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THE PHYSICAL BASIS OF LIFE[1]

IT is frequently stated that the cell is the unit of life, and this is a convenient form of expression, but its exact truth depends upon the conception that one has of life. The cell may be regarded as the morphological unit of life, but form in and of itself, and as recognized by the eye, is not essential to the manifestations of life. We know no life apart from matter, and matter and energy are the only things that we do know. When matter becomes endowed with life, it does not cease to be matter; it does not lose its inherent properties; it is not released from the laws that determine its structure, its attractions and its motions. In studying the organized cell of living things, whether vegetable or animal, whether bone or brain, it should always be borne in mind that it is material in composition, subject to the fundamental laws that govern matter, and possessed of the properties essential to matter.

The only essential, characteristic and constant difference between living and non-living matter is that within the former there is constant and rhythmic metabolism, while in the latter no such process occurs. The living cell is made up of active, labile molecules and these molecules consist of numerous atoms, and each atom contains a large group of electrons; atoms and electrons are in ceaseless, rhythmic motion, while groups of atoms are being constantly cast out of the molecule and replaced by new groups split off from matter outside the molecule. Metabolism, the one char-

[1] Address of the president before the Association of American Physicians, Washington, May 11, 1909.