

heart of Vertebrates, while a simple, straight tube,—without even smooth internal walls, and while the yolk cells are still dropping from its sides into its cavity and only move backwards and forwards like an advancing and retreating tide,—were not functionally and typically as fully a heart as later, when it has obtained two chambers in Fishes, three in Reptiles, and four in Birds and Mammals; or the lungs, while a simple, cul-de-sac-like dilatation of the wall of the œsophagus, were not truly performing their part as well as in the Fish when they become more isolated as a swimming bladder, or in *Lepidosteus* when they approach the complicated structure exhibited in Saurians and Chelonians, or in the latter two when they occupy a great portion of the cavity of the body, or in Mammals when they have changed into a uniform, spongy mass of minute bronchioles with their capillaries. And so we might mention the progressive stages of the eye, the ear, the brain, and all the other organs, if so many examples were necessary.

At no time is the whole type exemplified by any particular specimen; nor does any one individual, at the moment when we look at it, reveal to us its whole life. Still less can any alcoholic preparation of an animal, as it hangs inanimate before us, disclose its action, its manner of life, its physical relations, its former embryonic simplicity, its later metamorphoses, or its final mode of passing away. Such objects ought only to be considered as means for our study, as memorials of past life. We collect them, that they may assist us in telling the tale of their organic connections. We may even substitute wax models for the things themselves, and that too with very good success, so far as a plastic substance may represent the appearance of animal life at a given period; but the wax is a perfect blank as regards the past or the future, and so is the dead animal, when compared to what it has been, or to what it might have become. But when alive, we see in it at the beginning, as an embryo, certain characteristics of its type; when born it exhibits other characteristics, some of the former disappearing, and some remaining throughout life, and again at various periods of its life other characters appear and disappear, so that some individuals, dying before a certain age, never wholly exemplify their whole type, whether it be that of branch, class, order, family, genus, or species.

When such views are adopted, and such interpretations have become our standards, it is impossible to hold longer to the inanimate nature of any one portion of a growing body, and consider the others as endowed with all the characteristics of an animate being: it is impossible to assert, if we may revert more specially to what has already been said, that the so-called yolk sac is a mere bag of nourishment, a reservoir of food, for the embryo, which increases in bulk as the former doles out its supplies. What part this organ plays in the progress of the growth of *Testudinata* will be fully described in a future section; let it