

scope. The word itself is as old as the century, but the kind of teaching which Biologists now aim at—the inculcation of general principles on a foundation of thoroughly practical knowledge—has raised the Biological studies to a much higher position in liberal education than the Botanical and Zoological teaching of the past generation ever had accorded to them.

Biology investigates the form, structure and development of organisms; the modes in which the various parts perform their functions, and the relations between the organisms themselves, and between them and their conditions of existence.

Medicine is based on two sciences—Pathology, which discusses the nature and causes of departure from the normal in structure and function, and Therapeutics, which investigates how, by varying the conditions of existence, an organism may be restored from an abnormal to a normal state. As the abnormal can only be understood in terms of the normal, it is obvious that the medical sciences fall within the domain of Biology, and that the best introduction to the study of the former is a clear grasp of the elementary principles of the latter.

How, then, can such a clear grasp be best obtained? In the first place the student must be familiar with the chief sub-divisions of the vegetable and animal kingdoms, and have some knowledge of the reasons for arranging the different forms of plants and animals under these. But he ought not to be required to burden his memory with details of the classification of animals and plants, or with explanations of the often unwieldy nomenclature of the specialist. It is in such directions that mistakes have been made in the past, where Botany, *e.g.*, seems to have retained a place in Medical Education more as a survival of the knowledge of the Herbalist, than as an aid to understanding the general phenomena of life. What is wanted is an orderly arrangement and extension of what may be termed ordinary Natural History knowledge, and which, in fact, the student should bring with him in suitable form from his High School.

In the second place the student must proceed to a careful study of the structure of some well-selected types of the Animal and Vegetable

Kingdoms. Biology has arrived at its principles by means of observation and comparison, and the student, in accordance with a well-established pedagogical maxim, can only obtain an insight into these principles by following the same road. But there are other reasons besides the desirability of cultivating the faculties of observation and induction, which render such a course necessary. Firstly, a thorough elementary knowledge of the minute structure of cells and tissues, and of the varied technique required in their study, can only be acquired comparatively. Secondly, the student must familiarize himself with the general structural features of those animals, on which his physiological knowledge will afterwards be based; and thirdly, he ought to be familiar with the structure and life-history of those pathogenic organisms, animal and vegetable, which are responsible for such a large class of diseases. Lastly, it is a significant circumstance that all universities of the first class impose a similar course and a similar examination on candidates for their degrees in Medicine.

In the third place, before the student proceeds to study Physiology he must already have mastered the rudiments of Chemistry and Physics, for Physiology is the attempt to follow the chemical and physical phenomena occurring within organisms, and consequently the methods of these sciences and their laws must be learnt, not from books alone, but by actual laboratory practice. As with Botany, so with Chemistry; its relations to the Art rather than to the Science of Medicine have been kept in the foreground, while Physics, which is of equal importance, is, in most cases, ignored in medical education. I hope to return in a future article to this important subject of the necessity for preliminary work in Chemistry and Physics before the student approaches the study of Physiology.

It may be asked how far the university requirements in Biology accord with the scheme of preliminary training laid down above. It is quite possible that these requirements may be modified in the future, but the most important of them, which insists on the thorough study of certain typical organisms in the laboratory, will always be retained. It is a matter of quite