

# Epistasis

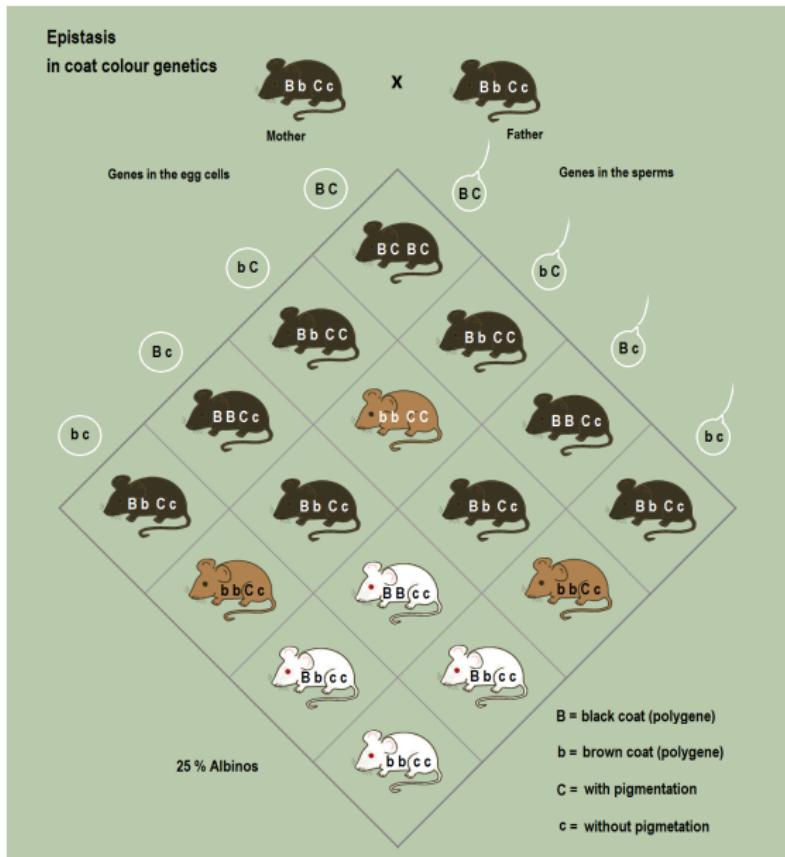
## Epistasis definition

**Epistasis:** One gene alters the phenotypic expression of another gene at a different locus.

## Epistasis: Interactions among genes

- ▶ In epistasis, a gene at one locus alters the phenotypic expression of a gene at a second locus
- ▶ For example, in mice and many other mammals, coat colour depends on 2 genes
- ▶ One gene determines pigment colour (alleles B for black and b for brown)
- ▶ Other gene has alleles C for pigment colour and c for no pigment colour, which determines whether pigment will be

## Epistasis: Interactions among genes



<sup>1</sup>Image: Public Domain

## Quantitative traits

- ▶ Most genes affect more than 1 phenotype (pleiotropic)
- ▶ Most phenotypes are affected by more than 1 gene (polygenic)

Thousands of genes affect human height<sup>1</sup>.

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<sup>1</sup>Yengo, L., Sidorenko, J., Kemper, K. E., Zheng, Z., Wood, A. R., Weedon, M. N., ... & Giant Consortium. (2018). *Human molecular genetics*, 27:3641-3649.

## Environment influences quantitative traits



- ▶ Clausen et al. (1948) experiments<sup>1</sup>
- ▶ Genetically identitical cuttings of the same plant grown at different altitudes
- ▶ Relative plant height of different genotypes changed across altitudes

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<sup>1</sup>Clausen, J., Keck, D. D., & Hiesey, W. M. (1948). Experimental studies on the nature of species. III. Environresponses of climatic races of *Achillea*. (Publ. No. 581).

<sup>2</sup>Image: [Public Domain](#)