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THE EARLY BEGINNINGS

The Battle Creek food business began in New England nearly a hundred years ago. A man by the name of Sylvester Graham, a scientific man, a university professor and lawyer, became possessed of the idea that there was a natural or biologic way to live and that many popular eating habits were unwholesome and should be reformed. A prominent feature of his system was the use of flour made from the whole wheat instead of the fine white flour which had within half a century become popular. This idea was not original with Graham, for the whole wheat ground on stones has been used from prehistoric times and is still in general use by primitive people; but it was so earnestly and ably advocated by Graham that it soon came to be known by his name. Fifty years ago graham bread was always spelled with a capital "G," and people who used graham bread were for some time called Grahamites.

The first graham flour used in this town was brought from a small mill in New York State—Lockport or Rochester, I believe—which was the only place in this country where graham flour was made. It was some time before it was possible to obtain graham flour in this part of the world without going to the mill and getting the miller to put together the fine flour, bran, coarse middlings, fine middlings, etc. in the right proportions to represent the original grain.

Eighty years ago Graham came to Michigan on a lecture tour and made many converts. Among his converts was Rev. John J. Shipherd, founder of Oberlin, which became a center of diet reform. The same man came to Michigan in about 1835 and established a diet reform

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A paper prepared by Dr. Kellogg and read by Dr. Martin at the Battle Creek Food Co.'s banquet, January 13, 1927.

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center at Olivet. The diet reform feature disappeared from both Oberlin and Olivet.

Twenty years later a group of people led by James White, J. N. Loughborough and others adopted Graham's idea which he had elaborated in a work entitled "Ten Lectures on the Science of Human Life," and Battle Creek became the center of an active health propaganda, one of the results of which was the establishment of a water cure or health institute. It was in this way that Battle Creek became a health center. The enterprise was so much hampered by various obstacles, intrinsic and extrinsic, that little progress was made during the first ten years; but Graham's idea of eating scientifically, physiologically, was well planted and this was the real foundation of the Battle Creek food business.

The breakfast food idea, so far as my knowledge goes, first made its appearance in a little third story room on the corner of 28th Street and Third Avenue, New York City, just 52 years ago. I was boarding myself while attending medical college, partly as a measure of economy and partly because I was making experiments in diet and no boarding house in New York would have provided such a diet as I wanted. My cooking conveniences were very limited. It was very difficult to prepare cereals. It often occurred to me that it should be possible to purchase cereals at groceries already cooked and ready to eat, and I considered different ways in which this might be done.

Two years later, after I had returned to Battle Creek and reorganized the little health institute into the Battle Creek Sanitarium just 50 years ago this winter, I took the matter up and prepared the first Battle Creek health food which I called Granola. This food consisted of a combination of grains which were partially digested by exposure to heat for several hours. Granola was well liked, but it was not advertised and its sale was comparatively limited, though it is still manufactured.

In those days the idea was to make the food as digestible as possible. Mr. Post advanced the idea by adding malt to the cereal, and Grape Nuts became the first ready-to-eat widely used breakfast food.

The Graham system excluded coffee. Numerous attempts were made to prepare substitutes by scorching bits of bread, roasting carrots, chicory, rye, acorns and various other substances. A mixture of grain and molasses was found to be the most satisfactory and quite a demand was soon developed for this coffee substitute under the name of Caramel Coffee. But the use of cereal coffees was very limited until Mr. Post took the matter up and by a widespread and persistent educational campaign put cereal coffee in perhaps ten per cent. of all the homes in the United States. Mr. Post's attack upon the coffee habit and the coffee business, while probably fairly profitable to Mr. Post, has at the same time proved to be, in my opinion, the most successful campaign against an unwholesome diet habit that has ever been waged.

Another feature of the Graham system was thorough mastication

of the food so as to give proper opportunity for mouth digestion. In order to encourage this I required every patient to eat a piece of dry toast, or zwieback, at the beginning of each meal. Zwieback had been in use for centuries at Carlsbad, Germany and other watering places where it got its name zwieback, meaning in Carlsbad German twice baked, the correct word being zwieback.

It occurred to me that if zwieback was a good thing it ought to be used in a thoroughgoing fashion, so I insisted that every patient at the beginning of each meal should eat a good sized piece of zwieback before taking other food so as to get his salivary glands in good working order and to form the habit of thorough chewing of the food.

One day a lady came into my office and demanded ten dollars of me to pay for the repair of her false teeth which she said my prescription had broken. I had at once a vision of a long procession of dentist's bills and numerous protests from people with false teeth, sore teeth, and no teeth at all and saw at once to make my chewing prescription practical I must provide toast in some form which could be readily chewed.

While I was hunting for a solution of the problem I was one night awakened about three o'clock in the morning by a telephone call. After answering the telephone, as I was returning to bed the thought occurred to me that the dream I was dreaming when I was awakened was an important one and that I should endeavor to gather up the threads and finish it, which I did, and with the result when I awakened in the morning I knew how to make cereal flakes. I went at once to my

wife's kitchen and by the aid of a pair of bread kneading rolls which I found in the kitchen made some very palatable wheat flakes before breakfast. Wheat flakes naturally led to corn flakes, rice flakes and flakes prepared from various other cereals. With each new cereal new problems arose.

The development of the flake cereals developed almost a cyclone of interest in breakfast foods and many different companies were formed for promoting the idea, a few of which still exist. The corn flakes business grew so rapidly it was turned over to the Toasted Corn Flake Company, and I think it may fairly be said that Toasted Corn Flakes have proved to be the most popular of any breakfast food that has yet appeared, a fact which is the more interesting because it owes its origin to the breaking of a lady's false teeth by my hard chewing prescription.

In dealing with patients at the Sanitarium the most difficult problem which from the first presented itself was that of prompt elimination of food remnants and body refuse. The millers in their efforts to combat the Graham idea of coarse meal bread had filled the public mind with grave apprehension of the dire consequences certain to result from the use of bran. The average citizen was thoroughly convinced that if bran, small seeds or any other roughage were allowed to traverse his interior the result might be a dangerous laceration or excoriation of his whole alimentary canal or a penetration of his appendix which might necessitate a month's stay in a hospital or some other disaster.

I cautiously began the use of bran as a remedy first in

teaspoonful doses, then in larger doses, and in the course of a year succeeded in getting my own courage and that of my patients up to the point of swallowing a whole tablespoonful of bran at a meal and with such good results that there became a demand for clean bran, sterilized and put up in packages ready for use. I think bran was more decidedly the butt of ridicule than any other of the new products of our laboratory and it was very slow in getting started. The score of food manufacturers now putting bran upon the market have carried on such a vigorous educational campaign that tens of thousands of people are actually using bran as a breakfast food, and the manufacturers of after-dinner pills, castor oil and mineral waters have suffered a great slump in their business. The world is discovering that materia alimentaria is much more efficient than materia medica.

But it would occupy too much of your time if I should undertake to tell you all about the nativity and the bringing up of each one of the hundred or more different offspring of the Battle Creek Food Company laboratories. It will perhaps be sufficient for me to say that every food this laboratory has produced has been called for by the clinical work of the Battle Creek Sanitarium and has been prepared to meet some dietetic need, to solve some dietetic problem which had newly arisen or had long been waiting for solution. Often the problem has proved to be a perplexing one, requiring not merely months but even years of thought and investigation, not continuous of course, but in a series of successive attacks as new ideas developed, offering solutions for difficulties that had seemed insurmountable. I am sure it is safe to say that there has never been

any time in the last 40 years when there were not from one or two to a dozen such problems on hand, and the chief purpose and effort of the Battle Creek Food Company has been to meet these dietetic needs and to solve dietetic problems rather than to produce commercial products. At least I am sure I am justified in saying that no product has ever been manufactured by the Battle Creek Food Company the primary purpose in producing which was commercial. This remark is not made in disparagement of food manufacture as a commercial industry, which is certainly as honorable and justifiable as any industry could be, but merely for the purpose of emphasizing the fact that the Battle Creek Food Company had its origin in an effort to promote the food reform movement initiated by Sylvester Graham and has been carried on from its beginning as a necessary part of the community of enterprises which comprise the Battle Creek Sanitarium, Battle Creek College, the Good Health Publishing Company, and the Battle Creek Food Company.

The Battle Creek Food Company has sought to do its part in creating a dietary system based upon modern science in harmony with the known principles of physiology and biology. Such a system to be successful must meet esthetic and gustatory requirements as well as digestive needs, and so the problems offered for solution have required the cooperation of trained cooks, dietitians and expert chefs. In this work a great number of loyal and enthusiastic experts have cooperated, especially in the development of a new system of cookery for which our laboratories have supplied the fundamental staples.

By this means there has been developed at the Battle Creek Sanitarium a dietary which is perhaps its most characteristic feature and which is probably the most important of any single factor in the successful treatment of the sick which has established its standing

as a medical institution.

In conclusion, I may perhaps be permitted to express some satisfaction in having lived long enough to see the small beginnings of the health movement with which I became associated more than half a century ago develop to proportions which I believed possible and probable, but never expected to behold with my own eyes, and to be able to feel that with the enthusiastic cooperation of the several great food enterprises of this city, the ideals to the development and propagation of which I have devoted my life have materially and beneficially modified not only the American breakfast but the American dinner and the supper as well, and have helped to make of this little country town a sort of international cafeteria where the world-weary stomach may be scientifically fed, comforted and satisfied.

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PIG AND LONG-PIG

Down in the South Seas, where the natives when discovered by Captain Cook, practised cannibalism, they called the flesh of a man "long-pig", but did not eat it for food or because they had a special liking for it, but because of a belief, wide spread among these primitive peoples, that by eating of a man one might absorb his qualities, his courage, physical strength, cleverness, his character, his very soul and personality, even his property rights. A native when asked by a judge for proof of his ownership of a certain property replied "I ate the former owner;" and this settled the matter.

The writer once asked the grandson of a Maori chieftain who was known to have eaten missionaries, "Why did he eat the missionaries? was he hungry, or did he like the taste of human flesh?" "For neither reason," he replied. "I once asked grandfather the same question and he answered. "I ate the missionary so that I would be good and wise like him;"

After eating human flesh, a cannibal performs various purification ceremonies. He fasts and does penance of various sorts to prevent the spirit of the deceased from doing all sorts of unpleasant things to him. His pigs and poultry would leave him, his garden vegetables die, and all sorts of calamities occur. Cannibalism is by no means so gross and savage a thing as it is generally thought to be. It is a ceremonial rather than a gluttonous feast.

The civilized eaters of pig may unwittingly realize the ambition of the cannibal in absorbing some of the qualities of their victims. Bronson Alcott, the Concord philosopher declared "eaters of pork became piggified;" and insisted that their hair in time becomes bristly - but they fail to take precautionary measures to prevent evil consequences, as does

the savage, and so they some times suffer severe penalties, such as tape worm infection and trichinosis.

Besides, the cannibal has a logical reason for his practice which is consistent with his philosophy; but with plenty of other better food at hand what excuse can the civilized man offer for first feeding, then killing and eating the pig? Said Ovid,

"Where will he ^{stop} end who feeds with household bread

Then eats the turkey that before he fed!"

TAKE A VACATION

Don't wait until you are compelled by illness to take a little respite from your dull routine. Take a vacation when you can enjoy it. When you break down, it will be because your reserve is completely used up. Nature never surrenders until every resource has been exhausted. This is like running your automobile when oil is low or the radiator is dry until a bearing gives way or the engine stalls so you have to telephone for help and to be hauled in to the garage for repairs, or neglecting to look after leaks in your business until your ~~profits~~ ^{assets} are damaged and your capital impaired.

A summer vacation is good, but a winter vacation is just as necessary and may be made every way as profitable. In fact, a vacation ^{a year} once is not sufficient. The ^{un}natural way in which we live wears us out prematurely. The more often a vacation is taken the better, as a means of extending life expectancy. Break away for a week or two. Get a breathing spell in the fresh air. Don't go to Florida unless you have to on account of weak lungs or sore nerves or rheumatic joints that forbid active exercise in the wintry air. Jack Frost is a friend, not an enemy. There is more tonic for spent nerves on a snowy hillside than in the biggest city drug store.

If you cannot get off any other way, get kidnapped. This is the Dearborn Independents bright suggestion. Referring to a certain religious leader out west whose name has been conspicuous in the papers for some weeks until recently, our contemporary says,

"Maybe she was kidnapped. If so, it was undoubtedly a good thing for her. There are many men living under killing strains today whose physicians would like to kidnap them, take them hundreds of miles away and make them walk home - it would be their physical salvation!"

THE VITAL OVERHEAD

Every successful business man gives much thoughtful attention to the overhead of his business. The overhead consists of certain basic and essential costs such as fuel, light, rent, labor, insurance, etc. Evidently the greater the overhead expense, the smaller will be the profit. Every dollar saved from the overhead cost will be a dollar added to the profit, other conditions being unchanged.

We take care to keep our automobiles in good running order so as to lessen the cost of running the car itself. We are careful to buy just the right brand of oil, we keep every bearing lubricated, we supply the best quality of gasoline, we see that spark plugs are kept clean and that the engine is kept free from carbon. By this means we lessen the internal expenditure of energy, and so get greater speed, and greater load carrying capacity. When internal friction increases, speed diminishes at once. A good chauffeur takes such care of his car that he can get the largest number of miles possible for each gallon of gasoline.

As a car is used, its efficiency gradually diminishes. Maximum speed is less, the number of miles per gallon of gas is less, and the load carrying power is less. The reason is the increase of internal friction, the increase of overhead cost, of unproductive expenditure of energy. The length of time a car will work up to full capacity, as when new, depends upon the quality of the car, upon the original material and workmanship embodied in it. Some cars deteriorate rapidly, others more slowly. But all cars deteriorate sooner or later. The aim of every wise car owner is to give his car such care as to prolong its efficiency as much as possible.

A man's body is his automobile. He is the chauffeur. His vital

machine is endowed with inherited powers which entitle it to an efficient life of at least one hundred years ~~if~~ his parents were of good *stock*. But he will probably die, according to the statisticians at less than ^{sixty} 60 years because of neglect to keep an eye on the vital overhead and hold it down to the minimum.

A man who smokes adds an enormous load to his vital overhead by making necessary the removal from his blood of very significant quantities of nicotine. This must be done to keep him alive because nicotine is a deadly poison, only a little less deadly than prussic acid. Two drops will kill a man and eight drops is the fatal dose for a horse. The liver destroys nicotine and the kidneys eliminate it. It is this alone that prevents a fatal result from the first cigar, for a single cigar contains a fatal dose of nicotine besides prussic acid and a dozen other poisons. ~~Nicotine~~ Nicotine not only loads the overhead but damages the machinery. It injures not only the liver and the kidneys, but the heart, bloodvessels, brain, nervous glands and digestive organs. Gastric and diodenal ulcers are now known to be due in many cases to the cigar. "Smoker's ulcer" ~~of the stomach~~ is a recognized disease.

Tea and coffee, mustard, pepper, excess of fats, pastry, sweets, and the free use of meat and eggs are other notable factors which overload the overhead, and hence lessen the output of useful work which the vital machine can do, and hasten the day when it must go to the scrap heap.

Keep an eye on the overhead.

SHODDY

If you were a manufacturer would you use good material or shoddy? Would you employ good reliable workmen or careless, irresponsible bunglers? If you were building automobiles would you use good metal, tested steel, rubber, leather, wood, everything ^{of} known quality, fresh from original sources, or would you be content to gather and assemble worn second hand parts from second-handed dealers and junk heaps?

We are all manufacturers, we are in the business of body building. Not car bodies for Fords or Pierce Arrows, but corpormobiles for our own individual use. Our bodies are made of what we eat. What we eat to-day is walking around and talking to-morrow. Blood, brains, bones, muscles, every cell or fibre of our bodies is made of the material we put into our stomachs. Food ~~seves~~ ^{seves} a double purpose. It is at one and the same fuel to be burned to keep us warm and ~~building~~ ^{building} material for construction and repair.

If you could make brains or blood in a laboratory, you would make a product of the finest quality possible.

Your body is a laboratory in which Nature's finest products are produced. In certain organs, bones, liver, glands, the blood is made. You control the process and determine the quality of the blood made by the food you eat and your habits as regards exercise, sunshine, sleep, etc.

If you use alcohol in any form, you destroy blood cells and deteriorate your blood. If you smoke you pollute the blood stream at the fountain head. Tea and coffee, neglect to chew the food, the candy habit, flesh eating, neglect of the bowels, neglect to exercise in the open air indoor sleeping, these and many other bad habits make blood of low quality.

When examination of the blood shows the

When examination of the blood shows the hemoglobin to be 100, that means that the quality of the blood is good, at least, that it has a full supply of iron, one of the chief essentials. A hemoglobin of 50 means that the blood is 50% below par.

The blood is the life. With the blood at 50% you are only one-half alive, half dead in fact. Your blood factory is turning out a shoddy product, and who is responsible? Why not reform at once? Why wait till you see the undertaker coming to carry you off to the rubbish heap?

THE SUCCESSFUL TREATMENT OF COLITIS

A few months ago, a colleague handed the writer a letter which he had received from a medical friend, a distinguished surgeon internationally known, who was suffering severely from colitis and was feeling much depressed because he had found no relief, although many physicians had been consulted and many different remedies tried.

At the doctor's request, the following letter was written to his friend:

"There is only one way to cure colitis and that is to change the intestinal flora, for colitis is an infection, and as in any other infection, the infecting agent must be combated. In the case of colitis, there does not seem to be any one specific bacterial cause, but a number of bacteria, particularly the paracoli bacillus, or paratyphoid, as it is sometimes called, the enterococci, various forms of streptococci, Welch's bacillus and other putrefactive bacteria are all perhaps capable of setting up and maintaining the condition through the damaging influence of the toxins which they produce upon the intestinal mucous membrane.

"Fortunately, all of these bacteria may be combated by the same means, that is, by changing the intestinal flora. This does not require cultures for Nature supplies the culture for adults just as she does for all infants. Every new-born baby is supplied with acid-forming bacilli, the growth of which in the interior of the body, prevents the growth of putrefactive organisms.

"The method of changing the flora is very simple. First of all, the diet must be antitoxic; that is, it must be such that the residues left behind in the colon will be as little putrefactive as possible. This means

of course, that meat and eggs must be eliminated. There are occasionally cases in which milk must also be eliminated for a time at least. As you know, in acute colitis in children, the withholding of milk is highly essential for the casein of milk supplies a culture medium for the infecting agent. The same thing is true in some cases of chronic colitis, especially cases characterized by acute relapses.

Vegetable proteins do not promote the growth of these organisms as do animal proteins. This was first pointed out by Tissier, of the Pasteur Institute, 20 years ago, and Torrey in experiments upon animals demonstrated the same thing. Torrey stated, in fact, that he found it possible to change the intestinal flora in dogs with the vegetable protein gluten from wheat.

Dr. Mitchell, of the Nutrition Laboratory of the Battle Creek Sanitarium, has recently verified Torrey's observations. The flora of meat-fed rats was reported improved when gluten was added to their diet and protective bacteria soon appeared in great numbers, in a few days reaching the proportion of about 60 per cent.

To get a thorough-going change it is of course necessary to eliminate meat, for meat is always swarming with Welch's bacillus and other bacteria which are capable of producing neuritis, and the residues left behind in the colon, are of such character as to promote in the highest degree the growth and development of colitis producing organisms of a virulent type.

The next thing necessary is to keep the colon empty. This may be accomplished by regulation of the diet and the use of the enema. These are the only means that should be employed. Laxatives of all kinds must be strictly eliminated. They create congestion and irritation and, according to von Noorden, may actually give rise to colitis. He showed this to be true

especially of saline laxatives, but all laxatives are bad because they irritate the mucous membrane and lessen its resistance, and they are quite unnecessary. The trouble is in the colon and the colon is simply a receiving pouch at the lower end of the alimentary canal, and can be easily washed out with water, and without any more harm to the body than washing the face or cleansing any other part of the body.

"So the diet must be highly laxative; that is, it should consist of an abundance of fruits and fresh vegetables such as spinach, lettuce, cabbage and coarse vegetables of all sorts, the coarser the better. Have no fear of roughage. The popular idea that a bland diet is required, is wholly a mistake. The only cases requiring a bland diet are those in which the food is carried through the intestinal tract too rapidly. Such cases are easily recognized by the use of carmin capsules. Two capsules, each containing five grains of carmin, are taken at breakfast and note is taken of the first appearance of the red color in the stools, and again of the time when the red color last appears. Not infrequently in cases of colitis, the red color will still be found present three or four days after taking. There is commonly a great delay of residues in the cecum, which is usually dilated. The ileocecal valve is incompetent. The colon is not completely emptied even when the stools are loose. I have known of some cases in which, notwithstanding the fact that the bowels moved ten or twelve times a day, bismuth and carmin were retained in the colon for three or four days. There is a more or less constant overflow of material from the colon but never complete clearance.

"Complete clearance is necessary. It must occur at least once every 24 hours. The cleaner the colon can be kept, the better. A good plan is

to take two carmin capsules for breakfast and then wash the colon out at bedtime, repeating the enema until the red color is wholly removed. The residue of the breakfast will all be found in the colon within seven to nine hours after the breakfast is eaten. That is, when breakfast is taken at eight o'clock, the residues of the meal will all be found in the colon by five o'clock in the afternoon and by ten o'clock these residues should be evacuated from the body.

Unfortunately, this rarely ever occurs in colitis and in so-called healthy people generally whose bowels move once a day the residues are retained more than two days. As a result, about nine-tenths of the entire population are suffering more or less from autointoxication, due to the absorption of the products of the putrefaction of food residues retained long after they should have been evacuated.

"In addition to the diet suggested, certain accessories are of great value, particularly Fig Bran, a half tumblerful at each meal. The coarser the bran, the better. Ordinary fine bran is not very efficient. Coarse bran, from which all the fine stuff has been removed, is most efficient. Fig Bran consists of this sort of bran with the addition of figs. It can be taken rather easily as a breakfast food. Agar may be used in place of bran, but is less efficient. It must be used in very liberal quantities to be effective.

Another excellent food accessory is psyllium seed, commercially known as Psylla. It is a highly mucilaginous seed of European origin. A still better variety, White Psylla, is commercially known. It belongs to the same family of plants, the Plantago. The white variety is the Plantago ovato, the ordinary black variety, the Plantago psyllium. The white psyllium seed has been used by the Asiatics for centuries. It produces considerably more mucilage than the black variety.

Psylla should be taken in doses of one or two heaping dessertspoonfuls at each meal. It should be put in a glass and half a glass of hot water added and stirred until it thickens and becomes about the consistency of gruel; then a little milk or cream or sugar may be added and it can be taken without difficulty.

"Psyllium seed has the advantage that it supplies both roughage and lubrication. Lubrication is as necessary as roughage. But in some cases more lubrication is needed. Mineral oil is commonly used for this, but in its ordinary form it is not very efficient. It generally helps but often fails to accomplish what is required. The reason is that the ordinary mineral oil does not mix with the food residues and does not remain with them. Examination of the stool shows the oil floating on the surface while the residues have sunken in the water. Vaseline is better than ordinary mineral oil for the reason that it adheres to the food and remains with the residues. It does not become sufficiently fluid in the body to move by itself and so adheres to the particles of food and food residues and is carried along with them.

"Best of all is a paraffin preparation which is solid at ordinary temperatures but melts at the temperature of the body. This occurs in tablets form and is known as Paramels. This is two or three times as efficient as ordinary oil and succeeds when oil does not succeed. This proves useful even in cases of colitis in which there are too frequent bowel movements, for it secures more complete movement and does not irritate the bowel, and so lessens the frequency of the movements. This is true of roughage in general except, as before remarked, in cases in which enteritis exists and the food is passed through the intestine at too rapid a rate. When the intestine is slow, the use of roughage and other

accessory means of increasing motility is indicated and no harm can result.

So-called **roughage** does not act upon the intestine roughly; it does not irritate but only titillates. The method by which material is moved along the intestine is not such as to render mechanical irritation possible. The irritation which disturbs the intestine is chemical rather than mechanical. The intestine handles its contents so deftly that there is no chance for irritation. Glass, stickpins and other sharp and cutting objects, have been transported through the intestine without giving any evidence of irritation or injury. Witness the glass eaters of the dime museum.

The feeling of apprehension widespread among the profession as well as the laity that all roughage must be withheld in cases of colitis, is a fatal mistake, for a bland diet produces such obstinate stasis that it is impossible to keep the as clean as it must be. Roughage is needed to broom out the intestine and so keep it free from putrefactive residues. Some putrefaction is likely to occur even when putrefactive foodstuffs are quite thoroughly suppressed, for the reason that the remnants of intestinal fluids and even the bile, are capable of undergoing putrefaction when marked intestinal stasis exists.

"It is highly essential in the treatment of colitis to keep the colon as thoroughly clean as possible. We know how necessary it is to maintain thorough cleanliness in the treatment of superficial lesions. Cleanliness is just as essential in dealing with lesion of the mucous membrane as in those of the skin. On this account, the colon should be thoroughly washed out at least once a day. Twice a day is better in severe cases. It is a good plan to wash the colon out very thoroughly just before going to bed. The volume of

water should not be over two quarts. The temperature should be as high as can be borne without discomfort; 115 degrees, at least. A temperature of 120 degrees is not too high. It will not do any harm. High temperatures are stimulating to the mucous membrane and promote health. The high temperature also has the effect to relieve pain when present and to relax the spastic colon, which is highly important.

"One more measure of importance is the use in liberal quantities of a carbohydrate of such character as to promote the luxurious growth of an aciduric flora. Lactose and dextrin have been found to be best for this purpose. Ordinary lactose is efficient. Dextrin is a little more efficient. A combination of the two seems to work better than either one alone.

"The Lacto-Dextrin must be taken in sufficient quantity to make sure that some of it reaches the colon so as to encourage lactic acid formation, and this will very soon kill off the bacteria which maintain the colitis. Of course, these bacteria are not all on the surface. Some of them have worked their way down into the deeper layers of the mucosa and for this reason the use of Lacto-Dextrin and all the other measures suggested must be continued for a considerable period of time, sometimes for many months. The Lacto-Dextrin must at first be taken in liberal amounts. About three ounces three times a day is the amount required for effective results. It is not necessary to take acidophilus buttermilk or cultures of any sort for Nature always furnishes the culture. The acid-forming organisms are always present and it is only necessary to supply a proper culture medium for the colon and they at once begin to multiply rapidly and soon become dominant.

"The evidence of improvement will be a change in the character of the stools. They will become less and less offensive and more normal in character. The bowels normally move after each meal. The stools are normally of a consistency of oatmeal mush and not formed, as the books tell us. A formed stool is always an evidence of stasis.

"At first the Lacto-Dextrin will give rise to considerable quantities of gas. This may be somewhat troublesome at first. Any inconvenience can be quickly overcome by means of a hot enema.

"In connection with the measures above suggested, sun baths should be taken when possible. The whole body should be exposed to the sunlight. The exposures should be long enough to produce a slight sunburn or solar erythema. This increases resistance and helps to develop immunity. Exposure of the body to the air also builds up resistance wonderfully,-- air baths of three to six hours a day and exposure to the sun from 15 minutes to an hour, gradually increasing the exposure as the skin becomes accustomed to the light."

In due time, a letter was received from the doctor acknowledging the receipt of our communication, and saying that he would make a thorough trial of the measures suggested.

A few weeks later, the following letter was received:

"Am unable to command words to adequately express to you how grateful I am for what has been done for me. On receipt of the instructions, I began most faithfully to follow the treatment outlined in your letter. Three days after I began to take Lacto-Dextrin followed by Ppylla as directed, I began to feel much better and have been improving constantly. Colitis is powerful as a strength destroyer. I am coming back, however, and feel confident that I will fully recover my health."

THE RATIONAL TREATMENT OF GASTRIC HYPERACIDITY

Up to the present time little progress has been made in dealing with this exceedingly common and often very distressing ailment. Failure has been due simply to the fact that the acid-forming and acid-regulating functions of the stomach have not been well understood.

The writer's purpose in this paper is to call attention to a simple and successful method of dealing with gastric hyperacidity through the application of the knowledge respecting the acid functions of the stomach recently developed by laboratory research by various investigators.

Fifty years ago, gastric hyperacidity was supposed to be due to fermentation. Dr. Salisbury, of Cleveland, propounded a theory which for some years maintained a considerable degree of popularity. His idea was that acidity was the result of the development of yeast in the stomach. To prevent this, he insisted upon the suppression of carbohydrate foods and put his patients upon a diet consisting chiefly of lean meat and hot water. Salisbury steaks were in great vogue for years until the Ewald test breakfast demonstrated that the real cause of the acidity was not fermentation but an excess of hydrochloric acid, a normal constituent of the gastric juice. A few years later, Pavlov made the important discovery that lean meat and meat juices instead of suppressing acidity are powerful stimulants of the acid-forming glands of the stomach.

These discoveries stopped the meat feeding in these cases and led to the use of soda, magnesia and other chemical agents for neutralizing the gastric acid. This method affords only temporary relief and often results in aggravation of the disorder or in other damage. Alkalies like flesh meats tend to increase the activity of the acid-forming glands.

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Boldyreff made the interesting discovery (1914) of the existence of an acid regulating gastric function through the reflux of duodenal fluids into the stomach. He found this reflux to be a constant and regular process in conditions of health and not an occasional pathological process as had formerly been supposed. Boldyreff's researches showed that in health the pylorus is tightly shut only for a brief period after the passage of a peristaltic wave and the discharge of a small portion of gastric contents into the duodenum. In the interval between the openings the pylorus is sufficiently relaxed to allow a constant tidal movement ~~back and forth~~ between the duodenum and the stomach, thus preventing an excessive accumulation of acid in the *stomach* ~~gastric contents~~ (Ryle, Bolton, Goodhart, Campbell).

Boldyreff considered the alkaline pancreatic juice rather than the bile to be the chief neutralizing agent, though sometimes the bile also was present.

It thus became evident that in most cases gastric acidity depends chiefly on the amount of neutralization through reflux of duodenal fluids and this depends upon the degree of relaxation of the pyloric sphincter, which, in turn, is determined by the degree of gastric tonus.

There are many factors which influence gastric tonus. Anything which hinders the normal reflux of alkaline fluids from the duodenum will tend to increase gastric acidity. Evidently, gastric hyperacidity is not always due to excessive acidity of the acid-forming glands of the stomach. Indeed, modern studies of this subject indicate that

hypersecretion of acid is a rather rare condition. If the pylorus closes too tightly and if the gastric contents are too long retained, the result will naturally be an accumulation of acid in the stomach and hyperacidity. On the other hand, very rapid emptying of the stomach might cause hyperacidity because of the rapidly diminishing amount of material in the stomach to mix with and dilute the gastric juice continually forming.

Numerous investigators have demonstrated another important factor in gastric acid regulation; namely, the secretion of an alkaline diluting juice by the glands of the pyloric portion of the stomach. This diluting secretion is by some considered to be the dominant factor in acid regulation. It at any rate plays an active and important role in this function.

In gastric hyperacidity there may be an interruption of either one or both of these neutralizing functions.

Now that we know the physiology of gastric acid regulation we are better prepared to undertake a search for rational means of relief. Evidently, measures which lessen pyloric tonus are indicated.

Now that we know the physiology of gastric acid regulation, we are better prepared to apply rational means of relief. Evidently measures which lessen gastric and pyloric tonus are indicated. Anything which lowers general muscular tone, in other words, anything that relaxes the muscles in general, will have a similar effect upon the muscles of the stomach. Hot baths and large hot fomentations over the stomach and abdomen, also hot drinks, and the hot enema have a pronounced relaxing effect and are among the most useful means known for affording relief in pyloric spasm or painful indigestion.

The same measures lessen acidity by relaxing the pylorus and thus assisting the normal neutralizing process through the reflux of alkaline intestinal fluids into the stomach.

Another indication of great importance is increase of the alkaline diluting juice formed by the pyloric glands of the stomach. This will be accomplished by the administration of certain carbohydrates, particularly by the use of Lacto-Dextrin. It has long been known that levulose, the sugar of fruits, produces this effect, and Herschel of London, years ago, insisted that malt sugar stimulates the pyloric glands. A combination of lactose and dextrin or Lacto-Dextrin usually affords relief in cases of gastric acidity and gastric pain with surprising promptness.

Relief often ^{occurs} ~~operates~~ ^{after Lacto-dextrin} more quickly than when soda is given, and the beneficial effect is of much longer duration. Soda is a mere chemical agent and only neutralizes the acid without removing the cause. In fact, experiments have shown that the taking of soda has a tendency to increase acid formation rather than to diminish it. Lacto-dextrin increases the activity of the glands which produce the alkaline diluting

juice and by lessening acidity lowers the tonus of the stomach, which causes relaxation of the pylorus and so permits the reflux of the alkaline pancreatic juice. This, then, is a rational and physiological remedy, affording relief by aiding the stomach to function in a normal manner.

The beneficial effects of Lacto-Dextrin are well illustrated in the following cases:

A patient, male, aged about sixty-five years, a travelling salesman, had suffered for many years with gastric acidity and an X-ray examination had recently shown the existence of a peptic ulcer. On several occasions he had undergone tube-feeding and other courses of treatment with temporary benefit but speedily relapsed and his condition had finally become aggravated to such a degree that only slight relief was afforded by tube-feeding and the use of soda. The patient had become a confirmed invalid and suffered much after every meal even when great care was exercised in his diet. Lacto-dextrin was given with the result that pain was immediately relieved. By its continuous use and care to maintain proper activity of the bowels, the patient has remained well for two years. He reports that he found quicker and more complete relief from Lacto-dextrin than from the use of soda, and by the systematic use of Lacto-dextrin, ~~not continuously but at frequent intervals~~, he has kept himself wholly free from the disease from which he had suffered for many years.

Another case ~~typical of many which might be cited~~, ^{was} that of a man aged about thirty-five years, a farmer, who had suffered greatly for three years from gastric distress and acidity. X-ray examination showed the presence of a duodenal ulcer.

The patient was brought to the writer by his physician with the request that an operation for gastrectomy should be performed on him as the case was one not likely to yield permanent results from treatment.

The patient was at the moment suffering severe gastric pain which he experienced after every meal. He was given at once two tablespoonfuls of Lacto-dextrin in half a glass of hot water. In three or four minutes, the patient remarked that his pain had disappeared and he was very anxious to know what had been given him, declaring that he had never experienced such prompt and complete relief from anything he had ever taken.

The patient was given instruction with reference to diet and permitted to return home being asked to return in two weeks.

The dietetic instruction given him was as follows: Meats were to be wholly avoided, the diet to consist of well-cooked fruits, grains, vegetables, milk and eggs in moderation. Half a tumberful of bran

at each meal and paraffin oil and a dessertspoonful of psyllium seed to be taken with lacto-dextrin, before or after the meal.

The patient was asked to take a hot enema daily at bedtime, so as to make certain the colon would be kept free from residues.

At the end of two weeks, the patient returned. He had been very well and wholly free from pain except on one occasion, when he had neglected to empty the colon after he had worked very hard at plowing, having resumed his farming, for which he had previously been quite incapacitated for several months.

The patient was instructed to continue his regimen and to return again at the end of two weeks, when he was found to be in excellent health. He had experienced no pain, had gained ten pounds in weight, and was feeling very fi

It should be mentioned that the patient, among other changes in his habits, had stopped the use of tobacco, which was doubtless a factor in promoting his recovery.

8-2-27

SPECIAL FEATURES OF THE BATTLE CREEK SANITARIUM

BILL OF FARE

It Is Unique

On no other table have appeared so many new and wholesome foods and food preparations which have afterwards become known and used throughout the civilized world. It is the result of more than 50 years of research and experimentation in the dietetic and culinary laboratories of the Battle Creek Sanitarium and its affiliate, the Battle Creek Food Company. Among the special features which have given to the Battle Creek bill of fare its superlative excellence and commanding influence are

It Is Biologic

That is, every food is selected with reference to its adaptation to meet the body requirements and its complete freedom from unwholesome properties. Nothing is permitted to appear upon the Sanitarium table which is in the smallest degree objectionable from a health standpoint. On the other hand, great pains is taken to provide as great a variety as possible of wholesome, attractive, palatable-satisfying nutrients and of the highest quality obtainable.

It Is Balanced

Every bill of fare is carefully arranged and studied by a group of food experts to make sure that everything needed to meet both general and special nutritive needs is provided.

It Is Safe

Extraordinary care is taken to insure absolute purity and

freedom from contaminants of any sort. In addition to the elimination of unwholesome foods, great care is taken to eliminate all possible danger from contaminants not only by careful inspection but by thorough sterilization. All uncooked foods such as fruits and green vegetables which are served without cooking are thoroughly washed and then sterilized by immersion in a highly efficient but harmless germicide similar in character to that which is in universal use for the purification of public water supplies. This affords perfect protection against the *Endameba histolytica* and other intestinal parasites which are rapidly becoming a grave menace to health through the general neglect of these precautionary measures which have afforded complete protection to guests of the Battle Creek Sanitarium for more than a quarter of a century. In addition to the careful sterilization of the food, food handlers, waiters and dish washers are required to sterilize their hands when they come on duty and to repeat the sterilization whenever contact is made with any possible source of contamination by contact of the hands with unsterilized foods or food containers, the person, clothing or other possible sources of contamination.

The Calorie Balance

As a pioneer in dietary progress, the Battle Creek Sanitarium was first to place upon its tables a bill of fare showing the energy values of each article of food served. Its bills of fare are still unapproached in the thoroughness and completeness of this feature which enables each diner to regulate with accuracy his food intake for each meal and each day, thus facilitating weight control.

The Vitamin Balance

Avitaminosis or vitamin deficiency is now recognized as one of the most common and perhaps the greatest of all causes of disease. Our

expert dietitians have all received special college and nutrition laboratory training and have had long experience in correcting vitamin deficiencies. These experts in marking bills of fare take care to make sure that the special needs of each individual guest are fully met.

Vitaminized Foods.

Very few natural foods contain all the vitamins required for normal maintenance. Only by carefully studied combinations, based upon expert knowledge of the vitamin contents of foodstuffs and of available vitamin concentrates, are these defects made good. The Battle Creek Sanitarium bill of fare is altogether unique in providing means whereby a complete vitamin ration can be provided for each guest no matter how great may be his vitamin need because of injuries resulting from some specific vitamin deficiency.

The Food Mineral Balance

The importance of careful balancing of the foodstuffs for lime, iron, copper and other food minerals, demonstrated in recent years by the nutrition laboratory, is fully recognized both in providing a bill of fare which makes these food essentials available and in the careful adjustment of each bill of fare to individual needs by trained dietitians.

Mr. Chairman;

Ladies and gentlemen, members of the Third Race Betterment Conference. In behalf of the Race Betterment Foundation and the Board of Managers of the Battle Creek Sanitarium, I extend to you a hearty welcome and assure you that there is no place in this world and probably no other where such a gathering as this would be more thoroughly appreciated or more warmly welcomed.

The Battle Creek Sanitarium is, and always has been, a Race Betterment enterprise rather than a hospital. Its charter enumerates in addition to the care of the sick a variety of activities looking toward individual and racial betterment.

The Race Betterment Foundation is a trust established some ~~forty~~ years ago having as its chief purpose the support of activities calculated to promote race betterment by the application to human life of the known facts of physiology and biology, as they are now applied in agriculture, horticulture and the live-stock industry and as chemistry, physics, mechanics and other sciences are applied in ~~various branches of~~ modern industry.

The first Race Betterment Conference was held here in January, 1911. It was presided over by Dr. Stephen Smith, the founder of the American Public Health Association and at that time in his ninety-second year and a fine example of the efficiency of biologic habits in promoting health and longevity.

At the time the first Conference met, the facts about race deterioration which are now fully established and quite generally known, had received little attention. A few years later, at the International Eugenics Conference in New York, the second speaker on the program remarked, "Of course, we all know that the human race will ultimately perish but if we will give attention to eugenics, we may hope to postpone the catastrophe somewhat."

And Major Darwin, the son of Charles Darwin, remarked, "If our present civilization survives, and I fear it will not, it will have to be the United States that saves it."

The newspapers called attention to the fact that there was a very pessimistic note in the Conference. Certainly, no one offered a program having for its aim the salvage^{ing} of civilization and the creation of a superior human race. The Race Betterment Movement, of which this Conference is an outgrowth, is an effort to find such a program in the discovery of means whereby the degenerative influences which are dragging the race down may be successfully combated, and through the application of science our civilized life may be made as biologic and health-promoting as is that of the savage living under ideal conditions. Why may we not do as much for ourselves as we have done for our domestic animals and our farm crops and garden products? We have fleeter horses, finer cows, more industrious hens, more delicious fruits, more wonderful flowers than the world ever knew before. Why not through the same means that have produced these marvelous betterments, applied by tactful and subtle methods adapted to human conditions, to not only stop the downward trend but start a trend upward which by small increments accumulating through many generations may create a new race of men as much superior to the finest representatives of the race to-day, as our highest types are above those lowest in the scale?

The belief that such an optimistic program is possible, is the raison d'être of the Battle Creek Sanitarium; hence it is a special joy to welcome here this great body of scientific men. You are the leaders in scientific thought on this continent, the makers of current opinion.

The greatest problem before the world is how to save the human race. I am sure that the splendid program which Dr. Little, the president of the Conference, has prepared for you and the discussions which will be elicited by the able papers which will be read will help to solve this great problem.

May I say further that in inviting you here for this Conference, we were thinking not only of future generations but of you. We want you to find here a house by the side of the road where a tired brain worker may find rest and comfort and possibly discover how to rest faster and to sleep sounder and to feel fitter to meet and solve weighty problems. And we want you all to feel at home and to know that we are all at your service.

RATIONAL PHYSICAL THERAPY

Empiricism has been the bane of physiotherapy. Most physical remedies, like many drugs, were first employed by laymen, or quasi doctors who knew little of anatomy and nothing of physiology. Thus, the first to use water systematically was Priestnitz, whose methods were wholly empirical, yet so practical and efficient that they are for the most part still in use in well appointed hydriatic establishments.

Massage and medical gymnastics were practised by the Chinese two or three thousand years before they became known to Western civilization. Even electricity was first used empirically.

Sixty years ago, in my boyhood days, ⁱⁿ one or two families, ^{electric} and nearly every community, possessed a shocking machine, a small generator operated by turning a crank. Mechanical appliances of various sorts, exercise, posture, diet, light and heat, were all made use of empirically before there existed a rationale for their use. As a matter of fact, the beginning of physiotherapy reached far back into historic and pre-historic times, long before medicine had become a science. The foundationstones of chemistry, physics, physiology and physiologic experimentation had not yet been laid. But when, sixty years ago, the new day of scientific medicine began to dawn through such leaders as Hufeland, Boerhaave, Sydenham and Currie in Europe, and Jacob Bigelow, Oliver Wendell Holmes and the elder Flint in this country, physical methods began at once to receive attention, for the very cogent reason that a rational, physiologic explanation of their effects was easily discoverable, and because physical agents above all others remedies were adapted to meeting the therapeutic indications based upon the study of

the morbid physiology of patients. For example, when I first began the use of massage, more than ⁵⁰sixty years ago, ~~this~~ physical method was generally looked upon with more or less suspicion as being closely allied to quackery if not absolutely irregular. In those days there were many magnetic healers who cured by laying on of hands, and in New England there was a family of bone-setters who had developed a considerable local reputation by the peculiar manipulations which they practiced upon their patients, not infrequently ^{however} to their decided detriment.

The use of massage at that time was wholly empirical, although scientific research had begun to build a physiologic foundation for ^{its} the rational therapy, and as long ago as 1895, I was able to prepare a treatise on the subject of massage in which I presented a rationale for each procedure and each therapeutic application recommended.

Five years later (in 1900), I was able to gather together from various sources, including careful observations made during twenty-five years of practical use of hydropathic measures, a sufficient body of scientific data to furnish a substantial foundation for a rational system of hydrotherapy. Large prejudice existed against the use of water because of the abuses of its use by empirics through which hydrotherapy had been generally discarded, although the prejudice against its use was not quite so great as when the famous Sydenham wrote a treatise on fevers, and felt obliged to apologize for departing from the current practice of the day to so great an extent as to recommend hydrotherapy. as being preferable to bleeding in the treatment of febrile disorders. This innovation was made with much fear and trembling on the part of the famous old physician, who expressed his expectation that his advocacy of water as a febrifuge would render him so unpopular with the members of his profession as to destroy his practice and reputation.

Thanks to the progress made in the development of rational medicine within the last century, and especially within the last twenty-five years, it is no longer necessary to offer an apology to scientific medical men for the recommendation of a remedy which, though the simplest of all elements, has come to be recognized as one of the most powerful means of influencing the varied functions of the animal body, having by careful clinical observation and patient laboratory research, been thoroughly rescued from the limbo of blind empiricism and placed upon a scientific and rational basis.

For nearly twenty years prior to the publication of *Rational Hydrotherapy*, I had maintained a laboratory and devoted much time to experimental studies of the physiologic effects of various thermic and hydriatic applications, having, with the aid of my associates, made hundreds of experimental observations with the calorimeter, the plethysmograph, the ergo graph, the sphygmomanometer, and various other instruments of precision.

A critical study of hydrotherapy convinced me that its principal effects were attributable to thermic impressions; in other words, hydrotherapy was for the most part thermotherapy.

When I discovered in 1891 the penetrating character of ~~the~~ radiant heat, I found any applications of light ~~and thermic procedure~~ more efficient when available than any form of hydriatic application. From prolonged and thorough-going study of the radiant heat from a light derived from electric light appliances of various sorts, I am convinced that this is a far more efficient means of applying heat to the body therapeutically, at least for general purposes, ^{than} as is any form of hydriatic application. It is to be noted that the curative properties of light depend upon two opposing facts:

1. That ~~the~~ skin arrests completely and absorbs certain light rays, especially the ultra-violet;

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2. ~~That~~ the skin is penetrated by certain light rays, especially the yellow, red and inner infra-red.

I am convinced that too little attention has been given to the radiant heat effects in light therapy.

NATURAL HISTORY OF THE SUNLIGHT EFFECTS ON LIFE.

The energy of the sunlight is one of the things essential to animal and vegetable life, and when applied in such a way as to intensify its effects this form of radiant energy has the power to influence the major vital functions of the body in such ways as to promote the natural healing processes and thus aid the organism in its battle against disease, or rather in its struggle to restore and to maintain the integrity of its functions under abnormal conditions. All nutritive metabolic processes appear to be encouraged by applications of light. *radiant heat*

The visible and invisible heat rays which penetrate the skin and are absorbed by the deeper tissues, have a range of about 4,000 to 12000 Angstrom units.

That luminous heat rays may penetrate the tissues to a considerable depth is shown by the red glow of the fingers when placed near an intense light. A photographic plate is affected by rays from an arc light after passing through the hand by an exposure of one second.

The most active ultra-violet rays, 2,900 A. to 3,000 A., penetrate not more than one-tenth of a millimeter, or $1/250$ of an inch, but the red and yellow and inner ultra-red rays penetrate much deeper, and to these rays must undoubtedly be ^{at} contributed a considerable part of the beneficial effects observed from light applications, if not the chief benefit, as held by Sonne. It is certainly an error to credit to the ultra-violet rays the total therapeutic effects resulting from light applications.

Sonne, the eminent Danish physicist, believes that the beneficial effects of light are chiefly due to the influence of luminous heat rays in raising the local temperature of the blood in the blood-vessels, which his remarkable experiments have shown may be accomplished to the extent of several degrees and without affecting the general temperature.

In the theories advanced to explain the physiologic and curative effects of light, its heat effects seem to have received little attention. As a matter of fact, in the use of natural sunlight, or the arc light, heat rays are always dominant in quantity and a factor which must be reckoned with. It is of course true that the specific effects of heat are not always desired. When the effects of the ultra-violet rays alone are desired, care must be taken to suppress the effect of the heat rays. In the use of natural sunlight, when the treatment is given in the open air, it is only during hot weather, or especially warm days, that this factor requires consideration; but in the use of the arc light, the question of heat must always be given consideration. This fact the writer noted more than 30 years ago and solved the problem by combining with the arc light the use of an electric fan. By means of the fan, it was found possible to eliminate the heat factor so far as desirable to do so, by cooling the surface treated. It was also found possible by means of the fan, to greatly increase the intensity of the light applications without producing unpleasant heating effects.

It is evident, then, that in the practical application of phototherapy, a full appreciation of the thermic effects of light is essential. This is true not only of the sunbath but especially in the use of the arc light and in the use of the electric cabinet bath.

In the employment of the incandescent light, either as a local or a general application, the thermic influence is practically the only effect obtained or expected, and so a knowledge of thermotherapy becomes of paramount importance.

In view of the above facts, it should be evident that in applications of the arc and incandescent light, consideration should be given to the physiologic effects of heat upon the nerves, blood-vessels and other bodily structures.

Heretofore, the thermic effects of light have been almost wholly overlooked by writers upon phototherapy. In my own use of light as a therapeutic measure, I have from the very beginning attached chief importance to the thermic effects, without, however, neglecting to note and regulate the specific effects of the ultra-violet rays. The rationale of light therapeutics must, then, give proper weight to

The Physiologic Effects of the Inner Infra-Red Rays and the Visible Thermic Rays (Yellow and Red) .

In a chapter on thermotherapy which I prepared for A System of Physiologic Therapeutics, published by Blakiston's Son and Company, in 1902, I presented an account of the physiologic effects of heat which I should be glad to quote in full as germane to my subject, but the space allotted to this paper will not permit. I will, however, quote a few paragraphs:

a-proof 21
b,c, " 21
a " 22
b " 22
c " 22

"The primary effects of heat are those of an excitant or a physiologic stimulant. Within physiologic limits, the application of heat to living cells increases the activity of their protoplasm, an effect easily recognized in the quickened movements of the amebae, leukocytes, and other minute animal forms, when placed upon a warming stage under the microscope. Heat is thus one of the most powerful of all vital stimulants, exciting the function of all tissues upon which it may be brought to bear--glands, nerves, nerve-centers, and the like.

"These effects, however, are temporary, and are followed by secondary effects of an opposite character,--depression,--a sort of negative or atonic reaction after the withdrawal of the hot application. To these secondary depressant or atonic effects are attributable the weakening or exhausting effects of thermic measures when improperly managed or inappropriately applied.

b Galley 21

"The actual effects of a thermic application depend (a) upon its temperature, duration, and form; and also (b) upon the condition of the patient.

"A prolonged application at a high temperature is at first excitant, and then decidedly depressant. The excitation is the natural result of the elevation of the temperature of the blood. The depressing effects appear to result from the lowering of the nerve tone and the exhaustion of nervous energy by overstimulation.

"A very brief application at a high temperature is strongly excitant, and the depressing effects which follow may be so slight as to be quite imperceptible.

"A less intense and moderately prolonged thermic application is excitant to a moderate degree at first, depressant effects appearing later, after the conclusion of the application.

Effects of Heat Upon the Skin.

"A very brief and very hot application produces goose-flesh appearance from contraction of the smooth muscle-fibers of the skin.

"Heat contracts the yellow elastic tissue, but relaxes the white fibrous tissue that constitutes the chief element of ligaments and tendons.

"Heat may cause increase in perspiration to more than twenty times the ordinary amount.

"Tactile sensibility increases at 98° F. (36.7° C.) ; decreases at 113° F. (45° C.); and disappears at 130° F. (54.4° C.), when painful sensations are experienced.

"Momentary pallor occurs when the temperature is high (110° F. — say, 45° C. —and upward), and is quickly followed by reaction, with reddening of the skin from dilatation of the vessels. Lower temperatures produce immediate reddening of the skin with dilatation of the small blood-vessels, especially the veins. Contraction of the cutaneous vessels, with pallor, occurs some little time after the withdrawal of heat, the result of atonic reaction and chilling of the surface from evaporation.

"Following a hot application there is increased heat-elimination, which is the result of the quickened movement of blood through the skin, dilatation of the surface vessels, increased conductivity of the skin, and the more active evaporation occasioned by the great amount of moisture thrown upon the surface by the sweat-glands.

Effects of Heat upon the Muscles.

"The energy of the striated muscles is increased by short, hot applications.

"Prolonged warm or hot applications lessen the excitability and energy of voluntary muscles. It is thus that heat becomes of service in relieving muscular cramp. Cold produces the opposite effect.

"Very hot applications— 104° to 130° F. (40° to 54.5° C.)—increase the excitability of smooth or involuntary muscles.

Effects of Heat Upon the Nervous System

"Very short hot applications excite the brain, nerves, and nerve-centers through the impressions made upon the skin.

"Prolonged general hot applications may give rise to pronounced exhaustion of the brain and spinal cord. Warm and hot applications lessen general nervous sensibility to a remarkable degree. This is especially true of very hot applications. The effect may be due in part to the absorption of moisture by the terminal nerve filaments in the skin; or it may be brought about by the stimulation of the temperature nerves. It is well known that the skin is much more sensitive to thermic impressions than to any other form of stimulus that it is capable of recognizing.

"Applications of heat to the skin generally produce an agreeable sense of comfort and well-being. If the application is continued too long, languor, lassitude, and depression result.

"Very hot applications of short duration, like brief cold applications, have both a direct and a reflex excitant effect.

Effects of Heat Upon the Circulation.

"Heart.—In general heat applied over the heart tends to quicken the systole, while cold produces the opposite effect.

"General hot applications at first slow the pulse, then increase its frequency. Cold produces exactly the opposite effect.

"Blood-vessels.—Very hot applications at first cause the blood-vessels to contract, then to relax.

"Under the influence of heat the skin quickly assumes a dusky red hue from slowing of the cutaneous circulation. The vascular activity accompanying the react on which follows a cold application concerns the arteries especially, and gives the skin a bright red hue. The vascular dilatation due to heat is passive, while that due to cold is active.

"Large arterial trunks are dilated by hot applications prolonged sufficiently to heat the intervening tissues, or made at points at which large vessels lie near the surface, as in the groin, the axilla, the neck, the bend of the elbow, and the popliteal space.

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"The principle of deviation or revulsion, which furnishes the foundation for one of the most important therapeutic uses of heat, depends upon the fact that, when the vessels of one portion of the peripheral area supplied by an arterial trunk are in a state of dilatation, the vessels of the remaining portion or portions are contracted. In other words, the local hyperemia induced by an application of heat gives rise to a compensatory or collateral anemia in correlated vascular areas. This explains the relief afforded by an application of heat about a rheumatic joint, or over an inflamed or congested nerve or muscle. The same fact likewise affords an explanation of the relief of visceral pain which results from a general hot application.

"Blood Pressure.—Cold raises blood pressure, while general hot applications lower blood pressure, though the blood-vessels may be dilated in both cases.

The Effects of Heat Upon the Blood.

"General hot applications diminish the number of red cells. Local applications of heat, either moist or dry, produce a very marked increase in the number of leukocytes, although reducing the number of red cells. Heat also lessens the alkalinity of the blood, thus diminishing vital resistance, as has been shown by Charrin. This fact emphasizes the importance of concluding every general hot application with a general cold application of some sort, the effect of cold serving to maintain the normal alkalinity of the blood, and thus to increase vital resistance. When profuse sweating is induced, the volume of the blood is diminished, unless the loss is made good by the ingestion of water.

Effects of Heat Upon Respiration.

"Heat and dryness of the air hinder the gaseous exchanges in the lungs, and render respiration more frequent and superficial. Heat and moisture to the point of saturation interfere with elimination through the lungs.

"A general hot bath increases the rate and frequency of respiration. The depth of respiration is at first diminished; but if the bath is continued sufficiently long to raise the temperature of the blood, and increase carbon dioxide production, the respiratory movements are augmented.

c Galley 22

The Effects of Heat Upon Body-temperature.

"A general hot bath at a temperature above that of the body causes elevation of the temperature of the blood by interference with heat-elimination.

A cabinet electric light bath raised the temperature of a subject (aypung man) 1.1° F. in 23 minutes.

(a)	(b)	gal	23
a	"		24
2	b	"	24
c	"		24
a	"		25

A short application of heat is followed by a fall of temperature, the result of increased heat-elimination through dilation of the surface vessels, and a diminution of heat-production through the reflex influence of the thermic nerves upon the thermogenic processes.

THE GENERAL EFFECTS OF HEAT UPON THE ABDOMINAL VISCERA.

As already observed, heat lowers the tone of voluntary muscles, while cold raises it. In other words, heat relaxes muscles, while cold contracts them. This effect is particularly marked when applications are made to the muscles of the abdominal wall, a fact which has long been taken advantage of in the treatment of strangulated hernia, and more recently in the practice of examining the pelvic and abdominal viscera while the patient lies in a hot bath.

The tension of the abdominal muscles is a matter of no small importance in relation to respiration, and especially to the blood movement in all the viscera lying below the diaphragm. With relaxation of the abdominal muscles intra-abdominal tension is diminished, and the portal vessels become engorged with blood. All the viscera are congested. The stomach and intestines become distended

with gas and their walls yield to the tension, resulting in dilatation, with stasis in the stomach and colon, and gastric indigestion and constipation, accompanied by fermentations and putrefactive processes that lead to auto-intoxication and various disturbances of nutrition.

Cold, when applied to the abdominal wall, contracts not only the external voluntary muscles, but the internal, involuntary muscles of the stomach and intestines, urinary bladder, and gall-bladder, together with the muscular structures found in the spleen and liver, and the muscular walls of the blood-vessels. Hot applications to the abdominal walls produce the opposite effect. It is apparent that hot applications of this sort are therapeutically valuable for the relief of conditions of muscular spasm, either in the external voluntary muscles, or the internal involuntary muscular structures, as, for example, in intestinal or renal colic, and gallstones.

Long continued warm applications to the abdominal surface appear to lead to concentration of blood in the portal circulation, doubtless by relaxing the visceral vessels.

Very hot applications divert blood from the internal viscera by widely dilating the surface vessels. This effect is made possible by the anatomic connection that exists between the cutaneous vessels

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and those of the viscera, and which will be mentioned in detail a little later.

By the alternate application of heat and cold, the blood movement through any internal viscus may readily and almost perfectly be controlled. Cold contracts the visceral vessels by reflex action through the thermic nerves, while heat produces the opposite effect. By the alternation of these effects a veritable pumping action may be instituted, whereby functional activity may be heightened, and morbid processes profoundly influenced.

~~b Galley 23~~

THE EFFECTS OF HEAT UPON RENAL ACTIVITY.

General hot baths promote renal activity, and increase the amount of urine when the temperature is sufficiently high to increase blood pressure - 104° to 110° F. (40° to 43° C). Renal secretion is diminished, however, when a general hot application is prolonged sufficiently to induce profuse perspiration. The powerful influence of general hot applications upon the kidneys is shown by the remarkably beneficial results obtained by the employment of the hotbath and other general hot applications in the treatment of acute nephritis.

THE EFFECTS OF HEAT UPON METABOLISM.

General applications of heat, if sufficiently prolonged to elevate the temperature of the blood, increase carbon dioxide production. Nitrogen oxidation appears also to be particularly favored by the elevation of temperature induced by general hot applications.

Experiments show that the elevation of temperature induced by general hot applications aids the body in the formation of alexins and antitoxins. Animals suffering from infectious diseases live longer when subjected to the influence of moderate heat. The recognition of this fact has led to the revival of the dictum of Hippocrates, that the elevation of temperature that occurs in connection with most acute infectious diseases is, within limits, remedial in purpose and effect. By parallel reasoning, we are led to the conclusion that a slight degree of pyrexia artificially induced by a general hot application may be beneficial in aiding resistance to infection, especially when followed by a short cold bath.

Local applications of heat in many instances operate beneficially by increasing the blood supply of the affected parts as well as by greatly increasing the proportion of leukocytes.

PIGMENTATION OF THE SKIN

One of the curious effects of the daily application of heat to the skin is a coloration and very pronounced mottling, or pigmentation (Fig. 9) which always appears after heat has been applied daily for a few weeks. The longer the application the more pronounced the effect. This effect affords positive evidence of the very pronounced and permanent dilatation of the cutaneous blood-vessels which results from thoroughgoing thermic applications.

The mottled appearance referred to differs from the tanning produced by the actinic or ultra-violet rays. The latter produce a uniform dark brownish tint, while heat rays produce a mottled coloration which often endures for weeks after the treatment has been discontinued.

Vascular Relations of the Skin with Internal Parts.

Careful study of the blood supply of internal organs in relation to the skin shows that the blood vessels of every import

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internal organ are very directly connected with the vessels of the skin, through arteries or veins, or both; so that it is possible to produce effects by means of local as well as general hyperemias of the skin, thus inducing collateral anemia of vascularly related parts.

~~e~~ ~~Calley~~ ~~24~~

The vessels of the brain are freely connected with those of the scalp and of the nose through the parietal foramen, the foramen ecum, the mastoid foramen, the posterior condyloid foramen, the foramen of Vesalius, the foramen ovale, the foramen lacerum medium, the carotid canal, the anterior condyloid foramen, as well as through the diploe of the cranial bones.

The circulation of the lungs is collaterally related with that of the skin covering the arms, the chest and the upper part of the back. The pericardium and the parietal pleura of the anterior portion of the chest are collaterally related with the skin covering the anterior part of the chest wall through the internal mammary artery.

The parietal pleura of the posterior portion of the chest and the visceral pleura are collaterally related with the intercostal

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vessels. A collateral relation also exists between the bronchial arteries, the nutrient arteries of the lungs, and the intercostals, especially those of the right side. The skin covering the arms is collaterally related with the pleura of the upper and anterior portion of the chest through the subclavian artery. There also exists a collateral relation between the nutrient vessels of the lungs and the vessels covering the anterior portion of the neck through the inferior thyroid arteries. The collateral relationship existing between the vessels of the skin and of the lungs is still further extended by the connection of the bronchial veins with the azygos veins of the right side, and with the superior intercostal or the azygos veins of the left side. It is in the highest degree interesting to note these extensive communications between the pulmonary circulation and that of the cutaneous surface, all of which are of high therapeutic interest.

The kidneys are associated with the skin covering the loins through the renal branches of the lumbar arteries.

The vessels of the prostate in men, the uterus and ovaries in women, and the bladder in both sexes, are associated with the cutaneous vessels overlying the sacrum, the buttocks, the perineum, the external genitals, the groins, the inner surfaces of the thighs, and the supra-

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pubic region, these parts being chiefly supplied by branches of the internal iliac artery. These parts are also associated with the skin of the leg through the common iliac artery.

The rectum is similarly associated with the skin covering the anal region and the perineum and that of the lower extremities.

There is a collateral relationship, both venous and arterial, between the stomach, liver, spleen, intestines, and even the pancreas, and the skin of the trunk which overlies these deeply seated organs.

The portal circulation communicates with the systematic circulation, thus establishing a collateral relationship with the cutaneous vessels at half a dozen or more points, especially the following: the hemorrhoidal plexus, the esophageal veins, the left renal vein, the phrenic vein at the surface of the liver, the epigastric veins at the umbilicus, the circumflex iliac vein (Treves, Schiff).

In a similar way it may be stated that the upper half of the body is collaterally related with the lower half; a fact of which constant use is made when the lower extremities are warmed to divert blood from the head.

The principles of thermotherapy as briefly outlined in the above paragraphs, apply to thermic applications by means of diathermy as well as by the electric light and other means.

In the use of the electric light for local effects or general restorative effects, it is important to avoid the depressing effects of over^heating.

~~a -proof 29~~
~~a - " 30~~

To Avoid ^{the} Depressing Effects of Heat

A point which seems to have been rather generally overlooked is also well worthy of notice, namely: that the highest degree of thermic stimulation through radiant heat may be produced upon the deeper structures of the body irrespective of the temperature of the skin surface or of the air surrounding the body. This is highly important for the reason that prolonged applications to the skin are depressing through the reflex effects which they evoke, whereas direct thermic applications are highly stimulating. For example, it is well known that a hot application to the cutaneous surface through reflex action lessens heat production, whereas heating of blood increases heat production by stimulation of the tissues.

Heat is the most powerful of all vital stimulants. All bodily activities are increased under its influence. It is important, then, in all cases of slow metabolism and diminished oxidation, that we should be able to stimulate the processes of tissue change and the burning of tissue wastes without bringing into operation the reflex depressing effects which are produced by heating of the skin. The skin acts thus like the glass roof of a hot-bed. It permits the passage of the luminous heat rays which accumulate in the tissues because they become dark rays, and as such cannot be transmitted by the skin except by conduction.

The electric-light bath affords the only means by which this may be accomplished. Light rays pass through a cold skin as well as a warm one. It is important to know, however, that unless certain

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precautions are observed, this most desirable effect may be lost. For example, in the use of the incandescent electric-light bath cabinet, if the cabinet is closed, the air surrounding the patient will be quickly heated and so a certain amount of depression will result. The heating of the air of the cabinet is never so great, however, as in the vapor or the Turkish bath. The perspiration induced in this bath is not the result of the heating of the air about the patient, but of the direct stimulation of the sweat glands by the thermic rays which penetrate below the surface.

Thus the peculiar and excellent quality of the electric-light bath here emphasized is always in operation to a greater or less extent; but to secure the full benefit of this special property of the electric light, measures must be taken to promote the cooling of the skin surface during the application. This may be accomplished in several ways. A simple means always available is the cooling of the surface by rubbing over it at frequent intervals a piece of ice, or quickly wiping it off with a sponge or cloth dipped in cold water. This method may be used in connection either with the arc light or the photophore. This is an extremely practical and useful measure, as it may be employed under any circumstances.

The Air Blast As a Cooling Procedure

Still another and very effective means of cooling is the air blast. ~~This may be used by either of the methods illustrated in Fig. 00.~~ As shown in Fig. 00, the fan is so placed that a strong current of air falls upon the surface to which the application is being made. The cooling effects of the air current may be enhanced by occasionally moistening the surface with a sponge or a wet cloth so as to increase the elimination of heat by evaporation. The

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effects obtained by this bath have been found to be most excellent.

A more convenient method of cooling the surface in connection with a general light application is the use of the electric fan in connection either with the upright or the horizontal cabinet, or the standing cabinet similar to that shown in Fig. 00. In the standing cabinet the fan is placed at the top so that the current of air strikes first upon the patient's head, the exit being at the bottom. A thermometer is placed under the patient's feet.

In the employment of these combined procedures in which the skin surface of the patient is cooled during the bath, the blast does not in the slightest degree interfere with the application. In the use of an incandescent light cabinet supplied with 16-candle power lamps, at least a part of the lamps must be exchanged for 24 or 32-candle power lamps. When the arc light is employed, all that is necessary, of course, is to increase the amount of current.

Cooling the Skin During Light Applications

By employing cooling measures so as to prevent overheating of the skin, the intensity of the light application may be greatly increased, and thus the effects upon the deeper lying tissues may be very considerably enhanced. The writer considers the combination of skin cooling with thermic stimulation of the deep-lying structures a most important advance in the light-therapy of chronic disorders. This measure is found particularly valuable in the treatment of a large class of cases suffering from chronic toxemia as the result of intestinal autointoxication. It is of equal value in the treatment of diabetes, obesity and various diatheses and cachexias.

This procedure combines the tonic or stimulating effects of cold

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and heat, while eliminating the depressing influence of both.

Heat depresses through the inhibitory reflexes set up as the result of the overheating of the cutaneous nerves. Cold depresses by lowering the temperature of the blood. By the combination suggested, both of these depressing influences are eliminated, and the direct thermic stimulation of the deep structures produced by the deeply penetrating heat rays is combined with the powerful tonic reflex stimulation resulting from the cooling of the cutaneous nerves.

No possible combination of therapeutic forces could be happier than this. No physician who has witnessed the prompt and potent remedial influence of this combined procedure could fail to desire to make use of it.

By cooling the surface during a general light application, the range of application of the electric-light bath is very greatly increased, as it becomes possible to employ the bath in cases quite too feeble to endure it applied in the ordinary way.

In general, electric light applications should be preceded by water drinking. This is true even of the arc light applied to a comparatively limited area, for the reason that light applications always promote to a marked degree activity of the skin and hence diminish the volume of the blood through the loss of water. This is, of course, especially true in those applications in which vigorous perspiration is induced, as in the cabinet bath. A glass of water, either hot or cold, may be taken just before entering the bath, and if profuse perspiration has taken place, additional water should be given after the bath.

Experiments made with the arc light combined with the air blast

and without it ^a give the following results:

In an application to one side of the abdomen for four minutes, the immediate effect was a very pronounced reddening of the surface. The patient experienced a very uncomfortable sensation of heat. The patient's position was then changed so as to allow the light to fall upon the opposite side of the abdomen. The air blast was turned on. The effect at the end of four minutes was very slight reddening of the surface and no discomfort from heat. The next day very pronounced solar erythema appeared on both sides alike. The skin was very sensitive. The effects were slightly more pronounced upon the side to which the air blast had been applied in connection with the light than upon the other side, showing that the ^{cooling} air light bath ^{may} should be used when it is necessary to increase the intensity of the effects of the actinic ray. It is equally evident that the air blast cannot interfere with the effect of the penetrating heat rays upon the deeper tissues, since the cooling effects of the air blast must be confined entirely to the cutaneous surface.

In conclusion, I desire to call attention to the fact that phototherapy cannot be considered in itself a complete physiologic system for the reason that it offers no cooling procedure. Its effects are thermic and chemical, and in practice the two are generally combined.

"There are certain inconveniences accompanying all super-heating procedures which must be compensated for if undesirable results are to be avoided. For example, it might be exceedingly disastrous to send out into the cold air of January a patient who has just emerged from an

incandescent light bath, or an application of the arc light to the back or any other large area. The cutaneous circulation is relaxed by hot applications, and its tone must be restored before the patient is released from the attendant's hands. Cool or cold water and cool air afford the most ready means of accomplishing this. Evaporating lotions may likewise be used.

"There are also certain depressant effects which follow and often accompany intense or prolonged applications of heat; these must be antagonized or compensated for by excitant or tonic applications of cold water or cold air.

"The combination of the eliminative, resolvent, derivative and inhibitory effects of phototherapy with the tonic, excitant and restorative effects which may be secured by suitable hydropathic measures, forms a most fortunate therapeutic partnership.

"Every physician who equips his office with the necessary appliances for the use of phototherapy should likewise equip his mind with information concerning the combined use of hydrotherapy with light applications, and should see that his office is supplied with facilities for at least the more simple hydropathic measures. These may be very few and inexpensive, or elaborate and comprehensive, as may suit the circumstances. Effective work can be done with a hand bowl and ~~stowel~~, but there is always an opportunity for greater and better things. Phototherapy is a resourceful method and is daily accomplishing therapeutic wonders, but in the writer's view its greatest and most useful function is to introduce, and aid in establishing in modern medical practice, scientific hydrotherapy and the physiologic method."

It is unfortunate that writers upon phototherapy have in general presented light, if not as a panacea, at least as a specific curative agent.

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Under the dominance of this idea, almost exclusive attention has been given to such questions as light, quality and intensity, as influenced by climatic conditions, etc.; lamp construction, dosage as regulated by the distance of lamp, duration of application, etc.; individual susceptibility etc.

The same error has been made by the early promoters of nearly every one of the great therapeutic resources which constitute physiotherapy. The pioneers of hydrotherapy wanted its theories as a cure for human ills and made use of it in a purely empirical manner.

~~a galley 40~~

Monotherapy succeeds only in exceptional cases. A rational therapy seeks to combine the use of therapeutic agents in such a way as to make the super-qualities of one make good the deficiencies of another and to counteract undesirable effects produced by one agent by the employment of another adapted to meet the particular indication.

Light therapy has made slow progress for the reason that it has ~~been~~ depended upon to meet all requirements. Leaders in phototherapy who have accomplished such great results at Leysin and Copenhagen, in their reports of the results of their remarkable experiences, have neglected to emphasize the important part played by air in connection with light treatment. This is perhaps due to the fact that at Lausanne, cold mountain air; and at Berck-Plage the cool waters of the English Channel, in which patients are dipped at certain seasons of the year, have incidentally played a more important part in the treatment and have contributed more largely to its success than has been appreciated.

~~b galley 40~~

In a recent discussion on light treatment in surgical tuberculosis, before the Royal Society of Medicine, Sir Henry Gauvain calls attention to the seeming paradox that persons living in hot countries, even those tribes that wear little or no clothing, are, nevertheless, susceptible to tuberculosis.

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Gauvain observed that

"Continuous exposure to sunlight in the summer will not produce beneficial results nearly as speedily as alternations of light and shade, of heat and cold, of humid and dry air. Even the onset of a week or so of rainy or cloudy weather may be an advantage to the sun-cure in a hot summer."

The benefits which patients incidentally or casually receive from Alpine air, sea baths and weather changes, may be secured by judicious applications of hydropathic treatment and with beneficial results much more pronounced and far more dependable.

It is encouraging, also, to note that Levick and other intelligent and experienced clinicians devoted to light therapy, are beginning to make use of the douche and other hydropathic measures in connection with phototherapy.

Hundreds of practitioners who, through the reading of the works of Rollier and others, and especially through the persuasive influence of travelling manufacturers' agents, have invested hundreds of dollars in light appliances, have been disappointed in the results obtained, especially in the employment of light as a general measure in the treatment of pulmonary tuberculosis and other chronic disorders. Failure in many cases has been due, not to the inefficiency of the light appliance which may have produced a flood of light rays equal in intensity to those of the Alpine sun, but to the absence of the bracing Alpine air. Fortunately, this deficiency may be made good, so that results equal to those afforded by Rollier and other observers in Alpine regions, may be obtained by supplementing light treatment with

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thermic measures such as air baths and applications of water in various ways, as may be indicated in individual cases.

Both Gauvain of Alton and Reyn of the Finsen Institute invariably administer a cold or tepid douche after the general light bath (arc light). It has always been the practice of the author since he began the use of artificial light treatment in 1891, to make after the light treatment a tonic, hydratic application of some sort.

DIET OF FINNISH ATHLETES

Mr. Lauri Pihkala, the greatest organizer of athletics in Finland, writes us that Finnish athletes eat almost no meat. He describes their diet as "a 90 per cent non-flesh menu," and says that meat or flesh is used for flavoring or condimentary purposes only, i. e., as extract for sauces; that the main bulk of the Finnish athletes' diet today consists of bread--often hard bread--and butter, milk, potatoes, and oat-rye- or barley-meal porridge. In summer vegetables and salads are used, he says, and fruit is keenly recommended, but on account of its great expensiveness is not much eaten. "In short," says Mr. Pihkala, "the menu of Finnish athletes is prominently a vegetarian one. Of meat they eat perhaps one-tenth as much as does the average American college athlete." He adds--

"Since Emil R. Voigt, the Olympic five-mile champion for 1908 and the famous vegetarian runner, paid in the year 1909 a visit to Finland, and gave a fine exhibition in running, he thereby became for a while the model runner for his Finnish colleagues, and a strict non-flesh dietary became the ideal for Finnish distance runners from 300 meters upwards during a period of about ten years. Thus Hannes Kolehmainen, the famous Olympic runner who spent several years in the United States, was a

strict vegetarian during at least three years of his fastest development. Paavo Nurmi, copying Hannes (his idol), was, too, a keen vegetarian from his twelfth to eighteenth or twentieth years."

Add about 4 pages
The Great Destroyer

7-27-27

Alcohol is

tr ~~This film is about The Great Destroyer,~~ a poison which has destroyed more lives than probably all other poisons in the world put together.

ALCOHOL BELONGS TO A FAMILY OF POISONS

is one member

Alcohol belongs to a family of poisons. There is methylic alcohol or wood alcohol and amylic alcohol or fusel oil, and propylic alcohol as well as ethylic or ordinary alcohol. All these alcohols are poisons, deadly poisons, every one. You could not expect one member of a family of poisoners to be salutary and harmless when the other members were all deadly enemies!


ALCOHOL AN EXCRETORY SUBSTANCE

Beside that, alcohol is an excretion. I do not know of any example in the whole world of an excretory substance which is wholesome. The excrement of the human body is poisonous and we are exceedingly careful to avoid it. We are very particular that none of it gets into our drinking water. We are careful to see that the sewage is kept entirely separate from our food and water supplies. Alcohol is sewage, it is the excrement of the yeast plant. Yeast itself is so susceptible to this poison that within 24 hours after the yeast

plant begins to grow in a sugar solution it develops only as much in one thousand minutes as it grew in one minute at the beginning 24 hours before. This slowing down, a thousand to one, is due to the accumulation of alcohol in the solution. Some days later, the fermentation ceases because the yeast plant dies, killed by its own excrement, alcohol.

The human body, like the yeast plant, is made up of living cells, cells that make bile, cells that destroy poisons, cells that digest, cells that execute movements, cells that feel, hear, taste, smell and see,—cells that think, plan, invent, imagine, remember, form judgements, make decisions, love, envy, hate.

These cells you see upon the screen are blood cells. There are two kinds. These little round cells are the red cells, which carry oxygen. These move only as they are swept along by the blood current.

CELLS WHICH DEFEND THE BODY AGAINST DISEASE 

But here is another kind of cells, known as the white blood cells. They enter the field from different sides. You will notice that each one goes straight to the center, where there is a minute particle

of starch or foreign body, which they attack. These white cells are the defenders of the body. They destroy germs and foreign particles which get into the blood stream. See how they rush at this little particle of starch and pounce down upon it like a terrier attacking a rat. And they work together like a well trained team.

Looking closer, you see they are breaking the starch grain into small particles, which they will carry off. There goes a white cell now carrying off a bit of starch which it has broken off. Pretty soon, the whole particle will be gone,—carried off by these living scavengers which protect the body and save our lives by keeping the blood stream clean, destroying pernicious germs which attack us.

What you see taking place on the screen is going on in your own body. In every drop of blood there are half a million or more of these body defenders fighting for us, but they can only fight well when the blood is kept free from poisons. Alcohol benumbs and paralyzes these wonderful creatures,—the life-saving crew of the body.

INTOXICATED BLOOD CELLS ARE LIKE DRUNKEN POLICEMEN
Here you see them again. Note how differently they act.

They are under the influence of a poison. They are intoxicated.

Instead of attacking, breaking up and removing the foreign body, they run away as soon as they get in contact with it. It is for this reason that pneumonia and other infectious diseases are so fatal to the drunkard. His fighting cells are intoxicated and cannot fight.

ALCOHOL POISONS EVERY BODY CELL

The same thing happens to all the rest of the body cells.

The brain ceases to think actively and accurately. All nervous activities are slowed. A man who is under the influence of alcohol cannot think as accurately and cannot act as quickly as a man who is in a normal condition. Alcohol poisons every body cell and lessens its activity and efficiency.

CELLS WHICH THINK

Here we have a picture of the brain. The skull is opened and the brain taken out. Now the brain is being taken out so you can see its different structures.

Here are the cells upon the surface of the brain which think and feel and cause the muscles to execute movements.

The brain is the broadcasting station of the body. It is made up of cells. Alcohol is a cell poison and a brain poison. It is a narcotic. It paralyzes and perverts cell action. It is never a

stimulant. This false idea, which originated in the Middle Ages with Paracelsus, a notorious quack, held its place in medical literature and was believed by doctors and by everybody until laboratory experiments upon human beings and animals finally proved it to be absolutely false. Alcohol never quickens, vitalizes or stimulates but always produces the opposite effect. It slows, narcotizes and stupefies.

Here you see the brain again. There are really two brains, a right brain and a left brain, so if one gets tired the other can take its place, or if one gets paralyzed the other can take its place. As a rule we do our thinking with the left brain. Left-handed people think with the right brain. That is why children who are left-handed should not be taught to become right-handed because they are born left-handed and they do their thinking with the right brain which operates the left side of the body.

ALCOHOL A NARCOTIC NOT A STIMULANT

Alcohol slows down all the wheels of life. The feeling of exhilaration after drinking wine or beer is a narcotic effect and not stimulation as the drinker imagines it to be.

Here is a healthy brain cell. All these hundreds of little branches are points of contact with other cells.

Here is a cell which has been damaged by alcohol. Ether and other narcotic poisons and anesthetics produce the same effect, for alcohol is itself an anesthetic.

BEER A POISON DRINK

Modern laboratory experiments have shown that even so small an amount of alcohol as is found in one glass of beer produces effects which can be measured. Dr. ^{Miles} ~~Mayer~~, of the Carnegie Nutrition Laboratory, of Boston, made careful mental and nerve tests on persons who had taken small quantities of alcohol and found so small a proportion as $\frac{1}{2}$ ^{2.75} per cent. would produce poisonous symptoms, evidence that the delicate machinery of the body was definitely damaged.

ARISTOCRACY OF IDIOTS AND LUNATICS

Alcohol has long been a recognized cause of insanity, idiocy, imbecility and epilepsy. Because of alcohol and other causes these degenerates are increasing in this country faster than the sane. At the present time degenerates constitute nearly one per cent. of the entire population of the United States. We are developing, in fact, an aristocracy of idiots, imbeciles and lunatics, poor blighted creatures who contribute nothing to human welfare but are a burden to society.

Great hospitals for the housing and care of these defectives are to

be found in every State, and the millions required for their support consumed in Massachusetts one-third of the total revenue. In New York one-fourth of the revenue of the State is consumed in caring for these unfortunates and the burden is growing every year. It has been clearly proven that alcohol in various ways, direct and indirect, adds multitudes to this growing army of defectives.

THE DRUNKARD'S LUNGS

Here are the lungs, a pair of living bellows, through which oxygen is taken in to be absorbed by the blood and carried to every organ, cell and tissue of the body. The millions of tiny cells in the lungs are lined with a delicate membrane which if spread out would cover a thousand square feet. Spread out on this broad surface are millions and millions of delicate cells which defend the body against attacks of the bacteria drawn in with the breath.

When a man who uses alcohol gets an attack of pneumonia he is almost certain to die because the cells that defend the body, the body defenders, are paralyzed. Beer drinkers die of Bright's disease.

THE HEART

Here is a heart—a living pump. Here are the valves of the pump. Here you see the heart actually at work. It is a frog's heart,

not a human heart, but it behaves just like a human heart.

The daily work of the heart is equal to lifting three hundred tons one foot high. The amount of blood the heart has to pump is enormous. Ordinarily it is actually equal in amount to the air we breathe. When a man is running rapidly the heart has to pump as much as half a barrel of blood a minute.

Alcohol weakens the heart. Alcohol never strengthens but always weakens the heart. It is not useful but very harmful in cases of shock, collapse and fainting, and is not used by up-to-date physicians in such emergencies.

Here you see the blood coursing through the blood-vessels. Alcohol paralyzes these blood-vessels so they become dilated and the blood moves along slowly. That is why the drunkard's nose is red. He has a rum blossom and great blotches on his cheeks because the blood-vessels are paralyzed. Alcohol paralyzes the blood-vessels not only in the nose and the cheeks but in the liver and in the stomach and in the brain and in the kidneys and all other parts of the body inside as well as outside of it, and this slowing down of the blood stream has

the effect to slow down all the processes of life and to encourage degenerative processes.

Here you see the blood moving back and forth, going in one direction and coming back in the opposite direction. Alcohol interferes with the heart by weakening it and damages the blood-vessels so the caliber of the blood-vessels is diminished, a condition known as arteriosclerosis. Hardening takes place in the walls of the blood-vessels and this results in high blood pressure and by and by in apoplexy.

ALCOHOL NOT A STIMULANT. Alcohol is not a tonic or a stimulant in any sense of the word. It is a depressing agent, an anesthetic, a narcotic. Dr. Benedict, of the Carnegie Nutrition Laboratory, proved that alcohol is first, last, and all the time a depressing drug, a poison which strikes at the very foundations of life.

12 Alcohol Hinders Digestion
It has been proven by the application of most delicate means of measuring the activities of the body that alcohol is a narcotic. It slows down instead of quickening all bodily activities. Alcohol does not aid digestion. Prof. Radzikowski showed that when alcohol is given, the gastric juice contains no pepsin. We have repeated these experiments and found it is true. It increases the flow of gastric juice so there

is a considerable amount of acid liquid produced in the stomach, but the alcoholic stomach contains no pepsin.

Here you see the alimentary canal at work. The food is swallowed into the stomach and it is passed out spoonful by spoonful through the pylorus into the small intestine and right down to the lower part of the ileum where it is retained for a little while, and this process continues until at the end of four hours that food is down here at the lower end of the intestine, and in four hours more it passes into the colon. Alcohol slows up the action of the stomach and so hinders the whole process.

So you see alcohol is a substance that hinders all the work of the body instead of helping it. It is not a food as has been supposed. It is not a food because it is an excrement, as I have already explained. I do not think one instance could be found in all nature in which the excrement of an inferior creature is food for a higher creature. Alcohol is an excrementitious substance. It is a poisonous substance which yeast produces in the process of growth and throws away and man takes this substance and actually makes a beverage of it and has been deluded into the belief that it is a good creature of God and that it is a food. Not

only ignorant people but even cultivated people, even some doctors at the present time are still laboring under the delusion that alcohol is a good thing; that it is a necessary medicine; that it is really a food that can be utilized by the body; but science has shown it is not and that all this is untrue.

Alcohol is a poison; it is a narcotic; it is a depressing agent; it is not a stimulant and at the present time no intelligent doctor thinks of giving alcohol to revive a person who has fainted. When I was a medical student, every first aid outfit contained a flask of brandy; but at the present time we have no use for it. When I first began to perform surgical operations we often injected alcohol into our patients when we thought our patients were in a state of shock. We do not do that any more because we know alcohol is not a stimulant but an anesthetic.

Beer hinders digestion. Lord Roberts and Professor Chittenden showed that alcohol, especially beer and wine, hinder digestion.

13


THE LIVER—WHICH PROTECTS THE BODY BY DESTROYING POISONS
The liver contains more than 10,000,000 cells, which make bile,
destroy poisons, and otherwise defend the body.

Alcohol destroys the liver cells, changing them into useless fat. Here are some healthy liver cells and alcohol-damaged cells.

Liver cells.

Here is a beer drinker's liver.


The effect of alcohol is to anesthetize the liver. By and by the liver loses its smooth, normal, symmetrical appearance and becomes covered with knobs that look like the big headed nails on the sole of a cartman's shoe, and then it is called a hobnailed liver. We frequently encounter such livers.

14  THE KIDNEY-WHICH PROTECTS THE BODY BY REMOVING POISONS

Each kidney contains one million cells, each of which produces one drop of urine in three months' time and one tablespoonful of urine in 60 years of life. So you see what a wonderfully delicate structure it is. Alcohol is eliminated by the kidneys and in time destroys these cells, so it is impossible for a drunkard or a man who uses alcohol even in so-called moderate quantities to live out his normal length of life. Beer drinkers die of Bright's disease. The Temperance Insurance Society of Great Britain have collected statistics upon this subject and they find that persons who make use of alcohol have a life

expectancy of 10 or 15 years less than that of persons who live normal lives and do not make use of alcohol.

Lord Woolsley, who led a great British army through the scorching heat of tropical Africa in an effort to relieve ^BKartoum, attributed his success to the fact that he abolished the grog ration.

15  THE GREAT MISTAKE ABOUT ALCOHOL
So you see we have been greatly mistaken with reference to

alcohol. People who have trusted alcohol as a friend and must always have it in the house in case of emergency are deceived. Alcohol is always a deceiver. A man who is cold drinks alcohol and feels warm, so he thinks it is a friend. When our arctic explorers first began going up to the north pole they carried alcohol along with them for that purpose, but they soon discovered they were entirely mistaken. When a man is cold and takes alcohol, although he feels warmer he is actually colder. The most deadly thing a man could do when exposed to great cold is to drink alcohol. Peary on his explorations did not allow one of his men to use alcohol. No modern arctic traveler will either use alcohol himself or permit its use by his men for the reason that it has the effect to increase the refrigeration of the body instead of to protect

it in any way whatever.

In the same way alcohol feels a man who is hungry. If he takes alcohol he is no longer hungry, but he needs food just the same. A man who is tired drinks alcohol and does not feel tired any more, but he is tired just the same. A man who is poor drinks alcohol and he thinks he is rich and is ready to treat everybody in sight when he has not a cent in his pocket to pay the bills.

You have heard a good deal about light wines and beer being so harmless that we ought to make use of these things. People who are objecting to the prohibition law are continually urging that the law is too strict and should not prohibit the use of non-intoxicating liquors and on that account the law should be changed.

16 A GOLD FISH ON A SPREE ON BEER *with a fish*
 To test this out I made an experiment in our laboratory. A gallon of pure water was prepared and into this was put just enough alcohol to give it the alcohol strength of very light beer, Bavarian beer, $2\frac{1}{2}$ per cent. Now, you see the effect upon this fish. It was quiet when the alcohol was put in, but it already recognizes it is in a bad place and is making an effort to get out. It has discovered it

is in a saloon and it is trying to escape. You see it is becoming more and more excited and is showing the effect of intoxication. Now you see it performing ridiculous stunts for a fish. It is trying to walk on its head. You never before saw a fish behaving as this fish behaves now. It rushes about and bumps its nose with great force against the bottom of the jar. Now it is standing on its head. If this fish had been trained I am sure it could not have performed any better than it does as a drunken fish. You see it is actually swimming on its back. It would like very much to get out if it could. A man under the influence of alcohol cannot behave in a natural way because his brain is addled. This fish cannot behave in a natural way because its nervous system and its brain are under the influence of a poison. It is getting more and more intoxicated and finally gives up. Just 30 minutes from the time the alcohol was put into the water the fish was dead. It was taken out of this dilute solution and put into pure water and left there over night but it did not recover.

So you see the effect of light wine and beer on fish and the effect upon a man or any other animal is just the same. The same is

true with reference to the effect of alcohol upon plants. Water a plant with a very dilute solution of alcohol and the effect will be to cause the leaves to turn yellow and the plant to languish and soon to die.

Alcohol is not a remedy but a poison. It could be dropped out of the list of drugs without any injury.

Said Sir James Barr, president of the British Medical Association, "I do not know of any disease where the patient won't get on better without alcohol than with it."

Alcohol does not cure disease. Says Dr. Lee, in the Journal of the American Medical Association (Aug., 1925), "Alcohol does not in the slightest degree remedy" diseased conditions. Its effects are purely "psychologic," that is, its effects are like those of opium and other narcotic drugs.

Alcohol Discredited by Science. Alcohol is still called a stimulant, but modern researches have shown that it is never a tonic or stimulant, but always a narcotic drug which poisons the living cells and lessens their activity.

The present demand on the part of some doctors that the restriction which will not permit the doctor to prescribe more than a pint of ^hwiskey once in ten days for the same patient should be broadened so that the doctor could give his patient as much whiskey as he feels inclined to give or as the patient feels inclined to ask for is entirely out of place. There is no call for any such demand. There is nothing that whiskey will do which alcohol will not do. Now, the doctor is permitted at the present time to make prescriptions of alcohol. If he thinks his patient needs alcohol he can prescribe it in such quantity as he thinks his patient needs, but alcohol does not have as pleasant a flavor as whiskey. People who have been accustomed to drink whiskey and like the flavor of whiskey do not find alcohol a pleasant substitute, so they demand that the doctor shall be allowed to prescribe not only alcohol, which he can now prescribe as freely as he likes, but whiskey. There is no condition of health or disease that demands whiskey, wine or beer.

REPORT OF COMMITTEE OF FIFTY ON ALCOHOL

Fifty eminent scientific men, after long study of the effects of alcohol, reached the following conclusions:

1. Alcohol supplies nothing which the body needs or can

HOW TO MAKE BATTLE CREEK A GREATER CITY

This city possesses an opportunity for growth and development not enjoyed by any other city in the state of Michigan and few cities in the world. Ten or twelve thousand people come to the Sanitarium annually, an average of a thousand a month. Nearly all of these persons remain long enough to become more or less acquainted with the city. The average stay is about six weeks. Quite a large percentage, however, remain several months. Among these thousands of persons who visit us annually, there are some hundreds of business men who are making plans to retire from active business because of advanced age or impaired health, and are possessed of a sufficient amount of wealth to enable them to do so. Not a few of these persons, by the aid of the treatment which they ^{received} at the institution and especially by the adoption of biologic habits of living, get a new lease of life and naturally become frequent visitors to the Sanitarium, coming back every year, sometimes ^{several times} a year, for examination and treatment. From many conversations I have had with such patients, I am convinced that if Battle Creek were made a little more attractive as a residence city, not a few of these people would become permanent residents here.

Our natural advantages are so great this would be a very easy thing to do, and the same things which made the city attractive to newcomers would make it a better place to live in for every citizen.

Battle Creek is a remarkably beautiful city. Its picturesque location at the junction of two rivers, surrounded by a rolling country thickly dotted with lovely little lakes, diversified by ravines and gulleys, broad meadows and curving eskars, carved out by the retreating glaciers thousands of years ago, makes our city notable for the natural beauty of its setting.

Michigan still suffers from the bad impression made by the report of a party of government surveyors working in Indiana more than a hundred years ago who, when crossing over into southern Michigan, happened to get into a marshy region and reported that Michigan Territory was covered with bogs and marshes and not worth surveying.

People who visit us from various parts of the world, especially in the summer time, often express surprise at the panorama spread out before them when they look out from the upper story windows of the Sanitarium building. We are providing at the top of our new building a large place for recreation from which the view of the city's surroundings is really most impressive.

Guests also frequently comment upon the beauty of our shaded streets. Now that nearly all of our streets are paved and are well cared for by our capable street commissioner, Mr. Ernest Fisk, we hear an increasing number of compliments and very few criticisms. There are some points, however, in which there is an opportunity for great improvement:

Our fine Michigan air is not infrequently badly soiled with coal smoke. A person with delicate lungs who has traveled a thousand miles to enjoy the benefit of Michigan air, is naturally disappointed and annoyed when he sees a great bank of coal smoke over the city and rolling up toward him. Those who live here become more or less used to the smoke and, thinking it to be a necessary evil, do not complain. But we ought not to forget that modern invention has provided ways and means for greatly abating or practically eliminating the smoke nuisance.

Another direction in which there is opportunity for great improvement, is in the suppression of noise. Unnecessary noise is not simply an annoying nuisance; it is a real cause of distress. Noise increases

nerve tension, exhausts the nerve centers, disturbs sleep, and is a recognized cause of nervous disorders.

The jargon of factory whistles which used to make a distracting din several times a day, is less conspicuous than formerly, but the long-drawn, ear-splitting whistles of incoming trains make the summer nights hideous for persons with sensitive ears and high strung nerves, especially in the western portion of the town.

At the Sanitarium we are constantly busy shifting patients, and try to find some corner where they will be to some degree protected against the noise of factory whistles and the signalling of trains. Scores of patients leave us because we cannot supply the quiet required. Hundreds of persons are kept away from the Sanitarium and from the city by having heard reports from those who have been here and gone away because of the noise. If these evils were corrected, not only would the city become more attractive to persons who might be highly desirable citizens, but every citizen would be benefited.

Everything done in the direction of beautifying the city, improving our city parks, developing the Leila Arboratum, improving the Kalamazoo River between here and Augusta, and otherwise making the city a more delightful place to live in, will be an investment certain to yield great returns in the development of our city, and especially in attracting people of wealth, ability and enterprise, to make this their home and to become participants in our business and civic activities. We have already many valuable citizens who came here through the Sanitarium. Many of our citizens will remember that it was through this door that Mr. C. W. Post entered our community.

Those who have visited European health resorts must have noted how much pains ~~paitaken~~ taken to make the whole place attractive to visitors and to adapt everything to their comfort and convenience.

Battle Creek is a city of many interests and it is not, of course, to be expected that the interests of sick people shall dominate all other interests, but I feel sure I am on safe and defensible ground in the suggestion that everything that is done by this city to make it a more desirable place for the sick people who come here, will work to the mutual advantage of both the city and the Sanitarium; and so, in conclusion, permit me to suggest as a slogan of progress, "A better, more beautiful and bigger Battle Creek."

John Harvey Kellogg.