

spondylus of Traquair, may raise still higher hopes for the early vertebrates. It is a little creature, an inch to two inches in length, destitute or nearly destitute of bony covering, having a head which suggests the presence of external gills, large eyes, and even elongated nasal bones,<sup>1</sup> a long vertebral column composed of separate bony rings, more than fifty in number, with possible indications of ribs in front and distinct neural and haemal processes behind. One cannot look at it without the suggestion occurring of some of the smaller snake-like Batrachians of the Carboniferous and Permian; and I should not be surprised if it should come to be regarded either as a forerunner of the Batrachians or as a primitive tadpole.

However this may be, the upper part of the Devonian, though rich in fishes and plants, has afforded no higher vertebrates than its lower parts, and in the lowest Carboniferous beds we suddenly find ourselves in the presence of Batrachians with well-developed limbs and characters which ally them to the Lizards. True lizard-like reptiles appear in the Permian, and then we enter on that marvellous reign of reptiles, in which this class assumed so many great and remarkable forms, and asserted itself in a manner of which the now degraded reptilian class can afford no conception.

The mammals and birds make their first appearance quietly in small and humble forms in the reign of reptiles, in which there was little place left for them by the latter; but the mammals burst upon us in all their number and magnitude in the Eocene and Miocene, in which quadrupedal mammalian life may be said to have culminated in grandeur, variety, and geographical distribution; far excelling in these respects the time in which we live.

The development in time of the back-boned animals thus stands in some degree by itself; but it illustrates the same

<sup>1</sup> I am aware that Woodward regards these parts differently.