OBSERVATIONS ON THERAPEUTICS AND DISEASE

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Observations on therapeutics and disease by Donald Campbell Black

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DONALD CAMPBELL BLACK

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Trieste

PREFACE.

THE instability of methods of cure, and the transitory popularity of remedial agents, have ever been deplored by the most intelligent practitioners of medicine, and have naturally evoked the sneers of the most discriminating beyond its pale. Confessedly, the science of therapeutics has followed with unequal step the rapid advances made in the pathology and diagnosis of disease; and it is in this department that the charge of empiricism can be least successfully refuted.

Fashion is potent, unfortunately, in medical, as in other matters; and as individual preferment is to such an extent dependent on a subserviency to it, the science of medicine is suffering in consequence. The dalliance with new remedies was never perhaps more manifest than at the present time. In no department of study is the deduction of reliable conclusions more difficult than in medicine; and in none, consequently, should the life-long labours of men of acknowledged ability be treated with greater respect, or ruthlessly discarded without the most scrupulous investigation.

While admitting unreservedly that some valuable additions have in recent times been made to our *materia medica*, and may yet be made, I am of those who believe that to a great extent retrogression, and not progression, has been the result of not a few innovations. I entertain the conviction, therefore, that he who introduces a new remedy, save on the grounds of comparative superiority over other remedies of the particular class to which it belongs, which he is unable to reconcile to some physiological or pathological principle, or as the result of conscientious comparative trial antecedently conducted, does a positive injury to the science of medicine, and that the

penchant for novelty in remedies is a human weakness which no upright practitioner ought unadvisedly to encourage. Of alleged facts there is no dearth: it is in their arrangement, reconciliation, and the estimation of their value as such, that the difficulty lies; and it appears to me, that if each one submitted to professional judgment the theory on which his prescription is based, far more benefit might reasonably be anticipated than from the ephemeral pursuit of panaceas. These considerations must be my apology for the appearance of the following observations in their present form. To what extent the views therein contained may be in harmony with the opinions of others, I have no means of determining.

D. C. B.

GLASGOW, *May*, 1870.

THERAPEUTICS AND DISEASE.

"Sunt delicta quibus non ignovisse velimus,
Nam neque chorda sonum reddit quam vult manus et mens,
Nec Semper feriet quodcunque minabitur arcus."—*Hor.*

In two papers on Syphilitic and Phagedenic Ulceration which the *Lancet* did me the honour to publish a short time ago, I very briefly, and no doubt very imperfectly, endeavoured to indicate a few general principles regarding the pathology of those diseases as I apprehended, and in accordance with which I conceived a certain class of remedies to have acted as therapeutic agents. Mature deliberation on these subjects has corroborated the conviction then enunciated that those views admit of a much wider generalization, comprehend the fundamental principles of a sound and rational pathology, and are thus capable of throwing light on the *modus medendi* of our remedial agents—a subject confessedly too much under the sway of routine and empiricism, hitherto less studied than the importance of the subject demands, and generally as little understood.

In therapeutics, I hold that the great desideratum is to make our remedial agents subserve to those chemical and physiological conditions which constitute life; and it appears to me that possessing, as we now do, an approximate knowledge of those conditions which constitute health, in so much should our knowledge of disease be advanced, and the great end of medical science, the prevention and mitigation of human suffering, be furthered. It need not be urged that unless we possess a correct appreciation of the state of health, that of its opposite must be at best conjectural. It is from this

grand standpoint that the scientific physician ever views disease, and from which in humble emulation the following hints are offered. Life has been aptly defined as organization in action, and that action is sustained in its normal state by the due performance of two antagonistic functions, which it may be convenient to term the histolytic, and histogenetic functions: and to this process the term assimilation applies in its widest significance. It is this development into the peculiar structures of the living organism, the ultimate ejection in turn by the excretory organs of such material as has filled its requirements in the economy, or the elaboration of part by the secretory organs for ulterior use, properly performed, which constitutes health; and it follows as a corollary that the derangement of one or other of these functions is an invariable manifestation of, or may constitute disease, and that their complete cessation is death.

Did space permit it might be desirable, for the sake of a more general coherency, to review the functions of digestion and absorption; but consideration of these the limit of these papers forbids. It must suffice as preliminary to the subject proper of these observations, to consider briefly the functions assigned to the blood; and these, to quote from Dr Gregory, are fourfold:—"1st, It has to enable the tissues, by oxidizing them, to perform their functions; 2nd, To repair the waste of tissue; 3rd, To effect, by the oxygen it carries, the oxidation of the respiratory food, or the production of heat; 4th, To concoct, or assist in concocting, out of the first products of oxidation, the various secretions and excretions.

1st, The blood has to enable the tissues, by oxidizing them, to perform their functions. Paradoxical as it may appear, we know that the proper function of the tissues culminates in their destruction; and the agent by which this is accomplished is oxygen—it is the histolytic agent. The tissues in the first place are not, however, entirely thrown off from the system; they are resolved into *secretions* as well as *excretions;* to which end the blood returning from the lungs is impregnated with oxygen, which from the capillaries unites with the effete tissues, forming, as the case may be, carbonic acid (CO_2), water (HO), urea ($C_2 H_4 N_2 O_2$), &c.

"It was formerly believed," remarks Claude Bernard, "that oxygen introduced into the lungs was there and then combined to the elements of the blood, creating in this manner a sort of combustion within the air cells, from which the carbonic acid exhaled,

and the animal heat produced during the process of respiration were both derived. But the operation is more complicated than our predecessors supposed; and we are now aware that the combination of oxygen with the cast-off materials of the economy takes place, not within the lungs, but in the very depths of the tissues themselves; and that so long as this gas (CO_2) remains in the blood, the respiratory process is not accomplished." Then with reference to the capillaries this distinguished physiologist observes:—"We know these delicate vessels to be the principal seat of nature's chemistry; in this point do the elements of our blood come in contact with the elements which compose our tissues, and enter into combination with them."

2nd, The blood has to repair the waste of tissue. It is merely necessary to observe under this head that the new supply of tissue-forming material, the histogenetic material, incorporated with the pure or oxidized blood from the left side of the heart is with it dispersed throughout every part of the body. As soon as any portion of tissue is thus oxidized, the blood from the arterial capillaries replaces it by the new material, which for a time exists as flesh, but is in its turn deposed by a more recent supply, taken up, and forming part of the venous blood, elaborated into a secretion, or ejected as an excretion.

3rd, The blood has to effect, by the oxygen it carries, the oxidation of the respiratory food. Heat appears essential to the chemical changes which take place in the capillaries; and this is generated by the combination of oxygen with the respiratory or non-nitrogenous principles, which chiefly contain carbon, and must be oxidized in order to elimination as a natural excretion.

4th, The blood has to concoct, or assist in concocting, out of the first principles of oxidation, the various secretions and excretions. The *secretions* serve an ulterior office in the economy, and are elaborated by special organs; while the *excretions* are ejected as peccant material, representing more especially the ultimate disintegration of organized tissues. For a moment, then, we shall briefly advert to the secretions and excretions of the human body, and consider how they are formed.

The excretions are discharged by the lungs, kidneys, skin, liver, and intestines. These organs are essentially the purifiers of the blood—the safety valves of the animal machine. The principal secretions, on the other hand, are those of the pancreas, salivary

and mammary glands, the liver, and synovial membranes. On the latter it is not my purpose further to dilate, but pass to a brief *seriatim* notice of the excretion of each depuratory apparatus just alluded to.

THE OFFICE ASSIGNED TO THE LUNGS is the removal of (CO_2 and HO.) carbonic acid and water. Whence, then, this carbonic acid and water? The first function above assigned to the blood, we observed, was that of enabling the tissues, by oxidizing them, to perform their functions. Thus albumen, for instance, an important constituent of the tissues, having fulfilled its requirements in the system, may undergo the following degradations—"It may be," remarks Gregory, "in the following manner, or in some way approximating to it, for all the facts we know prove that in the animal body every change is the result of oxidation more or less complete, or of transformation with or without the addition of water. Thus albumen, according to Gregory, is convertible into choleic acid, cholic acid, urea, and carbonic acid; or cholic acid may be formed, besides various other products of oxidation, from chondrine and gelatine, as follows:—

1 eqt. Chondrine, $C_{72}\ H_{58}\ N_9\ O_{22}$, by a fermentation, probably	may yield	1 eqt. Cholic Acid, C_{52}, H_{43}, NO_{12}. 2 eqts. Uric Acid ($C_{10}\ H_4\ N_4\ O_6$), 8 eqts. Water.
1 eqt. Gelatine ($C_{42}\ H_{27}\ N_{12}\ O_{13}$) with 10 eqts. Water,	may yield	1 eq. Cholic Acid, 3 eqts. Uric Acid, 12 eqts. Water.

(Gregory.)

Besides, carbonic acid may be formed in many other decompositions. This gas is unquestionably formed in the tissues by oxidation; and as we have already seen, "while it remains in the blood the respiratory process is incomplete."

THE EXCRETIONS FROM THE SKIN consist of carbonic acid, watery vapour, and sebaceous matter. In the sweat, Berzelius found lactic acid, chloride of sodium, and muriate of ammonia.

Having thus disposed in a most cursory manner of carbonic acid gas as an excretion, and partially of water, we proceed to a brief consideration of the important FUNCTIONS ASSIGNED TO THE KIDNEY. These are the excretion of phosphorus, lime, magnesia, water, and the nitrogenous compounds, urea, uric acid, and hippuric acid; of the phosphatic compounds, phosphates of soda, ammonia, lime, and

magnesia; of the sulphur compounds, sulphates of potash and soda. The rest consist of water, mucus, and extractive matter, with traces of other salts; urea forms nearly one-half of the solid constituents of the urine. It is probably the resultant of the oxidation of nitrogenous tissues, and may be formed as above. It may also be derived from unassimilated nitrogenous elements circulating with the blood. Urea exists ready formed in the blood, and is merely removed by the kidneys, not elaborated by them. Uric and hippuric acids have the *same* origin; but in *healthy* urine exist, *if at all*, but in exceedingly minute quantity. The saline matters existing in the urine likewise result from the disintegration of tissues, of which they form part

THE FUNCTIONS ASSIGNED TO THE LIVER are excrementitious and digestive. It is consequently an organ which both secretes and excretes. It removes, it is believed, something from the blood which if retained would be injurious; and this appears to be some compound of carbon and hydrogen. At the same time while this peccant compound is removed by the bile, it (the bile) assists in the process of digestion, some of it being reabsorbed, and some ejected by the bowels; that part which is absorbed being probably removed by the lungs. The intestines remove the rejected portion of the food, and earthy matter, in considerable quantity derived from the excretory glands in the course of the intestinal canal. But while the foregoing changes are chiefly effected through the medium of the blood-vessels, there is yet an important system of vessels whose functions contribute in no small degree to the maintenance of life, I refer to the lymphatic system. Of the real nature of their functions there yet remains some doubt. "It may, however, be held as highly probable," says Kirkes, "that the materials which it is the special office of the lymphatics to absorb, are like those commonly absorbed by the lacteals, chiefly of a nutritive kind, capable of higher organization, and of contributing to the nutrition of the body. Whether these are derived exclusively from the liquor sanguinis effused for the nutrition of the tissues, or from the fluid with which the tissues are kept moist, or, in part also, from the degenerated or used portions of the tissues, cannot yet with certainty be determined. Parts which, having entered into the composition of a tissue, and having fulfilled their purpose, require to be removed, may not be altogether excrementitious, but may admit of being reorganized and adapted to the nutrition of the same or some lower tissue." And again: "In the absorption by the lymphatic or lacteal vessels, there