**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/)

[](http://www.google.co.nz/imgres?um=1&hl=en&sa=N&biw=1366&bih=592&tbm=isch&tbnid=ptYuq3jy6n8b8M:&imgrefurl=http://www.telegraph.co.uk/news/worldnews/asia/japan/9474312/Fukushima-caused-mutant-butterflies-in-Japan.html&imgurl=http://i.telegraph.co.uk/multimedia/archive/02309/Fukushima_2309595b.jpg&w=620&h=387&ei=c5Y6ULz4IbGUiQfMh4GwAQ&zoom=1&iact=hc&vpx=93&vpy=150&dur=29&hovh=177&hovw=284&tx=155&ty=103&sig=115193253466652274354&page=1&tbnh=96&tbnw=154&start=0&ndsp=21&ved=1t:429,r:0,s:0,i:72)

# 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**

 [](http://www.flickr.com/photos/fourstuarts/3566333583/)

**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> [](http://www.google.co.nz/imgres?q=michael+meaney+rats&um=1&hl=en&biw=1311&bih=597&tbm=isch&tbnid=XkIMx0CyA7MQhM:&imgrefurl=http://www.multisensorytherapy.org/blog/2010/07/25/a-mothers-touch-can-trigger-genes-that-shape-stress-response/&imgurl=http://www.multisensorytherapy.org/wp-content/uploads/2010/07/elizabeth-200x200.jpg&w=200&h=200&ei=q_Q5UJrRD8aSiAewp4HQDg&zoom=1&iact=hc&vpx=753&vpy=253&dur=943&hovh=160&hovw=160&tx=80&ty=84&sig=104893590129161537187&page=2&tbnh=133&tbnw=133&start=21&ndsp=26&ved=1t:429,r:16,s:21,i:187) [](http://www.google.co.nz/imgres?q=michael+meaney+rats&um=1&hl=en&biw=1311&bih=597&tbm=isch&tbnid=35R4PkkmPyfQqM:&imgrefurl=http://classic.the-scientist.com/?articles.view/articleNo/23755/&imgurl=http://images.the-scientist.com/content/images/articles/23162/1.jpg&w=200&h=133&ei=q_Q5UJrRD8aSiAewp4HQDg&zoom=1&iact=hc&vpx=846&vpy=376&dur=947&hovh=106&hovw=160&tx=59&ty=75&sig=104893590129161537187&page=2&tbnh=106&tbnw=160&start=21&ndsp=26&ved=1t:429,r:24,s:21,i:212)