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Anthropology (Test code: AN02TS09-18) 4-19

Mobile no: 9899776680 Email: aniruddh981@gmail.com

Name of the Candidate ANIRUDDH YADAV CSE Admit card no

Place ORN Time 11:15 Test No. 4

Class room Distance Learning Date 06/07/2019

INDEX TABLE		
Q. No.	Maximum Marks	Marks Obtained
1	50	25
2	50	
3	50	29.5
4	50	30
5	50	29
6	50	
7	50	29
8	50	
9		
10		
11		
12		
13		
14		
15		
16		
17		
Total Marks Obtained		142.5

Signature of Examiner

INSTRUCTIONS

1. Do furnish the appropriate details in the answer sheet (viz., Name, Admit card no and Test Code).
2. There are **EIGHT** questions printed both in English and Hindi.
3. Candidates has to attempt **FIVE** questions in all.
4. Question No. **1** and **5** are compulsory and out of the remaining, **THREE** are to be attempted choosing at least ONE from each section.
5. The number of marks carried by a question/part is indicated against it.
6. Answers must be written in the medium authorized in the Admission Certificate, which must be stated clearly on the cover of this Question-cum-Answer Booklet in the space provided. No marks will be given for answers written in medium other than the authorized one.
7. Word limit in questions, wherever specified, should be adhered to.
8. Answers of questions shall be counted in chronological order.
9. Any page or portion left blank in the Question-cum-Answer Booklet must be clearly struck off.

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Feedback/Comments

P1-2 AE-1

Dear Aniruddh.

attempted well.

R

→ for fossil related ads evaluating significant points

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Anthropology Test Series -2018 **AN02TS09- 18**

Time allowed: ***Three*** *Hours* *Maximum Marks: 250*

Candidates has to attempt **FIVE** questions in all. Question No.**1** and **5** are compulsory and out of the remaining, **THREE** are to be attempted choosing at least ONE from each section. The number of marks carried by a question/part is indicated against it.

Word limit in questions, wherever specified, should be adhered to.

Attempts of questions shall be counted in chronological order. Unless struck off, attempt of a question shall be counted even if attempted partly. Any page or portion left blank in the answer book must be clearly stuck off.

This is Question-cum-Answer booklet, questions to be attempted in the provided space.

As I any prior definition too

SECTION - A

Q1. **Write notes on the following in about 150 words each** **10x5=50**

(a) Problems and prospects of Tribal development in North-East India 10

Adaptive Radiation

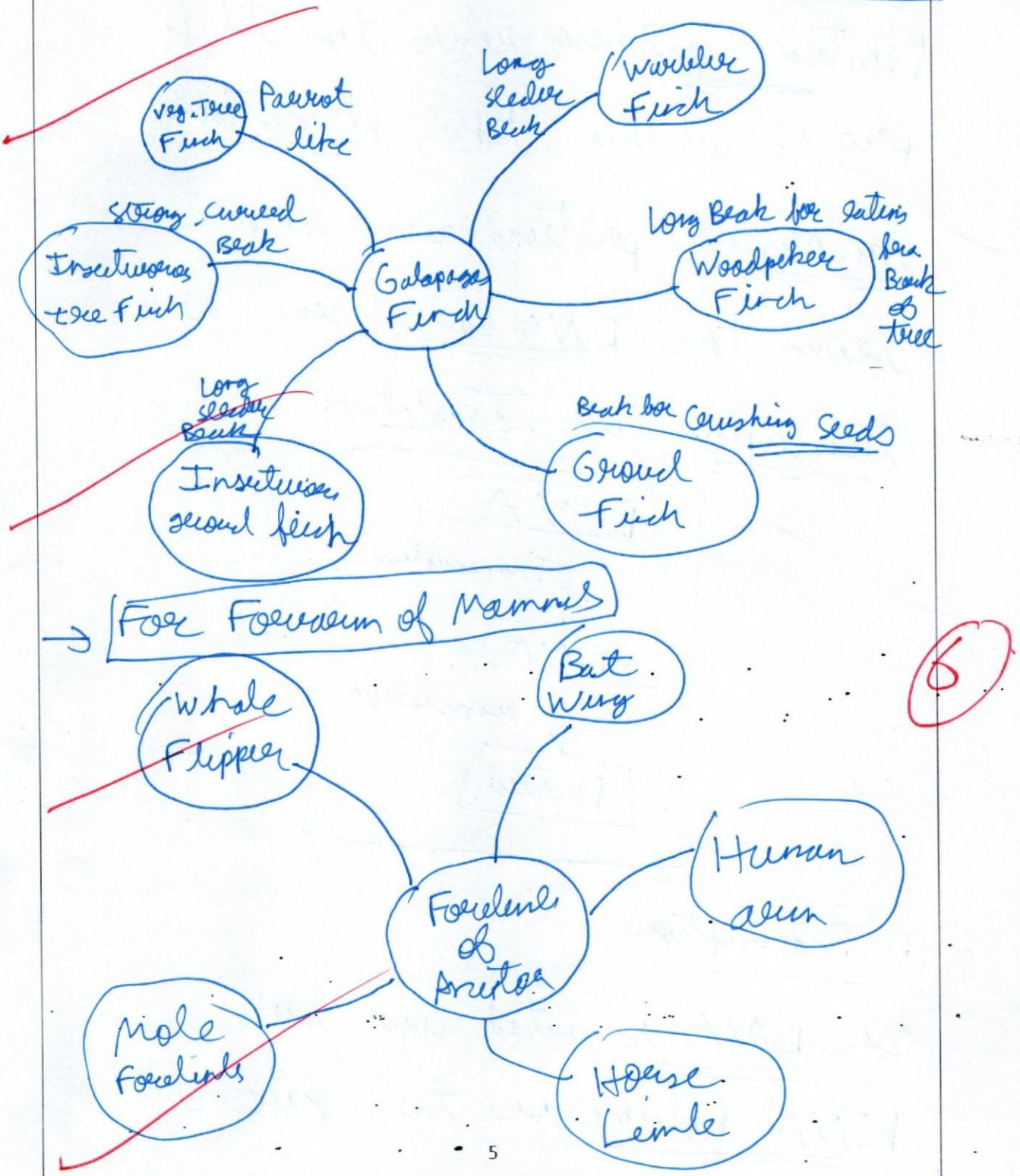
Adaptive radiation is the process of descendency from a common ancestor where evolutionary process gives multiple descents with varying phenotypes with respect to one or many traits.

Features

It occurs due to various reason

1. Increased competition in an area due to similar niche
2. Isolation and Speciation
3. Development of bush environmental pressures

Eg → C. Darwin studied the evolution of finches of Galapagos Islands and gave the following for Beak structure



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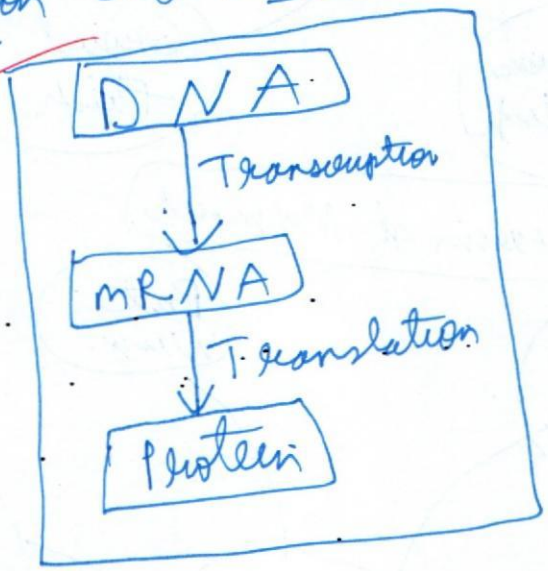
(b) Positive discrimination

10

Protein Synthesis

Protein Synthesis refers to the process wherein the phenotypic factors or proteins are formed from the DNA code (gene) via transcription and translation



① Transcription

The DNA is acted upon by RNA Polymerase to give an mRNA Transcript containing information

of Amino Acids in the form of codons

~~$ AUG~~ TAC AAA AAT $\xrightarrow[\text{Polymer}]{\text{RNA}}$ AUG UUU UUA

DNA mRNA

Translation

the mRNA transcript is then transported to the cytoplasm via the nucleus for translation uses the ribosome on tRNA adaptor complex

AUG UUU UUA Translation Met-Lys-Arg.

codons

This happens due to successive addition of Amino Acids via peptide Bond

Peptide Bond

$R_1-COOH + NH_2-R_2 \xrightarrow{-H_2O} R-CO-NH-R_2$

R_1: NH_2 R_2: $COOH$ R: NH_2 R_2: $COOH$

A.AI

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(c) Linguistic Anthropol Bio-genetic variability of Indian tribes 10

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Rhodesian Man

Rhodesian Man refers to a fossil of a skull found in Zambia representing a ~1.5 - 1 million year old fossil that is anachronistic with its appearance.

Features

① Modern Features

① Highly developed cranium with a cranial capacity of ~ 1200-1300cc

②

10 Revise

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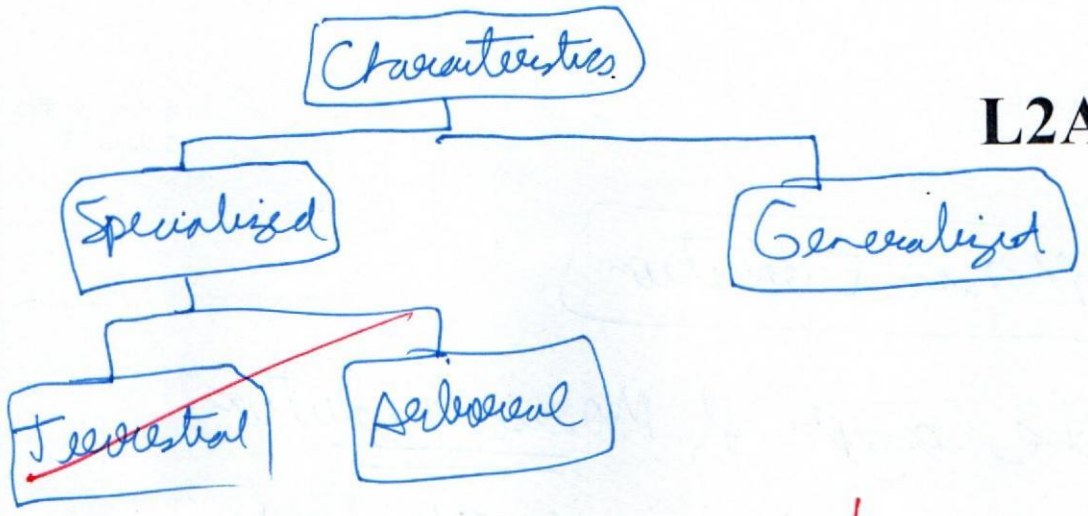
Primates

Definition

Mivart (1873) has defined primates as ungiculate, clavicular, placental mamals with at least 3 types of teeth at one point of life; well developed brain and forebrain; developed extremities with at least one pair of opposable digits; Hallux with developed nail or none; scrotum testes, penis pendulous, pectoral mammae.

Characteristics

Characters of primates can be of two types



General characters

1. Developed forelimbs of equilibrium
2. Ultrasonic
3. Development of opposable digits for grasping
4. Brain capacity developed due to larger cranium
5. Pentadactyl Manus
6. Scapula Sac-like

5½ + ½

(e) Starvation Deaths and PVTG's

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Mosaic Evolution

The concept of Mosaic evolution was proposed by Rutherford who said that evolution occurs in a gradual manner in an unsymmetrical and non-equitable manner.

Eg.

~~Aa~~ Evolution Form	Time (million yrs Ago)	Encephalization	Bipedalization
Homo Erectus	2 MYA	800-900cc	Biped
Homo Neanderthalensis	0.3	~1500cc	Biped erect
Homo Sapien	.04	~1400cc	Biped, Fully erect
Australopithecine	3-2 MYA	~600cc	Partially Biped
Homo Habilis	2-1.8 MYA	~700cc	Partial Biped

Thus from the temporal perspective the encephalization and bipedalization of man has resulted in an independent and seemingly unrelated manner however both have had a significant impact on the general and cultural evolution of man.

eg. High degree of encephalization made head bigger thus higher time of infant dependency, thus led to male-Female exclusive bond

Thus different traits show a mosaic pattern in evolution however all work in a manner to ensure overall evolution

6

Q2 (a) What is the concept of ethnicity? Provide explanations of Ethnic Violence between the Upper Caste Hindus and Scheduled Castes 20

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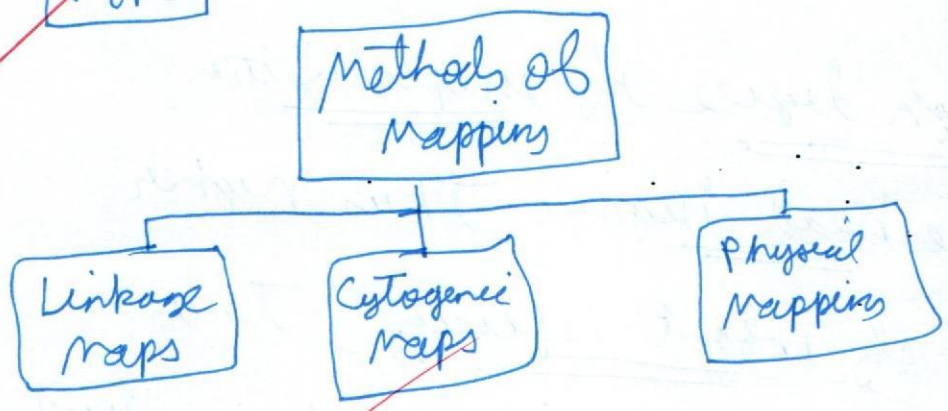
Gene mapping

Gene mapping refers to the process of linking genes to specific regions or loci on the genome as that provides an overall contextual map of gene placemut on chromsomes.

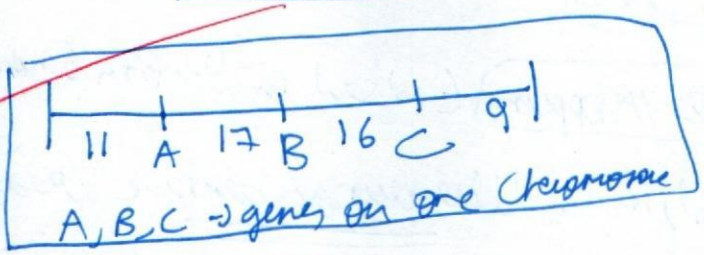
Types



① Linkage Mapping

It occurs when multiple genes on one chromsome are linked through hybrid experiments. Eg. A dihybrid

product is used here a double cross experiment or trihybrid for ~~three~~ ~~cross~~ quadruple cross experiment.



A, B, C → genes on one chromosome

(2) Cytogenic Maps

It is prepared by tracing location of specific genes on specific chromosome

(a) Hybridisation

Gene present on specific chromosome is amplified using hybridisation primers in a PCR to confirm Presence

(b) In Situ Hybridisation

Using a labelled probe to match on a particular gene to detect location on chromosome by FISH

(3) Physical Maps

(a) Restriction Mapping

Restriction Mapping involves using restriction enzymes to fragment DNA and consequently map specific genes to different loci

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(b) Contigious Mapping (Used in Human Genome Project)

→ It involves a library of genome created using restriction enzymes, consequent sequencing using shotgun sequencing, identifying and mapping genes based on contigious fragments.

Human Genome Study

The Human genome was first fully sequenced by the Human Genome Project under Dr. Craig Venter and the results were:

1. 3 Billion Base pairs of DNA
2. 99.99% DNA is common to all
3. Africa considered as the cradle of civilization

(4) 27000 - 32000 genes in humans
(5) 95% 'Junk DNA'
Thus the Human genome project

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(b) Write a note on the linguistic distribution of Indian Tribal population. 15

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provides us with a lot of information
base over genetic basis of life
and allowed us to study genes,
sequences etc.

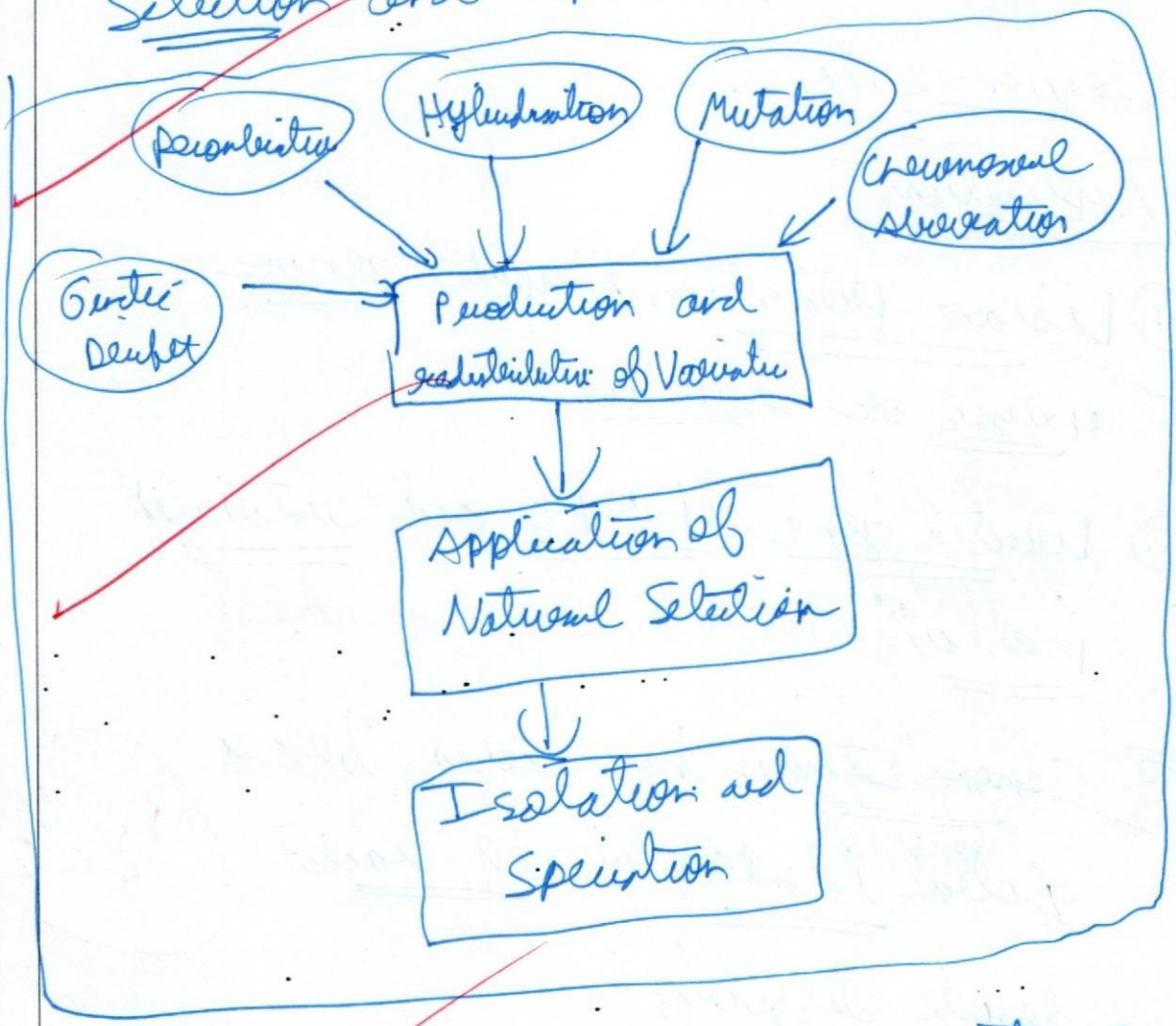
Applications

(1) Disease prediction through genome analysis or sequencing
(2) Directed gene therapy and customized medicine
(3) Genome Study has caused base a global identity of all races despite differences
(4) Use in Environment and Agriculture which uses gene information base better environment and better crops
(5) Forensic Anthropology (6) Paternity Analysis.

12½

Q2(b)

Evolution as described by the Synthetic theory of evolution is a combination of multiple processes of mutation, natural selection and speciation



Thus variation / mutation and natural selection can be understood as the twin drivers of evolution.

Effect of Mutation

Mutation refers to any spontaneous change in DNA and if genetic then heritable

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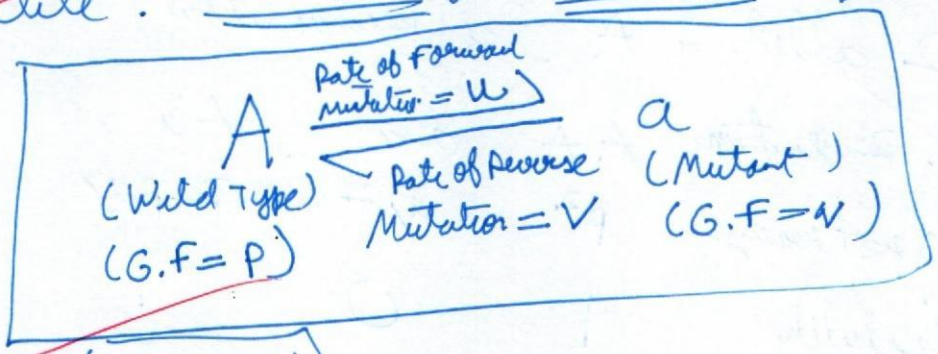
Mathematical proof of Mutative effect

Let 'A' and 'a' be 2 alleles in a population with 'a' as the mutant allele. Gene Frequency is p and q respectively



$\therefore p + q = 1$

Change of Gene frequency of population $\Rightarrow pv - vq = \Delta q$

In Hardy Weinberg Equilibrium; $\Delta q = 0$

$pv = vq$; $p + q = 1$

$\therefore p = \frac{v}{u+v}$ $\quad q = \frac{u}{u+v}$

Thus Mutation is affected by rate of mutation in a population only in process of evolution

Natural Selection

Refers to the process through which

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(c) Critically evaluate reservation polices for SCs and STs and to what extent they have led to social mobility among them. 15

a selection mechanism ensures viability of reproductive success in a given environment.

Eg: Natural Selection in a recessive lethal allele

Initial population ⇒ ~~A~~ P

↳ 2 alleles ⇒ A , a (Recessive lethal)

∴ 2 genotype AA , aa , Aa

Gene frequency p^2 q^2 $2pq$

Viability 1 0 1

Thus ⇒ the total population $= (p^2 \times 1) + (2pq \times 1) + (q^2 \times 0)$

$= p^2 + 2pq$

$= p(p + 2q)$

$= p(1 + q)$

also all dynamic equilibrium between MS N.S.

8½ Change in gene frequency of 'a' $\Rightarrow \Delta q = q - \frac{1}{2} \times \frac{2pq}{p(1+q)}$

$$\Delta q = \frac{q^2}{1+q}$$

∴ Natural Selection is inefficient in weeding out recessive lethal alleles which depends on initial gene frequency only

Q2 (c)

Genetic load

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Genetic load refers to the relative decrease in fitness of a population due to deviation of the genetic basis from the ideal optimum genetic situation.

Defined by any Muller etc.

L → Genetic Load
I → Ideal / optimum
W → Fitness of population

$$L = I - W$$

Significance of Genetic load

(1) It signifies as deviation from the ideal / optimum genetic fitness of the population which represents a 'load'

(2) It signifies a sort of 'genetic death' of individuals due to reduced fitness of individuals which consequently causes a reduced reproductive success rate

Types of Load

(1) **Mutational Load**

It refers to the decrease in fitness due to mutations in population

↳ (a) Silent Mutation → No effect on Load

(b) Missense Mutation → Slight effect on Load

(c) Nonsense Mutation → Significant effect on load
Frame shift

(2) **Fixation Load** or Gametic Load

Some situation do not allow the gamete to form viable

or survivability progeny thus leads to death eg Trisomy of Chromosome 1

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Q3. (a) Discuss the religious conversions in Tribal India with suitable examples. 15

Factors that affect load

1. **Mutation** : Rate of Mutation will affect genetic load
2. **Migration** : Inflow of population with different genetic frequency will affect the load
3. **Selection** : Varying amounts of selection due to changed environment

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Limitations

1. Excess 'genetic load' causes extinction
2. It is not necessarily a negative phenomenon as it only signifies fitness with reference to a particular environment

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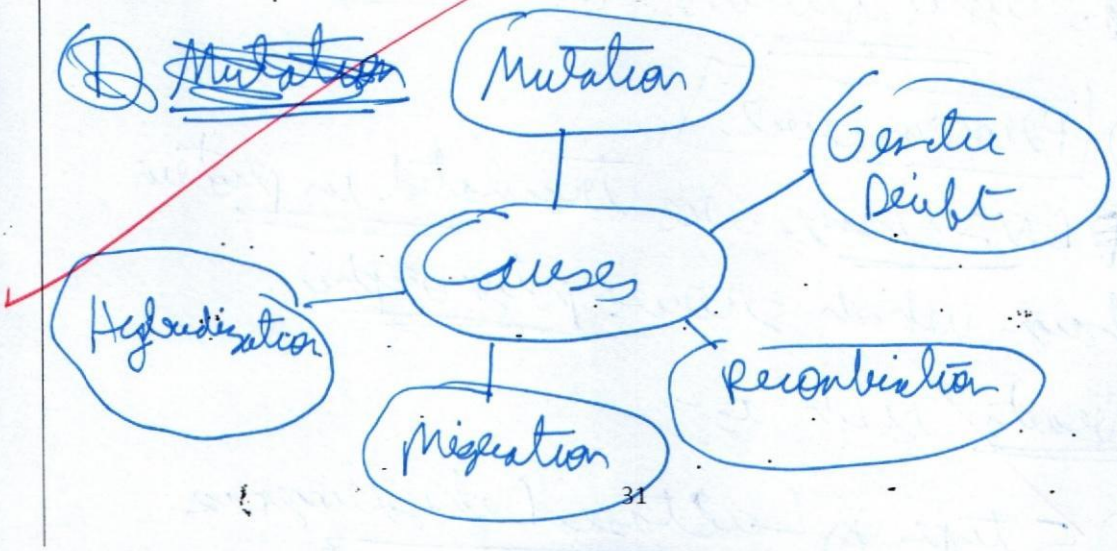
Q4a

Definition

Genetic Polymorphism refers to the occurrence of two or more distinct forms of alleles such that the rarest of them cannot be maintained by mutation alone.

It is only considered a polymorphism if it occurs in more than 1% of the population.

Cause of Genetic Polymorphism



Types of Genetic Polymorphism Seen

① Cell Surface level

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~~Q4. (a) Give a historical analysis of forestry in British and Post-British India.~~ 20

(a) A, B, O, AB antigens are coded for by Transferase on chromosome 9 (RBC)

(b) Rh Factor gene → chromosome 1 (RBC)

(c) HLA antigen (WBC)

Thus various polymorphic forms of antigen present on cell surface

② DNA Level

All change have underlying effect from DNA, thus there must be a genetic change.

Eg. Cystic fibrosis, Huntington Disease

③ Protein level

DNA change are translated in protein change which shows polymorphic traits such as:

① 5 types of Lactose Dehydrogenase

② Different types of Hemoglobin

such as Cheapskate, Hitkaro etc

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(4) Chromosome level

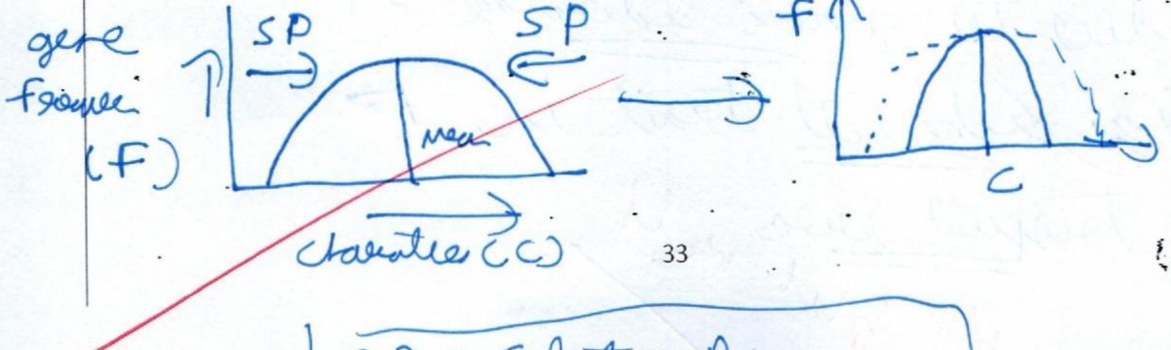
Polymorphic forms of Chromosome represent disease often eg trisomy of 21 (Down's syndrome); structural aberration (Angelmann syndrome) etc.

Evolutionary Forces

(1) Permanent Polymorphism and Stabilizing Selection

Extreme polymorphism are removed by selection which prefers the mean form

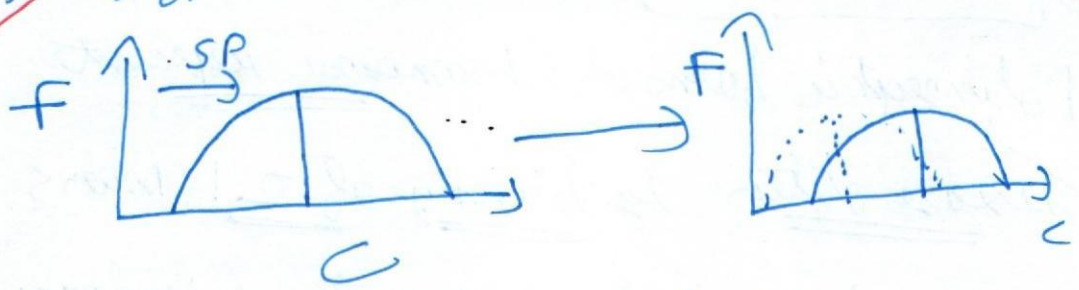
eg. Intersex cannot reproduce thus 2 genders maintained



SP → Selection Pressure

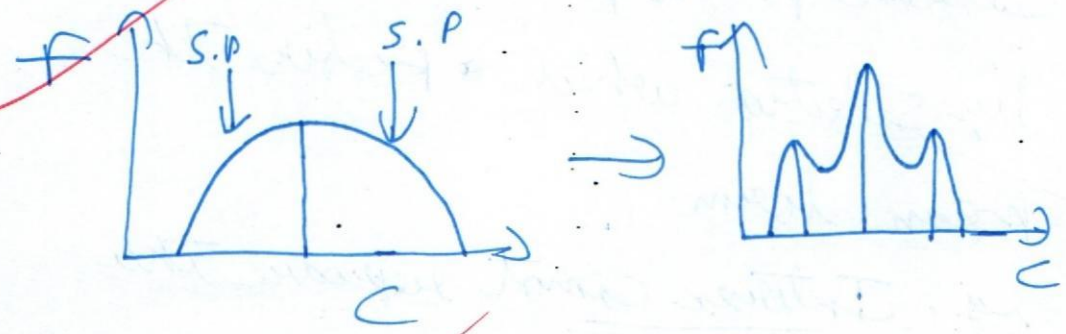
(2) Transient Polymorphism and Directional Flow

One Extreme beam is favoured due to type of environment



eg Blood group B in general population

(3) Stable polymorphism and Heterozygous advantage



It prefers heterozygous individuals due to genetic advantage.

eg. Sickle cell trait in tropical areas adapted well

13

(b) Critically examine the Development Induced to Displacement of Tribals 15

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Natural selection

Natural selection refers to the set of processes that determine evolutionary change in a population by ensuring maximum genetic viability is chosen and reproductive success is guaranteed in the population

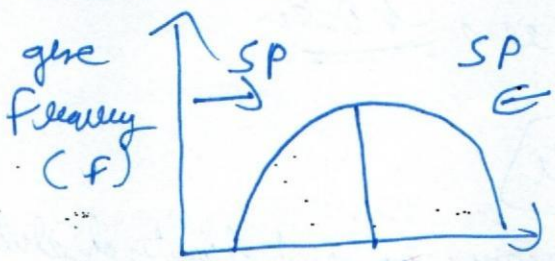
say the mechanism for

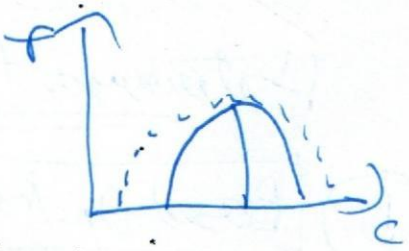
Types of Selection

Pre-requisites of selection

(A) BASED on effect

(1) Stabilizing Selection

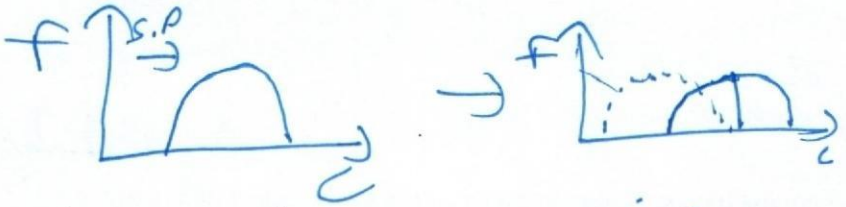




SP → Selection Pressure

eg. Intersex individuals are selected against to stabilise genders the 2 in human

② Directional Selection

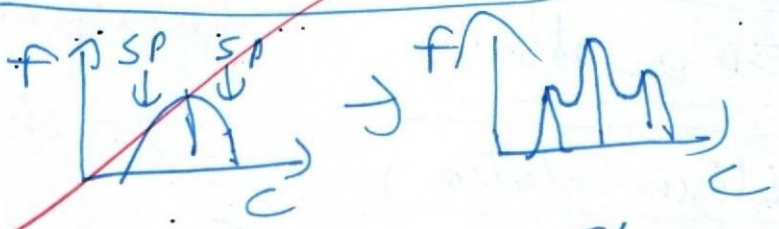


Selection flows to one direction
eg Selection of B blood group in
particular Oriental population.

③ Destabilizing Selection

Intermediate form is not chosen
eg Asian Swallow Tail Butterfly only
survive if it mimics predator

④ Heterozygous Selection



Heterozygous form are chosen

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⑤ Based On Magnitude

Depends on Kin, frequency and density of Selective traits.

⑥ Based on Ecological Traits

ⓐ R-Selection → Large population, High resource, favours low variability and high population

ⓑ K-Selection → Small population, Scare resource, favour individuals

(c) Write note on Regionalism and demand for autonomy among the tribal communities 15

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Hardy Weinberg Law

According to the Hardy Weinberg law "In a Mendelian population the gene frequency and genotype frequency remain constat over generations if there is no ebbut of mutation, migration or selection."

This situation is refereed to as Hardy Weinberg Equilibrium wherein gene Frequency and genotype frequency are Constant.

Conditions for Equilibrium

1. Large population with random Mating
2. No Mutation is operational
3. No Selection is operational
4. No Migration or Closed Population

Proof

Assume 2 Genotypes AA, aa with gene freqencies p and q. In the next generation we get Aa; thus

	A (p)	a (q)
A (p)	AA (p^2)	Aa (pq)
a (q)	Aa (pq)	aa (q^2)

Genotypes → AA (p^2), Aa (2pq), aa (q^2)

Thus Hardy Weinberg gave the equation

$$p^2 + 2pq + q^2 = (p+q)^2$$

Gene freqency → A → $p^2 + pq = p(p+q)$

$= p$

as $p+q=1$

→ a → $q^2 + pq \Rightarrow q(p+q) = q$

Thus gene freqency and genotype freqency remain conserved over generation.

Limitation of Hardy Weinberg

(1) Purely theoretical concept due to assumption of infinitely

large population, no Mutation and no Selection

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(2) There is no way to ~~be~~ obtain the absence of genotypic mutation unless phenotypic character is affected

(3) Selection is based on the environment which is dynamic thus cannot be stopped

(4) Only valid for ideal experiments in controlled population

8½

Significance of Hardy Weinberg

(1) Reflects a conservative force that is to be overcome to ensure evolution.

(2) Reflects the stable nature of Selection ~~be~~ which operates only when required

(3) It explains heterozygous advantage

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SECTION – B

Q5. **Write notes on the following in about 150 words each** 10x5=50

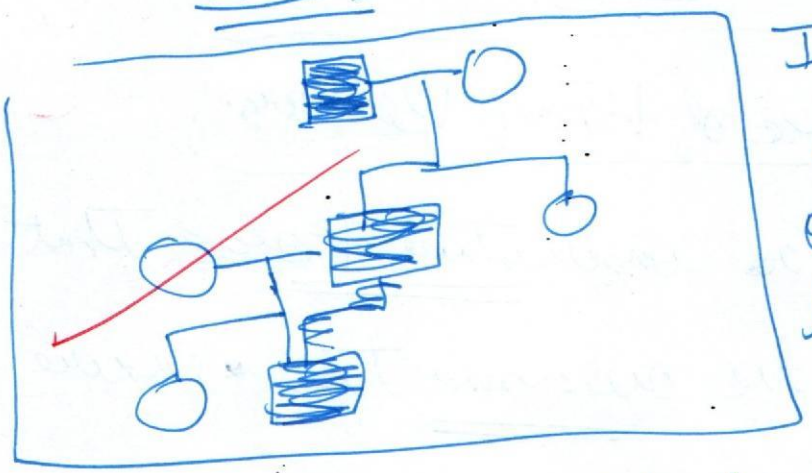
(a) Meaning of Ethnic Identity in the contemporary world 10

Sex linked Characters

Characters that are linked to the Sex Chromosone →

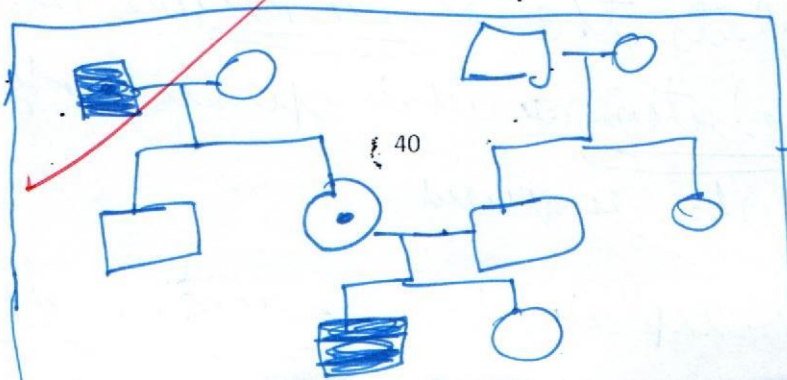
Male → XY
Female → XX

eg. Hairy ears in ~~Man~~ Men is a Y linked



It only affects men of the same line and all generations

eg. Hemophilia (X linked Recessive)

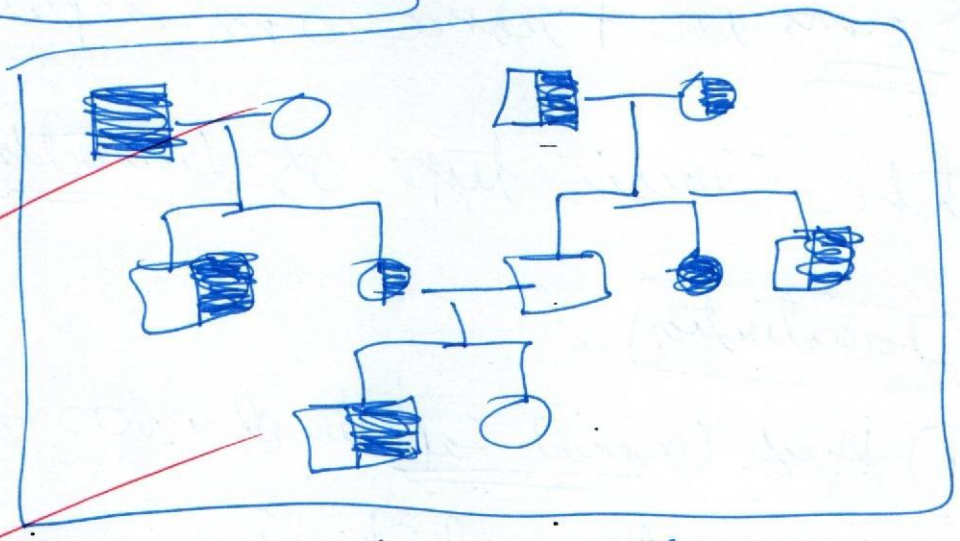


Affects male more due to Heterozygous

Sex limited Characters

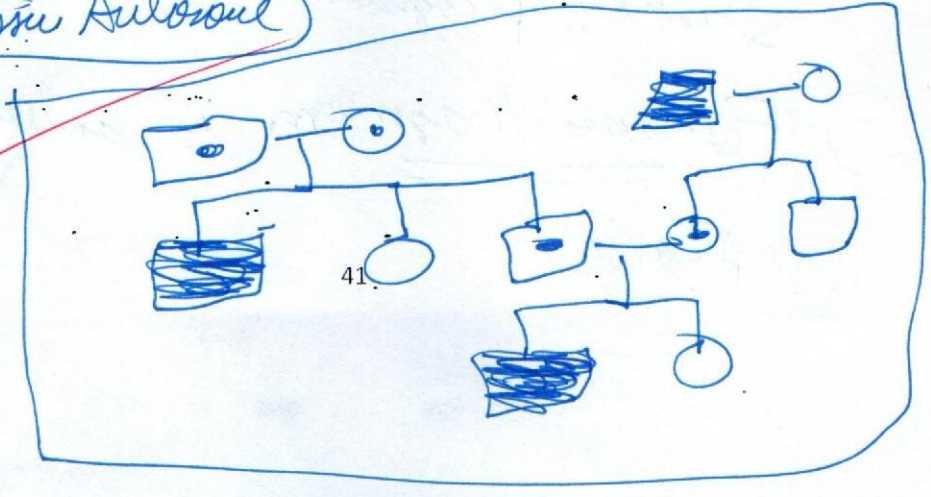
Characters that are inherited independent of the sex chromosomes and are thus autosomal in nature

Dominant Autosomal



It affects all genders equally due to autosomal nature and heterozygosity in enough bar expression (6)

Recessive Autosomal



(b) Denotified tribes 10

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La Chapelle Aux Saints is a fossil of Homo Neanderthalensis discovered in La Chapelle Aux Saints in France and depicts the 'Classic' type of Neanderthal.

Characteristics

(1) High Cranial Capacity of ~1600 cc

(2) Rough nature of Skull

(3) Broad face and jaw

(4) Paraleolic dentition with slightly prognathic features

(5) Foramen Magnum is anteriorly placed

(6) Developed Neanderthal Aspect

(7) Very Stout and Broad

(8) The Face structure is not completely human like

The Chapell Aux Saints also had technology

Cultural Features

(1) Clothes → Bone Needles Found

(2) Tools → Sophisticated Mousterian tools

(3) Bear Cult → Decorated Bear skulls found

(4) Cave Habitation

6

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Genetic Counselling refers to the process of determining the actual or potential genetic status of a person and informing them of the possible ramifications of their genetic predispositions

Method

Screening
↓
Risk Analysis
↓
Management of Issue

① Screening → Invoke DNA sequencing, RFLP, VNTR, etc to screen for possible

diseases.

In case of pregnant mother CVC or amniocensis is done

② Risk Analysis

Polygenic traits are harder to analyse but monogenic diseases such as thalassemia, Sickle cell anemia etc. can be detected

③ Management

① Gene Therapy
- ↳ Embryo Therapy
- ↳ Gene silencing using SiRNA

② Hormonal Therapy

③ Environmental pressures awareness eg. Reduced stress for Hypertensive patient

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(d) Underemployment among tribal communities 10

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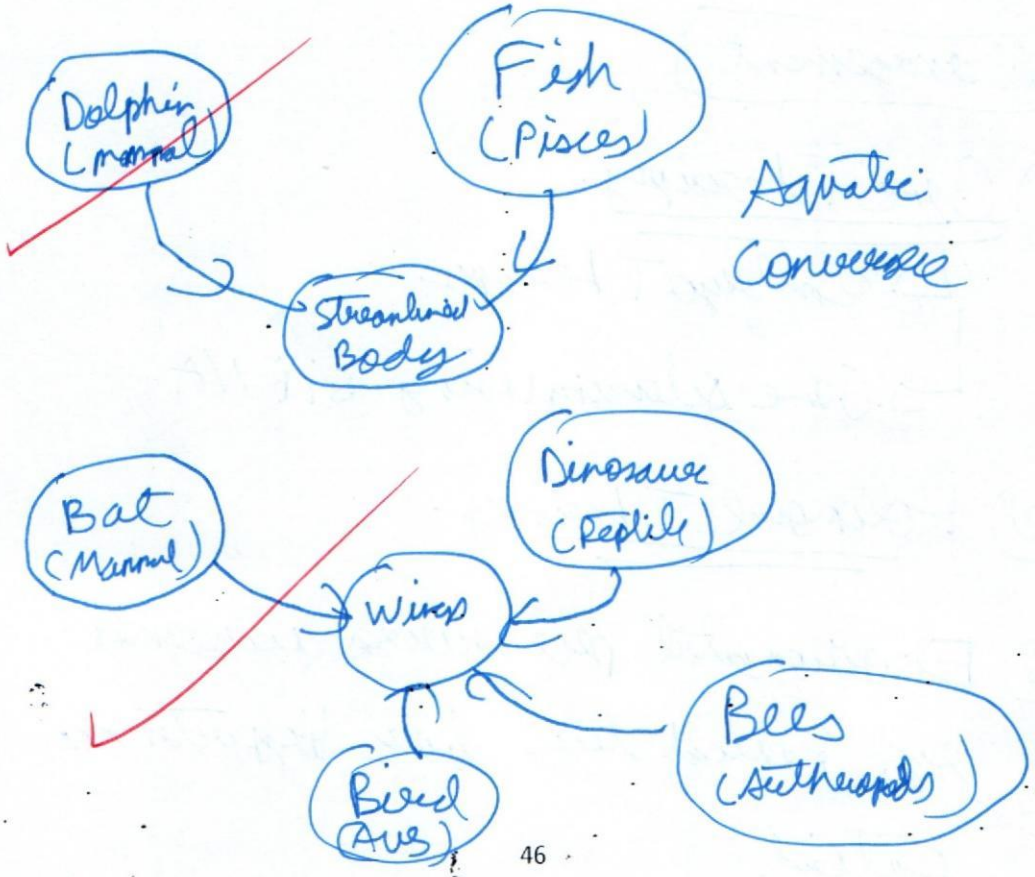
Convergent evolution

It refers to the convergence of evolutionary features due to similar need but does not show similar structure and only similar function.



Divergent Evolution

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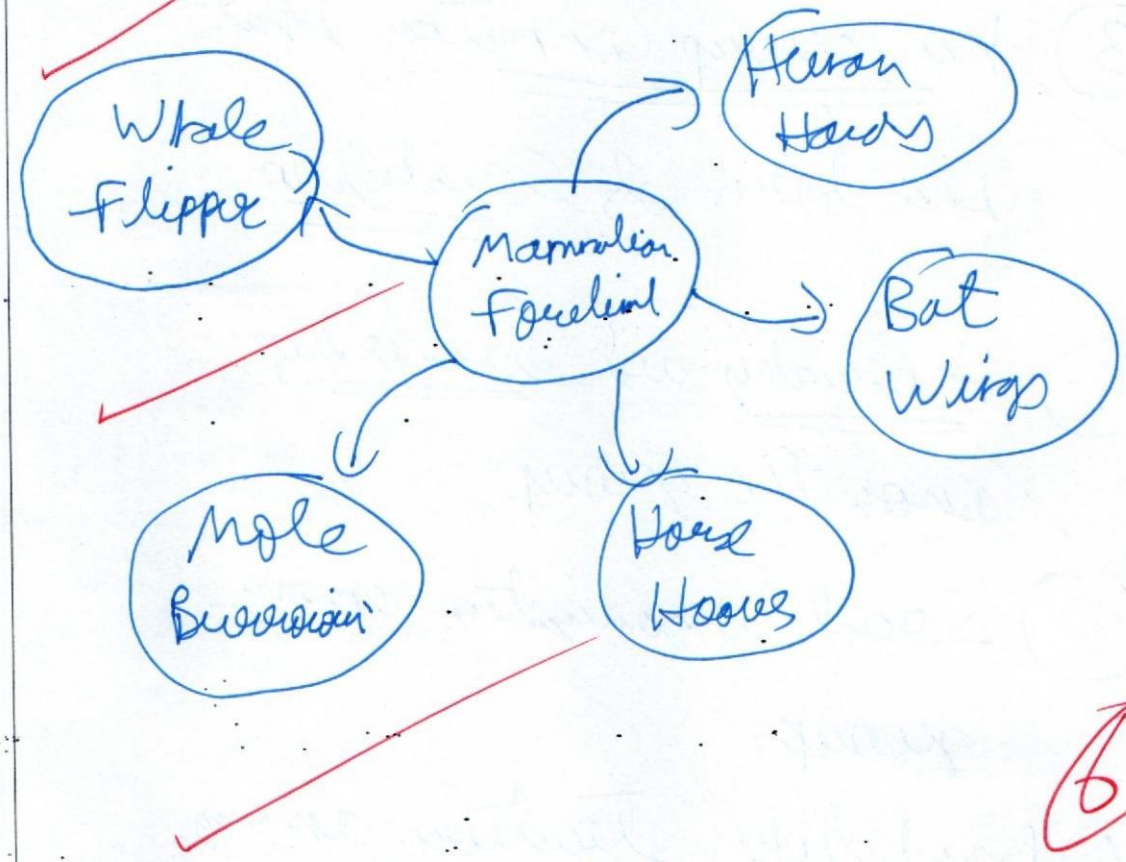
It refers to divergence of evolutionary traits or function that were once shared by the descendants' common ancestor

They show similar ~~function~~ structure but not function.



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add determinants too

B. Size
Dom R
Dist F

(e) *Relevance of Tribal Panchsheel in the light of emerging development practices* 10

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Primate Social Behaviour

availability of resources predation etc

(1) Formation of social groups

(2) Forms of communication
- Olfactory (smell)
- Auditory (chest beatings, grunting)

(3) Kin group formation that is a form of socialization

(4) Hierarchy and leadership among the group

(5) Social organization among groups

(6) Band like structure among gorillas.

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Q 8 (a)

Molecular Basis of 3 inherited disease

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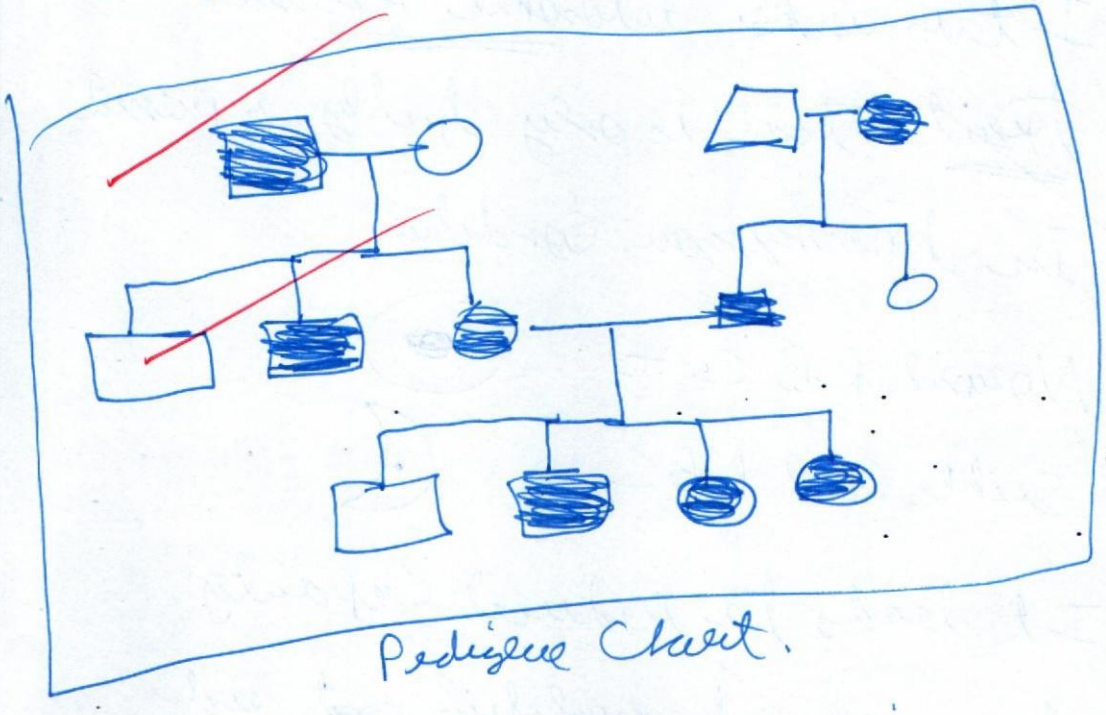
(1) Huntington's Disorder / Disease

It is an autosomal dominant disease which results in ~~an~~ some lethal condition. It can be passed on from both mother or father



Pedigree Chart.

This is caused by one single genetic polymorphism of DNA and thus can be cured by gene editing / therapy. Easily

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Q8. (a) Discuss the socio-cultural, economic, and psychological constraints responsible for low literacy in tribal areas. Give your suggestions 15

diagnosis is possible with pre natal amniosis sample or Chorionic Villi sampling.

② Sickle Cell Anemia

→ It is an autosomal recessive trait that is only fully expressed in homozygous condition

→ Normal RBC → 

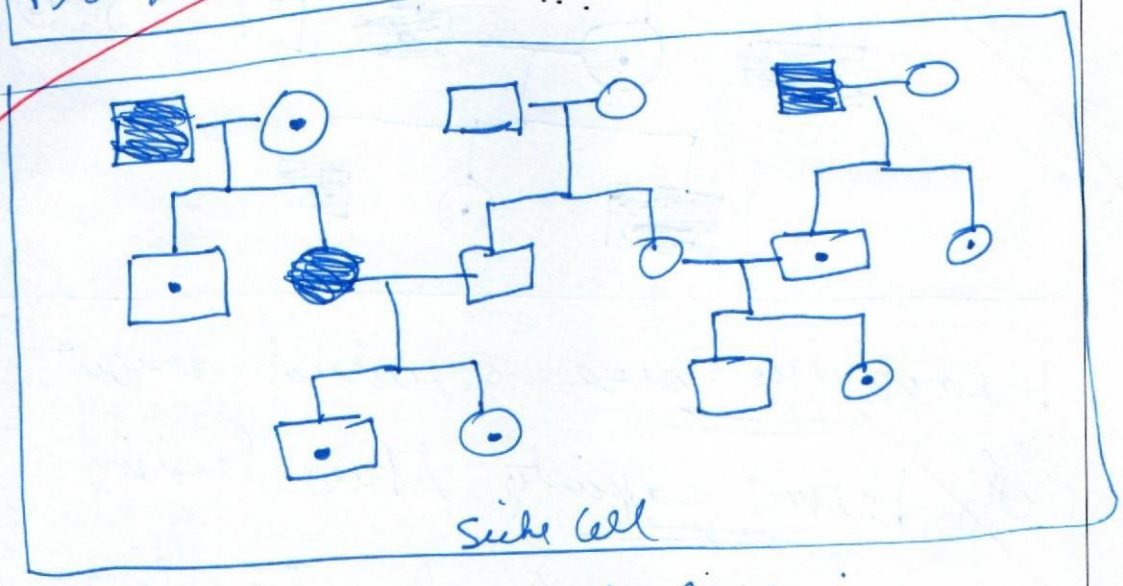
Sickle Cell RBC → 

→ It leads to reduced capacity to carry hemoglobin and thus causing tiredness and lack of health

→ It is caused by single polymorphism on the gene coding for

the β Chain of Hemoglobin on Chromosome 9.

→ Pedigree Chart



→ It is hard to see beneficial in tropical areas due to reduced risk of Malaria

(3) Hemophilia

→ It is a Sex linked ~~Dominant~~ recessive trait on X Chromosome

→ As Male is Hemizygous for X Chromosome he is affected more often

Pedigree Chart

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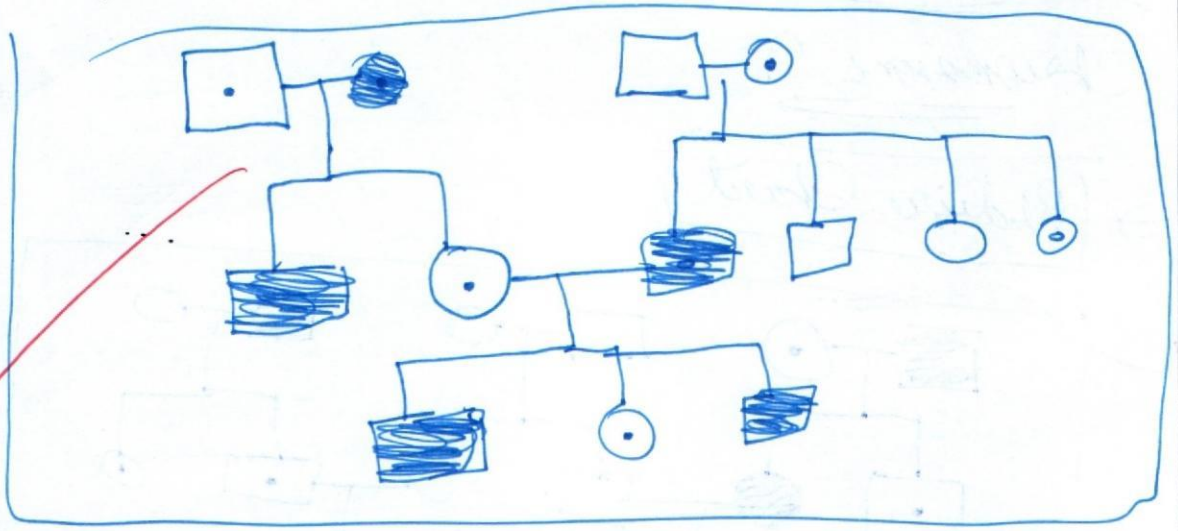

Hemophilia Causes a reduced amount of Heme capacity thus leading to anemic conditions due to decreased capacity to carry blood.

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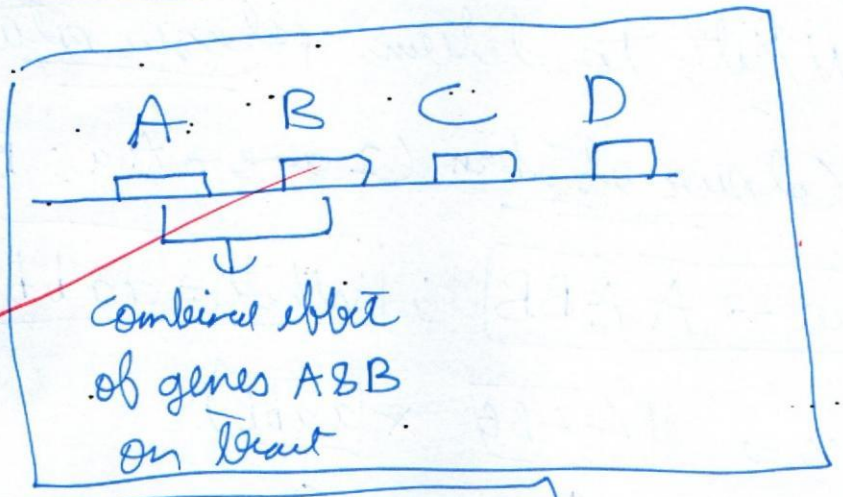
(b) Critically analyze the impact of development programmes and welfare measures on tribals and weaker sections. 20

Polygenic Inheritance

Polygenic inheritance refers to the mechanisms of inheritance of certain quantitative traits that are continuous in nature and thus are not affected by one single gene loci but multiple gene loci.



Multifactor Hypothesis

R H Fisher gave the hypothesis which states that certain

Continuous traits such as height, intelligence etc are effected by multiple genetic factors and thus do not follow mendelian pattern of inheritance with respect of traits inheritance.

Davenport's Experiment

Davenport used or cross breeding observation experiment between Negros and Whites to determine polygenic nature of Colour of Skin (2 gene → A, a ; Bb)

Negro → AABB ; White → aabb

F1 cross → AABB × aabb

AB × ab

F1 Genotype → AaBb

F1 Phenotype → Mullatos

F_2 Cross AaBb × AaBb

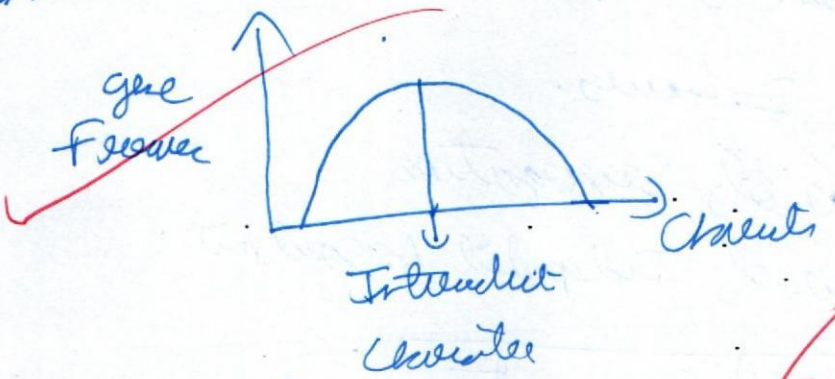
↓Female / →Male	AB	Ab	aB	ab
AB	AABB	AABb	AaBB	AaBb
Ab	AABb	AAbb	AaBb	Aabb
aB	AaBB	AabB	aaBB	aaBb
ab	AaBb	Aabb	aaBb	aabb

∴ Genotypic Ratio → 1 : 4 : 6 : 4 : 1

Coat Black : Dark : Mulattos : Light : White

∴ Emergent Characters

Distribution of Polygenic traits



Effects in Man

1. Continuous traits → Height, intelligence etc.
2. Threshold effect → Colour of eyes
3. Pleiotropic effect
4. Co Dominance
5. Incomplete Dominance

Mendelian Genetics refers to the branch dealing with inheritance of monogenic traits that follow the mendelian pattern of inheritance

Mendelian Pattern of inheritance

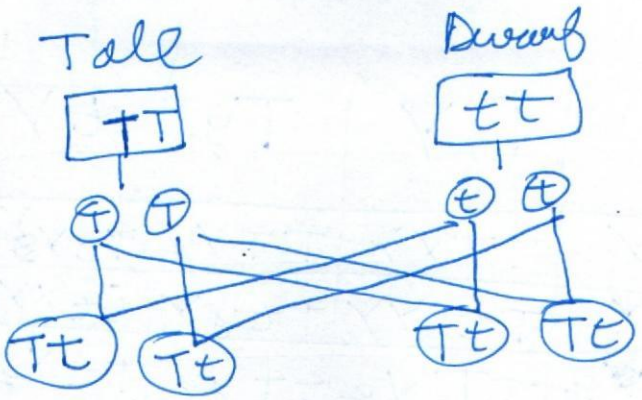
Mendel's experiments with pisum sativum were based on 7 characters and thus he gave 2 laws.

① Law of Segregation
② Law of Independent Assortment

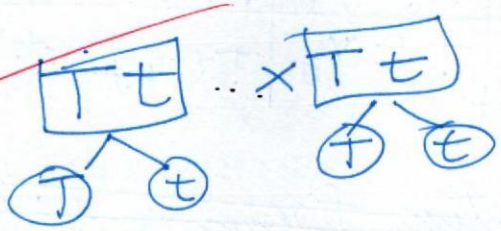
① Law of Segregation

Each trait or character is determined by a pair of alleles that are inherited independently and during gametic process are segregated separately.

i.e. F1 generation



F_2



	T	t
T	TT	Tt
t	Tt	tt

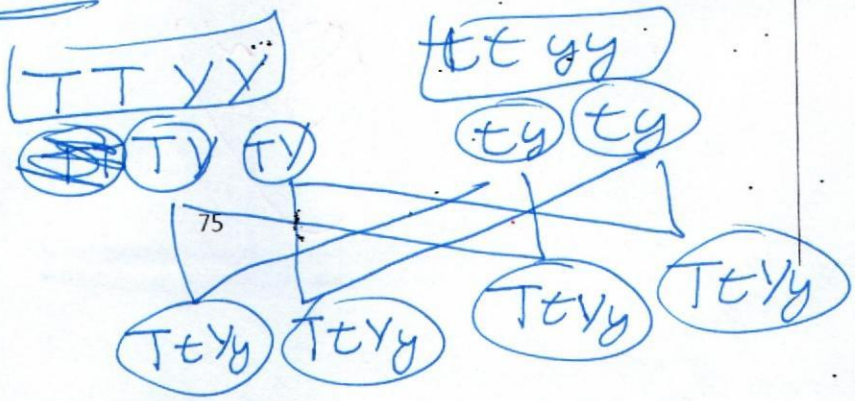
∴ there is segregation of gametes

② Law of Independent Assortment

Multiple factor inheritance occurs in an manner independent from the inheritance of a separate factor or trait..

i.e. 2 traits are inherited independently of each other.

by F_1



F2	TY	Ty	tY	ty
TY	TTYY	TTYy	TtYY	TtYy
tY	TtYY	Ttyy	ttYY	ttYy
Ty	TTYy	Tyyy	TtYy	tTyy
ty	TtYy	Ttyy	ttVy	ttyy

~~∴ genotype freq → 1 : 3 : 6 : 3 : 1~~

∴ Phenotype freq → 1 : 3 : 9 : 3 : 1

Mendelian Inheritance in Man

1. A, B, O Blood group
2. Genetic disease such as Huntington's disease
3. Sex linked diseases such as Hemophilia etc
4. Achoo syndrome

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