

weakened but not destroyed vitality. At this stage the beautiful red and yellow tints are developed, which produce such a fine effect in certain kinds of scenery. Then comes more complete death, when the affinity of oxygen acts without any opposition, and the various brown tints of later autumn make their appearance, due to changes which we can imitate in our experiments with dead compounds. This may not be a pleasing way of viewing an otherwise charming subject, but I think we must all admit that it is substantially true.

H. C. SORBY

HUMAN ANATOMY AND PHYSIOLOGY

The Physiological Anatomy and Physiology of Man.

By Robert B. Todd, William Bowman, and Lionel S. Beale. A new edition by the last-named author. Part 2 of Vol. i. (Longmans and Co., 1871.)

THIS part corresponds to the third, fourth, and fifth chapters of the last edition; it is now divided into four chapters, one of which is devoted to a general consideration of the properties of tissue, and the others contain detailed accounts of the connective, cartilaginous, osseous, and adipose varieties. Dr. Beale seems to have spared no time or trouble upon the present part, which has been carefully revised throughout; a considerable amount of new matter has been added, and many parts, especially those relating to the development of the different tissues, have been entirely re-written.

The chapter on the forms of connective tissue is very full and complete, and compares very favourably with that in the last edition; descriptions of several well-marked varieties, which were before omitted, being now introduced, such as those occurring in the Whartonian jelly, the vitreous humour, and the cornea. With respect to yellow elastic tissue, Dr. Beale states that the fibres, usually considered to belong to it, which are found in tendons, and resist the action of acetic acid, are not of elastic nature at all, but are merely imperfectly-formed white fibrous tissue; and in his account of areolar tissue he strongly contests one of the most generally-received pathological doctrines of the day, that which supposes in many cases of degeneration that the interstitial areolar tissue of the organ is the active agent, becoming hypertrophied, and then contracting and compressing the structures in its meshes. Dr. Beale considers, on the contrary, that in most cases the areolar tissue is quite passive, and that the phenomena ascribed to it are really produced by the rapid multiplication of parts of white blood corpuscles which have passed through the walls of the blood vessels.

In his account of cartilage Dr. Beale dissents from the opinion held by some, that the capsule of a cartilage cell differs from the matrix in its origin and nature; he points out that in some cases there is no matrix, in others no cell-wall can be demonstrated as distinct from the matrix; and again, in others the capsule passes gradually into the matrix; and maintains that the matrix when present is entirely formed of old capsules, and is *not* developed independently of the cells. Fibro-cartilage and elastic cartilage are both well described; no mention at all of the latter form was made in the previous editions.

The chapter on bone contains a good account of its

histological structure, but is chiefly interesting from the views put forward as to the mode of origin of the canaliculi. Virchow states that they are formed by the deposition of calcareous matter round processes radiating from corpuscles contained in the lacuna, while Kölliker thinks they are formed by resorption after the lacuna has been entirely surrounded by calcareous matter. Dr. Beale differs from both—he says the bone corpuscles of the lacuna have frequently no processes, and that when processes are present they are always much shorter and much less numerous than the canaliculi, and he points out that the formation of these little channels begins at their distal end, not at the end next the lacuna, as has been supposed; his own view is that in an early stage of the development of bone, it is all permeable to nutrient fluids, but that as calcareous matter is deposited this permeability gets restricted to constantly narrowing channels, which ultimately remain as the canaliculi, and are at first filled with soft matter (cartilage or membrane), which in fully formed bone dries and shrivels up, leaving the canaliculi as true tubes.

The concluding chapter, that on adipose tissue, is on the whole good, but in the account of its histological structure the impression is conveyed that an adult fat cell consists merely of an envelope containing oily matter—no mention being made of the fact that by proper treatment a nucleus also can be almost always demonstrated. Dr. Beale considers that the fatty matter contained in the cell is formed by the degeneration of the mass of "bioplasm," or "germinal matter," of which it was once entirely composed.

The part is illustrated by a large number of very good figures, and several full-page plates.

OUR BOOK SHELF

Elementary Treatise on Natural Philosophy. By A. Privat Deschanel. Translated and edited by Prof. Everett, M.A., D.C.L., &c., Professor of Natural Philosophy, Queen's College, Belfast. In Four Parts. Part 2.—Heat. (London: Blackie and Son.)

THIS work is intended to be an elementary treatise on the science of Heat. The remarkably fine engravings that embellish it throughout, give it an air of reality which, unfortunately, is not generally possessed by English scientific books. Still, some of the original engravings might have been improved; for example, figs. 223, 240, 245, and 264 are peculiar, and do not represent what is likely to be seen in the laboratory. Having said this much in favour of Prof. Everett's translation, we cannot avoid making some unfavourable criticisms. We decidedly object to the numerous formulæ and equations which may almost be said to disfigure many of the pages; they are not sufficiently explained for a popular work, and might have been more compressed if intended for advanced scientific students. And seeing that formulæ and explanations usually vary inversely as each other within the same volume, we should have been pleased—indeed, we expected—to find as many of the former eliminated as possible. This expectation was occasioned by the translator himself, who complained that oftentimes we are confronted with "unexplained formulæ, which burden the memory without cultivating the understanding." Can Prof. Everett assert that he has explained the formula on page 362 of Part 2? Has he not rather fallen into the very error which he so ably deplores in his preface; failing to see amid V, KT, and other algebraic mystifications, that his H and h are