

published only a few (eleven) papers, but some of these were of great value, especially his account of the development of *Hydra* (1872), of *Lumbricus trapezoides* (1878), and of the Polychæte worm *Lopadorhynchus* (1886). In his memoir on *Lopadorhynchus* he dealt very severely with the conception of the mesoderm as an independent germinal layer, and sketched his theory of the substitution of organs. This may be explained by taking a concrete instance.

In all Vertebrate embryos there is, for some time at least, a supporting axial rod or notochord, developed along the dorsal median line of the primitive gut. This persists throughout life in the lancelet and lamprey and a few old-fashioned types, but from Fishes onwards it is gradually replaced in development by the backbone. The notochord does not become the backbone, which has a different (so-called mesodermic) origin, but is replaced by it. The notochord is a temporary structure, around which the vertebral column is constructed, as a tall brick chimney might be built around an internal scaffolding of wood. Now, what is the relation between the more primitive axis or notochord and its more effective substitute the backbone, seeing that the former does not become the latter? Kleinenberg's suggestion was that the notochord supplies the stimulus, the necessary developmental condition, for the formation of the backbone when suitable materials are forthcoming. Of course we require to know more about the way in which the old-fashioned structure prepares the way for and stimulates the growth of its future substitute, but the general idea of one organ leading on to another is suggestive. It is consistent with our general conception of development—that each stage supplies the necessary condition for the next; it helps us to understand more clearly how new structures, too incipient to be functional, and old structures, too transitory to be of direct use, may persist; in short, it makes the process both of development and evolution more intelligible.

Kleinenberg maintained that the Annelids possessed two quite distinct nervous systems, one for the larva, and the other for the adult, which are not homologous