

THE ANIMAL ANCESTRY OF THE HUMAN RACE, FROM THE MONER TO MAN.

BY WILLIAM EMMETTE COLEMAN.

(Based upon Haeckel's History of Creation.)

(Concluded.)

II.—VERTEBRATE ANCESTORS OF MAN. (VERTEBRATA.)

NINTH STAGE. SKULL-LESS ANIMALS (*Acrania*).—The Lancelet, or Amphioxus, stands at the lowest stage of organization of all known Vertebrates. This exceedingly interesting and important animal, which throws a surprising light upon the older roots of our pedigree, is evidently the last of the Molluscs,—the last surviving representative of a lower class of Vertebrate animals, very rich in forms, and very highly developed during the Primordial period. It still lives widely distributed in different seas; for instance, in the Baltic, North Sea, and Mediterranean, where it generally lives buried in the sand on flat shores. Externally, the little lanceolate animal (two inches long) is so little like a vertebrate, that its first discoverer regarded it as an imperfect naked snail. It has no legs, and neither head, skull, nor brain. But still the Amphioxus in its external structure possesses those most important features which distinguish all Vertebrate animals from Invertebrate animals, namely, the spinal rod and spinal marrow. In all Vertebrate animals without exception, Man included, these important parts of the body, during the embryological development out of the egg, originally begin in the same simple form which is retained throughout life by the Amphioxus. Since this little animal in its embryonal state entirely agrees with the Ascidians, and in its further development shows itself to be a true Vertebrate, it forms a direct transition from the Vertebrate to the Invertebrate. Skull-less animals of similar structure—out of which animals with skulls developed at a later period—lived during the Primordial period, and originated out of the Humategia of the eighth stage by the formation of the body segments, as also by the further differentiation of all organs, especially the more perfect development of the dorsal nerve-marrow and the spinal rod lying below it. Probably the separation of the two sexes began at this stage, whereas all the previously mentioned invertebrate ancestors (except those of the third and fourth,—the first neutral stages) exhibited the condition of hermaphrodites.

TENTH STAGE: SINGLE-NOSTRILED ANIMALS (*Monorhina*).—Out of the skull-less ancestors of man there arose in the first place animals with skulls, or Craniota, of the most imperfect nature. The lowest stage of all still living Craniota is occupied by the class of round mouthed animals, or Cyclostoma, namely, the Hag and Lampreys. From the internal organization of these single-nostriled animals, or Monorhina, we can form an approximate idea of the nature of the human ancestors of the tenth stage. In the former, as in the latter, skull and brain must have been of the simplest form, and many important organs, as for example, the swimming bladder, the sympathetic nerve, the spleen, the jaw skeleton, and both pairs of legs, may probably as yet not exist. However, the pouch gills and the round sucking mouth of the present Cyclostoma must probably be regarded as purely adaptive characteristics more recently acquired, which did not exist in the corresponding stage of our ancestors. The single-nostriled animals originated during the Primordial period out of the skull-less animals by the anterior end of the dorsal marrow developing into the brain, and the anterior end of the dorsal chord into the skull.

ELEVENTH STAGE: PRIMÆVAL FISH (*S-lachii*).—Of all known Vertebrate animals, the ancestors of the Primæval Fish showed most resemblance to the still living Sharks. They originated out of the single-nostriled animals by the division of the single nostril into two lateral halves, by the formation of a sympathetic nervous system, a jaw skeleton, a swimming bladder, and two pairs of legs (breast fins or fore legs, and ventral fins or hind legs). The internal organization of this stage probably, upon the whole, corresponded to the lowest species of Sharks known to us. They lived as early as the Silurian period, as is proved by the fossil remains of Sharks from the Silurian strata.

TWELFTH STAGE. MUD FISH (*Dipneusti*).—Our twelfth ancestral stage is formed by Vertebrates which probably possessed a remote resemblance to the still living Salamander Fish. During the dry season, in summer, these strange animals bury themselves in a nest of leaves in the dry mud, and then breathe air through lungs like the Amphibia; but during the wet season, in winter, they live in rivers and bogs and breathe water through gills like Fish. In many particulars they resemble Fish more than Amphibia, but in other features they resemble Amphibia, especially in the formation of their lungs, nose, and heart. Owing to the complete blending of characteristics which they present, they belong neither to the class of Fish or Amphibia, but are a special class of Vertebrata, forming the transition between Fishes and Amphibians. They originated out of the Primæval Fish (probably at the beginning of the Palæolithic or Primary period) by adaptation to life on land, and by the transformation of the swimming bladder into an air-breathing lung, and of the nasal cavity (which now opened into the cavity of the mouth) into air-passages. The series of the ancestors of Man which breathed air through lungs began at this stage.

THIRTEENTH STAGE: GILLED AMPHIBIANS (*Stegobranchia*).—Out of those

Mud Fish, which are considered the primary forms of all the lunged Vertebrata, there developed the class of Amphibia as the main line of air-breathers. Here began the five-toed formation of the foot, which was thence transmitted to the higher Vertebrata, and finally also to Man. The gilled Amphibia must be looked upon as our most ancient Amphibian ancestors; besides possessing lungs, they retained through life regular gills, like the still living Proteus and Axolotl. They originated out of the Dipneusti by the transformation of the paddling fins into five-toed legs, and also by the more perfect differentiation of various organs, especially of the vertebral column. They existed about the middle of the Palæolithic, or Primary period, possibly even before the Coal period; for fossil Amphibia are found in coal. The proof that similar gilled Amphibians were our direct ancestors is given by the comparative anatomy and ontogeny of Amphibia and Mammals.

FOURTEENTH STAGE: TAILED AMPHIBIANS (*Saxura*). Our amphibious ancestors which retained their gills through life were replaced at a later period by other Amphibia, which, by metamorphosis, lost the gills which they had possessed in early life, but retained the tail; as in the case of the salamanders and newts of the present day. Many of the present-day Saxura still retain the gill-slits, although the gills themselves have disappeared. Tritons occasionally, when forced to remain in water always, retain their gills, and thus remain at the same stage of development as gilled Amphibians. The fourteenth stage originated out of the gilled Amphibians by accustoming themselves in early life to breathe through gills, and later in life only through lungs. They probably existed in the second half of the Primary, namely, during the Permian period, but possibly even in the Coal period.

FIFTEENTH STAGE: PRIMÆVAL ANNIOTA (*Protannia*).—In passing from the Amphibia we encounter three remaining classes of Vertebrata,—Reptiles, Birds, and Mammals. During the embryological development of each of these latter, a peculiar delicate covering, the first fetal membrane, or *amnion*, is found around the embryo. We may therefore comprise the three most highly developed classes of Vertebrates under the term Amnion-animals, or *Amniota*. The common primary form of the three higher Vertebrate classes may, therefore, be appropriately named *Protannion*. Two diverging branches of the *Protannia* led, respectively, to the Primary Reptiles, and the Primary Mammals. From the Reptiles, at a later period, Birds were evolved. This common ancestor of these three classes, the *Protannion*, originated out of tailed Amphibia by the complete loss of the gills, by the formation of the amnion, of the cochlea, and of the "round window" in the organ of hearing, and of the organs of tears. It probably originated in the beginning of the Mesolithic or Secondary period, perhaps towards the end of the Primary, in the Permian period.

SIXTEENTH STAGE: PRIMÆVAL MAMMALIA (*Promammalia*).—We now find ourselves more at home with our ancestors. From the sixteenth stage onward they all belong to the large and well-known class of Mammals, the confines of which we ourselves have as yet not transgressed. The common, long since extinct, primary forms of all Mammalia, named *Promammalia*, were, of all still living animals, of the class most closely related to the beaked animals, or Ornithostoma,—that is, the Duck-bill, or Ornithorhynchus, and the Echidna. The *Promammalia* differed from the latter, however, by the presence of teeth in their jaws. The formation of the beak in the beaked animals of the present day must be looked upon as an adaptive characteristic which developed at a later period. The *Promammalia* arose out of the *Protannia* (probably at the beginning of the Secondary period, or in the Trias) by various advances in their internal organization, as also by the transformation of the epidermal scales into hairs, and by the formation of a mammary gland which furnished milk for the nourishment of the young ones.

SEVENTEENTH STAGE: POCKETED ANIMALS (*Marsupialia*).—Mammals are divided into three sub-classes: the Monotremata, the Marsupialia, and the Placentalia. These three stand in such a relation to one another that the Marsupialia, both as regards their anatomy and their ontogeny and phylogeny, form the direct transition from the Monotremata to the Placental animals. Consequently, human ancestors must also have existed among Marsupialia. They originated out of the Monotremata, which include the Primary Mammalia, or *Promammalia*, by the division of the cloaca into two distinct passages, by the formation of a nipple on the mammary gland, and by the partial suppression of the clavicles. The oldest Marsupialia certainly existed as early as the Jura period (perhaps even in the Trias), and during the Chalk period they passed through a series of stages preparing the way for the origin of the Placental Mammals.

EIGHTEENTH STAGE: SEMI-APES (*Prosimia*).—Naturalists are familiar with a very remarkable small group of animals, for the most part extinct, called the Semi-Apes or Lemurs. These curious animals are probably the little changed descendants of the primæval group of Placental Mammals, which we have to consider as the common primary form of all the higher or Deciduate Mammalia. The Lemurs probably belong to a different order from the Apes, not merely because they differ from all Apes much more than do the different Apes from one another, but also because they comprise most interesting transitional forms leading to the other orders of Mammals. This group of Semi-Apes contains the direct primary forms of Genuine Apes, and also of Man. The old primary group of Semi-Apes probably developed out of Handed or Ape-footed Marsupialia, which are surprisingly like them in the transformation of their hinder feet into grasping hands. They originated from Marsupialia, probably at the beginning of the Tertiary period by the formation of a placenta, the loss of the