ANALYZING THE SYSTEM

To see how a system works, consider the system that is a single farm. The components of this system could be categorized in a number of ways. One choice would be to list them under the following headings:

- Animals (genotype)
- Physical environment
- Fixed resources and management
- Economics

The animal category contains the characteristic farm. On a dairy farm, for example, a typical genotype could be described genotype or genotypes—there may be more than one—of the animals on the as having small size, low feed intake, moderate yield, and high butterfat content. A contrasting genotype might have large size, high intake, high yield, and low butterfat.

Physical environment refers to those elements of the environment which out of humans control. Examples of physical environmental factors include weather, altitude, soils, and quality and quantity of native forages. For some production systems. physical environment is extremely important. Range cattle and sheep often exist under conditions. They must deal with the vagaries of the physical environment every day.

Fixed resources include things like the size of the farm, the ability of the farm to grow supplementary feeds.

Management involves all the policies implemented by the farmer. Some examples are level of supplementary feeding, health care, and the length of time animals remain on the farm.

Economics refers to the costs of farm inputs like feed, labor, and supplies, and the prices for farm outputs.

Genetic interaction: occurs whenever two or more genes of different locus determined specific trait , protein , enzyme or hormone.

The phenotypic ratios obtained by Mendel in garden peas demonstrate that one gene controls one character; of the two alleles of a gene, one allele is *completely* dominant over the other. Due to this the heterozygote has a phenotype identical to the homozygous parent. Soon after Mendel's work was rediscovered, instances came to light where a gene was not producing an individual effect. On the contrary, genes were interacting with each other to produce phenotypes which did not exhibit dominance relationships observed in Mendel's experiments.

DOMINANCE TYPES

COMPELETE DOMINANCE

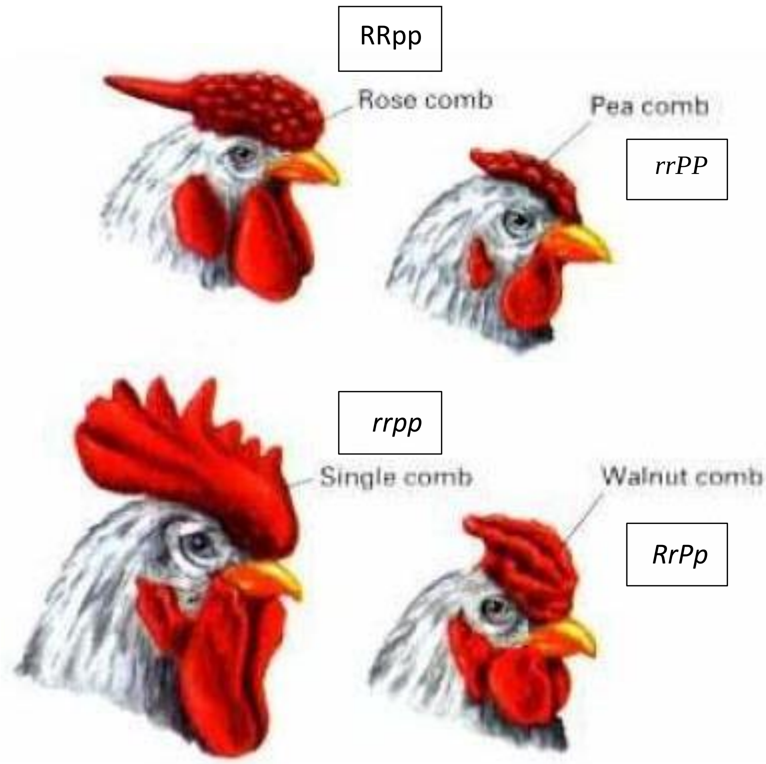
In complete dominance, the effect of one allele in a heterozygous genotype completely masks the effect of the other.

INCOMPELETE DOMINANCE

A monohybrid cross between a red-flowered and a white flowered variety does not produce red or white flowered plants in $F1$ as expected from mendelism. Instead the flowers are pink, *i.e.* intermediate between the two parents. This is because neither red flower color nor white is dominant, but each allele has its influence in color development and the hybrid appears pink. If the $F1$ pink flowers are self-pollinated, the $F2$ progeny shows red, pink and white flowered plants in the proportion 1 : 2 : 1. It may be recalled that this is the same genotypic ratio that Mendel obtained in garden peas. The difference is that in the present case the heterozygous progeny is distinct in appearance from the homozygotes.

CODOMINANCE

There are four types of combs in fowls: rose, pea, walnut and single. Bateson first performed a cross between rose and single. The $F1$ hens all had a rose comb, and on inbreeding gave rise to an $F2$ progeny of rose and single in the ratio 3 : 1. The cross indicates that rose and single comb are controlled by a single gene and that rose is dominant over single. In the second cross when chickens with pea comb were mated with single comb, the *F*1 progeny had pea comb, and *F*2 had pea and single in the proportion 3 : 1. Obviously, the gene for pea comb is dominant over single. This raises an interesting question—are the genes for rose and pea comb same or different? Bateson then crossed rose and pea. Surprisingly, the *F*1 birds had an altogether different comb of the walnut type! An *F*2 progeny raised by inbreeding the walnut type consisted of four types of chickens—walnut, rose, pea and single (Fig. 2.1) in the ratio 9 : 3 : 3 : 1. As this ratio is typical for dihybrid Inheritance it became clear that rose and pea combs were controlled by two pairs of genes.



ROSE> PEA> WALNUT> SINGLE

1. rose x single = rose

2. pea x single = pea

3. (rose x single) F1 x (rose x single) F1 = 3 rose : 1 single

Example: Deduced the product of a rose comb male with pea comb female?

P:	Rose comb		×	Pea comb
	$RRpp$			$rrPP$
Gametes:	Rp			rP
F_1:		Walnut	×	Walnut
		$RrPp$		$RrPp$
Gametes:		RP, Rp, rP, rp		
F_2:	9 Walnut :	3 Rose :	3 Pea :	1 Single
	$RRPP$	$RRpp$	$rrPP$	$rrpp$
	$RrPP$	$Rrpp$	$rrPp$	
	$RRPp$			
	$RrPp$			

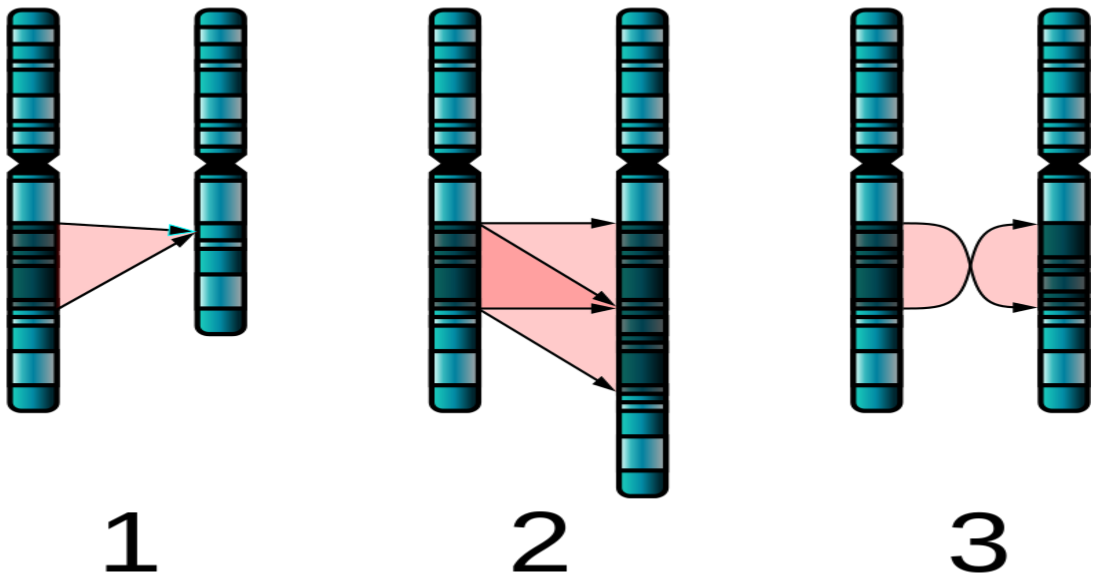
The Chromosomes Abnormalities

Evolution happened based on the changes at a molecular level that cause species to change over time. These changes may be mutations in DNA, or they could be mistakes that happen during mitosis or meiosis in relation to the chromosomes. If the chromosomes are not split correctly, **there may be mutations that affect the entire genetic makeup of the cells, As**:

1-Dublication: A duplication involves attachment of a chromosomal fragment resulting in addition of one or more genes to a chromosome.

2-Translocation: Sometimes a segment of a chromosome becomes detached and unites with another nonhomologous chromosome

3- Inversion: Inversions result when there are two breaks in a chromosome and the detached segment becomes reinserted in the reversed order.



MUTATION TYPES

Missense mutation: changes an amino acid to another aminoacid. This may or may not affect protein function.

Nonsense mutation: changes an amino acid to a STOP codon, resulting in early termination of translation.

"Silent" mutation: does not change an amino acid, but in somecases can still have a phenotypic effect.