

of the primary life regions of the earth, with their distinctive types, as important as a knowledge of the embryology of the crayfish?

Naturalists delight in contemplating the aspects of nature, and derive enjoyment from studying the forms, habits, and relationships of animals and plants; while most of the self-styled "biologists" of the present day direct their studies to the minute structure (histology) and development (embryology) of a few types—generally lowly forms that live in the sea—and are blind to the principal facts and harmonies of nature. Imbued with the spirit of evolution, they picture in their mind's eye the steps by which the different groups attained their present state, and do not hesitate to publish their speculations—for "they know not what they say." Their lives are passed in peering through the tube of a compound microscope and in preparing chemical mixtures for coloring and hardening tissues; while those possessing mechanical ingenuity derive much satisfaction in devising machines for slicing these tissues to infinitesimal thinness. An ordinary zoölogist or botanist is not constituted in such a way as to appreciate the eagerness and joy with which one of these section-cutters seizes a fraction of a millimetre of the ductless gland of a chick or the mesoblast of an embryonic siphonophore; nor is it vouchsafed him to really understand, though he may admire, the earnestness, devotion, unparalleled patience, and intense satisfaction with which the said investigator spends years of his life in hardening, staining, slicing, drawing, and monographing this same bit of tissue.

Such "biologists" have been well characterized by Wallace as "the modern school of laboratory naturalists"—a class "to whom the peculiarities and distinctions of species, as such, their distribution and their affinities, have little interest as compared with the problems of histology and embryology, of physiology and morphology. Their work in these departments is of the greatest interest and of the highest importance, but it is not the kind of work which, by itself, enables one to form a sound judgment on the questions involved in the action of the law of natural selection. These rest mainly on the external and vital relations of species to species in a state of nature—on what has been well termed by Semper the 'physiology of organisms' rather than on the anatomy or physiology of organs" ("Darwinism," 1890, Preface, p. vi.).

It is hardly an exaggeration to say that in our schools and colleges the generally accepted meaning of the word biology has come to be restricted to physiology, histology, and embryology, and that the courses of instruction now given in biology cover little additional ground, save that they are usually supplemented by lectures on the morphology and supposed relationships of the higher groups. It is against this modern custom of magnifying and glorifying these branches or departments of biologic knowledge until they are made to appear not only the most important part of biology, but even the whole of biology, that I beg to enter a most earnest protest. Far be it from me to deprecate any investigation that tends, in howsoever slight a degree, to increase our knowledge of any animal or plant. Such investigations fulfil an important and necessary part in our understanding of the phenomena of life, but they should not be allowed to obscure the objects they were intended to explain.

Without a knowledge of anatomy and embryology it would be impossible to properly arrange or classify the various groups, or to understand the inter-relations of the many and diverse elements that go to make up the beautiful and harmonious whole that naturalists and other lovers of nature so much admire. Similarly, the architect would be powerless to construct the magnificent edifices that everywhere mark the progress of civilization unless he understood the nature and properties of the various parts that go to make up the finished structure; yet what would be thought of a school of architecture that limited its teachings to the strength of materials or the composition of bricks, mortar, nails, and other minor factors necessary in construction? But would not such a school be strictly comparable with the modern school of histologists and physiologists who, under the head of biology, teach little besides the minute structure and functions of tissues, ignoring the characters that constitute and distinguish species, that show the adaptation of species to environment, that