

Heredity and evolution

Traits transfer from parent to their off springs is called genetics.

W. Bateson coined the term genetics in 1905.

Process of transmission of traits from one generation to another is called heredity.

Variation –(to change) the difference in the traits shown by the off spring (siblings) of the same parents are known as variation

(i) somatic

(ii) Germinal

Cause of variation – chance separation of chromosome during gametogenesis.

2) crossing over during meiosis

3) mutation (alteration in genetic material).

Father of genetics – **Gregor Mendel**

Mendel selected the pea plant for series of hybridization experiment due to

special feature:-

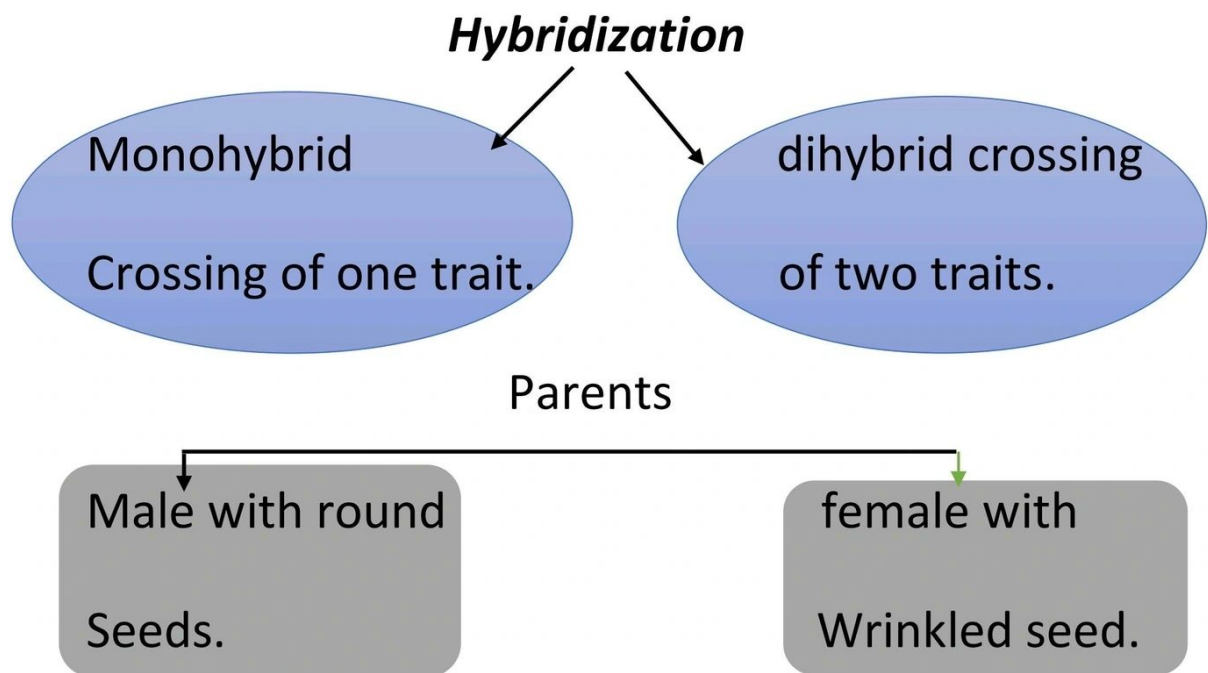
- 1) it was easy to grow
- 2) it had a short life cycle and it was possible to study no of generation
- 3) seven pairs of contrasting character in garden pea plant
- 4) each pea plant produces many seed in one generation
- 5) all the contrasting traits were existing in every generation.

Mendel experiment technique: -

- I. of pure parent plant
- II. Selection Production of first generation by cross breeding
- III. Raising of second and subsequent generation by self-fertilization of hybrid

While performing his cross breeding

He always focused on the inheritance of specific traits.



F1 generation all plants with round seeds. First set of off spring from their parent in known as F1 generation.

Crossing of F1 generation or self-pollination of F1 generation to get F2 generation ie. 3 round and 1 wrinkled seed.

Eg:- dominant and recessive.

DNA is genetic material – first isolated by Friedrich Miescher but experimentally proved by Griffith Avery Macleod and McCarty.

Segment of DNA is gene coined by Johannsen in 1909.

Gene is unit of inheritance.

30000 to 40000 genes are present on 46 human chromosomes.

Mechanism of inheritance

- I. Characters are controlled by genes which present on chromosomes.
- II. Each gene control one character.
- III. There may be two or more forms of gene (allele).
- IV. One form may be dominant over the other form.
- V. An individual has two similar or two dissimilar forms of gene.

- VI. Two forms of gene separate at the time of gamete formation.
- VII. The two form of gene are brought together at the time of fertilization to form zygote.

Sex determination

The mechanism by which the sex of an individual is determined as it begins life is called sex determination.

Chromosome

Sex chromosome	auto some
One pair are sex Chromosome. In human being and fruit fly Are of two type X chromosome And Y chromosome. Eg. Heterogametic.	22 pair of autosome These are homologous. homogametic

The sex of child is determined at the time of fertilization when male and female gamete from to from zygote.

Parents- **male**

female

44+XY

44+XX

(22+X) (22+Y)

(22+X) (22+X)

Off

spring

	22+ X	22+ X
22+X	44+ XX female	44+XX female
22+Y	44+XY male	44+XY male

Role of environment

1)*Turtle* – at high incubation temperature above 33.c result female progeny at 28.c produce only male.

2)*lizard* (agama agama) at high incubation temperature result male off spring while below 28.C produce only female.

3) snail can change sex with genetically determined

Inherited traits

1) Inherited traits are
Obtained from the Parents.

2) these are genetic
Variation.

3) these develop due to
Crossing over and mutation

4) these are coded by DNA.

5) these are passed from
One generation to next
Generation.

Ex. eye ball colour skin
Tone.

acquired traits

1) these are developed
during the life.

2) these are somatic
Variation.

3) these develop due to
use direct effect of

Environment.

4) these are not coded
by DNA.

5) these die with the
Death of individual.

It means there are not Passed
from parent to off spring.

Evolution means to unroll or
unfold.

Concept of organic evolution was first given by **Charles Darwin.**

Organism have originated from the earlier simpler form of life.

During the course of age by the process of gradual change.

The theory of evolution by natural selection first formulated in Darwin book on the origin of species.

Natural selection is the phenomena where in nature in the wild select traits favourable to the species in its environment. It means those organisms survived who selected by nature and these traits transfer from generation to next generation.

Genetic drift – the elimination of gene of certain traits from the small population.

When a section of the species of population dies of natural calamity or migrate to other region is called genetic drift.

Genetic drift – change in frequency of generation.

Speciation -origin of new species from pre-existing species.

Geographical isolation- after few generations genetic drift will accumulate different variation in each of two geographically separated subpopulation.

Geographical region

Crow are killed by eagle.

No such change

Green colour of crow is

No of crows is high

Not selected by 1st region.

Colour of crow will be

Strongly selected by this

Region.

Both are different from each other reproduction isolation occurs between two group. They are unable

to reproduce even if they happen to meet somehow, these two groups then transform into new species.

Q1) **what is reproduction isolation?**

It is mechanism which check the population of two different group from inter breeding.

Evidence of evolution

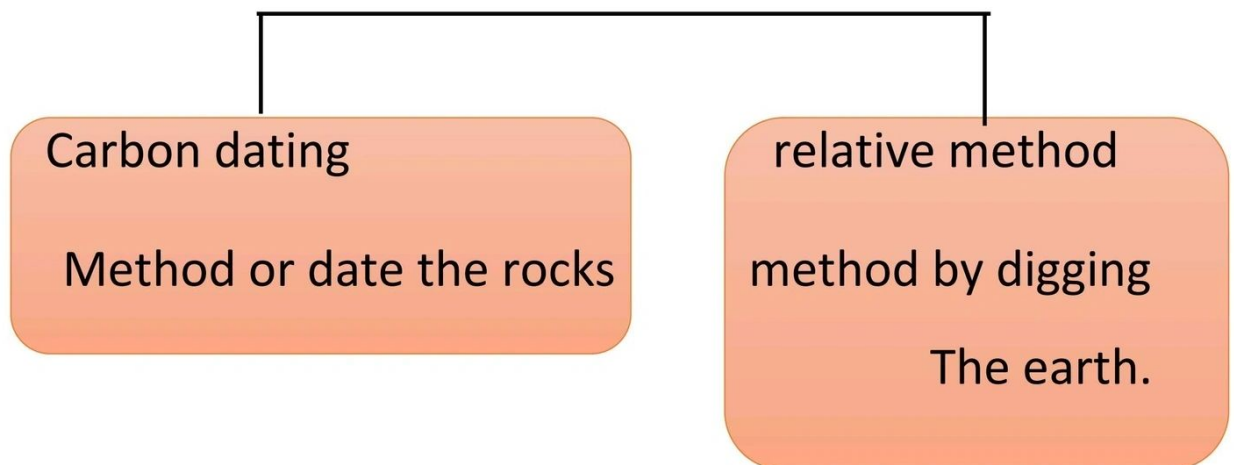
Morphological and anatomical evidences.

Homologous organ	analogous organ
These organs have different Function in different species But similar basic structure. E.g. for limbs of frog lizard	these organs which are quite different in Fundamental structure But same in function. E.g. An insect wiring and bird wiring.

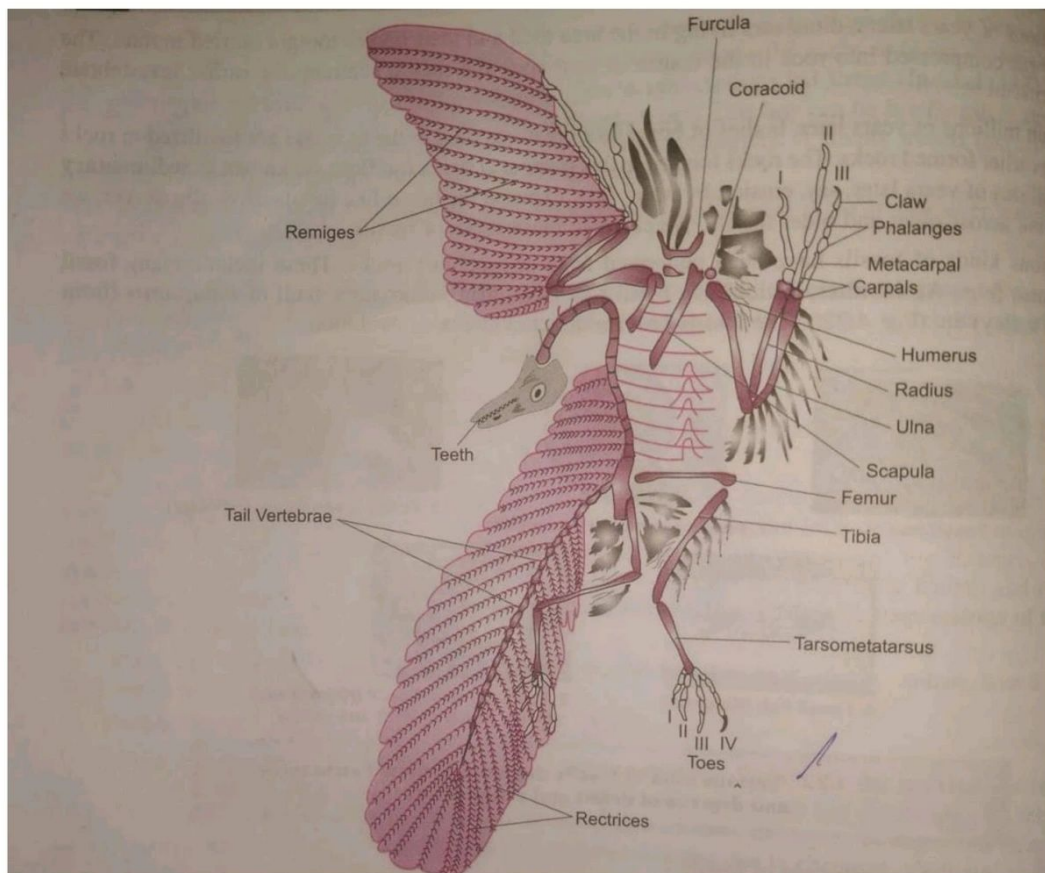
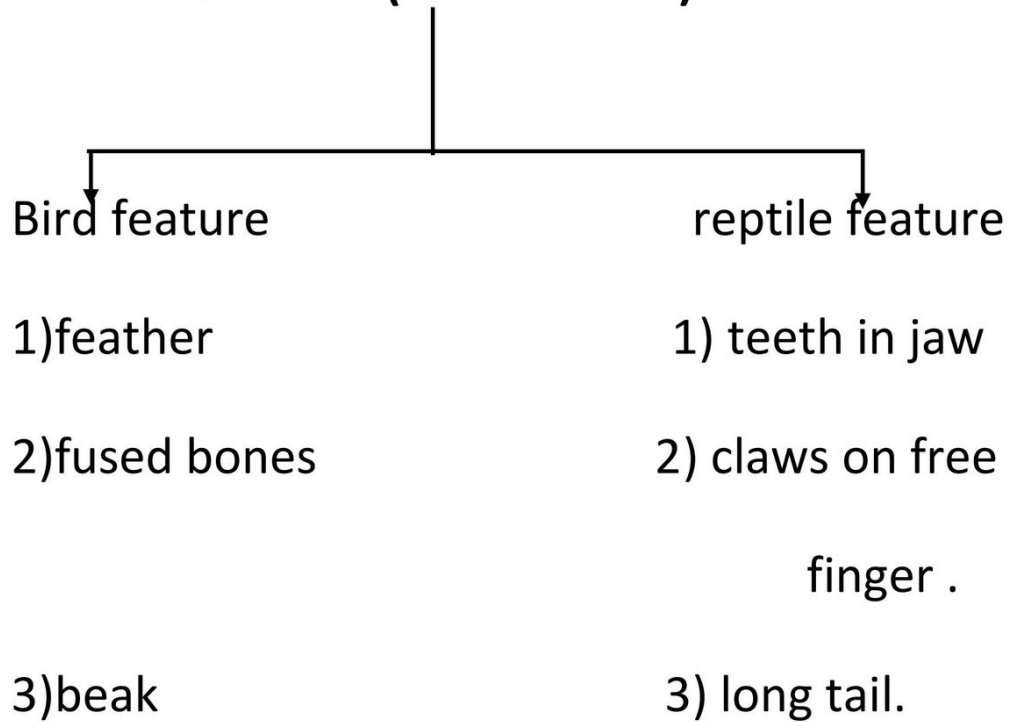
FOSSILS

Categories of Fossil Types						
Category	Trace fossil	Molds and casts	Replacement	Petrified or permineralized	Amber	Original material
Example						
Formation	A trace fossil is any indirect evidence left by an organism. Footprints, burrows, and fossilized feces are trace fossils.	A mold is an impression of an organism. A cast is a mold filled with sediment.	The original material of an organism is replaced with mineral crystals that can leave detailed replicas of hard or soft parts.	Empty pore spaces are filled in by minerals, such as in petrified wood.	Preserved tree sap traps an entire organism. The sap hardens into amber and preserves the trapped organism.	Mummification or freezing preserves original organisms.

Q. How do you know the age of fossils?



ARCHEOPATRYX (LIZARD BIRD)



Artificial selection

In this process man select the traits useful to him for improving the qualities of domesticated animals and plants.

Difference between artificial selection and natural selection.

(Minkoff 1983)

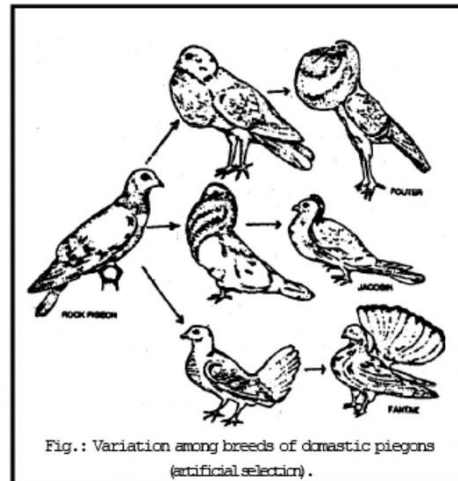
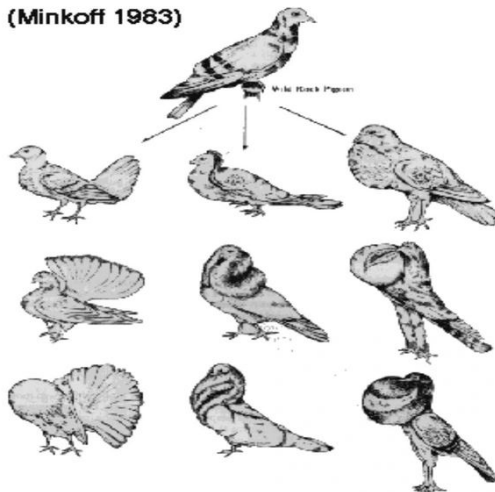
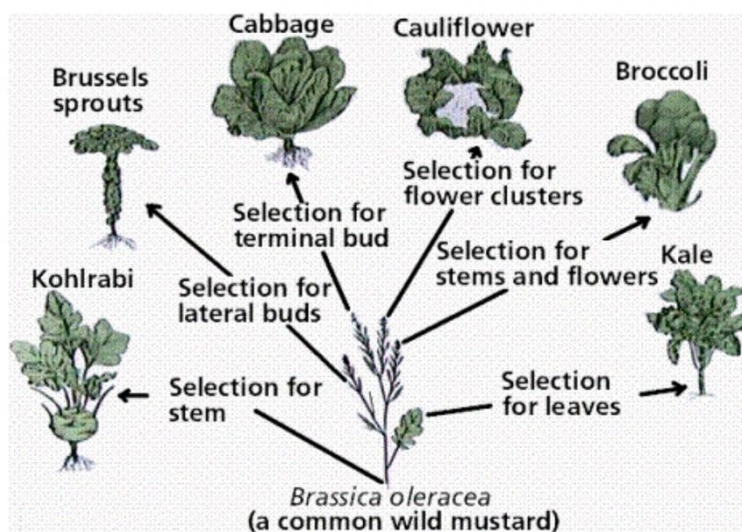


Fig.: Variation among breeds of domestic pigeons (artificial selection).



Artificial selection	natural selection
artificial selection involves the artificial process where selection is done by favouring the desired character in the new organisms.	Natural selection involves the natural process of selection, favouring the most fittest which is able to face all type of situation.
Process rate is faster	Process rate is slow and long process.
It is controlled by humans	It is controlled by natural.
It bring out the new Variety of that species.	It transforms the entire population of a species.
Eg. It is usually performed on pet animal or animals which are used for economical purpose.	Eg. Darwin finches which are group of birds of 14 species of small bird ,evolved from the same species of bird on the Galapagos islands.