

of the animal kingdom, and that general homology strictly proved, proves also typical identity, as special homology proves class identity.

The results of all embryonic investigations of modern times go to show more and more extensively, that animals are entirely independent of external causes in their development. The identity of the metamorphoses of oviparous and viviparous animals belonging to the same type, furnishes the most convincing evidence to that effect.¹ Formerly it was supposed that the embryo could be affected directly by external influences to such an extent, that monstrosities, for instance, were ascribed to the influence of external causes. Direct observation has shown, that they are founded upon peculiarities of the normal course of their development.² The snug berth in which the young undergo their first transformation in the womb of their mother in all Mammalia, excludes so completely the immediate influence of any external agent, that it is only necessary to allude to it, to show how independent their growth must be of the circumstances in which even the mother may be placed. This is equally true of all other viviparous animals, as certain snakes, certain sharks, and the viviparous fishes. Again, the uniformity of temperature in the nests of birds, and the exclusion, to a certain degree, of influences which might otherwise reach them, in the various structures animals build for the protection of their young or of their eggs,³ show distinctly, that the instinct of all animals leads them to remove their progeny from the influence of physical agencies, or to make these agents subservient to their purposes, as in the case of the ostrich. Reptiles and terrestrial Mollusks bury their eggs to subtract them from varying influences; fishes deposit them in localities where they are exposed to the least changes. Insects secure theirs

¹ This seems the most appropriate place to remark, that the distinction made between viviparous and oviparous animals is not only untenable as far as their first origin in the egg is concerned, but also unphysiological, if it is intended, by this designation, to convey the idea of any affinity or resemblance in their respective modes of development. Fishes show more distinctly than any other class, that animals, the development of which is identical, in all its leading features, may either be viviparous or oviparous; the difference here arising only from the connection in which the egg is developed, and not from the development itself. Again, viviparous and oviparous animals of different classes differ greatly in their development, even though they may agree in laying eggs or bringing forth living young. The essential feature upon which any important generalization may be

based, is, of course, the mode of development of the germ. In this respect we find that Selachians, whether oviparous or viviparous, agree with one another; this is also the case with the bony fishes and the reptiles, whether they are respectively oviparous or viviparous; even the placentalian and non-placentalian Mammalia agree with one another in what is essential in their development. Too much importance has thus far been attached to the connections in which the germ is developed, to the exclusion of the leading features of the transformations of the germ itself.

² BISHOFF, (TH. L. W.,) in R. Wagner's Handwörterbuch der Physiologie, Article "Entwicklungsgeschichte," p. 885.

³ BURDACH's Physiologie, etc., q. n. vol. 2, 2d ed. Sect. 334-38. See, also, KIRBY and SPENCE's Introduction, etc., q. n.