

dark problems of disease we can never, from the nature of the subject matter, approach nearer to a solution than what mathematicians call "a first approximation." It is through such successive approximations that all science advances; yet in the instance of a diseased organism these must ever remain somewhat of a mystery, and we can never pass to the final stages of the *How* and the *Why*.

Among the theories advanced, there is one which has recently gained considerable prominence, which may be provisionally regarded as the correct one, both from the number of facts which it explains, and also from the manner in which it has withstood the tests of experiment and criticism, though its claims are stoutly opposed in some directions. This theory, as originally propounded by its author, Metschnikoff, undertook to ascribe the chief phenomena of immunity, both natural and acquired, to the functional or vital actions of the body-cells, though, as now modified by its expounders, it concedes the ancillary office of other agencies, though of a subsidiary character.

Before proceeding to a detailed consideration of this theory, it is necessary, to a clear comprehension of the issues involved, that we take a brief survey of the salient features in the genesis and life-history of the body-cells. Biology teaches that the cell is the basic element of all life. As a primitive part, it may be either an organism or an element in an organism. That it may lead an isolated life, as plant or animal, or it may become united with other cells and lead a more or less corporate existence; but always, even as an element of a higher organism, it preserves and retains its own individuality as a cell. At first we see that the corporate union is very slight, merely the contact of one cell with another of its own kind—as the filament of a conferva. Rising higher, we see the cell united with others different from it. Plants and animals appear, having structures composed of various cells. Rising still higher, we see animal forms of which the web is woven out of myriads and myriads of cells, with various cell products, processes, fibres, and tubes. Viewed in this manner, the cell is seen to be the elementary factor of life, and the complex organism is but an aggregation of these elements, though this association is not a complete subordination of living parts, but each and all are mutual and co-ordinate, and there exists an interdependence of parts in so far as every part is dependent upon every other part. Each is, so to speak, a condition of existence for every other part, and the unity of the organism is but the expression of its solidarity. This is true, inasmuch that, whenever organized substances become differentiated into morphological elements—such as cells—each of these has its own evolution, separate and distinct, and is born, lives, and dies an individual.

Hence, whether as an element or as an organism, associated or differentiated, the cell possesses and retains its own individuality, and lives as a separate creature. The vital or functional activity of the cell is a threefold kind. It is directed in part towards its self-preservation, self-propagation, and the altering of outward relations. Virchow distinguishes these severally as the nutritive, formative, and functional activities. Many of these functions of the cells cannot be seen, and are only known through their effects. Others, again, like motion, growth, multiplication, ingestion, and alterations in form, can be directly observed under the microscope. Every cell, whether isolated or joined with others, is influenced by the nature of its environment. This may assist or antagonize its vital functions. They may disturb to a degree amounting to a complete arrest of all the signs of cell-life, or they may accelerate them all to the highest point of activity. Let the temperature be raised, a noxious substance be present, or an enemy to cell-life approach, and there is at once a corresponding change in the behavior of the cell. The cell is autonomous in itself, and yet it is subject to its conditions of external existence. To pass further into details: All microscopists are familiar with the spectacle of a formless lump of albuminous matter (a Rhizopod) putting forth a process of its body as a temporary arm or leg, or else slowly wrapping itself around a microscopic plant or morsel of food-substance, thus converting its whole body into a mouth and stomach. These phenomena are, however, surpassed by another monad, which fastens itself to a plant and sucks the chlorophyll first from one cell and then from another, while a second monad, unable to make a hole in the cell-wall of the plant, comes along and thrusts long processes of its body into the openings already made, and drags out the remains of the chlorophyll left by its predecessors. And still another, a third monad, comes, leading a predatory life, and falls upon those who have filled themselves with food, and takes it away from them. It is here that we stand at the threshold of that dark region where animal will begin, though we are, as yet, in the presence of the lowest forms of life known to science. It is in this direction concerning the facts in the genesis, morphology, and physiology of the cell, as interpreted by the laws of development and heredity, that science looks for a solution of those questions which have hitherto baffled all efforts. To understand and to estimate their several values, and their import as factors in the conditions of immunity, is to solve the mystery and to invoke their allegiance to the medical art.

It has long been known that inert particles of matter, such as pieces of bone, sponge, animal ligatures, and the like, when introduced into the blood and tissues of an animal, would become