

carboniferous beds, we can pretty accurately determine the time of their origin. The development of the first Tracheate Insects out of gill-bearing Zoëa-crabs, must have taken place between the end of the Silurian and the beginning of the coal period, that is, in the Devonian period.

Gegenbaur, in his excellent "Outlines of Comparative Anatomy,"²¹ has lately endeavoured to explain the origin of the Tracheata by an ingenious hypothesis. The system of tracheæ, or air pipes, and the modifications of organization dependent upon it, distinguish Flies, Centipedes, and Spiders so much from other animals, that the conception of its first origin presents no inconsiderable difficulties to phylogeny. According to Gegenbaur, of all living Tracheate Insects, the Primæval Flies, or Archiptera, are most closely allied to the common primary form of the Tracheata. These insects—among which we may especially mention the delicate Day flies (*Ephemera*), and the agile dragon-flies (*Libellula*)—in their earliest youth, as larvæ, frequently possess *external tracheate gills* which lie in two rows on the back of the body, and are shaped like a leaf or paint-brush. Similar leaf or paint-brush shaped organs are met with as real water-breathing organs or gills, in many crabs and ringed worms, and, moreover, in the latter as real dorsal appendages or limbs. The "tracheate gills," found in the larvæ of many primæval winged insects, must in all probability be explained as "*dorsal limbs*," and as having developed out of the corresponding appendages of the *Annelida*, or possibly as having really arisen out of similar parts in *Crustacea* long since extinct. The present tracheal respiration of the Tracheata developed at a later period out of respiration through "tracheate gills." The tracheate gills