

of blood are also in arches, which do not coincide with the medial line of the body. The nervous system consists of diffused ganglia, united by threads, the larger ones being around the cesophagus. The nervous system and the organs of sense appear late; the motions are slow and powerless.

IV. *The Vertebrate Type.* This is, as it were, composed of the preceding types, as we distinguish an animal and a vegetative system of the body, which, though influencing one another in their development, have singly a peculiar typical organization. In the animal system, the articulation reminds us of the second type, and the discharging and receiving organs are also placed at opposite ends. There is, however, a marked difference between the Articulates and the Vertebrates, for the animal system of the Vertebrates is not only doubled along the two sides, but at the same time upwards and downwards, in such a way that the two lateral walls which unite below circumscribe the vegetative system, while the two tending upward surround a central organ of the animal life, the brain and spinal marrow, which is wanting in Invertebrates. The solid frame represents this type most completely, as from its medial axis, the backbone, there arise upward arches which close in an upper crest, and downward arches which unite, more or less, in a lower crest. Corresponding to this we see four rows of nervous threads along the spinal marrow, which itself contains four strings, and a quadripartite grey mass. The muscles of the trunk form also four principal masses, which are particularly distinct in the Fishes. The animal system is therefore doubly symmetrical in its arrangement. It might easily be shown how the vegetative systems of the body correspond to the type of Mollusks, though influenced by the animal system.

From the illustrations accompanying this discussion of the great types or branches of the animal kingdom, and still more from the paper published by K. E. von Baer in the *Nova Acta*,¹ it is evident, that he perceived more clearly and earlier than any other naturalist, the true relations of the lowest animals to their respective branches. He includes neither Bryozoa nor Intestinal Worms among Radiata, as Cuvier, and after him so many modern writers, did, but correctly refers the former to the Mollusks and the latter to the Articulates.

Comparing these four types with the embryonic development, von Baer shows that there is only a general similarity between the lower animals and the embryonic stages of the higher ones, arising mainly from the absence of differentiation in the body, and not from a typical resemblance. The embryo does not pass from one type to the other; on the contrary, the type of each animal is defined from the

¹ Beiträge zur Kenntniss der niederen Thiere, *Nova Acta Academia Naturæ Curiosorum*, vol. 13, Part 2, 1827, containing seven papers, upon *Aspidogaster*, *Distoma*, and others, *Cercaria*, *Nitzschia*, *Polystoma*, *Planaria*, and the general affinities of all

animals. These "Beiträge," and the papers in which Cuvier characterized for the first time the four great types of the animal kingdom, are among the most important contributions to general Zoölogy ever published.