

proved to contain centres for voluntary motion. The individual convolutions are separate and distinct centres. Electrical irritation of well-defined and limited portions of these convolutions give rise to certain definite movements of the limbs or face, usually of a combined nature. Other new facts of quite a different nature are due to Dr. Parkes of the Army Medical School. He fully expounded, by experiments of his own, the celebrated observations of Fick and Wislicenus, that gave the decisive blow to Liebig's theory which prevailed for so many years—that muscular work is dependent on, and *proportioned* to the destruction of muscular tissue by oxidation, this destruction being represented by the amount of urea formed. His experiments prove that the elimination of urea is *not* dependent on the amount of muscular exercise, but on the amount of nitrogenous food taken—that muscular tissue does not consume itself as a fuel doing work; also that it is the gland cells, especially those of the liver, that we have to look to as the organs of this transformation. Parkes admits with the Swiss physiologists that some muscular tissue is disintegrated through muscular exercise, but it is the wear and tear of the engine through continuous work and not of the fuel consumed which keeps the engine at work. We see the important bearing of these facts in pyrexia. The febrile state involves a large destruction of nitrogen-containing tissues, which are hardly consumed at all in health. Every degree of fever heat, or of heat above 98° 4, implies so much additional destruction of the most important organs of the body, such as the heart and muscles and nerve-centres, as well as corresponding addition to the work of the excreting organs; further—according to the older notions, it was the kidneys that were blamed for the red deposits in the urine. According to our present views, the liver is the organ that should be blamed, the disintegrating tissues being transformed into urea and uric acid by that organ.

Other experiments of Parkes are some with reference to alcohol, which prove that it never increases the temperature, as was formerly supposed; on the contrary, that it slightly diminishes it. He also upset the theory of Lallemand's, that alcohol is not oxidized in the body, but excreted unchanged.

Perhaps some of the most interesting and important results of experimentation on the lower animals are those in connection with tuberculosis. Tuberculosis can be transmitted from mankind to animals, and probably from these back again to the human

species. Laeunec considered tubercle a special and peculiar product. In 1865 Villemin announced the production of tuberculosis by inoculation, and thus seemed to establish its specific nature. The researches of Burdon-Sanderson, Wilson Fox, and others prove that the inoculation of many kinds of noxious matter might give rise to tubercle; that tubercle is a result of inflammation, with this addition, that the presence of a special structure impresses on it a special form. These are very important facts for us to bear in mind; more especially when we have it stated on the best authority that fully one-half of the cattle slaughtered die more or less tuberculous. The microscope has demonstrated that these masses are identical in structure and development with tubercle in man. When you remember that the powers of absorption in the infant are very active, and that milk enters into most of their food, you can readily perceive what an important bearing this question of transmissibility may exert.

The researches in connection with the constituents of the blood have resulted in very materially modifying our views especially with respect to the white corpuscle, the most striking peculiarity of which is its marvellous inherent power of spontaneous motion, only quite lately recognized. The constituent molecules of which this apparently insignificant little body is made up, are incessantly dancing hither and thither, and rolling over and over among themselves. It is continually changing its form, protruding now one part and now another of its outer surface, and twisting and contorting itself into all sorts of indescribable shapes. It can be seen insinuating itself into and through the finest slits and pores, by first pushing forward the minutest finger or feeler of its substance into the available chink, and then bringing after the feeler all the rest of the corpuscular mass in the same attenuated way, until the opening is passed, when the corpuscle forthwith expands to its larger dimensions in the less restricted space beyond. The peculiar motion of these little bodies has done much to very materially alter our views on the great subject of inflammation, which underlies so much of pathology.

Thirty years ago Rokitansky taught alteration of the fluids of the body; especially of the blood, to be the cause of most morbid changes. These views for a time prevailed, but only to be superseded by the celebrated cellular pathology of Virchow, who traced all to growth of cells. This theory was supplanted to a great extent by Cohnheim's discovery in 1867, or rather what he considered his discovery, the