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ON

Nutrition.

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Nutrition.

Nutrition not only implies that proces peculiar to living bodies by which tisues and organs already formed maintain their integrity, but in a more extended sense, it is the action by which every part of the body, on the one hand appropriates to itself a portion of the blood distributed to it; and, on the other hand gives up to the absorbents a portion of the materials that previously composed it; or, in other words, Nutrition is a continual development & decay going on in the tisues of the animal economy. And the growth or decay of the several parts, is in direct proportion to the amount of plastic material apimilated by each part.

Nutrition in the animal as well as in the vegetable kingdom, in the majority of cases is essentially a process of cell-growth. These cells, according to Carpenter, originate from germs, which draw to themselves the materials of their nutrition, and give to some of them a new arrangement, whereby they form the cell-wall, whilst others are introduced into the cell-cavity; and then, when these cells have gone through their regular series of changes, they die, and set free their contents. "In some cases, the germ is prepared by previously existing cells of the same kind; whilst in others they are furnished by certain 'nutritive centres,' which seem to be constantly engaged in the preparation of them,

deriving their materials from the blood. Frequently it would seem as if the original or parent cell is able to continue the production of secondary cells to an almost unlimited extent, even though it may itself have undergone a considerable change of form."

But before we can fully understand the process of nutrition, it will be necessary to inquire into the origin and preparation of the nutrient element.

The blood is the direct, and immediate source from which all the organs, and tissues of the body derive the materials of their growth, and development. But to get at the origin, we must go still further back, and begin

with the food taken into the system. This leads me to speak of Digestion, Secretion, Absorption &c: but will treat of them only so far as is essential to the subject under consideration.

The food coming into the healthy stomach, meets with the gastric juice, & forms chyme, which, passing on in the intestinal canal, comes in contact with the bile, pancreatic and other juices, and thus forming chyle, which is taken up by the lacteals, and conveyed, in connection with the lymph, by means of the thoracic duct, into the venous system, near its entrance into the right side of the heart. While, perhaps, the greater portion of the nutrient element thus

derived from the food gains the general circulation through the lacteals, & thoracic duct, yet a large proportion is absorbed directly through the coats of the stomach and intestines into the veins, by means of which it is conveyed to the liver, and after serving its purposes there is conveyed to the ascending vena cava, and thence to the right side of the heart.

Here the question arises, why it is, that the nutritious matter takes such different routes in order to reach the general circulation. But before this question is answered, it will be proper to notice the composition of the materials thus absorbed.

Now it has been proved that the substances which the stomach completely dissolves and absorbs, are the azotized aliments. Then it seems reasonable to conclude, that such portions of these aliments, as have escaped absorption by the stomach may undergo a similar solution in the intestines, and be absorbed by their blood-vessels without passing into the state of chyle. It is also proved that the chyle in the lacteals after ordinary digestion, contains fatty, or non-nitrogenous, substances; hence its white, or milky appearance.

This fact has been proved, by feeding animals on fibrine, albumen, and other nitrogenous

substances: in which cases the chyle was invariably found to be transparent; resembling in appearance, the lymph.

These differences between the substances absorbed by the stomach, & those transmitted to the lacteals by the villi of the intestines, are in a great measure, no doubt, dependent upon the action of the gastric, and pancreatic juices upon the contents of the alimentary canal.

From these facts it seems not unreasonable to conclude, that the materials thus absorbed by the stomach and bowels, are in some way subservient to the peculiar function of the liver; namely, the formation of bile.

It may be proper to remark here,

that the liver not only contributes to the maintenance of general nutrition, by aiding in the solution of certain aliments in the intestinal canal, but also by eliminating carbonaceous matters, as fat and sugar, which furnish food to the calorifacient process.

Now we have traced the nutricious materials through two different channels into the general circulation, which come together in the right auricle of the heart.

This brings me back to the proposition already stated,- that the blood is the source of all nutrition, and growth. But it is not yet fully subservient to the purposes of nutrition; for, so far we have only

spoken of venous blood.

In order that the process of nutrition may be fully accomplished, the following conditions are necessary: 1st. A proper condition, and composition of the blood. 2. This blood must be brought in close proximity to the part to be nourished. 3. A natural state of the part to be nourished. 4. A certain degree of nervous influence.

1. This proper condition, and composition of the blood is dependent upon various causes. The food, in the first place must be of the right kind, and taken in proper quantities. This is proved by the defective nutrition of those persons who live on a poor, mean diet; and have no regard to quantity.

It has also been clearly demonstrated that man requires a due proportion of animal, and vegetable food for the perfect nutrition of the body.
Again, the composition of the blood is greatly modified, in its papage through the lungs. There, the blood, coming in close relation to the atmospheric air, gives off its carbonic acid, which is the result of decaying tipsues in every part of the body, and receives oxygen in return; thus, fitting it for the great purposes of nutrition and calorification.
2. That it is necepary for a sufficient amount of blood (arterial), to be in or near the part in order for its perfect nutrition.

is proved by the wasting of certain parts to which there is not a sufficient supply of blood, & the death of the part, when the supply is entirely cut off. In order that the nourishment of an organ be perfect, it is necesary that the blood be brought sufficiently near that the tisues may imbibe through the walls of the blood-vesels the nutritious materials which they need.
Now, how is this effected? The blood, being purified in the lungs by means of respiration, is conveyed to the left side of the heart, and thence it is propelled into the arterial system; and this terminates in the capillary system, which is a net-work of blood-vesels of microscopic minuteneps, distributed to

every part of the body: and thus the blood is brought into such relation to the several parts, that it may be readily absorbed. And while the blood-vesels are the carriers of the nutritive materials, they themselves take no part in the proces of nutrition.

3. It is necesary in the next place, that the part to be nourished be in a healthy condition.

This fact is proved by the very nature of the nutritive proces, which consists in the formation of new particles exactly similar to those which already excist, or in other words, each tisue is maintained by apimilating to itself new particles, which take the place of those that degenerate

and endowing them with its own peculiarities: therefore, so long as a part remains healthy, and the function of nutrition is in no way deranged, it maintains its condition. But, on the other hand, if the part be in a diseased condition, or rather if its structure be altered from the natural condition, the alteration is maintained: the altered structure as well as the healthy being perpetuated.

This statement, to a superficial observer might seem to be false: for if it be true, why is it, that an ulcer, once formed in a wound is not maintained? To answer this it is only necessary to understand that the particles thrown off by suppuration are entirely

disorganized, consequently is not nourished at all: also that the process of ulceration is confined to the surface, and cannot occur within the texture, or substance of the part, therefore its structure is not altered. As soon as the period of suppuration or disorganization ends, the period of reparation sets in, and by the process of granulation the chasm is filled: thus, beautifully illustrating the fact, already stated; that a part has the power of assimilating to itself new particles.

Taking this view of the subject we can account for hereditary diseases, and the persisting character of cancerous and syphilitic affections.

4. That a certain influence of the nervous system is necessary to the process of nutrition, has been denied upon the ground, that in plants, some of the inferior animals, and in the early embryo, there is no nervous system developed.
Notwithstanding, this is true, there are facts which make it highly probable that a nervous influence is necessary to the process of nutrition in the higher order of animals, and especially in man: at least, if the nervous influence is not essential to the nutritive function, there can be no doubt, but that it is more or less influenced by it, either directly or indirectly. This is sufficiently proved by the influence of the mind in the production,

aggravation, and cure of diseases.
Again, sudden and depreſsing emotions of the mind; as, great mental anguish, fear, joy &c, have an influence over the digestive & secretive organs, and consequently modify the proceſs of nutrition.
In the case of paralyzed limbs from lesions of the spinal cord, or other nervous trunks, defective nutrition is perhaps in a great measure dependent upon a want of nervous influence.
Having gone through with the conditions necesary to the accomplishment of nutrition, it will be necesary to notice, in a few words, some peculiarities in the proceſs of nutrition itself.
1st. The selecting power of the

different organs.

The materials of nutrition are prepared in the blood, as has already been shown, but the process of nutrition is the act of each individual part. That which is fovd for one set of organs is not fit for the nourishment of another. And it is a curious fact, that each tisue has the power of selecting such materials as are best adapted to its own nutrition:—thus, muscle draws fibrine; the bones take up gelatin and the earthy salts; while the nerves take away fatty-matter, &c: each part not only selecting such materials as it needs, but endowing them with its own vital properties.

2. Varying activity of nutrition.

The ~~process~~ activity of nutrition varies greatly according to age, constitution, state of health, exercise, idiosyncrasy &c. Nutrition, as we have seen, is a process of cell-growth; therefore, these variations are in direct ratio to the development or decay of these secreting cells. This process goes on much more rapidly in youth, than in adult life, and old age.

During early life the powers of growth are great; the demand for food is large in proportion to the bulk of the body; and though the waste is rapid, and the excreting process is very active, the growth predominates over the decay, and the development of the whole structure goes on increasing,

until the full size is attained; and then growth ceases ordinarily, and nutrition is simply maintained for a longer or shorter period, and finally gradually declines with old age. And here we can but admire this wise provision of nature; for if it were not so man would grow to an enormous size.

As we have already seen, the determination of blood to a healthy part favors its nutrition. Or in other words, growth is regulated mainly by the supply of nutritious blood; being increased by the afflux of blood to the part, and vice versa. This accounts for the activity of growth in early life, for it is evident, that the vascular system is more active

then than in after life. And hence it is that muscular action favors nutrition. By friction of the muscular fibres- which is the case in exercise- heat is generated, blood is invited to the part, and its oxygen uniting with the carbon of the system, increases the discharge of carbonic acid, urea, and water- the ordinary products of the decomposition of the animal tissues- and hence it is, that the laboring man requires a greater amount of food, than one who leads a sedentary life.