

Moths

The Urth list — 1 messages, 1 voices, 15 Jun 1998

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David_Lebling — 15 Jun 1998, 17:18

From: Dan Parmenter <dan at lec.com>

What would Dollo have to say about that? Did the Peppered Moths' (as they are called) coloration actually "revert" or did they simply evolve their white color a second time? If we introduced large amounts of red soot into their environs could they evolve into red moths (Cayenne Peppered Moths) or is the range of possible mutations only black and white?

I think the general explanation that is given in genetics textbooks is not that the moths "evolved" a black color and then a white color. Rather, there was (and is) a certain amount of genetic variation in the moth population. When pollution made the trees dark, there was selective pressure that favored darker colored moths (i.e., birds found and ate the light-colored ones). So, after a while, the population was mostly dark-colored, but this didn't mean that the gene for light-colored-ness disappeared: it just got less prevalent. Eventually, the pollution was cleaned up and the selective pressure went the other way, as the dark moths became more noticeable, so the occasional light colored moth was able to reproduce, leaving more light colored moths, and so on.

If the soot had gone on long enough, it is possible to imagine that every light colored moth would have been eaten, in which case when the trees turned white again, that species of moth would have been in a major pickle. Of course, some characteristics are caused by random mutations that happen at "favorable" sites in the chromosomes, and these happen over and over, "spontaneously," but color in moths may not be one them. Some genetic diseases are like that, but it gets even more complicated, because the tendency to get some of these diseases is inherited (not the certainty, the tendency), so maybe these favorable spots are themselves a genetic variation.

There are no simple statements about genetics.

If there is some representation of cayenne pepper genes in the moth population, then eventually dyeing the trees red will create selective pressure favoring red moths. Otherwise, you're in the position of waiting for the moths to mutate at random into red. This is roughly as likely as turning a mouse's tail into a hand by slapping it against a tree.

-- vizcacha

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