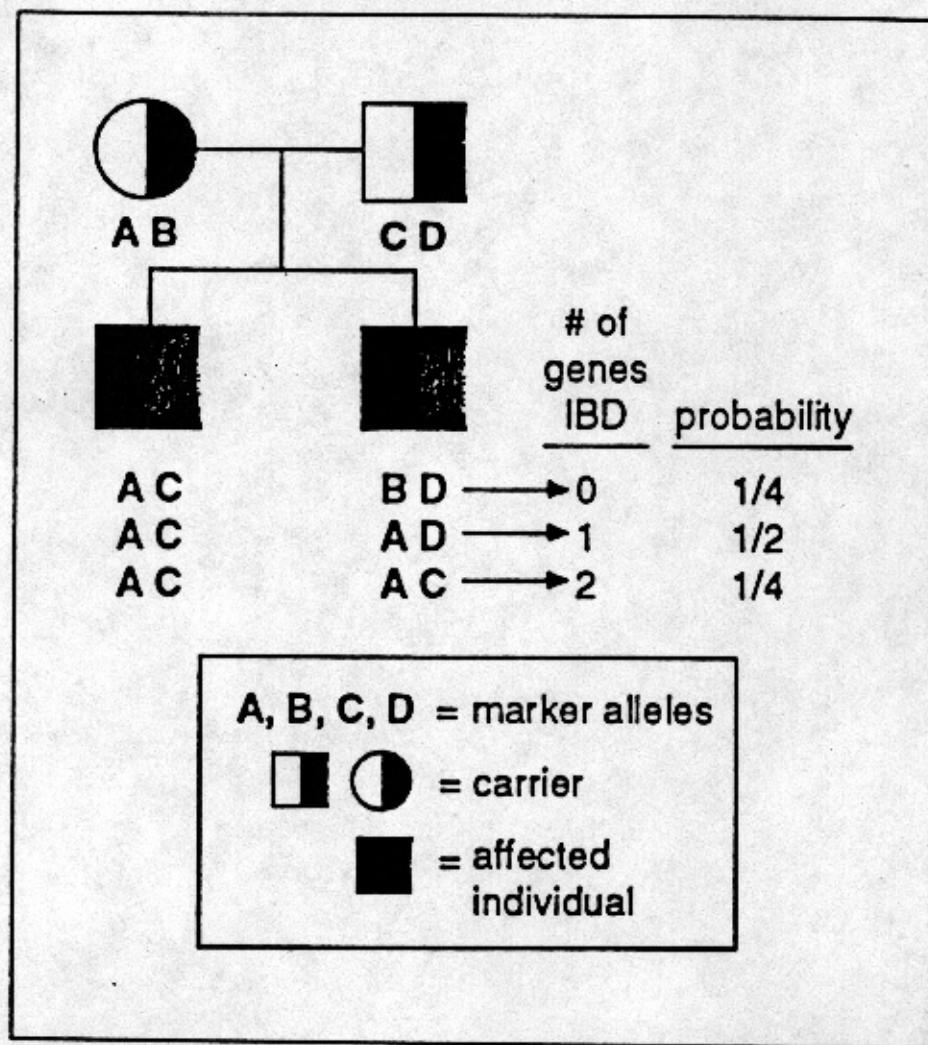


## **PREMISE:**

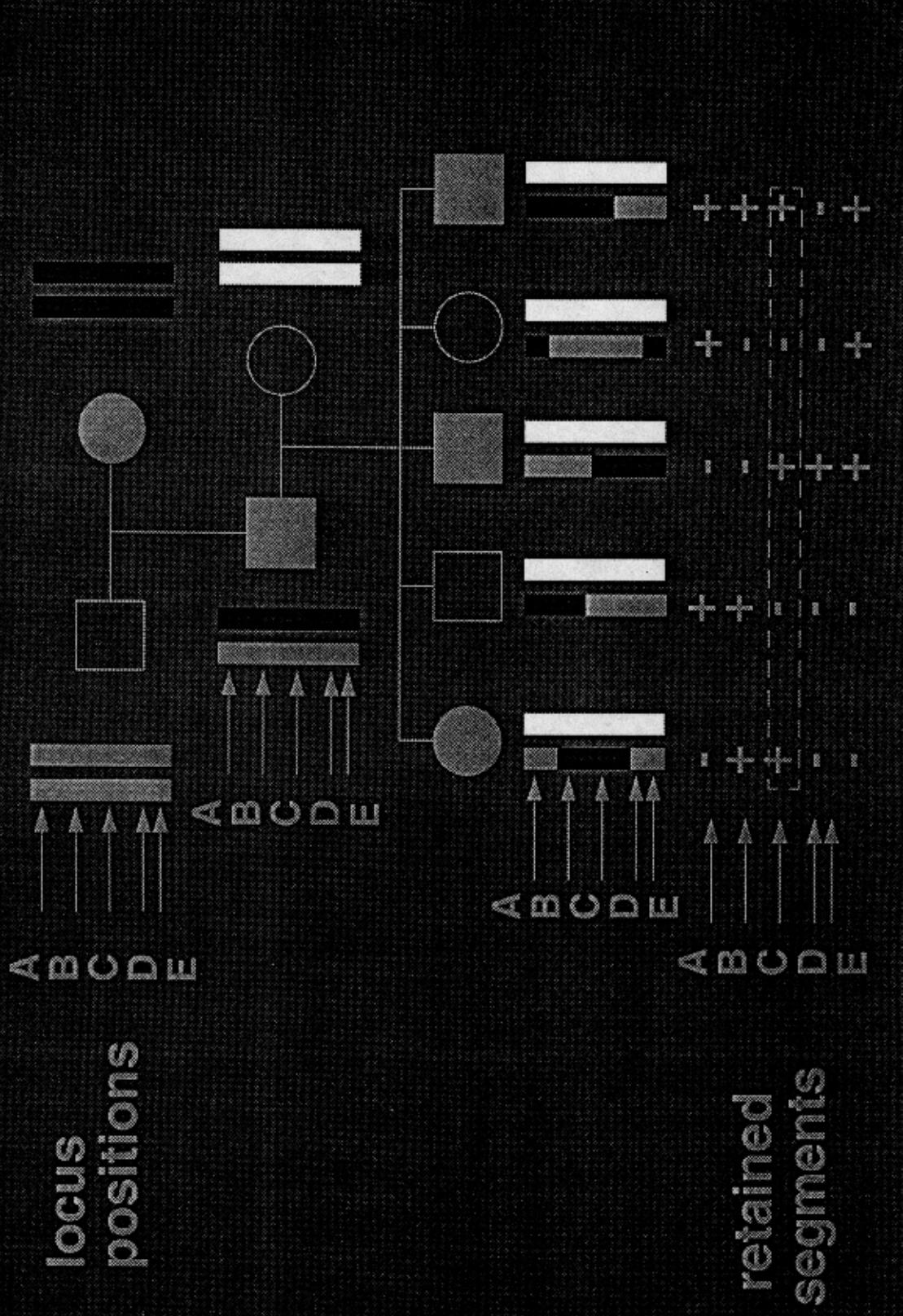
In a disease with a non-zero fraction attributable to genetic factors, regions of the genome that are responsible for the disease should show non-random patterns of variation



**Figure 1.4.8** Identity-by-descent (IBD) relationship. IBD relationships form the basis for the sib-pair (SP) linkage test. Shared alleles and their associated probabilities are given.

## Kinship ( $\phi_{ij}$ ):

For individuals i and j in the population, the probability that a gene chosen randomly from one is identical by descent with one chosen randomly from the other



founder  
generation:



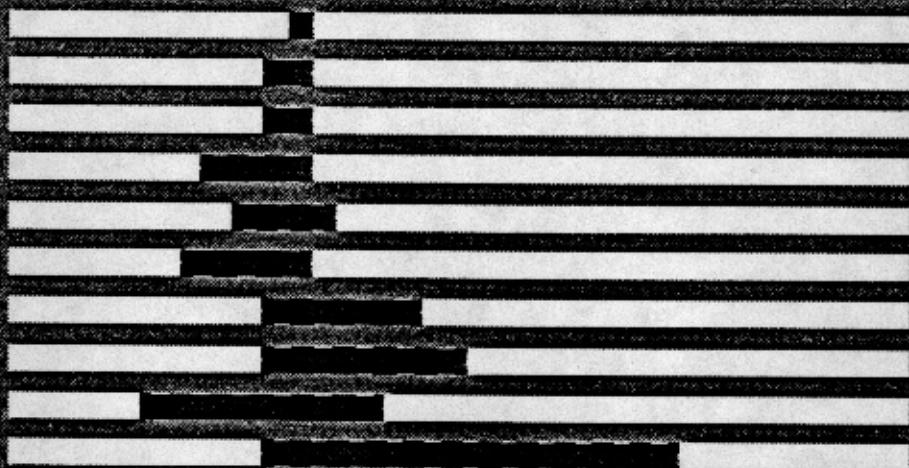
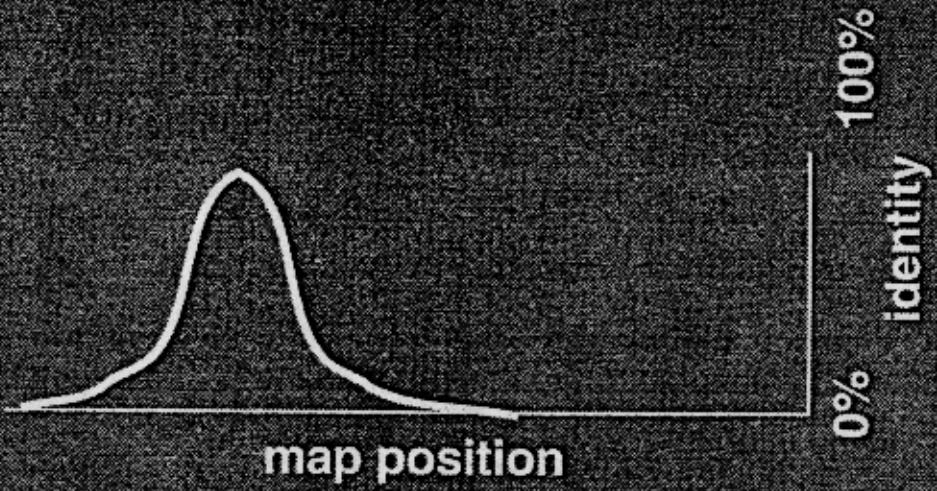
after one  
generation:



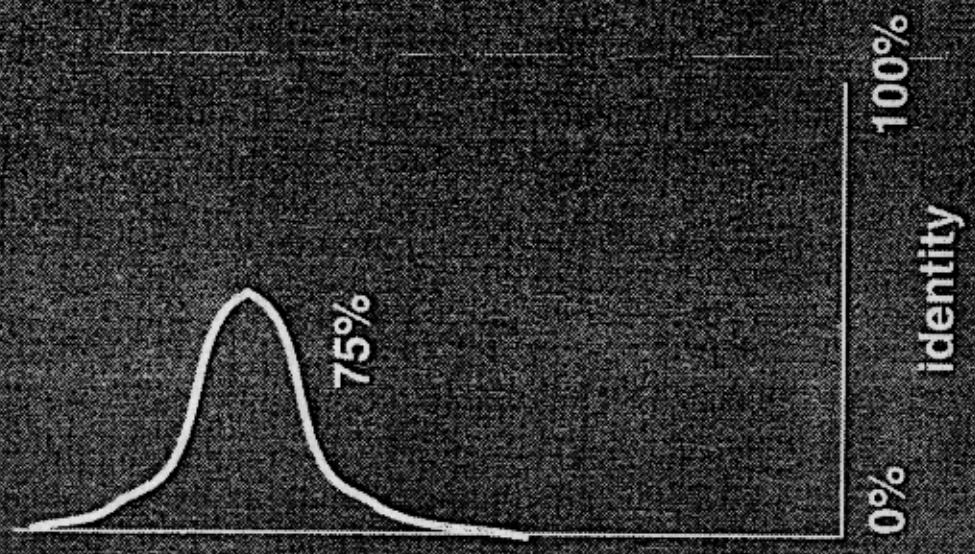
after many  
generations:



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map position

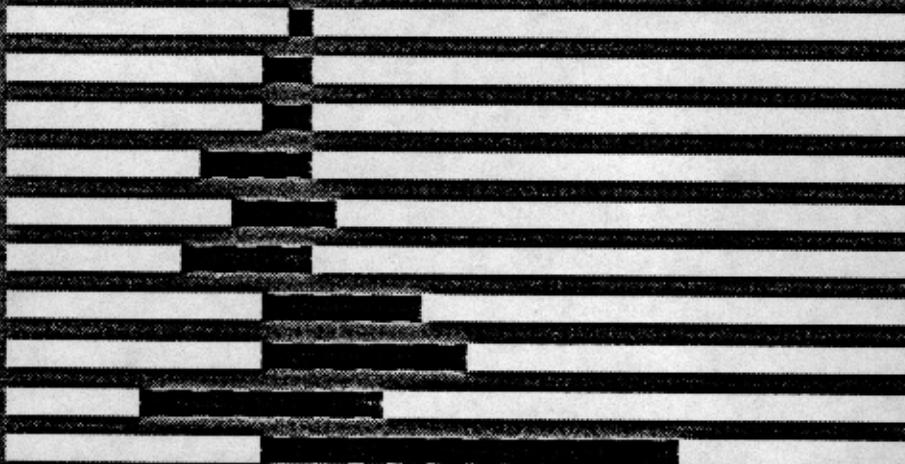
phenocopy

phenocopy

phenocopy

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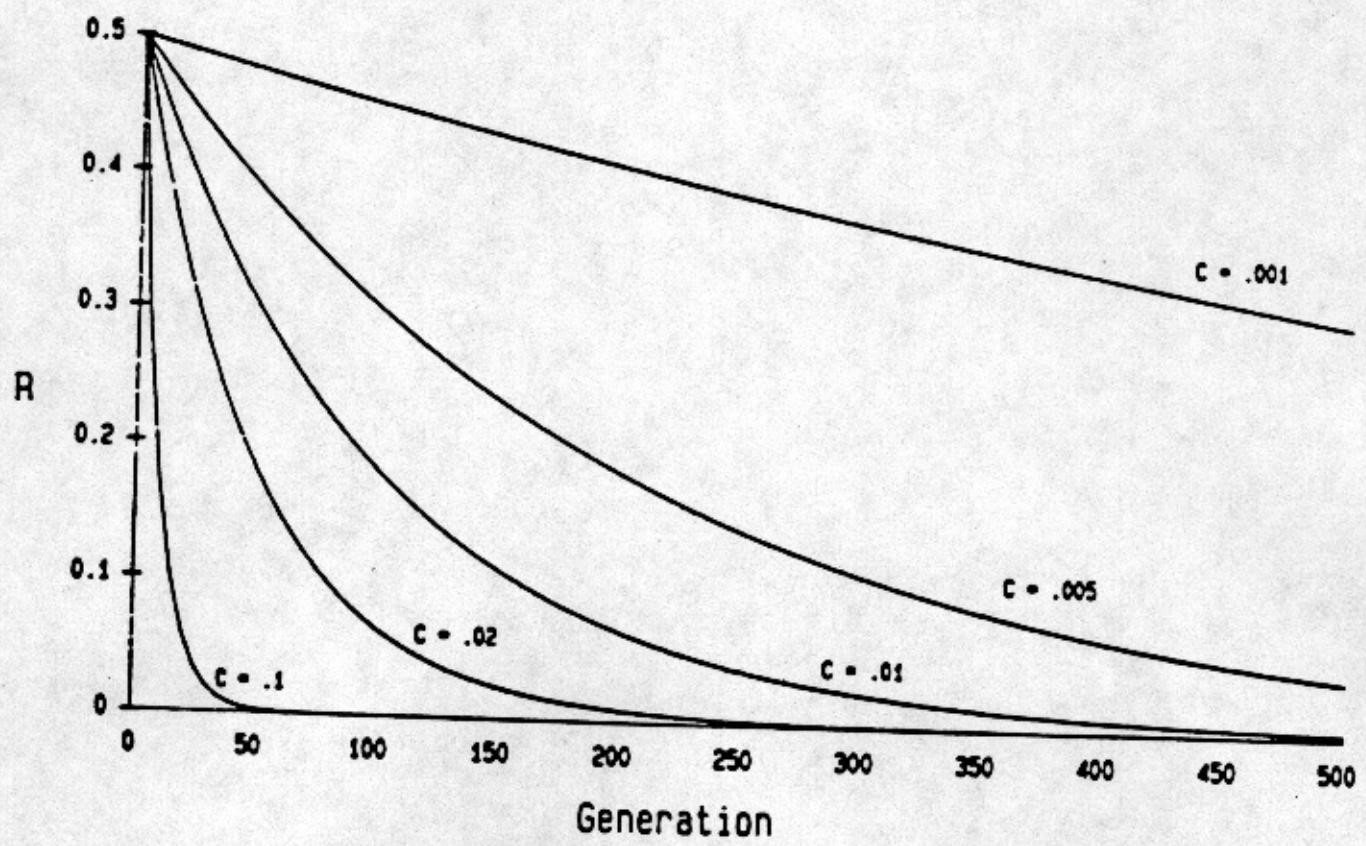
phenocopy



100kb |

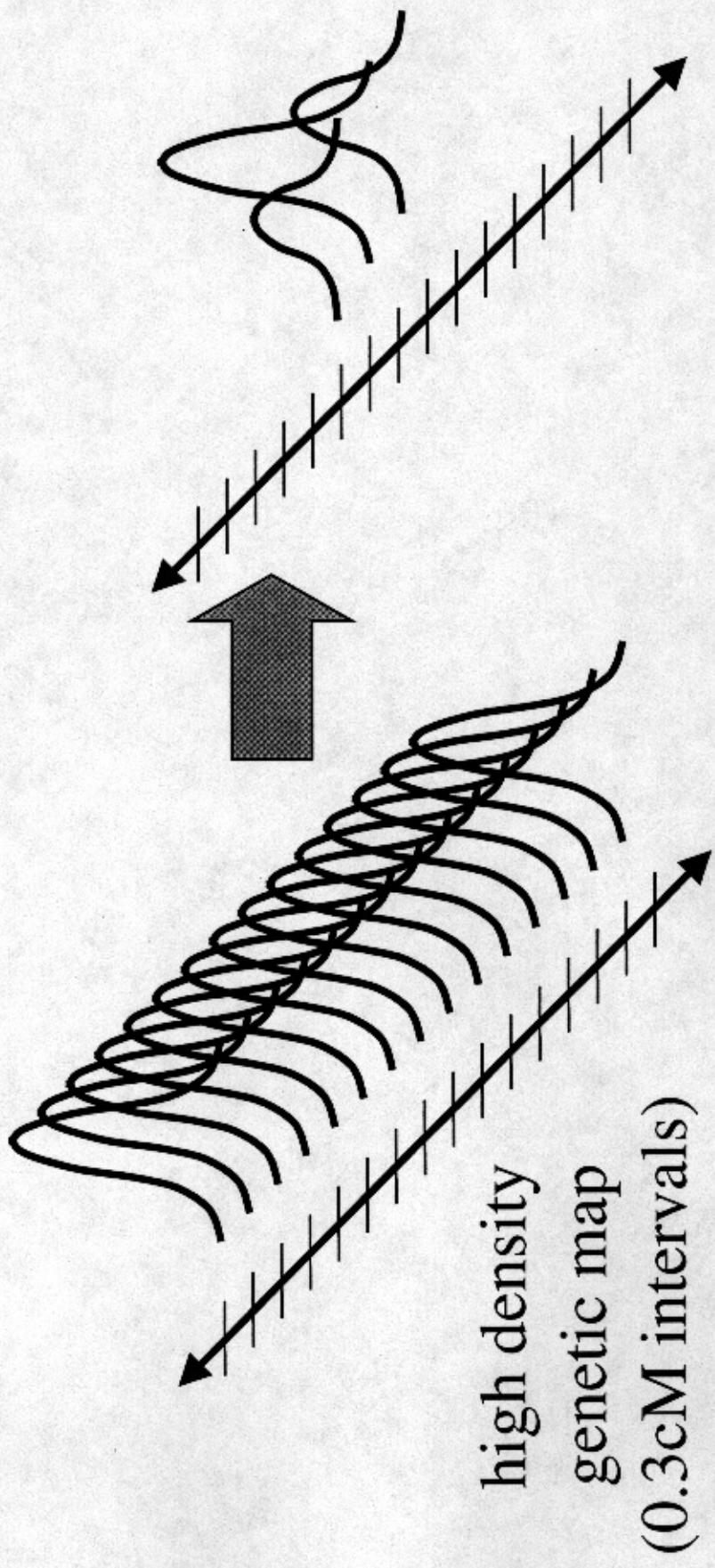


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**FIGURE 1.** Decay of linkage disequilibrium ( $R$ ) with time as a function of recombination (c).

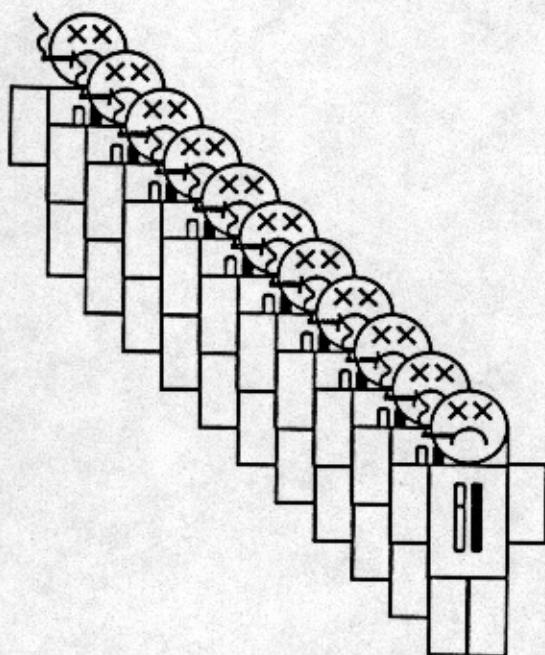
# Linkage Disequilibrium Mapping



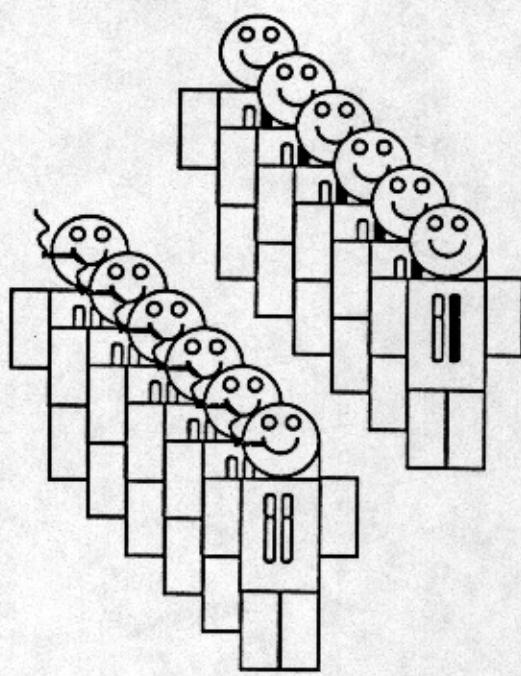
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CANCER  
INSTITUTE  
Laboratory of Population Genetics  
Division of Cancer Epidemiology and Genetics



## Cases



## Controls



50%  
50%

75%  
25%