McElroy

WITH COMPLIMENTS OF THE AUTHOR.

On some points in the Pathological-Histology of So-called Phthisis, Pulmonalis or Consumption.

By Z. C. McELROY, M. D.
ZANESVILLE, OHIO.

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On Some Points in the Pathological-Histology of So-called Phthisis Pulmonalis, or Consumption.

By Z. Collins McElroy, M. D., of Zanesville, Ohio.

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Mortality reports of the past year show one-fifth of the total deaths in several large cities, is due to what is called "consumption." And including pneumonia and bronchitis, one-fourth of the total mortality. As near as I can ascertain, in the absence of any reliable statistics, that is about the ratio of mortality in our own city from consumption, pneumonia and bronchitis. I do not think it will vary much from that anywhere in our county. Perhaps it is less in the Southern States, and greater in New England, but still not disturbing the average for the whole country.

A study of the main condition, to-wit: consumption, must always be a subject of profound interest to physicians.

My own understanding of what is consumption, is this: A waste of the body, at a higher than natural speed, without being balanced by repair. In the beginning, without noticeable local complications, but as it progresses, the failure of structure in the lungs becomes prominent, though the waste of all parts of the body keeps pace with that of the lungs.

I do not propose to reproduce the symptomatology, as it would, it seems to me, be a waste of time, as it is contained in most text-books, and in various special monographs, much more complete and systematic than would be proper on this occasion.

And for precisely like reasons, nothing will be said of post-mortem appearances with unassisted vision, and microscopic sections could only be interesting enlarged on screens.

And for the further reasons, that nothing can be learned, not already known, by a study of the forms, colors and other physical features of structure in a condition of decay: For, with every more or less complete change, or modification of physi-

ological forms of structure, there are modifications of, or total abolition of function.

I am not an admirer of Rev. Joseph Cook, nor a constant reader of his "Monday Lectures." It is very seldom I read one at all. But that delivered by him on the 20th of December last (1879), on the anatomy and functions of the brain, is exceptionably fair in its resumé of what is known on the subject. I mention this now only for a single object, which I think he has very happily formulated. It is thus stated: "Every function performed by a living body, has its correlate in structure." These are not exactly his words, but they are, to my understanding, just a little more explicit. I have on various occasions presented the same general truth in other words to our medical societies.

My own formulation has been as follows: "Every function performed by a living body, has behind it special forms of structure on which it depends." Any change in any structure is absolutely certain to be followed by a corresponding change of function.

There is one point on which hinges the whole pathology of the condition of the bodies which we call consumption. It is a histological point, and has not, up to this time, engaged the attention of experimenters, and obsevers. It is this: by what means, exactly, is food converted into organic structures during life; Or, it may be stated thus: "How does food become living tissue?"

If the answer is "by digestion and assimilation," let me ask are we any wiser than before? What is digestion? What do physiologists mean by the term? What do they mean by assimilation? Is it by some orderly process which can be followed from beginning to end and understood? Or, is it by some hocus pocus, haphazard process, which cannot be followed or understood? The former is my understanding.

Confining our investigations to the complexities of animal—higher animal—life, it does not seem to me possible to get even a clue to it. But turning to the simpler forms of organic life in the vegetable kingdom, a clue can be obtained that will not be misleading.

Study attentively the mode of reproduction in any of the more common forms of vegetable life around us. They are reproduced, and the means are not a secret, even to the most careless observer. How is grass, for instance, reproduced? The

proper reply is by a seed. And what is a seed, say of grass, wheat, corn, rye or oats? It is the material in which the parent plant has *stored up* the material and force for a two-fold purpose, viz.: the necessary material and the requisite modes of force to form the structures of the new plant, up to that point in its growth and development, at which it can appropriate other and new material to its further evolution.

Grass, or other vegetable forms of organic life, when the means for their multiplication and preservation have been perfected, that is, when the seed is ripe, so to speak, the parent plant is dead. The seed falls to the ground in the cases under consideration, amidst the debris of the decaying parent plant; and from the midst of this decaying mass, with favorable external conditions, comes forth the new life and the new plant or plants. Analogy, not always a safe guide, is not likely to lead us astray in this case, and will be sure to show the investigator that the same law holds good in the complex animal, as in the simple vegetable and may be formulated thus:

"Each special histological structure in a complex living being, in the act of physiological decay and the performance of function, stores up, in the requisite material, the necessary force for its own reproduction from other and new material."

If the structures of a living being at all times did this perfectly, and new material and necessary conditions were always present, and the processs of reproduction always perfect, man would be immortal; would live in a state of perpetual youth. This is so far from being the actual state of the case, that, after maturity, the years will leave their traces on all the structures, and it is by this gradual loss of perfect physiological structural forms that men grow old and pass away. Advancing age is the correlate of failing tissues.

But it will be instructive to follow food, so far as it can be traced in its pathway to living tissue. All the food ever eaten by a living being, and I have man in my mind prominently in my present study—is germinal—that is, it is the material in which some previous existences have stored up the material and force for their own preservation and multiplication. And as we are not cannibals, none of us ever partake of food in which a being of our own kind has stored force for its own preservation.

Chemically, the food eaten by human beings is divided into the carbonaceous and nitrogenous. Another classification is by

proximate principles, viz.: starch, fat, sugar, albumen and fibrin, gelatin, etc. Associated with our food, as we get it, there is always more or less woody fiber and other insoluble matters.

The stomach may be regarded as a receptacle of food in which it, or so much of it as can be, is dissolved by the aid of acids, and organic principles, the most prominent of which is now understood to be pepsin. The office of pepsin is to dissolve heat coagulated albumens and fibrins. The acids of the stomach dissolve the starchy elements of food. Oils and fats are emulsified. As rapidly as these several proximate principles are dissolved, they are passed directly into the venous blood-vessels, and go forward to the liver. In the liver there is a mingling of old blood—blood from the venous capillaries—and the new material from the stomach. All that takes place there is not understood, but it is very certain that the starchy compounds are converted into glucose—grape sugar.

The stumbling block in the way of physiological investigation has been, and is now, the lacteals. Current physiology assigns to them the functions of "absorbing" certain products of digestion of new material—food—by the stomach? Why so? The structure of the lacteals and lymphatics here and elsewhere are identical. Why then a difference of function here from elsewhere?

The lymph in the lacteals, during so-called digestion, is in larger quantity and differs from lymph in the lymphatics elsewhere, only in the greater amount of fat emulsion. And why should not the lymph be greater in the so-called lacteals during digestion—that is, solution of new food in the stomach—than at any other time? Does not increased functional duty include increased physiological decay of structure performing it? Surely this is so. Increased duty means increased decay of structure in the intestinal tract, including in this its whole extent. Then, if the structures store up the force in the necessary material for their own reproduction from new material, there would of necessity be a larger amount of lymph in the lacteals during their periods of functional activity, than in periods of functional repose.

In truth, the function of the lymphatic system would seem to be to gather up the material in which the structures have stored up the force for their own repair and perpetuation from the general debris. The lymph, therefore, is the analogue of a vegetable seed. It performs in the living body precisely the functions of a vegetable seed in the vegetable kingdom. To

adopt it to the performances of its function continuously during the life of any individual, it must be mingled with the necessary new and old material exactly as it is mingled in the human body. And, further, it must be exactly as it exists in the human body to perform this function. And that is, these several things, old material, new material and the lymph—the seed of the various structures from which it has been derived—must be mingled together just before coming in contact with the gaseous atmosphere, containing ozonized oxygen.

The mechanical arrangement of these several parts may be varied, but the essential principle must be strictly adhered to, as it is throughout animated nature.

The researches of Klien, in London, have demonstrated the identity in histological structure of the serous membranes and lymphatic ganglia and glands.

But to return to the stomach. It will be seen that a truer physiology will not regard the lacteals as carriers of new material at all. All new material, after solution is effected in the stomach, is sent through the venous blood-vessel system to the liver direct. Here it is mingled with the old blood returning to the lungs from all the capillaries.

When the changes effected by the liver, in both new and old material, are completed, it is sent forward to the right heart. Just before it drops into the right auricle, the thoracic ducts pour their contents into the stream, and it goes thence to the lungs. In the lungs, this stream—old blood, new material and lymph, or seed of the various structures—meets the gaseous atmosphere. Some of the changes occurring there are known, but probably much that does occur there is still to be made out. But whatever they have been, all identity of its constituents are lost, and the outgoing stream—arterial blood—is at once, like the contents of the egg, the material and force to reconstruct the wasting tissues in the arterioles and capillaries. It will be seen that whatever there is of *digestion*, if by that term it is meant to cover the changes necessary to convert food into living flesh, must of necessity take place in the lungs.

The stomach may do its duty perfectly; the liver ditto; the lungs ditto; but if the structures have failed to provide for their own repair from new material, or the seed-gathering apparatus—the lymphatic system—fails in its duty, there must of necessity be a failure in the repair of momentarily wasting tissues, at least

with full physiological capacity to perform function. The subsequent chain of events would be waste of tissues—not alone in the lungs—without being balanced by repair from new material. And that, it seems to me, brings to light some of the hidden mysteries of the pathology of so-called phthisis pulmonalis, or consumption.

Difficulties in the performance of the functions of the stomach end of the assimilative apparatus are well known as dyspeptic, and are much better understood than those at the other end, where food becomes living tissue. Dyspepsia has its phenomena in pain and uneasiness, but once the food gets past the stomach, it is converted, without further unpleasant symptoms, into living flesh. The failures at the other, or capilliary extremity of the assimilative apparatus, have no symptoms of pain or uneasiness. The failure has another language, which has never been properly interpreted. So-called consumptives often have good appetites, good *digestion*, so-called, in stomach—that is, food is dissolved properly in the stomach, and is properly sent to the liver, but the waste of body goes on, notwithstanding. The defect is made known by the progressive waste of body unbalanced by repair from new material.

One other fact in regard to consumption is about receiving its final proof—that is, its self-limited character. And the additional fact, that the progress of the changes in structure are often arrested, and remain in abeyance longer or shorter intervals, sometimes through life.

These facts explain the so-called successfully treated cases, and the action of so-called remedies which get credit for doing that in which they, in reality, have taken no part.

Thus viewing the pathological condition, in so-called cases of consumption, my expectations of more successful remedial measures than any now known, it seem to me, are well founded. But it will not consist in any specific mixtures of drugs to cure the patient outright. But it will consist of at least common sense in life's surroundings, and less haphazard exhibition of drugs. It seems to me that the blood of persons in good health, of not dissimilar age, and the same sex as the patient, will in some way not now understood, be employed to furnish the force that will perfect the final process of living flesh formation in the capillaries of those in whom this process is deficient, and for the want of a better name we call consumptives.

This same conception of what must and does actually take place in all living beings during life, when applied to other departments of pathology, fits equally well as in so-called consumption. I apprehend in it are comprehended every possible pathological condition; acute and chronic, abnormal, deformed, and monstrosities. For, if the processes of living tissue making from food are not interfered with by some superior force, there could not be any pathology. All life would be immortal and perfect in types and forms.

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