

throat Now, the pericardium touches the arch of the tongue or second post-oral (*hy.*), as in the embryos of fishes (see Salmon's Skull, Phil. Trans., 1873, pl. i.).

The tissue bounding the fourth post-oral cleft, and which answers to the third branchial arch of a fish, lies under the fourth (evident) muscle-plate; and this would answer in the adult to the region of the third cervical vertebra.

This corresponds with the fact that the ventral cephalic region—the perforated respiratory pharynx—is not nearly so much retracted as the dorsal or cranial part of the head.

There has been, evidently, a secular retraction and shortening of the head and throat in existing (*Holocranial*) Vertebrates; but the region of the clefts and gills has suffered less change than the part containing the enlarged, but (relatively) shortened, neural axis.

As far as possible the head has formed a coil similar to that of the tail, both hanging over the lengthening and narrowing umbilical pedicle, and thus getting more and more clear and free of the subjacent yolk.

From this coiled condition the head never recovers more than partially; thus parts that would have retained their proper distance from each other as serial elements of a row of segments are, so to speak, huddled together, and this state of things gives rise to "a struggle for existence" in the ventral moieties of the segments.

That, however, which imprisons the elements of the face sets the dorsal region free, and thus the swelling and growing vesicles of the brain expand the neural canal, producing what in the spinal region would be morbid or abnormal—a state of "spina bifida."

At present the middle vesicle (C 2) is not only relatively very large, but it also looks directly forward, whilst the fore-brain (C 1) looks downwards and backwards.

Already the fore-brain has budded out into a pair of additional swellings—these are the rudiments of the hemispheres (C 1a); these do not yet reach the mid-brain. The pineal body (*pnl.*) grows from this intervening part.

Behind the globular mid-brain, the hind-brain (figs. 3, 5, C 3) is seen to be divided into two regions, the second of which passes almost insensibly into the myelon (fig. 6).

The axial tissue below these nervous masses is thickening into embryonic cartilage; but the sides, and more especially the roof, of the skull, are composed of very delicate layers of cells that are only beginning to break up into strata.

The outermost cells are derived from the *epiblast*, and the innermost from the *mesoblast*; this latter has thus intruded itself between the enfoldings of the upper layer of the *blastoderm*, at the part where that layer dominates everything else, being here most accumulated and developed.

The sectional view (fig. 6) shows that the mid-brain (C 2) is bent like a horse-shoe; the tissue in the cavity of this bend is the *middle trabecula* of Rathke, and is traversed