

Chapter 48

Evolutionary Aside 48.2--Gigantic Insects from the Past

The existence of extremely large insects that roamed the Earth in prehistoric times was discussed in an Evolutionary Aside in chapter 46. The conditions under which insects could grow to such large sizes is related to their ability to respire through spiracles. For that reason, the Evolutionary Aside is repeated here:

Beetles are the heaviest insects, with some attaining a mass of 100 g (3.5 oz). However, in prehistoric times, insects grew to much larger sizes. The largest insects that ever lived occurred in the Permian period (approximately 250 mya), a time when many arthropods also grew to large size. The largest insect was *Meganeuropsis permiana*, a relative of modern dragonflies that had a wingspan (the distance from the tip of one wing to the tip of the other) of 0.7 m (nearly 2½ feet) and an estimated mass of more than 400 g (approximately 1 pound).

Given the limitations on insect size imposed by their reliance on breathing through holes in their body wall (termed “spiracles”—see chapter 34), how could insects attain much larger sizes in the Permian? Although this question is still hotly debated, one hypothesis is that the higher oxygen levels in the atmosphere at that time meant that insects could get by with relatively smaller holes, given that they were getting more oxygen per unit of air inspired; as a result, insects could grow to larger sizes before the size of the holes became prohibitively large. A corollary of this hypothesis is that an insect such as *Meganeuropsis permiana* could not exist today.