FUNCTION AND DESIGN

Among natural sciences physiology takes a place which in one respect is different from that taken by any other. It studies the phenomena of life, but more particularly the ways in which these phenomena are related to the maintenance of life. Anatomy and morphology are concerned with the forms of living organisms and their structure; biological chemistry, as distinct from physiology, with the composition of the material in which the phenomena of life are exhibited. The province of physiology, in studying the functions of these forms and of this material, is to ascertain the contributions that they make to the organization of the living mechanism, and learn how they minister to the maintenance of its life. Function implies ministration, structure for physiology implies adaptation to function, what in a word may be termed design.

Ultimate analysis of the phenomena with which physiology deals leads to the fundamental distinction between matter in which life is manifested and matter in which it is not. Life is exhibited only in aqueous systems, containing unstable, perishable combinations of carbon with hydrogen, nitrogen, sulphur, phosphorus and oxygen, in the presence of certain inorganic ions, those which are present in the sea, the native environment originally of all forms of life; and the inalienable property that such matter exhibits when alive, and that matter which is not alive does not, is that these unstable organic combinations are forever reforming themselves out of simpler combinations that do not exhibit this property, and do so at a rate which averages at least not less than that at which they break down. This power of self-reformation, spontaneous regeneration, operates not only when living organisms, cells or communities of cells are growing or reproducing their kind; the very maintenance of living existence requires by definition that it should persist. In the absence of water the living process may sometimes apparently be suspended for a time, as it may be if the surrounding watery medium is immobilized by cold; it is a question whether this is anything more than a retardation to a rate of change that is imperceptible by the ordinary methods of observation, and a question how long such suspended animation is possible where it is possible at all. It is only where water has the kinetic activity of the liquid state that spontaneous regeneration of

1 Address by the president of Section I—physiology—of the British Association for the Advancement of Science, Oxford, August, 1926.