

# Biology Essentials - 002



## Examples of Natural Selection

# Natural Selection

Environment

Phenotypes

Fitness

Humans

Flowering

Climate

Mutations

Genes

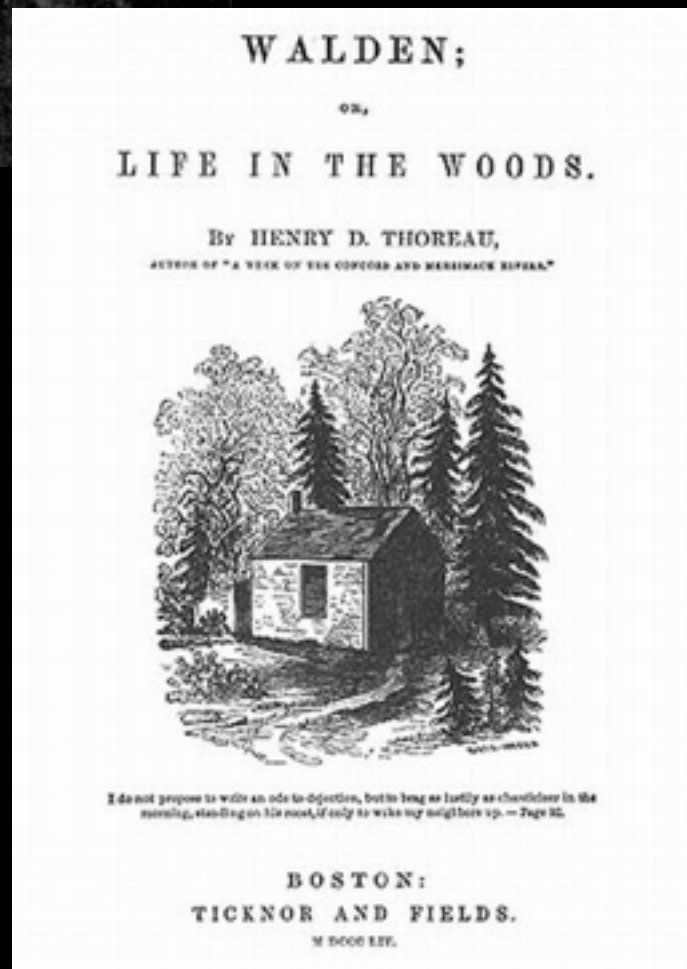
Sickle Cell  
Anemia

Antibiotic  
Resistance





I went to the woods because I wished to live deliberately, to front only the essential facts of life, and see if I could not learn what it had to teach, and not, when I came to die, discover that I had not lived.

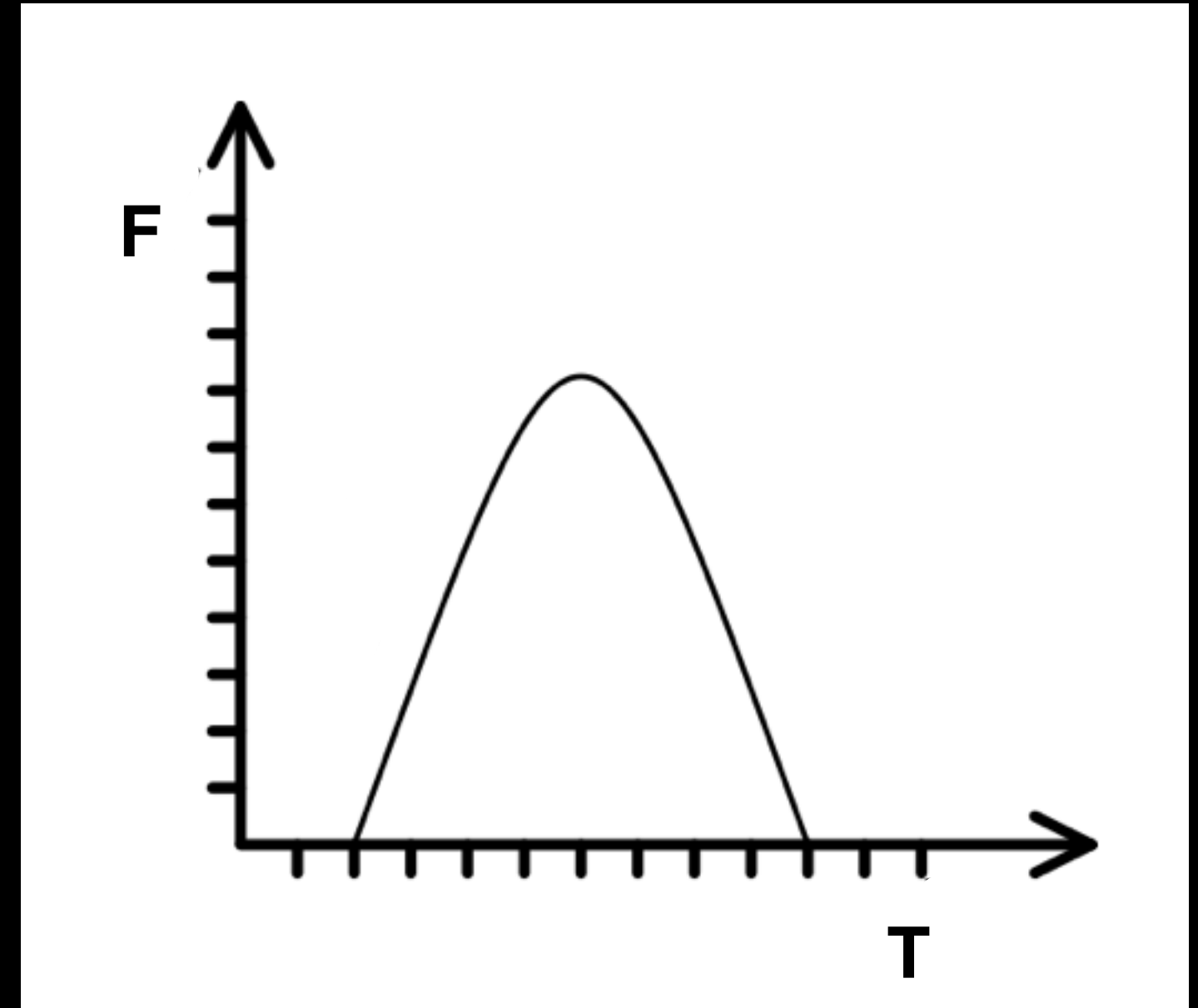


# Environmental Change



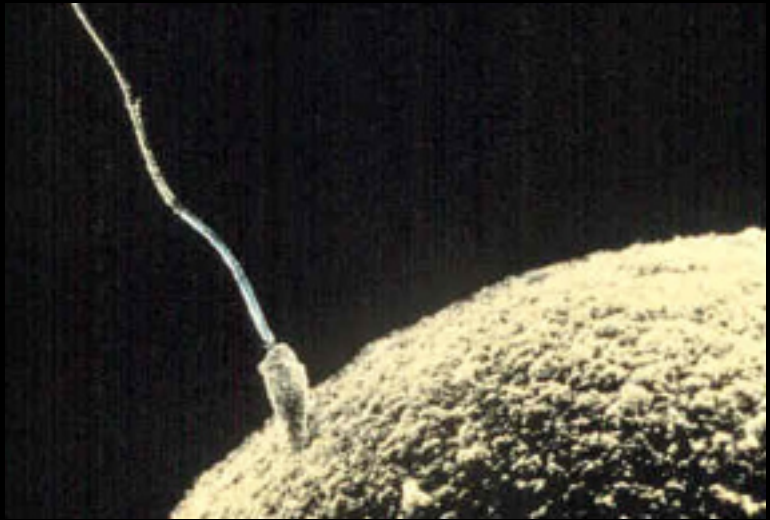
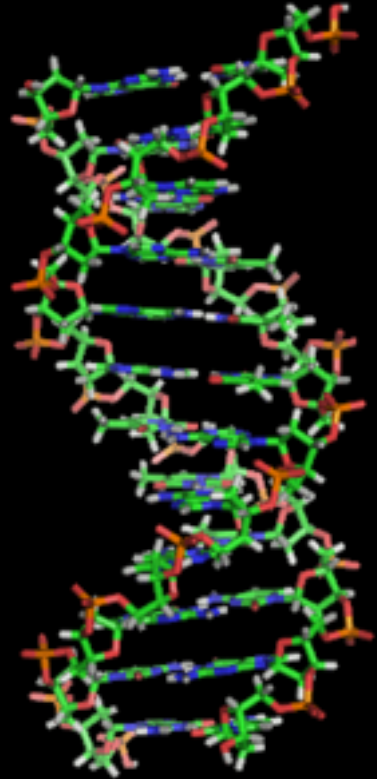
Thoreau's Journal - April 7, 1853

"I am surprised to see how much in warm places the high blueberry buds are started, some reddish, some greenish, earlier now than any gooseberries I have noticed. Several painted tortoises; no doubt have been out a long time."

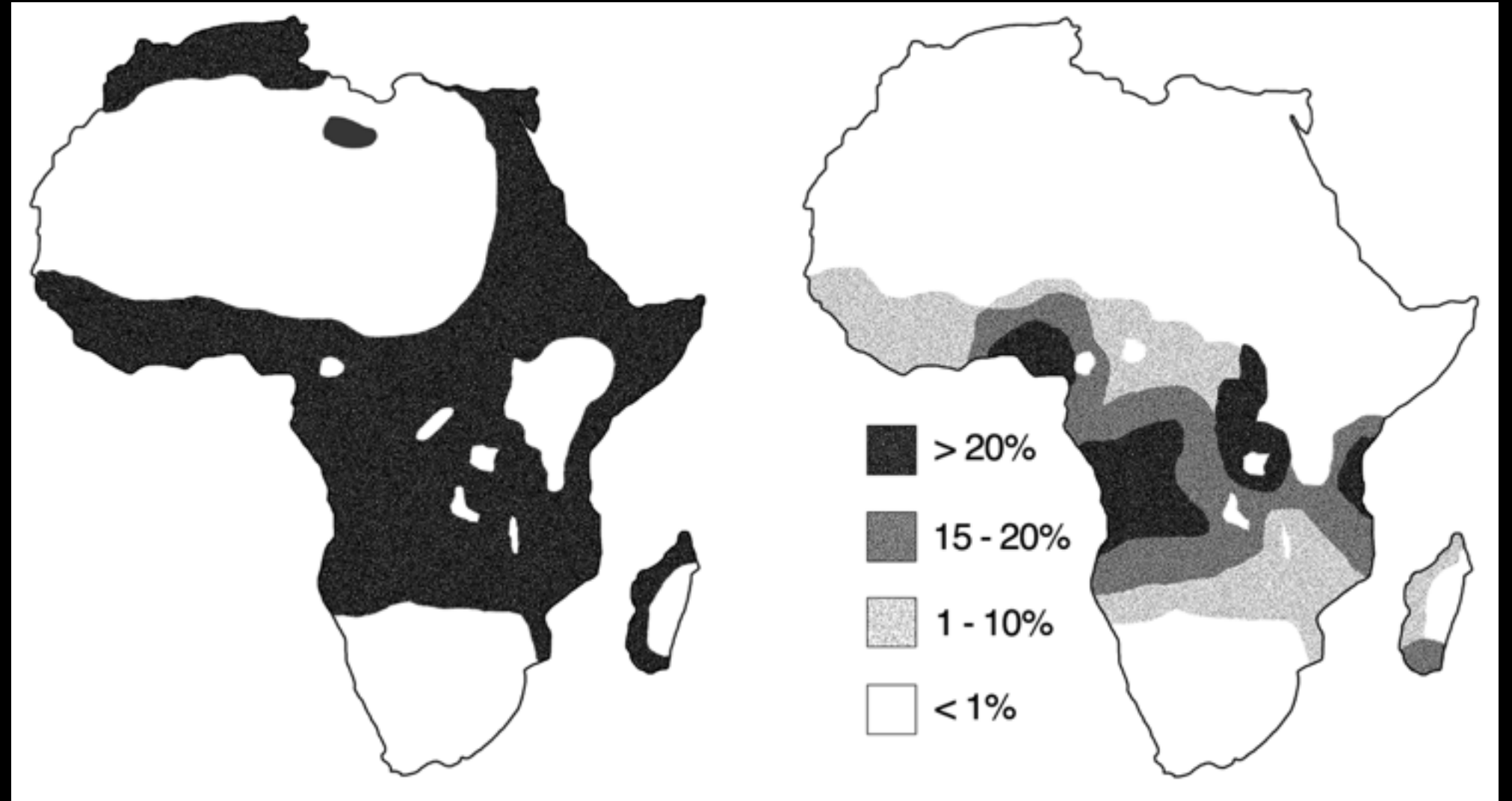
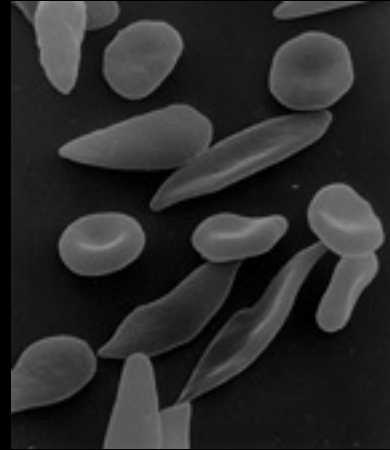




# Phenotypes



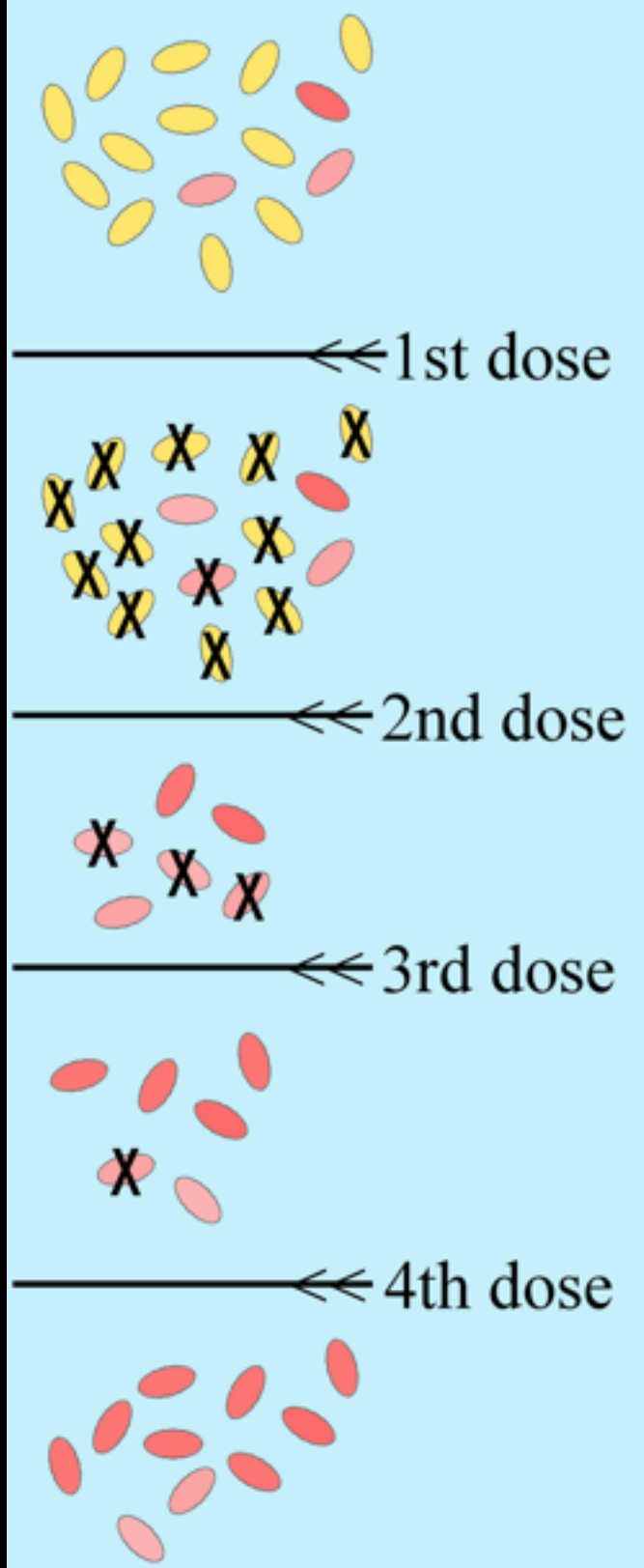
*Donax variabilis*



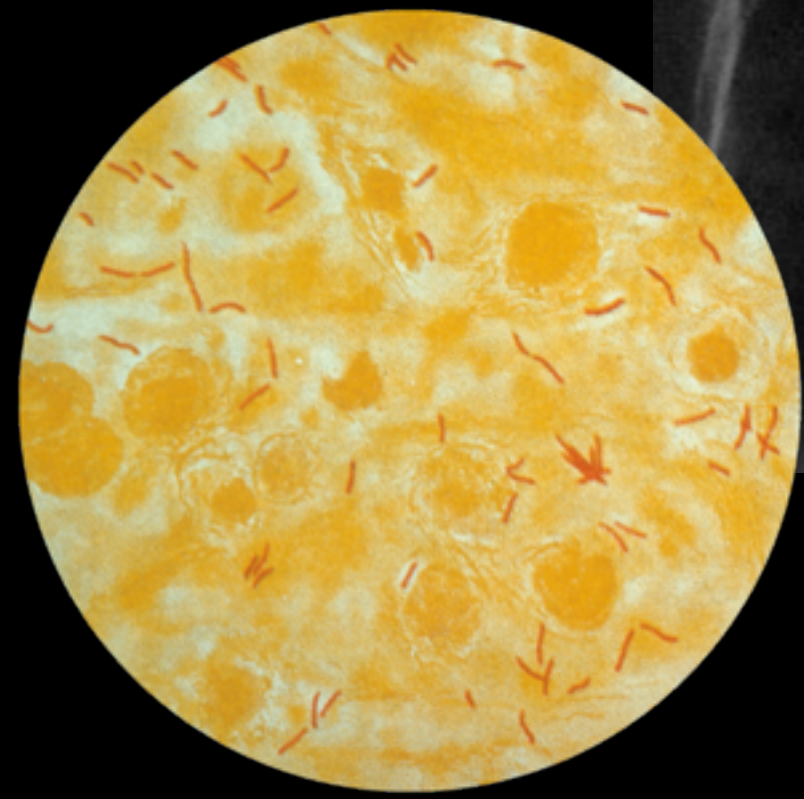
# Phenotypes Affect Fitness



**Original population**



**Resistant population**



# Human Impacts

## Acknowledgements

- Alex1961. *English: Erythronium Grandiflorum, (Glacier Lily or Avalanche Lily) (Glacier National Park, Logan Pass)*, February 3, 2008. <http://www.flickr.com/photos/alex1961/333269991/>. [http://commons.wikimedia.org/wiki/File:Erythronium\\_grandiflorum\\_prairie.jpg](http://commons.wikimedia.org/wiki/File:Erythronium_grandiflorum_prairie.jpg).
- Allison, Anthony. *English: Comparison of the Distribution of Malaria (left) and Sickle-cell Trait (right).*, [object HTMLTableCellElement]. Original work by Anthony Allison. [http://commons.wikimedia.org/wiki/File:Malaria\\_versus\\_sickle-cell\\_trait\\_distributions.png](http://commons.wikimedia.org/wiki/File:Malaria_versus_sickle-cell_trait_distributions.png).
- Azcolvin429, Selection\_Types\_Chart.png: *Polksi: Mechanizmy Ewolucji*, January 7, 2011. Selection\_Types\_Chart.png. [http://commons.wikimedia.org/wiki/File:Disruptive\\_selection\\_before.svg](http://commons.wikimedia.org/wiki/File:Disruptive_selection_before.svg).
- Debivort. *English: Various Coquina Shells. Individuals in the Mollusk Species Donax Variabilis Show Diverse Coloration and Patterning in Their Phenotypes.*, October 2006. Own work by Author. [http://commons.wikimedia.org/wiki/File:Coquina\\_variation3.jpg](http://commons.wikimedia.org/wiki/File:Coquina_variation3.jpg).
- Esseh. *Schematic of the Acquisition of Antibiotic Resistance.*, May 14, 2007. Own work. [http://commons.wikimedia.org/wiki/File:Antibiotic\\_selection.JPG](http://commons.wikimedia.org/wiki/File:Antibiotic_selection.JPG).
- “File:Anopheles Albimanus Mosquito.jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 2, 2013. [http://en.wikipedia.org/wiki/File:Anopheles\\_albimanus\\_mosquito.jpg](http://en.wikipedia.org/wiki/File:Anopheles_albimanus_mosquito.jpg).
- “File:DNA Orbit Animated Static Thumb.png.” *Wikipedia, the Free Encyclopedia*. Accessed November 2, 2013. [http://en.wikipedia.org/wiki/File:DNA\\_orbit\\_animated\\_static\\_thumb.png](http://en.wikipedia.org/wiki/File:DNA_orbit_animated_static_thumb.png).
- “File:Russia TB Wiki.jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 2, 2013. [http://en.wikipedia.org/wiki/File:Russia\\_TB\\_Wiki.jpg](http://en.wikipedia.org/wiki/File:Russia_TB_Wiki.jpg).
- “File:Saint Johns Wart Flowers.jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 1, 2013. [http://en.wikipedia.org/wiki/File:Saint\\_johns\\_wart\\_flowers.jpg](http://en.wikipedia.org/wiki/File:Saint_johns_wart_flowers.jpg).
- “File:Sicklecells.jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 2, 2013. <http://en.wikipedia.org/wiki/File:Sicklecells.jpg>.
- “File:Sperm-egg.jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 2, 2013. <http://en.wikipedia.org/wiki/File:Sperm-egg.jpg>.
- “File:TB in Sputum.png.” *Wikipedia, the Free Encyclopedia*. Accessed November 2, 2013. [http://en.wikipedia.org/wiki/File:TB\\_in\\_sputum.png](http://en.wikipedia.org/wiki/File:TB_in_sputum.png).
- “File:Tuberculosis-x-ray-1.jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 2, 2013. <http://en.wikipedia.org/wiki/File:Tuberculosis-x-ray-1.jpg>.
- “File:Vaccinium Corymbosum(01).jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 1, 2013. [http://en.wikipedia.org/wiki/File:Vaccinium\\_corymbosum\(01\).jpg](http://en.wikipedia.org/wiki/File:Vaccinium_corymbosum(01).jpg).
- “File:Walden Thoreau.jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 2, 2013. [http://en.wikipedia.org/wiki/File:Walden\\_Thoreau.jpg](http://en.wikipedia.org/wiki/File:Walden_Thoreau.jpg).
- “Google Image Result for [Http://www.neh.gov/files/imagecache/neh\\_large/humanities/articles/640px-waldenpondspring.jpg](http://www.neh.gov/files/imagecache/neh_large/humanities/articles/640px-waldenpondspring.jpg).” Accessed November 5, 2013. [http://www.google.com/imgres?imgurl=http://www.neh.gov/files/imagecache/neh\\_large/humanities/articles/640px-waldenpondspring.jpg&imgrefurl=http://www.neh.gov/humanities/2012/julyaugust/curio/thoreau-flora&h=276&w=460&sz=15&tbnid=SMjoeFwmb4-SGM:&tbnh=95&tbnw=158&zoom=1&usq=\\_\\_N4cWg9ErWHDjUSgXduBvP3qwfY=&docid=VvQARIZ4Pqg\\_YM&sa=X&ei=9L5zUp\\_tNaGkigL02oGQAw&ved=0CDkQ9QEwAg](http://www.google.com/imgres?imgurl=http://www.neh.gov/files/imagecache/neh_large/humanities/articles/640px-waldenpondspring.jpg&imgrefurl=http://www.neh.gov/humanities/2012/julyaugust/curio/thoreau-flora&h=276&w=460&sz=15&tbnid=SMjoeFwmb4-SGM:&tbnh=95&tbnw=158&zoom=1&usq=__N4cWg9ErWHDjUSgXduBvP3qwfY=&docid=VvQARIZ4Pqg_YM&sa=X&ei=9L5zUp_tNaGkigL02oGQAw&ved=0CDkQ9QEwAg).
- villy. *English: Portrait by Benjamin D. Maxham (daguerreotype), Black and White of Henry David Thoreau in June 1856. The Writer-collar Post a Beard and Is Dressed in a Black Frock Coat, a White Shirt and a Black Bow Tie.*, November 7, 2004. <http://eserver.org/thoreau/images.html>. [http://commons.wikimedia.org/wiki/File:Henry\\_David\\_Thoreau.jpg](http://commons.wikimedia.org/wiki/File:Henry_David_Thoreau.jpg).
- “ファイル:WaldenPondSpring.jpg.” *Wikipedia*. Accessed November 2, 2013. <http://ja.wikipedia.org/wiki/%E3%83%95%E3%82%A1%E3%82%A4%E3%83%AB:WaldenPondSpring.jpg>.





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