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Joe Bateman
Email: Joseph.bateman@cancer.org.uk

The occurrence of the same characteristic in different related species is usually the hallmark of a common evolutionary ancestor. However, the same trait can sometimes evolve independently, even in closely related species, a process known as convergent evolution. Understanding convergent evolution at the molecular level may shed light on exactly which genes are the tools for evolutionary change. In the August 21 Nature, two papers provide some illuminating insights into this issue by examining morphological features in different *Drosophila* species.

In the first paper, Nicolas Gompel and Sean B. Carroll at the University of Wisconsin describe the correlation between the expression of Bric-à -brac2 (Bab2) and abdominal pigmentation and hair pattern. The two *bab* genes (*bab1* and *bab2*) are known to negatively regulate these traits in *Drosophila melanogaster*. Males exhibit pigmented stripes and two heavily pigmented abdominal segments (caused by *bab2* downregulation), whereas females have only stripes. The authors examined different *Drosophila* species and observed that the same pigment pattern resulted multiple times in different lineages (i.e., convergently). Of the 13 *Drosophila* species studied, Bab2 expression correlated broadly with the differing abdominal pigment patterns. This suggests that although many genes are involved in controlling pigment morphology, regulatory elements of *bab2* are a hotspot for evolutionary control of this characteristic. The authors also observed that, in some species, Bab2 expression was uncoupled from pigment morphology but still regulated abdominal hair pattern. Surprisingly, in *D. serrata* (a close relative of *D. melanogaster*) the pigmentation pattern was reversed - the male is pale, and the female has a darkly pigmented segment - but the Bab2 expression pattern was *melanogaster*-like. This suggests that, in *D. serrata,* a pathway that circumvents *bab2* controls pigmentation (*Nature* 2003, **424:**931-935).

In the second paper, Elio Sucena and colleagues at Princeton University, examined the pattern of hairs on the dorsal and lateral surfaces of fly larvae, a morphological trait that also varies among different *Drosophila* species. This group had previously shown that variation in hairiness correlates with regulation of the *shavenbaby/ovo* transcription factor. The authors crossed *Drosophila* species to generate hybrid larvae, and analysis of these larvae showed that the degree of hairiness was controlled by a locus on the X chromosome, where the *svb* gene is located. They then examined *svb* expression in different species and observed a direct correlation between the presence of *svb* and the presence of hairs. These data strongly suggest that, like *bab*, *svb* is a major target for evolutionary regulation of larval hair pattern (*Nature* 2003, **424:**935-938).

"Both studies suggest that although many genes are involved in the development of physical characteristics, some evolutionary changes - including examples of convergence - involve key regulatory points," conclude Michael K. Richardson and Paul M. Brakefield from the University of Leiden in an accompanying News and Views article.

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