

clear pupil was instantly produced, and a sudden blaze of light let in upon the retina, quite astounding to the delighted patient. At other times a permanent aperture in the iris will be made, of sufficient extent to allow of a thorough view of the opacities behind the pupil, and to admit of future operations with the needle for their removal, either through the cornea or sclerotica. I lay claim to no credit for this operation, having seen Mr. Alexander perform it thirty years ago; but I am not aware of its being described in any works upon diseases of the eye, and, as I consider it a very valuable one, I am glad to avail myself of the opportunity this meeting affords of making it more generally known.

## EXPERIMENTAL

AND

### PRACTICAL RESEARCHES ON THE BLOOD.

(Second Series.)

By WILLIAM ADDISON, F.L.S., &c.,

[Abstract read at the Meeting of the Provincial Medical and Surgical Association, Leeds, August 3, 1843.]

After referring to the results obtained by the first series of his "Researches," published in the Transactions of the Association (Vol. XI), the author draws particular attention to the numerous *colorless corpuscles* readily detected in the minutest portion of blood drawn by a puncture from the skin, and *their increased abundance where any inflammatory or abnormal nutritive action is going on*; he also refers to the *fibrillation of the liquor sanguinis*.

From these facts, and from the results of numerous experiments, he has come to the conclusion that lymph and pus globules, and epithelial cells, originate from the *colorless blood corpuscles*, either by a conversion or transformation of the entire corpuscles into these objects, or by the growth of their molecules. It is impossible to frame any conception of the phenomena of nutrition and secretion in the higher orders of animals without supposing the *parietes of the capillary blood-vessels in those places where these processes are actually going on to partake in the necessary changes*.

The appearance of the vessels in the web of a frog's foot after irritation, and of those in the transparent membranes of the embryo, is adduced to show that the walls of the capillaries are formed of fibrous tissue enclosing colorless blood corpuscles, this tissue being subject to changes and alterations equally with other parts of the structure. The adhesion of the colorless blood corpuscles to the parietes of the capillaries, and the physical properties and microscopical structure of the buffy coat of the blood, indicate these corpuscles as the sources from which the fibrous walls of the secreting vessels are formed, the corpuscles forming fibrous tissue, or passing through it to form epithelial cells in subjection to the special law governing the function of the organ in which they are placed, the tissue and the secreting cell originating from a peculiar development of the same object. If the colorless blood corpuscles be hurried through their tissue stages by an abnormal or increased nutrition, they come under our observation as lymph, pus, or exudation corpuscles, being various in magnitude, and having various appearances, according to the nature

and function of the organ from which they are taken, the stages or progress of their development, and the chemical reaction of the fluid with which they are associated.

From these facts and observations the author of the paper deduces the following theory:—

Nutrition may be normal or abnormal.

In *normal nutrition* the colorless blood cells first adhere to the tissue which forms the periphery of the capillary blood channels, they then enter into and contribute to the compositions of the tissue, being subsequently evolved upon the nearest *free surface*\* as epithelial cells.

In *abnormal nutrition* the colorless blood cells adhere to the tissue in much greater abundance; they pass through a tissue stage, in which the tissue is much less fibrous and coherent, and are at length evolved or thrown off on the nearest *free surface*,† as lymph, pus, exudation, or imperfect epithelial cells, the forms and magnitudes of these objects resulting from the degree in which the formative influence regulating the development of the tissue has been exerted upon them. In this theory the red corpuscles are not supposed to take any active share as regards the formation of the tissue, or of the epithelium or pus; but it is supposed that in *acute inflammation* they do so, thereby constituting a distinctive character between abnormal nutrition and true inflammatory action.

Without binding himself to this theory in the exact terms in which it is here expressed, and with liberty to modify it, should his future observations require, the author believes that it affords the best key or explanation yet offered for a variety of microscopical facts, and gives a *rationale* of the phenomena observed in the most extensive class of diseases. The following account of the phenomena, giving rise to the buffy coat of the blood, and to scarlet fever, is given to show the practical application of the foregoing theory:—

From various causes, the nutritive function, or, what amounts to the same thing, the process of secretion, from some one or more of the epithelial surfaces, is diminished or arrested, and the colorless blood corpuscles, therefore, accumulate in the circulating fluid, so that when a vein is opened a much larger amount of them than usual flow out, and, from the sudden change of temperature to which they are exposed, or from other causes, they become ruptured, and discharge their contents, which consists of liquor sanguinis and molecules. In a short time the liquor sanguinis rises to the surface, carrying or drawing with it not only the molecules with which it was associated, but likewise those colorless corpuscles which, having for a longer period resisted the changes to which they have been exposed, have preserved their integrity; it then fibrillates, and forms tissue in the same manner as it would have done within the living vessels, if the colorless corpuscles had been appropriated to the purposes of nutrition; hence the buffy coat has a relation to the lower and colored portion of the clot, similar to that which the capillary parietes have to the currents of blood flowing through them.

In *scarlet fever*, some peculiar cause affects the

\* The interior of a follicle, crypt, or duct.

† The pyogenic membrane.

blood corpuscles; the function of nutrition is disturbed, and the colorless corpuscles accumulate in a special manner in the capillaries of the skin, for the purpose of being eliminated from the body, this end being accomplished by the formation of an excess of epithelium, which peels off at the termination of the disease. But a patient may have scarlet fever without any redness of the skin, or there may exist more or less eruption on the surface of the body, and yet no exfoliation of the cuticle; it is thus the primary febrile symptoms of the disease may appear and subside. The patient seems to be fast getting well, but, as the abnormal blood corpuscles are still circulating in the blood, these appearances ought not to be relied on. They are, perhaps, insidiously accumulating in some of the glandular structures, laying the foundation for future scrofulous disease, forming tubercles in the lungs, or, if none of these things are taking place, their presence is shortly proclaimed by symptoms of dropsy; they are, as it were, thrown upon the kidneys, and produce a true inflammation in these organs, according to the terms of the preceding theory, for both the red and the colorless corpuscles are passing through the tissue, denoted by their presence in the urine.

These views of the phenomena of scarlet fever give the reason why it usually happens that it is those cases which present the mildest primary symptoms that are attended with the graver lesions afterwards, for the disease can never be considered as having terminated satisfactorily unless there has been a more or less copious exfoliation of epithelium. And what are the practical measures which the theory points out in those cases in which the natural effort has been insufficient—those in which the secondary symptoms arise? *Bleeding*, for the purpose of diminishing the amount of the colorless blood corpuscles in the circulation, and (by diminishing the volume of the blood) to recal into the current of the circulation many of those corpuscles which have become stationary in the oppressed and disordered tissues. *Emetics and brisk cathartics*, to remove all the worn out epithelium from the mucous tract of the alimentary canal, and, by their stimulant properties, to urge these tissues to renewed exertions in expending the accumulating colorless blood corpuscles to form new epithelium. *Baths and friction* to the skin upon the same principle; these measures being conjoined with, or followed up by, *pure air, exercise, appropriate diet, and invigorating tonics*. The extension and adaptation of these views to many other specific, inflammatory, or abnormal nutritive diseases, will readily occur to the mind of the experienced practitioner.

In the first series of these Researches it is stated that the colorless blood corpuscles imbibe water and increase in size, during which the outline of the central portion disappears, and the corpuscles are seen filled with molecules. The author now says that if a very dilute solution of acetic acid be added to the corpuscles, thus enlarged and altered by water, the central portion becomes corrugated, and collapses, appearing in the interior of the transparent outer tunic, or integument, either as a single more or less irregular shaped object, or as three or four separate bright granules; if, on the other hand, to corpuscles enlarged and altered by water, a similarly weak

alkaline solution be added, its effect will be to enlarge the corpuscles still more, and render the molecules within still more conspicuous, after which they burst open with considerable force, discharging a quantity of molecular matter, and a multitude of distinct molecules or granules. "Hence," the author observes, and to this remark we would invite particular attention, "the colorless blood corpuscles are among the most delicate tests we have of the acidity or alkalinity of the fluids with which they come into contact, and their vital functions, as well as their visible appearance, must be correspondingly modified."

Neither of the solutions above referred to could be discriminated by the taste from pure water, the acid hardly perceptibly; reddened litmus and the alkali was in a similarly dilute condition.

The author concludes his paper by remarking that the solidist and humoralist can neither of them maintain exclusive views, and the most philosophical course is to merge all differences on these topics in a vigorous prosecution of minute microscopical anatomy. As regards the forthcoming phases of medical opinion, the chemical investigator must necessarily fail of practical utility in the treatment of disease, if, by relying too exclusively upon the laboratorial results of his researches upon the metamorphosis of the living tissues, he overlook the fact that every product of vital action is the result of cell life. No reasoning from mere chemical principles can be made the basis of medical practice, to the entire exclusion of the varied and incomprehensible changes and combinations wrought upon the same materials by life. So, on the other hand, if the mere microscopical observer closes his eye upon the brilliant results of chemical science, the sphere of his usefulness will be equally contracted and obscure; whereas, by union and co-operation, harmony of result must ensue, and medical science will emerge from her present unphilosophical position.

CASE  
OF  
TUBERCULAR DEPOSIT  
WITHIN THE  
CRANIUM OF AN ADULT.

By HENRY SNOWDEN, Esq.

On the 28th of April last, was called to attend Mr. M., aged thirty-eight, for an hæmoptysis. He had had pulmonary complaint for some weeks previously, and presented the usual symptoms of tuberculous disease of the lungs. Had been a member of a temperance society for six years, and was a strongly built, muscular man. The usual treatment was employed, and after the first visit there was no return of the hæmoptysis. However, the chest symptoms grew worse, the cough was very troublesome, he had profuse night sweats, and he became emaciated.

In the early part of June he noticed that his memory failed him, and at times he was slow to reply, as if it required an effort to collect his ideas. There was no complaint of headache, and he attributed these symptoms to anxiety concerning his family affairs, which, during his illness, had given