**Effect of Environment on phenotype**

* **Via genotype, ie mutation**

[**http://www.globalanimal.org/2012/08/15/mutant-butterflies-product-of-fukushima-nuclear-disaster/79949/**](http://www.globalanimal.org/2012/08/15/mutant-butterflies-product-of-fukushima-nuclear-disaster/79949/)



# Mutagen

From Wikipedia, the free encyclopedia

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In [genetics](http://en.wikipedia.org/wiki/Genetics), a **mutagen** ([Latin](http://en.wikipedia.org/wiki/Latin), literally *origin of change*) is a physical or chemical agent that changes the genetic material, usually [DNA](http://en.wikipedia.org/wiki/DNA), of an [organism](http://en.wikipedia.org/wiki/Organism) and thus increases the frequency of [mutations](http://en.wikipedia.org/wiki/Mutation) above the natural background level. As many mutations cause [cancer](http://en.wikipedia.org/wiki/Cancer), mutagens are therefore also likely to be [carcinogens](http://en.wikipedia.org/wiki/Carcinogen). Not all mutations are caused by mutagens: so-called "spontaneous mutations" occur due to spontaneous [hydrolysis](http://en.wikipedia.org/wiki/Hydrolysis), [errors](http://en.wikipedia.org/wiki/DNA_error) in [DNA replication](http://en.wikipedia.org/wiki/DNA_replication), repair and [recombination](http://en.wikipedia.org/wiki/Genetic_recombination).

 **Also:**

**UV rays**

**Chemicals (esp. organic solvents, incl. Tobacco tar)**

**Some microbes (viruses)**

**Location of mutation- does it matter?**

* **With no change in genotype…**

**Wind and trees**



<http://www.7is7.com/otto/travel/photos/20040209/ushuaia_treewind.html>

wonky windswept tree… does it really want to look so silly- wouldn’t it prefer to be tall and proud

**Hydrangeas and pH**

 

**Daphnia**

<http://www.youtube.com/watch?NR=1&v=2g-04Uk0ut0&feature=fvwp>

Daphnia helmet formation:



<http://www.comprehensivephysiology.com/WileyCDA/CompPhysArticle/refId-c110008.html>





<http://anooplal.com/children-starve/>

**What about human behaviour…..**

<http://en.wikipedia.org/wiki/Michael_Meaney>  