint.

My first cylinder was made of one piece of copper rolled into the shape of a cylinder. Naturally I have made a number of modifications since making the first cylinder, one of which changes is to make the cylinder of two halves

*presented by the author*  
Read before The Ohio State Medical Society  
at the 42<sup>nd</sup> Annual meeting held at Cleveland, O.  
May 19, 20, & 21, 1897.

hinged together, thus allowing the limb to be layed into the apparatus, and then the upper half is closed upon it.

A recent modification is to have the lower half of the cylinder double with an air space between the two, or rather an inner half cylinder of an inch less in diameter, with a half inch flange which is set down into the lower half of the cylinder. By this means the temperature is more equalized between the lower and upper halves—the hot air between the two cylinders is carried up against the upper half of the limb.

Heat is applied underneath the cylinder by means of a small gas stove on the Bunsen-burner principle, i. e. gas and air mixed. I have used oil lamps, gasoline and the alcohol flame, but when it is possible I prefer to use the gas flame.

In the practicable application of the apparatus I have found it necessary to encase the under third of the limb in cotton, which is held in place by loosely tied tapes. This was found necessary from the fact that the high temperature used caused such profuse perspiration from the joint that the moisture ran from the skin in drops, which falling to the bottom of the cylinder was instantly turned into steam, scalding the patient. The cotton takes up this perspiration, and the hot air quickly dries out the cotton. The cotton being applied, the limb (the knee for example) is placed into the apparatus, and the upper half of the cylinder is then swung shut, and the hoods are, by means of the puckering strings, drawn tightly around the calf and the thigh. The cylinder sets in a frame work at about the height of an ordinary chair. The patient's foot is placed in a chair and raised to such a height that the calf touches nothing about the cylinder but the rubber hoods. If necessary, the patient may sit on a pillow in order to raise the thigh free from the wood rings in the cylinder. Everything being ready the gas is turned on and lighted. The joint is kept in the heated apparatus from thirty minutes to

one hour, and the heat is used as often as three times a week, or in some instances daily.

The temperature ordinarily used is from  $250^{\circ}$  to  $300^{\circ}$ . In some cases I have carried the temperature as high as  $350^{\circ}$  to  $400^{\circ}$ . In one case on two occasions the bulb of the thermometer lay in the cotton at the side of the limb one inch from bare skin, and registered the extreme temperature of  $450^{\circ}$ . On the other hand I had blisters on two patients where the temperature registered was below  $300^{\circ}$ , and neither of the patients complained of the heat being excessive.

Heat and cold have been used for many ages to allay inflammation, but the moist heat, the form generally used, only permits a range of temperature seldom above  $140^{\circ}$  F. Very high temperatures have been used in the form of the cautery, but only for a moment of time, and its effect does not in any way parallel the effect of prolonged use of a temperature of 300 degrees.

The influence of these agents just named is determined firstly, by their power to modify the circulation; secondly, by their power to increase the lymphatic circulation; thirdly, by their modification of the secretions, and fourthly, by their action on the nerve supply to a part.

To make it a little plainer what these effects are, I will go somewhat into detail. By the use of a temperature as high as previously named, say from  $250^{\circ}$  F, to  $300^{\circ}$  F., the perspiration of the local part is so great that if not absorbed by the under layer of cotton, it will roll off rapidly in drops, and the whole amount evaporated in an hour is quite large. The circulation of the blood is also greatly increased, which is very apparent on the surface, the part being reddened and the arterioles dilated, as is seen in the blush of an erysipelas. The pain and stiffness are greatly relieved.

Take for instance, an old case of gonorrhœal rheumatism, or rheumatoid arthritis, and we find at all times there is more or less pain with considerable stiffness, and the mo-

tions of the joint are accompanied with creaking sounds. At times there are exacerbations, when all these symptoms are considerably increased. It has been my experience in the use of the apparatus, that very soon after the temperature in the cylinder is raised to  $250^{\circ}$  the patient feels entirely relieved of the pain, and on removing the limb from the apparatus after the treatment, it is found that the mobility of the joint is considerably increased, and the creaking sounds have greatly diminished, or entirely disappeared. The marked effect of the heat is especially noticeable at the time of an exacerbation, when the difference in the condition of the joint before and after the treatment is considerable.

As illustration of the effect of the high temperature used, I will report several cases of my own, and quote from the letters received from several surgeons to whom I furnished the apparatus.

Case I. Mrs. S. A. M., age 29. Diagnosis, Arthritis Deformans. No history of gout; no history of tuberculosis. Mother of patient complained some of rheumatism. On January 3, 1893, knee became painful, swollen and hot, but not changed in color. Was laid up in bed for three months. Used crutches for a while. Has limped ever since original attack. Has had milder attacks since. Limb about same as one year ago, but not so straight. Examination January 10, 1895. Knee swollen and increased in temperature. Fluctuation in joint. Outlines of knee changed somewhat. Ends of tibia and femur enlarged. Knee cannot be straightened beyond  $160^{\circ}$ . No marked spasm of muscles. Treatment: Used four applications of the dry heat, two and three days apart, with considerable improvement. Flexion increased ten degrees. Knee less sensitive. Temperature used was  $260^{\circ}$  F., for forty minutes at a time.

Case II. F. M., age 20. Diagnosis, Ankylosis from acute rheumatic attack. Patient had suffered much from

rheumatism since her seventh year. Would get it in feet, knees and arms. Mother of patient has suffered from rheumatism for many years. In April, 1894, had a severe attack of rheumatic fever from exposure to wet and cold. Was very sick, and in bed for three and one-half months. Got up on crutches with right knee drawn up. Examination February 19, 1895. Find barely perceptible amount of motion in right knee, any forced flexion or extension causes pain. Both knees of same temperature. Knee held at an angle of  $105^{\circ}$ . Normal motion in left knee following rheumatism. Treatment: Application of heat of a temperature of  $290^{\circ}$  F. for periods of an hour were used, with an idea that the adhesions in the joint might be loosened up. Finding that the adhesions remained firm after several applications of the heat, the patient was placed under ether and the adhesions were broken up—the limb being put in plaster of Paris in the straightened position. Complete paralysis below the knee, both of motion and sensation, followed the straightening of the limb. After keeping the knee in the plaster for a short time, the knee and calf were again subjected to the high temperature heating apparatus. Quite an amount (30 degrees) of free motion was soon established, and the paralysis was reduced to the lower half of the foot. At this time the patient went into the country, and was lost track of.

Case III. Dr. F. C. T. Diagnosis, rheumatism. The doctor had an attack of rheumatism during July of 1896. The usual treatment was carried out. When I saw him his knee was in plaster of Paris, and the doctor told me that for three or four weeks he had made no progress. He sent for me to ask as to the advisability of using hot air. I recommended the treatment, and about a week later I applied the heat to his knee. On removing his knee from the plaster prior to the treatment, I found the knee much swollen and exquisitely sensitive and painful on motion. With the greatest care we got his knee into the apparatus.

The heat was applied forty minutes at a temperature of 270° F. The doctor soon declared that the knee felt better, and at the end of treatment on removal of the limb from the apparatus, the motions were freer and with less pain. The doctor continued the treatment two or three times a week for several weeks, at which time he felt well enough to go to Mt. Clemens. Here he received great benefit from their treatment, returning from Mt. Clemens able to walk fairly well with a cane. He again continued his treatments with hot air with decided benefit.

I have several times talked with the doctor about the condition of his knee and the benefits of this treatment. He tells me that whenever his knee pains from any cause as twist of the joint or the oncoming of a storm, he gets out the apparatus and gives his joint a good heating with the result of relief from all pain. At the present time he is riding a bicycle and has good use of his joint, and has a practically normal gait.

Case IV. Mrs. Anna T., age 66. Rheumatism in both hands—more marked in the left. Patient had a Colles fracture of the left wrist, which made the left hand more stiff than the right. Examination. The usual deformity of Colles fracture is found at the left wrist. The fingers of the left hand are considerably flexed, especially the fourth and fifth. The hand cannot be closed like the normal hand—in fact, only about one-third the usual motion is permitted. On attempting to extend the fingers, we find them blocked firmly, apparently by adhesions in the joint, instead of the stretching resistance found in shortened tissue. The same condition holds in the right hand, though not to so marked a degree. Nine applications of the hot air, at an average of 310° were used, for forty minutes at a sitting, followed by twenty minutes of massage and passive motion. The treatments were given every other day, and at the end of the nine treatments the motion in all the joints of the fingers of the left hand were quite free, except in the little

finger—here the motion was only fair. The patient and her daughter, who always accompanied her mother, were delighted with the results of the treatment.

The following letter from Dr. Frank S. Milbury, of Brooklyn, N. Y., is self explanatory.

On the first day of March, 1 A. M., 1894, when taking a chair down stairs, I slipped, flexing my left fore leg upon the thigh, and being a heavy man, weighing 205 pounds and about 5.11 tall, brought the joint on a sudden and heavy strain. Apparently, I felt something give way, the pain was very great, but being very busy professionally, and as my practice is confined exclusively to the eye, ear, nose and throat, and necessarily in the office, I attempted for a few days to attend to business, keeping off my feet as much as possible, believing that it was only a severe sprain, and would soon be well. However, in this, I was mistaken, as it grew rapidly worse, and in about eight days my knee was greatly swollen, and the pain very acute. I applied water as hot as could be borne for about fifteen minutes and then douched it with ice water—several gallons—after which I applied, with considerable friction, a palliative linament, and retired. This treatment was given night and morning, and always afforded great relief. The swelling and severe inflammation soon subsided. At the earliest possible moment I drove to New York to consult Dr. A. M. Phelps, 62 East 34th St., and after a careful examination he stated that in the fall two of the semi-lunar cartillages had been ruptured. He ordered me to wear an apparatus so as to keep the knee stiff when walking, and flexed on sitting, but advised absolute quietness for a few months, which advice I followed to the letter. In addition to this he suggested the hot and cold applications followed by a brisk rubbing with a coarse towel, after which a chloral-camphor and morphia linament was applied and the knee wrapped with oiled silk, covered with flannel. The object was to generate heat and stimulate the parts. Improvement was marvellously rapid, and

I was soon about; probably too soon for my own good, as a chronic condition ensued. This was contrary to the advice of Dr. Phelps, whose untiring patience and skill had placed me again on my feet and given me the use of my leg, but my business had become so impaired that I felt it absolutely necessary to look after it myself, instead of leaving it altogether in the hands of my assistant, who is a thoroughly good man in the work, but as you know, patients come to the principal. I wore the apparatus a little more than one year, and laid it aside. In spite of all we could do a rheumatic trouble ensued, and my knee was in a bad shape, and I was laid up again. About this time I noticed in one of my medical journals a review of an article published by Dr. Wm. E. Wirt, of Cleveland, Ohio. I communicated with him, and he kindly described to me in detail his methods of procedure and apparatus. I immediately had one constructed as near as possible to Dr. Wirt's, but in comparison it was no doubt very crude; however, through it, I applied dry heat twice daily, as hot as could be borne, and a rapid improvement began, so after a few weeks my knee appeared nearly well, and with an occasional application for about one year longer, I abandoned all treatment, since which time I have been entirely free from all trouble. I attribute my improvement latterly to the "hot air," and from the only experience I have had which is the best—my own—I consider the treatment perfectly logical, and a marked advance on other methods in vogue. I shall certainly consider that Dr. Wirt was the means of giving me a useful leg again, and extend my sincerest thanks to him for his kind interest.

FRANK S. MILBURY,  
215 Jefferson Ave., Brooklyn, N. Y.

CLEVELAND, O., June 26, 1896.

DR. WIRT.

DEAR SIR: Dr. Gilchrist tells me that you have kindly offered to let us have your apparatus again for a few days,



as we would like to give Thompson one more sitting before letting him go. \* \* \*

I will state that Thompson feels so much better that he speaks of leaving the Hospital on Monday, a thing he never suggested before the application of the heat. He said today that his left knee was bothering him a little again, so I guess we will give him another application on that leg tomorrow, with your permission. \* \* \*

Thanking you for your kind offer, I am, Doctor,

Sincerely,

DR. L. P. H. BAHRENBURG.

The patient mentioned in the above letter was a man about 45 years old who was being treated for gonorrhœal rheumatism.

LOUISVILLE, KY., April 9, 1897.

DR. WM. E. WIRT, Cleveland, O.

DEAR DOCTOR: Your letter of the 7th just to hand, and I hasten to answer same. My experience with the hot-air drum has shown me that the present one in use has many disadvantages, and to overcome these I have designed one of my own that I will eventually present to the medical profession. The results of my work have so far been satisfactory, when it is followed by some radical measure such as general Hydrotherapy, but otherwise its capacity is limited. I have, at present, some very interesting cases that are under my observation, but it is yet too soon to speak of its permanency of result. Trusting this will prove of service to you, I remain

Very truly yours,

CURRAN POPE.

I have modified the apparatus considerably since furnishing Dr. Pope the one he refers to.

BOSTON, MASS., April 15, 1897.

MY DEAR DOCTOR: Your letter has just been received and in regard to the hot air, it seems to me that it is a

valuable adjunct in our department of medicine. I certainly have been able to get results by its use that I could not have gotten in any other way, or at least in the same length of time. I have quite a large amount of apparatus and it is in constant use here at my office.

Very truly yours,

JOEL E. GOLDTHWAIT.

#### DISCUSSION.

DR. DAVIDSON: I should like to ask the Doctor if he has applied for or secured a patent on the apparatus.

Answer: No, sir.

DR. DAVIDSON: I should also like to know how long he would continue the application.

DR. R. HARVEY REED: I take it for granted, from what the Doctor has said, that this apparatus is intended for the use of hot air where heat is indicated in cases of joint affection. I do not take it that he intends to use heat in all cases of joint affection. If he does, I certainly take issue with him.

DR. WIRT: I keep the part in the apparatus from half an hour to an hour, and I feel satisfied with a temperature of anything over  $250^{\circ}$ . Dr. Gibney, of New York, reported in January or February, six cases in which he used  $250^{\circ}$  to  $300^{\circ}$ . In regard to the cases, I use it in chronic cases. I would not use it in acute cases.

DR. DAVIDSON: Would you use it in sprains?

DR. WIRT: After the acute symptoms have passed off. I have used it in dislocations of the patella.



