

**Donald I. Williamson; doi:10.1073/pnas.0908357106**

I reject the Darwinian assumption that larvae and their adults evolved from a single common ancestor. Rather I posit that, in animals that metamorphose, the basic types of larvae originated as adults of different lineages, i.e., larvae were transferred when, through hybridization, their genomes were acquired by distantly related animals. "Caterpillars," the name for eruciforms with thoracic and abdominal legs, are larvae of lepidopterans, hymenopterans, and mecopterans (scorpionflies). Grubs and maggots, including the larvae of beetles, bees, and flies, evolved from caterpillars by loss of legs. Caterpillar larval organs are dismantled and reconstructed in the pupal phase. Such indirect developmental patterns (metamorphoses) did not originate solely by accumulation of random mutations followed by natural selection; rather they are fully consistent with my concept of evolution by hybridogenesis. Members of the phylum Onychophora (velvet worms) are proposed as the evolutionary source of caterpillars and their grub or maggot descendants. I present a molecular biological research proposal to test my thesis. By my hypothesis 2 recognizable sets of genes are detectable in the genomes of all insects with caterpillar grub- or maggot-like larvae: (that code for proteins determining larval morphology/physiology and (proteins. The genomes of insects and other animals that, by contrast, entirely lack larvae comprise recognizable sets of genes from single animal common ancestors.