SS3 Biology Lesson Note Second Term

SUBJECT…BIOLOGY E-NOTE FOR SECOND TERM

SCHEME OF WORKS SS3

WEEK ONE…HEREDITY (GENETICS)

WEEK TWO/……THE CHROMOSOME

WEEK THREE……/VARIATON AND EVOLUTION

WEEK FOUR……ADAPTATIONS

WEEK FIVE……DIFFERENT CASTSES OF TERMITES AND THEIR ROLES

WEEK SIX……THEORY OF EVOLUTIOS

WEEK 1

Genetic is the study of heredity and variation in living things

HEREDITY OR INHERITANCE is defined as the transmission and expression of characteristics or traits

in an organism from parents to offspring.

VARIATION is defined as the differences which exists between parents and offspring as well as a many the offsprings.

CHARACTERS OR TRAIT THAT CAN BE TRANSMITTED IN MAN

It is only those traits that constitute the genetic makeup of the parents that can be transmitted and expressed in the offspring.

These traits include colour of the skin, colour of eyes this colour of the hairs and hair texture, size of body stature, shape of the head , shape of the ears, shape of the month, lips, shape of the nose, length of the hands and legs, length of neck , Blood grouping, baldness, tongue rolling, hemophilia , voice, intelligences composure, aptitude , sickle cell anaemia are transmissible in animals while is transmissible include colour and shape of the leaves shoot , seed size and shape, colour of the flowers, size of the fruit and pigmentation

HOW CHARACTERS OR TRAITS GET TRANSMITTED FROM GENERATION TO GENERATION

Only characters controlled by genes can be transmitted A diploid organisms has two sets of chromosome referred to as homologues. Such an organism has two copies of each gene, with each copy occupying identical locations or loci on the homologous chromosomes.

Diploid organisms produce gametes by meiosis in their reproductive organs. A male individual produces egg cells or ova.. During meiosis the number of chromosome in a cell is halved , the gametes are therefore haploid containing one set of chromosome and gene only one copy of each gene.

During sexual reproduction, the gamete of a male and female individual fuse to form zygote. Each zygote is diploid as it gets one set of chromosomes, and hence one copy of each gene from the gametes of each parent. The gene an organism inherits during fertilization is called genotype remain constant throughout life span. The phenotype which is the physical appearance or features of an organism is determined by its genotypes and the environment in which it lives.

Basic Genetic concepts

GENE; this is defined as the physical unit of inheritance transmitted from due generation another and responsible for controlling the development of characters in the new organisms.

CHROMOSOMES: these are strands of genetic materials which are obvious during cell division. They are found in the nucleus where they carry the genes. They contain of DNA (deoxyribonucleic acid) and protein.

CHARACTER OR TRAIT; these are inheritable attributes or features possessed by an organism's height or size.

ALLELOMORPHS these are pairs of genes or locus that controls contrasting character. Pair of allomorphs are called allelic pair while each member of the pair is the allele of the other.

PHENOTYPE: Is the sum total of all observable features of an organism s that is the physical, physical, physiological and behavioral traits e.g. height, weight, skin colour.

GENOTYPE; The term in used to describe those traits or sum total of the genes inherited from both parent or in order word, it is the genetic makeup or constitution of an individual. Genotype includes both the dominant and the recessive traits that form the genetic makeup of an individual.

DOMINANT charater; this is a trait that is expressed in an offspring when two individual with contrasting characters are crossed.

RECESSIVE: Character this is the trait from one parent which is masked or does not produce its effect in the presence of dominant gene or character. Shortnees is recessive character while fellness is dominant character. Recessive genes are gene which control recessive character,

HOMOZYGOUS: Is an individual with identical alleles in respect of a particular trait or character (TT or tt).

HETEROZYGOUS: An individual having two member of a pair of genes controlling a pair of contrasting alleles located on different on the same position on a pair of chromosome e.g. (Tt for tallness or a plant with Rr.

GAMETE - Is a single cell formed as a result of the union of a ale gamete with a female gamete

FILIAL -Generation - the offspring of parent make up the filial generation the first, second and third generations of offspring are known as first, second and third filial generations of offspring are known as first, second and third filial generation are denoted by the symbols F1, F2 and F3.

HYBRID: Is an offspring from a cross between parents that are generically different parents that are generically different but of the same species.

HYBRIDIZATION - is the crossing of a plant with contrasting character.

MONOHYBRIDIZATION: Involves the crossing of two organisms with two organisms with two pairs of contrasting character.

LOCUS- is the site for location of gene in a chromosome.

HAPLOLD- Is when an organism has one set of chromosomes in the same genete it is represented by (n).

DIPLOID- Is when an organism has two sets of chromosomes in the body cell. The bodies of animals and plants are diploid. Diploid number is represented by (2n).

MUTATION – Is a change in the genetic makeup of an organism that resulting in a new characteristic that is inheritable

BACKCROSS - This is the mating of an f1 individual with an individual which has the parental genotype.

PURE BREED - This simply means an individual that is homozygous.

CO-DOMINANCE - Is a situation where the phenotype of the heterozygote exhibits properties of both parents. Example of co-dominance is seen in ABO BLOOD GROUP SYSTEM IN HUMAN BLOOD GROUP a IS DOMINANT AS BLOOD GROUP b. If a child is product by two parents, one with blood group B and the other blood group A. The child will belong to blood group AB.

SEX – LINKED CHARACTER – These are characters that are carried by genes located on the sexchromosome. These genes or characters are said to be sex- linked and usually found in the X- chromosome they expressed in male children even when the gene is recessive. Such phenotype are expressed in female only when the two X – chromosomes are recessive or two x – chromosomes are recessive or carry the

recessive gene. Example of characteristics expressed by genes that are located on sex chromosome include colour blindness, hemophilia , baldness.

MENDEL'S WORKS IN GENETICS

Gregor Mendel (1822 - 1884) was a Monk in Austtria. He is referred to as father of Genetics because of his work which formed the foundation for scientific study of heredity and variation Mendels Experiment.

Gregor Mendel carried out several experiment on how hereditary characters were being transmitted from generation to generation. He worked with garden pea called possum sativum.

Reasons for using the pea are follows.

_ Peas are usually self-pollinating and he could pollinated them by himself.

_ They have a very short life span than animals and some other plants.

(1) He planted tall plants for several generation and discovered that

the plant produced were all plants in the same way he planted short pea plants for several generation. He also discovered that the plants produced were all short.

(2) He proceeded to plant tall plants and short pea plants. By the time the flowers were produced of the collected pollen grains of the tall pea plants tagged of male and pollinated the stigma of the short plant which is labeled as female.

He collected the pollen grain of the short plant and placed them on the stigma of the tall plant.

(3)Mendel area again picked the seed and he discovered that the plant were all tall. This he referred to it as first filial generation (fi)

(4) Mendel them crossed the f1 plants, collected their got from this were tall and short in the ratio 3 : 1 . He then called this stage second filial generation.

Parents Tall plants

X

Parents Tall plant (F1) X Tall plant (F1)

Tallness shortness

T T X t t

F1genertion

PARENTS Tt x Tt

GAMETES

F2generation

Phenotypic F2 are 3 tall plant 1 short plant

Genetypic ratio 1:2:1

Mendelian Traits:

Mendel discovered trait or characters that be transmitted from parents to offspring. He studied various inherited characteristics in pea plant. The traits or character are: height/length, colour of seeds, and surface of seed coat. Other examples of traits that can be transmitted from parents to offspring include: the blood group, the Rhesus factor, skin colour eye colour shape and body weight.

Mendelian Laws of inheritance

Mendel's Laws of heredity explains the principals of Mendelian inheritance.mendel produced offspring of pea plant by self-polling on and cross –pollination and as a result of his experiments,he came out with his certain deductions termed mendel's law.The two laws are

1. **First law**

Law of segregation states that genes are responsible for the development of individual and that they are independently transmitted from one generation to another without undergoing any alteration.

1. **Second Law**

Law of independence assortment of genes

This law states that each character behaves as a separate unit and pair of alleles for a given character distributes itself in the gemetes during formation does not affect the way other allelic pair for other character distribute themselves. OR the Law State that when more than one factors are considered, each character behaves as a separate unit and is inherited independently of any other character.

How characters Manifest from Generation to Generation

1. **Sex Determination**-In human being,sex is determined by sex chromosome (23rdpairs).In female,the sex chromosomes are similar in size and shape,,they are referred to as "X" chromosome hence female have XX in (^{23rd}) pairs. .Male on the other hand have contrasting (different) size and shape. One is an "X" chromosome while other is a "Y" chromosome. M.ale chromosome is therefore XY.half of the male sperms contain X chromosome and the other half is Y chromosome . Each egg of the female contain an X Chromosome. This implies they if an X- sperm fertilizes an X- egg, the offspring will be a female (XX). Otherwise if Y-sperm fertilizes an X -egg,the offspring is a male,having XY genetic constitution

(SPERM) XY X
XX(Eggs)

1. SEX-LINKED CHARACTER OR SEX LINKAGE

These are characters that associate themselves with sex chromosome. The gene rresponsible for such characters are found on the sex chromosome such characters are called **sex-linked** characters. Examples are colour blindness, haemophilia and baldness

Colour blindness

It is associated with sex. The sufferers are unable to distinguish between colours. All colours unable to distinguish between colour. All colours e.g red and green looks alike to the sufferers of the disease. The gene of the disease is receissive and it is associated with X-chromosome only. The Y- chromosome does not carry the gene that controls colour blindness.If gene C (capital) is present with its allele c

(small letter) the disease effect is not felt.

X^CX^C – Normal female

X^CY _ Normal male
$X^c X^c$ _ Carrier female

$X^c Y$ _ Sufferer male(colour blind)

PARENTS $X^C X^c$ x X^CY

Gamates

1. **Sickle cell Anemia**

This is an inherited and genetically linked disorder-The red blood cells of the sufferer of the disease change shape of round look to sickle or cresent form by a lowering in concentration of oxygen due to insufficient flow of the blood to the part of the body. This results in sickle crisis with pain in bones and joints. Sickle cell disease /trait is caused by recessive gene connoted by letter 'S' and normal situation connected by A. The trait is carried by hemoglobin.

Parent

Both the normal and carrier do not feel the effect of sicked cell.

Some heretic disorder

1. Sickle cell Anaemia

PARENTS X

1. **Hemophilia –**is a disease in which the correct protein (fibrin) for clothing are not produced. The result is a serious bleeding even after trivial bruises who pass it to possible sufferers (males) don't always suffer from it in most cases.

iii. Colour blindness

1. Rhesus factor

This is a type of agglutinogen found in red blood cells. It was first discovered in mokeys when present it is termed rhesus positive (RH^+) .

Lack of it is referred to as rhesus negative (RH^-) .

Father Mother Compatibility

Rh +ve Rh + ve compatibles

Rh – ve Rh – ve compatible

Rh – ve Rh + ve compatible

Rh +ve Rh – v incompatible

INCOMPLETE DOMINANCE: Is a condition where neither of the contrasting characters are dominant over each other. This result in a mixture or blend of the two characters. This phenomon is known as incomplete dominance, blending inheritance or co-dominance.

Examples: Andalusian fowl: If a while featherds Andalusian fowl (WW) is crossed with a black fowl (BB) . The offspring are BW (blue) parents WW x BB

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PARENTS WW X BB

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GAMETES X ____

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F1 genertaion all blue fowls

Parents WB X WB

Gametes

F2 WW WB WB BB

Generation white blue blue black

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CO-DOMINANCE - ABO blood group in man exhibit co-dominance. The blood group is determined by a single pair of genes located or a homologous pair

of chromo ones. There are three different alleles., T^A for antigen A, T^B for antigen B , t^o for no antigen B, for no antigen .T^A and T^B are dominant while t^o is recessive.

Blood group **Alleles**

A T^A T^A or T^AT^o

B T^B T^B or T^BT^o

AB T^A T^B

O t^o t^o

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DIHYBRID CROSS (DIHYBIDIZASTION)

The study of cross involving the inheritance pattern of two characters each of which is

determined by two alleles of a gene for instance, pea plant with seed colour and seed shape are used in garden pea plant , round seed (RR) is dominant over wrinkled seed (rr) , yellow seed (Y) is dominant over the green seed (y).

When a pure stock of plants having round yellow seeds is crossed with a pure stock of wrinkled and seeds , the F1 general offspring all round and yellow.

Parents ____ Round and yellow X wrinkled and green

RYRY x ryry

Gametes RY ry

F1 RYry (All round and yellow)

F2 is arranged in prunnet table as follow

RY, ry , X RYry

Gametes : RY, RY, ry , ry X RY , RY, RY, ry

	RY	RY	ry	ry
RY	RYRY	RYRY	RYrY	RYrg
Ry	RyRy	RyrY	RyrY	Ryry
Ry	RYrY	RyrY	RyrY	rYry
Ry	RYry	Ryry	rYry	ryry

Analysis of phenotype ratio

Round and yellow 9

Round and green 3

Wrinkled and yellow 3

Wrinkled and green 1

Analysis of genotyptic ratio

Homozygons romo yellow 1

Homozygons romo green 1

Homozygons wrinkled yellow 1

Homozygons wrinkled green 1

Homozygons Romo, heterozygons yellow 2

Homozygons romo yellow, Homozygons green 2

Homozygons wrinkled, Homozygons yellow 2

Homozygons romo and yellow 4

Questions

(1) A man with heterozygous genotype for blood group B marries a woman with heterozygous

1. what percentage of their children be universal donor?

2.The alternative form of a gene that represents constrasting character is a/an (A)allele (B)diploid (C)haploid (D)homologue

(3) If two parents are sickle cell carrier their genotype would be (A) Hb ^{A} Hb^{A} and Hb^{s} Hb^{s} (b) $Hb^{s}Hb^{s}$ and Hb^{s} Hb^{s} (c) Hb^{A} Hb^{s} and Hb ^{A} Hb^{s} (D) Hba Hb^{A} and Hb^{A} Hb^{A}

WEEK 2

CHROMOSOME (Basic of Heredity)

Chromosomes are thread like structure that occur in the nuclear of plants and animals and carry heredity information from generation to generation.

There are seen only during nuclear division and occur in identical pair called homologous pair. The body cell (somatic) of man has 46 chromosomes (23pairs). The sex cell (sperm, ovum) have 23 chromosomes. The 23pairs of chromosomes are called diploid number (2N) and 23 chromosomes are referred is as haploid number (N).chromosome are made up of two threads 'chromatids'. Chromosome carry genes that are hereditary unit for inherited traits

Structure of chromosome:

During the early cell division chromosome become condensed and visible, each, then ,duplicate or replicate to produce a compact twins connected by a centromere. Each member of a bond pair is called a chromatid which tread like in appearance

Chemical analysis: of chromosomes show that they are composed of proteins combined with nucleic acids which are of two kinds.

1. **De oxyribonucleic acid (DNA**) Which is confined to the nuclear material of the cell which the primary heredity material making up the gene.
2. Ribonucleic acid (RNA) in some viruses.

The DNA consists of a double chains formed by repeating small chemical units known as Nucleotides. Each nucleotide is composed of

1. deoxyribo sugar (s)
2. Phosphate group (p)

iii. Nitrogeneous bases which may be purine (Adenine and Guanine)or

pyrimidine (cytocine and Thymine).

The two chain of nucleotides of DNA are coiled like a spring to give a structure called a double helix. The nitrogenous base of the nucleotide pairs along the DNA chain.

Adenine (A) pairs with thymine (T) A-T while Guanine (G) pairs with cytocine

(C) G-C

Role of chromosome in transmitting hereditary characters.

1. **Formation of gametes**– gametes are formed by meiotic divisions of cells. Each sperm or egg producing cell in reproductive organ is diploid that is having two sets of chromosome.

During meiosis the number of pair homologous separate first, then the twin chromatids separate The outcome of the cell division result into four daughter cells.

haploid

haploid

Haploid

homologous

chromosomes

sister chromatids haploid

2 It allows for reshuffment of gene by allowing crossing over. It happens during the prophase of meiosis. It is important because it leads to new combination of alleles on a chromosome which leads to more types of allele combination in gametes.

1. Homozygous chromosome pair up, each chromosome has already replicated
2. Exchange of genetic material takes place between chromatids of homologous pair of chromosome
3. crossing over result in re arrangement of alleles A and

Probability in Genetics

This explains the predicted ratio or chances of having a particular trait or character in a cross or transmission from generation to another. This explains the predicted ratio of 3:1 for monohybrid cross and 9:3:3:1 for dihybrid cross.

Probability = Number of times an event occur

Total number of trial

Probability is usually expressed in units ranging from 0-1. Two principles are necessary is understand the importance or probability in genetics.

1. The result of one

trial of a chanced event does not affect the result of latter traits of the event

1. The chance that two independent events will occur together simultaneously is the product of their chances of occurring separate question

In a plant of genotype Tt, what is the probability that a gametes will contain gene t?

P = No of times an event occurs

Total number of trial

P = $^1/_2$

Question

An albino man marries a normal woman (homozygous) for skin pigmentation). What is the probability the couple could have an albino child?

Gene for albinism = aa

Gene for the Normal pigmentation = AA

(1) In a cross involving a heterozygous red flowered plant (Rr) and a white flowered plant (rr), what is the probability that the offspring will be (Rr)?

1. What is the probability that two consecutive children of the same parent will be males?
2. In human beings, the albino trait is recessive is the probability of parents who are heterozygous for albinism having an albino child?

Application of Genetics in Agriculture

1. It improves crop yield.
2. It improves the quality of product of plant and animal.

- It leads to development of early maturing varieties of plant and animals

1. It leads to development of disease resistant varieties of plant and animal.
2. It leads to production of crops and animal that can adapt to climatic condition.

Application of Genetics in in field of Medicine

It help in determination of the paternity of a child.

The knowledge helps in blood transfusion who to donate and who should receive.

It enlightens the marriage partner about genotype through marriage counseling

1. The method is used in diagnosis of diseases
2. The knowledge is used in crime detection

- The method is development of test tube baby

1. The knowledge can be used to choose the sex of a baby
2. It can be used to know the sex of a baby.
3. NB: Do crosses for the students.

Question on Genetics

1. Two varieties of maize, one with yellow seeds and the other with pink seeds were crossed with the parent variety with pink seeds, half of the resulting offspring had yellow seeds white the other half had pink seeds.By Means of labeled diagram only
2. Deduce the genotype of the seeds of Fi generation
3. How the results of the cross between the F generation and the parent pink variety.
4. How many X chromosome will the girl have in each body cell?
5. If the parents already have a family of one boy and two girls. What are the chances of their next baby being a boy? Give a reason.

WEEK 3

VARIATION IN POPULATION

Variation can be defined as the differences that occur between individual or organisms of the same species. Variation is caused majorly by

1. **Genetic of differences or genotypic variation**
2. **Effect of environmental factor.**

The genetic differences or genotypic variation may be as a result of new genetic combination which occur during sexual reproduction or due to mutation, a rare and spontaneous alteration that occur in genes or chromosome. This type of variation is inheritable and can be transferred from parent to offspring. For examples variations in eye colour and disease resistance.

Variation due to effect of environmental factors such climate, food supply and action of other organism on the expression of the genetic potential.. Such variation are not heritable but acquired and cannot be transferred from parent to offspring.

TYPES OF VARIATION

Morphological or continous variation

Morphological variation are variations that deal with physical appearance of individual or an organism. It concerns form and structure or an organism or a plant. It helps us to identify and differentiate individual in population based on their physical appearance.

Continous variation is a type of variation in which a particular feature show a smooth gradual transition between two extremes with the majority of individuals at the centre. For example, a graduation in height from short to tall is a continous variation since there are intermediate forms as majority of individuals are of average height.

Example of continous or morphological variation in human being are

1. Height of the body
2. shape of the body parts e.g head,jaw,mouth,nose

iii. Size of various part of the body such as head, nose ear, eye, hand and lips.

1. Colour of part other body such as skin, hair, and the eye.
2. Finger print
3. **Physiological or discontinuous variation**.

Physiological variation are variations which are related to the functioning of the body. It is a discontinuous type of variation since it composed of well-defined classes with no intermediate forms. For example the blood group composed of four distinct classes A,B, AB and O, which indicate sharp differences between the various blood groups. No intermediate feature of a particular trait..

Examples of discontinuous variation or physiological variation in human being are

1. **Rolling of tongue**
2. **Moving the ears without moving the head**

iii. Closing one eye and leaving the other open

1. **Tasting the chemical substance called**

phenylthiocarbamide (PTC).some people can taste the chemical while others cannot

1. **Differences in blood group A, B, AB and O in man**. Each person belong to one of these group.
2. **Sex of an individual**. An individual will either belong to a male or female

vii. **Behavioural pattern** of an individual can be grouped as being excitable or calm, pessimistic or optimistic, mean or Kind, gentle or harsh, timid or brave, intelligent or foolish. Environmental factors and genetic make up of individual are believed to contribute greatly to their behaviour.

APPLICATION OF VARIATION

1. **It can be used to trace or detect the perpetuator of crime by using finger printing**.

Explanation: Forensic examination of objects or substance seen at the scene of crime may provide necessary clue of the suspect. Finger printing is a techniques used in forensic examination based on the impression of the finger tips left on surface touched bare-handed. Dusting the surface with powder using a brush allows the powder to stick to the protein secreted by the sweat glands on the skin ridges of the finger tips. Upon the removal of excess powder, an outline the contours of the rigdes remain.Another method is chemical treatment to reveal contours. The finger print of potential suspects compared with the one under examination. Any individual whose finger print matches the finger print on the gun or other material picked from the scene of the crime will be taken as an accused person.

(b)**DNA Finger printing** is used in identifying a rapist.The body cell or DNA sample is first extracted from body tissues or fluid at the scene of the crime and fragment using enzyme. The DNA pattern is analysed to defect the criminal.

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Finger prints

It is established that no two persons have exactly the same finger print and the patterns of any one individual remain unchanged through life. The major group of finger prints are whorl, arch,,loop and double whool. The slight variation in the main group of finger print patterns have found application in crime detection and in voting.

1. **The knowledge of variation is used to in blood transfusion**. Blood transfusion is giving of blood to case of accident, surgery, gastrointestinal bleeding and childbirth where huge amount of blood is lost. In blood transfusion, there must be compatibility between the donor and the recipient. There are four blood group in man. These are group A, B, AB and O Group O is a universal donor while group AB is universal recipient.

BLOOD GROUP`	ANTIGEN ON CELL	ANTIBODY IN PLASMA
A	A	anti-B
B	B	anti –A
AB	A and B	neither anti A nor anti B
O	no anti A or B	no anti-A or B

Detecting the ABO blood group

Blood group	Anti body A serum	Antibody-B serum
A	No Clumping	Clumping
B	Clumping	No Clumping
AB	Clumping	Clumping
O	No Clumping	No Clumping

BLOOD TRANSFUSION DONOR-RECIPIENT COMPATIBILITY

Blood groups	Can donate blood to	Can receive blood from
A	AB and AB	A and O
B	B and AB	B and O
AB	AB	All group
O	All group	O

1. **Variation application can be used to determine the paternity of a child.** A combination of blood group lest and DNA finger printing be used to determine the father of a disputed child

Assignment

1. Which of the following is an example of physiological variation?

(a) Blood group (b) Skin colour (c) finger prints (d) Human height

1. A person with blood group B can only donate blood to individuals with blood group (a) A and B (b) B and AB (c) O only (d) b only

3a. Define variation _

1. Mention the types variation and explain any two
2. List the three application or variation and explain any two of them
3. For crime detection the variation that is essential (a) Ability to taste (PTC)

(b) Blood group (c) finger print (d) Tongue rolling

WEEK 4

ADAPTATION

Adaptation is a change in an organism that make it to adjust or survive in its environment. The various animals of the same species try to specialize using their structure and function to survive in a new environment. This is called adaptive radiation. For instance, fish use fins to move in water but terrestrial organisms such as lizard develop limbs to move on land. Toad that live a dual life both in water and on land limbs for hopping on land.It develops web digits for swimming in water and limbs for hopping on land.

1. **Structural Adaptation for colouration**.Colours and colour pattern in plants and animals are adaptation which may be classified into protective colouration, warning colouration and mimicry.
2. **Protective colouration**is used in camouflage and enables the organisms to escape predation and remain unnoticed. Examples are the green cuticle of the grasshopper that allow it to blend with the grass.

Chameleon also has the ability to change its colour when frightened to remain undetected by predator.

Some animals like tiger,leopard and Zebra also have colour patterns on their bodies that break up the familiar shape of the their bodies allowing them to remain undetected

1. **Warning colouration**are adaptations found in small animals like insect and snakes that have bright colours and colour pattern on their bodies that makes them to be quickly noticed by predators. However, this colour serves as a warning to potential predators to avoid such animals because of their poison or painful sting.

2. **mimicry:**This is the act of an organisms trying to disguise itself to be a non- living thing like dry leaf or stick (imamate object) for the sake of survival e.g. the praying mantis which mimics dead leaf and other insect katkid that mimics a fresh leaf.
3. **Insects are attracted to bright coloured flowers**.
4. **Behavioural Adaptation**Behaviour adaption is the way an organism respond to a specific set of changes in environmental conditions. Animal exhibit many forms of behaviour in order to attend to their various needs.

- in order to survive harsh environmental condition. They use hibernation and aestivation

1. **Hibernation**- is a period in which an organism survive long period and food shortage. Animals like bats and rodents are completely inactive during winter with their body temperature close to freezing temperature.
2. **Aestivation**is a method survival adopted by organism to survive a long period drought and heat during dry season. Animal like snail and Africa lungfish aestivate by sealing themselves up during the dry season and only return to the active state when it rains.
3. **Structural adaptation for obtaining food; Insects**; various insect have different mouth parts. The parasites e.g mosquito and nectar suckers use their proboscis. The biting and chewing type of insects have mandibles, labrum and maxillary palps with which they bite and chew materials e.g grasshopper and cockroach

Birds: Different bird have different shape of beaks depending on their mode of feeding.

Example, some carnivores among the birds have curved sharp beaks for devouring their prey. Others have long beak e.g cattle egrets with which it picks fish in water, possession of long neck as the ostrich with which it picks leaves from the trees. Chameleon sit still flicking out their tongue to catch flies.

1. **Structural adaptation for protection and defense**

- Chameleon uses photosensitive cells on its skin to pick the environmental in which it finds itself as a measure of protection from its prey

- Some insects have various ways of protecting or defending themselves. Some secrete repelling odors to drive away animals intending to attack them. The bee stings in order to defend itself. Other animals withdraw to their shell to escape from predator e.g snail and tortoise

1. **Structural Adaptation for securing mate**

- The male peacock has beautiful feathers which it display for female so as to attract her before mating.

- The red-head Agama lizard raises its head up and down to attract the hood female

-insect pollinated flowers are mostly bright colouraed

1. **Structural adaptation for regulating body temperature**.

- mammals maintain a constant body temperature due to the presence of hairs or furs. These they use in trapping air in between pores in time of cold weather. That is why people living in temperate region tend to be more hairy than those in the tropic.

- The cold blooded animal like fishes adjust using scales to give them the required temperature.

Part of behavioral adaptation .

-Migration : This is when the animals undertake long journey from one place to another ,some animals like birds , fishes (salmon) flee from the cold winter down to the tropics only to come back when the weather improves.

- **Social Animals**live in groups . They are so organized that there is division of labour among them. They live in colonies or communities . The various castes differ in appearance as well as in duties. Each and everyone of them performs That is workers, soldier and queens are seen in termites. Example of social animals include termite, bees , wasps , foxes, wolves, elephant, baboons' and humans.

WEEK 5

SOCIAL INSECTS: are specialized group of insects of the same species which live together cooperatively in organized community known as colonies.

CHARACTERISTICS OF SOCIAL INSECT/ANIMALS

1 They live together in colony

2 They show or display division of labour

3 They show distinct castes

4 Members communicate with one another within the colonies.

CASTES OF TERMITES

Termites are usually found living together in large communities in nest which may be in tunnels in dead wood, chamber under the ground or anthill, or termitarium/termiteria.

All the various individuals in termite colony are grouped into three castes as follow the reproductive are of three types. The reproductive are fertile and are able to reproduce. These are the (a) king (b) queen (c) and long winged reproductive.

The king

1. The king is a reproductive individual that is fertile
2. It has no wing

iii. It is smaller than the queen

1. The function or the king is to mate or fertilize the egg of the queen

QUEEN

1. The queen is a reproductive female individual.
2. It has a small head and small thorax with very big abdomen

iii. The abdomen is large and swollen with eggs

1. There is usually only a queen at a time in a colony
2. The queen is the largest of all the castes

vi The function of the queen is a lay egg the long winged reproductive

1 They have wings

2 They are fertile i.e. able to reproduce

3 They can become new queen or king in a new colony after a nuptical or wedding flight

SOLDIERS

I They soldiers are sterile i.e. unable to reproduce

Ii They are wingless

Iii They have a big head with a pair of strong and hard mandibles

Iv They defend the colony against enemies . The solders are of two types (1) Madibulate soldiers termite defend with their strong mandible .(11)Nasute soldier which kill with poison from its

mouth

WORKER

I The workers sterile and blind

Ii They are wingless and white in colour

Iii They form the largest population of the colony

Iv They possess well developed mouth parts.

FUNCTION

- They build and repair the termitarium
- They provide food for other member of the colony e.g. large queen and soldier
- They look after the nymphs (baby termiter)
- They feed the nymph and the queen.

WEEK 6

EVOLUTION (History of Life)

The world is believed to have been occupied by millions of different plants and animals. These plant

are animal are adapted to different kind of habitats. There are two theories that support the history of life.

There are ; **divine creation and organic evolution**

The theory of divine creation states that every living things are created by God within six days.

I The theory of organic evolution believes that the first living organism is formed from certain molecules such as methane, ammonia, hydrogen and water vapour which combined under particular ultraviolet radiation from the sun and electrical lighting of the hot atmosphere to form the living thing about two billion years ago.

Organic evolution is therefore defined as a series of gradual changes which living organism had undergone in response to changes in environment since th beginning life.

Lamarck's theory of organic Evolution

Jean Baptist Lamarck, a French biologist was the first to put forward the theory of organic evolution in 1801. His idea of evolution was based on theories:

ii.**The theory of need**

This theory states that the development of a new part or organ by an organism (plant or animal) result from the need of part or organ to the organism .

For instance, the early ancestors of snake had short bodies and legs. As the land was charging during its formation, many narrow places and dense vegetation, were formed, for snake to walk through narrow places and dense vegetation , they started stretching their bodies to become elongated so that they could easily crawl through the vegetation instead of walking would be gather preferred.

The theory states that organ become well developed and achieve, become functionless or disappeared with disuse.

For instance , each generation of snakes continue to stretch their bodies resulting in the strengthening of their bodies . The become useless and strengthless and finally disappeared since they would hinder crawling through narrow places and dense vegetation.

iii Theory of acquired characterizes of inheritance .(structures) or variation acquired by organism during their life time are transmitted to the next generation by inheritance.

The modern giraffe believed to have evolved from a giraffe with short neck and short legs. When competition for low grasses among herbivorous animal become been , the short neck and short legged giraffe started to starch their neck legged giraffe started to stretch their neck and four legs so as to reach the leave of the trees.

The load and duck originally had no webs between their toes, but as they continue frequently visiting water food therefore the need to develop webs for swimming become a necessities.

DARWIN'S THEORY OF ORGANIC EVOLUTION BY NATURAL SELECTION

Charlie's Darwin , a British biologist in 1859 propounded a theory of organic devolution by natural selection leading to the origin of species. His theory of natural selection is as follows:

i-Overpopulation

All living organisms should be allowed to produce more offspring than can survive.

ii-Struggle for existence

Due to overpopulation of offspring, there is a constant competition for existence among offspring

iii-Offspring shows variation

No two individual are exactly the same .

ivAdaptive characteristics

Some of the offspring's are well adapted or fitted to survive the competition than others.

v-inheritance of adaptive characteristics.

The well adapted ones or the fittest will transmit such variation to their offspring's.

Those with poor adaptation will die off (extinct).

vi-Development of new species.

An accumulation of favourable variation will in a long time head a divergence (spread) from the original stock resulting in the formation of new species.

TYPES OF EVOLUTION

1-**Divergent Evolution** is that for which related species or their parts become different because of the availability of niches in the environment. For instance, the month part of insects, birds and limbs of vertebrate.

Ii- **Convergent Evolution** – is were unrelated parts if organisms are modified to look similar which arises because of a common need in the environment. Example, the need to fly caused the birds and bat to develop wings .Birds are aves while bat are mammals.

Modern theories of organic Evolution.

Theory of organic evolution as stated by Darwin has been modified. The modern

The modern theories of evolution are now based on genetics ecology cytology palaceotolgy, physiology , anatomy and embryology.

EVIDENCES OF EVOLUTION

Evolution any process are continuous but slow the evidences have been derived from several sources including.

i- CYTOLOGY

Biochemical similarities- The studies on the structure and function of cells have revealed that biochemical and fine structure of the cell of different organisms are very alike with respect to .

- Nucleic acids

- ATP and cytochrome

- Organelle like mitochondria

- Serological test - is the study of the test tube reactions between antigens and antibodies. Possible evolutionary relationship can be detected by comparing the blood proteins.

ii- **Serological test** has shown that human blood is much closer to that of the great apes like chimpanzees.

iii- **Physiology (molecular record)** The evolutionary relationship has been established from molecular records, based on the fact that hereditary information is stored by all organisms in nucleic acids mainly DNA.

iv- **Paleontology (fossil Record**).

Plants and animals that lived in the past have been studied from fossil record, fossils are generally preserved in sedimentary rocks which were formed by the deposition of silt ,sand or calcium carbonate over thousands or even million of years.

v-. Comparative anatomy

Many groups of organisms especially vertebrates show similarities in anatomical features.

- Pent dactyl limb
- Brain
- Heart
- V Embryos of many organism reassemble the embryo of their ancestor especially during the early stage of development the early human embryo for example has wee developed fail and a series of pouches (fold of skin) and slit making it look very much like an early embryo of rabbit.
- Vi **Evidence from vestigial organs**.

Vestigial organs are rudimentary or organs still found in animals and plant examples are

- Appendix in man which functionless in man but useful in herbivore ;
- Coccyx (caudal vertebrae)of man are together and reduced to small size has no specific function in man.
- Pyramidial nasi muscle of forehead and posterior auricular muscles of the ears
- Posterior auricular muscle is functionless in man but used by other mammals in moving the pinnae.

MUTATION THEORY OF EVOLUTION

Mutation is defined as a sudden changes in genetic make up (DNA) either in gene or chromosomes resulting in a new characteristic or trait that can be inherited . Mutation occurs during meiosis when the sperm and egg are being formed. When mutation occurs it will lead to production of offspring with marked difference in appearance from other member of the population of the species called a mutant.

Mutation provides raw materials for organic evolution through natural selection of new species.

TYPES OF MUTATION

i Gene point mutation are sudden changes in the structure of DNA (gene code) at a particular point or area.

Ii Chromosome mutation are caused either by breaking off or fragmentation of chromosomes during mutation.

CAUSES OF MUTATION

I X- rays

Ii Ultra – violet light

Iii Cosmic radiation

Iv Reassortment of gene

Forces responsible for evolution

(i)Mutation

(ii)Reassortment of gene

(iii)Recombination of gene

Questions

1A honey bee worker communicate with other on locating a source of food by (A) Dancing (b) stinging (c) instinct (d) flares.

2Which of the following insect or a social insect (a) Grasshopper (b) Honey bee (c) Butterfly (D) Housefly

Which disease is sex hinked and mainly affect the male offspring? (a) sickle cell anaemia (b) Haemophilia (c) Diabetes (d) Malaria.

4A sudden change in the structure of genes resulting to an abnormality in individual is called (a) polyplody (b) Diploidy (c) Mutation (d) Monoploidy.

5.Which of these is not likely to be found in the nucleotides of the Hetical structure of DNA (a) Guanine (b) Cytocine (c) Thymine (d) Uracil.

6.Which of the following is not an example of behavioural adaptation for protection (a) mimicry (b) feigning death (c) croaking (d) offensive smell (e) Camouflage.

7.The caste of termite that is blind, wingless and sterile is the (a) queen (b) king (c) workers (d) soldiers.

8.The theory that uses survival of the fittest and natural selection principles to explain evolution was propounded by (a) Charles Darwin (b) Isaac Morgan

(c) Yean Lamarck (d) Ugo de varies

9 Any change in an organ or characteristics an of an survive in a particular environment is (a) competition (b) evolution (c) succession (d) adaptation

10 A survey to determine blood groups was carried out on 250 people living in a community . The results are prepare represented in the table below.

Blood group percentage

A 8.0

B 14.0

AB 32.8

0 45.2

(a) Explain the term co –dominance

(b) Calculate the number of individual with co-dominant blood group.

(c) What is the total number of individuals in the table that are able to donate blood to an accident victim with blood group B?

(d) A whose blood is heterozygous A is married to a woman whose blood group is AB. With the aid of a genetic diagram, suggest the possible blood group of their children,