

sists of the *sensitive* nervous fibres which convey the impressions of sensation from the skin and the organs of the senses in a centripetal direction to the central marrow, in a centrifugal direction to the muscles. By far the greater part of these peripheric conductive nerves originates from the skin-fibrous layer, by peculiar local differentiation of the rows of cells into the respective organs.

"The membranous coverings and blood-vessels of the central marrow are identical in origin with the greater part of the conductive marrow; these membranous coverings are the inner membrane (*pia mater*), the central membrane (*meninx arachnoides*), and the outer membrane (*dura mater*). All these parts are developed from the skin-fibrous layer."

"Important as is the vascular system in the more highly developed and differentiated animal body, it is not, however, an apparatus as indispensable to animal life as is generally supposed. In the older theory of medicine the blood was regarded as the real source of life, and humoral pathology referred most diseases to corrupt blood-mixture. Similarly the blood plays the most important part in the prevailing obscure conception of heredity. Just as half-blood, pure blood, etc., are yet common phrases, so it is widely believed that the transmission by heredity of definite morphological and physiological characters from the parent to the child lies in the blood. That this customary notion is entirely false, is easily seen from the fact that neither in the act of procreation is the blood of the parents directly transmitted to the procreated germ, nor does the embryo acquire blood at an early period. As we have already seen, not only the separation of the four secondary germ-layers, but also the beginning of the most important organs, takes place in the embryos of all vertebrates before the rudiment of the vascular systems of the heart and blood is formed. In accordance with this ontogenetic fact, we must, from a phylogenetic point of view, regard the vascular system as the most recent, the intestinal system, on the contrary, as the oldest formation of the animal body. The origin of the vascular system is, at least, much later than that of the intestinal system. If the fundamental law of biogony is rightly appreciated, it is possible, from the ontogenetic sequence in which the various organs of the animal body consecutively originate in the embryo, approximately to infer the phylogenetic sequence, in which these organs gradually develop-

ed one after the other in the ancestral order of animals."

The organ system may be arranged, according to age, in something like the following order: *First*, the skin system and intestinal system. *Second*, the nerve and muscular system. *Third*, the kidney system. *Fourth*, the vascular system. *Fifth*, the skeleton system. *Sixth*, the sexual system.

We have now, gentlemen, gone through Baer's germ history as set forth and approved of by Haeckel, and I can conceive nothing more clear and distinct. Every step in embryology is gradually and distinctly traced from the moment the female ovum is fertilized by the cell of the male sperm till the formation by evolution of the perfect animal child—I say animal because it is only as such Mr. Haeckel speaks of him pure and simple, differing from all other animals only in degree. He does not recognize, what I do, that man has a human nature, in virtue of which he differs also from all other animals in kind as well as in degree. You who have heard my first paper know that, while I accept the evolution theory as I have described it, I do not accept the monistic hypothesis as set forth, nor yet the dualistic hypothesis as it is generally understood.

From Mr. Haeckel's book we learn many very important facts, which not only explain to us many physical phenomena, but which must be of great practical utility in the treatment of disease. First, we learn that heredity is not through the blood but nervous system, hereditary syphilis, insanity, imbecility, phthisis, gout, cancer, intemperance, etc., and is it not of the greatest importance to know that in the treatment of these diseases it is not the blood we have to deal with, but with the nervous system—not with a reproductive fluid, but living organisms. You may say that Mr. Haeckel did not say heredity was through the nervous system, but that it was not through the blood. Very true, but have we not a right to conclude it is through the nervous system when it is not through the blood. Physiological heredity always exhibits itself in the nervous system, let it be good or bad, as in hereditary insanity or atrophy, as exhibited to us by Dr. Osler, in the case of the Farr family of Vermont.

Then what are the phenomena of animal life? Sensation, thought, perception, or consciousness, and motion. From whence come these phenomena? From the nervous system, that imparts animal life and with it all its phenomena to the male and female cells to the male sperm cell that fertilizes the cell in