

truism that these develop because of immediately operative growth-conditions, or reactions between inherited organization and environmental stimulus; but the whole story becomes more luminous to us if we are otherwise assured that the race of frogs sprang from a fish ancestry. (*d*) It is said that increased precision of embryological work discloses individual characteristics at a very early stage in ontogeny, that even a blind man could distinguish embryos of duck from those of the fowl as early as the second or third day of incubation. Yet this does not seem to be inconsistent with a general recapitulation.

All are agreed that there is no completeness of recapitulation, else phylogeny would be a simpler business than it is. As Hæckel, Balfour, and others have said, ancestral stages may be dropped out in embryonic development, or disguised by newer adaptive characters in larval development. But in the dropping out there must be some law. Why do certain ancestral characters recur, or apparently recur, while of others there is no trace? Why does an embryo snake show gill-clefts but no trace of fore-limbs? To this question Balfour answered, "It is very possible that rudiments of the branchial arches and clefts have been preserved because these structures were functional in the larva (Amphibia) after they ceased to have any importance in the adult; and that the limbs have disappeared even in the embryo, because in the course of their gradual atrophy there was no advantage to the organism in their being preserved at any period of life".

Similarly, Prof. Sedgwick has maintained that when there is a recapitulation of ancestral stages in *embryonic* development, this implies that the characters in question were retained as useful *larval* characters for a long time after they had ceased to be directly functional in the adult.

Another evolutionary idea which has arisen out of embryology is that of "the substitution of organs", suggested by Nicolaus Kleinberg (1842-1897), one of Hæckel's numerous disciples, and professor of zoology at Messina and Palermo. He