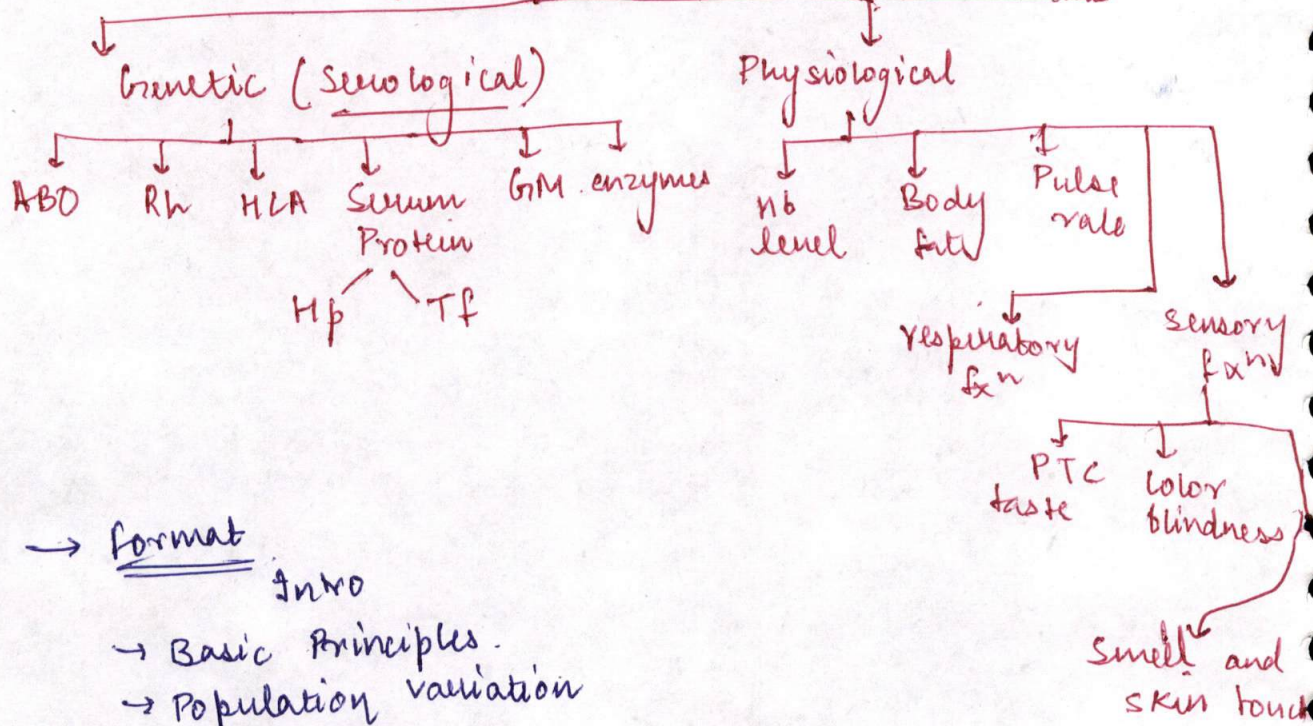


Genetic Markers



→ Format

Intro

- Basic Principles.
- Population variation
- Significance conclusion.

Unit-9.6

Q.1 what are genetic markers? why blood group is considered as good genetic marker?

• Intro :- Genetic marker is a gene or DNA sequence whose chromosomal location is known and can be used for the identification of an individual or species.

→ Example :- Blood groups (ABO & Rh); HLA; GM factor, Hb level, pulse rate etc.

• Genetic markers in blood. enzymes, serum proteins

1) Blood cells

1.1) Red cell antigens :
→ ABO system
→ Rh "
→ MNS "

1.2) Haemoglobin

1.3) G-6-PD enzyme

2) Plasma :- Haptoglobin, Albumin, Globulin, GM factor, blood enzymes etc.

• ABO Blood : Reason for using blood as genetic marker

1) It is easily obtained

2) It can be easily transported throughout the body.

3) There are a wide range of markers to identify an individual.

4) It follows Mendelian laws.

5) Not altered by environment; thus stable freq.

6) Arose very early in man's evolution.

↳ e.g. Rh from Rhesus monkey.

7) Discrete trait; no scope of ambiguity.

• ABO Blood grouping

→ Discovered by Landsteiner in 1900-02.

mode of inheritance
established in
1924 by
Bernstein

→ Antigens :- These are present on RBC surface and facilitates in formation of antibody.

↳ 3 types of alleles :- I^A, I^B, I^O .

→ This results in 6 genotypes and 4 phenotypes.

Genotype	Phenotype	Antigen	Antibody
$I^A I^A / I^A I^O$	A group	A	Anti-B
$I^B I^B / I^B I^O$	B "	B	" - A
$I^A I^B$	AB "	A & B	No antibody
$I^O I^O$	O "	No antigen	Anti-A & Anti-B

↳ Distribution of ABO :- As per Mc Arthur & Penrose.

1) O (32%) :- most widely distributed; common among American Indians, Eskimos.

2) A (21.5%) :- More common as one moves towards west. Eg:- Europe, USA, Australian aboriginals.

South Am. tribes.

3) B (16%) :- More common in the eastern part. Eg:- South Asia, Central Asia etc.

✓ Significance of ABO blood grouping



1) Used in racial classification.

2) Helps in tracing migration patterns and distribution of various sub-population.

3) Resistance against diseases.

↳ B provides resistance against tropical diseases.

4) some blood groups are more prone

 O
 A
 B

to certain diseases. Eg: → A - diabetes
↳ AB, B - heart diseases

↳ Hence, appropriate measures could be taken.

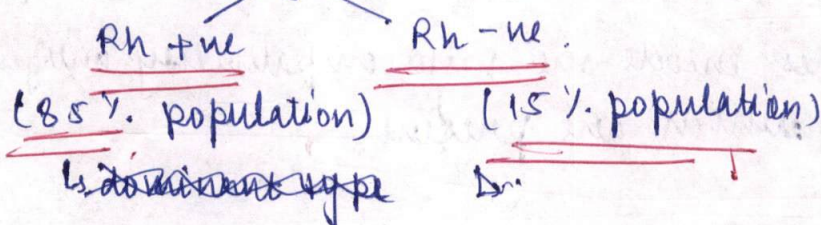
5) ABO compatibility & blood transfusion.

6) Paternity determination. / criminal forensics.

Q.2 Rh blood grouping (1940).

• Landsteiner & Weiner, first discovered the Rh system in rhesus monkey & then in humans, hence the name.

↳ There are multiple alleles defining the Rh system. However, population can broadly be classified into 2 groups.



Reasons why we use it

--- same as Q.1 ---

Distribution

1) Rh -ve very rare among Mongoloids (0.5-1.5%).

2) " comparatively present at higher rate in caucasoids (15%).

3) Negroes - in b/w (5-8%). ; R₀ exclusively of African origin; found in 70% African

Significance

①, ⑤ & ⑥ from Q.1 ---

→ Rh incompatibility :- embryoblastosis fetalis

Q.3 HLA - Hp :- Human Leukocyte Antigen - Histo compatibility.

• HLA-system is closely associated with organ transplantation. Histo compatibility antigens are a part of HLA system. No two persons except MZ twins will have completely identical HLA-system. & immune system of the body. Body identifies ~~it~~ cells as its own or foreign based on HLA system.

→ Location of HLA genes.

→ These ^{antigens} are present not only on leucocytes, but also other tissues.

① The HLA genes are located on short arm of chromosome 6. :- A, B, C, D & DR.

→ Each individual differs in their immune system functioning due to difference in genes at this locus.

② These genes encode the histo compatibility antigens or HLA which are present.

→ HLA-system & graft acceptance / rejection

1) Before organ transplantation, individuals are tested for their histo compatibility.

2) It is highly unlikely two unrelated individuals would be compatible.

3) In such a case, the antibodies produced by the HLA system will eliminate the foreign cells & the graft would be rejected.

4) However, in case of MZ twins & close relatives, rate of graft acceptance is high because they have greater similarity at locus.

system

• Distribution of HLA-genes & alleles in population. / Population Variation

- 1) A2 allele :- high freq. in all
- 2) A1 " :- present in all; but high frequency among Africans.
- 3) BW42 :- confined to only Africans.

• Significance

- 1) Used as genetic marker for racial classification & identification of individuals.
- 2) Organ transplantation.
- 3) Auto-immunity :- Certain HLA antigens are associated with some diseases like autoimmune type 1 diabetes.
↳ Thus, helps in early diagnosis.
- 4) Evolutionary significance :- said to be inherited from neanderthals; thus pointing towards hybridisation b/w Neanderthals & sapiens.

Q.4 Haptoglobin / Hp. / Serum Proteins (α globulin).

- Intro :- It is a serum protein which is concerned with transport of free haemoglobin to liver. The haem is broken down here to produce bile salt & biliverdin.

Thus, it binds the free haemoglobin & prevents loss of iron.

→ Genetics of haptoglobin

- ↳ Haptoglobin is determined by two alleles - Hp1 & Hp2.

↳ Genotype

① Hp1 Hp1

② Hp2 Hp2

Phenotype band (on electrophoresis)

band 1-1; single strong band

band 2-2; series of slowly moving bands.

3) Hp^1/Hp^2

band 2-1; characteristics of both Hp^1 & Hp^2 .

→ Reasons why we choose this

--- same as Q.1 ---

→ Population Distribution

1) Hp^1 distribution

↳ Western Europe - 40%.

↳ Tropical Africa - higher at 60%.

↳ Some African population (20-30%) show no haptoglobins.

↳ Asia (India, China) - low freq of 10-20%.

Hp^2 found throughout the world relatively equally - suggests its presence in early human ancestors.

• Significance

1) Racial classification

2) Migration pattern :- its freq. rises from

India to N. Am through Siberia

as well as from India to Western Europe.

rise of

3) ~~used~~ early diagnosis of infection & inflammatory diseases.
~~is~~ as its rise concentration is associated with that.

→ Helps in paternity dispute settlements to a certain degree.

Q.5 Transferrin

(β -globulin)

• Antib :- Serum protein; involved in

transporting iron from sites of red cell destruction & from intestine to bone marrow, where haemoglobin is synthesised.

→ Each Tf molecule can bind to 2 iron atoms.

→ 20 variants have been distinguished based on electrophoretic mobility.

→ Distribution

Tf C - most common across all populations.

1) Tf Di - common in Africa, Australia, New Guinea.

2) Tf Dclu :- China, SE Asia & some indian tribes.

• Significance

① Racial classification.

② Migration pattern

③ Low transferrin level can lead to iron deficiency & hence anaemia.

↳ Thus, early diagnosis.

④ Plan public health policy accordingly if population in general genetically possess low levels of Tf.

Q.6 GM factor?

• Intro :- GM factor is the variation in the constant region of IgG antibody when it crosses through the placenta to reach the embryo.

variation in hydrogen chain of IgG.

→ There are 5 types of antibodies released by B-lymphocytes :- IgG, IgA, IgM, IgE & IgD.

→ out of these; IgG is passed onto the child from mother through placenta & lactation.

→ Variation in this IgG antibody is called GM factor.

→ different populations have been characterised by different GM characteristics

Significance

1) Differentiation of races.

2) Natural / innate immunity to the child in early years.

→ Population Variation

↳ GM (3, 5, 13, 14) - European common; infrequent elsewhere

↳ GM (4) - common in Africa

↳ GM (1, 13, 17) - " East Asia.

7 Variation in physiological characteristics

1) Hb. level.

• Protein molecule in RBCs that carries oxygen from the lungs to the body tissues and returns CO_2 from the tissues back to the lungs. It consists of iron and a protein chain molecule

↳ Population

↳ Different variations of Hb found :- HbA, HbS, HbC, HbE, Hb Hittkari, Hb D Punjab etc.

1) HbS :- Africa & South India

↳ resistance to malaria.

→ Japan

2) HbC :- distributed in Eastern Africa.

3) HbE - SE Asia.

4) Hb D Punjab :- highest in Sikhs & Bhujanats

Variation in Hb level

1) Sex :- Male - 16 g/dl &

↳ Female - 14 g/dl (Menstruation; thus lesser RBCs)

2) Indian population :- high instance of anaemia. (quote NRHS - 5 data).

↳ on avg :- Male = 13 g/dl

Female = 10 g/dl

3) Hb level high in Arabs due to iron rich diet of dates & dry fruits.

4) low in pastoral community.

5) Effect of Age :- Rise in Hb level after

puberty in males while constant or rise in females

↳ American study :- Pre puberty :- M = 13.9 g/dl due to menstruation
F = 13.8 g/dl

↳ Post-Puberty :- M = 15 g/dl.

↳ F = 13.3 g/dl.

↳ High in infant; gradual rise upto 30 yrs. Then in old age, gradual decline.

• Significance

1) Classification of population into different ethnic groups, sex & age category

2) Deficiency of iron - Anaemia; appropriate policy intervention for target group.

3) Detection of genetic diseases like sickle cell anaemia.

→ Eg:- Poshan Abhiyan.

Q.8 Body fat

• Intro :- Subcutaneous fat is uniformly distributed in human body. It plays a crucial role in cold adaptation & warming the body. The level of body fat is determined by both genetics & environment.

• Variations

I. Age

• Areas of fat deposition in body

→ high saturation in subscapular region, abdominal region, arms, thigh & buttock, calf & limbs.

• Factors determining Body fat level.

1) Genetic :- In many cases, factors determining level of fat deposition run in the genes. It influences the no. of fat cells.

2) Environment :- Dietary habits, physical activity & exercise.

• Variation

1) Age :- 1) fat deposition starts in foetus at 34 weeks & peaks by the time of birth.

2) Till 8 years :- fat level generally ↓ in children after birth due to influence of growth hormone.

3) After 8 years, with the (onset of puberty) fat level generally ↑; often determined by environmental factors.

2) Sex :- The general trend in ↓ & ↑ of body fat with age remains same in both sexes.

However, the amount of fat is generally greater in females.

3) Difference among ethnic groups.

↳ Those living in colder areas generally have higher fat level. Eg:- Eskimos.

a) Difference among socio-economic groups.

↳ Obesity :- rising concern in high income nations.

Significance

- 1) Pattern of distribution of fat can help in classification of different ethnic groups, age & sex categories.
- 2) Timely intervention in case of chronic diseases :- hypertension, cardiovascular disease, renal failure etc.

0.9 sensory variation in various socio-cultural groups.

• Intro :- Population vary on various genetic & physiological factors like ABO grouping, HLA system, Hb level, Body fat and so on.

→ Sensory variation studied mainly in 2 forms.

- 1) Ability to taste Phenyl ^{thio} carbamide (PTC)
- 2) Red & Green color blindness

I | PTC Testing

↳ Autosomal dominant trait. :- TT & Tt
↳ tt → Non taster. taster

↳ Sex :- Females are more sensitive to tasting

↳ Racial classification :- 1). High freq. of T in Caucasoids.

- 2) High freq. of t in Negroids
- 3) mongoloids lie in b/w the two.

II R-G Color blindness

↳ sex linked recessive traits

- ↳ Variation :- 1) Females mostly carriers but not affected.
2) Males are highly affected.

↳ Racial classification :- 1) Higher freq. among caucasoids and lowest among negroids; mongoloids lie in b/w.

Significance

- 1) racial classification; classification b/w sexes.
- 2) Genetic counselling
- 3) appropriate intervention to identify carrier female of color blindness gene.
- 4) Paternity dispute settlement upto a certain degree.

→ Other sensory variations

1) Skin :- female & children more sensitive to mechano-receptors.

↳ negroids have more heat-tolerant skin; caucasoids " " cold - " "

2) Smell :- female & children have better sense of smell.

Pulse rate

- 1) New born have high (100-160 ^{beats} per min (bpm))
- 2) 1-10 yr children :- 70-120 bpm
- 3) adults :- 60-100 bpm.
- 4) well trained athlete :- 40-60 bpm

→ varies with environment; high pulse rate

3) at high altitude, to compensate for Respiration reduced inhalation of Oxygen.

Environment :- ^{or col} is in hot condⁿ; resp. rate declines

1) Old age - issues

2) Gender - female have

lower respiratory rate - low metabolism & lung capacity.

Q. 10 Blood enzymes?

Tibetans have gene variant

EPAS1 & EGLN1

oxygen haemoglobin

then resp. rate thus stable even at high alt.

Protein molecule - act as catalyst in biochemical processes, i.e., speeds up the process w/o getting used up.

(a) soil-eco.
↳ construction workers, stone cutters - reduced resp. capacity.

Enzymes as genetic markers

1) G6PD (Glucose-6-Phosphate dehydrogenase)

↳ G-6-P → Phosphoglucanate

↳ protects RBCs from premature destruction.

↳ G6PD - AL- - Africa

↳ G6PD - mediterranean - Middle East.

2) Red Cell Acid Phosphatase (ACP)

is split phosphate

ACP₁^A

ACP₁^B

ACP₁^C

high in Europe low in Africa.

most freq. - 60% - 80%

least freq.

③ 6-PGD

↳ Alleles - PGDA

↳ PGDC - 3% in Europe;
higher in Africa &
Far East.

Unit - 9.7

9.1 Ecological anthropology.

• Intro :- Ecological anthropology is the study of influence of environment on human beings and their culture and vice-versa.

→ There are two components in ecological anthropology :-

Culture ecology

- Advocated by Julian Steward and in 'Theory of Cultural Change' (1955).
- It recognises cultural response to different environmental conditions and vice-versa.

→ Eg :- use of tools, fire etc.

Biological ecology

- Advocated by Rapaport & Baker.
- It proposes biological response in organisms to different environments.
- Eg :- change in body weight, height, skin tone etc.

'Man in the Andes' (1926)

Development of ecological anthropology

- 1) The term ecology was coined by Ernst Haeckel in 1866. Since then, human ecology has also gained momentum.
- 2) In 1950s, Julian Steward proposed culture ecology :- cultural adaptation to environment.
- 3) Later, Rapaport and Baker incorporated biological ecology into study ^{of cultural} ecology. This gave us the complete science of ecological anthropology.

combine

• Scope

I Influence of environment on human beings

- 1) Cultural ecology :- It deals with various cultural adaptations of human societies to their unique environmental conditions.
- 2) Biological adaptations :- It deals with biological & genetic changes that allows survival of humans even in harsh climates.
- 3) Ethno-ecology :- It focuses on how indigenous people perceive and understand their natural environment.
↳ LP Vidyarthi
N-M-S
complex
↳ It is also concerned with how they put this knowledge to use which can be seen in their cultural manifestations.

II Influence of man on environment

- 1) Environmental degradation :- Overexploitation of resources due to rising population.

• Significance

- 1) Helps in understanding man-environment relationship.
- 2) Promote the idea of sustainable development to safeguard the environment.
- 3) Helps in combating racism by creating awareness that different biological features are a result of adaptation to different environments.
- 4) Promoting awareness about suitable practices & diet for good health of the masses.
nomadic lifestyle → Eg :- Kung - adapted to hot & arid climate of Kalahari desert.
physical attributes - an to
Study of Maler
N-M-S
complex
LP Vidyarthi

Conclusion

Thus, ecological anthropology holds great significance in present times. It can lead the world in designing sustainable ways of development that are well adapted and in harmony with the natural environment.

→ Significance

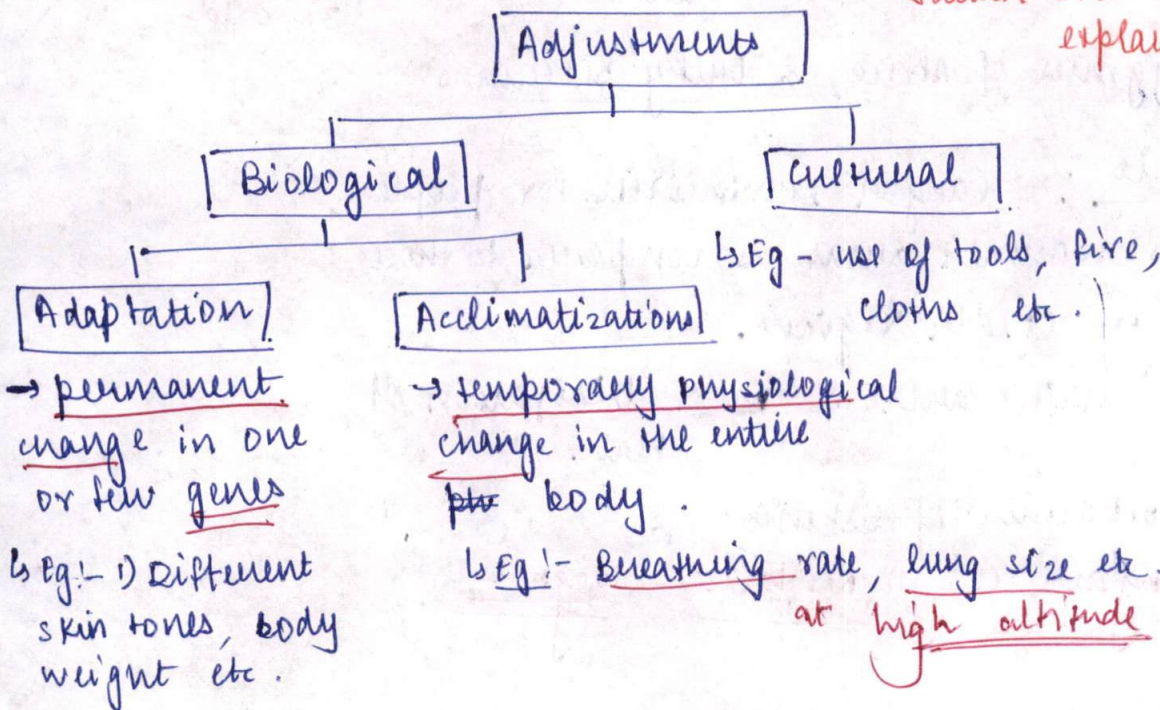
- ③ Help develop adaptive and mitigative measures for ongoing environmental change to see the chances of human sustenance.

Q.2 . Describe bio-cultural adaptations to different environments.

- Intro :- Darwin first put forward the principle of 'survival of the fittest' and 'natural selection' in his book 'origin of the species' (1859).

Humans have also developed different types of biological (genetic) and cultural (non-genetic) responses to enhance their chances of survival in different environments.

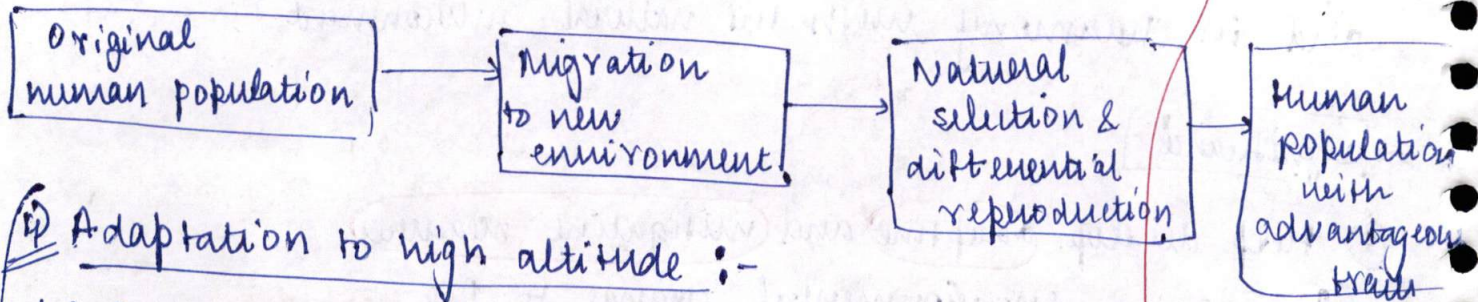
This was first proposed by Julian Steward while explaining cultural ecology.



Biological adaptation.

- ↳ It refers to change in genetic, anatomical, morphological, biochemical and physiological factors corresponding to a particular environment.

} defn }



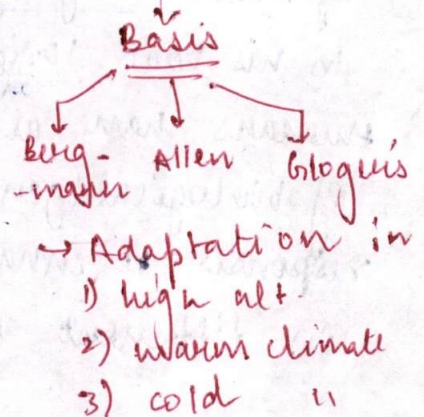
Adaptation to high altitude :-

- 1.1) Acclimatizations :- Increased breathing rate
↳ Increased RBC & haemoglobin
↳ Increased lung surface etc.

- 1.2) Adaptations :- Increased chest size (exception - Nepali Sheerpas)
↳ reduced body size.
↳ haemoglobin has higher affinity for oxygen etc.

EPAS1 & EGLN1 genes in Tibetan - O₂ homeostasis

- 1) Bergmann's rule :- It fits for humans too. Smaller sized populations inhabit warmer areas whereas heavier & bulky population live in colder areas.



- ↳ Eg:- Pygmies of Africa, & bulky Siberians.

- 2) Allan's rule :- Larger extremities for people living in warmer areas as compared to those residing in colder regions.
↳ more surface area & more dissipation of heat.

- ↳ Eg:- short limbs of Eskimoes &
→ longer " " Nilotic Negroids.

3) skin color :- more melanin in tropical regions to protect from UV rays.

Hogben's rule

- ⑤ Adaptation to hot climate :- not dry climate; avoid heat-stroke
- ↳ shorter size. Eg -
 - ↳ longer extremities / limbs; Eg -
 - ↳ more sweating (physiological response).

more surface area as compared to volume; larger dissipation of heat by radiation.

⑥ cold climate :-

- ↳ Presence of cold genes :- burning of fat
- ↳ shorter extremities
- ↳ large body-mass.

⑦ All humans are capable of short-term acclimatizations in response to seasonal climatic change or otherwise.

• Cultural adaptations

→ In humans, the ability to survive in diverse environments is largely cultural or non-genetic accumulated through learned behaviour.

→ Cultural adaptations are more important in colder climates.

↳ Eg:- H. sapiens were able to establish their supremacy over Neanderthals because of their superior cultural adaptations.

imp.

⑧ Tools and Technology :- It had a multiplier effect on other cultural factor.

- ↳ Eg:- needle for sewing clothes.
- ↳ stones & bricks for houses
- ↳ Tools for cooking food etc.

↳ contemporary tech.

:- Air conditioners & heaters; thermostat etc.

2) Use of fire :- Facilitated survival in colder regions; also enabled consumption of meat & fishes that provide more metabolic heat and are easily available in colder regions as compared to plants.

3) Clothing :-→ Woolly for cold areas; sweat absorbing cotton material for warmer regions.

4) Housing :-→ Material used to build houses depend on the environment

↳ Design of houses :- slanting roof for colder areas.

↳ Igloos

5) Diet :- Eg:- high carbohydrate diet of people in high-altitude.

6) Lifestyle and activities :-→ People in high ~~low~~ altitudes have an active lifestyle

↳ People in colder areas carry out most physical activities during day time while hunters-gatherers of warm regions avoid that.

• Conclusion :

Thus, humans have developed several bio-cultural adaptations to their environments. With advancement in technology, the cultural response has risen to a far greater extent.

Eg:- smart houses etc.

0.3 . Elaborate human adaptations to hot climate .

• Intro :- As suggested by Julian Steward in his principle of cultural ecology, and later expanded to include biological ecology, humans have over-time developed various cultural & biological features to enhance their chances of survival in extreme environments including hot deserts.

• Biological adaptations . / Adaptation to hot climate .

→ Humans have developed in Tropical savannah type climate . Hence, they are capable of tolerating moderate heat and temp. upto 35°C .

intro ; beyond that certain bio-cultural adaptations come in handy .
↳ after intro

→ Response when $T \geq 35^{\circ}\text{C}$.

a) Small fluctuation :- Hypothalamus induced conductance . That is, when body temperature rises, hypothalamus temperature falls, pushing the overall range downwards.

b) Large-scale fluctuations :- cooling body through radiation of heat & sweating .

• Various [biological adaptations] are :- acclimatisation (temporary) adaptation (permanent) .

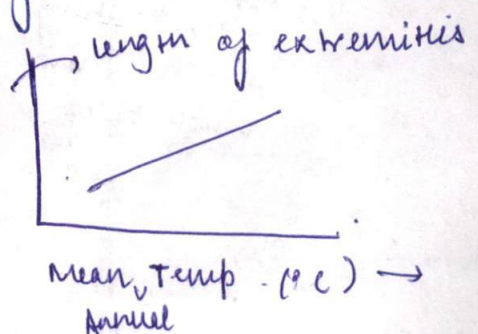
↳ Genetic adaptations :- more surface area w.r.t body mass ; some from heat stroke too .

1.1) Bergmann's rule :- Decreased body size helps in more dissipation of heat by radiation .

↳ Eg :- Pygmies of Africa .

1.2) Allen's rule :- Used Extremities

↳ Eg :- Nilotics of Africa .



^{Darken}
1.3) Skin tone :- high conc. of melanin
to protect the skin from harmful
UV rays.

1.4) Broad and flat nose :- People living
in hot and humid climate have broad
nose to allow greater exit of warm air
from lungs.

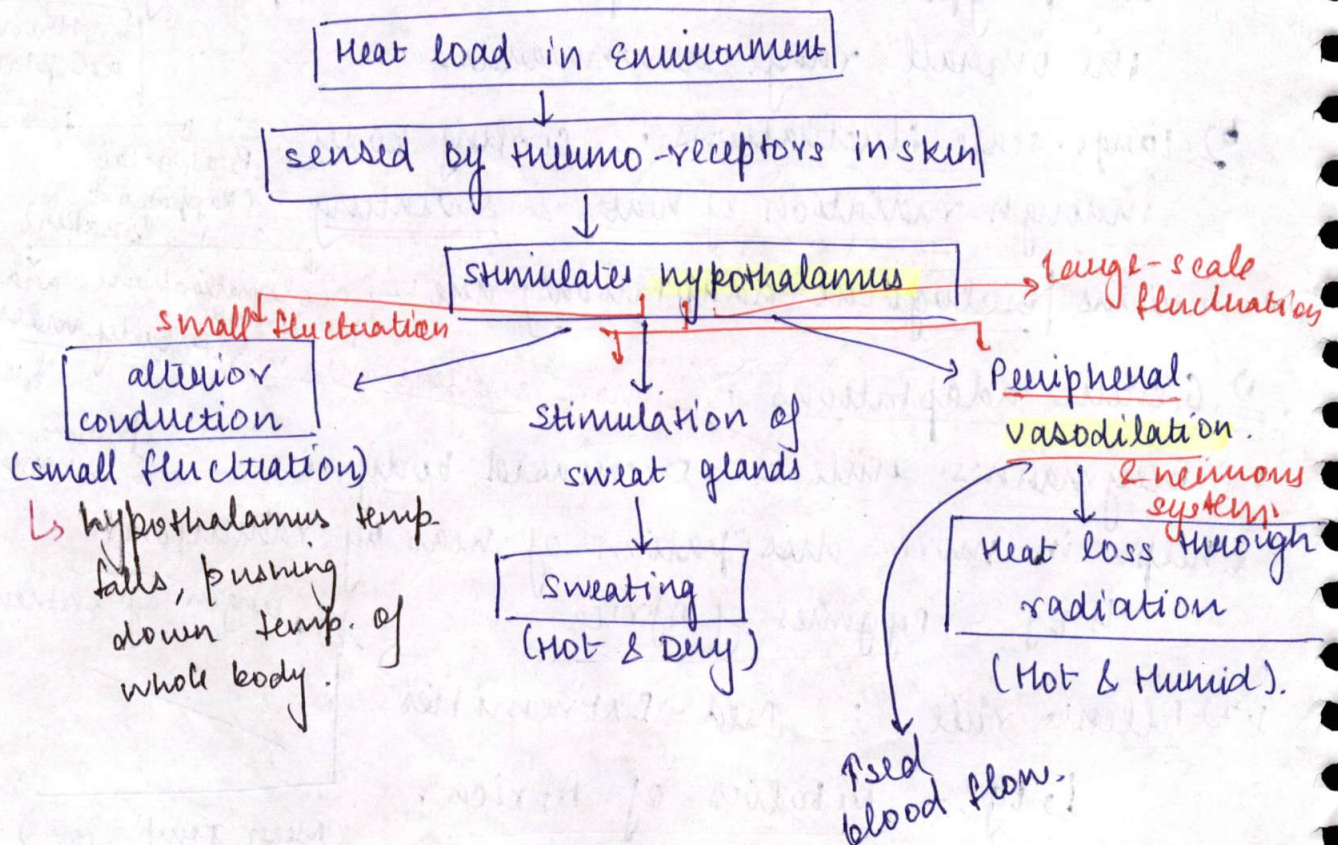
2 Physiological adaptations

2.1) Thermal gradient :- loss of heat through
radiation as a result of vasodilation.

↳ effective in both hot-humid & hot-dry climates.

2.2) Sweating :- This only occurs in hot and
dry climate.

2.3) Heat acclimatization :- It is a universal
human capability when someone is exposed to
hot climate for a long period.



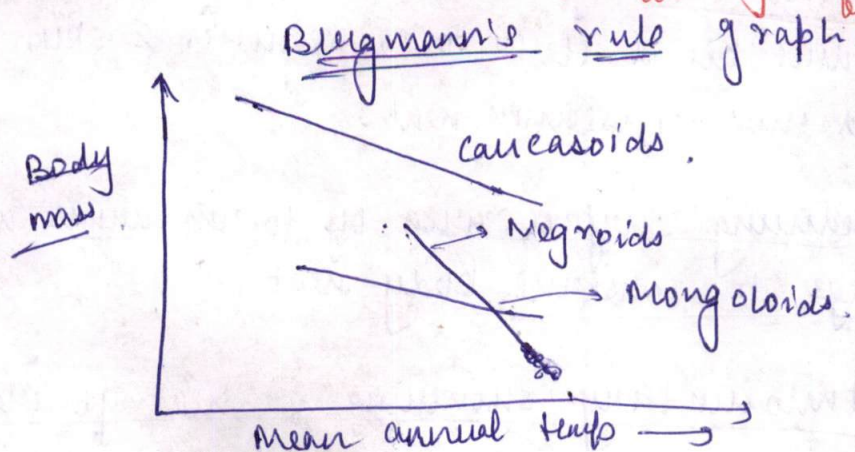
• Cultural adaptation.

- 1) Housing :- In hot wet climate houses are open.
Most houses are built from materials and in a way to keep the inside cool. → heat-reflective mat, kenath the surface
↳ Eg:- Pukelo Indians houses
- 2) Clothing :- In hot dry conditions, people usually cover whole body to prevent heat strokes
↳ In humid climate, clothing is scanty.
Eg:- Chaamba Arabs from Sahara wear special clothing to block heat gain
- 3) Physical activities :- People usually ~~pre~~ avoid doing physical activities during peak day hours.
- 4) Technology :- More technology has made adaptation more easier with Air conditioners, refrigerators etc.
- 5) Diet :- People usually have food items that have a cooling effect on the body. / Water high in diet.

• Conclusion.

Thus, human adaptation to heat is both bio-cultural in nature. Such adaptation is necessary for continuation of ^{human} race on earth. However, some of the cultural adaptation like ^{modern} Acs etc have come at the cost of environment itself.

such adaptations crucial for survival of the fittest (Darwin). However, modern technological adaptations like Acs are coming at the cost of ecology itself.



Q.4 . Explain cold adaptation of human beings .

• Intro :- As per the concept of cultural ecology given by Julian Steward, all human societies adapt to their environment through cultural means. However, in reality both biological and cultural adaptations enable survival in harsh climates like extreme cold.

• Principle of cold adaptation in humans

- 1) Man, because of its savannah origin, is poor tolerant of cold.
- 2) Hence, we rely more on cultural adaptations than biological adaptations to survive cold climate.
- 3) ~~to~~ There are principally 2 mechanisms in cold adaptation :-

conservation of heat

generation of heat

• Biological adaptation

I Physiological adaptation.

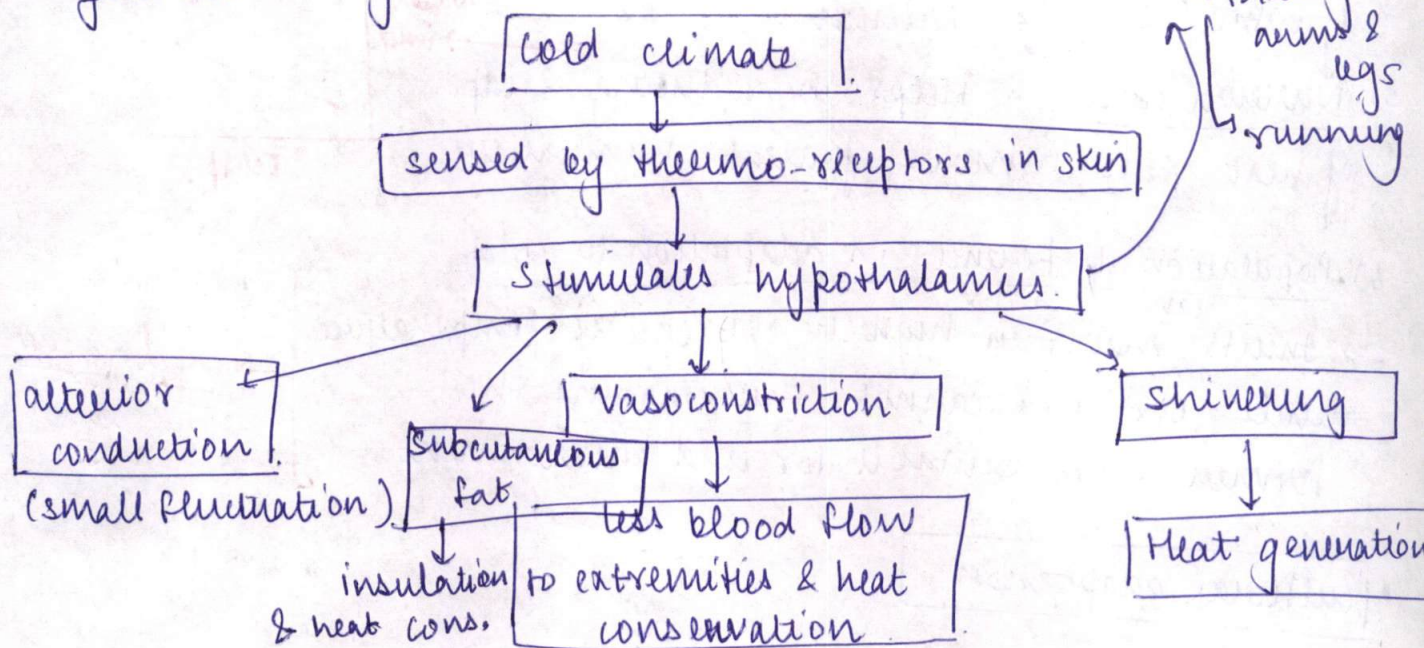
1. Vasoconstriction and heat conservation.

1. Usually, in response to cold climate, hypothalamus induces vasoconstriction to reduce blood flow to extremities & skin and thus conserve heat.

2. Reducing surface area by folding arms and legs to conserve body heat.

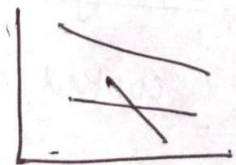
3) Involuntary shivering & heat generation

↳ Hypothalamus also induces shivering to stimulate muscular activity causing generation of heat.



II. Genetic adaptations.

1) Body size (Bergmann's rule) :- People in colder regions have increased body size and are bulky.

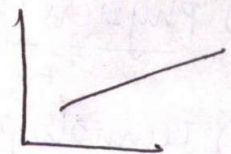


↳ 1.1) The subcutaneous fat helps in heat conservation as it has low thermal conductivity.

↳ 1.2) There is decreased surface area as compared to volume which also helps in heat conservation.

↳ Eg:- Eskimos are bulky; Siberians also have large & bulky bodies.

2) Short extremities & limbs (Allen's rule) :-



It means reduced surface area and hence more heat conservation.

↳ Eg:- Eskimos.

3) Cold genes :- These control how the body burns fat for warmth in the cold.

4) Skin tone :- The skin tone is lighter to allow even minimal sunlight to penetrate deep into the skin to facilitate production of vitamin D & calcium.

5) Narrow nose :- Helps in reducing escape of heat & is a more efficient humidifier.

Nasal
→ index

Temp.

6) Population difference in adaptation to cold.

↳ Inuits ^{can} maintain highest extremity temperature while Africans cannot; thus making the former more suitable for cold environment.

→ cold genes.
eg

• Cultural adaptation.

1) Use of fire :- Provided warmth in cold regions; also enabled eating of cooked meat as plants are scanty in colder areas.

2) Housing ! → sloping roofs for allowing it to get maximum heated during the day; & prevent deposition of snow.

↳ Igloos act as insulated houses.

3) Clothing :- woollen clothes or clothing from animal fur to keep the body warm.

4) Diet :- Rich in fat; Australian aboriginals chew leaves of Rubi'sia & Tobacco to warm their body.

5) Physical activity :- max during day time.

6) Technology :- modern tech - heaters & thermostats.

• Conclusion.

More often it is seen that cold exposure for long periods and cultural adaptation may enhance an individual's response to cold, example - in North Atlantic sherman.

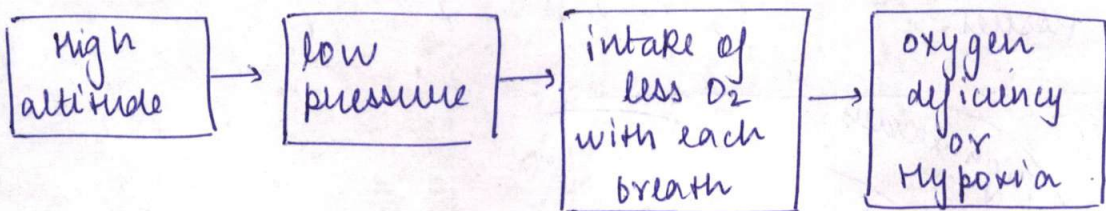
Q.5 Describe human adaptations to high altitude climate.

• Intro:- At high altitude, people usually face oxygen stress due to low partial pressure. There are several biological and cultural adaptations that enable human survival in such harsh conditions.

This causes oxygen deficiency or hypoxia.

↳ This is in agreement with cultural ecology theory of Julian Steward.

• Principle of high altitude adaptation.



→ At lower pressure, saturation of haemoglobin with oxygen is also low causing several problems.

→ However, human habitations have been found as high as 5000 meters; eg - in Himalayas, Andes etc. indicating special adaptive mechanism in them.

• Biological adaptation

I Physiological adaptations.

1) Increased breathing rate :- It helps in compensating ^{for} the intake of less oxygen with each breath.

Hypoxic condition

↓
Stimulation of Medulla oblongata in brain

↓
Increased breathing rate

↓

Increased pressure of O_2
in lungs

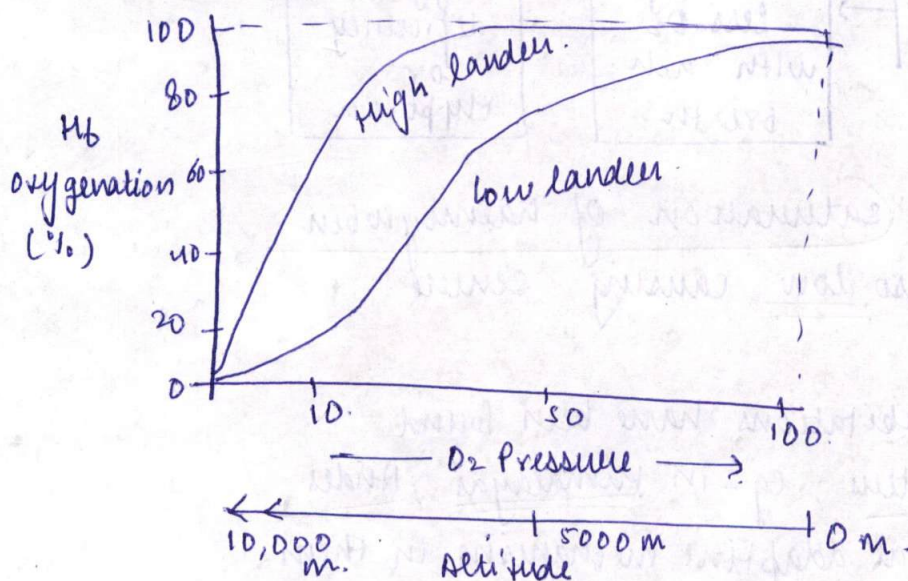
Normalisation of oxygen supply

2) Increased RBC and haemoglobin

Hypoxi condn $\rightarrow$ stimulation to kidney $\rightarrow$ secretion of erythropoietin $\rightarrow$ Increase in RBC & Hb $\rightarrow$ More O_2 binds to Hb.

3) Shift of oxygen dissociation curve to right

$\rightarrow$ At high altitude, dissociation of oxygen from Hb becomes rapid to make it easily available to tissues.



4) Increased lung surface :- more diffusion of oxygen to blood.

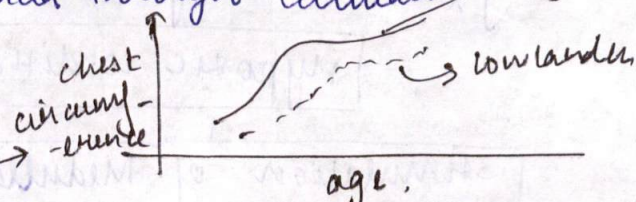
5) Increased tissue blood supply

6) Cellular acclimatization :- Used in mitochondria, thus more energy is produced through cellular respiration.

II Genetic adaptations.

1) Increase in chest size :- This provides high ventilatory capacity.

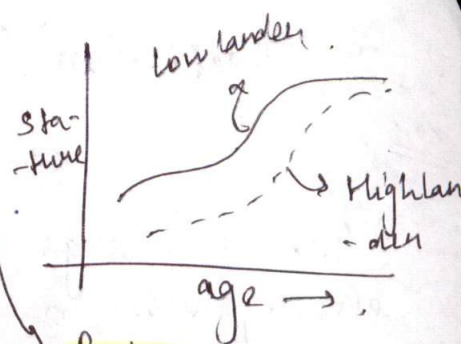
$\rightarrow$ Exception :- Sherpas of Nepal.



Eg:- Bods of Ladakh

2) Reduced body size including reduction.

in weight of babies :- lower body mass can be supported by lower level of oxygen.



3) Increase in right part of the heart :- More supply of blood to lungs for oxygenation.

4) shortening of nose with nostrils directed upward :- This reduces the nasal passage.

Baker's 'Man in the Andes' (1976)
children have low rate of physical growth
Andean variant

5) Haemoglobin can combine with oxygen even at low partial pressure.

6) Genes EPOA1 & EGLN1 in

• Cultural adaptation.

1) Clothing :- Clothing is usually loose to allow supply of blood to different parts.

2) Physical activity :- They have an active lifestyle to build tolerance.

3) Diet :- High carbohydrate diet to increase Hb in blood

↳ Eg:- Brazilian highlander chew hebar leaves to increase Hb content.

4) Moreover, it has been observed that people develop required traits through acclimatisation when they are exposed to high altitudes for a prolonged period.

• Conclusion.

Thus, humans adapt to high altitude through acclimatization as well as bio-cultural response.

Tibetans - helps in O_2 homeostasis
their respiration rate thus stable at even high altitudes

Q.6 Adaptation & Acclimatization.

Adaptation

1) Genetic changes that allow an organism to survive in a particular environment.

2) It is mostly permanent.

3) change in one or few genes - genetic; can be inherited/ ^{transmitted} across generations.

4) People are born with the adaptations or they develop them fairly early in life and remain that way throughout life.

5) What is adaptive in one environment may not be in another.

→ give egs.

* Sometimes, long-term acclimatizations are difficult to distinguish from genetic adaptations. Eg:- Tse in lung size; Peruvians.

* Some acclimatizations are closely related to genetic adaptations.

Eg:- Tanning in light skinned people.

Acclimatization

1) Impermanent physiological changes that people make to survive in a new environment.

2) Mostly temporary; reverts back when environment is changed.

3) Acclimatizations are not genetic though they might have underlying genetic factors.

4) People develop them during their lifetime.

5) Acclimatizations simply change, that is they appear & disappear with change in environment.

→ format

Intro: man originated in savannah.

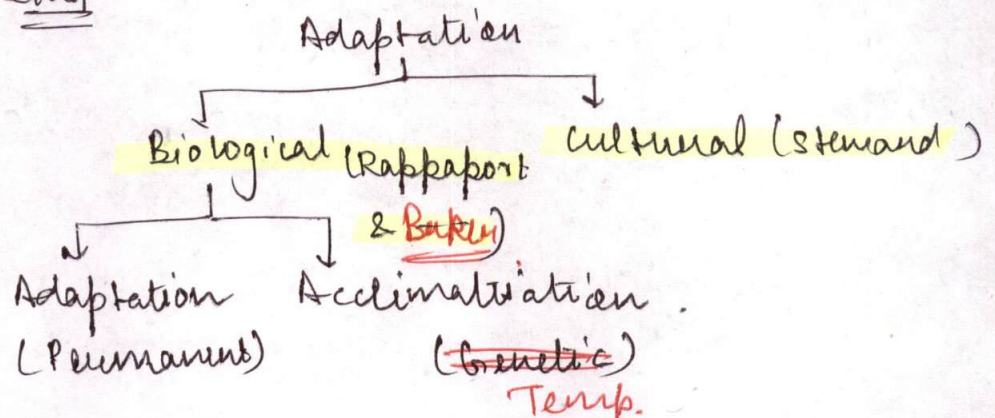
can tolerate temp. up to 35°C .

moderate heat

Poor tolerants of cold.

→ high altitude → low PO_2 → hypoxic condn.

II Diag



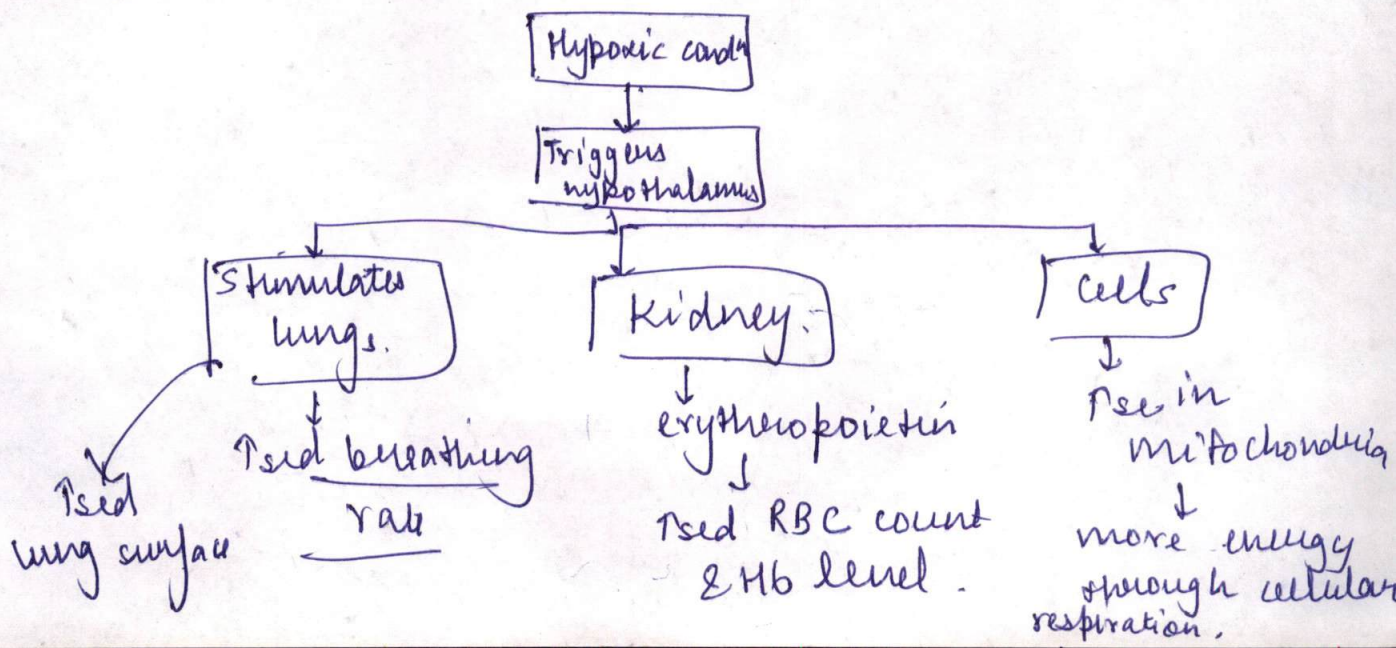
III Biological Response.

1) Physiological (Acclimatisation)

2) Genetic (Adaptation)

IV Cultural Response.

Acclimatisation - high altitude



9.1 Epidemiological anthropology.

• Intro :- Epidemiological anthropology is concerned with ~~the~~ determination, manifestation and distribution of diseases and disorders in human community.

• Basic components of epidemiological anthropology.

1) Medical anthropology :- Anthropological study of health and illness; and associated bio-cultural factors that lead to manifestation of diseases.

2) Ethno medicine :- health-related beliefs, knowledge and practices of a cultural group.

↳ Eg :- Belief in shamans, supernatural forces etc.

3) Study of factors causing diseases :- Both biological and socio-cultural factors.

↳ Eg :- while covid-19 is caused by corona virus, the spread of infection largely depends on socio-cultural practices; eg - large gatherings for weddings, festivals etc.

4) Population variation in occurrence and spread of disease.

↳ Eg :- Infant mortality is higher in poorer sections.

5) Measures to control the spread and occurrence of diseases; by taking into account socio-cultural factors too.

• Scope of epidemiological anthropology.

→ It includes the following studies :-

1) Infections and non-infections diseases.

2) Biological responses to diseases.

③ socio-cultural responses

④ Nutritional deficiency related diseases

⑤ ecology of malnutrition

• Significance and applications.

- 1) help in determining effect of cultural and ecological settings on manifestation of diseases. Eg:- Social habits like hygiene & sanitation or gender disparity.
- 2) Assessing community health with the help of epidemiological data.
- 3) evidence-based medication. ~~as well as~~. :- This will increase efficacy of medicine too.
- 4) better targeting of most vulnerable group.
- 5) Informed policy decisions in concurrence with socio-cultural practices of people.
↳ Eg:- vaccine hesitancy among tribal groups like Dongria Kondh of Odisha.
- 6) Combining ethnomedicinal practices with modern ~~the~~ medicines health care systems.
↳ Eg:- Bhorias have been using Himalayan yew as anti-cancer drug.

• Conclusion

Thus, epidemiological anthropology has wide significance in present times as it can help control the spread of Covid-19. It is instrumental in improving public health through its wide range of studies.

Q.2. Discuss the role of anthropology in studying health and disease.

• Intro :- Health can be described as physical, social and mental well-being of an individual.

Any deviance from this condition is called disease. Epidemiological anthropology is concerned with study of health status and manifestation of diseases in human community.

• Anthropological theories of Health and disease.

1). Functionalist approach :- It considers healthcare system as an important institution that maintains order and stability in society. } Durkheim & Brown.

↳ Eg :- Role of shaman, medicine-man in tribal societies.

2). Ecological approach :- It deals with the role of environment in both disease manifestation as well as cure of disease. (Julian Steward)

↳ Eg :- 1). Unhygienic environment have greater occurrence of diseases.

2) Wu :- Himalayan yew used by Bhutias as anti-cancer drug.

3) Cultural Interpretivist approach :- It deals with how cultural practices determine people's understanding and local treatment of disease.

↳ Eg :- Levi-Strauss studied how song sung by shaman among Kuna Indians of Panama help a woman through a difficult delivery.

4). Theory of supernatural causation :- Belief that diseases are consequence violation of a taboo,

or due to sorcery or witchcraft.

5) cognitive perspective (Clylin & Conklin) - It focuses on the effect of attitude and behaviour of people on community health.

↳ Eg:- wearing of masks :- cognitive behaviour to stop spreading of disease.

6) Critical medical anthropology :- Focuses on various socio-economic and political determinants of health.

• Causes of disease / Various dimensions of diseases

1) Biological factors :- Example - viral & bacterial infections.

2) Genetic diseases.

3) ~~Behavioural~~ factors including socio-cultural factors & economic practices.

↳ Eg:- social habits such as sanitation etc.

↳ Gender disparity in access to healthcare.

NFHS-5
↓
57% women
anaemic

4) Economic & political factors.

↳ Eg:- 1) Disparity in quality of health care due to economic & political inequalities.

~~2) Disparity~~ 2) Nutritional deficiency more common among poorer sections.

5) Influence of environment :- some diseases are more common in tropical areas like tropical neglected diseases.

↳ ~~Other~~ eg:- mental disorder called pibloktoq among Eskimos due to calcium deficiency (less Vit. D).

• Treatment of diseases

1) Use of native remedies :- Eg - Himalayan yew.

② Medical practitioners in tribal societies like shaman and medicine-man.

↳ They ~~establish~~

③ Integration of non-western medical practices with western bio-medical paradigm.

↳ Eg:- Promotion of Ayurveda or Chinese technique of Acupuncture.

Case study - (below)

④ - - - - same as ③ of Q.1 - - - -

⑤ Better targetting of affected population.

through → Bridging the economic / income disparity.

↳ Awareness campaign to dismantle the myths.

↳ Understanding causative factors and concern of people etc.

Eg:- Tribal acts of Lodhas, Saythal & Kinomis to spread awareness about covid-19 appropriate behaviours & vaccination

• Conclusion.

Thus, along with bio-medical intervention, adequate focus should be given to socio-cultural, psychological, ecological, economic and political factors to improve public health.

Case study - Amy Maxmen (2015)

↳ In Sierra Leone, local community resisted authorities over removal of dead bodies of Ebola victims. They insisted at performing rituals. ~~Epid~~ Through help of epidemiology - cial anthropologists, the cultural aspect was highlighted and trust deficit b/w authorities and tribal chief / shaman could be bridged.

Q.3 . Discuss the scope of epidemiological anthropology in study of infectious and non-infectious diseases .

- Intro :- The disease epidemiological anthropology deals with determination, manifestation and distribution of various infectious and non-infectious diseases in human community .

→ Infectious diseases :- These are caused by viruses, bacteria and other multicellular organisms and can spread from one individual to another . Eg :- covid-19, Dengue, chicken pox, AIDS .
etc .

→ Non-infectious diseases :- These are not transmitted from an infected person to a healthy individual through physical contact and other means . Eg :- Diabetes, Hypertension etc .

Scope of epidemiological anthropology in infectious diseases

I . Causative factors :- / Manifestation of infectious diseases .

1) Biotic agents like bacteria, virus, protozoans, fungi etc .

2) Ecological factor ^{/ environmental} which favour spread of diseases .

↳ Eg :- improper drainage and standing water can cause dengue, chikangunya etc .

↳ Other air-borne, water-borne and vector-borne diseases .

3) Family Pattern ^{& population density} :- Human social habits also influence spread of diseases . genetic history, lifestyle, diet .

↳ Eg :- Poorer families living in more crowded places

→ Economic factors

are more prone to infectious diseases.

④ Population density

- ⑤ socio-cultural practices :- Eg :- hygiene and sanitary habits (open defecation etc.)
↳ community gatherings for weddings etc. can lead to spread of covid-19.

eg of cultural practice
:- Yanomamo Indians of Brazil frequently visit other villages & don't isolate the sick; this promoted rapid spread of infectious diseases among them.

- ⑥ Migration :- Eg: Corona virus spread throughout the globe due to inter-country migration.

spread of measles
in 19th century in Hawaii, Guam etc.

- ⑦ Occupation & commerce :- places of work, education, market-places etc. have the potential to become hot-spots for spread of infectious diseases.

II Response to infectious diseases

1) Immunological response :- Response of human body.

- ↳ Human body respond at first stage through fever, pain, inflammation etc.

- ↳ Prolonged exposure to an infection results into building of immunity.

Immune system
↳ Ethno-medicine
↳ Understanding their context
↳ Addressing myth
↳ Awareness
↳ Local, traditional knowledge
↳ Scientific evidence

2) Controlling spread of disease :- (socio-cultural response)

- ↳ Adopting proper hygiene and sanitary practices. Eg :- Swachh Bharat Mission.

- ↳ Appropriate behavioral approach :- Eg :- wearing masks, avoiding crowded gatherings, social distancing.

↳ on sea-buck-thorn

- ↳ spreading awareness among people
↳ Addressing concerns and myths among people.

3) special targeting of more vulnerable sections : eg. poor, women, unorganised labour class etc.

n) Bio-medical intervention

- ↳ Preventive medication - vaccines;

- ↳ Curative medication - timely, inexpensive, quality and equitable treatment to all

and psychological.
5) Addressing larger socio-political issues.
like poverty, gender inequality, stigma
associated (eg-in HIV-AIDS' etc). which increase
the likelihood of such infections.

• Scope of epidemiological anthropology in non-infectious diseases

I Causative factors.

These are rare but found in higher freq.
in certain population.

1) Genetic diseases :- Eg. sickle cell anaemia,
Haemophilia etc.

Africa, South Indian
tribes

2) Lifestyle factor :- Certain diseases are
caused by dietary habits, ~~occupational~~ ~~task~~ stress
& sedentary lifestyle etc.

↳ Eg:- Hypertension, Diabetes etc.

3) Occupational diseases :- Eg:- Mine workers or
industrial labourers are more prone to
respiratory disorders.

4) Environmental factors :- heat stroke in desert,
or frost-bite in extreme cold etc.

↳ There are racial differences in occurrence

of these diseases. Eg:- Negroes are more susceptible
than Inuits to frostbite.

→ Pi blaa tag
↓
Esquimos

II Response.

1) Bio-medical intervention :- Administration
of vaccines, medicines, gene therapy to cure disease.

2) Socio-cultural practices of society should
be taken into account to rise efficacy of treatment.

↳ Eg :- 1) genetic counsellor cannot and should not

~~advice~~ should be sensitive while advising on personal matters like marriage, family etc.

③ Ethno-medicine & native remedies

↳ Eg:- Himalayan yew.

④ Behavioral change; eg- in dietary habits etc.

⑤ Cultural response to tackle different climates.

• Conclusion.

Thus, epidemiological anthropology can be used to understand why certain sections are more vulnerable to some infections & non-infectious diseases. Accordingly, appropriate counteracting measures could be taken.

* Format

→ Intro

→ Defⁿ of infectious & non-infectious.

→ Infectious diseases:

↳ Vulnerable groups

↳ Cause / Manifestation of disease

↳ Response.

→ Non-infectious

↳ "
↳ "
↳ "

→ Cultural Factors It's exposure to a disease & its effect.
worsen it

- economically poor.
- women. (Eg:- HIV AIDS).
- socially backward classes.
- certain racial groups.
- People engaged in particular occupations.
- Urban-lifestyle (people having unhealthy diet, high stress)
- Poorer households - suffering from malnutrition etc.

Q.4 . Evolution of diseases

→ Co-evolution of people & diseases have taken place.

• causes for evolution

1) Agriculture & sedentary lifestyle :-

1.1 more population density :- need possibility of spread of diseases

1.2 Permanent settlements :- & storage of food grains play host to various organisms like rodents (rats), insects, flies etc.

1.3 Food produced (cereals) lower in nutrients as compared to diet of hunter-gatherers.

1.4 livestock & domestic animal :- They act as hosts for various disease causing pathogens.

1.5 Poor sanitation and hygiene.

1.6 Migration and greater contact with other population through trade.

2) Genetic adaptation of disease-causing (Mutation) organisms :- These virus, bacteria due to their shorter life cycle, evolve at a faster pace; and hence can prove deadly.

Colonial expansion :-

3) Lack of genetic immunity to certain diseases in some populations.

↳ Eg:- spread of small-pox in new world.

4) Faster rate of mutation ~~with~~ ^{as} more and more no. of people get affected :- homogeneity among population

Antibodies are
5) Antibiotic resistance → inducing further mutations in disease causing organisms.

8) Establishment of towns & cities

↳ 6.1) Poor sanitation.

↳ 6.2) High population density

↳ 6.3) wide socio-economic disparities :- access to health care, nutritious food, income disparity etc.

↳ 6.4) Migration of people.

↳ 6.5) environmental pollution :- air pollution causing respiratory problems etc.

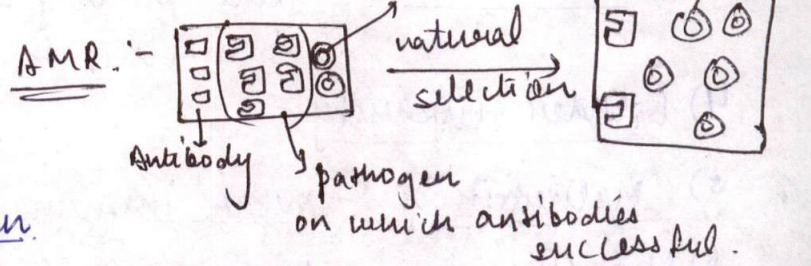
↳ 6.6) Substance abuse ; lifestyle diseases etc.

* format :- I) Biological evolution of diseases

→ Point (2)

→ Point (4)

→ Point (5)



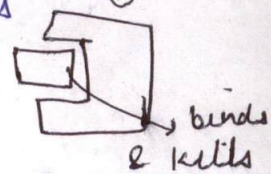
II) Socio-cultural evolution

1) Hunter-gatherer soc :- less instance of infectious diseases due to low population density ; diet rich in all nutrients etc.

→ Point (1)

→ Point (3)

→ Point (6)



Q.5 what are the major causes of ill-health ? / why some section are ^{more} severely impacted.

• Biological / ~~path~~ environment :- virus, bacteria etc.

• Physical environment :- heat stroke, air pollution etc.

• Genetic diseases :- racial differentiation factors in too.

4) Socio-cultural habits :- sanitation etc.

5) high population density

6) sedentary lifestyle :- obesity

7) Politico-economic disparity

↳ Blw rich & poor; females

8) ↑ sed globalisation and migration.

9) Nutrient deficit diet

→ why some groups more vulnerable?

1) Housing & family pattern - live in crowded places.

2) Politico-economic disparity :- income less, lack access to healthcare,

3) Social issues :- like poverty - inadequate sanitation facilities.

4) Gender disparity.

5) Malnutrition - weak immune system.

6) Migration for work :- more vulnerable at new place without any family support
↳ Psychological stress.

Various nutrient-deficiency diseases

I Protein Energy malnutrition

mild to
① Moderate undernourishment leading to stunting, wasting etc.
② Marasmus.
③ Kwashiorkor.

II micronutrient deficiency

Table :- Nutrient deficient

1) Iron. 3) W 5)
2) Vit-A, B, C, D.
3) Iodine
etc.

disease

Disruption in
age-old practices
↳ e.g. - Pygmy-Bantu trade :- protein
carb. trade -

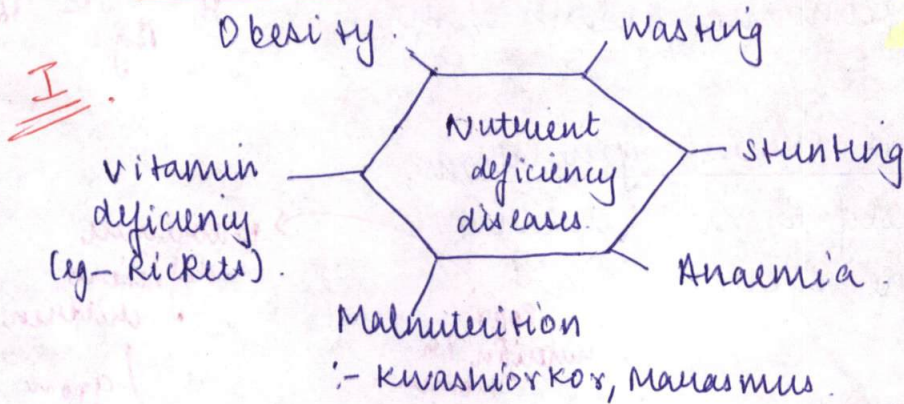
Q.6 . Explain about nutritional deficiency related diseases

Intro :- Human body requires many nutrients such as proteins, carbohydrates, vitamins, minerals and other micronutrients to function properly. When the diet fails to provide all the required nutrients - it leads to nutrient deficiency related diseases.

Nat. Nutritional survey; triple burden of nutritional issues in India
 ← hunger
 ← obesity
 ← malnutrition

Female Anaemic - 57%
children under 5
 wasted (20%) under-weight (32%) stunted (35%)

→ use NFHS-5 data in intro



Table

Disease	Nutrient Deficiency
1) Scurvy	Vit. C
2) Beri-beri	Vit. B (Thiamine)
3) Anaemia	Iron

Various Nutrient deficiency diseases

- Kwashiorkor :- diet low in protein but adequate in carbohydrates → growth retardation & edema.
- Marasmus :- It includes diet low in both proteins and calories.
 ↳ It is similar to wasting / mid-arm circumference reduced; depletion of fat in adipose tissue
- stunting of children due to inadequate nutrition

III Causes

- Economic cause :- expensive food. ↳ unemployment, inflation.
- Social cause - poverty
- Gender disparity ↳ girl child weaned earlier
cultural causes ↳ self bias. ↳ practice of feeding men first. ↳ obesity more common in developed countries (show map)
- Lack of awareness :- imp. of breastfeeding etc.
- Climate change & food insecurity
- Modernization & urbanisation :- lifestyle change - obesity etc.

II Distribution :- Africa, Latin America, south and south-east Asia (show map)

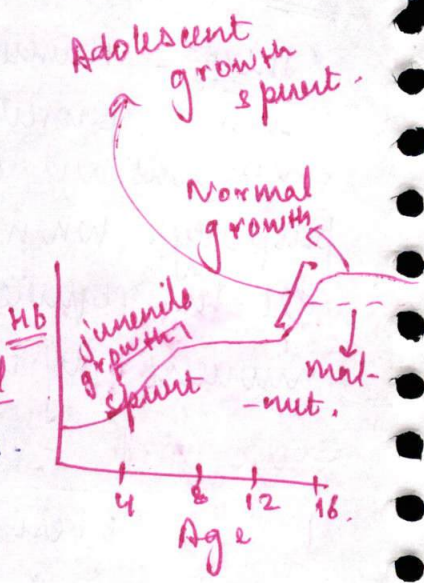
Effect

30/1000 births.

- 1) Infant and early childhood mortality
- 2) Decreased resistance to infection in adults - unhealthy population - unproductive.

↳ don't contribute to development & physical growth.

- 3) Poor learning ability % - retard brain growth.
- 4) Lower ~~to~~ socio-economic growth of the nation.



5) vicious cycle persists across generations.

- ↳ anaemic women likely to have children with poor immune system.

Way Ahead

- 1) Breastfeeding importance & early childhood care :- monitoring by Aasha & Anganwadi workers.

- 2) Shift ~~to~~ from 'food security' to 'nutritional security'
↳ Poshan Abhiyaan.

- 3) Bio-fortification of rice etc.
- 4) Focus on improved reproductive & maternal health etc.
↳ Project Sampurna.

3) Climate-smart agri.

SDGs - 1, 2 & 3

Grime case study - S. Chakrabati (2021) - 'Natures Communication'
↳ mid-day meal.
- 13-32% improvement

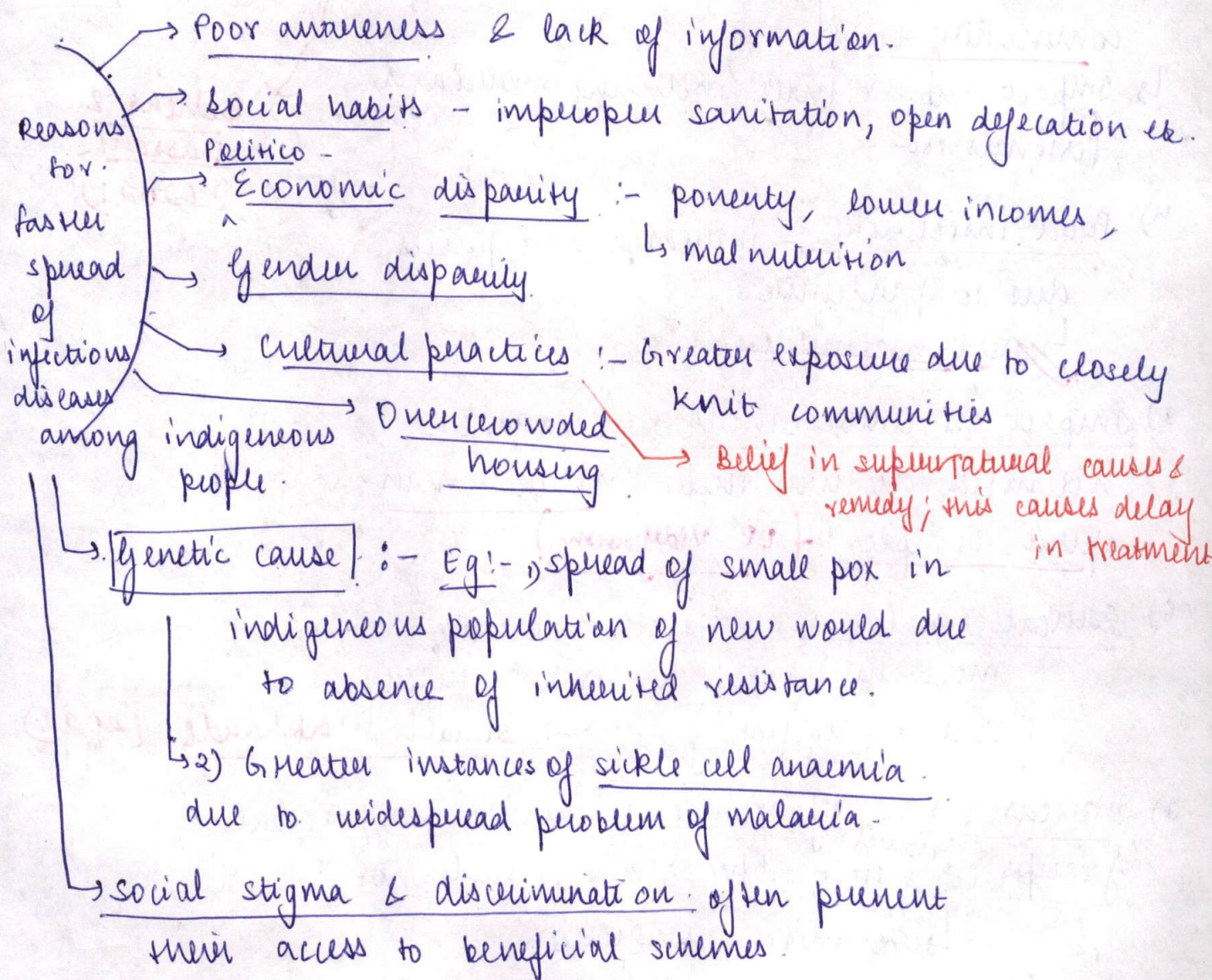


Q.17 Explain impact of infectious diseases on indigenous population.

• Intro :- Indigenous population refers to original inhabitants of a region who have retained their unique social, cultural, political & economic characteristics.

→ Infectious diseases :- These are caused by pathogens (eg- Virus, bacteria etc.) and can spread from one individual to another.

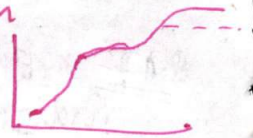
→ According to UN, indigenous people experience high level of maternal & infant mortality rate and infectious diseases.



Impact

1.3) Physical & mental retardation

? - diag



1) Impact on health :- ^{1.12} high maternal & infant mortality rate.

^{1.2} High levels of deaths due to infectious diseases like HIV, Malaria, TB, Covid-19 etc.

2) Economic impact :- livelihoods severely hit due to lockdowns & containment zones.

reduced
productivity

Eg :- 1) Nagas couldn't go out for foraging.

2) Reverse migration has strained tribal communities back home.

reduced life expectancy :-

Eg :- ~~Atitara~~

latest

report

life expectancy

for

STs = 64 years

against general

67 years

3) Socio-cultural impact

↳ Ban on social gatherings weaken community bond.

↳ Impact imp. rituals including marriages, festivals etc.

Behena & Dassani
(2021)

4) Food insecurity :- increased food prices due to pandemic.

↳ Increased malnutrition

5) Impact on environment :- quarantine activities disturb their 'nature-man-spirit complex' (LP Vidyarni)

6) Educational lag :- education became more challenging for tribal students due to digital gap. → Sonali Wakhaude (2021)

7) Increased rate of crime against women, Tribal groups :- ^{creates} rift b/w 'have & have nots'.
↳ domestic violence.

8) Psychological impact :- more secluded from ^Mainstream.

↳ Several cases of suicides & mental health disorders.

→ WAY AHEAD.

1) Penetration of modern health care systems.

↳ At the same time, healthcare functionaries should be more sensitive to socio-cultural elements of tribes.

2) Awareness campaigns to bust myths and promote healthy practices.

↳ Eg:- 1) Successful campaign to overcome vaccine hesitancy among Dongria-Kondhs (PVTG).

3) Relief plans & package for revival of their livelihoods.

↳ Eg:- 1) First Tribal Food Park at Bastar, Chhattisgarh

4) Collaborative work with academic institutions, local civil societies, indigenous community to improve their socio-economic condⁿ.

↳ 2) Revival of tribal art in Bengal among Lodha, Santhal & Kumi Tribes for spreading awareness about covid-19 & promote vaccination.

5) Evidence-based public policy specifically targetting tribal population.

↳ Eg:- 1) Project Samhati - delivery of elementary education to tribal students in mother tongue.

↳ 2) Mobile Connectivity Project in tribal districts

• Conclusion

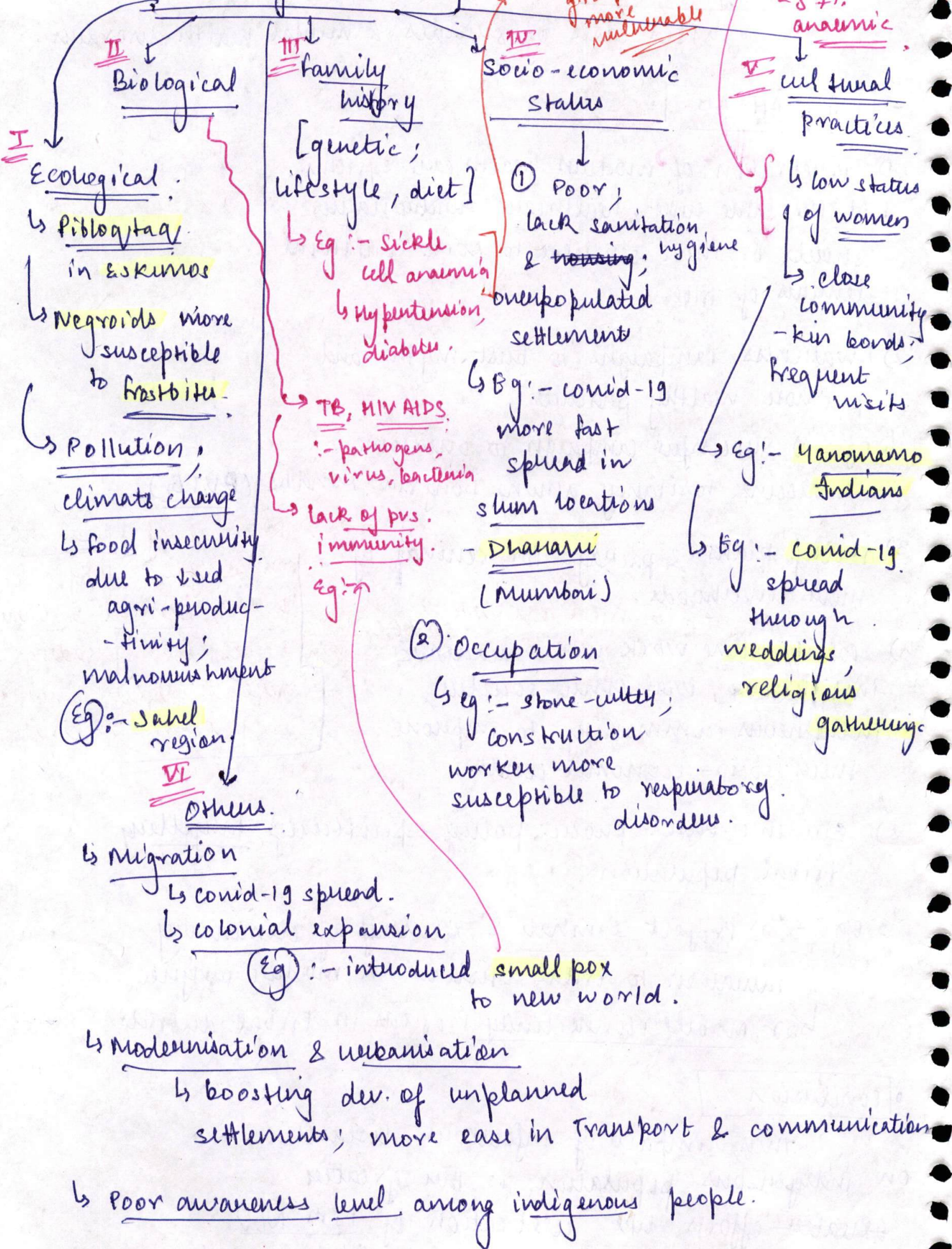
Thus, impact of infectious diseases on indigenous population is far greater.

~~Greater~~ efforts like celebration of 15th Nov.

as Tanjatiya Gramin Diwas is likely to put

greater focus / attention ~~of~~ on tribal problems and their effective solⁿ.

Causes of diseases



• Response to diseases / disease control.

Bio-medical response

↳ 1) Preventive medication / care

:- vaccines, isolation, covid-appropriate behaviour; proper sanitation.

↳ 2) Curative care.

↳ Access to inexpensive, timely & equitable treatment.

↳ medications, hormone therapy, bio-fortification of food.
↳ gene therapy.

Socio-cultural response

↳ 1) Understanding the concern & addressing the myth / worries.

↳ (Eg) :- Sierra Leone case study;
Dongria-Kondh vaccine administration.

↳ 2) Awareness campaign

:- Poshan Abhiyan;

↳ (Eg) :- Tribal art of Santal, Kumi - - -

↳ 3) Ethno-medicine

↳ (Eg) :- Seabuck thorn used by Kinnauri tribes (HP) - treating heart, skin & stomach ailments;

↳ Ayurveda; acupuncture - true (Chinese)

State Policy interventions

↳ 1) Strengthening N/W of Asha

& Anganwadi workers.

↳ (Eg) :- spread msg about breastfeeding; various schemes - POSHAN 2.0.

↳ 2) Climate-smart agri

(for nutrition deficiency)

↳ 3) Improving maternal health

↳ (Eg) :- Project Sampurna

↳ 4) Evidence based health-policy.

↳ better targeting of most vulnerable.

S. Chakrabarti case study

✓ Eg:- 1st tribal food bank - Bastar Chhattisgarh

Unit-10

Q.1 Differentiate between child growth and development.

• Intro :- Growth and development refers to process of continuous change that an individual goes through throughout his lifetime.

Growth :- It is a quantitative increase in size or mass.

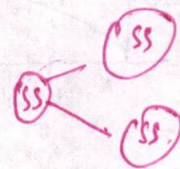
Development :- It is enhancement of qualitative characteristics.

• Growth.

1) There is quantitative increase, mostly in number of cells. (less focus on expansion of cells).

2) This is achieved through:-

↳ Mitosis - Multiplication of cells or multiplicative growth.



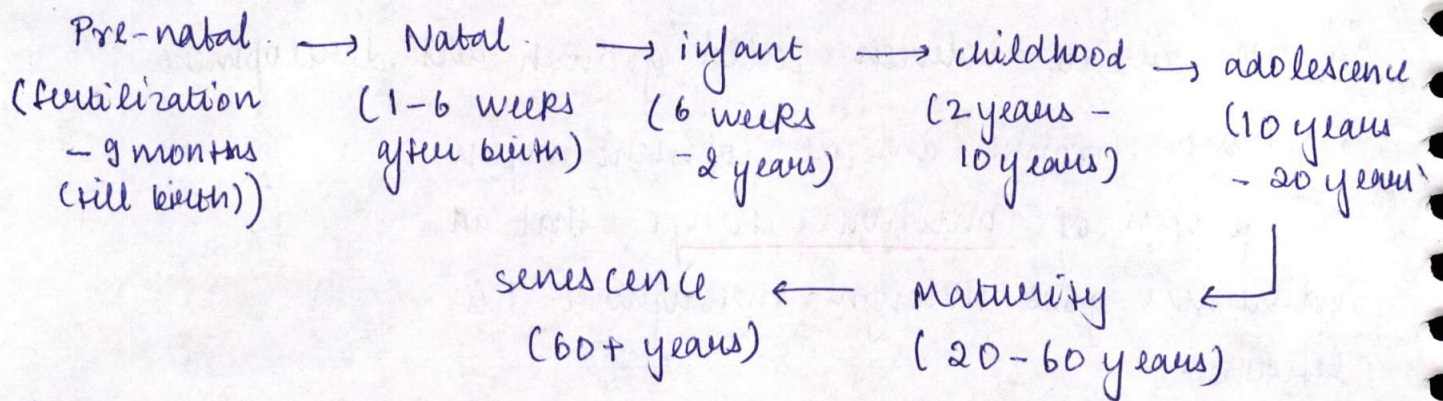
↳ Dimensional growth - increase in intercellular substance

↳ Accretionary growth :- increasing inner cell substance.

3) ~~however~~ growth is less attributed to expansion of cell size.

3) Growth begins at fertilization itself and continues till death except in the case of neuron and some muscles.

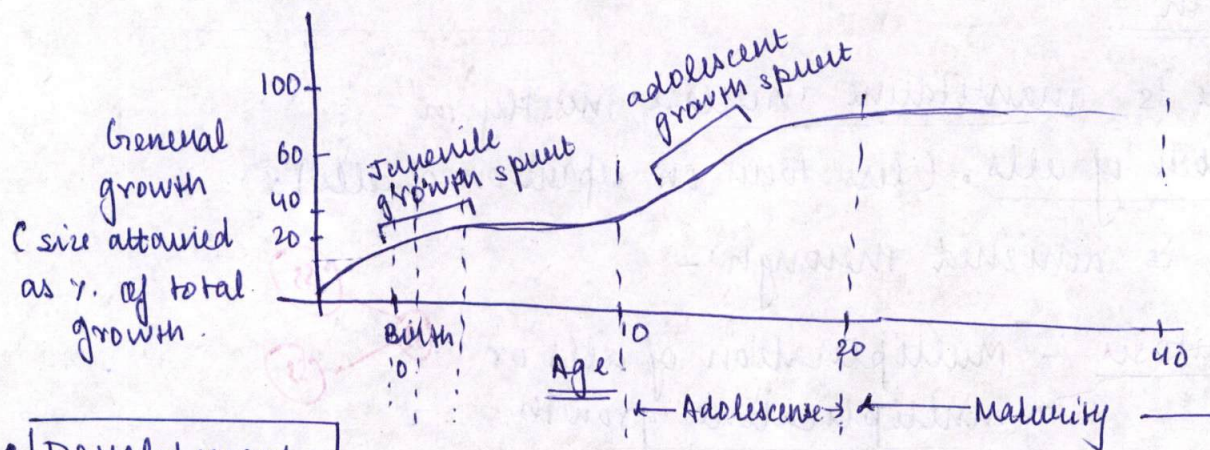
4) Various stages of growth are :-



5) The general body growth rate varies greatly in all these periods.

↳ It is most rapid during - foetal life, infancy, and during puberty.

↳ Slowed rate :- middle childhood period.



• Development

1) It involves → expansion of cells.

↳ maturation and myelination of nervous system.

↳ functional competence :- undifferentiated and immature cells turn into high organised and specialised organs.

↳ Acquisition of various skills - like hand gripping, eye to hand coordination etc.

2) Majority of development occurs during infancy & childhood period.

3) However, it occurs throughout the life of an individual.

Conclusion.

Growth and development are correlated to each-other. While growth mainly is in terms of structural enhancement, development also includes the functional aspect.

Both are influenced by genetic & environmental factors.

Other differences.

Growth

- 1) Quantitative
- 2) Primarily multiplication of cells. *through mitosis, dimensional growth.*
- 3) Growth - rise in size & mass.
- 4) can be +ve or -ve.
↳ Eg of -ve growth :- lymphoid tissue which decrease in size after peaking during childhood.
- 5) Related to structural change.
- 6) Growth is rapid during foetal life, early infancy & puberty (collagram).
- 7) similar broad pattern of growth in all individuals.
↳ through same stages
→ prenatal → - - - - - → senescence

Development

- 1) Qualitative *& maturation of cells.*
- 2) Primarily expansion of cells and formation of ^③ highly organised and specialised individual.
for competence, acquisition of skills.
- 3) Always mostly +ve; irreversible process.
- 4) Related to functional competence of an individual
↳ Acquisition of various skills
- 5) Development is mainly throughout the lifetime :-
mainly during infancy & childhood
- 6) Pattern varies greatly from person to person with respect to timing & degree of expression of developmental change.
while mostly same; people acquire different skills

8) Brain ~~do not~~ undergo much growth ~~during~~

Q.2 . What are the different stages of human growth?

• Intro :- Growth refers ^{to} quantitative change in overall size ~~and~~ of the body and its parts. It is largely attributed to multi-
plication of cells.

→ various stages of human growth are :-

Pre-Natal → Natal → Infancy → Childhood

→ Adolescence → Maturity → Senescence.

Pre-natal

zygote formation & continues till

I Time period :- Begins at child birth (up to 40 weeks or 9 months)

1.1) Early embryonic period :- multiplication of cells.

✓ Morula → Blastula → Gastrula.

1.2) 1st trimester (up to 3 months) :-

↳ Differentiation and regionalisation of cells, genitalia to form distinct body parts like head, arm, etc.

↳ Histogenesis :- formation of ~~the~~ specialised tissues like muscle or nerve.

↳ Morphogenesis :- each region is moulded into a definite shape through differential cell growth or cell migration.

1.3) 2nd trimester (4 months - 6 months)

↳ spurt in height (18th - 22nd week).

↳ Development of all major body organs and tissues.

1.4) 3rd trimester (7 months - 9 months)

↳ spurt in weight (34th week)

↳ No new growth takes place during this period.

↳ There is only expansion in size of ~~body~~. Foetus
↳ subcutaneous fat deposition.

Natal

↳ Time period :- Period from birth to first 6 weeks.

↳ Height :- The baby usually measures 50 cm at birth.

↳ Boys are 2 cm longer and 100 gram heavier than girls on an average at birth.

↳ Weight :- Average weight at birth is 3.5 kg.

↳ During first few days after birth, new born loses extracellular fluid equivalent to about 10% of the body weight.

↳ However, they regain their birth weight by the age of 10 days.

↳ There is both enlargement of existing cells and formation of new ones (except neuron & some muscles).

Infancy and childhood

↳ From 6 weeks to 10 years.

↳ General body growth :- It is rapid until 2 years, however during mid-childhood, rate of growth slows down.

↳ Eg :- Weight :- A child ~~triples its weight~~
The weight of a child at 3 years is usually 5 times its birth weight. Post that, he only gains 2-3 kgs / year.

↳ Height :- The child achieves around 100 cm height until 4 years. Thereafter, there is slow increase in height upto 10 years.

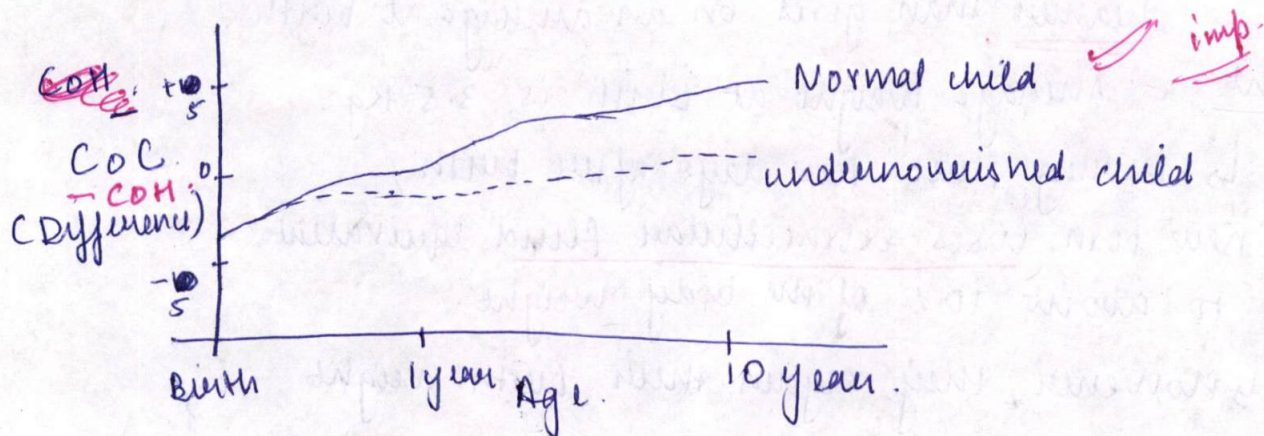
↳ Circumference of chest :-

At birth :- circumference of head $>$ circumference of chest
(CCH) (COC)

By 1 year :- CCH = COC.

After 1 year :- CCH $<$ COC.

↳ However, this is not the case in under-nourished children.



↳ Stem stature index :- $\frac{\text{sitting height}}{\text{standing ht}} \times 100$

↳ With age, it decreases.

(II) Gross motor development

↳ 3 months - infant can lift his head and support his weight on arms.

↳ 5-8 months :- infant can roll on bed; maintain sitting posn.

↳ 8-10 months :- infant can crawl $\rightarrow$ creep $\rightarrow$ stand $\rightarrow$ few steps.

↳ 1 year :- walking without support.

↳ 2-3 years :- climbing stairs.

(III) Fine motor development

↳ Eye coordination develops b/w 2-4 weeks.

↳ Hand-eye coordination 4-6 months.

↳ hand-mouth " :- little late; able to feed himself only after 18 months.

↳ Hand skills begin to develop after 2 years and become more & more perfect with age.

(IV) No major reproductive growth.

(V) Lymphoid growth :- most notable during mid childhood. (tonsils & large lymph nodes)
↳ Thereafter, decrease.

(VI) Brain growth :- At birth, brain size is 65-70 % of expected head size.

↳ It reaches 90 % of adult head size by 2 years.

(VII) Language development

↳ 1 month :- attends to curious sounds.

↳ 9-10 months :- understands speech and responds to it through monosyllable sounds.

↳ 1-2 years :- true speech develops.

(VIII) Cultural development

↳ 2 months :- social smiling back.

↳ 3 months :- recognises mother.

↳ 6 months :- shows anxiety on meeting strangers.

↳ 1 year :- child capable of mimicking actions and adult behaviours.

↳ 1-10 years :- child learns all the ^{socio-}cultural, religious, educational aspects from his surrounding environment.

Adolescence

- ↳ Period :- varies acc. to environment & genetics.
- ↳ earlier in girls. :- 12-18 years
- ↳ boys :- 14-20 years

↳ Hormonal basis of adolescence

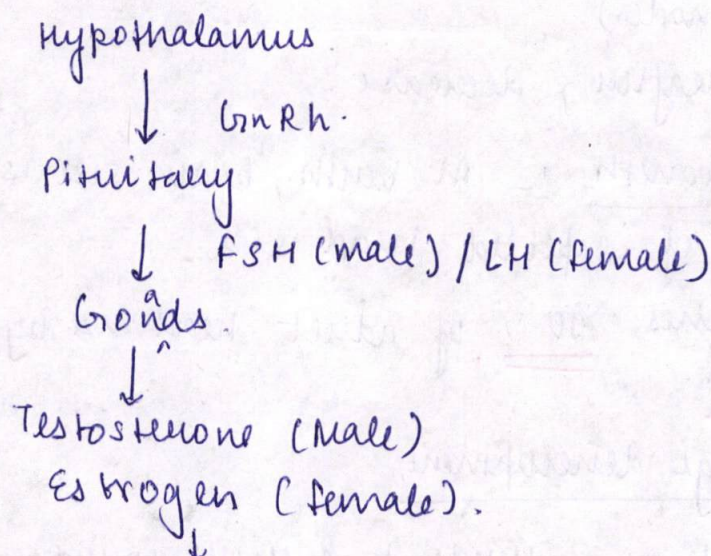
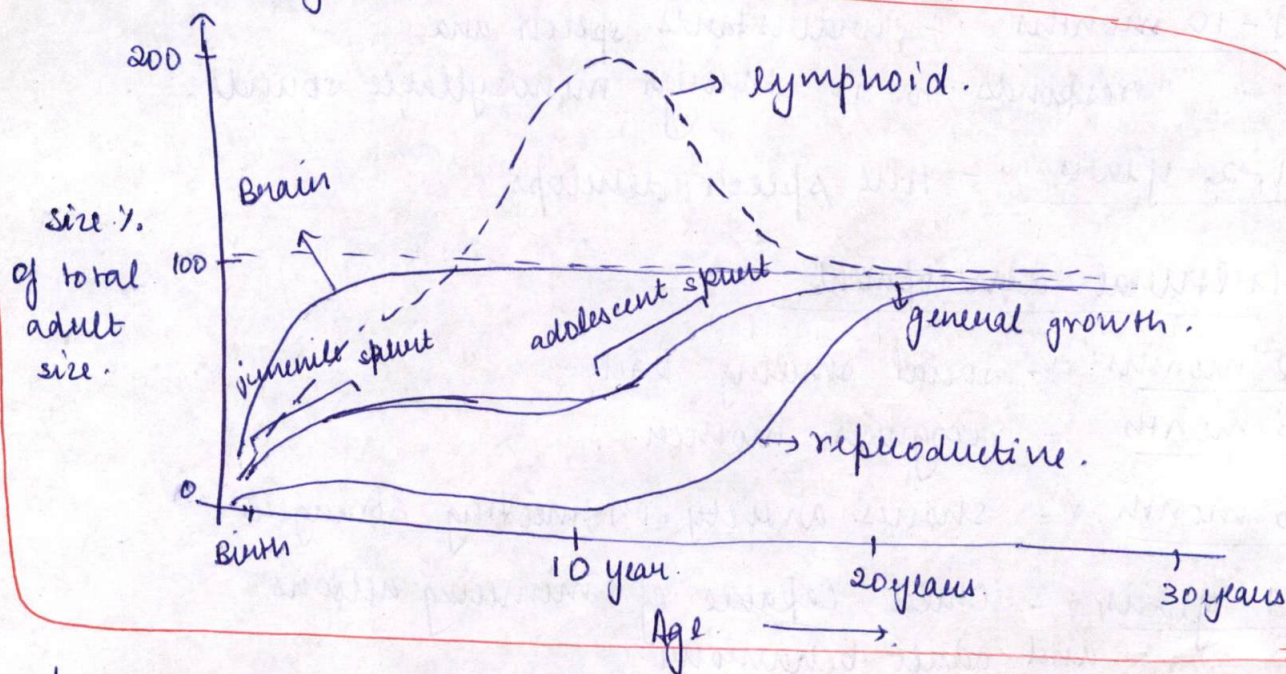
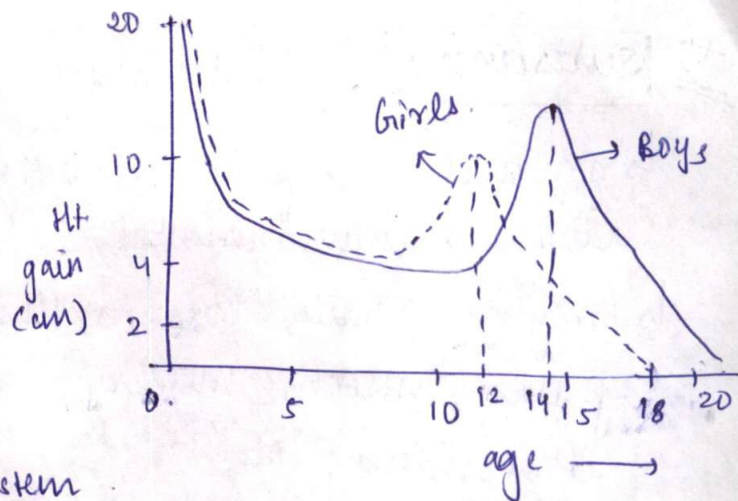
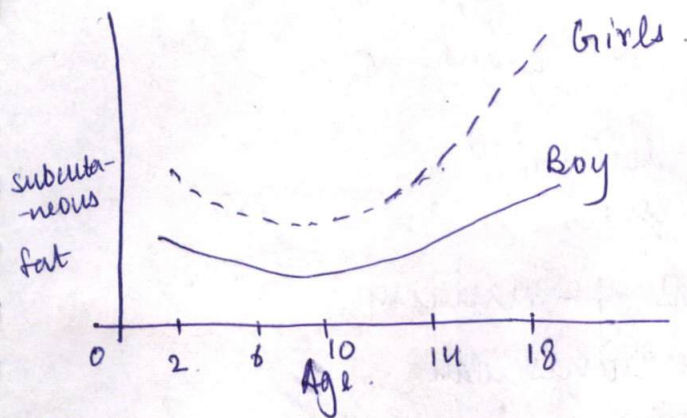


Diagram for growth



- ↳ spurt in height & weight :- Male height experiences greater rise.
- ↳ Boys also face larger spurt in muscle growth and overall size.
- ↳ subcutaneous fat :- more in girls.



(II) Changes in reproductive system

Boys

- accelerated growth of testes & scrotum.
- ↑ in shoulder width.
- change in voice; pubic hair; axillary & facial hair
- spermatogenesis starts

Girls

- development of uterus, vagina & breast.
- ↑ in width of pelvic region.
- appearance of breast bud, pubic hair
- Menarche & oogenesis.
↳ influenced by nutrient & health.

(III) Physiological change.

- ↳ much more marked in boys than girls.
- ↳ larger muscles, lung size, greater oxygen carrying capacity of blood, ↑ red RBCs & consequently ↑ in Hb in boys.
- ↳ Thus, boys gain much more physical strength than girls during adolescence.

V Maturity

- ↳ Time period :- Post adolescence. 20-60 years
- ↳ Growth of skeleton does not cease entirely; small increment of 1-2 cm in ht. by 30-35 years.
- ↳ afterwards, stationary it remains

V Senescence :- Time period 60+ years.

↳ gradual or rapid decline in ability to adapt to environmental stress.

↳ greying of hair; loss in terms of - elasticity of skin, vision, memory, cardiovascular functioning etc.

• significance of studying human growth & development
/ contemporary relevance of.

(add this part to Q.1, Q.2 & individual answers for each stage - childhood, adolescence etc.)

I 1) Importance in public health :-

helps in determining the health status of citizens

↳ Eg:- NFHS-5 data states that wasting, stunting and underweightness in children under 5 has decreased, but still significant at 19.3%, 35.5% and 32.1% respectively since 2015-16.

III 2) Cross-regional studies :- identify states and districts which require most focus.

↳ supplementary nutrition under Poshan scheme

3) Devise adequate socio-economic policy :-

IV Eg:- PM Poshan scheme to address growth & development in children. SACRED SAGE scheme

↳ Greater focus on silver economy based on future projections of increasing percentage of people above 60 years.

4) Assess the impact of culture and environment on growth and development.

④ Help in understanding intra and inter-population variation with respect to gender, age, socio-cultural and environmental factors in growth & development. → ethnicity.

↳ Eg:- low income group → poor nutrition → diarrhoea → stunting / wasting in children

⑤ ~~FB~~ ~~better~~ Building human capital by better understanding the physical & mental changes experienced by adolescents.

↳ Eg:- Scheme for Adolescent girls.

→ Caucasoid,
Nilotic negroid
- tall in height
(> 170 cm)
→ Mongoloid,
Pygmy negroid
- short in ht
(< 160 cm).

→ cont. ③ (imp. of pre-natal).

→ identify genetic anomalies in growth of foetus.

↳ MTP (Medical Termination of Pregnancy Act) has also used the upper limit of abortion in exceptional cases to 24 weeks.

→ format for significance :-

1) Population variation

2) Imp. in developing public health policy.

3) Cross-regional studies :- Eg:- Various indices by NITI Aayog etc.

4) human capital :- Better focus on education & health of adolescents as they are the drivers of future economy.

5) socio-economic policy.

↳ PM-Poshan (Balika Aanganwadi & Poshan 2.0)
↳ SAGE
↳ MTP

Q.3 What are the factors affecting growth and development.

As per Malina
• Growth :- Growth can be defined as quantitative change in size and mass of the body. Development is qualitative in nature and refers to specialisation of different body parts according to their functionality.

• Genetic factor.

→ Genes are inherited from both the parents.

They influence growth and development through their products i.e., - hormones & enzymes

1) Different genes are activated at specific time periods by inducers (proteins) for coordinated growth.] induction factor (heading).
for. → in a specific sequence.
definite

2) cell differentiation; DNA duplication and protein synthesis by mRNA is essential.

DNA $\xrightarrow{\text{Transcription}}$ mRNA $\xrightarrow{\text{Translation}}$ Protein] $\Rightarrow$ gene expression.

(has genes)

3) Homeotic genes control differentiation of various organs.

4) hereditary control by genes.

↳ 4.1) Phenotype :- Morphological aspects of children depend on genes inherited from parents

↳ Eg:- Tall parents are likely to have tall children

↳ 4.2) skeletal maturity, dental eruptions etc.

⑦ are predominantly hereditary.

↳ Eg:- Japanese children reach their growth peak and mature earlier than Negroes & Europeans.

] $\rightarrow$ General growth

↳ 4.3.) Twin studies :- These also show greater degree of similarity between MZ twins than DZ twins on various parameters

↳ Eg:- eye color, ~~hair~~ color and height etc.

Method 2 co-twin
1) Twin studies
2) Foster child study
3) Pedigree
4) Cytogenetic
5) Biochem.
6) DNA fingerprinting

↳ Biorythm :- similar age of menarche of mother & daughter

↳ Sex :- sex is genetically governed and causes different growth patterns in girls and boys.

sexual & reproductive growth.
(3)

(4) Genetic diseases
↳ color blindness.
↳ vision defect.

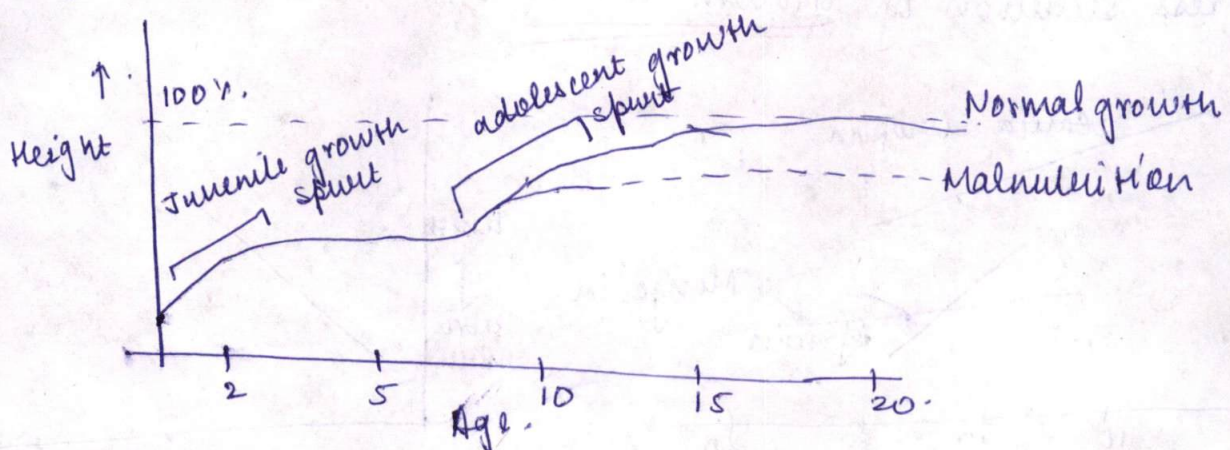
• Environmental factors

→ while growth is genetically determined, environment has a great influence in expression of certain genes.

↳ This includes both internal & external environment

↳ Thus, heredity and environment might not be additive, but multiplicative.

1) Nutrition factor :- Prolonged malnutrition can lead to reduced immunity and impaired physical & mental development



2) Allen's and Bergmann's rule :- Individuals in colder areas have bulkier bodies with short extremities while opposite is true for those living in warmer regions.

3) Migration :- It is useful in cross-comparative studies ~~also~~ on impact of environment.

↳ Eg.:- Japanese migrant to Hawaii have shown rise in height and weight.

method

1) Cross-comparative studies

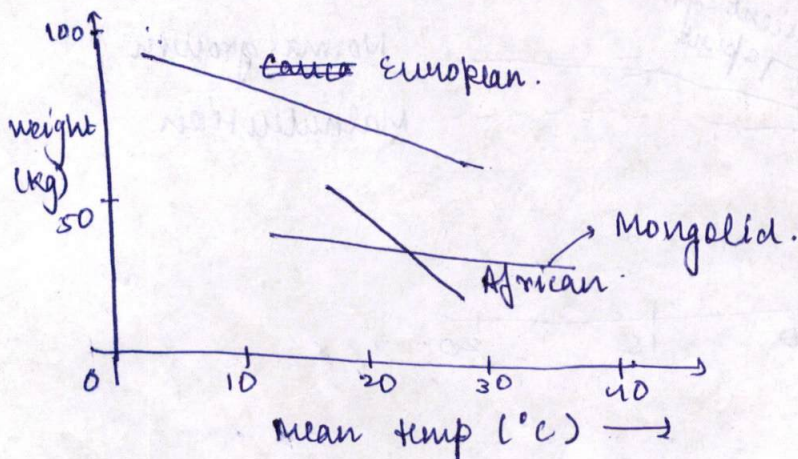
2) Twin studies, Foster child study.

4) Internal environment :- while concordance rate is high in identical twins (eye color 99%) but never 100%. This can be due to environmental differences in womb of the mother.

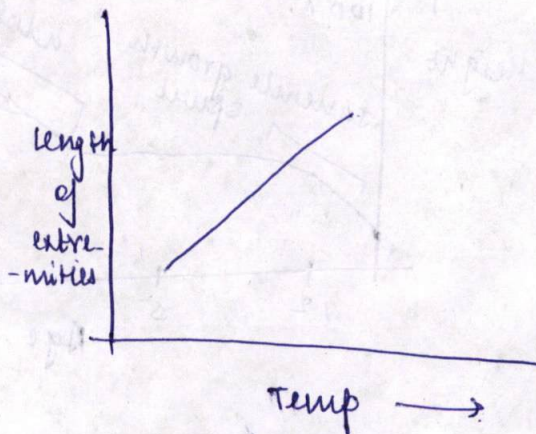
5) Seasonal impact :- Some studies show that increase in height is faster in spring and weight in Autumn. However, these studies are very old.

6) Emotional factors :- Children from broken homes, poor households & orphanages show inhibited growth due to high stress.

↳ less secretion of growth hormone.



(Bergmann's rule)



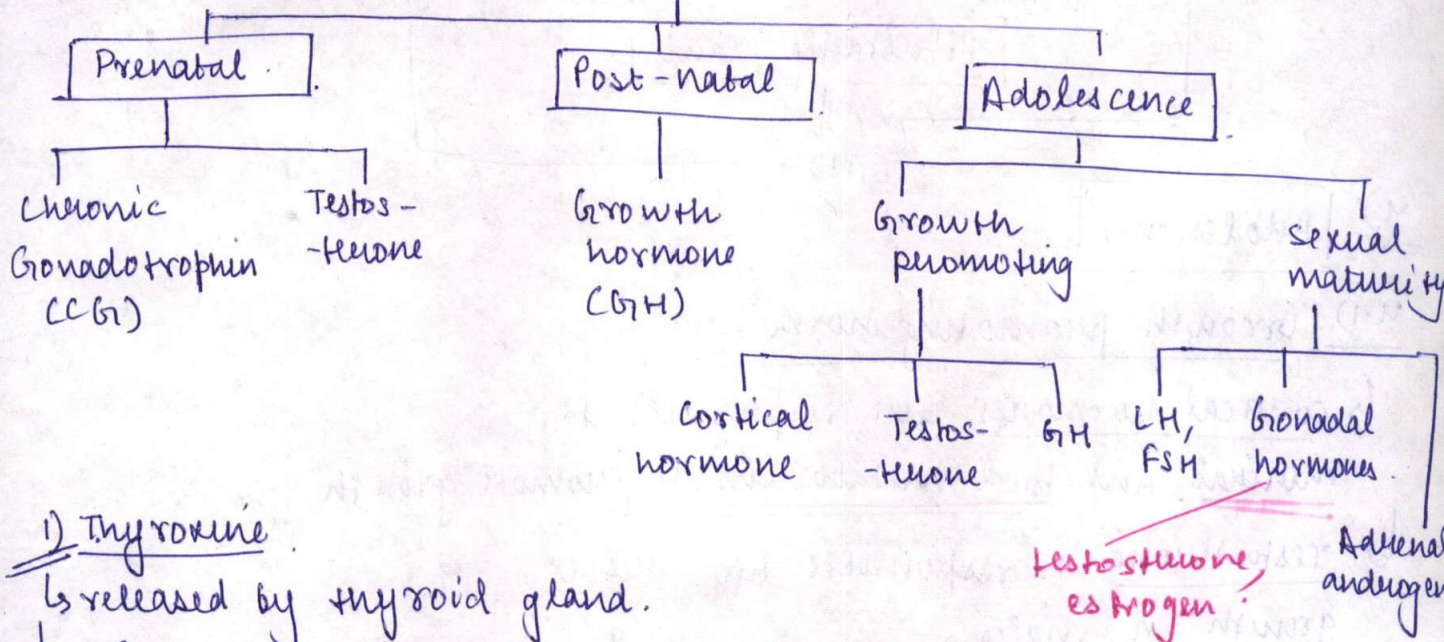
Allen's Rule

• Biochemical factors.

→ Growth is influenced by various hormones secreted by endocrine glands.

Hormones of growth.

Thyroxine in all stages.



1) Thyroxine

↳ released by thyroid gland.

↳ ~~Pre~~ Increases cell permeability so that uptake of substance essential for growth by the cell increases.

↳ Increasing the size and no. of mitochondria.

↳ Activates DNA in nucleus for synthesis of RNA which converts into protein.

2) Pre-natal growth

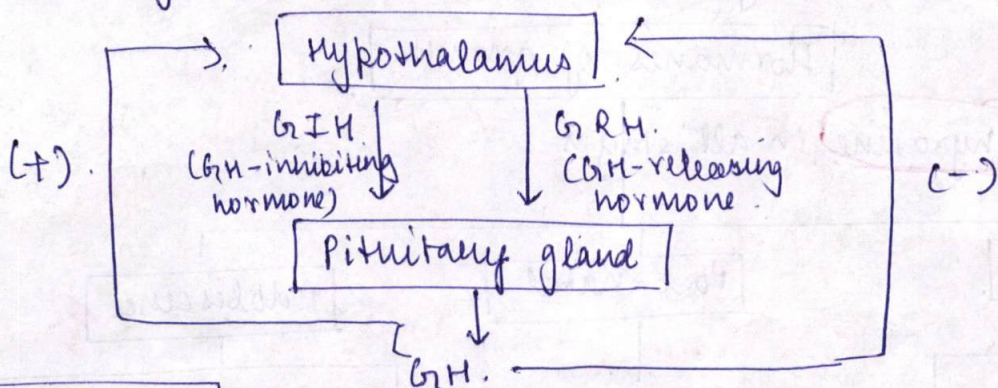
2.1) Chorionic Gonadotrophin - It is secreted by foetus in 12th week.

↳ Essential for appearance and stimulation of leydig cells in testes for secretion of testosterone.

2.2) Testosterone :- causes differentiation of genitalia to form scrotum and penis in boys.

3) Post-natal growth

3.1) Growth hormone (GH) - It is secreted by pituitary gland and is essential for growth.



4) Adolescence

4.1) Growth promoting hormones

↳ cortical hormones are responsible for mineral and food metabolism to promote growth

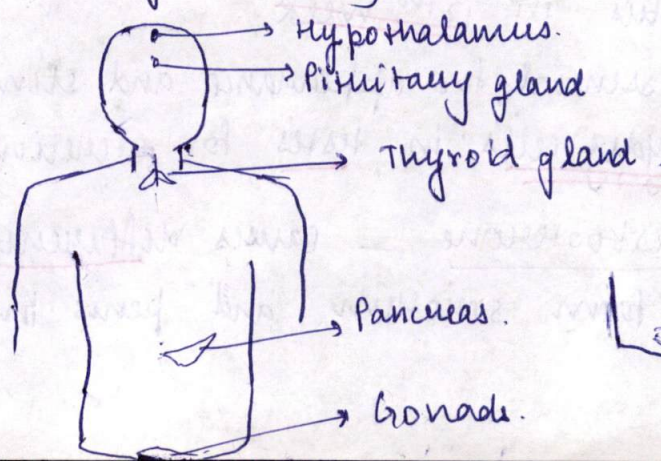
↳ Testosterone is responsible for muscle growth in males.

4.2) Sexual maturing promoting hormones

↳ Follicle stimulating hormone (FSH) and Luteinizing hormone (LH) are released by pituitary gland

↳ These are responsible for development of ovarian follicles as well as oogenesis (female) and spermatogenesis (male)

↳ Sex-hormones from gonads (oestrogen & testosterone) are responsible for development of secondary sexual characteristics.



Nutritional Factors.

- physical & mental retardation.
- lower immunity.

↳ The body requires certain essential nutrients in diet for optimal growth especially in early childhood years and puberty.

1) Malnutrition :- It causes lack of essential nutrients and lower immunity, causing impaired mental & physical development.

2) Effect of undernourished mother on child development

↳ A study published in Nature Communications stated that girls who had access to mid-day meals ^{in govt. schools} had children with 13-32% improved height to age ratio b/w 2006-16 & infancy.

Case study
by S. Chakrabati
(2021)

3) Nutrition during (early childhood) :- This is the period of maximum development.

↳ Malnutrition is leading cause of under-5 mortality.

underweight - 32%
stunted - 35%
wasting - 20%

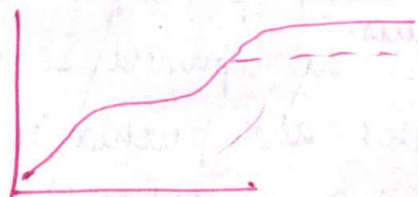
4) Adolescence :- malnutrition can delay menarche and puberty in girls by 1.5-2 years.

diseases
↓
Kwashiorkor, Marasmus, anaemia, etc.

↳ Eg:- Age of menarche in India
↳ well-off families - 12.85 years
↳ poor - 13.89 years.

5) Maturity & senescence :-

lack of nutrition can cause of functional decline of body. It can thus make the ageing process more rapid.



Socio-cultural factors & economic

1) Nutritional deficiency :- Poor economic condⁿ and illiteracy can deprive the child of a balanced diet.

2) Home conditions / ^{env.} There is inhibition in secretion of growth hormone if child is in a stressful environment.

↳ Poor households, ^{divorced parents / broken homes} are likely to have a more depressing and grieving atmosphere.

3) Economic deprivation & faulty family budgeting :-

In poor households, budgeting is never child-centric ; nutritional deficiency ^{club here}.

↳ eg:- Tanner (1972) observed height difference of 2-5 cm b/w children of managerial class & unskilled labour.

4) Minor illness - Poor households are more

^{due to overpopulated settlements, poor sanitation & hygiene}

susceptible to diseases like measles, influenza, diarrhoea etc.

↳ These adversely impact growth in the long run.

5) Lifestyle practices :- Women who smoke ^{sooner ageing due} during pregnancy are likely to have children 100g and 1cm smaller than others.

^{to lack of sleep, poor diet, alcoholism, smoking}

6) Social mobility / ^{status} :- People who are more intelligent show upward social mobility, while others are pushed to the lower strata.

↳ Thus, social mobility is both the cause & effect of segregation into rich & poor.

4) Gender disparity

↳ less access to resources.

↳ cultural practices of feeling male 1st impact their growth.

eg:- Ancient / medieval times; girls' growth arrested by making them wear tight shoes, corsets in China, etc.

• Conclusion

Thus, growth trajectory is impacted by several factors. Govt. initiatives like Poshan Abhiyan can promote nutrient rich diet and hence healthy development.

(6) Social status - people belonging to upper caste better growth indicators than lower caste due to differential access to resources

↳ Lancet study

↳ life expectancy - 64 yrs for ST, 67 yrs avg.

Q.4 Explain ageing and Senescence. Describe its various theories.

• Intro :- Ageing simply refers to changes associated with growing old, regardless of when they occur in the life span.

Gerontology
:- science of ageing

Senescence, however, as per Strehler (1962) implies changes which occur generally in the post-reproductive period, ~~and which~~ resulting in decreased survival capacity due to functional decline.

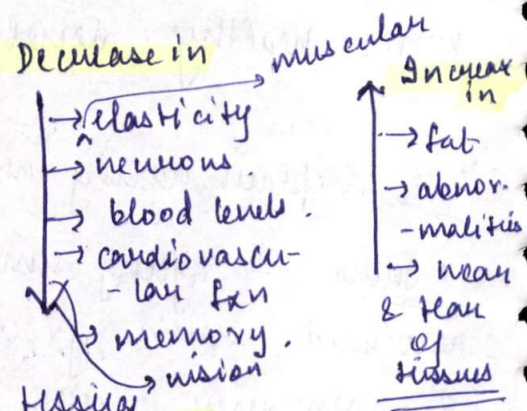
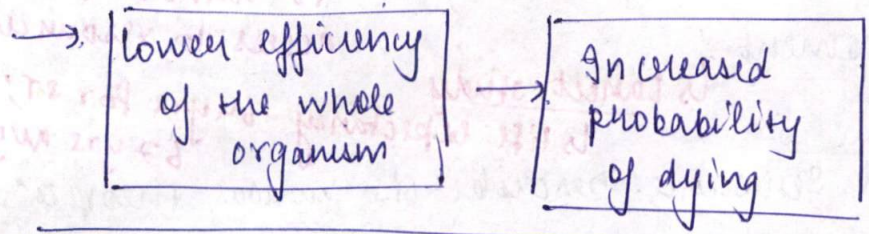
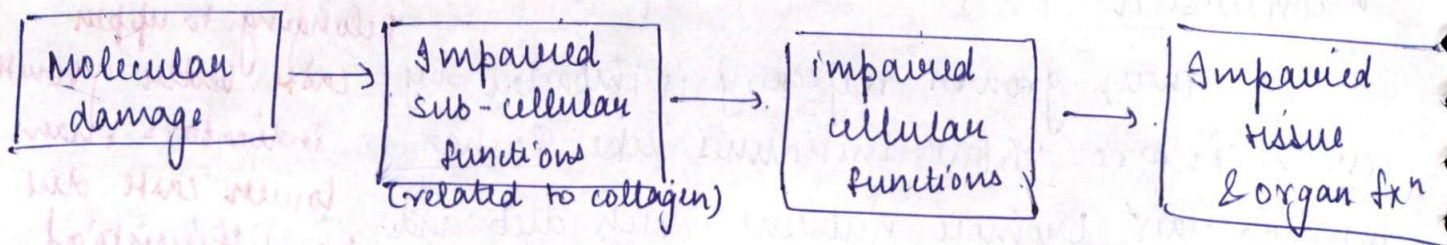
→ Eg:- Puberty can be classified as ageing but not senescence.

• Characteristics of Ageing & Senescence

- 1) Changes are always deleterious.
- 2) They are cumulative & the ultimate result is death.
- 3) Decreased capacity of organism to cope with its environment.
- 4) It is a fundamental process and inescapable in nature.

• Mechanism of Ageing & Senescence

→ It is a gradual process initiated at molecular level much in advance before the external symptoms appear.



External symptoms of senescence

- decreased elasticity in connective tissue
- Decrease in no. of neurons, blood pumping efficiency & other vital capacities
- Used amount of fat in body.
- Decreased enzymes responsible for oxidation.

Biological theories

1) Wear and tear theory. :- By A. Weismann (1882).

↳ It suggests that tissues get worn out due to constant & spontaneous use & are not replenished.

2) Theory of genetic blueprint or death gene theory.

↳ Ageing follows a biological clock. It is genetically determined ^{when} one or more harmful genes become active in late life.

↳ It states that human life span is an inherited trait.

↳ Eg:- Similar age of death of MZ twins.

↳ high long extraordinary longevity in generations of families in Hunza (Pak).

criticism
↳ inadequate understanding of how gene signals are transformed into ageing signals.

3) Free radical theory - by Denham Harman in 1980s.

↳ free radicals of hydro-peroxy in cells react with unsaturated lipids to form 'age-pigments'. → cause damage to cells.

↳ Thus, vit. E (an antioxidant) helpful in delaying ageing.

4) Error theories.

↳ Increased error at the level of DNA, RNA or protein synthesis with age.

↳ This impacts functionality of several enzymes.

→ by Bjorksten (1942)

Criticism

↳ error can occur

at any stage of life.

Criticism - Not all free radicals

damage cells. Some actually kill harmful bacteria.

5) Collagen cross-linkage theory.

↳ cross linkage of collagen fibres with age. → damages cells & tissues. This causes reduction in diffusion of nutrients and waste products across basement membrane.

by Burnet & Wajford

6) Immunological theory

↳ efficiency of immune system decreases after adulthood.

↳ This is due to atrophy of thymus shortly after puberty. Thymus is associated with differentiation of T-lymphocytes.

Criticism

↳ long time b/w puberty & senescence when ageing starts. immunity of children also low in many cases.

7) Theory of brain as pacemaker :- brain is at the key locus of ageing.

↳ Hypothalamus determined control of body-temperature, blood pressure & heart rate are impacted.

↳ Besides it also impacts several pituitary hormones.

Criticism -

how brain & hypothalamus are affected by age.

• Social theories.

(Don't mention until specifically asked)

1) Disengagement theory :- formulated by Cumming & Henry in the book 'Growing old' (1961)

→ Individuals start to withdraw & isolate from social interactions due to age-related factors like - expectation of death, decline in activity levels etc.

→ Criticism - Not universally applicable, many elderly are very active.

② Activity theory :- developed by Robert J. Havighurst in 1960s.] Criticism - not everyone wants to engage in new roles; health & economic inequality that hinders engagement

↳ Proposes that successful ageing occurs when elderly stay active & maintain social interactions.
Eg:- volunteer activity post retirement.

③ Continuity theory :- developed by Robert Atchley (1971)

↳ states that elder adults will try to maintain the continuity of their lifestyle by adapting different strategies.

↳ Eg:- using spectacles to read books.

Criticism - neglects elders with chronic diseases (can't be adjusted); role of social instit.

• Contemporary relevance

1) Increasing % of aged population due to medical interventions & higher life expectancy at birth.

↳ Acc. to technical group on population projections (2014) :- proportion of 60+ individuals will increase from 8.4% in 2011 to 15% in 2036.

↳ 36% population above 60 in Japan (2014).

Avg age in Europe = 43 years.
Median " " Japan = 48.4 yrs
" " India = 28.4 yrs.

2) Decrease in working population ¹ - This also calls for tapping the youth potential by investing in health & education ~~also~~ before ~~to changes in demography~~. ^{major demographic change.} ^(15-59 age) ^{Using the demographic dividend.} ^{Demographic dividend reported to peak by 2036}

3) Focus on silver economy catering to the needs of elderly. At the same time, making them active participants in the economic development of the country.

↳ Eg: - 3.1) SAGE scheme

4) Need of more robust eldercare ecosystem

put sector to bring out innovative products for elderly.

3.2) SACRED Portal :- connect senior citizens with job providers.

5) Integrate elderly to prepare India for future

↳ use their professional experience, crucial link for transferring moral values, etc.

Conclusion

Article 41 of the directive principles also calls for public assistance in case of old age. Hence, efforts should be done to integrate them more effectively in the mainstream society.

Format for 10-markers

- Defn.
- char. + external observations.
- Mechanism
- Theories (just words - main)
- contemporary relevance.

Decrease in
↓
→ neurons
→
→

Increase in
↑
→ abnormalities
→ fat

Q.5 what do you mean by biological & chronological longevity.

- Intro :- Chronological age is the real age of a person while biological age is the age of the body. Many times, chronological age does not match the biological maturity of a person.

→ Example :-

1) Biological age is advanced than chronological age

:- A 35 year old person showing greying of hair, cardiovascular irregularity which is unusual for that age.

2) Biological age is less than chronological age

:- late onset of menarche & late development of secondary sexual characteristics.

→ Thus, biological age is seen as true measure of age.

• Reasons for difference b/w two.

1) Biological age is influenced by many factors:-

↳ genetic, environmental, nutritional, socio-cultural etc.

give menarche eg - 12.8 yrs - well off families
↳ 13.8 yrs - poor fam.

2) Life style practices such as:-

↳ Diet :- fast food, smoking, high cholesterol intake.

↳ stressful life

↳ lack of physical activity and exercise

can cause diseases such as diabetes, heart diseases etc.

3) This causes variation in biological & chronological age.

• Methods to determine biological age

1) Skeletal maturity :- Biological age of each bone is determined by the no. of ossification centres & their stage of development.

↳ X-ray of the skeleton of the person is compared with standard atlas of primary & secondary centres of ossification where there is high calcium content.

2) Dental maturity :- It is determined on the basis of stages of calcification.

↳ X-ray of the person's jaw is compared with that of a standard atlas.

3) Shape age :- It is comparatively difficult to derive.

↳ It takes into account a combination of body measurements which change with age.

4) Behavioral surveys :- A person's details about exercise regime, smoking habit, weight etc are taken.

↳ It is compared with average score of a large sample of healthy people of same chronological age.

• Conclusion

Hence, it is important to maintain a good and healthy lifestyle to minimise the disparity b/w biological & chronological age.

Q. 6 Describe human physique and somatotype. Explain its various methods.

• Intro :- Somat^{ty}ope is defined as the quantification of ~~the~~ human shape & body form. As per Sheldon (1940), somatotypes are morpho-phenotypic ranges along constantly recognisable characteristics and are the functional end products of the whole genetic & development complex.

• Somatotyping :- humans are classified into certain classes based on their physique or build

→ such classification Methods of somatotyping

I. Viola's method

→ It recognises 4 types of somatotypes :-

1) Longitype - long limbs compared to trunk; large thorax relative to abdomen; large transverse diameter relative to Antero-posterior (AP) one.

2) Brachitype - characters opposite of longitype i.e., short limbs; small thorax etc.

3) Normotype :- characteristics in between longitype and brachitype.

4) Mixed - mixture of several characters in different body parts; do not fall into above categories.

→ Criticism :- This classification is not used because of the level of discreteness which is not practical.

II Kretschmer's method

→ It gives 3 types of somatypes:-

- 1) Pyknic - broad, round and fat, sturdy and stocky
- 2) Leptosome - long, thin and linear.
- 3) Athletic - heavily muscled; large thorax & shoulders; narrow hips.

→ Criticism :- 1) It lacked detailed classification.
2) It also gave discrete body types.

III Sheldon's Method

→ Sheldon gave three broad somatypes in 1940.

These were:-

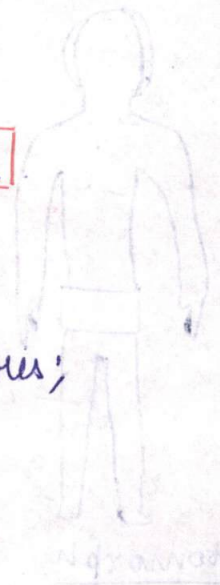
- 1) Endomorphy :- reflects general softness and roundness of the body; tapering of extremities; abdomen predominates over thorax.
- 2) Mesomorphy :- Reflects general massiness and sturdiness of the musculo-skeletal system; highly developed limb muscles; strong & muscular thorax.
- 3) Ectomorphy :- thin and lean body; weak muscles; long and slender extremities.

→ His observations (add when asked specifically)

→ He studied 4000 male students aged 6/w 16-20 years by inspection of photographs in various angles.

→ The components he studied were:-

- 1) Head, face and neck.
- 2) Thoracic trunk.



3) Arms, shoulders & hands.

4) Abdominal trunk

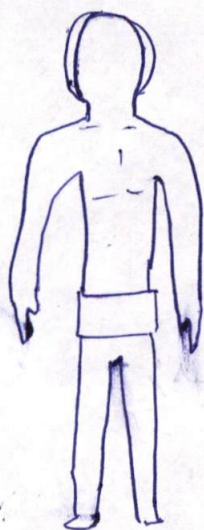
5) Legs and feet.

→ He then rated every individual from 1-7 in each of the 3 somotypes, based on these five parameters.

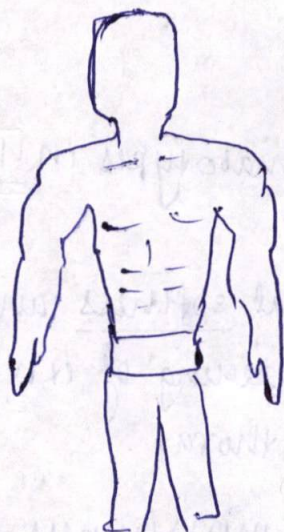
↳ Extreme Endomorphy :- 7-1-1

↳ " Mesomorphy :- 1-7-1

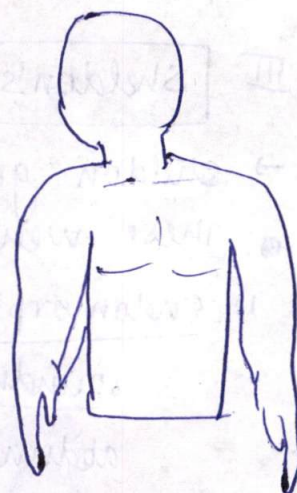
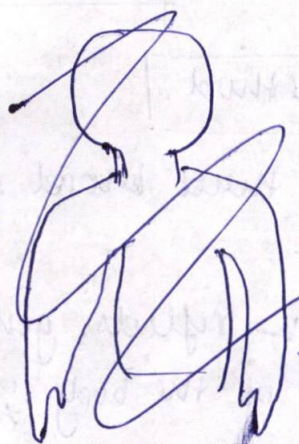
↳ " Ectomorphy :- 1-1-7.



Ectomorph



Mesomorph



Endomorph

→ Criticism :- Though it is widely used; certain limitations are:-

- 1) Neglect of changes associated with age-factor, gender, ethnic group etc.
- 2) No certain precise age at which rating should be done.
- 3) Ignores role of environment and assumes human physique to be static from birth to death. — main criticism by Heath & Carter.
- 4) Scope of biasness due to prior contact of subject with rater.

(9) Heath and Carter method (1967)

→ Heath critically analysed the shortcomings of Sheldon (1963) and gave a new method with Carter in 1967

→ main difference :- Heath argued that a person's body type changes ~~with~~ over time with body & muscle mass fluctuations.

} while sheldon considered it to be static.

↳ Thus, ~~only present mo.~~ it is more objective as it is based on present morphological conformation.

→ components :- 1) Endomorphy - - - } same as
2) Meso - - - } sheldon
3) Ecto - - - }

→ Methodology

↳ ~~the~~ They evaluated ten anthropometric measurements like height, body weight, biceps skin fold etc.

↳ Each individual was then rated from 1 to 7 in each of the 3 somatotypes based on these 10 bodily measurements.

→ Adv

- 1) highly objective :- results based on accurate measurements
- 2) Useful in studying spatial-temporal variation in body forms.
- 3) More accurate, efficient
- 4) Takes into account variations due to gender also.

→ Criticism

- 1) No precise age.
- 2) bias.

write all methods in short when not specifically asked.

• Methodology

1) Photogrammetric anthropometry

:- inspection of photographs taken from different angles for accurate body measurements.

2) X-rays :- Used to measure width of fat, muscle and bone.

3) Relative indexing of individuals based on these measurements

• Significance / Relevance

1) Function :- Ectomorphs are more likely to secrete higher thyroidal secretions.

Understanding

1) Physiological variation

- ↳ higher thyroidal secretions in ectomorphs
- ↳ High systolic & diastolic BP in broad built persons than linear ones.

2) Diseases :- some body types are more susceptible to certain diseases.

↳ Eg! -> Pulmonary tuberculosis - ectomorphs.

↳ Diabetes Mellitus - endomorphs.

↳ Cancer (mainly breast cancer) :- more frequent in brachytypes than longi types etc.

3) Behaviour

↳ Sheldon said that there is 0.6 correlation b/w:-

b1) Endomorph :- Viscerotonia - relaxed & extrovert

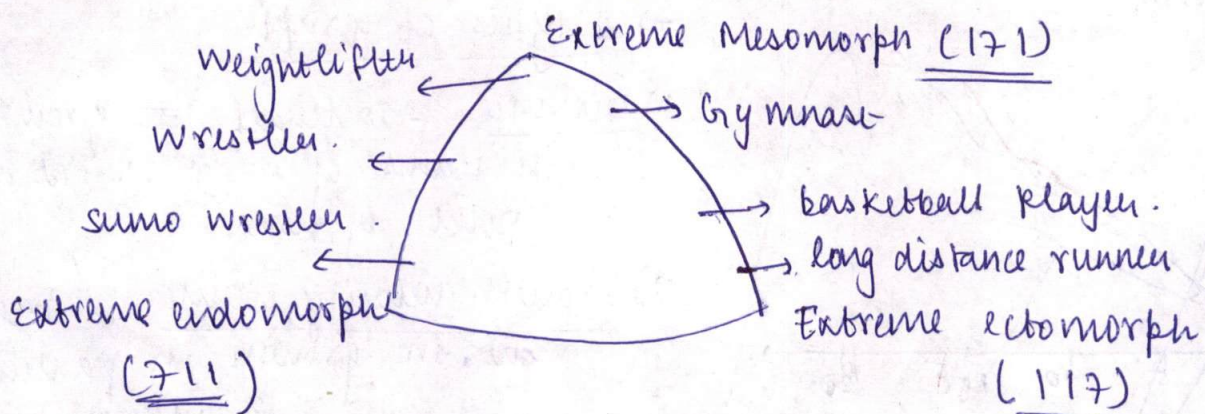
b2) Mesomorph & Somatotonia - Assertive, active & extrovert.

b3) Ectomorph & Cerebrotonia :- restricted & introvert

u) sports performance

→ Ectomorph - more agile & flexible

→ Mesomorph - high strength & endurance.

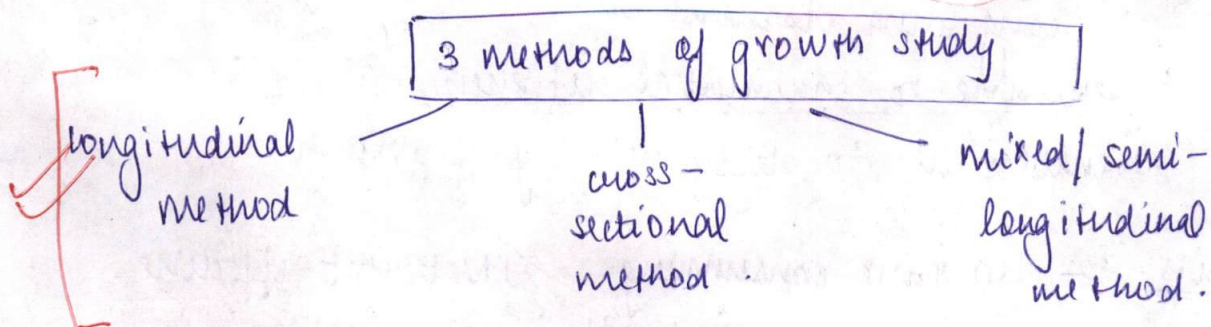


• Conclusion.

Sheldon & Heath-Carter method are widely accepted. They find application in kinanthropometry, ergonomics, nutritional studies etc.

Q.7 What are the different methods to study growth?

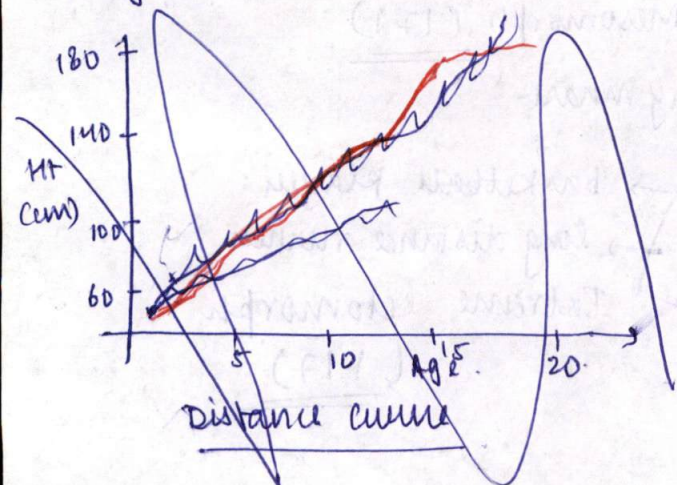
• Intro :- Growth refers to quantitative increase in body size and mass. It is primarily due to multiplication of cells.



1) Longitudinal method

- ~~Growth study~~ It is performed on same individual at different point of time.
- Repeated measurement of same individual are taken at regular interval.
- Graphs are then plotted for each individual, ~~for comparative purpose~~.

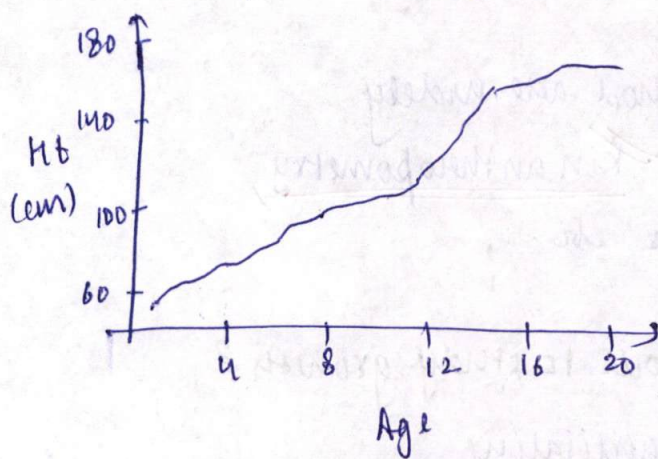
→ ~~These average show the general pattern of growth~~



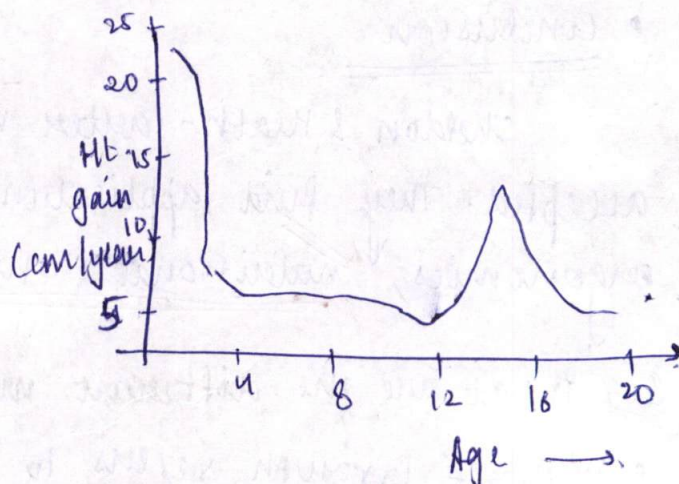
→ 2 types of graph

1) Distance :- overall ~~the~~ growth in terms of ht or wt. at any point of time.

2) Growth velocity curve :- Increment in growth in particular time interval.



Distance curve



Growth velocity

- Merits :- 1) highly accurate as it involves long term observations.
- 2) sensitive to individual difference
- 3) enables us to study velocity of growth.

- Demerits :- 1) Time consuming 2) Not cost effective.
- 3) Not easy to obtain individual samples of a large population.

3) Other problems due to long terms like researcher's health, commitment etc.

② Cross-sectional method.

Eg:- 100 sample for age 5-10
100 " " age 10-15

→ Individuals are included from different age-levels. Their growth parameters are recorded all at once. No long-term study is done on them.

→ Average at each age-level is taken from the large sample

→ It is based on assumption that all the individuals of a population will show same growth norms over a period of time.

→ Merits :- 1) Rapid process.

2) Saves time, energy, resources; more cost effective.

3) Useful for establishing population mean at successive age level.

→ Demerits :- 1) Can be inaccurate due to one-time study.

2) No consideration for individual differences.

3) Not true representative of the growth curve in general.

③ Semi-longitudinal method.

→ It combines both longitudinal & cross sectional method.

→ It studies the same individuals for 3-5 years. While other measurements are collected from other individuals.

At the same time, measurements of other individuals are also collected.

→ It combines the advantage of both methods.

→ used for practical purposes.

→ limitation :- 1) large sample at particular age level might not be available

• Conclusion

Hence, semi-longitudinal method is largely preferred for growth studies.

Significance of growth studies

→ from Q.2 (last part)

• catch-up growth :- After illness or starvation characterized by slow growth, there is tendency in younger individuals to bridge the deficit in growth as soon as possible and catch up with the original growth curve.

→ It stress → severe

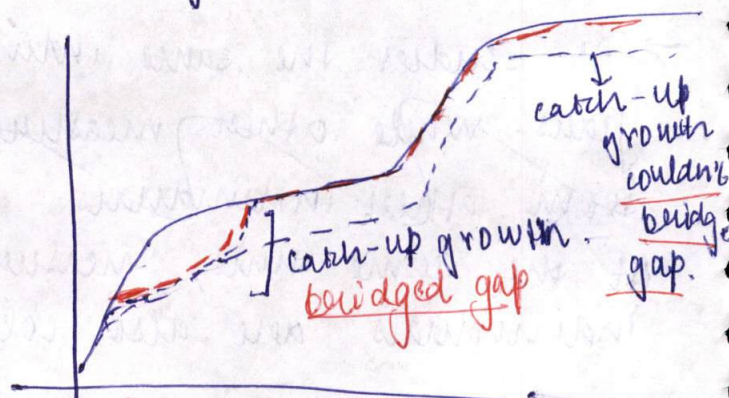
↳ prolonged

↳ early in life.

→ Catch-up growth velocity may be 3 times the normal velocity for that age.

even though catch up velocity attained for a while, it may be insufficient to return to normal growth curve.

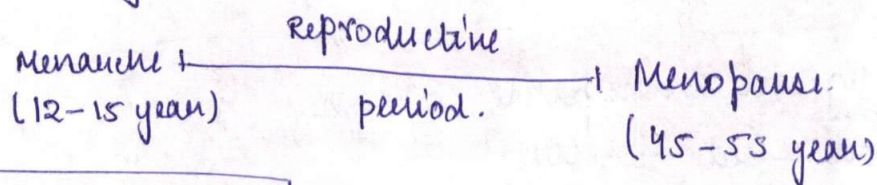
→ This results in permanent undergrowth.



Unit -11

Q.1 What is the relevance of menarche, menopause.

- Intro Menarche refers to the onset of menstrual cycle in girls, generally during adolescence, menopause is a stage when menstrual periods stop completely.



• Physiological impact

→ Menarche

- 1) Secretion of oestrogen.
- 2) Enlargement of breasts and widening of pelvis.
- 3) Increase in fat density.

→ Menopause

- 1) Cessation of oestrogen secretion.
- 2) vaginal dryness characterised by hot flashes, mood swings.
- 3) end of reproductive cycle.

• Age at menarche and menopause

I → Mean age of menarche has declined significantly over years mainly due to improved nutrition.

→ Other factors :-

1) Genetic :- biorythm - Daughters often reach menarche at a similar age as their mothers.

↳ MZ twin studies :- MZ twin sisters reach menarche at an average of 2-months apart while non-sisters on an average of 20 months apart. identical

2) Environment :- Nutritional status and thus Socio-economic status also impacts age at menarche.

↳ Eg:- Study by AM Tripathi shows,

Girls belonging to urban group of high society get their menarche 1-1.5 years earlier than the rural groups.

II Menopause

→ Depends on nutrition, climate and racial (genetic) factors.

→ Nutrition :- Age at menopause is higher in better nourished societies

↳ Eg:- India - 45.03 years.

↳ UK - 51 years.

→ Other factors responsible for early menopause :- smoking cigarettes, extreme thinness etc.

• Relevance

1) Biological :- The period between the two events is the reproductive span of a woman.

↳ It marks the ability to bear child, called fecundity

2) Evolutionary :- Menopause is seen as an adaptation that allowed females to re-channel reproductive energy into nurturing of offsprings, thus contributing to human survival.

3) Cultural :- These events are associated with rituals in different communities.

Eg:- Ritu Kala Samskara - ^{menarche} rite de passage ceremony in south India.

↳ Tuloni Biya ceremony in Assam.

4) Demographic :- Determines the demography of a country depending on the TFR.

5) Health :- Early menarche has been associated with increased risk of breast cancer & endometrial cancer.

6) Political social :- helps in policy making related to adolescent health, women health, family planning etc.

• Conclusion :-

The lifestyle changes as well as increased nutrition have resulted in change in: micro-changes.

Menstrual cycle is often determined by nutrition level and lifestyle practices. Hence, it demands for exclusive studies in these areas.

Q.2 Explain the demographic transition.

• Intro :- Demography refers to study of human population, its growth and decline due to changing patterns of migration, fertility & mortality. Such change in population structure is called demographic transition.

→ Demographic Transition theory was first developed by Warren Thompson in 1929. But the first authentic work was done by F.W. Notestein in 1945.

Any change in population structure in terms of age & gender patterns due to migration, fertility & mortality.

• Stages of Demographic Transition

→ It is believed that all populations pass through the following 4 stages:-

1) First stage :- High Population Growth Potential

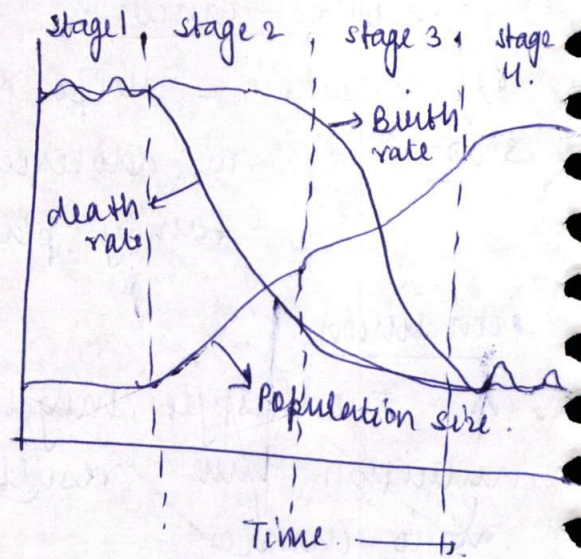
1.1) Society is rural & agro-based.

1.2) High birth rate :- due to illiteracy, children seen as economic assets, early marriage etc.

1.3) High death rate :- lack of medical facilities & nutritious diet; poor sanitation.

1.4) Net Result - high population growth potential but low actual growth.

1.5) Eg:- India before 1950s.



2) Second stage - Population explosion.

2.1) Beginning of industrialisation; rise in income levels.

2.2) High birth rate :- still high due to unchanged family attitude & socio-cultural norms.

2.3) Reduced death rate :- Rapid decline due to improved food supplies & medical facilities.

2.4) Net result :- Birth rate remains high while death rate rapidly falls causing a population explosion.

2.5) Eg:- India between 1950-1980

3) Third stage - Incipient decline

3.1) Transformation of economy from agrarian to partially industrialised one - rapid urbanisation

3.2) Falling birth rate :- improved status of women, preference for smaller families

3.3) low death rate :- due to further improvement in medical facilities, diet, sanitation etc.

3.4) Net result :- There is incipient decline of population growth.

↳ 3.5) Eg:- India is currently in the 3rd stage.

TFR (1991) - 3.6 ; TFR (2019-20) - 2.00 (NFHS-5 data)

↳ It is predicted that India's population will peak b/w 2040-50 as per studies published in The Lancet, UNDP etc.

→ 2048 at 1.6 bn;
& decline to 1.09 bn
in 2100

(4) Fourth stage - stationary population

4.1) Economy has completely transformed from rural high birth & high death rate to modern low birth & low death economy.

4.2) This results in population stabilisation & low actual growth of population.

4.3) Eg:- Western Europe.

Acc. to NFHS-5 data; peninsular India is close to completing its transition; while North-Central India is still expanding & will peak in 2040s.

• Significance of demographic transition studies

- 1) Helps in understanding the population with respect to gender ratio & age structure.
- 2) Framing public policy to utilise the demographic dividend.
- 3) Policy to cater to rising old-age sector and boost to silver economy.
- 4) Helps in crafting strategy for family planning, adolescent health, maternal health etc.

Q.3 Discuss the demographic theories / Discuss different theories of population.

• Intro :- Demography is the study of human population, its growth and decline due to changing patterns of migration, fertility and mortality.

→ There are several theories that study these patterns and its effect on population growth.

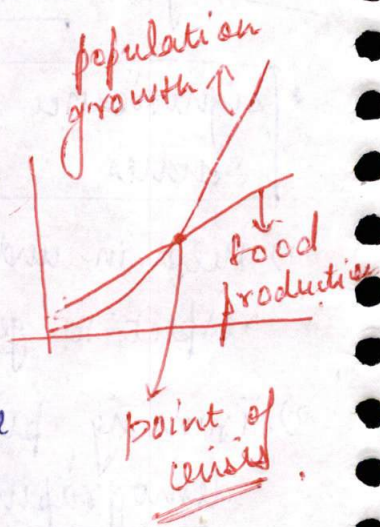
Biological theory.

I) Sexual behaviour related theories.

① Malthusian theory :- It was given by T.R. Malthus in his essay "Essay on the principle of population as it affects the future happiness of mankind". (1798).

1.1) Geometric progression of the population :-

Because of passionate behaviour of male & female sexes, human population shall double in one generation time of 25-30 years. Hence, population shall increase in GP (2, 4, 8, 16, ---)



1.2) Arithmetic progression of food production because of law of diminished return. That is, food will increase in AP (2, 4, 6, 8, ---)

1.3) Positive checks by nature (miseries) :- Before shortage of food occurs, nature will keep a check on population by miseries like bad food, famine etc.

1.4) Preventive checks :- Malthus believed that mankind could be saved from these miseries if he

voluntarily controls the growth of population through late marriage, chastity before marriage etc.

② Robert Ardant's theory.

↳ It states that primitive societies & animal species have since long practiced population control measures, aimed at controlling sexual behaviour.

↳ eg:- verbal prescriptions used by Chola in India of Kerala for family planning.

II Food fertility Nexus related theories / Socio-cultural theories

① Theory of Herbert Spencer:- He argued that fertility decreases as complexity of life rises.
By same analogy;

Rich people
low genesis due to
high individuation (energy
for self development).

complex soc.

Rich individuals /
Higher forms.

Low genesis

High individuation

(energy for self-development).

simple societies

Poor people /
Lower forms

high genesis due to lower
individuation.

② Theory of de-castro :- Presented in 'The geography of hunger' (1952)

↳ culture with low protein diet

↳ It states that less protein consumption by females leads to fatty degeneration of liver making it weak.

↓
high fertility

↳ weak liver is unable to neutralise excess oestrogen.

resulting in higher fertility.

→ Thus, TFR is higher among poor-strata or low-income countries.

③ Theory of Thomas Malthus

He states that scarcity of food enhances fertility and so does leanness. While plethoric state is unfavourable to fertility.

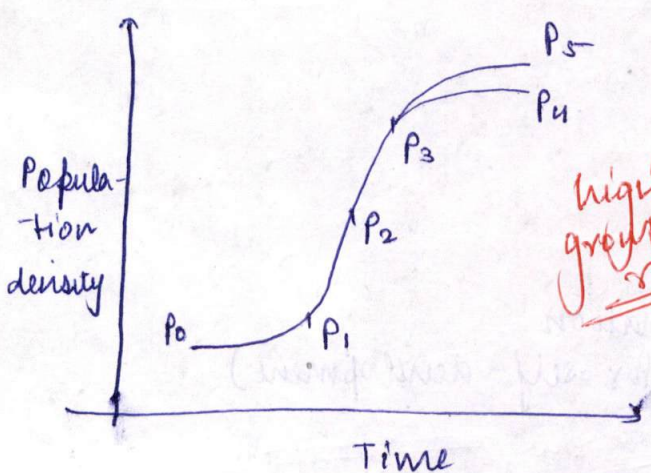
→ cultural :- vegetarian diet ↓ fertility; non-veg ↑ it

↳ sedentary life ; consumption of animal fat ↑ fat level in body & interferes with fertilisation process; thus decreasing fertility.

III Density - Fecundity Nexus theories

① Theory of Pearl and Reed Socio-economic theories

!- As density grows, there is a fall in fertility & population finally reaches a plateau. The population experiences transition from low density to high density as shown :-



$P_0 - P_1$ → most backward society

$P_1 - P_2$ = Developing society

$P_2 - P_3$ = Society starts showing concern about population growth

$P_3 - P_4$ = Developed soc. with no rise in population.

$P_4 - P_5$ = Developed soc. with slight rise in population.

② Sadler's theory !- It says that

hard work & privation ↓ fertility. (state of deprivation).

With industrialisation, there is less manual work & privation as population starts to gain literacy. All this leads to lower fertility.

• Conclusion

All these theories have been criticised on several grounds. Mostly because, the observations do not hold true for all populations mainly after ^{modern} advancements in population control & ^{made} food production.

Q.4 . Fecundity and fertility / Discuss the factors influencing fecundity & fertility. / factors responsible for differential fertility.

• Intro :- Fecundity refers to the capacity to bear child while fertility is the actual number of child born or the actual reproductive performance.

• Difference between fecundity & fertility

- | <u>fecundity</u> | <u>fertility</u> |
|--|---|
| 1) <u>No</u> direct measurement of fertility fecundity. | 1) It can be directly measured using statistics of birth. Eg - <u>TFR</u> . |
| 2) A person can be fecund but not necessarily bear children (i.e., can be both fertile & infertile). | 2) A person who is fertile has to be necessarily fecund (i.e., cannot be infertile). |
| 3) It is mostly determined by <u>biological</u> factors. | 3) It is determined by range of factors - <u>biological</u> , <u>psychological</u> , <u>socio-cultural</u> , <u>economic</u> etc. |
| 4) Fecundity is independent of fertility | 2) Fertility is limited by fecundity. A person can be fertile only if he is fecund. |
- environmental* (nutritional)

④ It is the maximum fertility level that can be attained.

④ It is usually less than the total fecundity level.

↳ Eg:- A woman can ideally have a fecundity rate of 20 children in her lifetime
↳ but normally, it's not that high, i.e., fertility is low.

Factors affecting fecundity & fertility

I Biological

- 1) Age of menarche & menopause :- The duration b/w these two events marks the reproductive cycle of a woman.
- 2) Frequency of sexual intercourse
- 3) Contraception and induced abortion.
- 4) Sterility of either male or female] ✓.
- 5) Lactational / ^{Post-Partum} infecundity :- period following the pregnancy is characterised by infecundity due to influence of lactation and inhibition in secretion of LH & FSH hormones.

II Socio-ecological cultural.

- 1) Age at marriage :- Acc. to NFHS-5 data Bihar has one of the highest rate of child marriage & has a TFR = 3.
↳ while states like Kerala having higher age at marriage has a TFR of 1.8

2) nutrition :- lack of nutrition causes early menopause & hence reduction in fecundity.

3) social customs :- Patriarchal mindset promotes couples to have children till birth of male child.

↳ Reduction in fertility due to widowhood, post-partum abstinence etc. → 10-14 yr.

(tribe eg- of 6 months among Swazi) children considered gift of god.

4) literacy & superstitions :- using contraceptions or termination of pregnancy is considered as sin in many societies.

5) lower education is associated with higher fertility. Eg: Abolition of Abortion in US

6) Religion, caste etc. :- Most religions like Hinduism, Islam, Christianity etc. are pro-natalist. While others like Jainism, Jee have lower fertility.

↳ lower castes tend to have higher fertility.

III Economic Theories

IV Environmental 1) Nutritional status

1) Theory of benefit-cost ratio :-

↳ Poor societies :- high IMR; thus desire to compensate for loss of children leads to high fertility.

↳ Rich societies :- high expenditure in upbringing of children → low fertility.

2) Becken's theory :- Factors determining fertility are knowledge, attitude and practice about family planning.

↳ He said next factor is income - higher the income, more is the aspiration of children.
more.

2) lifestyle :- smoking, stress etc.

③ Castellini's theory of parental aspiration

:- He states that high income ~~and~~ ^{but} low aspiration parents have high fertility.

↳ While if parents have high aspirations for themselves, fertility is low.

④ Unemployment-inflation combine has further lowered fertility rate in many societies.

⑤ Rising socio-economic status of women has also led to ~~used~~ fertility.

• Conclusion

India has recently achieved a TFR of 2.00, as per NFHS-5 data. Hence, any artificial (lower than replacement level of 2.1) effort to further reduce the TFR will be detrimental.

Instead of this, focus should be shifted on leveraging the emergent demographic dividend.

Q.5 factors affecting natality and mortality.

• Intro :- Natality is the measure of birth rate of a population. It is expressed as no. of live births per 1000 people per year.

Mortality is the measure of death rate of a population.

It is expressed as no. of deaths per 1000 population per year. It differs with age & sex.

• Factors influencing them are :-

I. Biological factors.

1) lethal & sub lethal genes or genetic disorders like Trisomy 21, 18, etc. - cystic fibrosis

2) Influence of sex :- X-linked immunoregulatory genes provide greater resistance to diseases in females and hence increased life expectancy in males.

In India →

♀ (Male) = 69.5 years

♂ = 72 years

↳ while some diseases are sex specific due to inherent reproductive physiology

↳ Eg:- breast cancer, maternal mortality in females.

↳ Prostate cancer in males.

3) Genetic diseases like heart disease, diabetes etc. According to CDS nine of the ten top causes of death are genetic.

4) for specifically natality :- 4.1) Menopause & menarche age
↳ 4.2) Age of mother, spacing b/w births

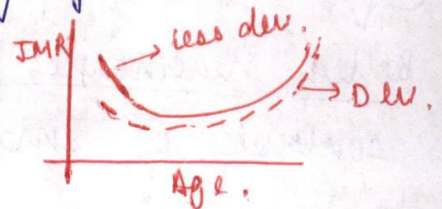
II. Socio-ecological factors

→ Maternal nutrition

S. Chakrabarti
case study
(2021)

1) Nutrition especially during pre-natal & childhood period determines longevity of life.

2) Socio-economic status & income :- Poor households have less access to medical facilities and healthy diet, thus higher mortality.



3) Education :- high education → higher socio-economic status → longer life.

4) Marital status :- studies generally show that married people have improved cardiac health, improved mental health etc.

5) Lifestyle :- inadequate exercise, unhealthy diet, excessive use of tobacco & alcohol negatively impacts longevity of life.
↳ major lifestyle factor today is obesity

6) Socio-cultural practices :- cultural factors foster more risky behaviour in men like use of weapons, employment in hazardous occupation etc. reducing their life expectancy. (eg - mining, wars)

7) Gender-specific discrimination :- infant girls usually receive inadequate diet & health care resulting in higher mortality in them.

8) Improved climate :- hot climates have high IMR due to famines & higher risk of infectious diseases etc.

• Causes of recent decline in mortality rates

① Control of epidemics

Better healthcare facilities & technology :-

control of small pox, TB etc.

↳ immunisation, vaccination etc.

② Public health programmes :- free vaccination, Ayushman-Bharat Mission etc.
drives.

annually
2 lakh deaths
due to inadequate
water & sanitation

NITI Aayog

③ Environmental pollution

↳ WHO reports
air pollution
has decreased.
life of most
of people in
India by 3
years

③ spread of education has made people more health conscious.

↳ Eg:- Covid-19 has promoted more healthy diet, practice of yoga, exercise etc.

④ Improved status of women

↳ Increasing age of marriage to 21 from 18 will further reduce MMR, IMR.

⑤ Increased food supply - reduced famine related deaths.

⑥ Better sanitation & hygiene

⑦ Economic development led to rise in incomes, access to healthcare. Improved life expectancy.

• Conclusion

Pandemic like corona-virus pose a major health challenge to the entire world. Collaborative action is thus required to prepare ourselves for such situations in the future.

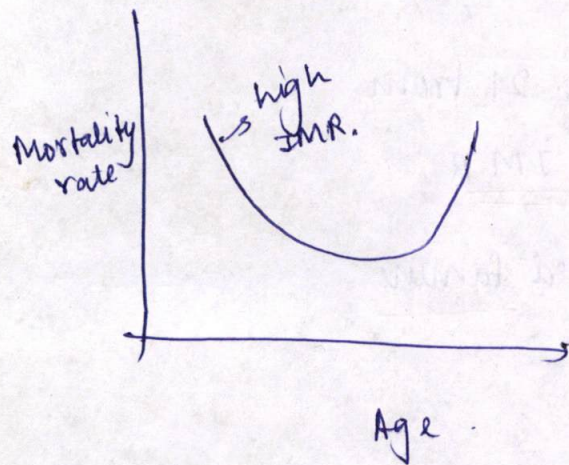
• Cause for IMR

- 1) Age of mother, birth interval
- 2) Status of women - education, health, socio-economic status
- 3) Gender discrimination.
- 4) Poor household.

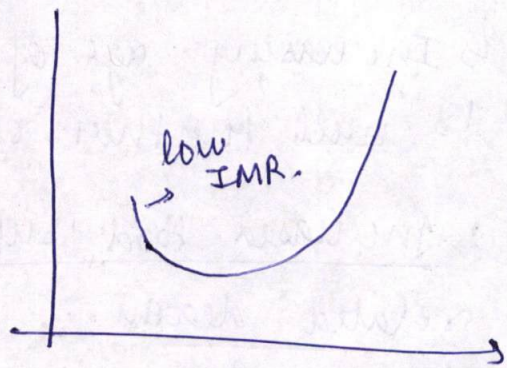
5) Poor nutrition . .

6) Sanitation & hygiene

→ Mortality curve for
poor & less developed
countries



→ developed countries



Unit-12

Q.1 Kinanthropometry / anthropology of sports?

• Intro:- Anthropology of sports or kinanthropometry is concerned with evaluating the physical structure of individuals in relation to gross motor functions so that they attain their fullest potentialities.

Background

→ The term 'kinanthropometry' was coined by Bill Ross in 1972, and got acceptance in 1976 at Quebec.

olympic scientific conference (OSC) at.

→ International working group on kinanthropometry (IWK)^{was} founded by UNESCO in 1986. It has been a driving force behind development of sports anthropology since then.

Basic Principle

→ Aim at selecting the best-suited genotype for a particular sport and then

1) Role of genetics and environment:- While genetics is the main architect, a person can be trained to achieve its full potential if provided proper environment

help him in gaining his full potential through exposure to suitable environment.

2) This includes

→ Nutrition.

→ Physical activity

→ Education & training

→ Proper design of sports equipments etc.

enhances quality of performance.

3). Hence, the combination of heredity & environment is very crucial for ~~the~~ kinanthropometry.

① brings out best talent

② saves cost & time

Significance

1) Selection of sportspersons based on their physique & morphological characteristics for particular sports.

↳ In this respect, Marquouse & Rasch (1964) formulated the following scheme:-

stature	weight	Appropriate sport
Tall	Heavy medium light	wrestling Boxing, <u>Basketball</u> . <u>Tennis</u> , Sprinting, Running (eg:- Usain Bolt)
medium	Heavy medium light	shot-putter Swimming Cricket, hockey, football etc.
short	Heavy medium light	weight-lifting (eg- <u>Mirabai Chanu</u>) Gymnastics skating

2). Recently, Mirabai Chanu won the silver

medal in Olympics 2020 for weightlifting.

↳ short stature is desirable as it would require greater strength to overcome gravity to ~~reach~~ ~~at~~ greater height lift to a

ht = 4' 11"

② Other factors are also considered for selection of sportspersons now:-

③ Kinanthropometry also considers craniometry, osteometry and genetics for sportsperson selection.

↳ ① craniometry - Eg! - ACTN3 is considered with good athletic performance.

④ Aerobic & anaerobic power :- Former is useful in sports which require great force with a sudden jerks like wrestling.
↳ while latter is useful for long-distance runners.

⑤ Redesigning of sports equipment to achieve full potential of an individual.

↳ Case study :- Dr. Sachindran Nanayan redesigned hockey sticks to suit the tribal players from Chotanagpur.

↳ And they went on to become National champion in 1995.

⑥ Regional mapping of specific sports - This has been done by Sports Authority of India (SAI) to find regional talent in specific sports.

↳ Eg :- Talent from North East India.

Conclusion

Hence, anthropological study of sports helps in both selection of fit genotypes for a particular sport as well as addressing regional development through focus on sports.

Various dimensions while selecting a sports person.

- 1) Physique & morphological characteristics. Eg :- Maehouss & Rasch
- 2) Maturity = Chron maturity; same chronological & biological age
- 3) Aerobic & anaerobic power
- 4) Subcutaneous fat - Eg :- Swimmers should have a medium layer to protect them from cold water but at the same time not provide friction while swimming

5) Genetics - ACTN-3 and ACTN-2 associated with elite performance in short distance & long distance running respectively.

6) Osteometry :- for a football player, dimensions such as femur versus tibial length, patellar height etc. become imp.

7) Taking into account other nutritional & socio-cultural factors

↳ eg:- Tribals of Chongapuri are considered excellent archers like (Santia Panahiya)

Tribal players excelling in archery

↳ eg:- Deepika Kumari

* Format

→ Intro

→ Bg.

→ Basic principle :- 2 points

① fit genotype (written in red)

② Environmental factors

→ Various dimensions of selecting a sports person (all 7 points)

→ Significance of Kinanthropometry

1) Brings out best talent

2) Saves cost & time

3) Redesigning of sports equipment

4) Regional development - SAI doing regional mapping of specific sports.

↳ eg:- Finding talent from North East

(Mirabai Chanu, Mary Kom, Lovlina Borgohain).

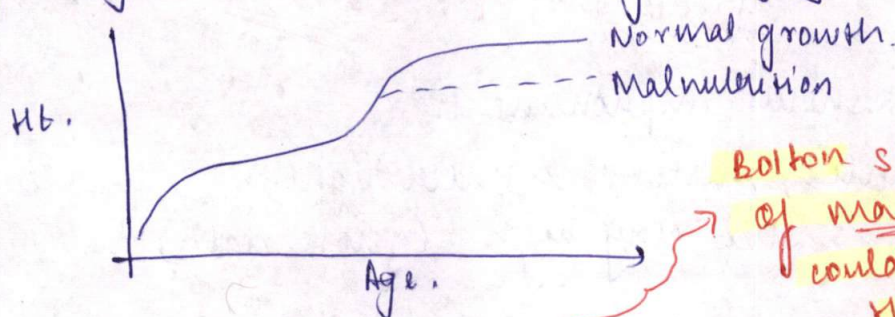
Q.2 Nutritional anthropology?

- Intro :- Nutritional anthropology is concerned with study of nutrients and nutritional status of an individual or community.

• Scope

- 1) Food intake, nutrition and health :- A nutrition deficient diet can cause undergrowth in children and several other nutrition deficiency diseases (Anaemia - deficiency of iron).

S. Chakrabarti case study (2021)



Bolton studied Orang Asli tribes of Malaysia - pregnant women could only eat 'small animals that possessed so called 'weak spirits''.

- 2) Social epidemiology of nutrition - Effect of various socio-cultural factors on nutrient intake
↳ Eg:- Deficiency of vit. B12 in majority of Indians - Vegetarian diet (cultural beliefs)

- 3) Population genetics and nutrition -

Eg:- Lactose intolerance in Africa; effect of nutrition of menarche or menopause & subsequent influence on demography

- 4) Socio-economic changes & nutrition :-

Effect of globalisation, urbanisation, technology use on food & nutrition.

↳ Eg:- shift from foraging-hunting to agriculture also saw rise in malnutrition

culture ecology

- 5) Applied research for nutrition programs

Eg - Poshan Abhiyaan, PDS etc Biofortification

Lee studied Kung (1999) (1979)

- 6) Nutritional anthropology -

hunter-gatherer tribes - low level of nutritional stress due to their diverse diets

• Nutritional anthropometry and methodology associated with nutrition anthropology.

⑧ Nutritional anthropometry

1) Choice of reference population

2) Indices for measuring ^{nutrition} deficit

! - Refining nutritional status through several techniques

↳ 2.1) Wasting - weight for Height

↳ 2.2) stunting - Height " age

↳ 2.3) Underweight - weight " "

→ for children

↳ 2.4) Body mass Index = $\frac{\text{weight}}{(\text{ht. in metres})^2}$

→ for adults

→ Contemporary Relevance

evidence based policy making

1) NFHS-5 data shows improvements

made in % of stunted, wasted & underweight, however the no. is still very high (quote data).

2) BMI relevance → BMI > 25 - overweight
↳ BMI > 30 - obesity.
↳ BMI < 18 - underweight.

3) Obesity ~~has~~ ^{is} becoming a rising health concern.

for both developing & developed countries due to lifestyle changes.

↳ innovative measures like Kerala govt. imposing fat tax on fast-food should be adopted to tackle it.

(iv) Helps in comparative study of nutritional status of 2 countries or ethnic groups.

↳ Eg! - Lactose intolerance in Africa.

• Conclusion

The scope of nutritional anthropology is ever increasing with schemes like POSHAN Abhiyan. ~~Region~~ specific diet could be provided.

to children targeting deficiency of a particular nutrient in a particular population. This can also provide boost to local crops

Q.3 Discuss the application of anthropometry in designing defence & other equipment.

• Intro :- Anthropometry is the branch of physical anthropology concerned with the measurement of the human body. ~~such as to determine range and variation in body shape in a population.~~
 promotes info on range & variation of body shape.

→ This data is useful in designing -
 workplace workspace clothing Equipments other components & devices.
 Anthropometry coined by Dufflet in 1871. 1st major work published by Rudolph Martin in 1928.

• Background

→ The term was first

• Anthropometry and principles of designing

- Leharbuch der Anthropologie.

1). Designing of equipments etc require participation of 3 groups of people -
 user, manufacturers and anthropologists.

2) All designs are based on range and variation in human body shape, size and fit.

3). In design anthropometry, the concept of average man is not suitable. Instead of this, percentile of normal distribution curve is used for designing.

↳ Designing for clearances - highest percentile

↳ Designing for reach - lowest "

eg - door must be designed keeping in mind tallest individual.

4) factors that determine the designing process :-

↳ efficiency → operational.

↳ safety

↳ comfort.

→ economic benefits - reduction in costs.

• Applications

1) Workspace design :- It involves designing of any space for human occupancy during work, rest, travel etc.

↳ Aim is to ensure adequate work space & proper location of controls, displays & devices.

↳ Eg:- Cockpit size & seat configuration to reduce discomfort & fatigue.

↳ Automobile interior etc.

↓
for different type of aircrafts.
for both fighters & bombers.

2) Clothing & personal equipment design :-

↳ It involves designing of garments, pressure suits, helmets, gloves, etc.

↳ Aim is to ensure proper fit & minimum restriction of movement.

↳ Eg:- Design of partial pressure suit for jet engines pilots. It prevents swelling of body at high altitudes.

3) Components and devices.

↳ It involves designing of defence appliances like gun turrets and even small appliances like knobs, doors, steering wheel etc.

↳ Eg:- When designing breaks, clutches of a car, reach is crucial factor, hence lowest percentile of data like length of limbs is taken.

• Conclusion

Design anthropometry was first used during World War II. In India, DRDO maintains anthropometrical database of soldiers and is involved in effective designing of defense equipments.

Q.4 Forensic Anthropology/ Methods of personal identification using forensic anthropology?

- Intro: - C.C. Snow (1973) defined the role of physical anthropology in forensic science. It refers to using the specialised knowledge of human sexual, racial, age & individual variations to the problem of medical jurisprudence.

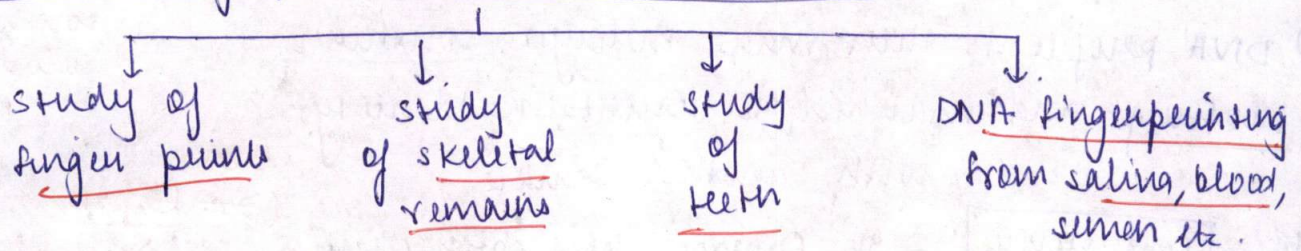
Scope

→ forensic anthropology could be used to identify a person in the following cases:-

- 1) Criminal investigation
- 2) Disputed parentage
- 3) identify person at site of accidents
- 4) identification in immigration cases.

→ It is also used in facial or personal reconstruction of identified individual.

Methods of personal identification



I Fingerprint Analysis

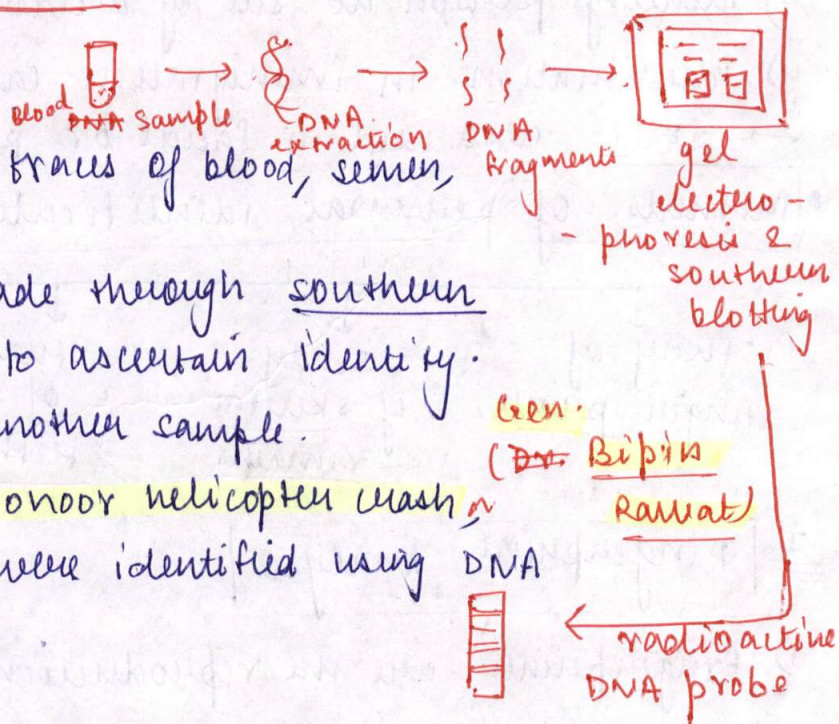
- 1) Fingerprints are the reproduction of friction ridges of the finger on a smooth surface.
- 2) First step involves collection of fingerprints. It is followed by identification of ridge-patterns.
- 3) A minimum of 6 characteristic ridge patterns are required to establish identity. - as per All India Forensic Science Congress (1973)

II Skeletal remains

- 1) Two types of skeletal remains are widely used to establish identity - bones & tooth.
- 2) Age and sex of a person can also be identified through skeletal remains.
- 3) Sex :- skulls of females tend to be smaller & gracile
↳ Pelvis region and sub-pubic angle also helps in identification of sex. (women - wider)
- 4) Age :- If all the teeth have not erupted & basisphenoid suture at the base of skull has not fused, it belongs to a sub-adult.
↳ through analysis of ossification centre.
Eg:- Infants show ossification centre at the lower end of humerus.

III DNA fingerprinting

- 1) DNA extracted from traces of blood, semen, hair etc. is used.
- 2) DNA profile is then made through southern blotting and matched, to ascertain identity with another sample.
- 3) Case study :- In Coonoor helicopter crash, martyred soldiers were identified using DNA fingerprinting.



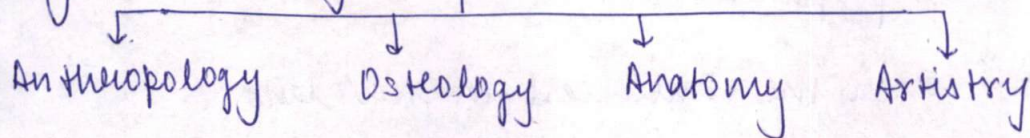
Conclusion

Forensic anthropology thus have vast scope in criminal investigation & person identification. Hence, it is essential that we focus on proper forensic training along with development of required lab infrastructure.

Q.5 Explain facial or personal reconstruction.

• Intro :- Facial reconstruction is an application of forensic anthropology. It refers to recreating the face or likeness of an individual from his skeletal remains.

→ Facial reconstruction requires amalgamation of the following fields -



→ Scope .

→ Facial reconstruction is used in :-

- 1) Criminal investigation.
- 2) Identification of persons at site of accidents.
- 3) Visualisation of prehistoric hominids.

• Methodology .

I). Reconstruction of entire stature

↳ ① Anatomical method - It involves simply putting the bones together & reproducing the curves of spine^{et} after estimating allowances for cartilage & external tissue.

↳ Merit :- Yields accurate estimation of stature.

↳ Demerit :- useful only when complete skeleton is available.

↳ ② Mathematical method . - It^{can} determine the complete stature using only one bone.

↳ Here, proportion of the bone to height in people belonging to same ethnicity, sex or age is used for reconstruction.

II facial reconstruction

1) It is advisable to pre-determine age, sex and ethnicity of the individual using other forensic techniques.

2) Two imp. criteria for facial reconstruction are - knowledge of skull musculature & soft tissue thickness of

3) A cast of skull is prepared.

4) clay is used to [↓] cover the skull cast in accordance with available knowledge of thickness of soft tissue etc.

5) Nose is reconstructed based on nasal opening.

6) However, one cannot accurately determine features such as eye color, hair color, shape of lips, body hair, degree of wrinkling etc. from skull remains.

↳ This, therefore requires certain degree of artistic imagination.

↳ In such a case, knowledge about person's age, sex and ethnicity is useful.

• Limitations.

1) Insufficient tissue thickness data, particularly while reconstructing faces of prehistoric hominids

↳ As standard measurement of skull of today's human is quite different.

2) Lack of a standard method.

3) Great degree of subjectivity involved.

4) Personal bias of the anthropologist or artist

• Conclusion

Facial reconstruction is thus a subject of great curiosity & controversy at the same time. Recent advances in 3-D printing software & holography hold great promise for future of facial reconstruction.

0.6 Paternity disputes.

• Intro :- Applied human genetics is used to identify whether a person is the biological father of a child. This is known as paternity diagnosis.

↳ Eg - N D Tiwari case.

• Methods of paternity diagnosis

1) Morphological

↳ Comparison of metric & non-metric features.

~~↳~~ ^{Non-}metric - skin color, eye color, shape of head.

↳ ^Metric - cephalic index, nasal index, facial index etc.

2) Dermatographic method

↳ matching of fingerprints & palmar ridges.

3) Genetic method

3.1) Serological method :- It is based on Mendelian inheritance.

↳ It can more often identify who is not the father rather than who is the father.

↳ It involves analysis of ABO blood grouping, Rh factor, Haemoglobin etc.

Parent
I
A

Parent
II
A

Possibly child

A, O B, AB

10-15% cases can be solved.

↳ eg! - A child having blood group O cannot have a biological father with blood group AB.

→ by Alec Jeffreys (1984)

3.2) DNA fingerprinting :- This is the most trusted & full proof method to identify parentage.

↳ Here, DNA profile of both child & suspected father made through southern blotting are compared.

↳ Greater degree of similarity b/w DNA profiles confirms paternity.

3.3) Other methods involve comparison of immunological and biochemical components like GM factor, enzymes, proteins etc.

• Application

- 1) - Used to identify biological father in case of rape victims, extramarital affairs etc.
- 2) settle disputes related to inheritance of property etc.

• Conclusion

The subject of paternity diagnosis is a very sensitive one. It should therefore be handled with utmost care and accuracy.

Q.7 Discuss eugenics, euphenics and euthenics.

• Intro:- These are various fields of applied human genetics aimed at promoting better and healthy genotype while eliminating the lethal genes.

→ All 3 however act at different stages, though they aim to cause the same effect.

• Eugenics

↳ The term was coined by Francis Galton in 1885.

↳ It refers to interference at the level of transmission of genes itself.

↳ Inheritance of better genes is encouraged while that of lethal genes is discouraged.

→ Two types.

Positive Eugenics

↳ To preserve the best type of germplasm through:-

- 1) Selective mating of individuals with desirable traits
- 2) Artificial insemination - sperm banks etc.

Negative Eugenics.

↳ eliminate defective genes. through:-

- 1) Genetic counselling
- 2) Marriage restrictions
↳ eg- in Cyprus, thalassaemia screening is compulsory before couples could marry
- 3) Sterilisation of the defective.

• Euphenics

↳ It comes into play after lethal genes have been inherited to an individual.

↳ It involves steps to delay or minimise the harmful effect of such genes through.

personalised or medical care.

↳ Eg:- 1) Gene therapy.

2) Artificial synthesis of medicines, hormones (insulin) etc.

• Euthenics.

↳ It involves improving the environment to enhance expression of better genes & reduce the impact of lethal genes.

↳ Eg:- 1) Better nutrition or diet (Phenylalanine free diet for patient of phenylketonuria)

2) Nanodaya schools for better development of intelligent students etc. ; Pollution-free env.

• Ethical concerns with eugenics.

1) Promotion of elitism, racism etc. as it tends to propagate the concept of superior-inferior genes.

2) Restricting individual freedom

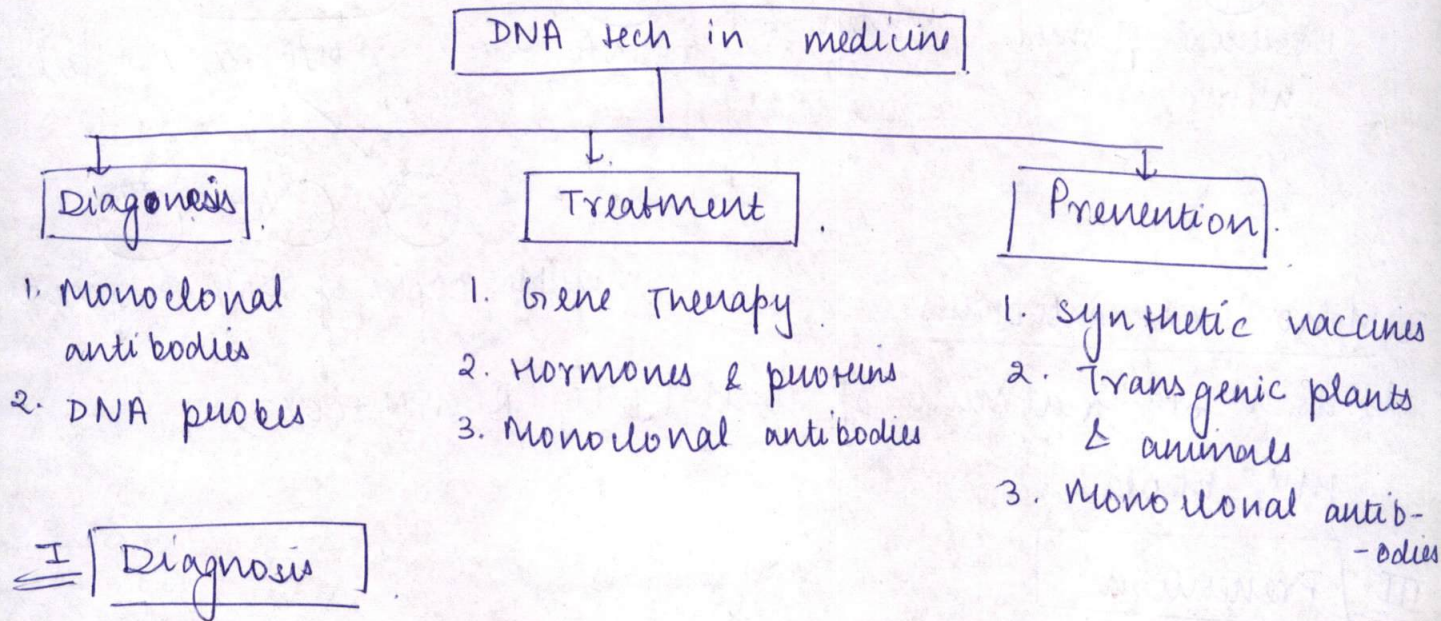
3) Forced sterilisation.

• Conclusion

While these concepts are crucial for betterment of human society, their misinterpretation should be checked. Adequate awareness and education can be helpful in balancing the act.

Q.8 Discuss the role of DNA technology in diseases and medicine.

• Intro :- DNA technology refers to manipulation of genetic material or introduction of desired gene into DNA to bring about favourable outcomes.



I Diagnosis

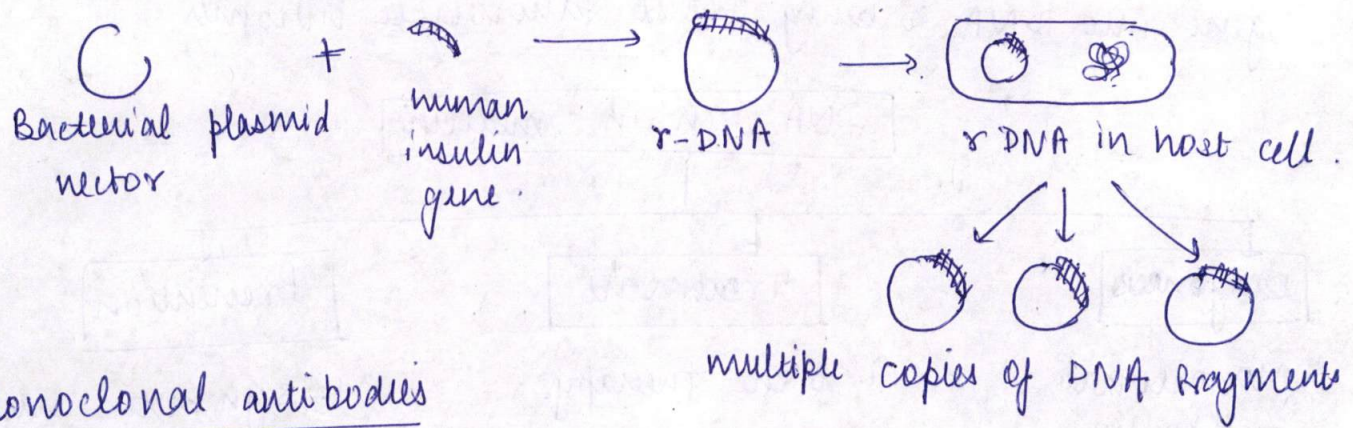
- 1) Monoclonal antibodies :- These are produced by lymphocytes through hybridoma technique.
↳ These are used to diagnose presence of pathogens (virus/bacteria), pregnancy test etc.
- 2) DNA probes :- DNA probes are short segments of DNA that recognise complementary sequences and thus help in their identification.
↳ Eg:- RT-PCR test for detection of covid-19 also use DNA probes.

II Treatment

- 1) Gene therapy :- It consists of gene replacement, augmentation or targeting, to overcome harmful effects of lethal genes.
↳ Eg:- Gene therapy was used in ADA deficiency.

2) Hormones & proteins

↳ R DNA technology has been used to artificially synthesise imp. hormones like insulin, growth hormone etc.



3) Monoclonal antibodies

↳ used for treatment of covid-19 (eg- REGEN-COV2), HIV, Ebola.

III / Prevention

1) Synthetic vaccines :- Vaccines have been made using inactive or weakened pathogen, r-DNA, m-RNA technology etc.

↳ Eg:- Vaccines for covid-19, rabies, cholera etc.

2) Transgenic plants & animals

↳ DNA tech. is used to produce genetically engineered plants and animals to improve their nutritional value for better health-outcomes.

↳ Eg:- Announcement for biofortification of rice with iron, vit. A etc.

• Conclusion

Folic acid.

Recent advances in DNA technology like CAR-T therapy (used in fighting cancer), CRISPR-Cas9

are further significant in improving public health. However, other dimensions of ethics, affordability and accessibility have also to be kept in mind to bring about transformation in health system.

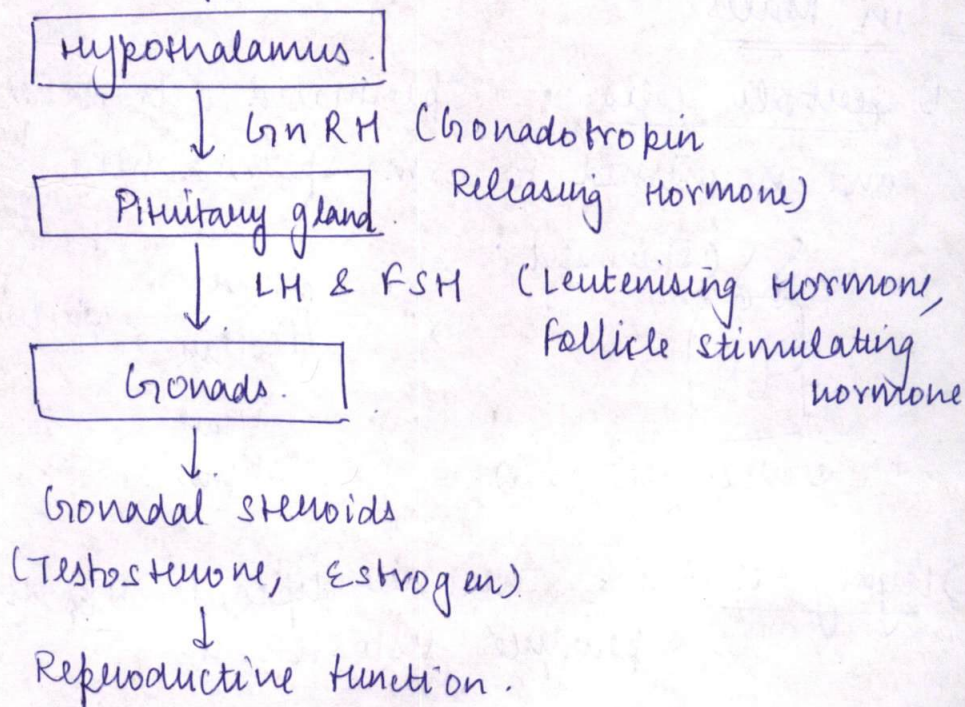
Q.9. Describe the role of serogenetics & cytogenetics in reproductive biology.

• Intro :- serogenetics is concerned with study of serological proteins such as production of hormones. Cytogenetics is associated with analysis of chromosomes and their role in cell behaviour.

→ Both the branches play a crucial role in reproductive biology.

• Serogenetics.

↳ It refers to study of production of various sex hormones and their effect.



I) in Males

- 1) LH - helps in production of testosterone by triggering the leydig cells.
- 2) FSH - regulates spermatogenesis.
- 3) Testosterone - development of 2° sexual characteristics.

II) in Females

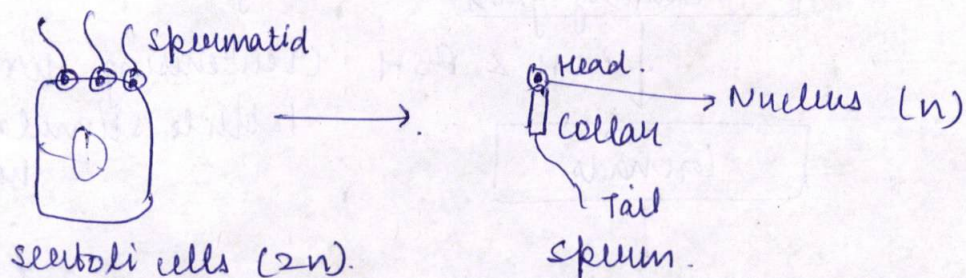
- 1) Estrogen - causes ovulation; development of 2° sexual characteristics.
- 2) Progesterone - Pregnancy hormone.
- 3) Prolactin - milk secreting hormone.
- 4) Oxytocin - milk ejecting hormone.
- 5) Relaxin - Dilates vagina during child birth.

• Cytogenetics

↳ It is concerned with chromosomal analysis of gametes and how ~~it affects their functioning~~ they are formed.

I in Males

- 1) Sertoli cells :- Spermatoid gets developed and nourished to form sperm here.



- 2) Leydig cells :- These are diploid cells that produce testosterone.

- 3) Granulosa cells :- These are regarded as source of sperm.

II in females.

→ stages in ova production are as follows:-

Ovarian cells

↓
Graffian follicle
↓
2° follicle
↓
1° follicle
↓
primordial follicle
↓
ovarian cells

Ovarian cells

↓
Oogonium (2n)
↓
1° oocyte (2n)
↓
2° oocyte (n)
↓
ovulation

↓
ovum (n)

Reproduction - ovum (n) + sperm (n) → zygote (2n).

Male

:- spermatogonia (2n) → 1° spermatocyte (2n) → 2° spermatocyte (n) → spermatozoa (n) ← spermatid (n)

Conclusion.

Thus, serogenetics and cytogenetics have enhanced understanding about reproductive biology. Accordingly, medical intervention could be taken to treat any abnormality.

Q.10 : 'Molecular anthropology' :

→ term is used by Emil Zuckerkandl in 1962.
studies human evolution with
help of molecular biology. That is,
establishes evolutionary link b/w
modern and archaic human
species, as well as other contemporary
species through study of molecular
genetics.

↳ Involves study of → DNA
↳ Mitochondria (eve)
↳ Y-chromosome (adam)

1) Ancient DNA studies

↳ fossil samples - protein extraction → DNA
extraction.
↓
Amino acid sequencing ↓
Nitrogen bases sequencing

↳ Polymerase Chain rxn

↓
amplification of said DNA helpful.

↓
DNA fingerprinting (Alec Jeffreys)

Result :
↳ Human DNA has 2-6% of Neanderthal DNA
↳ 99% of all primate DNA is similar.
↳ HLA system

proof of
interbreeding
& co-existence

2) Y-chromosome DNA marker.

- ↳ transferred from father to son.
- ↳ targeted region of Y-chromosome for population studies is that ~~that~~ does not combine with other X chromosome, i.e., male specific region of Y (MSY).
- ↳ Any mutation in Y-passed (no recombination).
- ↳ easy to identify & trace back to common male ancestor.
- ↳ 0.1 mya — common male ancestor in Africa — Y-chromosome Adam hypothesis.

3) mitochondrial DNA marker

- ↳ It also doesn't ^{undergo} recombination.
- ↳ passed from mother to all children, but daughters keep the inheritance going on to successive generations.
- ↳ mitochondrial eve — 0.2 mya — in Africa

• conclusion — human genome Project

Unit-1.1.

Q.1 Explain anthropology and its relevance. holistic

• Intro :- Anthropology is defined as study of biological and cultural characteristics of human populations in all periods and in all parts of the world. (across time & space)

→ A.L. Kroeber in his book 'Anthropology' (1939) defined it as "the science of groups of men and their behaviour & production".

Basic Tenets of anthropology

1). Study of humans across time and space.

:- That is, anthropologists are interested in both primitive and contemporary societies that existed anywhere on the face of the earth.

2) studies similarities as well as variations among human populations.

3). Holistic approach - It studies all the aspects of human life ranging from their physical environment to the language they speak in a comprehensive and integrated manner.

4). Objective study of human societies without any biases by adopting cultural relativism (as given by Boas).

5). In-depth understanding by adopting techniques such as 'participant observation' - established by Malinowski in his 'Argonauts of the Western Pacific' (1922). imp

• Scope of anthropology

→ As suggested by Franz Boas' four-field method of anthropology, the scope can be described as follows:-

- 1) socio-cultural anthropology.
- 2) Physical/Biological "
- 3) Archaeological "
- 4) Linguistic "

• Relevance of anthropology

1) Increased understanding of human beings everywhere
- This improves our understanding of inter and intra-population variations.

2) Avoid misunderstandings and conflicts between different groups.

↳ Eg:- Better understanding of culture of other societies can make us more tolerant & sensitive.

3) Discarding myths such as racial superiority and ethnocentrism.

↳ Eg:- The nomadic lifestyle and physical attributes of Kung of Kalahari desert came to be

imp. understood in terms of their adaptation to their hot and arid physical environment.

4) Applied anthropology can be used to solve real world problems ^{both} at the global and local level.

↳ This includes (climate change, increasing inequality, etc).

① It can aid in policy formulation & administration by adopting the approach of 'one size doesn't fit all'

↳ Eg:- Tribal sub-Plan & Tribal Panchasheel

club.

①

②

Sports anthro

- Better design-
ning defense
equip.

health, forensic
science

③

⑤ Concerning biodiversity :- Knowing our place in the biological world can make us more compassionate about our surrounding environment.

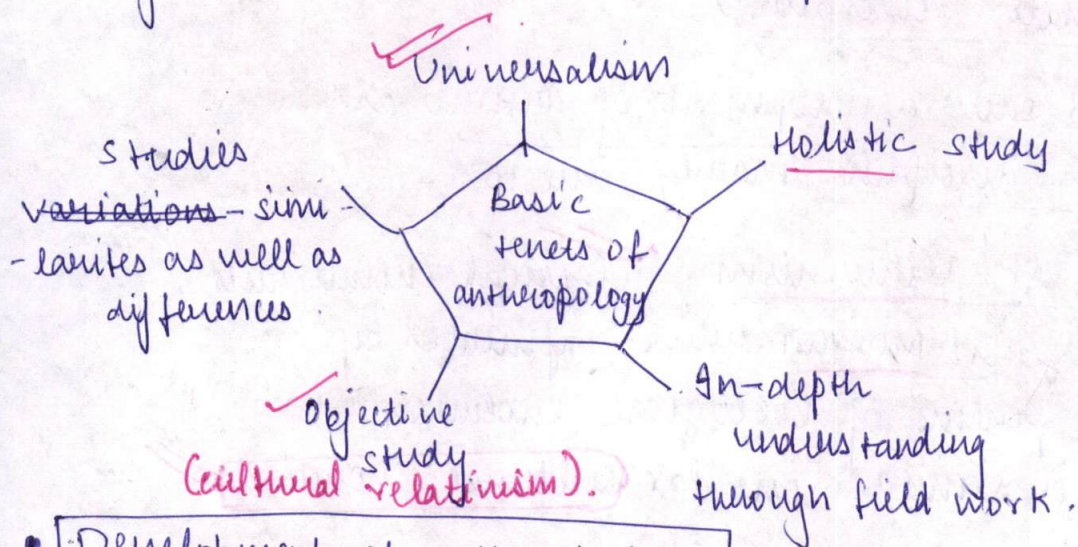
↳ Increasingly, tribals have also been associated with forest conservation efforts.

Conclusion

Thus, anthropology is the most unique of all sciences owing to its holism, universalism and the curiosity it arouses. Its knowledge can be instrumental in meeting the challenges of the present & the future.

Q.2 Discuss the development or evolution of anthropology.

• Intro:- Anthropology is the study of biological and cultural characteristics of man across time and space.



Development of anthropology

I. Informal beginning of anthropology (before 1800).

- 1) Many ancient Greek and Roman scholars such as Aristotle, Herodotus, Socrates etc. conducted studies of anthropological nature as early as 5th century BC.

II Convergent phase (1800-1860)

- 1) Divergent views about society emerged in this period. leading to emergence of 'sociology' as a discipline.
- 2) Many sociologists like Herbert Spencer, Augustus Comte also conducted studies of anthropological nature.
- 3) Most revolutionising development was Darwin's theory of evolution as given in his 'On the origin of species by means of natural selection'. (1859)

III Constructive phase (1860-1900) - (anthropology as a separate discipline)

- 1) This period saw development of anthro as a separate discipline mainly due to :-

1.1) influence of Darwinism - Classical evolutionists like Tylor & LH Morgan were influenced by Darwin's scheme of biological evolution and gave a similar one for cultural evolution.

1.2) Role of industrialisation and colonialism

↳ It enabled missionaries, travellers etc. to visit diverse places and collect information about native societies & cultures.

↳ This 2^o data was used by armchair anthropologists of 19th & 20th centuries like Frazer - ('Golden Bough' (1890)).

② Anthropology was also offered a place as an independent discipline in Oxford University in 1884.

③ Franz Boas became the first professor of anthropology in US at Clark University, Massachusetts.

↳ He trained several future anthropologists like Mead, Ruth Benedict, Kroeber etc.

IV. Critical Phase (1900 - 1940)

1) During this period, importance of field work & objectivity was emphasised in anthropology.

2) Malinowski through his fieldwork among Trobian islanders as mentioned in 'Argonauts of the Western Pacific' laid the foundation of participant observation. → 1922.

3) Many theories came up during this period.

↳ Structural functionalism - R.C. Brown's study

↳ Structuralism - Levi-Strauss of Amé tribe of Andaman.

↳ Culture & personality school.

↳ Physical anthropology - population genetics, primatology, etc.

V Later phase (1940-onwards)

- 1) During this period, scholars like Robert Redfield introduced studies of peasants societies, urban-rural societies etc. ↳ This also inspired Indian anthropologists like MN Srinivas (Dominant caste)
- 2) The scope of anthropology widened to include applied anthropology covering diverse fields of forensic sciences, health, political science, rural development (RRA, PRA), anthropometry, cytogenetics etc.
- 3) Now, anthropology has increasingly been used for policy formulation and administration
↳ Eg:- Removal of tribal out of Lodha, Santhal & Khuntia to promote vaccination & spread awareness about covid-19.

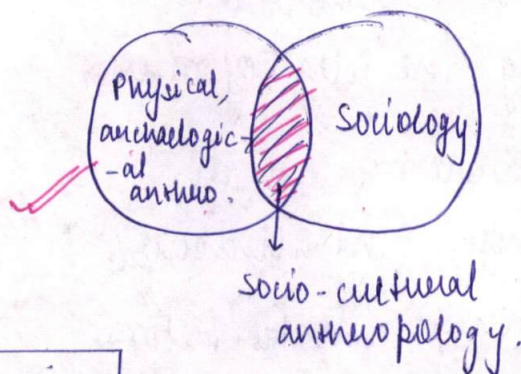
Conclusion

Hence, anthropology is a comparatively young discipline though it was present in informal forms since the times of Aristotle. Its applications in contemporary period has widened to counter various real-time challenges.

→ ques. with reference to India - Development in India
↳ role in India etc.

Q. 1 Anthropology & sociology?

• Intro :- Anthropology refers to study of man across time & space. while, sociology is the study of society. ~~Anthro~~ sociology is often compared with socio-cultural anthropology.



• Similarities

1) Subject matter of both is common to a great extent. - Both study societies & their culture.
↳ This is because, man is a social animal, and therefore society cannot be delinked from study of man.

→ In this regard, Kroeber has called sociology and socio-cultural anthropology as twins sisters.

(2) Contribution of sociology to anthropology

2.1) Ideology of Durkheim influenced RC Brown to come up with his social structure and structural functionalism theory.

→ Max Weber's
social action,
idea of power
etc.

(3) Contribution of anthropology to sociology

3.1) sociology has taken ideas of cultural field, cultural apparatus, cultural lag etc. from

borrowed
method of
participatory observation

social anthropology & developed them further.

3.2) Basic personality model of Kardiner & Ralph Linton - how social experiences influence basic personality.

3.3) National character study of Benedict have been referred to solve various sociological problems.

3.4) Physical anthropology has contributed to sociology by disapproving the ideas of racism.
↳ Boas and Levi-Strauss were pioneers in busting the myth of racism and attributed human variation to environmental factors.

Differences

- 1) Subject matter :- Scope of anthropology covers both primitive as well as modern societies.
↳ while sociology is concerned with only modern rural & urban societies.
- 2) Area of study - Anthropology covers biological aspect along with socio-cultural studies. Even socio-cultural anthrop focuses on all the social, economic, political & cultural aspects of mankind.
↳ whereas, sociology is more particularistic and focuses only on social relations & social interactions.
- 3) Fieldwork Techniques :- Anthropologists use applied methods like participant observation while conducting studies.
→ whereas, sociologists used to rely more on

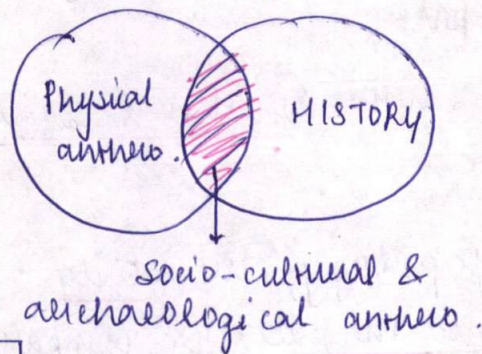
statistical methods like questionnaire, surveys etc. However, this is not true anymore.

• Conclusion.

In contemporary times, both the disciplines have adopted many features from the other due to its relative advantage. focus & should be on following an interdisciplinary approach where both disciplines benefit from each other.

Q.2. Anthropology and history.

• Intro:- Anthropology is the study of different events of the past in a chronological sequence. History is mainly compared with socio-cultural & archaeological anthropology.



• Similarities

- 1) Socio-cultural anthro. & history share the common subject matter with focus on social & cultural events of societies of the past.
- 2) Archaeological anthro. & history, both focus on origin & evolution of civilization through study of ancient tools & artefacts.
- 3) Both the disciplines now increasingly focus on all aspects of human past including

social, economic, cultural & religious aspects.

↳ In this regard, Evans Pritchard has said that socio-cultural anthro is historiography to a great extent.

• Differences.

1) Subject matter - Anthropology also studies physical aspects of man along with socio-cultural ones.

↳ while, history is only focussed on the socio-cultural aspect, especially on the political dimension.

2) Area of focus - Anthropology mostly focuses on simple societies which don't have any written record of the past.

↳ history studies societies with written records mostly.

3) Chronology - In anthropology, we study present and then peep into the past for comparative studies & so on.

↳ In history, the process is reverse, i.e., first we study the past and then continue upto the present.

4) Fieldwork techniques - Anthropologists - participant observation
↳ history - 2^o sources of data. Not true anymore.

• Conclusion

Both the ^{fields in} ~~disciplines~~ should be studied in an interdisciplinary manner so that both of them could benefit from the other.

In this way, they contribute to each other's advancement as well as greater & holistic understanding.

Q.3 Anthropology & social sciences / Humanities

• Intro :- Anthropology refers to - - - - -
- - & space. while social sciences refers to study of different aspects of society one by one. social sciences is often compared with socio-cultural anthropology.

Similarities

- 1) Subject matter - Both social cultural anthro & social sciences are concerned with various social, cultural, economic, political aspects of human life.
- 2) Many anthropologists like Evans Pritchard, Kroeber etc. have also stated close similarities b/w the two.
- ↳ Kroeber even stated that, 'sociology & socio-cultural anthropology are like twin sisters'.

Differences

→ Anthropology can be regarded as a unique social science on the following accounts:-

- 1) Subject matter - Anthropology is concerned with both biological & socio-cultural study of man.
- ↳ while social sciences only focus on the latter aspect.

2) Holistic approach - Anthropology studies human beings in a holistic manner by taking into account biological, social, historical, economic, political and cultural aspects.

↳ while social sciences only study one dimension at a time. Thus, it is more particularistic.

↳ Eg:- 1) ~~Sociology~~ studies human as social animal only.
2) ~~Political science~~ only covers the political aspect.

3) Area of focus - Anthropology is primarily concerned with primitive societies.

↳ Social sciences - modern societies & their modern concepts.

4) Anthro & sociology - 'explain in short'

4.2) Anthro & history - history is upside down anthro - - -

4.3) Anthro & economics - Economics focuses on demand-supply & profit-loss with respect to modern economies only.

↳ While, economic anthropology focuses on economies of simple societies where these modern principles might not even apply always.

↳ Greater focus is on studying the social aspects of these primitive economies like influence of kinship, reciprocity, social interactions etc.

↳ Eg:- 'kula ring exchange' among Trobandians.

4.4) Anthro & political sciences : political science studies modern states with their present-day institutions of governance & their working.

↳ Anthropology ~~also~~ studies stateless societies which might not even have demarcated boundaries. It is concerned with role of kinship, tribe etc. in political leadership.

⑤ fieldwork technique - - - same as pvs answer - - -

• Conclusion

- - - same as Q. 2 - - -

1.4 Anthropology & behavioral sciences / psychology.

• Intro :- Anthropology studies the collective behaviour of human beings across time and space. While psychology focuses on individual behaviour. Thus, they are complementary to each-other.

→ social psychology is often compared with socio-cultural anthropology.

• Relationship b/w two. → study of mind → structure - lists
→ cognitive school.

1) Psychology helps anthropology in understanding root cause of human behaviour.

2) Anthropology helps psychology in understanding the influence of cultural environment on human behaviour.

↳ Eg:- Meads study in Samoa Island.

3) Evolutionists and scholars of culture personality school have dealt with psychology aspect in anthropology.

3.1) E B Tylor and L H Morgan emphasised on the psychic unity of mankind while explaining evolution of culture.

3.2) Culture Personality school.

↳ Ruth Benedict gave the concept of culture pattern and showed impact of collective behaviour on culture.

↳ Margaret Mead studied the impact of culture on personality.

↳ Kardiner and Linton gave the concept of basic personality type.

↳ The National character studies were also based on identifying the collective behaviour of a nation.

• Differences

1) Psychology focuses on individual behaviour while anthropology studies whole of the mankind and studies collective behaviour.

2) Both study man but with different ~~but~~ viewpoints.

↳ Psychology is more inclined towards the biological aspect while anthropology towards the cultural aspect.

3) Anthro includes more holistic study of man & includes fields like

3) Fieldwork technique - while most of the methods are same, some methods like 'introspection' is not used in anthro.

archaeology, primatology etc too.

• Conclusion

— — — came as Q.2 — — —

Q.5 Anthropology & life sciences.

• Intro :- Anthro refers to study - - -
- - - space. while life sciences involve the scientific study of life & organisms.

→ Biological anthropology is often closely related to several of the life sciences, such as, biology, zoology, anatomy & physiology.

• Similarities

② Anthropologists utilise the general principles of biology to study physical characteristics of human.

① Subject matter - Both regard human species as unique in animal kingdom.

↳ Both study fossils, primates, racess etc.

③ Both use similar evolutionary, structural and ecological approaches to deal with the biology of human.

• Differences

Biological

1) Anthropology doesn't move beyond the study of humans & their ancestors. However, life sciences deal extensively with diverse life forms, like bacteria, plants & animals.

2) Life sciences usually study anatomy & physiology of 'contemporary human beings', while anthropology studies humans across time & space.

3) Anthropology is mainly focussed on learned behaviours of humans. While life sciences also studies inherited & instinctive behaviours.

• Conclusion

- - - same as 11.2 - - -

Q.6 Anthropology and medical sciences.

• Intro :- Medical sciences deal with prevention, diagnosis & treatment of diseases. Since human health is associated with biological & socio-cultural factors, it has close links with anthro.

• Similarities

1. Both study the medical systems of human population.
2. common subject matter such as study of blood group systems, HLA, dermatography, anthropometry, genetics etc.
3. Both the disciplines have borrowed from other fields like molecular biology, biotechnology etc.

• Differences

- 1) Medical sciences ignore the impact of cultural aspects like religion, magic & taboo on human health.
↳ Eg :- 'Corona deni' temples; ritual bathing can lead to spread of diseases & Anti-microbial resistance.
- 2) Medical sciences, unlike anthro do not give emphasis to local practitioners like shamans & priests.

3) Medical sciences focus mainly on modern systems of medicine. While, anthrop studies both traditional & modern system of medicine with special focus on the former.

↳ Eg:- Himalayan yew used by Bhotias to treat cancer.

4) Fieldwork technique - Medical sciences rely on first-hand info from hospitals & dispensaries. While anthrop is based on fieldwork through participant observation.

• Conclusion

Thus, medical science & anthrop should be studied in an inter disciplinary manner as.

The place of medicine in any society is largely determined by the social & economic value that society gives to medicine.

Q.7 Anthrop & earth sciences.

• Intro:- Anthropology refers to human space. While earth sciences include the disciplines of geography & geology. Earth sciences is often ~~compared~~.

→ Julian Steward was one of the first scholars who ~~identified~~ advocated the relationship b/w culture & environment. He gave the concept of 'cultural ecology'.

• Relationship b/w two.

1) with archaeological anthro :-

1.1) Archaeologists rely on geology for analysing archaeological sites in dating the past & finding out chronology of their findings.

1.2) They need the help of geography, pedology, petrology etc. to study climatic changes in the past and accordingly decipher characteristics of human settlements.

2) with socio-cultural anthro.

2.1) The cultural ecology model studies cultural change as an adaptation to the local environment.
by Julian → Steward

3) with physical anthro

3.1) Physical anthropologists rely on geology to study fossil findings.

3.2) They also take help from geography while studying human adaptation to various climatic condⁿ such as desert, extreme cold, high altitude.

• Difference

1) Anthro confines its study area to humans and ~~the~~ archaeological findings related to them.

↳ The scope of earth sciences is much wider.

2). Anthro includes certain degree of subjectivity while understanding culture.

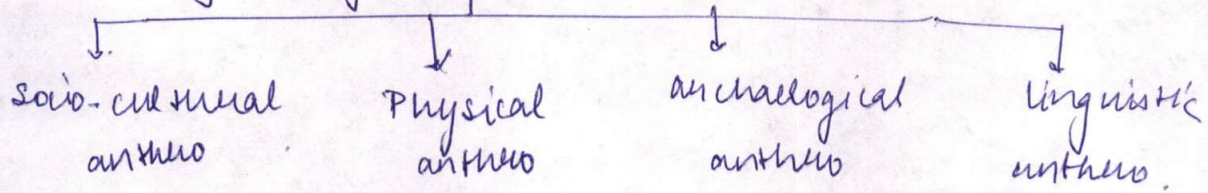
↳ Earth sciences are completely objective based on raw facts.

3) fieldwork technique — — — same as geo — — —

Unit-1,3

Q.1. what are the main branches of anthro?

• Intro :- Anthro is defined as study of man across time & space - franz Boas' suggested the 4 fold division of anthro into the following subfields:-



I Socio-cultural anthro.

Q.2 'Socio-cultural' anthropology.

• Intro :- Socio-cultural anthropology is one of the fields of Franz Boas' 4 fold division of anthropology. It refers to the comparative study of social behaviours & human societies.

• Background

→ Social anthropology - The term was first used in United Kingdom by structural functionalists like RC Brown.

↳ Prior to that, it was referred to as ethnology by classical evolutionists.

↳ focuses more on social behaviours & interaction

→ Cultural anthro. - The same discipline developed as cultural anthro in late 19th - early 20th centuries in USA, by Boas et. al. ↳ focuses more on culture & tradition.

→ Finally, in 1950 the two branches merged to form Socio-cultural anthro.

→ A. L. Kroeber defined it as a "study of culture & society which are distinguishable yet inseparable"

• Basic tenets

1) comparative study (ethnography) - It is interested in description and comparison (ethnology) of all human cultures & societies.

2) Holistic approach.

identifying.

3) Reconstruction of social history & universally valid social laws.

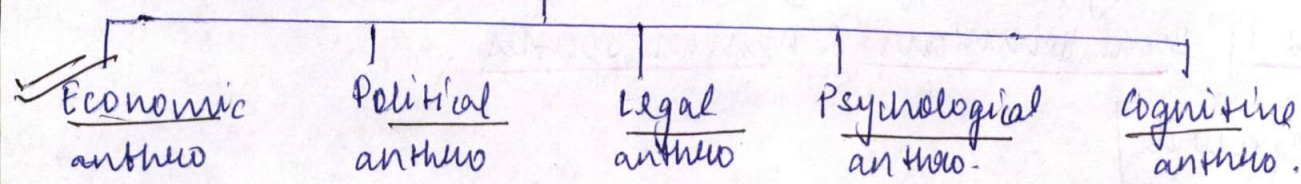
4) Field work approach :- collecting data through participant observation; 1st done by Malinowski - Argonauts of the Western Pacific (1922)

5) Emic & etic approach - integrated understanding of socio-cultural phenomena from the perspective of natives as well as scientists

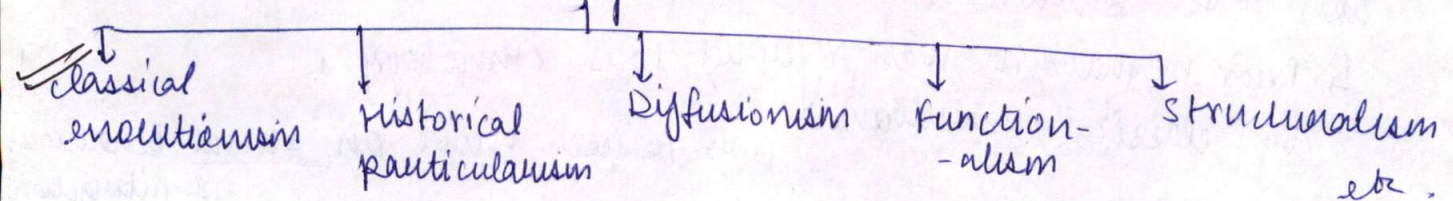
• Scope

→ Owing to an interdisciplinary approach, the discipline has widened to include several fields:-

sub branches



→ There are also several theories that led to development of this branch:-



• Relevance

① ----- Unit -1,1. Q.1 (Relevance part-Point ①-④).

• ethnography :- This is detailed description of a culture

• ethnology :- This is comparison b/w 2 cultures
↳ adopted by classical evolutionists.

• Conclusion

Hence, socio-cultural anthro is one of the most prominent of the 4-branches. It has been the backbone of applied & action anthro.

Q.3 Biological anthro. / Physical anthro.

° Intro :- One of the 4-field division of Boas. It studies biological ~~evolving~~ evolution of man. The subject matter includes not only morphological / physical aspects of human beings but also ~~physical~~ genetic.

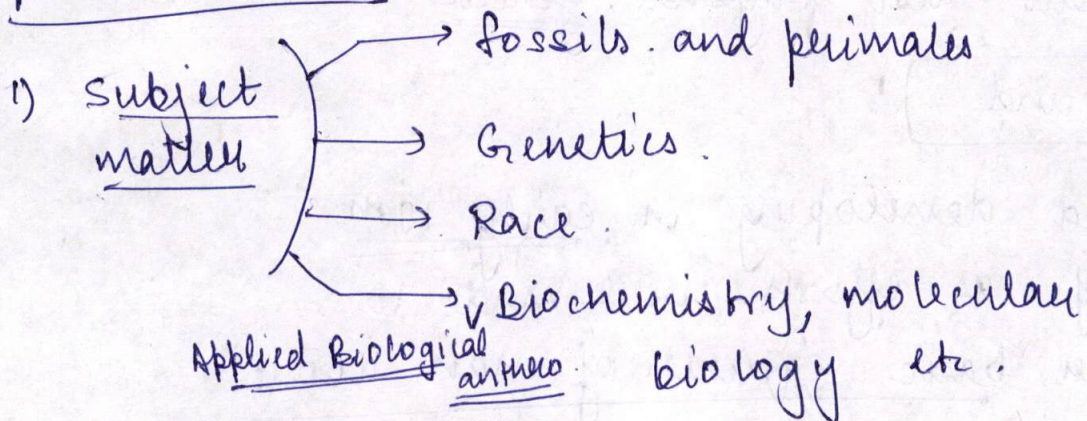
° Background

- 1) started developing in early 19th century as efforts were made to answer basic enquiries of man about himself.
- 2) In 1850s - discovery of fossil remains - Neanderthal man.
- 3) Charles Darwin's work in 'Origin of species' (1859) describing theory of natural selection & biological evolution of man.
 - ↳ later Darwin in his book 'Descent of man' (1871) opined that man must have evolved from apes, thus introducing primatology as a discipline
- 4) From 20th century, new aspects like Mendelian genetics, ABO blood grouping.

biochemistry etc. got added to it.

↳ This widened the scope of physical anthropology; & it began to be termed as new physical anthropology (by Washburn in 1951) or biological anthropology.

• Basic tenets.



2) Interdisciplinary approach - combines knowledge from various branches like anatomy, geology, palaeontology, earth sciences etc.

3) Cultural ecology - studies evolution of climate patterns and how it influenced physical attributes of human beings in different regions.

↳ Eg:- Eskimo's though have sturdy body, their limbs are short (Bergmann's & Allen's rule)

• Relevance

1) Better understanding of biological aspects of human beings.

↳ Better establish man's place in animal kingdom.

↳ It could also make us more compassionate about our surrounding environment.

② Discarding myth of racism

↳ Bg:- Kungs of Kalahari

③ Applied anthropology :- Health & nutrition ; forensic sciences ; DNA fingerprinting.

↳ designing defence equipments ;

↳ Anthropometry & sports anthropology.

↳ ↓ less wastage of time, money & energy.

• effect of culture on biological aspects

• 1) Discovery of fire led to change in eating patterns, now cooked meat was available.

↳ this also led to change in dentition, the size of canines decreased.

↳ emergence of stone tools also had similar effect on dentition.

• effect of biological attributes on culture :- As cranial capacity of man ↑ed ; societies became more and more complex ; it led to emergence of religion, marriage.

2 other traditions.

Q.4 Linguistic anthropology

Franz Boas

how language and socio-cultural
context influence one-another.

1 Background

1) Franz Boas

2) Al Kroeber - "Culture first emerged with
speech. Thereafter, enrichment in any of
them meant development of the others"

3) Sociolinguistics & Levi-Strauss

4) Sapir-Whorf

5) Cognitive anthropology

2 Basic Tenets

1) Influence of language on society

↳
↳
↳

2) Influence of socio-cultural aspects on language

↳
↳
↳

3 Relevance

1) Evolution of language - diffusionism

2) Understand a culture / simple soc.

↳ Malinowski, Mead emphasised imp.
of learning language.

3) Policy development — non-verbal behav.
study.

→ contemporary relevance

1) Threat to native
languages — extinction.

2) AI & digital culture

4) linguistic
variatic transla-
-ting to bio ethno-
variations

↳ Aryan-Indo.
↳ Drauidian

Q.5 Archaeological anthropology / Principles of pre-historic archaeology:

• Intro: - Archaeological anthropology refers to the study of material objects of the past as a means of reconstructing the cultural history of mankind, its growth & development in time.

→ It is one of the fields of Franz Boas' four-field classification of anthropology.

• Background.

→ The branch originated in 1797 but gained popularity only in the late 19th century.

→ This was mainly due to:-

↳ ethnographic studies conducted by Tylor, Morgan etc. on one hand, and.

↳ Discovery of fossils and tools of early man on the other. Eg:- Neanderthal remains were first discovered in 1856.

→ After 1960s, cultural ecology perspective by Julian Steward got added to it. to

→ The later period saw emergence of new archaeological anthro with focus on rate & direction of cultural change.

• Basic tenets

1) Reconstruction of culture history - They are concerned with determining cultures of pre-historic societies and how it changed over time.

2) Culture ecology - Archaeologists are also concerned with how humans used the environment.

and how they were impacted by it.

3) Chronology & evolution - Archaeology ~~looks~~ looks through long stretches of time to determine the ~~order~~ pattern of human biological & cultural evolution.

↳ Pleistocene epoch is considered to be the most imp. period from this viewpoint.

④. Evidences that archaeologists use for study are:-

↳ Artifacts - stone tools etc.

↳ ecofacts - remains of animals, plant pollens etc.

↳ fossils.

↳ features - hearth, pit, buildings etc.

⑤ Putting it all in context - To tell the story of the past, all these evidences have to be placed in context.

↳ Eg: ~~Presence~~ ^{imp} Presence of artifacts in the burial ground can tell that people believed in life after death.

Methodology

1) It requires collaboration ~~from~~ ^{with} other fields like geology, ~~palaeontology~~ palaeontology, geophysics etc.

2) Site selection :- this can be done through pedestrian survey or remote sensing.

3) Excavation - Once site is identified, archaeological deposits are recovered through excavation.

4) Relative ages could be determined by accurately recording the horizontal & vertical locations of

the evidence.

↳ eg:- earlier occupations will be below later ones.

⑤ Dating :- Putting the evidence in chronological order for reconstruction of cultural history through relative or absolute dating methods.

• Scope

- 1) Prehistoric archaeology - Deals with undocumented human past before the dawn of history.
- 2) Historic archaeology - Deals with human past for which records are available.
- 3) Ethno archaeology - Combines examining archaeological remains with present ethnographic data to determine rate & direction of cultural change.

• Relevance

- ① Enables us to understand the origin and evolution of human culture & behaviour.
- ② Helps us in knowing climatic patterns of remote past and how it would have influenced cultural development.
- ③ Contemporary relevance - the use of GIS tools, along with genetic & DNA engineering have enhanced the holistic outlook of the discipline.

• Conclusion

Recently, archaeological evidence from Tamil Nadu directed towards the existence of Thapovanai.

river civilization 3200 years back (1155 BC) → older than Vaigai civilization.

• Pre-history :- no written record is available; undocumented human past; from 2.2 mya to 2000 BCE.

Q.6 Applied and action anthropology?

• Intro :- The practical utility of anthropology is represented by applied & action anthro. It refers to applying anthropological knowledge to solve real-world problems.

I Action Anthro

- 1) The term was coined by american anthropologist, Soltax in 1957.
- 2) In this, anthropologists, are themselves actively involved in policy development and administration.
- 3) They directly participate in implementation process, thus not depending on others to use their knowledge.

④

II / Applied anthro

1) organised interaction b/w professional anthropologists and policy making bodies - both public and private

2) Anthropologists don't participate directly, rather their knowledge is used by others (NGOs, govt. etc) to solve problems

↳ Eg:- Tribal sub-Plan - devised on the basis of

inputs from

↳ Task force on development of tribal areas (1972) under Vidyarthi & Expert committee on Tribal development (1972) under SC Dube

o Difference - Action anthro - more participatory; anthropologist directly works with local community to seek solⁿ.
↳ Applied anthro :- ready-made solⁿ are put in place

- Intro.
- Time period
- climate
- Material culture
 - Raw mat
 - ↳ Tools type
 - ↳ Technique used
- Regional variation
- social life

• Difference b/w

- | <u>Absolute Dating</u> | <u>Relative</u> |
|---|---|
| 1) Defn | " |
| 2) correct <u>numerical age</u> | 2) arrange fossils in order |
| 3) <u>high accuracy</u> & <u>precision</u> | 3) <u>low</u> |
| 4) <u>expensive</u> & <u>time consuming</u> | 4) <u>less expensive</u> & <u>takes less time</u> |

5) Types :-

- 6) works better for igneous & metamorphic rocks

5) Types

- 6) sedimentary rocks - as they have layered arrangement of sediments.

Q.1 What are relative dating methods?

• Intro :- Relative dating methods refer to determining the age of a specimen or deposit relative to a known specimen or deposit.

It is different from absolute dating that determines the actual age of the deposit.

• Types of Relative dating

I. Stratigraphy.

1). It is based on the law of superposition. It determines the relative age of a specimen based on the principle that lowest layer of any deposition is older than the ones above it.

III newest layer.

II

I oldest layer

2). However, for that the site must not have faced any natural or anthropological disturbance.

3). Indicator artifacts or ecofacts are used to establish a stratigraphic sequence.

4). These are the items that changed relatively rapidly and major transitions in them could be used to define epochs or larger units of geological time.

↳ Eg:- stratigraphy of olduvai gorge was established in part on the basis of fossil pigs.

• Limitations :- 1) Most of the times, site has been disturbed by natural factors like water or wind.

2). Reverse succession in case of river terrace stratigraphy due to influence of water.

II Fluorine dating.

- 1) Bones and teeth of fossils buried underground absorb fluorine from groundwater.
 - 2) The hydroxyapatite (potassium based compound) in bones reacts with fluorine to form fluorapatite absorbed.
 - 3) Greater the percentage of fluorine in fluorapatite in the sample, older is its age.
- limitations - 1) The rate of fluorine absorption varies from site to site. Thus, it cannot be a universal criterion.

III Pollen dating

- 1) Pollens have excellent preservative ability and can be recovered from prehistoric soil.
- 2) They tell a lot about the type of plants and climatic phases of the concerned area.
- 3) Hence, they help in dating a site by associating it with the type of vegetation or environment during that period.

- limitations :- Greater amount of precision and care is required for recovering pollens from the site.
 → sometimes, pollen from another area might be found at a site - misleading

Contemporary Relevance

- Thamirabarani / Thapornai civilization of south India
:- 3200 years ago (1155 BC)

↳ Recently, carbon dating of rice with soil from Tamil Nadu area led to discovery

of the oldest civilization of southern India, perhaps older than Vaigai civilisation.
(2600 years old). (500-600 BCE)

→ It can provide greater reflection upon cultural development in southern India.

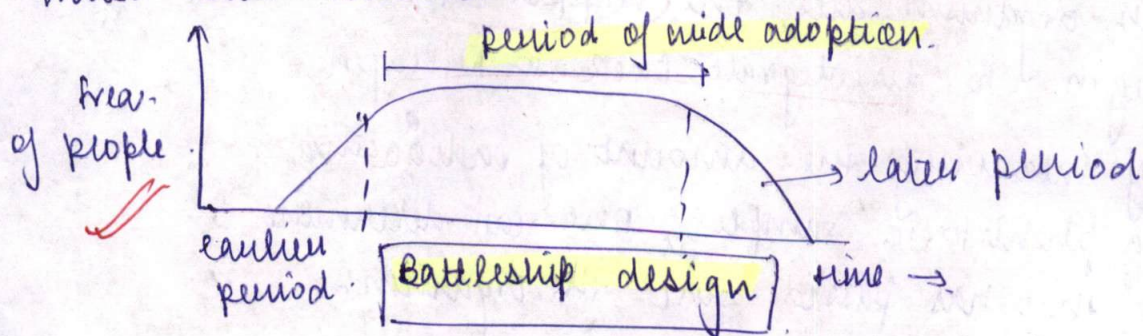
• Conclusion

Relative dating methods despite not telling the actual age of a sample are of great significance. Archaeologists usually use at least two or three dating techniques to overcome the given limitations.

IV. Seriation

① It involves identifying minor stylistic changes in a given type of sample through a period of time.

② It uses the principle that a particular style must have started slowly, then widely adopted by the people and slowly its use must have declined.



③ It is used for dating ceramics based on their stylisation.

• Limitations 1- Not useful in case of samples from relatively older period.

2) Not useful for dating bones or fossils; only artifacts.

Q.2 What are absolute dating methods?

• Intro :- Absolute dating, also known as chronometric dating refers to determining the actual age of a deposit or specimen. It is different than relative dating which finds only the relative age.

→ The actual age in relation to a geological time scale helps in determining the chronology of events.

• Types of absolute dating

I. Carbon-14 (C-14) dating

① C-14 is a radioactive isotope. The rate of decay of C-14 is known (half-life - 5730 years) and can be used to estimate the age of the specimen.

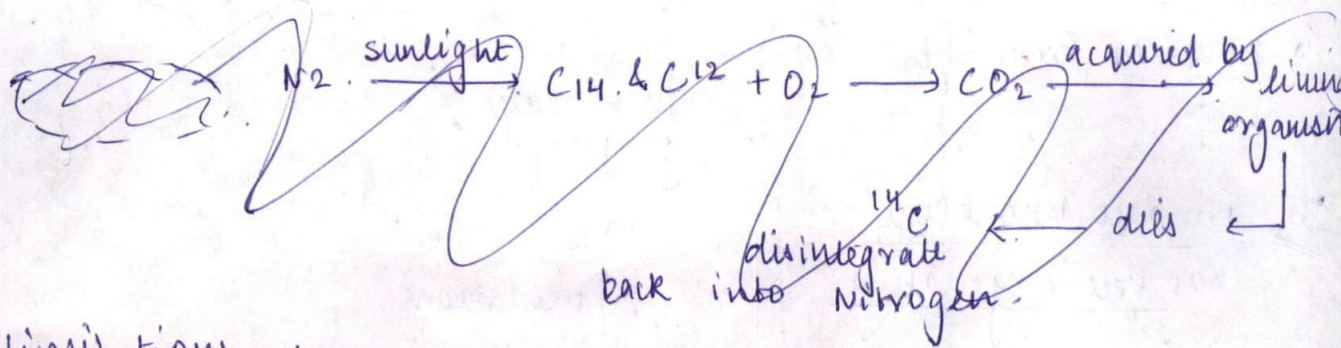
② It is based on the principle that solar radiation converts small amount of nitrogen in upper atmosphere to C-14.

③ This C-14 along with C-12 forms CO₂ and ~~it~~ is acquired by all living organisms.

④ When an organism dies, the trapped C-14 in the cells begin to disintegrate back to Nitrogen.

⑤ Thus, by measuring the amount of radioactive C-14 in a prehistoric sample, one can determine the time that has passed since the organism's death.

⑥ The amount of C-14 is determined either by counting the beta rays emission or using a particle accelerator to measure the actual amount,



• Limitations :-

- 1) It can provide reliable dates upto 50,000 years only.
- 2) Contamination of sample can lead to inaccurate results.
- 3) There is a huge variation of plus minus 180 years in dating ^{prehistoric} which impacts accuracy.
- 4) C^{14} in all specimens ^{was} not necessarily same as found in contemporary organisms.
 ↳ This is because C^{14} fluctuates due to changes in earth's magnetic field or alteration in solar activity.

Not useful for dating non-organic samples like tools, ceramics, stone etc.

II. Potassium-40 - Argon-40 (K-Ar) dating

- 1) It is also based on radioactive decay of K-40 to Ar-40. The half-life of this decay is about 1.3 billion years.
- 2) It is used to date specimens beyond ~~50,000~~ ^{much older} what C-14 method can estimate.

• Limitations :-

- 1) It can be done only on rock or volcanic ash samples and not on fossils.
- 2) It can provide inaccurate results due to large statistical margin of error.
- 3) It cannot be used to date samples younger than 5,00,000 years ago.

→ Thus, we don't have reliable dating method for period b/w 5,00,000 ya - 50,000 ya.

• Diagram for C-14

III Dendrochronology or tree ring dating

① It is based on the principle that certain trees add a new growth ring to their trunk every year.

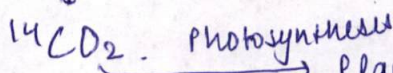
② therefore, age can be ascertained by counting the no. of rings.

- limitations - 1) It can be used only for wooden samples
- 2) Only useful in regions where rainfall is seasonal & growth of rings regular.
- 3) Only useful in regions where trees are of great age such as giant sequoia & bristlecone pine.

cosmic rays.

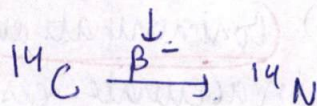


↓ oxidation



Plants → Animals

die ↓ and decompose



$$t_{1/2} = 5700 \text{ years}$$

IV Thermoluminescence

1) It is based on the principle that many materials including clay and stones can store energy by trapping e^- from impurities. On heating, this energy is emitted in form of glow & is called thermoluminescence.

2) On cooling, the alpha particles are again reabsorbed. This 'rate of reabsorption can tell the time since it was last heated.'

- Limitation :- 1) cannot be used to date bones
- 2) large statistical margin of error.

• Contemporary relevance & conclusion

→ - - - same as Q.1 - - -

Archaeomagnetic dating

- 1) It is based on the principle that whenever a prehistoric fire hearth was heated, it must have brought around a change in earth's magnetic field for that region for that period.
- 2) Hence, if magnetic data for the region through time is available, or mere comparison can predict the date of hearth.

- Limitations - 1) Accurate magnetic ^{field} data is not available for period beyond 1600 AD.

• Tools basics

→ Flake & core :- You hit a stone with another stone, the piece that comes out is called flake, the one that remains is called core.

↳ The area on flake that was detached - called scar of detachment.

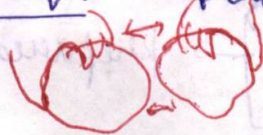
↳ The detached area is slightly elevated (∩)

& is called the bulb of percussion :- It is present in flake.

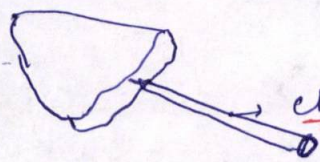
↳ The bulb of percussion (C) - present in core.

• Techniques

- 1) stone-hammer technique - flake was detached by a single blow.



(2) Pressure flaking technique - flake was detached by chiseling



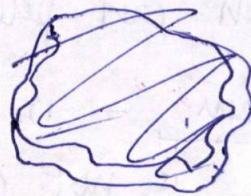
(core)

applying pressure on stone's edge forcing off small flakes.

Chopper - a massive tool $\sim (1\frac{1}{2} \text{ kg})$
↳ they have a couple of huminal flakes taken (unifacial flaking) out of the transverse border.

formed through block on block technique - each of the areas from where flake is detached is extremely concave with -ve bulb of percussion

↳ oldest tool made by man.



• Hand axe tool → a core in which both the surfaces are flaked [teardrop shaped]

↳ one end is pointed & other end is broad & more efficient

* Flake tools are more evolved than core tools.

↳ Thus, man making flake tools might also be more evolved.

more precision using 'precision grip'

↳ for making core tools; you only need 'power grip'.

(4) Cylinder hammer technique

↳ when you don't want to break tool by giving large blow directly as it may completely destroy it.



→ antler hammer



→ antler punch



→ prepared rock core

- Blade :- A flake in which length $>$ 2 breadth
 ↳ Every blade is flake but every flake is not blade.

- Tools & techniques are useful for analysing material culture but not non-material component of culture
 ↳ It is only after 40,000-30,000 years ago that man started making art, paintings etc. → upper paleolithic
 ↳ This can tell about non-material component of culture.

- ⑧ Levallois point technique :- A flake is detached from core by pre-determination, that it is just not randomly detached. → focus is on completely reducing the core to a large no. of flake tools
 ↳ Eg- point :- used for piercing.

* How do we know about culture of the past?

- ↳ By interpreting functions of tools, if most of the tools are hunting type, then the site might be used for hunting

more efficient
 → core itself is of no use.

* Lower paleolithic tool types - multifunctional.

* Middle " " " - job-specific

* Upper " " " - more specialised

fn. (bone, used), ivory

hunting
 piercing (points)
 cutting etc.

* Mesolithic - tools are fixed on a wooden handle.

- ↳ Thus, small tools attached to handles

↳ Eg:- Bow & arrow.

new fn must have evolved due to new needs like clothing, housing etc.

* Neolithic :- axe (grounded & polished) - might have been used for cutting trees or ploughing
 ↳ Thus, first step towards civilisation, sedentary settlements by clearing trees & agriculture.

* Function of tools also depend on adaptational strategy to survive in a particular environment.

• Scraper - one side flaked and other is flat edge
↳ unifacial tool

→ Axe is bitacial tool

• Chopping tool → variation of chopper; only difference that flaking is done from both surfaces of the terminal end.

• Abbevillian Handaxe - Earlier than Acheulian

- ↳ bulky & larger.
- ↳ handaxes have scooping deep scars
- ↳ lateral border is irregular (wavy) & not regular.
- ↳ not quite symmetrical.
- ↳ rarely any 2° retouching

→ made using stone hammer technique.

• Acheulian Hand axe -

- ↳ smaller, more symmetrical
- ↳ regular border
- ↳ numerous 2° retouching
- ↳ formed using cylinder hammer technique.

↓
more controlled; eliminating the risk of shattering the core.

• Chopper - bifacial flaking like hand axe

↳ but working end is transverse & not pointed



→ working end.

<u>Glacial (4)</u>		<u>Interglacial (3)</u>	<u>Pluvial (4)</u>
I	Gunz		I Kageran
II	Mindel	→ Gunz - Mindel (I)	II Kanjerman → Kageran - Kanjerman
III	Riss	→ Mindel - Riss (II)	III Kamasian → Kanjerman - Kamasian
IV	Wurm	→ Riss - Wurm (III)	IV Gamblian → Kamasian - Gamblian

(3)

Q.3 Describe lower paleolithic culture. (in general).

• Intro :- lower paleolithic culture refers to the oldowan & acheulian stone tool traditions that are recorded from the pleistocene epoch.

Time period and climate

H. erectus

1). The culture dates from 1.5 mya - 2,00,000 years ago - pleistocene epoch.

2). Climate - The European region witnessed successive glacial & inter-glacial periods. The African region meanwhile, witnessed successive pluvial & inter-pluvial periods.

① Material used -

② Technique -

③ Tools -

Material culture - Tools and technology

→ lower paleolithic is divided into two lithic industries - Oldowan and Acheulian.

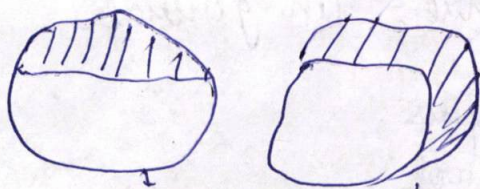
The material used to form tools was quartzite

1) Oldowan - It is dominated by choppers & chopping tools. The technique used for removing flakes was block on block technique.
↳ It is associated with H. habilis (1.6 mya)



2) Acheulian - It is dominated by small & beautifully crafted hand axes and cleavers. The technique used was cylinder hammer technique.
↳ It is associated with H. erectus.
↳ It also shows evidences of flake tools - clactonian & Levalloisian flakes.

3). Abbevillian - This 3rd industry occurred during lower acheulian and was characterised by coarse & bulky hand-axes. Technique - Stone Hammer.



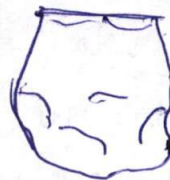
chopper & chopping tool



Acheulian
Hand axe



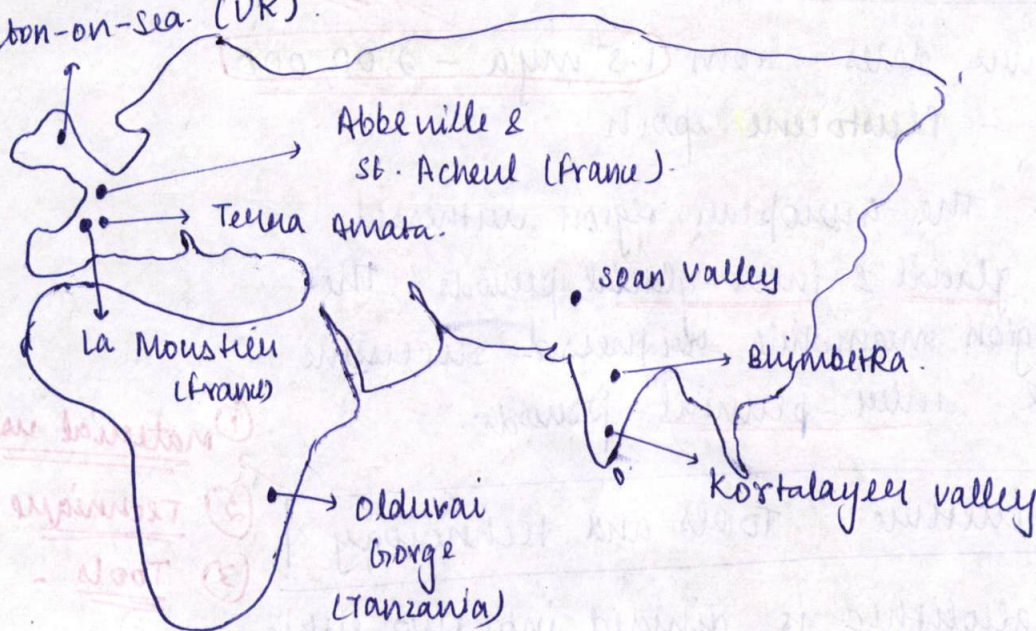
Abbevilian
Hand axe



cleaver

Regional variation

Clacton-on-sea (UK)



1) Western Europe - Evidence of both chopper-chopping tools & hand-axes - cleavers have been found.

2) Central Europe - Absence of hand axes & cleavers.

3) Africa - Primary site of Olduvai Gorge has large no. of chopper-chopping tools, cleaver hand-axes and even flake tools.

4) India - Late Acheulian period is found here with integration of chopper-chopping tools as well.

Social life

1) The economy was based on hunting & gathering

2) Tools were mostly multipurpose in nature.

3) Use of fire had started

↳ Eg:- chained bones at Swankrans (South A.J.)

Eg:- Fossils of H. Heidenburgensis along with animal fossils of elephant, bison

big game

4) No clear evidence of religion & burials has been found. However, presence of red ochre on many sites indicate some ritualistic activities.

5) They lived in small campsites. Male-male cooperation was a unique feature.

• Conclusion.

most Hence, lower paleolithic stage marks the prominent phase of bio-cultural evolution of man.

d.4 Clactonian tradition.

- British lower Paleolithic - clacton-on-sea.
- Discovered by Weimer in 1880
- Climate & time → ... same ... - (Pre-Mindel).

→ Tools → chopper & chopping

↳ clactonian flakes

→ large flakes with.

↳ high flake angle - because.

✓ once a flake is removed from a surface, this flaked surface is used to remove another flake.

↳ This ensures that core doesn't shatter.

• Terra Amata site :- south France. (lower Paleolithic)

↳ chopper & chopping tools.

↳ foot print of pre-historic man

↳ fire hearth with stones all around its boundary as it was used as a dining table.

• Torralba & Ambrona (Spain) - lower Paleolithic.

↓

→ beautiful hand-axes & cleavers

→ elephant hunting site (1000s of elephant skulls),

Q.5. Lower Paleolithic in India.

Robert Bruce Foot
in 1863.

• Intro :- Lower Paleolithic culture refers

to the cultural debris from Pleistocene epoch.
In India, it occurred during late Acheulian period ~~was~~ ranging from 5,00,000 - 1,00,000 years ago.

In India it is characterised by chopper-chopping type integrated with the Abbevilian & Acheulian.

Time & climate

- 1) Unlike Europe & Africa, lower paleolithic in India starts very late (5,00,000 - 1,00,000 ya)
- 2) Climate - Northern mountainous region witnessed successive glacial & inter-glacial periods. While, river valleys of peninsular India witnessed pluvial & inter-pluvial periods.

Material culture

• Divided into 2 lithic industries - Abbevilian & Acheulian.

→ Robert Bruce Foot is credited for discovery of many lower paleolithic tools from all over India.

→ Material used - Quartzite.

1) Abbevilian - dominated by chopper-chopping tools and crude and bulky hand-axes.
↳ These formed using stone-hammer technique.

2) Acheulian - - - - same as Q.3 - - -

- - - same diagrams - - - -

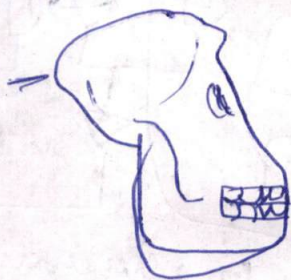
(5)

F H Giddings in his book 'The elements of sociology' (1898) defined society as - "society is the union itself, the organisation, the sum of formal relations in which associating individuals are bound together"

RELATIONSHIP BETWEEN CULTURE AND SOCIETY

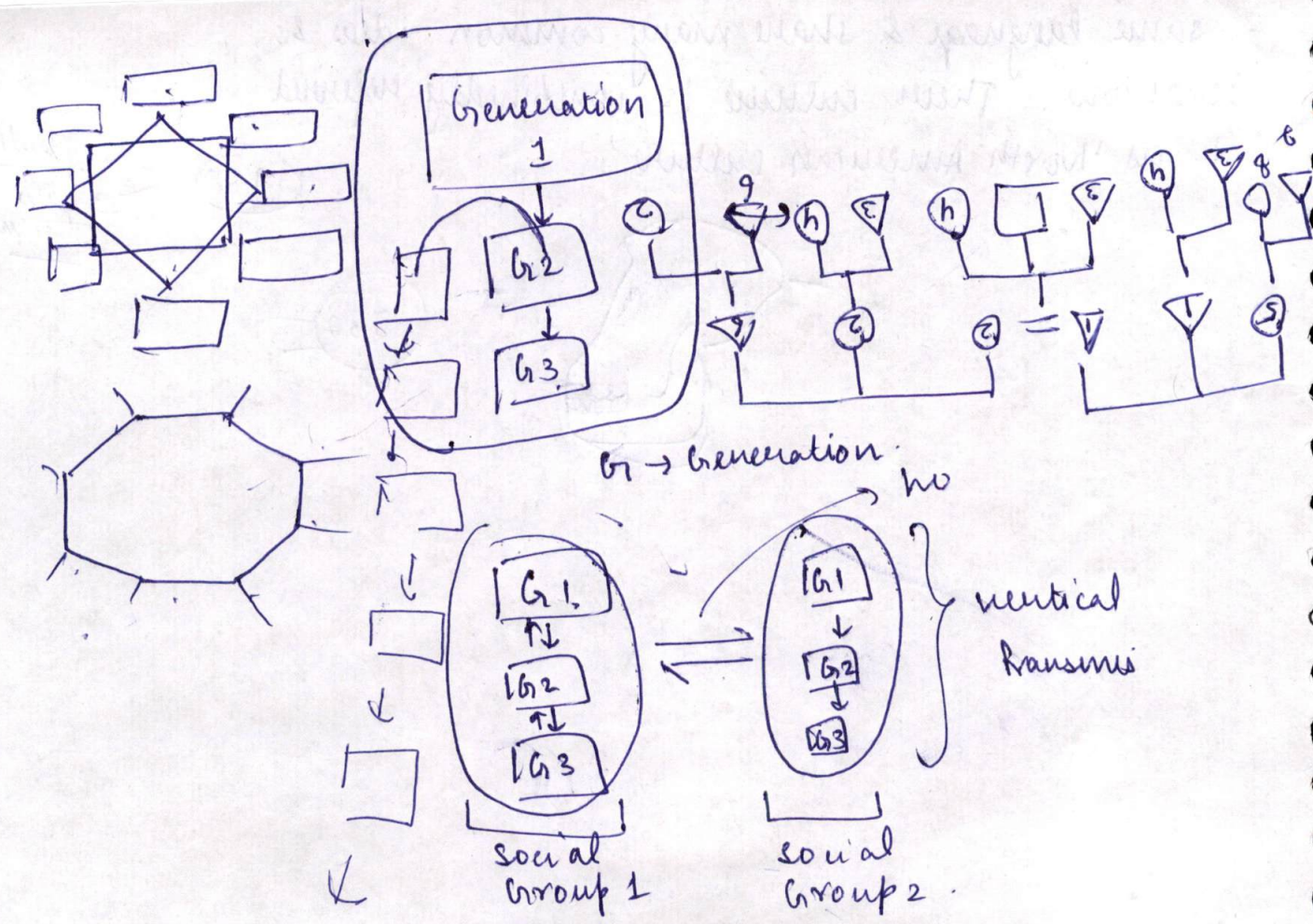
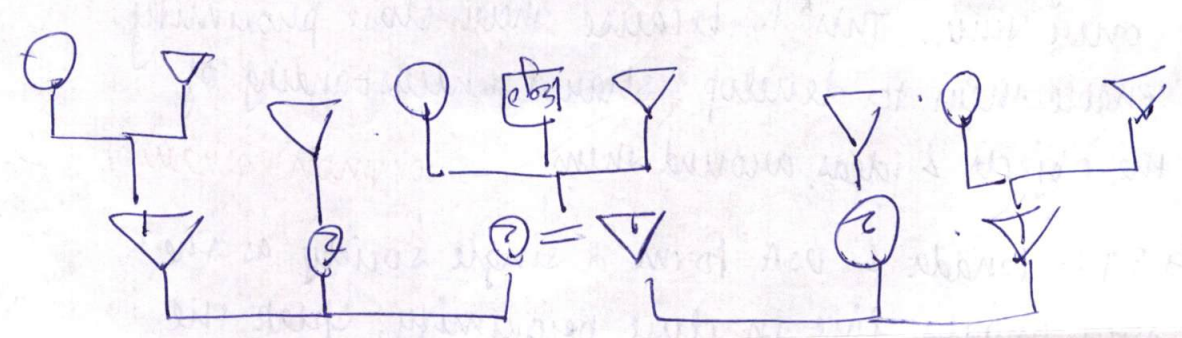
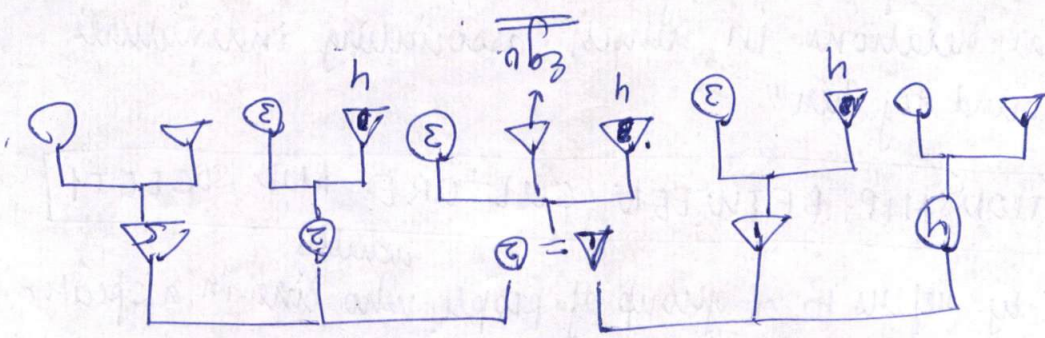
- Society refers to a group of people ^{usually} who live in a specific geographic area; these people tend to interact more with each other than they do with outsiders.
- Therefore, society tends to share a common culture over time. This is because their close proximity enable them to develop a shared understanding of the objects & ideas around them. → common behaviour &.

↳ Eg:- Canada & USA form a single society as the two groups live in close proximity, speak the same language & share many common ideas & behaviours. Their culture is combinedly referred to as 'North American culture'.



1982

1982 → skull
→ jaw
→ remains



• Regional variation ^{arised} - due to non-uniform climate.

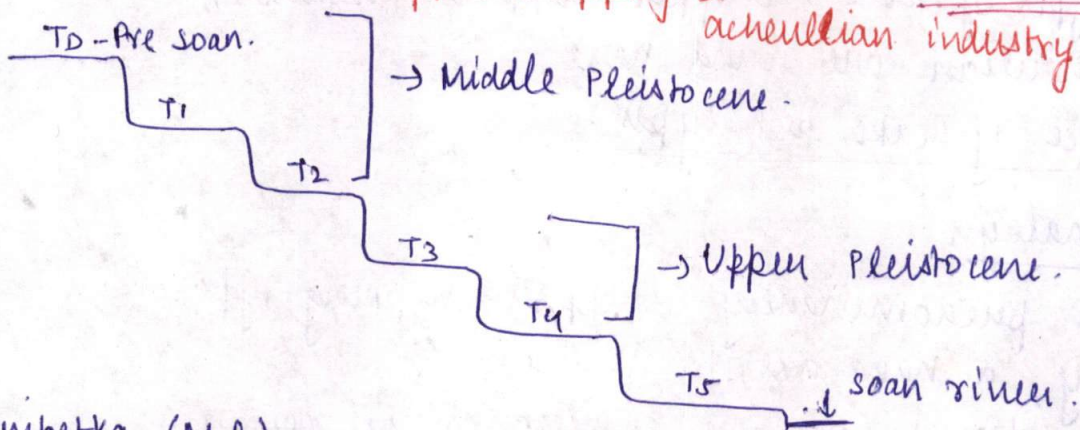
→ Evidences are found all over India with exception of Northern Alluvial plains, Kerala etc.

1). Sohan valley (Pak)

It was excavated by De Terra & Potterson in 1935.

→ It is a lacustrine depositional bed with ~~4~~ several terraces.

→ Both chopper-chopping & acheulian industry found.



2). Bhimbetka (MP)

↳ It was discovered by V S Wakankar in 1957. VN Misra excavated one of its largest cave III F-23 b/w 1966-76.

Do 1957 excav. - where else too

↳ The Bhimbetka shelter has yielded 8 layers, out of which bottom 3 belong to acheulian industry of lower paleolithic.

→ Absence of chopper-chopping & Abbevilian type tools.

1		mesolithic.
2		
3		
4		upper paleolithic
5		middle paleolithic
6		lower paleolithic
7		
8		

3) Didwana (Raj)

- Excavated by VN Misra (1980)
- choppers with hand-axes found. Cleaners are absent.

- 4) Eastern region - Kuliana & Kamarpada (Odisha) ^{Mayurbhanj}
- Excavated by NK Bose & Dhananjay Sen (1939-42).
 - chopper-chopping, hand-axes & cleaners found.

5) Madrasian Culture (Peninsular India).

- oldest acheulian type tools in India found from here.
- All types of tools - chopper-chopping, Abbevillian & ascheulian are found here.
- Absence of flake tool types.

6) Meghalaya

- ↳ tools predominantly chopper-chopping type. Rarely, a hand axe is found.
- ↳ It is due to unique environmental conditions - probably bamboo was used in this region for making tools.

• Social life

①, ②, ⑤ from Q. 3.

- ④ No fossil evidence has been found from India except recently discovered Narmada Man

• Conclusion

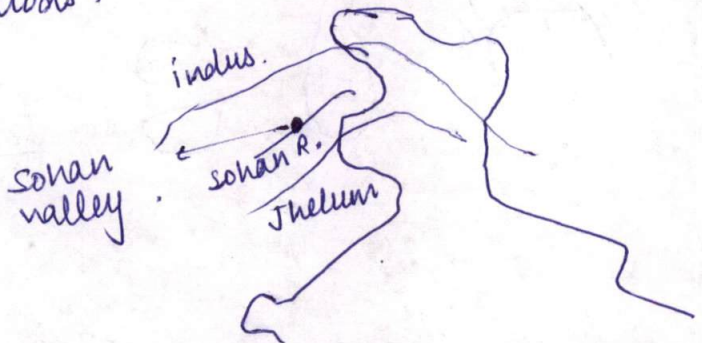
Hence, lower palaeolithic culture is younger and shows large cultural variability as compared to its counterpart in Europe & Africa.

Q.6 Soan valley.

• Intro :- Soan valley is a lower paleolithic site located in northern Punjab, Pakistan. It was first excavated by De Terra & Paterson in 1935.

Time & Climate

- 1) It dates to upper pleistocene - 5,00,000 - 1,00,000 ya.
- 2) Since it is located near the Himalayan valley (Potwar Plateau), it witnessed glaciation & inter-glaciation periods.



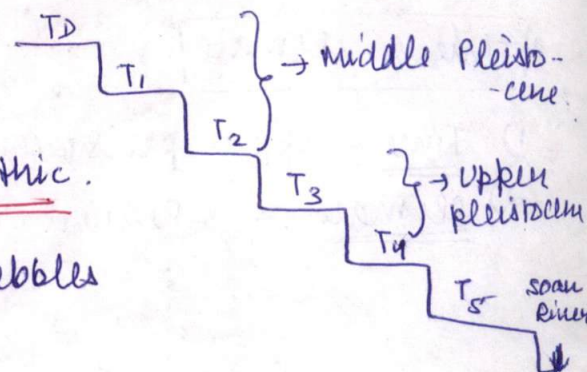
Material culture

- It is a lacustrine depositional bed with several terraces.
- It ~~has~~ ^{coexistence of} 2 prominent lithic industries. Eg. Chauntelia site
- | <u>Abbevillian</u> | <u>Acheulian</u> |
|--|--|
| <u>chopper-chopping tools</u>
with crude & bulky hand-axes. | small sized and precisely crafted <u>hand-axes</u> & <u>cleavers</u> . |

→ Material used - Quartzite.

→ The first 3 terraces (T_0, T_1, T_2) yield tools belonging to lower paleolithic.

- 1) T_0 - Pre soan :- mostly split pebbles & big flakes with small bulb of percussion.



2) T₁ - Early Soan.

↳ Mainly chopper - chopping tools made by stone hammer technique. Hand axe also found.

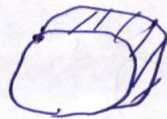
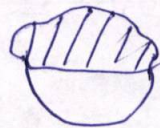
3) T₂ - Late Soan

↳ Flake tools increase in number particularly Levalloisian & blade flakes. Chopper & chopping tools are also found.

4) T₄ - Evolved Soan

↳ It dates to Middle Paleolithic period. Tools consist of mostly flake and blade tools.

• Social life



} Flake Tools

1) --- same as Q.5 ---

(4) - No fossil evidence.

• Conclusion

--- same as Q.5 ---

Q.7. Madrasian culture of lower paleolithic.

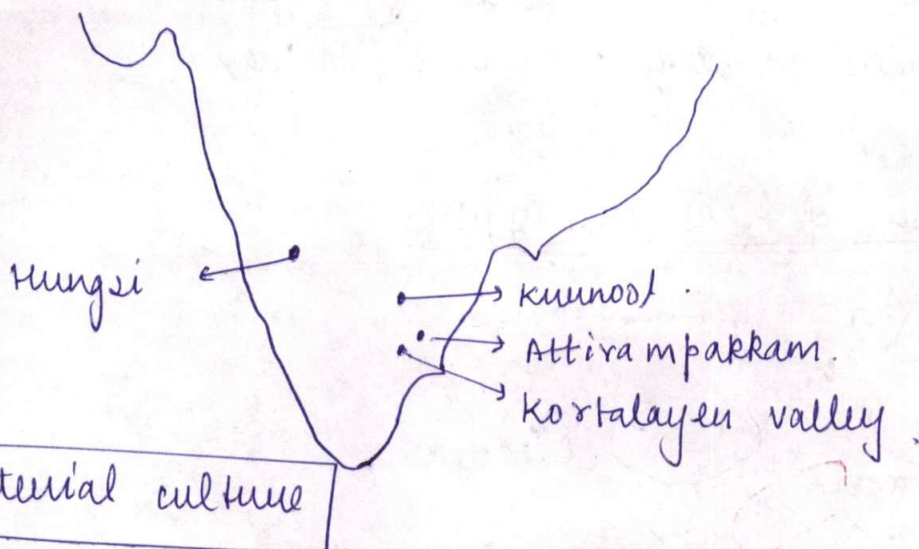
• Intro :- Madrasian culture combinedly refers to lower paleolithic sites of peninsular India.

The first site discovered here was At Hiranpakkam, near Chennai in 1863 by Robert Bruce Foote

• Time & climate

1) Time - upper pleistocene - 5,00,000 - 1,00,000 ya.

2) Climate - Pluvial climate



1) Material used - Quartzite

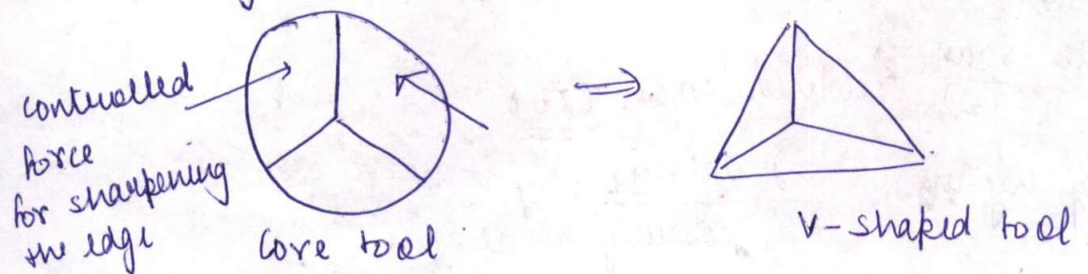
2) can be divided into 2 lithic industries.

:- 1) Abbevillean → - - - same -

2) Acheulian → - - - same -

3) However, the major difference from Soan culture is that, Madrasi industry is pre-dominated by sophisticated handaxes & cleavers. while Soan is dominated by chopper-chopping types of tools.

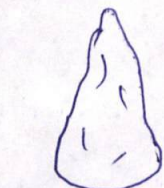
4) Cleavers & handaxes were formed by Vaal technique - Krishnaswami who excavated Kortalayer valley in 1938.



5) Andhra Pradesh is often called 'treasure house of lower paleolithic tools' due to their vast abundance there.

6) There have also been claims about hafting of tools on wooden or bamboo handles, though unproven.

7) There is absence of flake tool types.



Hand axe



cleaver

• Social life

----- same as D.6 -----

• Conclusion

----- same as D.5 -----

• Soan → glacial & inter-glacial Madrasi → pluvial & inter-pluvial

1) Predominant - chopper-chopping type.

1) predominant - handaxe & cleavers

2) crude tools.

2) more sophisticated

3) later established by De Terra -- in 1938.

3) earlier established by R.B. Foote in 1863

4) presence of flake tools esp. Late Soan (T₂)

4) absence of flake tools.

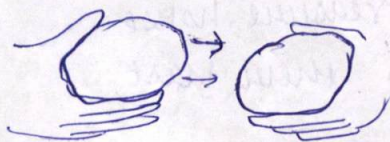
Evolved Soan (T₄)

5) No claim of hafting

5) hafting might be possibly done.

6) Technique - Stone hammer

6) Technique - vaal.



7) less abundant

7) more abundant - Andhera (breast-house)

- Scraper - flake tool in which one or both lateral borders are shaped by contiguous retouchings.



small nibblings on side
to increase sharpness for longer period.

- Point :- Triangular flake with workable pointed end.



→ Convergent scraper.

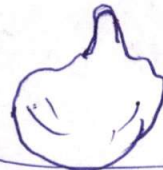
in which both borders meet



- Borer :- thick projected end; obtained by carving out two lateral notches or incisions on both sides of it.

- Foliate or Blattspitzen

↓
bifacially worked leaf shaped point.



Borer



Q.8 Middle paleolithic. in general.

- Intro :- Middle paleolithic refers to the second sub-division of paleolithic culture. It is concerned with monstherian stone tool tradition and spans from 3,00,000 - 40,000 years ago.

- Climate :- The European region witnessed successive glacial & interglacial periods. Meanwhile, the African and south asi. region witnessed pluvial & inter-pluvial periods.

- Material culture

→ Raw material changed from quartzite to

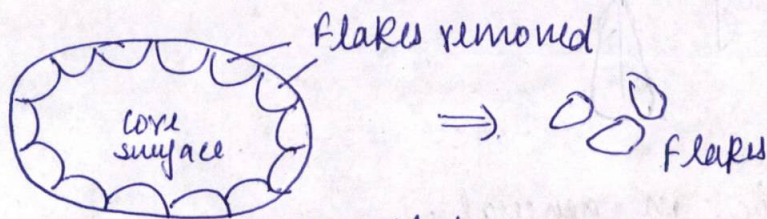
crypto-crystalline silica like jasper, flint etc. in many places.

→ The middle paleolithic industry is commonly referred to as Mousterian stone tool tradition based on the site Le Moustier in south France

→ It is characterised by large proportion of small flake tools such as scrapers, points, and borers.

→ Flakes were often formed using Levallois technique. They were also retouched by striking small chips from its edges.

→ small proportion of core tools like hand-axes and cleavers are also found.



Levallois technique - flake of predetermined & standard size removed off from core.



Side scraper



Point

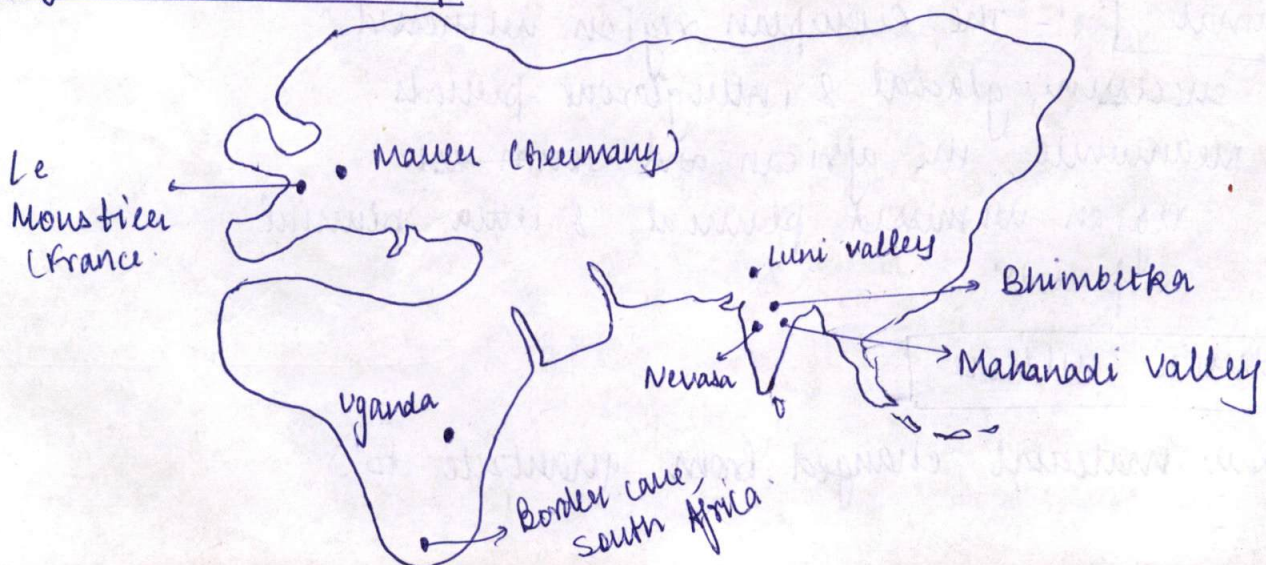


Borer



Foliate

Regional variation



1) Europe - Le Moustier shows abundance of flake tools.
↳ Blattspitzen (foliate) are found at Mauer, Germany.
↳ There is large variation & variability in both ~~the~~ cultural & physical type in Europe during middle Paleolithic.

2) Africa - Flake tools are discovered at Uganda, and Olduvai Gorge², South Africa.

3) India - Middle paleolithic of India shows indigenous vertical development. Major sites are Nevasa, Bhimbetka, Luni valley etc.

• Social life

- 1). The economy was based on hunting & gathering
- 2) Tools - showed some specialisation. For instance, study of wear on scrapers suggest that they were used for scrapping hides or working woods.
- 3) Middle-paleolithic culture is often associated with Neanderthals. They lived in caves or rock-shelters.
- 4) There is evidence of ritualistic burial suggesting start of rites and religion.
↳ Eg :- In Shanidar, Iraq, pollens (flowers) have been found around a buried body.

• Conclusion

Hence, middle paleolithic culture shows large cultural variability throughout the world. In India, the nature of middle paleolithic culture remains to be adequately

understood due to the lack of ^{discovery of} any primary habitational site.

2.9 Middle Paleolithic in India.

• Intro:- Middle paleolithic refers to the second sub-division of paleolithic culture.

It is associated with monstherian stone tool tradition and spans from 1,00,000 - 40,000 years ago in India.

Not as developed as its counterparts in Europe, Africa.

Time and Climate

1) In India, middle paleolithic culture occurs a little late than its European & African counterparts, from 1,00,000 - 40,000 years ago.

2) The Northern mountains witnessed successive glacial & interglacial period. While, peninsular river valleys witnessed successive pluvial & inter-pluvial periods.

Material culture

--- same as 2.8 (including diagrams) ---

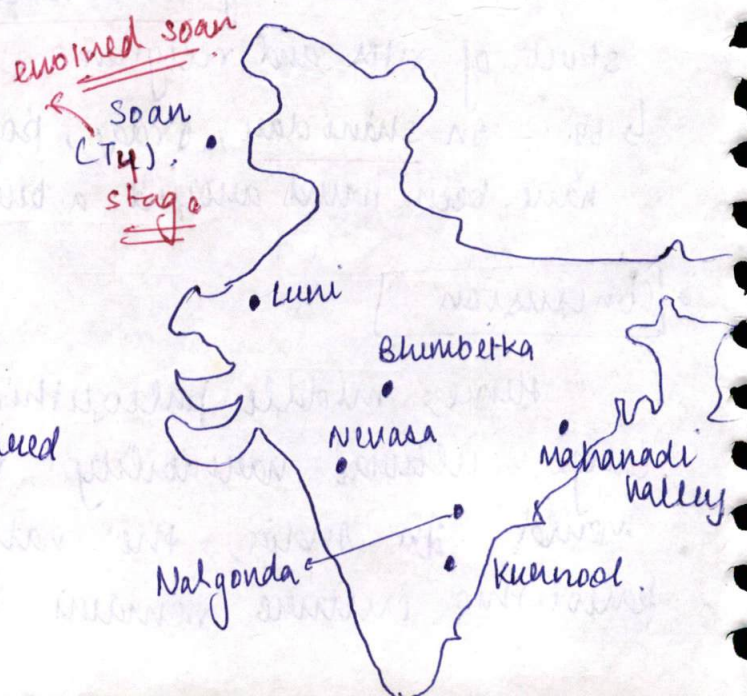
Regional variation

1) Nevasa (Maharashtra).

→ It was excavated by MD Sanpalia in 1956.

→ The site has yielded several.

Levallois-based flake tools prepared on jasper.



2) Luni (Rajasthan)

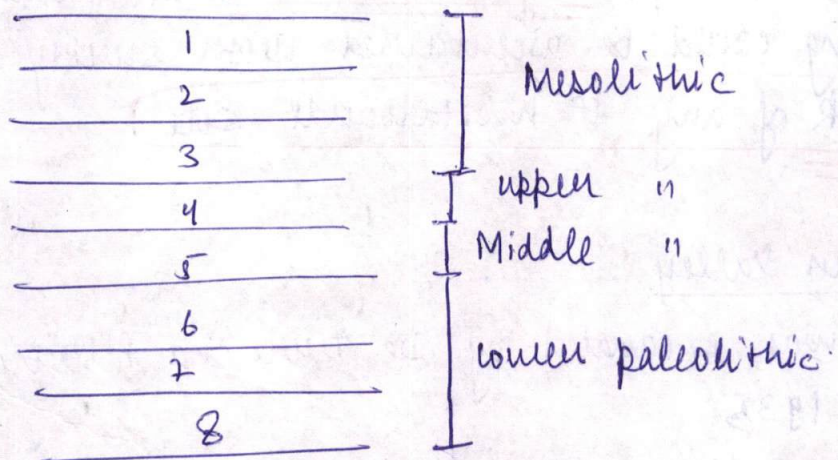
↳ It was excavated by VN Misra. It has high quantity of repeatedly reworked flake tools.

3) Bhumbetka (MP.)

↳ It was discovered by VS Wankar in 19⁵⁷.
VN Misra excavated one of its largest cave III F-23 b/w 1966-76.

↳ The shelter has yielded 8 cultural layers. Out of this, the 5th layer from the top represents middle paleolithic culture.

→ Here, the flake tools use quartzite ^{as} raw material.



4) Eastern India - Mahanadi valley (Odisha)

→ Mahapatra has excavated these sites

→ There is no change of raw-material as tools are prepared using quartzite.

→ The flake tools are also crude and Levallois technique is not properly developed.

→ There is dominance of borer over points.

5) Andhra / south region

→ It includes Kurnool, Chittoor and Nalgonda.

→ The tools are formed on quartzite. Levallois-technique is not so developed.

Cambridal discovered tools in 1932-1935

• Social life

--- ① & ② same as Q. 8 ---

③ Neanderthal man was associated with this culture. Though, no fossil record has been found in India.

④ There is evidence of burials with implements indicating start of rites & rituals.

• Conclusion

Middle paleolithic culture in India shows regional variability with indigenous neotical development in the eastern part, while western part shows influence of some kind of exogenous element. However, nothing could be ascertained with surety due to lack of any 1st habitation site. & is more closer to Mousteroid culture.

Q. 9 Soan Valley

→ It was excavated by De Terra and Patterson in 1935.

→ The T₄ terrace (enclined sohan) shows middle paleolithic flake tools.

Q. 10 Nevada

• Intro :- Nevada is prominently a middle paleolithic site located near river Pravara in Maharashtra.

It was excavated by H.D. Sankalia in 1956.

It is closely associated with Mousterian stone tool tradition of Europe.

• Time & climate

1) occurs a little late ---

--- 100,000 - 40,000 years ago.

2) The region witnessed pluvial & inter-pluvial periods.

• Material culture

- 1) Raw material changed from quartzite to crypto-crystalline silica based jasper, flint etc.
- 2) Levallois flaking technique to form flake tools.
- 3) Most prominent tool type - side scraper.
Others - point, borer.

--- diagram same as d. 8 ---

• Social life

--- same as d. 9 ---

• Conclusion

The Neurasian culture was spread across Godavari, Krishna and son valleys. It was distinct from middle paleolithic culture in the eastern part of India as it was more similar to the Mousterian industry while the latter showed indigenous neolithic development.

- Eastern part - 30,000 years earlier; crude flake tools; raw mat - quartzite; Levallois technique not developed; dominance of borer over points.
↳ indigenous neolithic development
↳ by Mahapatra (discovered)
- contrast with western part

- Burin :- working edge is similar to a screw driver.
↳ It has a thick (1cm) transverse cutting edge obtained by intersection of 2 plains which meet at an angle.



Q.11 . upper paleolithic culture in general.

- Intro :- upper paleolithic refers to the last sub-division of paleolithic culture. It is associated with blade tools and emergence of art, especially in the old world. Gabriel De Mortillet described upper paleolithic in France.

• Time & climate

- 1) Time - It occurred during last stage of pleistocene epoch between 40,000 - 10,000 ya.
- 2) Climate - It witnessed the last phases of glaciation (Weurm) and pluviation (Gravelian).

• Material culture

- 1) The upper paleolithic culture is characterised by stone tools as well as tools made up of bone, ivory and antlers.
- 2) The stone tools were made on quartz, to give rise to smooth and sharp edges.
- 3) Parallel-sided blade tools and blade flakes predominated this period. Other prominent types were - burins, harpoons, lance leaf blades etc.

4). The main technique used during this period were indirect punching technique and pressure flaking technique.

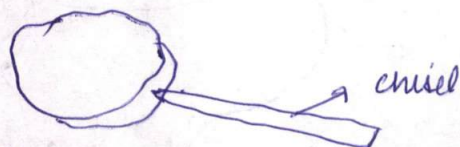


⇒



Blade flake

Indirect punching technique



Pressure flaking technique.

5). The Upper paleolithic culture is divided into 4 stages, especially in Europe.

↳ 1) Perigordian - blunt sided blades. Ceromagnon-Grimaldi

↳ 2) Aurignacian - working end of blades was a little sturdier; beautifully engraved bone tools & ivory points, basque burin, strangled blade

↳ 3) Solutrean ^{very thin} - lanceol leaf blades (zenith of human tool technology); hide needles.

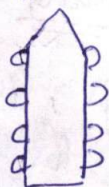
↳ 4) Magdalenian - large proportion of bone tools as compared to stone tools. ↳ also chancelled.



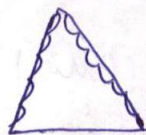
Blade.



Burin

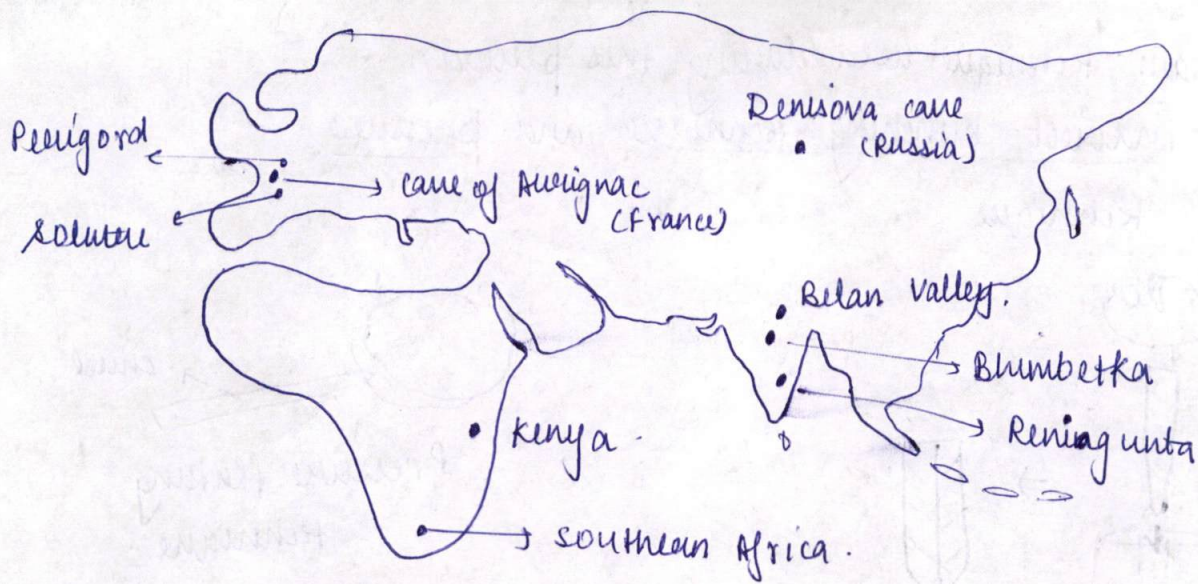


Harpoon.



Blunted back arrow head.

• Regional variation



- 1) Europe - Europe especially western sites of France and Spain show most promising evidence of upper paleolithic culture divided into 4 stages - perigordian, Aurignacian, Solutrean and Megadalenian.
- 2) Africa - Evidence is found at Kenya and southern Africa
- 3) India - Upper paleolithic in India has very restricted occurrence in few isolated sites of Belan valley, Bhimbetka etc.

• Social life

1) The economy was based on hunting and gathering.

2) Emergence of art - cave paintings, art engraved bone tools and figurines appear for the 1st time.

3) Tools show high degree of specialisation - for instance, hide needles with hole at the back similar to modern day needles were found.

↳ They might have been used for stitching

4) The culture is associated with Homo sapiens. They lived in camp sites.

Aurignacian
Cro-Magnon,
Grimaldi

⑤ Evidence of implements at burial sites ~~st~~ indicate emergence of rites & rituals.

⑥ Position of women - ~~These~~ Venus figurines with exaggerated secondary sexual char. have been found.

↳ These have been referred to as mother goddess worshipped for fertility.

• Conclusion

Upper paleolithic ended with the last ice age. It was most prominently developed in Europe as per available evidence. This period holds special importance in human biological & cultural evolution due to emergence of art.

Q.12 Upper paleolithic culture of India.

J.R. Sharma - Balan
Valley in
1980

• Intro :- Upper paleolithic refers to the last sub-division of paleolithic culture.

It is associated with blade tool technique.

~~However~~, and span from 40,000 ya - 10,000 ya.

• Climate

1. It witnessed the last phases of glaciation. (Würm) & pluviation (Gravelian)

• Material culture ②.

--- Point ③ & ④ of Q.11 ---

① In India, contrary to the European and African counterparts, we rarely find any

bone tools and art work.

⑤ Hence, though large number of blade tools are found in India, there is absence of a separate stratigraphic context in India.

↳ This leads some to believe that upper paleolithic was partially absent or had very restricted occurrence in India.

----- diagrams same as Cl. 11 -----

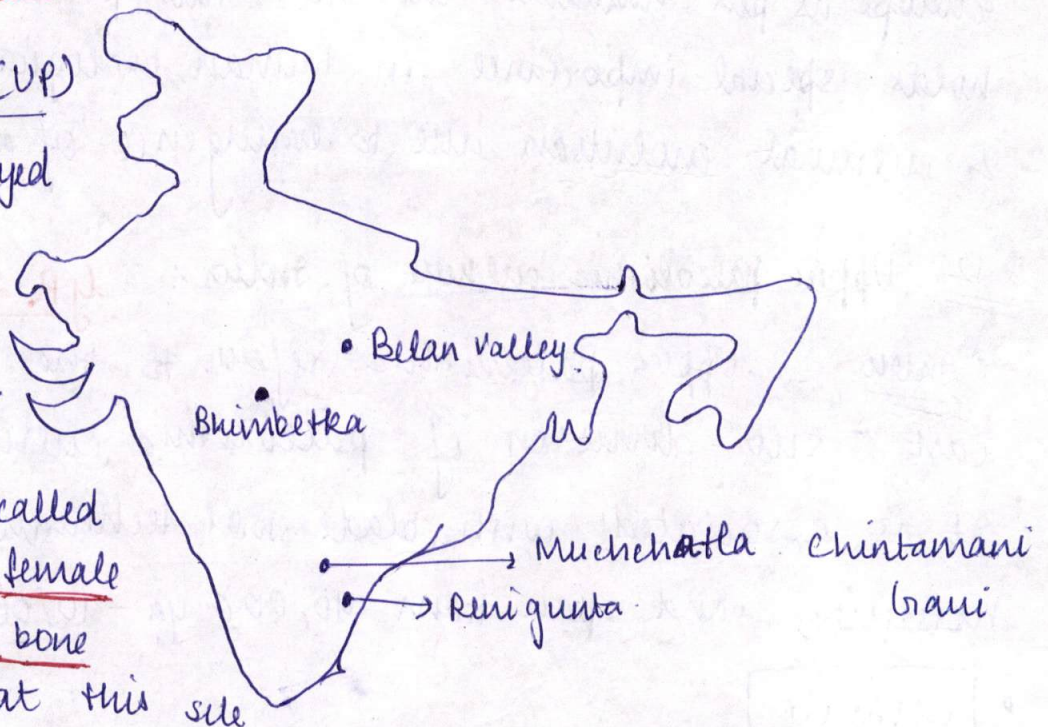
• Regional variation

near Allahabad.

1) Belan Valley (UP)

→ It was surveyed by G.R. Sharma in 1980.

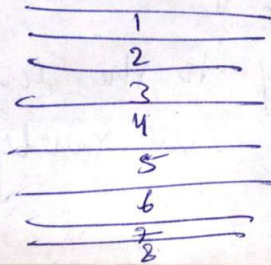
→ stone blade tools, small artificial stone structure called shuni and a female figurine made of bone were discovered at this site.



2) Bhimbetka (MP)

→ Excavated by V.S. Wankar in 19⁵⁷~~60~~. V.N. Misra excavated one of its largest caves III F-23 b/w 1966-76.

→ 8 cultural layers, 4th from the top is upper paleolithic.



I → upper paleolithic.

3) Renigunta (Andhra Pradesh)

→ It was excavated by MLK Murthy in 1963-64.

→ It has overwhelming number of blade tools prepared on fine grained olive green quartzite.

4) Muchchatla Chintamani Gauri (Kurnool, AP)

→ excavated by Murthy in 1970.

→ This site has yielded a large no. of bone tools such as chisels, scrapers, shouldered points etc.

• Social life

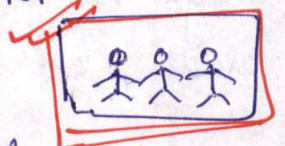
1) The culture is associated with homo sapiens; though no fossil evidence found in India.

2) The economy was based on hunting & gathering.

3) Emergence of art - Cave paintings emerged during this period. especially in Bhimbetka and Lakshidiyan.

↳ The paintings usually contain huge animal figures with some drawings of humans.

This indicates at social organisation.



4) Religion & rituals - Burials are found with implements.

↳ The presence of shrine near Belan valley also points towards religious practice.

5) Tools also show high degree of specialisation

↳ Blade has larger working edge, thus leading to used economic efficiency.

Conclusion

The upper paleolithic stage in India is very restricted and lacks context as compared to its European counterpart. However, it marked the emergence of art.

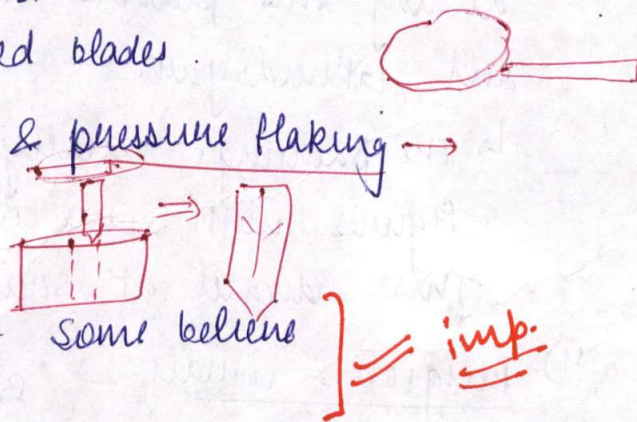
Recently, upper paleolithic cave paintings were discovered from Mangar Bani Hills in Madhya Pradesh. This puts light on their geographic distribution.

0.13 Belan valley.

- location - near Belan Valley, Allahabad, UP
- excavated by G.R. Sharma in 1980.
- Mat. culture :- 1) 4 depositions are found; 2nd from top is upper paleolithic.

1	Khetanhi	Microoliths & Neolithic.
2	<u>Baghor</u>	Upper "
3	Patpaha	Middle "
4	Sihawal	Lower Paleolithic

- large no. of blade tools - micro & macro blades, backed blades, shouldered blades.
- 2 techniques - indirect punching & pressure flaking.
- a small artificial shell.
- Female figurine made of bone. Some believe it to be a fishing harpoon.



Social life

--- same ---

Q. 14 Explain the paleolithic culture of the world.

• Intro :- Paleolithic culture refers to the cultural debris recorded from the entire

Pleistocene epoch. It has been divided into

3 sub-phases :-

- ↳ Lower Paleolithic (1.5 mya - 2,00,000 years ago)
- ↳ Middle " (3,00,000 ya - 40,000 ya)
- ↳ Upper " (40,000 ya - 10,000 ya).

• Climate

→ The Paleolithic culture has witnessed 4 stages of glaciation & pluviation (rain), separated by 3 dry phases of inter-glaciation & inter-pluviation.

<u>Culture</u>	<u>Tool type</u>	<u>Technique</u>	<u>Material</u>
----------------	------------------	------------------	-----------------

• Material Culture

1.1) Lower paleolithic :- There is predominance of core tools. The two types of industries are :-

- ↳ Acheulian - chopper-chopping type and crude hand-axes.
- ↳ Acheulian - properly finished hand-axes & cleavers
- ↳ There is also Oldowian industry in Africa.

1.2) Tools were made using Quartzite

1.3) Technique used was stone-hammer technique.

2) Middle paleolithic :- 2.1) Mousterian tool tradition Predominance of flake tools like scrapers, points, & borers.

2.2) Raw material was silica based like jasper, flint etc.

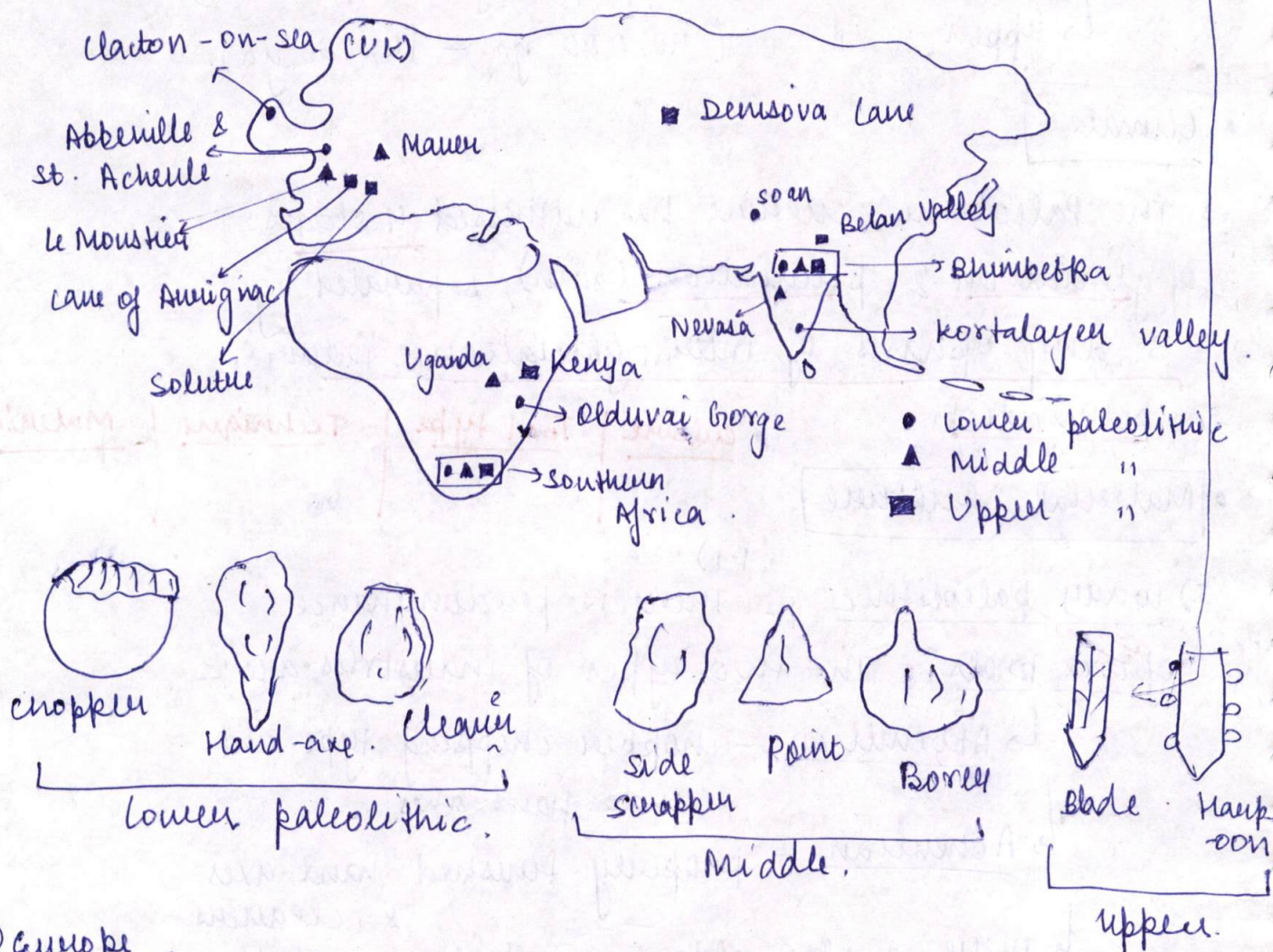
2.3) Technique used was Levallois flake technique.

3) Upper paleolithic - 3.1) Blade tools, burins, and bone & antler tools were found in large numbers.

3.2) Raw material used was Quartz and bone.

3.3) Technique used was indirect punching and pressure flaking technique.

Regional Variation



1) Europe

↳ lower paleolithic culture was found at clacton-on sea (UK), Abbeville and St. Acheule in France.

↳ Middle paleolithic culture is called Mousterian due to the Le Moustier in France

↳ Upper paleolithic culture is best depicted here and is divided into 4 stages - Perigordian, Aurignacian, Solutrean and Magdalenian.

2) Africa

↳ Olduvai Gorge is the earliest lower paleolithic site.

↳ other sites include places in Eastern & Southern Africa.

3) India

↳ lower paleolithic culture is most widely developed in India out of the three - Soan valley, Madrasian culture etc. ↳ late acheulian at.

↳ middle and upper paleolithic culture lack primary habitation site in India.

However, there important evidences were found at Nevasa & Belan Valley respectively.

→ Bhimbetka caves show evidence of all three cultures.

• Social life

1) Lower paleolithic was the culture of Homo erectus, middle paleolithic of neanderthals and upper paleolithic was of homo sapiens.

2) Economy - hunting & gathering.

3) Burials - rites & rituals.

4) Lived in camp-sites. showed social organisation.

5) Art - Cave paintings, art engraved tools & figurines (Venus) found particularly in upper paleolithic.

• Conclusion

Hence, paleolithic culture signifies imp. phase of human bio-cultural evolution.

As compared to its European & African counterparts, Indian paleolithic started late and lack proper primary sites.

As the culture proceeds from lower to upper paleolithic, the duration, also reduces of a culture progressively hinting at the ability of man with time.

Q.15 Paleolithic culture of India.

• Intro :- same as Q.14

3 sub-phases in India are :-

- ↳ lower paleolithic (5,00,000 - 1,00,000 ya)
- ↳ middle " (1,00,000 - 40,000 ya)
- ↳ upper " (40,000 - 10,000 ya).

• Climate :- same as Q.14

Northern mountains → successive glaciation & inter-glaciation
Peninsular river valleys → " pluviation "

• Material culture

--- same as Q.14 ---

• Regional variation

1) Soan

--- same as Q.5 ---

2) Madrasian

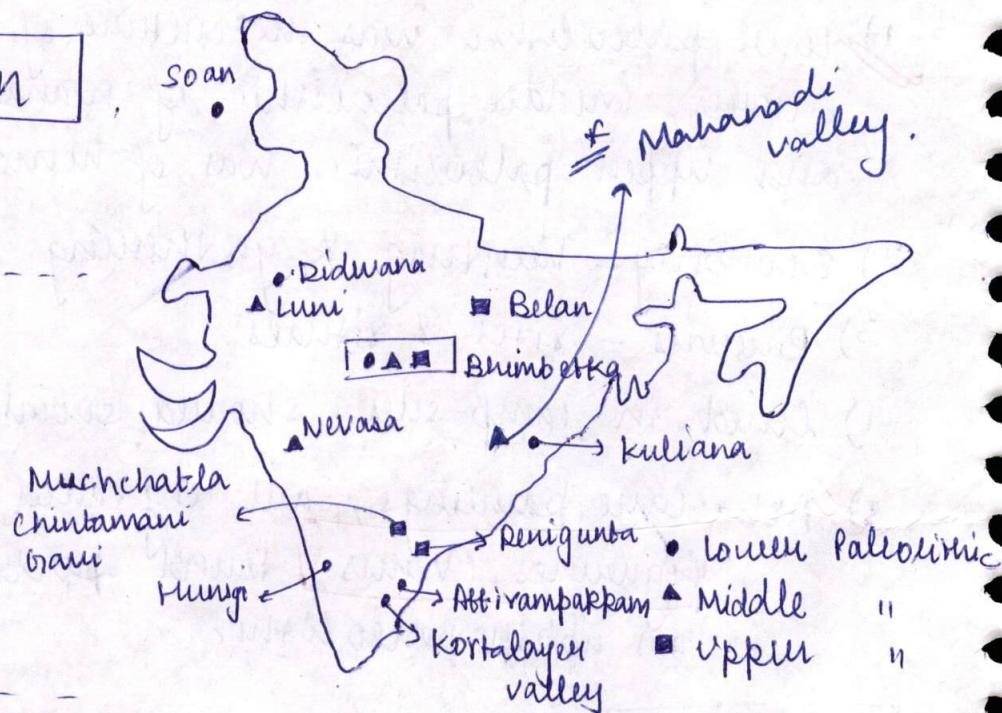
--- same as Q.5, 7. ---

3) Nevasa

--- same as Q.9 ---

4) Belan valley

--- same as Q.12 ---



5) Bhimbetka

--- same as Q.5 ---

• Social life

--- same as Q.14 ---

↳ no fossil evidence found in India except Naumada man.

• Conclusion

Contrary to its European & African counterparts, Indian paleolithic culture developed quite late & it shows high cultural variability, as well as lack of primary habitation site.

Q.16. Indian paleolithic culture is neither chronologically homogeneous nor culturally uniform. Discuss.

• Intro --- general defⁿ ---
↳ Indian paleolithic starts quite late

discovered by Robert
Bruce Foote in
1863

I) chronologically non-homogeneous.

1) Starts late than European / African counterparts

2) Well developed lower paleolithic exists.
However, at most places.

3) Majority of Indian sites show only two gravel layers belonging to pleistocene period.

↳ The first layer contains evidence of lower paleolithic (chopper-chopping; hand-axes).

↳ The second layer usually contains mixture of flake tools & blade tools.

3) Thus, there is no separate stratigraphic context for upper paleolithic despite the presence of blade tools.

4) This causes chronological non-homogeneity as follows: -

well-developed lower paleolithic culture

↓
some evidence of middle " "

↓
no prominent evidence of upper " "

↓
directly surpassing to microliths

8) occurs later than Europe / Africa.

5) It was only after G.R. Sharma excavated the Belan Valley in 1980 that ^{proven} evidence of upper paleolithic culture was found in India.

6) However, till now, both middle & upper paleolithic culture lack 1st habitation sites in India.

• Cultural non-uniformity.

7) Middle paleolithic in Eastern India

Mahapātra occurs 30,000 years earlier & shows indigenous vertical development.

Western

↳ H.D. Sankharya.

1) Climate & stratigraphy - Soan valley witnessed glacial climate & shows 6 terraces. Whereas peninsular India witnessed pluvial climate and stratigraphy here is quite complicated and mostly shows only 2 layers.

2) Regional variability in material culture

2.1) Lower paleolithic - In Soan, chopper-chopping tools are the predominant type, whereas in south India, hand axes & cleavers were dominant.

2.2) Middle " — The Western belt (Nerara) shows change of raw mat. to silica-based (jasper, flint etc.) whereas there was no change of raw mat. in the eastern belt.

↳ Flakes were also beautifully crafted using Levallois tech. in western India whereas in eastern India flakes were crude in nature.

2.3) Upper paleolithic — large no. of blade tools found at Belan valley. whereas bone tools predominate at Muchchatla Chitamani Gani. This is also the only site where they are found.

3) Art :- Cave art found in upper paleolithic. that too only at limited sites of Bhimbetka.
→ while, Belan valley lack any painting but has artificially made shrine and figurine made up of bone.

• Problems with Indian paleolithic.

1) Occurs late.

2) No separate stratigraphic context for upper paleolithic.

↓
This brings cultural evolution in conflict with biological evolution. — Hen.

3) No 1st habitation sites for middle & upper.

4) No fossil evidence.

5) Bone tools & art evidence rarely found in contrast to Europe & Africa.

6) Probably two different human populations co-existed side by side.
↳ cultural non-uniformity.

Q.17 Mesolithic culture of the world.

• Intro :- Mesolithic culture corresponds to the early Holocene period spanning b/w 10,000 - 4,000 BCE. It was identified by Piette in 1885 when he discovered rock shelters at Mas d'Azil (France).

→ It was placed as a transition stage b/w paleolithic & neolithic.

Climate

→ It was marked by the end of ice age and onset of relatively dry period. (warm) - last glaciation. (last pluviation)
→ The melting ice also caused the 'big game' (animals) to become extinct or they migrated.

↓
shift in man's subsistence from big game to small animals, birds & fishes

↓
change in tool kit to microliths.

Material culture

1) Mesolithic period is characterised by the use of small stone tools, called microliths (1cm-6cm)

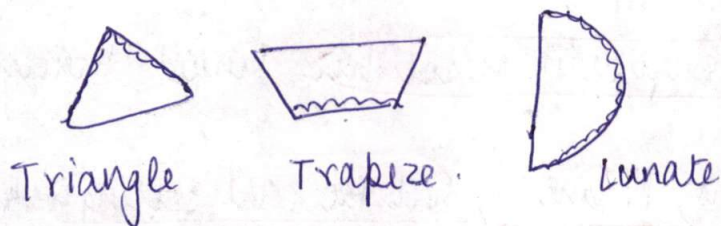
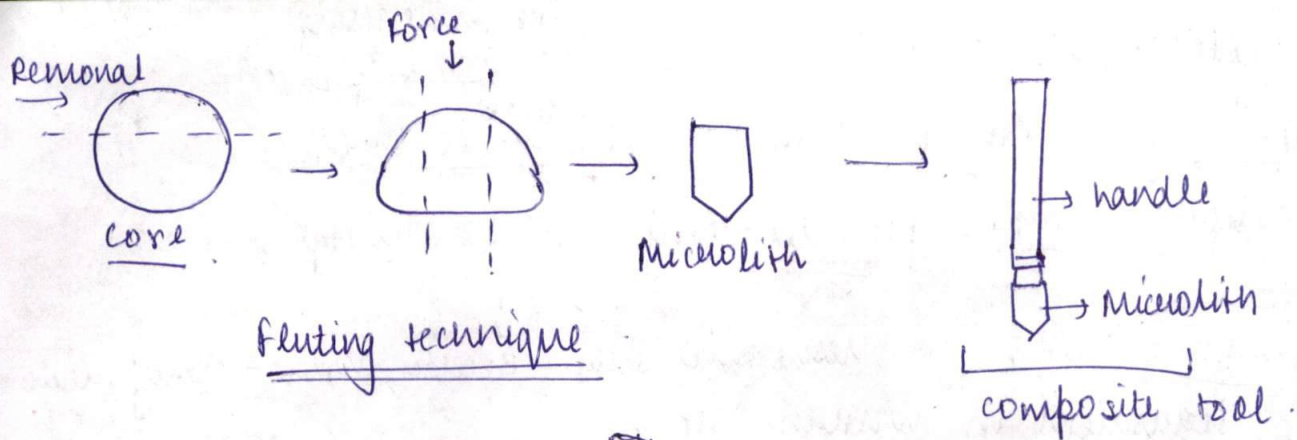
2) Microliths were generally of two types :-

↳ Geometric - triangle & trapeze. Fluted blades.
more evolved type. ↳ Non-geometric - lunate, microburin, etc.

3) These were prepared using pressure flaking technique or fluting technique.

4) The microliths were generally hafted on an organic material handle and were used as composite tools.

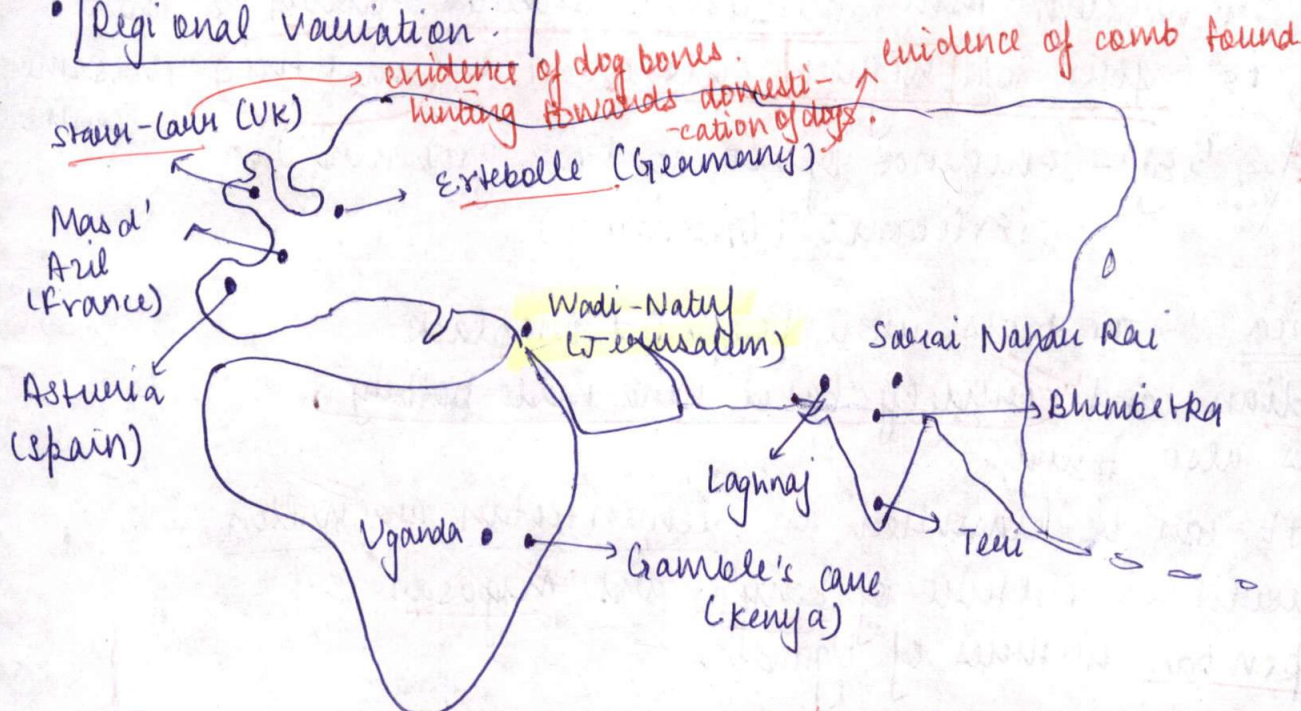
↳ Eg :- Bow & arrow, harpoon, spears etc.



5) The raw mat. used included quartz, agate, chert and non-lithic mat. such as bones, antler

1) The mesolithic culture of Europe can be divided in following stages :-

Regional Variation:



• Europe :- Due to melting of ice, mesolithic habitations have also been found in Northern Europe near coastal regions & rivers.

→ Mesolithic culture of Europe can be divided into following stages :-

- 1) Azilian culture (southern Europe) - lunates, bone harpoons with hole in the center (fishing economy); painted pebbles.

- 2) Tardenoisian culture - developed in Northern Europe due to melting of ice during Holocene.

- 3) Asturian culture - Western Europe

4) Maglemosian culture :- evidence of grinding & polishing methods. (trait of neolithic culture)

5) Campignanian - pit-dwellings used as habitat.

* Natufian culture - Mesolithic site - Beidat, Wadi-Natuf near Jerusalem in western Asia.

They collected wild seeds & grasses; earliest evidence of agriculture since late pleistocene
↳ Extended branch of European Mesolithic linked through Danube river.
↳ Evidence of microliths, ceramics, habitational settings found.
↳ In Europe, the western part shows clear development of mesolithic culture; as you move towards the east to western Asia, mesolithic shrinks down & there is influx of higher culture, i.e., neolithic in some cases.
↳ eg:- evidence of comb (for grooming) in Ertebølle (Germany).

• Africa :- The tools were prepared on black obsidian and crudely baked hand-made pottery was also found.

↳ It can be classified as Elementitan and Wilton mesolithic culture of Kenya and Magosian & Lupemban cultures of Uganda.

• India :- The earliest evidence was found from Sarai Nahar Rai (8000 BCE) whereas ~~the~~ youngest site is Lanhnaj (2400 BCE).

Social life

1) The economy during early mesolithic was based on hunting, gathering & fishing though small game and birds were the usual target.

↳ In the later part, there was partial

small game
hunting
&
fishing
fowling

domestication of animals and plants accompanied by wild seed collection (eg - Langhnaj)

- ② Man also became less mobile and sedentary lifestyle began to take root.
- ③ The tools were extremely specialised in nature and most of them were used as missile tools.
↳ eg:- Bow & arrow.
- ④ evidence of rites and rituals as burials have been found in various positions.

- ⑤ Mesolithic art - cave paintings have been found at various sites. These mainly include animal paintings and sometimes, human figures too.
↳ This shows that man had created a symbolic world for himself on the basis of his external perceptions of the world.

Draw fig:

↳ in Shimbetka most painting of this period; small-sized.

• Conclusion Gordon Childe's work also talks of neolithic revolution.

Thus, mesolithic culture marks the transition of man from paleolithic culture to settled and productive economy of neolithic times.

Q.18 Examine the mesolithic culture of India.

• Intro :- Mesolithic culture refers to the early period of Holocene epoch. It marks the transition from paleolithic to food-producing neolithic culture.

• Time period & climate

- 1) The Indian mesolithic spans b/w 9000-2000 B.C.E.

2) It marked the end of glacial period ^(warm) and beginning of relatively warm Holocene period.

↓
This led to extinction & migration of big game

↓
shift in subsistence

----- same as c.12

• Material culture

----- same as c.12

• Regional variations

~~pot-sheeds~~ also found

1) Sanai Nahau Rai (UP)

→ It is the oldest Indian Mesolithic site (8000 BCE) excavated by archaeologists of Allahabad university in 1969-70.

→ It is essentially a geometric Langhnaj tool industry though many non-geometric tool types are also found.

→ Other findings include living floor with fire hearth, human burials in specific posture and domesticated animal bones.

→ maybe for communal cooking

→ Mesolithic cave paintings are also found.

Sanai Nahau Rai group include sites such as:-

Suhaga cave → Morhana, Baghai Khor, Lekhania, Chopani Mando etc.

2) Langhnaj (Guj)

→ It was excavated by HD Sankalia b/w 1944-63.

→ Various geometric & non-geometric microliths are found here.

→ Human skeletons buried in crouching posn - indicating some ritual.

→ Animal bones of wild & domestic animals -



imp.

indicating some degree of pastoralism.

→ Langhnaj was a contemporary of Harappan culture (2000 BC) and might have been involved in some sort of primitive trading with them.

3) Bagor (Rajasthan)

→ excavated by VN Misra (1964).

→ zenith of Indian microlith industry. Thousands of microliths extremely small in size were found.

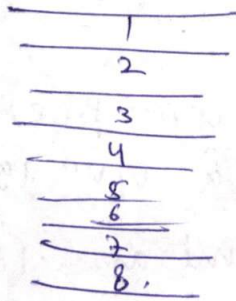
→ Other findings - stone paved habitational floors, burials and animal bones.

4) Bhimbetka (MP)

----- same as prev ones -----

→ first 3 layers - mesolithic period.

geometric microlith industry cave paintings



5) Teeli (Tamil Nadu)

→ Microliths in this area first recovered by foote.

→ It shows the most primitive microlith industry in India.

→ southern India - Karnataka has large no. of microlith tools. ; microliths extremely long & slender. ; geometrical types (trapeze & triangles) absent.

6) Eastern India

↳ fairly large-sized microliths.

↳ geometrical forms absent or rare.

• Social life

①. ② - same as Q. 17 - - -

③ rites & rituals - Burials in crouched posⁿ at Langhnaj.

④ Mesolithic art - Most cave paintings depicted animals, hunting activity and even sometimes dancing figures.

↳ The paintings showed the risk man took and knew that was involved in hunting.

⑤ Inter-group warfare might have been common. as per findings of skeletons at Sarai Nahar Rai.

• Conclusion

- - - same as Q. 17 - - -

Q. 19 Langhnaj.

→ Mesolithic site (2400-2000 BCE) in Guj.
excavated by HD Sankalia b/w 1944-63.

→ Time & Climate - - - same as Q. 18 - - -

• Most of mat. culture points same as Q. 17, 18

→ Some additional points

↳ large no. of microliths collected.

✓ 90% of these are waste mat., cores & chips.

✓ 10% are finished types - blunted back blades, lunates, trapeze, scrapers etc.

iron-rangled arrow head.
Rhino shoulder blade was used as anvil for making cherting microliths

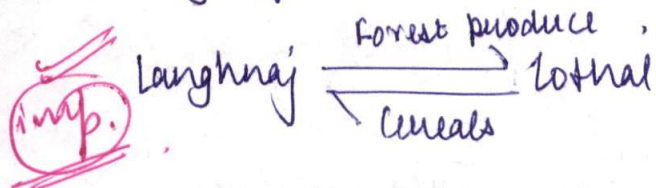
• Social life

→ economy - - - same as Q. 17, 18 - - -

→ Burials - crouched posⁿ

→ animal bones - some degree of pastoralism

→ contemporary of Lothal (Harappan culture)



0.20 Neolithic culture of the world.

- Intro :- Neolithic culture refers to the holocene period characterised by emergence of farming economy and sedentism. It preceded the discovery of metal.
- V.G. Childe has referred to Neolithic culture as First revolution of mankind.
- Time period :- It occurred b/w 7000-2000 BCE.
- Climate :- The period is marked by warm & dry climate. Melting of ice lead to emergence of large tracts of forested land which could be cleared for food production & settlement.
- Material culture.

1) Neolithic culture is characterised by use of celts (stone-age axes) - these were ^{used} to clear forests for primitive agriculture.

2) Celts are formed in the following way :-

Flaking technique
to take out flakes

→ Pecking technique
to smoothen the
undulated surface due
to scars

→ Grinding & polishing
(sharpening the
tool by rubbing
it against a rough
surface).

3) Other prominent tool types are:- adze, saddle & quern (for grinding grains), ring → for threshing grains, stone, chisel etc.

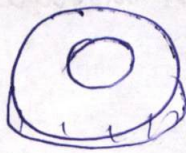
4) Pottery usually hand-made and ill-fired is also found for storing surplus grains.



Axes.



Adze.



ring-stone

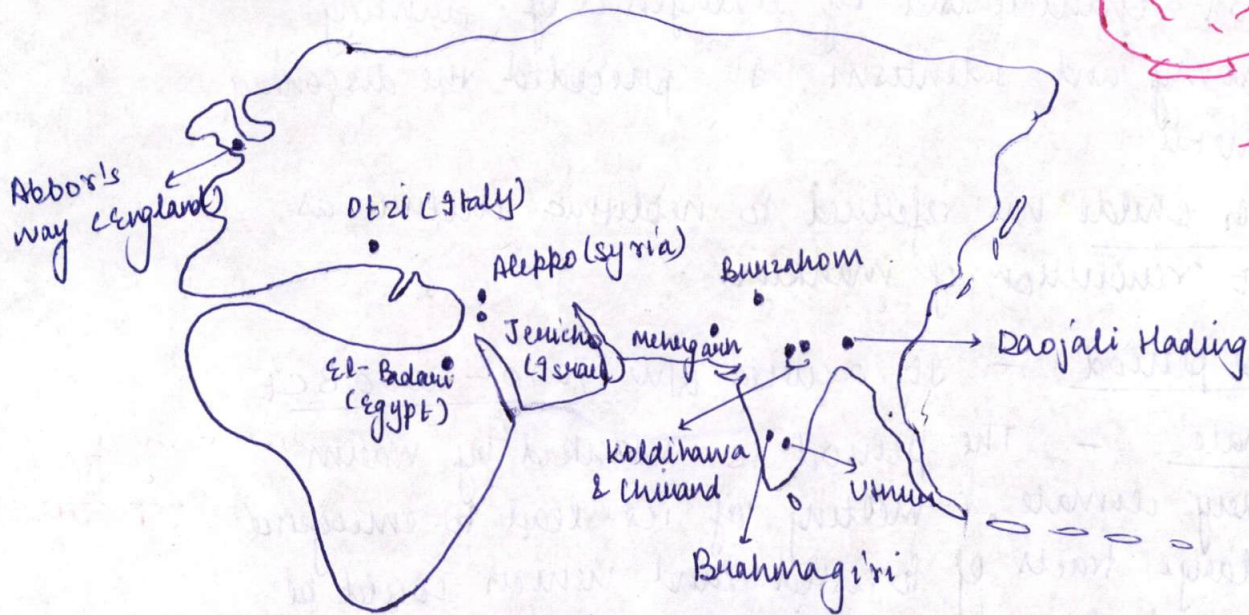


Saddle quern/
grinder



earthen
pottery

• Regional Variation



1) Near East (9000 BCE)

↳ The earliest evidence of neolithic culture comes from the sites of Aleppo (Syria) and Jericho (Israel). Even, the Natufian culture of mesolithic times showed evidence of wild seed collection and food production.

2) Europe

↳ Agriculture was introduced through contact with west Asia in the river valleys of Greece and Balkans. A number of neolithic cultures like Stancevo culture, Linear pottery & Horgen culture have been reported from Europe.

3) Africa

↳ Neolithic culture developed in Egypt & Nile valley due to influence from west Asia. The major types are Mehinda & Badarian culture.

4) India

↳ ~~The western and eastern side~~ Neolithic culture in India shows regional variations. Important sites are Mehgarh in the west, Dajali Harid in the north-east and Chirand in the Gangetic plains.

↳ The Neolithic culture of Deccan India developed a bit late and is called neo-chalcolithic by RD Sankalia.

Social life

- 1) Economy shifted to subsistence agriculture based on domestication of plants & animals.
- 2) Lifestyle ~~was~~ ^{became} more sedentary and this led to development of complex village system. (Habitational structures are found)
- 3) Permanent settlements led to cooperative existence as well as social inequalities & conflicts. } → Marx's cultural materialism
- 4) To resolve social conflicts; religious and political organisations began developing.
- 5) Religion and rituals were present - Eg:- dog buried with man at Burzahom. } ↳ infra-structure
→ superstructure

Conclusion

The development of Neolithic culture is chronologically non-uniform throughout the world. It depends on the economy, social system & population size of the area. Nevertheless, it marked an important techno-cultural revolution in history of mankind.

Q. 21 Neolithic culture of India.

• Intro :-

• Time & climate

} --- same as Q. 20 ---

• Material culture

--- same as Q. 20 ---

→ large no. of tools made of bone, antler, wood were also used.

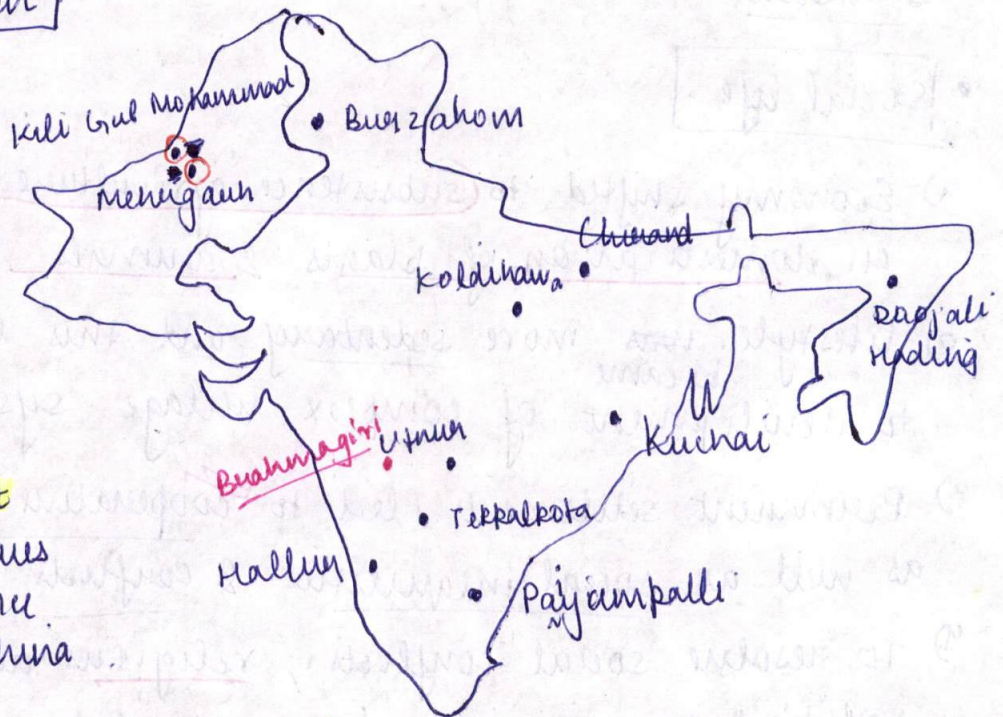
• Regional variation

→ 2300 BCE

1) Buzzahom (J&K)

→ A variety of celts and bone tools along with clay hand-pottery have been found.

→ People lived in pit dwelling - this shows exogenous influence probably from China.



2) Mehrgarh (Pakistan), (6000 BCE).

→ It was excavated by Jahange & Lechevallier (1960-71). (1974-86).

→ A number of celts, habitational structures of mud bricks and barley grains have been found.

→ It is considered as a precursor to Harappan civilisation.

3) Chirand (Bihar) (2000 BCE)

↳ Here, frequency of bone & antler tools is greater than celts.

↳ well-made pottery, domesticated wheat, rice & sugarcane objects are other features of this site.

4) Koldihawa (UP) $\approx$ 5440 BC.

↳ It exhibits Daub & Wattle type habitational structures, domesticated rice grains & ceramic evidence.

5) N. E India - Dagjali Hading (Assam)

↳ It was excavated by TC Sharma in 1967.

Smaller sized cells which are shouldered at Butt-ends are found here.

6) Southern India (2000-1000 BCE).

↳ HD Sankalia calls Deccan Neolithic as Neolithic due to occurrence of beads and some metal pieces along with large-sized cells.

↳ The economy was pastoral and neolithic ash mounds are found here.

• Social life

• Conclusion

--- Same as ca. 20 ---

led by TN Khazanchi

D. 22 Bulizahom

→ excavated by Archaeological survey of India (1960-70)

↳ 4 cultural periods dated b/w 3000-1000 BCE.

1st two are neolithic; 3rd - megalithic & 4th - historical period

• cells, rich bone tools.

↳ pit dwellings

↳ harvesters - rectangular knives with 2 holes.

↳ hand-made coarse pottery.

↳ Dog buried with man; skeleton covered with red ochre

↳ Primitive surgery - hole in skull

↓
indicates some
rites & rituals

→ show exogenous influence from China.

Q.23 Mehgarh.

→ shows 7 periods b/w 7000 - 2000 BCE

↳ 1st period - aceramic neolithic.

↳ 2nd period - neo-chalcolithic with evidence of ceramic pottery.

↳ 3rd - 7th - chalcolithic

↳ Habitational structures of mud-bricks.

↳ cells & bone tools.

↳ barley & wheat. — earliest evidence of farming & herding in South Asia

↳ Burials with goods.

↳ evidence of long-distance trade, indicated by presence of beads & sea-shells.

↳ precursor of Indus-valley civilization :- people of Mehgarh are believed to have migrated to more fertile Indus valley.



Q.24 Neolithic of Gangetic plain.

↳ sites :- Chirand, Koldihawa, Chopani-Mando.

↳ Additional points :- indigenous dev. of neolithic culture w/o ^{much} influence from the contemporary cultures developing at the western & eastern borders of India.

↳ cells, bone & antler tools.

↳ habitational structure - Raub & wattle type

made with tree branches & mud

↳ rice grains → not found anywhere else. (in any neolithic site)

↳ rich - ceramics

↳ complex village development. (similar village dev. not found in eastern & southern India).

Q.25 Neo-lithic of N.E India.

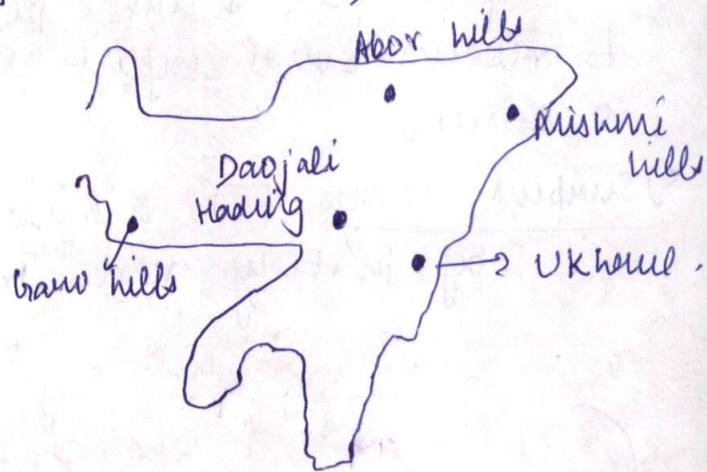
- influence of S.E Asia
- excavated by TC Sharma, Dani & OK Singh in 1967.
- Climate - ~~long~~ v. high rainfall, thus large scale neolithic culture is not present here unlike neolithic of northern plains
- Time period - 4000 - 2000 BCE.
- Site - Daojali Hading, Mishmi hills, Garo hills, Ukhrul, Aboor hills

→ Additional points

- ↳ grinded & polished celts are found.
- ↳ celts are small & have shouldered butt-ends.
- ↳ No habitation structure evidence.
- ↳ No microliths or bone tools.
- ↳ hand-made pottery, grinding stones & ring stones are found
- ↳ evidence of jhumming cultivation.
- ↳ ring stones have v. small hole at the centre probably used for fishing



shouldered celt



Q.26 'Neolithic is a revolution' → 'social evolution' (1951)

- Intro :- V.G. Childe coined the term 'Neolithic Revolution'. Acc. to him, neolithic period for the 1st, showed large-scale evolution in terms of tool-technology used by man's socio-economic system.
- ↳ thus, it marks the 1st revolution of mankind prior to industrial rev. of 18th century & IT rev. of 20th century.

• Large-scale changes

full-fledged

- 1) Domestication of plants & animals. - subsistence [^] farming economy.
- 2) sedentary life style leading to permanent habitational structures & complex village system.
- 3) Tools :- from microliths to extremely efficient celts hafted on wooden handles used for clearing of forests.
- 4) Rise of complex social & political organisation to resolve social conflicts & ensure cooperative co-existence.
- 5) Surplus storage - hand-made pottery followed by pottery made from potter's wheel.

→ for contribution of mesolithic / or how it was transitory.

1) late mesolithic showed partial domestication of plants & animals; wild seed collection

↳ Eg:- evidence of animal bones.

2) Natufian culture in Near East earliest evidence of food production.

mesolithic

3) evidence of crude pot shards at Sanai Nahari Rai etc.

4) refinement of tool tech. & craftsmanship :- grinding & polishing

↳ Eg:- Maglemosian culture of Europe

5) Habitational structures from mesolithic - campignanian - pit

Bagon, Natufian

(From Terra Amata in France)

lower paleolithic

6) Hafting of tools also started during mesolithic

sometimes present in middle paleolithic

Critique points supporting why all these developments were also happening prior to neolithic.

Q.27 Neo-chalcolithic culture of south India.

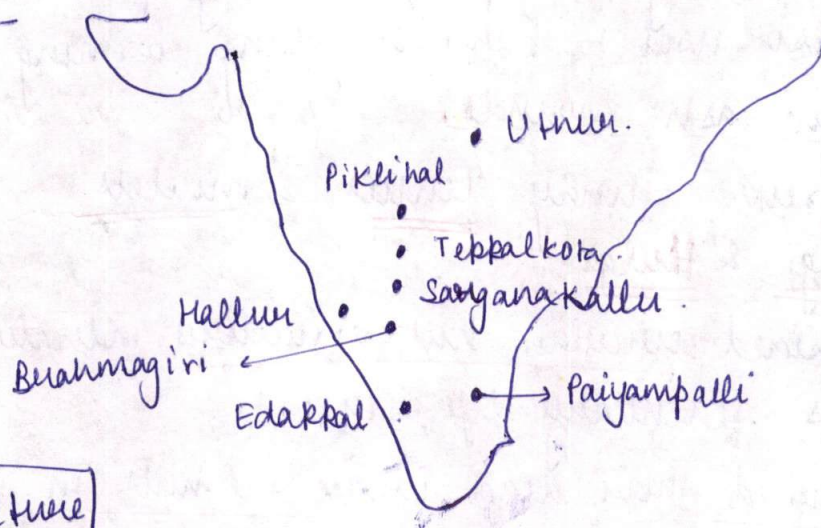
- Intro :- HD Sankalia in 1962 classified the Neolithic sites of southern India as neo-chalcolithic.

These are the It refers to a culture characterised by food-production and sedentism. The use of stone celts is prominent along with some occurrences of metal pieces.

- Time-period :- It occurred at a later time period around 2500 - 1000 BC ~~while the~~ when the northern part was experiencing full-fledged chalcolithic & harappan culture.

- Climate :- warm & arid.

- Imp. sites :-



- Material culture

- 1) In this region, a layer or two of pre-metal industry is found sandwiched b/w mesolithic & chalcolithic culture. These layers are referred to as neo-chalcolithic.
- 2) Large no. of ~~stone~~ ^{massive} celts (stone-age axes) are found - These were hafted on wooden handles and used for clearing forests.
- 3) Celts were formed through flaking and pecking tech. followed by grinding & polishing.

Other prominent tool types were - grinders, saddle & quern, mullers etc.

5) Pottery was used for storing surplus.

It shows transition from coarse hand-made pottery to red ware & black ware pottery.

6) In some places, beads and metal pieces are also found, most probably due to influence of chalcolithic culture of N. India.

↳ Eg:- gold toe ring at Tekkal Kota.

Social life

--- diagrams ---

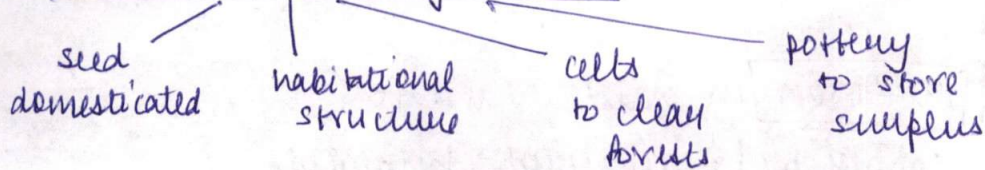
- 1) Their economy was predominantly pastoral. They also used to burn cow dung forming Neolithic ash mounds → indicating some sort of rituals.
- 2) They grew sturdy lentils & millet like ragi & Hulgi.
- 3) They resided circular hut structures indicating towards sedentary life-style.
- 4) They buried their dead under the huts in pottery urns - this resembles a primitive coffin & indicates towards some rites & rituals.

Conclusion

Hence, neo-chalcolithic of southern India appeared at a later time as compared to the rest of ~~the~~ India. Recent discovery of Thamirabarani civilisation of Tamil Nadu (1155 BC) can further provide some links about prehistoric development in South India.

- Other neo-chalcolithic :- Bagor → Microliths, pottery, habitation floor, copper arrow-head.

• 4 main evidences of neolithic



0.28 Chalcolithic culture of the world.

• Intro :- Chalcolithic culture is characterized by the simultaneous use of both copper & stone tools. This stage just precedes the bronze age and spans b/w 5500 - 2000 BCE.

• Climate

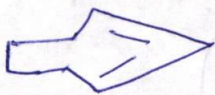
→ The climate is warm and dry, suitable for agriculture & settlement.

• Material culture

- 1) The technology is a mix of ~~copper~~ metal and stone ~~tools~~ implements.
- 2) Cu tools are manufactured through smelting of copper.
- 3) Stone tools contain a mix of microliths, stone axes, blades, celts etc.
- 4) Polychrome painted pottery is another characteristic of this period.
- 5) Thus, ceramics is the main attribute of Chalcolithic culture.

Material culture

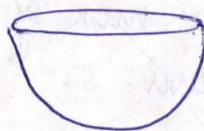
- 1) The technology is a mix of metal & stone implements.
- 2) Metal used is pre-iron in nature and is mostly copper. Copper tools required knowledge of manufacturing of metal extraction and smelting.
- 3) Lithic tools mostly consisted of a mix of microliths, stone axes, blades, axes etc.
 (celts) → adze.
- 4) Ceramics is the main attribute of this culture. It was used to make polychrome painted pottery.
- 5) Many other allied cultural materials like terracotta figurines, beicks, bangles etc. also occur during this period.



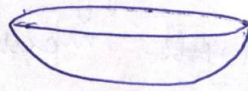
arrowhead



Axe head



bowl

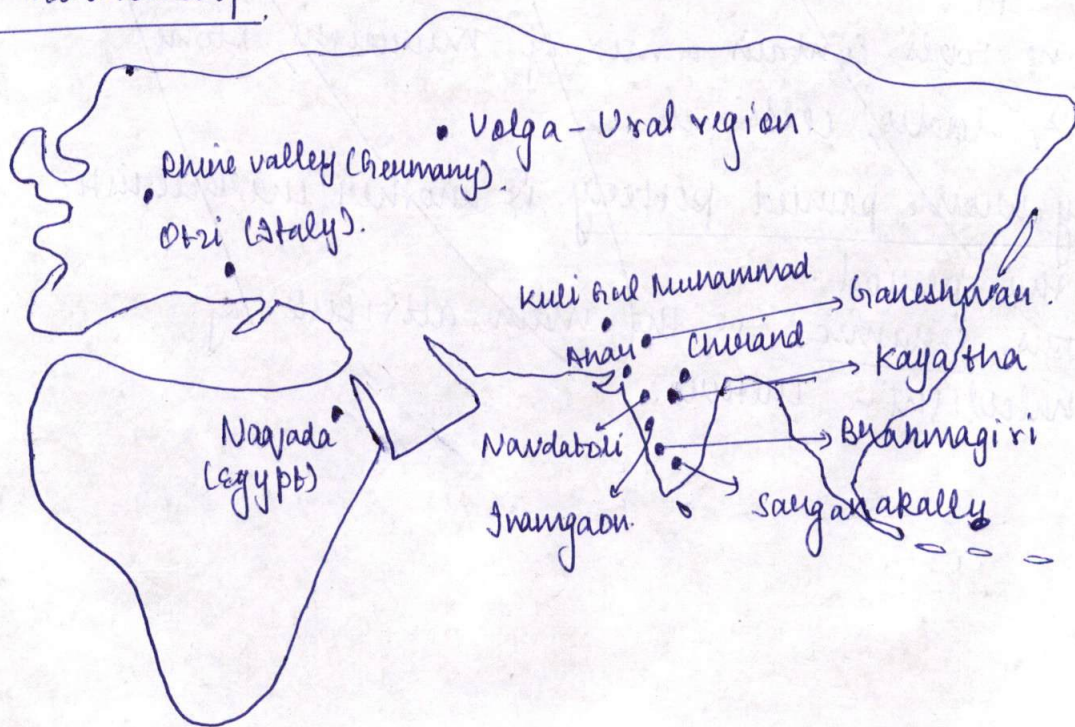


Dish



Jar

Regional variation



1) Europe

→ European chalcolithic culture is characterised by Megaliths, significant economic stratification and probably the earliest presence of Indo-European speakers. Certain cultures include Tamna, Corded ware & Kurgan culture.

2) Africa

is
→ Chalcolithic culture first found in Egypt in the form of Nagada culture. However, for most of the Africa, there is no distinct chalcolithic period as iron & copper smelting appear together.

3) India

→ Chalcolithic culture in India is non-uniform and is divided into six zones - Ahar-Banas, Madhya Pradesh (Malwa), Gangetic doab, Eastern, Northern Deccan and southern chalcolithic culture. 10% → Jorwe

→ These are distinguished in terms of ceramic industry and utilisation of copper to make implements.

• Social life

1) The economy was centered around cultivation of cereals & domestication of animals.

2) The period saw emergence of full fledged villages.

3) Habitational structure usually included mud & thatched houses.

3) There must have been strong organisation of social structure ^{political organisation}. This is because extraction & smelting of copper would require group ^{both} knowledge and labour. (group activity).

4) social hierarchy must have existed.

↳ Eg :- Ahar region is supposed to be labour habitational area.

where they mined Cu & transported it to urban areas

5). Religious life was centered around mother goddess, sacred figurines and belief in afterlife (burials with implements).

6). societies were engaged in long-distance trading.

• Conclusion

Copper started to be used along with Bronze towards the end of chalcolithic period. This led to the emergence of bronze age.

Q. 20. Chalcolithic culture of India.

• Intro :- same as Q. 28

• Time period - 4500-1000 BCE

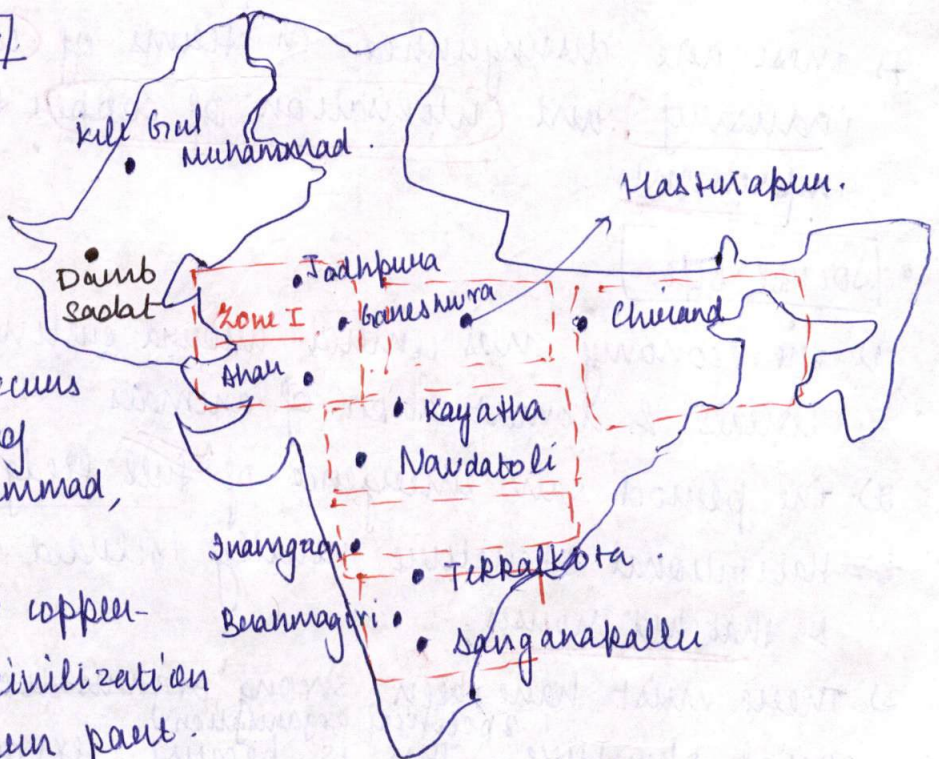
• Climate

• Material culture

] --- same as Q. 28 ---

• Regional variation.

→ Chalcolithic culture is divided into 6 zones non-uniform



→ The earliest appearance of chalcolithic culture occurs at the western border of India - Kuli Gul Muhammad, Damb Sadat etc.

→ This merges with the copper-bronze Indus valley civilization in the North-Western part.

→ The rest of India show indigenous independent & non-uniform development of chalcolithic culture. It can be divided into 6 zones. -

1) Ahar-Banas zone (2500-1500 BCE)

→ It is spread over south east Rajasthan & includes sites like Ahar, Ganeshwar, Banas Valley, Gilund etc.

→ Their pottery is black & red ware with white colored decorations on exterior.

→ Ahar is usually thought to be a miners camp because though copper was mined here, it was not used to make any objects as such. It must have been transported to urban Harappan sites from here.

→ heating tech. through which interior of the pot becomes black & exterior of the pot becomes red.

* Other points → 1) Ganeshwar has large no. of cu tools & microliths (no other Ahar-Banas site has microliths).

2) Malwa zone (2000-1100 BCE)

→ At Kayatha, pottery is found in three fabrics. Most prominent is thick, sturdy brown slipped ware painted in violet or deep red.

→ It has well developed copper & blade industry.

→ Another prominent malwa type is buff or orange slipped pottery painted in black or dark brown.

3) Granetic coast

majority of cu tools found mostly in caches.

→ The culture is called copper hoard culture. However, in spite of emergence of copper, it was not much utilised & harnessed for development of society.

→ The associated pottery is other colored pottery.

→ must have been remains of Harappan refugees on their eastward march.

4) Eastern zone

(Chirand)

→ It is spread over Bihar, West Bengal & Assam.

→ The pottery is of three types - handmade thick grey ware (1), wheel-thrown red ware (2) & black & red-ware (3).

5) Northern Deccan Chalcolithic culture

- The most imp. culture is the Jorwe culture of Maharashtra. is well baked &
- The Jorwe ware has a fine fabric, with red-orange matt surface painted with black geometric designs.
- artificial irrigation
- earthen pan for making food.
- female figurines - fertility cult
- Different burial styles of children & adult.
 - ↳ children in handmade red gray ware urns.
- Settlement pattern showed social hierarchy with centre of settlement occupied by the elite.

extra points.

6) Southern Chalcolithic → in 1962.

- H.D. Sankalia has termed it as neo-chalcolithic as it shows mix of both cultures.
- These sites are known for ash mounds.

red ware & black ware

• Social life

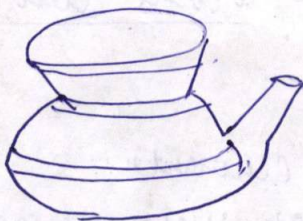
--- same as D. 28 ---

• for Chalcolithic culture of Deccan India

- ↳ unite about both
 - Jorwe culture of North Deccan
 - Neo-chalcolithic of South India (--- D. 27)



Atharvian Black & red ware



Jorwe ware



Malwa type

Q.30 Explain Bronze age or Copper-Bronze age of the world.

• Intro :- Bronze age refers to the period preceding the iron age, characterised by bronze metallurgy as the dominant industry. It spans from around 3300-1000 BCE.

• Climate

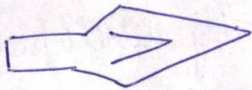
↳ warm & dry climate, suitable for settlement.

• Material culture

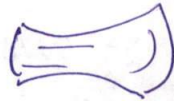
1) Bronze is an alloy made from smelting of copper and mixing it in appropriate proportion with tin, arsenic or other metals.

2) Bronze has ~~more~~^a technological advantage over individual metals like copper because it is more durable & handier.

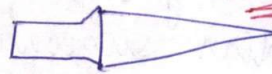
3) Bronze tools were made through bronze casting technique, that is, melted bronze was poured into a mould giving desirable shape to ^{the} implements.



Bronze arrowheads



axe head

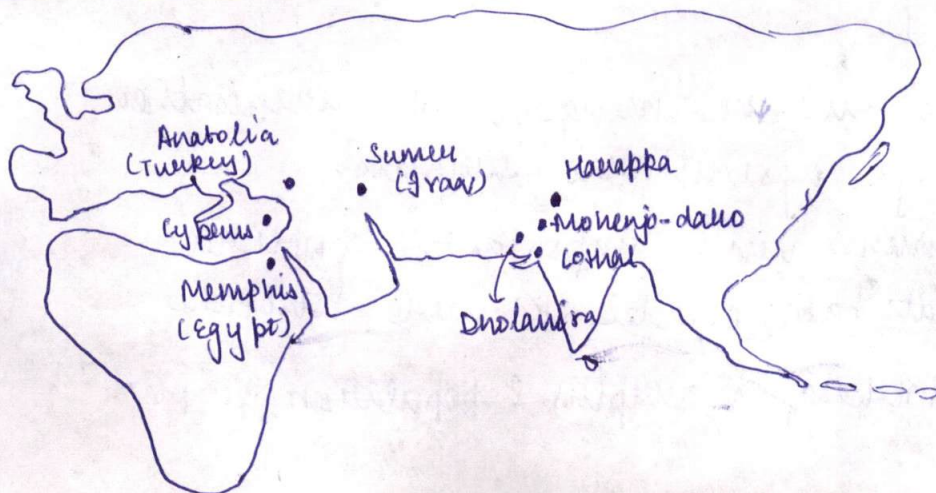


Knife with handle

4) Polychrome pottery ware

5) Others -
Kerala copper
stone
sculpture
Ornaments

• Regional Variation



1) Near East

- Near East was the first region to enter Bronze age. It saw the emergence of rich Sumerian, Babylonian and Assyrian civilizations in Mesopotamia.
- They practiced ^{& trading} intensive agriculture, developed a writing system and created complex political organisation.

2) Europe

- In Europe, Bronze age started in the Mediterranean region with emergence of Aegean culture in Greece / Cyprus. It subsequently spread from here to central & Northern Europe.

3) Africa

- The ancient Egypt civilization developed alongside the Nile valley. It had advanced levels of agricultural, architectural & ^{socio-}political systems.
- Other regions in Africa outside Egypt did not develop a distinct Bronze age.

4) India

- Indus valley civilization marks the bronze age in Indian subcontinent. It was a highly developed urban civilization with maritime trade links with Mesopotamia, Persia & Arabian Gulf.

• Social life

- 1) Bronze age saw the emergence of urbanisation with large agricultural surplus.
- 2) Planned towns with important structures like great bath, citadel etc. were established.
- 3) Due to increase in surplus & population, people

took to range of specialised occupations like craftsman, priest (pharaoh) etc.

- 4) long-distance and maritime trade was practiced.
- 5) These people have developed a system of writing.
- 6) Complex political & religious organisations came up. which also resulted in social hierarchy.

• Conclusion

Bronze age abruptly ended around 1200 BCE and gave way to the iron-age. The iron age unlike bronze period was more of a rural civilization.

• Bronze age of India = Indus valley civilization

Q.31 Iron age of the world

• Intro :- Iron age was the period succeeding the bronze age, characterised by a fervent metallurgy as the dominant metalworking technology. It spans from around 1500 - 500 BCE.

• ~~the~~ however, there is no firm ending date as it continued in the form of iron alloy-steel.

• Climate :- The period saw warm and dry climate, suitable for settlement & agriculture.

• Material culture

- 1) Iron replaced bronze and copper to form various tools & implements. It was because of its ^{and} greater strength, higher melting point, easy & low cost availability.

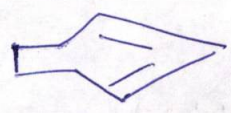
2) Various iron implements include axes, sickles, arrowheads, ~~etc~~ blades, shovels etc.

↳ These tools were used to clear large-scale forests ~~to get more land~~ for cultivation and setting up permanent colonies.

3) Besides, iron objects, microlith components, beads and bone ~~tools~~ like bangles, needles etc. ~~implements~~ ~~are~~ also found.

Wheel-made

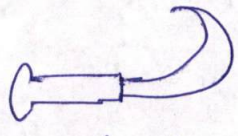
4) Pottery especially Painted Grey Ware is also found during iron age.



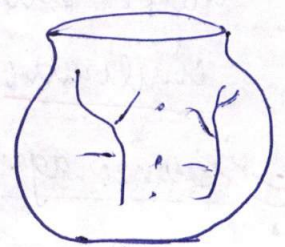
arrow head



axe head

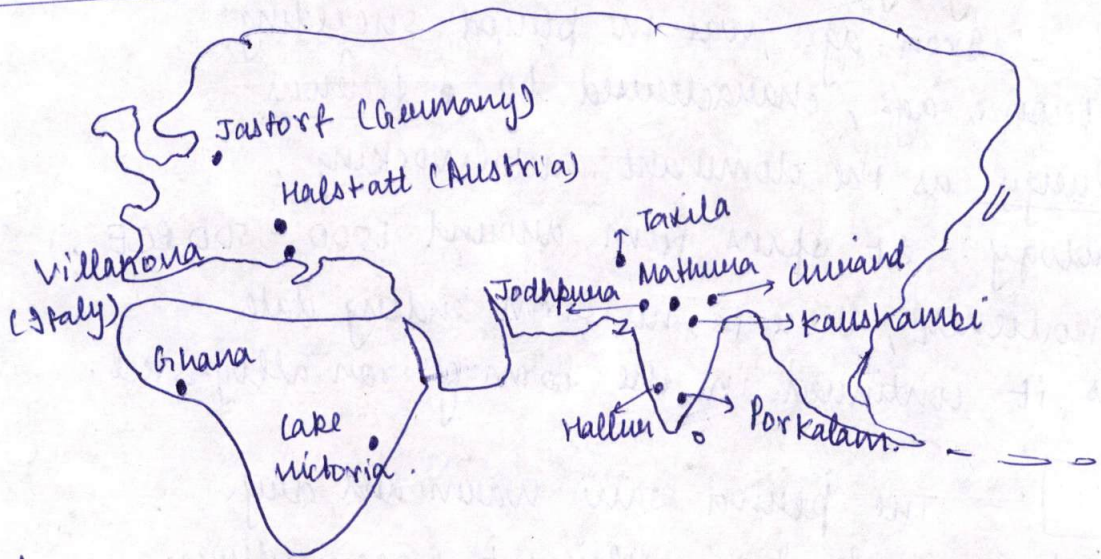


sickle



Painted Grey Ware

Regional variation



1) Europe

↳ European iron age culture includes Hallstatt, Nordic & Jastorf culture. The period was characterised by rural & agricultural communities like Celts tribe living in small communities.

↳ They designed extensive iron made weapons & utensils.

② Africa

↳ In ^{most parts of} Africa except Egypt, iron and copper smelting appeared together. The various African iron age cultures include Akan, Chifumbaze & Urewe culture.

③ India

↳ Indian iron age is divided into Northern & southern part characterised by Painted Gray ware & Megalithic burials respectively.

↳ The second urbanisation in India after Harappan civilization took place in Kaushambi during iron age (1200 BC).

• Social life

1). The primary economic activity ^{was} centred around intensive cultivation of crops like rice, wheat & barley.

↳ Several animals like sheep, cattle & horse were domesticated. People also performed other specialised craft activities.

2). Development of complex villages with large scale colonisation.

3). Habitational structures were made of mud & wood with thatched roofs.

4). A complex class based society developed.

5). Religion was central to people's lives. It is depicted through terracotta figurines & burials with iron implements.

• Conclusion

Hence, iron age was marked by a complex development of society. It paved the way for

what we now refer to as history. Thus, it marked the end of prehistoric period.

Q.32. Iron-age in India (~~Post Harappan~~).

- Intro : - - - same as Q.31 - - -
- Climate
- Material culture] - - - same as Q.31 - - -
- Regional variation.

→ Iron age in India can be broadly divided into two zones :-

1) Northern zone (Gangetic Region).

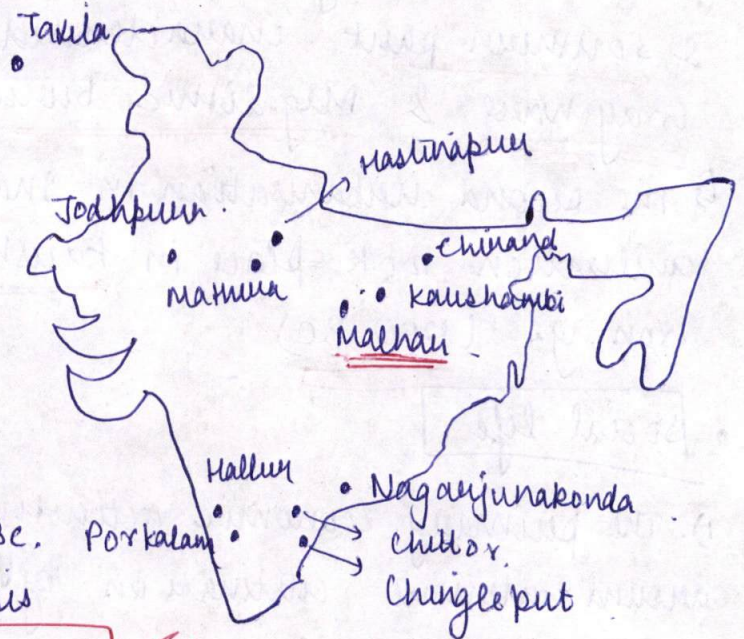
↳ Gangetic plain was colonised for the first time in 1200 BC.

↳ The distinctive feature of this region ~~was~~ is Painted Grey Ware.

It has a thin fabric of very well lemnated clay. It is fixed uniformly grey by heating upto a temp. of 800°C in well oxygenated kilns. Hence, it shows a high technological level. Some paintings in black color are made over the pottery.

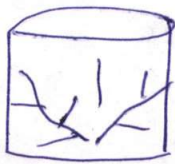
↳ Despite high technology, the shapes are limited in variety - (straight sided bowls, dishes & lotas).

↳ The region has large number of iron implements, however the civilization is mostly rural in nature, nowhere near the Harappan city development.



Clay when heated first turns into black → red → grey.

2) Southern zone ;



straight sided bowl.



lota

2) southern zone

↳ In southern India, Megalithic culture developed.

It refers to, large blocks of stones to build using & massive various structures usually associated with burials & religious functions.

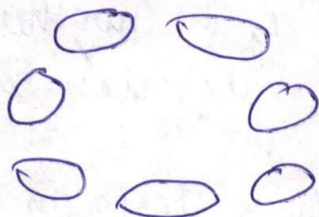
↳ The pottery used here is black and red ware.

↳ The burials are often found with large no. of iron implements.

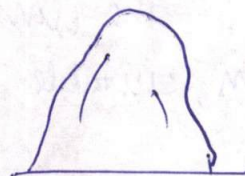
→ There seems no inter-connection b/w iron age of northern & southern India. Many scholars believe that Megalithic builders arrived in south India through sea route from Arabia.



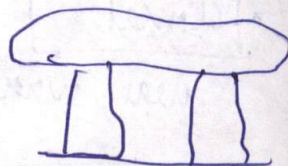
cist grave.



cairn circle



Menhir



Dolmen

• Social life

--- same as Q. 32 ---

rural dev. except
↳ few urban sites like
Kaushambi

• Conclusion

Hence, iron age marked the complex development of

society & end of pre-historic period.

Recent discovery of iron smelting crucibles from Malhar from around 1800 BCE provides evidence of much earlier knowledge of iron technology in India than rest of the world.

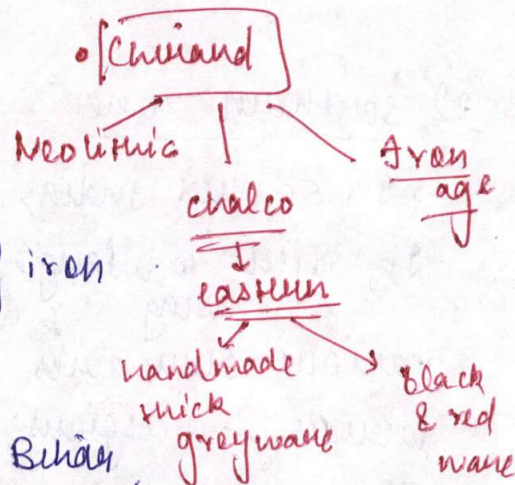
→ Other zones

3) North western Gandhara sites

- ↳ include Taxila, Timengrahi etc.
- ↳ large no. of grave goods made of iron

4) Eastern Region

- ↳ imp. iron-age sites are Chirand in Bihar, Mahisdal & Pandu Rajar dhibi in West Bengal,



Q. 33 Iron-age in N. India/ PGW culture of India.

- Intro :- ~~Painted~~ Iron age in northern India is associated with Painted Grey ware culture. It ~~was~~ is the period when ferrous metallurgy was the dominant industry.

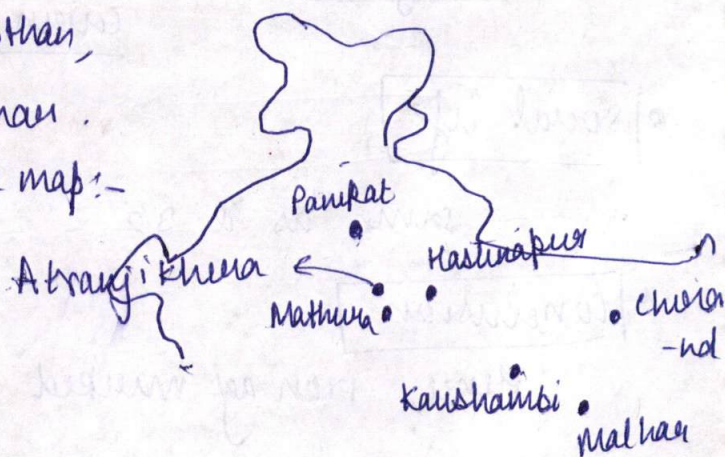
→ It spans from around 1500-500 BCE

- Climate :- The climate of the northern plains was warm, suitable for habitation & cultivation.

- Imp. sites Yamuna-Ganga basin including

→ The culture covers Eastern Rajasthan, Haryana, Uttar Pradesh & Bihar.

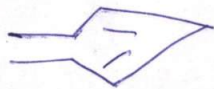
→ Imp. sites are shown in the map:-



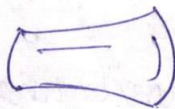
• Material culture

1) Iron implements replaced copper ones in the Northern plains. The main iron tools include spearheads, arrow heads, sickles, axes etc.

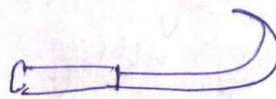
↳ These were used to clear forests for large scale settlement & cultivation.



Arrow-head



Axe head



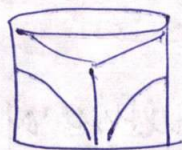
Sickle

2) Painted Grey Ware pottery is characteristic feature of iron-age in Northern plains.

↳ It has a thin fabric of very well leonigated
- - - - - 0.32 - - - - - shows high
technological level.

↳ Some decorations in black paints are done over the pottery.

↳ The shapes of pottery are however limited to a few types - straight sided bowls, dishes & lotas.



straight sided bowls



Lotas

3) Apart from iron tools, a large number of bone implements, beads and microliths are also found.

4) Some evidences of glass and lapis lazuli are also known.
Terra-cotta figurines

• Social life

- 1) The primary economic activity revolved around cultivation of crops like wheat, rice, barley and domestication of animals.
 - ↳ People were also involved in other specialised craft activities
- 2) There was large scale colonisation and development of villages
- 3) Most of the PGW sites show daub and wattle work.
 - ↳ Thus, ^{the} iron age culture was nowhere near the city development seen in Harappan times. However, few urban centres like Kaushambi are found.
- 4) A complex class based society began to develop.
- 5) Religion was central to people's lives indicated through terracotta figurines etc.

• Conclusion

--- same as Q. 32 ---

Q. 34 Iron age in South India / Megalithic culture of South India.

- Intro :- Iron age in South India is associated with megalithic culture and spans from around 1500-500 B.C. According to R&M Wheeler

(1956), "megaliths refer to monuments built of rough, large, undressed blocks of stones connected with burials which fulfill funerary or religious functions"

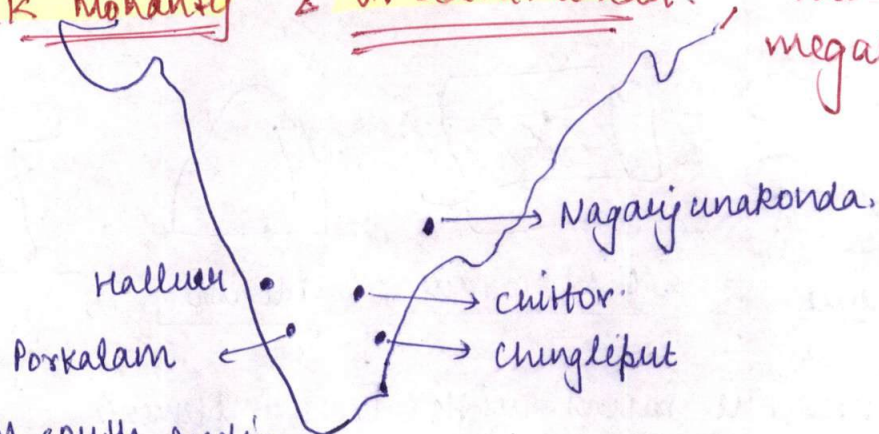
- Climate :- Megalithic period is characterised by warm & dry climate, suitable for settlement.

• Imp. Megalithic sites

As per R.K. Mohanty

& V. Selvakumaran

around 2200 megalithic sites found in South India.



→ Apart from south India, few megaliths are also found in Northern India (Dehradun, Allahabad etc.) & Vidarbha (Dhule, Nagpur, Amravati etc.).

• Material culture

1) A large number of burial sites surrounded by elaborate stone arrangements have been found.

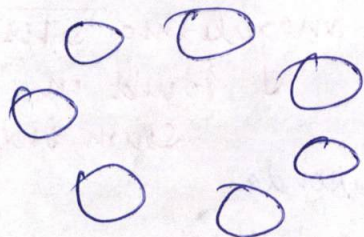
2) The main types of megalithic burial sites are:-

2.1) Cairn circle :- The body along with iron implements, animal etc. was buried first and then it was surrounded by rounded stones.

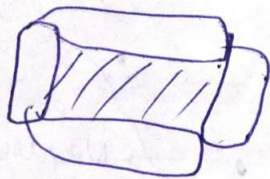
2.2) Cist - The body was buried first, ~~then~~ with small stones erected around it. Larger stone slabs were made to rest on the pillars, thus providing shade to the grave. Hence, it was a kind of ancient stone coffin.

2.3) Menhirs - These were large & tall memorial stones to indicate the presence of a grave.

2.4). Dolmen - It is a type of stone table. The body was placed on a stone slab on a raised platform. It was covered from all four sides with a flat stone slab.



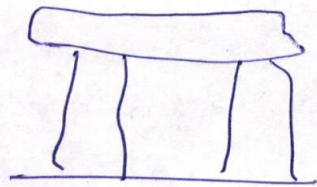
cairn circles



cist grave



Menhir



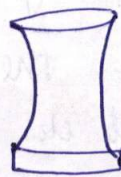
Dolmen

③ The graves are found with iron implements like flat axes, sickles, spearheads, lamp hangers arrow heads etc.

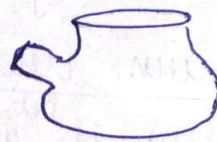
④ horse bones and ornaments used on frontal region of horse are also found.

⑤ Black and red ware pottery is also associated with Megalithic culture of south India.

↳ The main pottery types were carinated vessels, spouted dishes & bowls with pedestals.



carinated vessel



spouted dish

• Social life

- 1) It is believed that megalithic culture was brought by Arab migrants through sea route.
- 2) There were no urban settlements. Megalithic builders maintained isolated gypsy like tented colonies.
- 3) They bred horses which were traded with political powers of Ganga valley.

4) They believed in religion & after-life as can be seen from iron implements & animal bones with graves.

• Conclusion - Also find mention in sangam lit.

Megalithic culture of South India continued in many tribal communities. Recently, megalithic site of Huie Benkal in Karnataka was included in the tentative list of UNESCO world heritage sites, thus providing adequate recognition to the culture.

→ Megalithic in India - Iron age of South India
→ " " Europe - associated with neolithic / chalcolithic culture.

Q.35 Prehistoric Art,

• Intro :- As per Leakey (1960) prehistoric art refers to rough drawings in sand, in earth and clay made by prehistoric man. It provides the earliest indication of mindset of prehistoric man - his anxieties, agonies and source of ecstasies.

• There are two varieties of ^{prehistoric} art

- 1) Home art / Art mobilier
- 2) Cave art / Art parietal

• Cave Art

Features :- While earliest evidence comes from lower paleolithic itself, conclusive evidence of cave art is available from upper paleolithic times only (10,000 BCE).

- 1) Most of the art shows predominance of herbivores like bison, horses, reindeer etc.
- 2) There is high degree of superimposition of paintings. → These must have been hunted by cave dwellers.
- 3) Most of the paintings occur in far-off and non-accessible places in caves indicating some element of secrecy. → Paintings on ceilings too.
- 4) There is little consideration for orientation, scale or relative sizes of figures. → if less space.

I Upper Paleolithic

- 1) Important sites :- Chauvet (France), Altamira (Spain), ~ Africa (South Africa)
→ if less space.
 ↳ India - Bhimbetka (vs Varkhanka in 1952);
 Lakshadweep.

- 2) Main themes → Paintings comprise of huge animal figures, such as bison, elephants, rhinos, boars etc. nursing scenes.



- ↳ stick-like human figures. Eg - Hand-linked dancing figures in Lakshadweep.



- ↳ geometric patterns and lined figures called tectiforms dots.
- ↳ palm prints ✓

- 3) Material used → Red, white, green and black ochre are common colors.

- ↳ These colors have been obtained from rocks. Eg: - Red from hematite (green), white " limestone.

→ include in general features only.

II Mesolithic art

- 1) Imp. sites - Iberian Mediterranean basin (Spain), Tassili n'Ajjer (Algeria)
 ↳ India :- Bhimbetka, Adangaurh, Suhaga cave near Mirzapur, Allahabad.
 (discovered by Carrlley & Copburn)

2) Main themes → large numbers of multi-themed paintings but smaller in size.

white
in
Bhimbetka
too

↳ Hunting and fishing scenes predominate. The scenes usually depict people hunting in groups armed with barbed spears. Such spears must have been obtained by attaching microliths.

↳ There are paintings of both animals being hunted by man and man being chased by animals. This depicts that they were aware of the risk involved in hunting.

↳ Other paintings show women both nude and clothed, children playing, community dances etc.

↳ There are also hand prints and fist prints found.

↳ There are also X ray paintings depicting man's cognitive ability to go beyond what is perceptible.

3) Material used - Red, white, yellow, orange, green and black ochre.

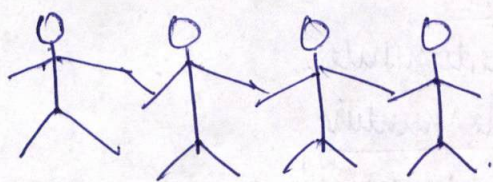
III Neolithic art

1) Imp. sites - Yunnan (China), Pilbara (Australia)

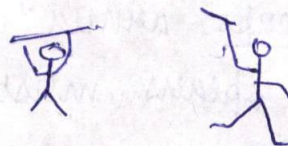
↳ India - Granite rocks of Karnataka & Andhra Pradesh, Kupgallu, Pikelihal, Tekkal kota.

2) Main themes : → Departure from depicting real-world to an idealised super-world.
→ Animal hunting scenes are found in high frequency.

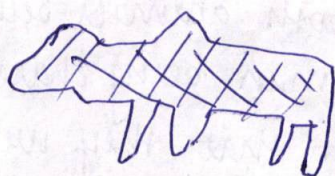
3) Material used - red and white ochre



hand-linked dancing figure



hunting scene



X-ray figure

• Home art

- ↳ It refers to art engravings on mobile objects
- ↳ This includes art engraved on ornaments, stones, bone implements like harpoons etc. ivory
- ↳ It also includes female figurines of upper paleolithic called Venus.
- ↳ Another type is polychrome pottery of the neolithic & chalcolithic period.

• Interpretation of pre-historic art

- 1) It could have been art for art's sake.
 However, this view is mostly negated.
- 2) It might have some ritualistic purpose
 like initiation rights
- 3) The art could be form of sympathetic magic -
 to hunting the animal in painting can help in actual hunt.
- 4) Some art objects like Venus figurines point towards fertility cult.

Conclusion

All in all, prehistoric art helps in understanding the lifestyle and mind of prehistoric man.

Recent discovery of upper paleolithic art at Mangar Bani hill forest in Haryana could provide further insight on prehistoric art in India.

Q.36 Bhimbetka

↳ It is a prehistoric site in Raisen dist. of M.P.
It was discovered by V.S. Wakankar in 1957.
It consists of more than 800 caves, around 500 of them contain paintings.

III Prehistoric culture chronology at Bhimbetka

I. Time-period :- occupied from as early as 4,00,000 BCE - 5,000 BCE.

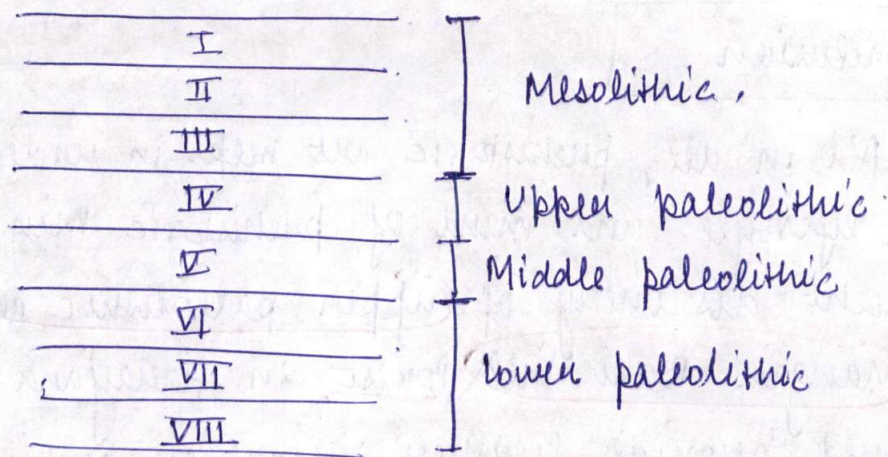
↳ Cave paintings even belong to the early historic period.

II. Climate :- The Pleistocene epoch witnessed successive pluviation & inter-pluviation stages.

↳ while holocene period after the last ice age was characterised by warm & dry climate.

→ V.N. Misra excavated one of its largest cave, III F-23. b/w 1966-76.

→ The rock shelter has yielded 8 layers which belong to the following cultures :-



- 1) First 3 to Mesolithic :- prominent geometric microlithic industry & cave paintings (triangles, trapezes etc.)
- 2) 4th layer from the top - ^{upper paleolithic} large variety of stone blade tools & cave paintings
- 3) 5th layer from the top - (^{middle paleolithic}) - large no. of flake tools made of quartzite.
- 4) Last 3 layers (lower paleolithic) - Acheulian hand-axes are found. Absence of chopper-chopping & Abbevilian type tools.

• Bhimbetka cave art

→ The art can be classified under 7 different periods, the first three dating to prehistoric age -

- 1) Upper Palaeolithic :- The main themes include.
 - ↳ huge figures of animals like bison, elephant, rhino etc;
 - ↳ stick like human figures;
 - ↳ geometrical patterns and hand prints.
- 2) Mesolithic :- contain largest number of paintings.
 - ↳ Paintings are multi-themed & smaller in size.
 - ↳ ——— same as Q.35 (mesolithic part) ———

3) Chalcolithic :- The paintings show departure from real world. It shows that the cave dwellers were engaged in exchanging goods with agricultural communities of the Malwa plains.

→ The paintings were made using red, white, green and black ochre. These were obtained from different rocks.

→ There are 4 painting styles prevalent here as per M. Mathpal (1984) :-

- 1) Dry color painting
- 2) Wet transparent color painting - wash paintings
- 3) Wet opaque or oil tempera paintings
- 4) Spray color paintings

Conclusion.

Bhimbetka ; thus shows rich prehistoric culture of India. It was accorded the status of UNESCO world heritage site in 2003.

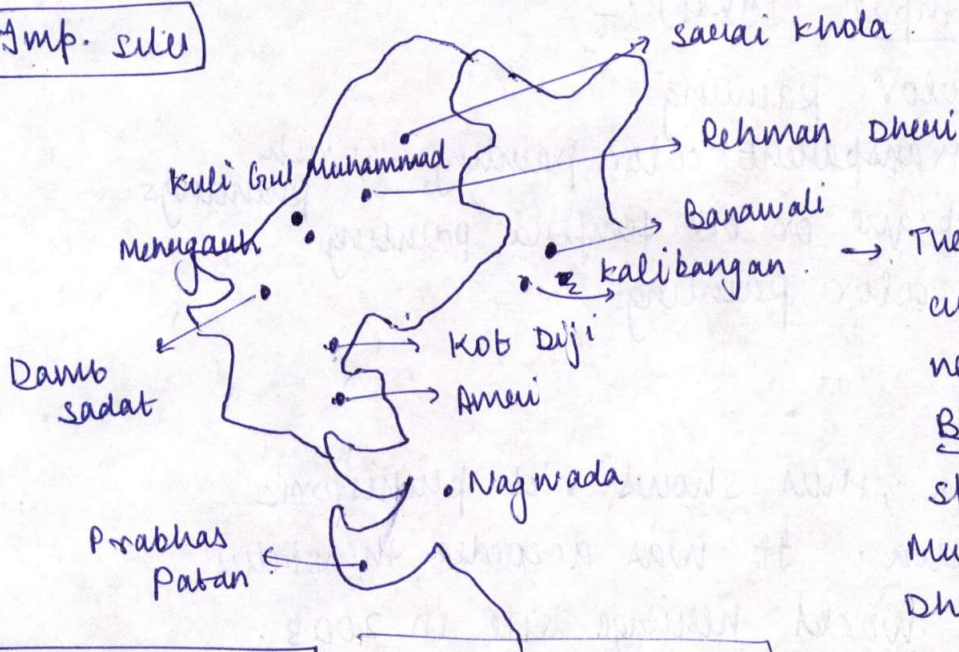
→ Questions on Robert Bruce Foote, HD Sankalia, VN Misra. [collect from previous ans. & compile later] :

- Proto history - People in past history who remained without writing & yet demonstrate a well-developed settled life.
→ Indus Valley civilisation / Bronze age.

Q. 34 Explain the pre-Harappan culture.

- Intro :- The pre-Harappan culture refers to the chalcolithic culture in the North-western part of Indian subcontinent, considered to be the predecessor of Harappan civilisation.
- Time period - 3500 - 2500 BCE.
- climate - warm & dry.

Imp. sites



→ The pre-Harappan culture originated near Mehrgarh in Baluchistan and spread to Kuli Gul Muhammad, Rehman Dheeri, Sarai Khola & other places in Indus valley.

Cultural Features

- 1) A simple village life with mud-brick dwellings.
- 2) Large number of microliths along with crude pottery in the initial phase.
- 3) Subsequent phases show continuance of microliths despite emergence of metal. Ceramics show an emphasis on colorful decoration.

(Polychrome)

→ From there, it spread eastward to Kalibangan & Banawali, thus initiating the start of Indus Valley civilisation.

→ In Gujarat, also pre-Harappan culture developed at Prabhas Patan, Nagwada, Ahau etc.

4) With time, secular structures appear with evidence of a large population maintained within the system. Mudbrick structures continue, but are more compact & raised.

5) Multichrome pottery is replaced by black on red bichrome style in the later phase.

→ As per scholars, some of these farming communities, especially of Mehgarh, moved to the flood plains of the Indus river.

They learned bronze technology and established the ^{first} urban civilization of India - the Harappan civilization.

• Conclusion

The pre-Harappan culture in the Baluchistan region shows the gradual transition to urban Indus valley civilisation. Some of these sites continued to flourish even after the Harappans consolidated their regime in the Indus plains and were engaged in trading with them.

↳ Presence of beads, lapis lazuli indicates that

→ Banawali, Kalibangan, Kot Diji had 2 cultural phases :- Pre-Harappan & Harappan.

Q. 38 what is Harappan culture / Indus valley civilization / Proto-historic?

• Intro :- Harappan culture is a bronze age civilisation that developed in the North-Western region of Indian subcontinent between 3000 - 1300 BCE. It was an urban civilisation flourishing along the plains of Indus river valley.

include in intro :-

Daya Ram

Sahni excavated

1st site Harappa

in 1920-21.

• Time period & climatic regime

→ The Harappan culture can be divided into

3 ~~parts~~ phase :-
↳ Early Harappans (3000 - 2500 BCE)
↳ Mature / Urban Harappans (2500 - 1900 BCE)
↳ Late Harappans (1900 - 1300 BCE)

→ The climate was warm & relatively more wet than the contemporary Indus region climate. It was suitable for settlement & cultivation.

• Material culture

1) Bronze Metallurgy was a distinct feature of this culture. It involved mining of ore, smelting of ore and casting it into different tools and ~~other~~ implements.

↳ Bronze is an alloy of Cu & Tin. Copper was obtained from Khetri mines in Rajasthan. While tin was imported from Afghanistan & Iran.

2) The various types of bronze objects include axes, spear heads, arrow heads, celts, utensils and images of bronze. Eg:- Bronze dancing girl from Mohenjo-daro

3) Various lithic ^{stone statues also} implements like celts, blades,
querns & millers ^{are} found. Eg:- statue of bearded priest

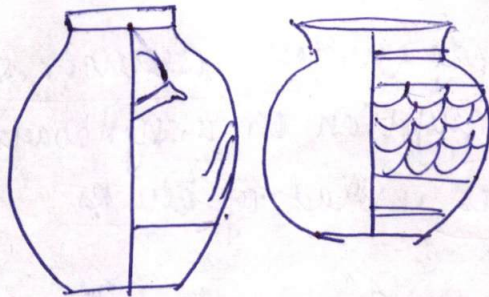
4) Pottery - Harappans made very finer wheel
-made pottery. The pottery was either plain
or painted and adorned geometric & animal
designs.

5) Seals made on steatite, are a distinctive feature
of Harappan culture. A seal usually depicted
animal figure along with a short inscription.

6) Other material objects include terracotta
figurines and toys, weights & measures,
beads, ornaments made of precious metal,
lapis lazuli or bone etc.



Bronze dancing
girl



Harappan pottery



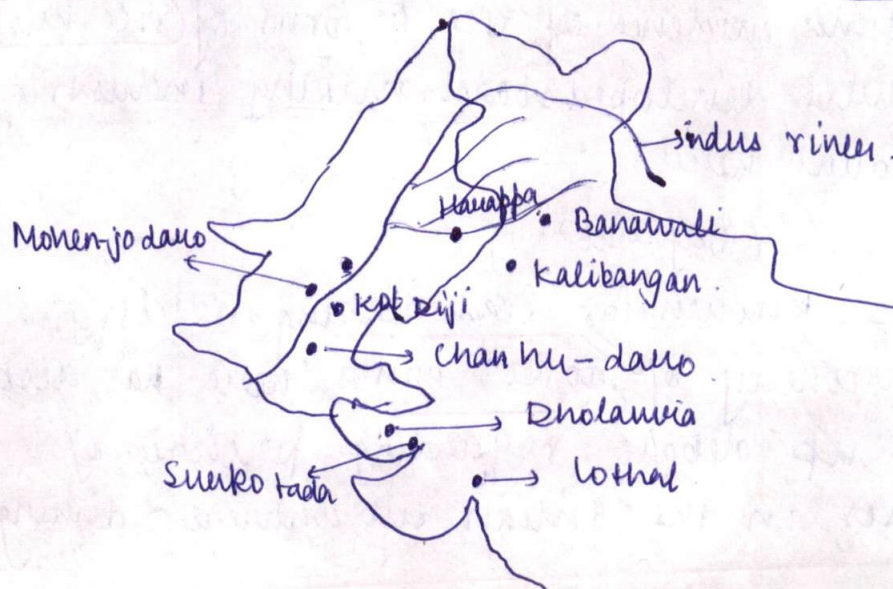
→ script

Seal



Terracotta
mother
goddess

Geographical distribution



1) Harappa (bank of R. Ravi, Pakistan)

- ↳ It was excavated by Daya Ram Sahni in 1920-21.
- ↳ It was the first site to be discovered, hence the name Harappan civilization.

2) Mohenjo-daro (Sindh, Pakistan)

- ↳ It is located on the bank of River Indus & was excavated by R. D. Banerji (1922).
- ↳ It is the largest Harappan site.
- ↳ Important findings here include the Great bath, dancing bronze girl, the bearded Priest King and the Pashupati seal.

→ SP Joshi (1967-68)

3) Dholavira (Gujarat)

- ↳ It is located in the island of Khadiar at Rann of Kutch.
- ↳ Unique features include water reservoir system, large pictographic inscription on a signboard and houses made of stones instead of bricks.

4) Lothal (Gujarat)

- ↳ It was excavated by R. Rao near Gulf of Cambay.
- ↳ It consists of a dockyard and was the centre of Harappan maritime trade with Mesopotamia.
- ↳ First time evidence of rice in form of rice husk and well developed bead-making industry are found here.

5) Sukkotada (Gujarat)

- ↳ It is known for bead-making industry. The discovery of horse bones here has also opened up debate regarding presence of horses in the Indian subcontinent during Harappan age.

6) Kalibangan (Rajasthan).

↳ It is located on the banks of dried course of ~~the~~ R. Ghaggar (ancient Saraswati)

↳ It is known for evidence of ploughed field, earthen oven for cooking and cylindrical tanks/pits for storing water.

7) Banawali (Harappan)

↳ It has ^{evidence of} both pre-Harappan & Harappan culture.

↳ The main findings include terracotta model of plough, fortified & planned township.

• Chanu-daro

↳ This site exclusively devoted to crafts production & has bead-making shops.

↳ no citadel or acropolis.

• Socio-cultural features

:- what kind of society may be reconstructed from archaeological evidence.

1) Town-planning (life in short unless aspired exclusively).

1) There is a uniform system of planning visible across all Harappan sites. This indicates towards a centralised authority.

2) ~~The major towns were divided into two sections - citadel and lower town.~~

3) Citadel :- It was the cor.

2) The major towns were divided into two sections - citadel & lower town. The entire town was fortified & surrounded by a complex defense wall.

↳ Evidences of reinforcement of the wall show constant architectural vigil.

3) In both the sections, buildings were made on raised mud platforms, probably as a defence against flooding.

4) The houses were mostly made of burnt bricks, all having a standardised ~~propo~~ measurement.

5) Citadel - It was the core fortified raised area occupied by the ruling class.

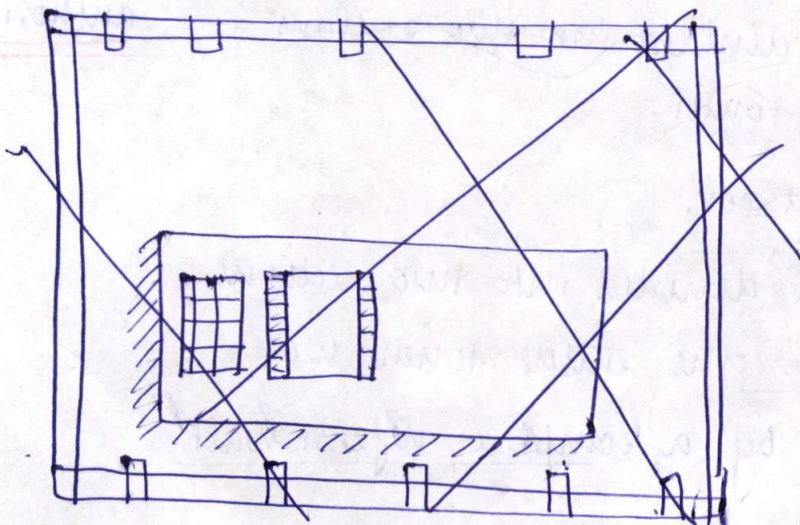
↳ It housed important buildings such as the great bath, granary and community hall.

↳ Eg:- The great bath at Mohenjo-daro :- It ~~is~~ was a water-proof public bath (lined by bitumen), connected with well or canal through various channels. A series of rooms were present along side the tank. Staircase were present on either side of the bath connecting the rooms & the tank. Periodic cleaning of the tank was ensured through an outlet at the corner leading to a drain.

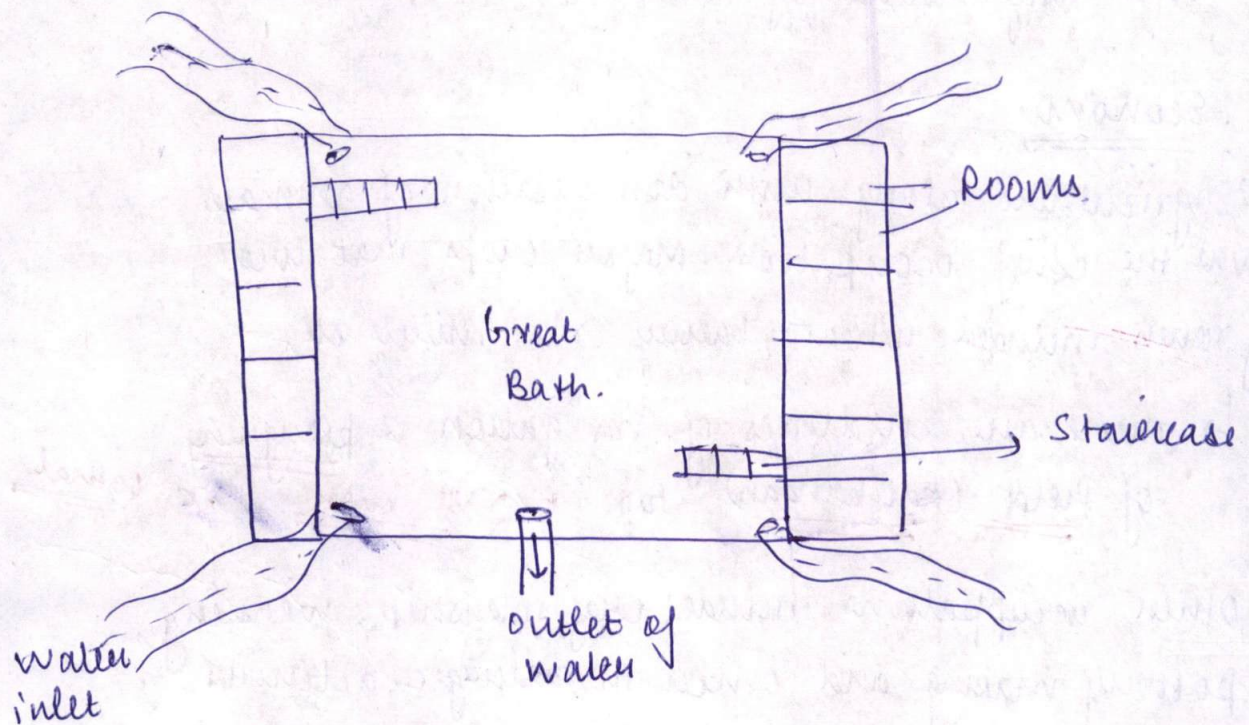
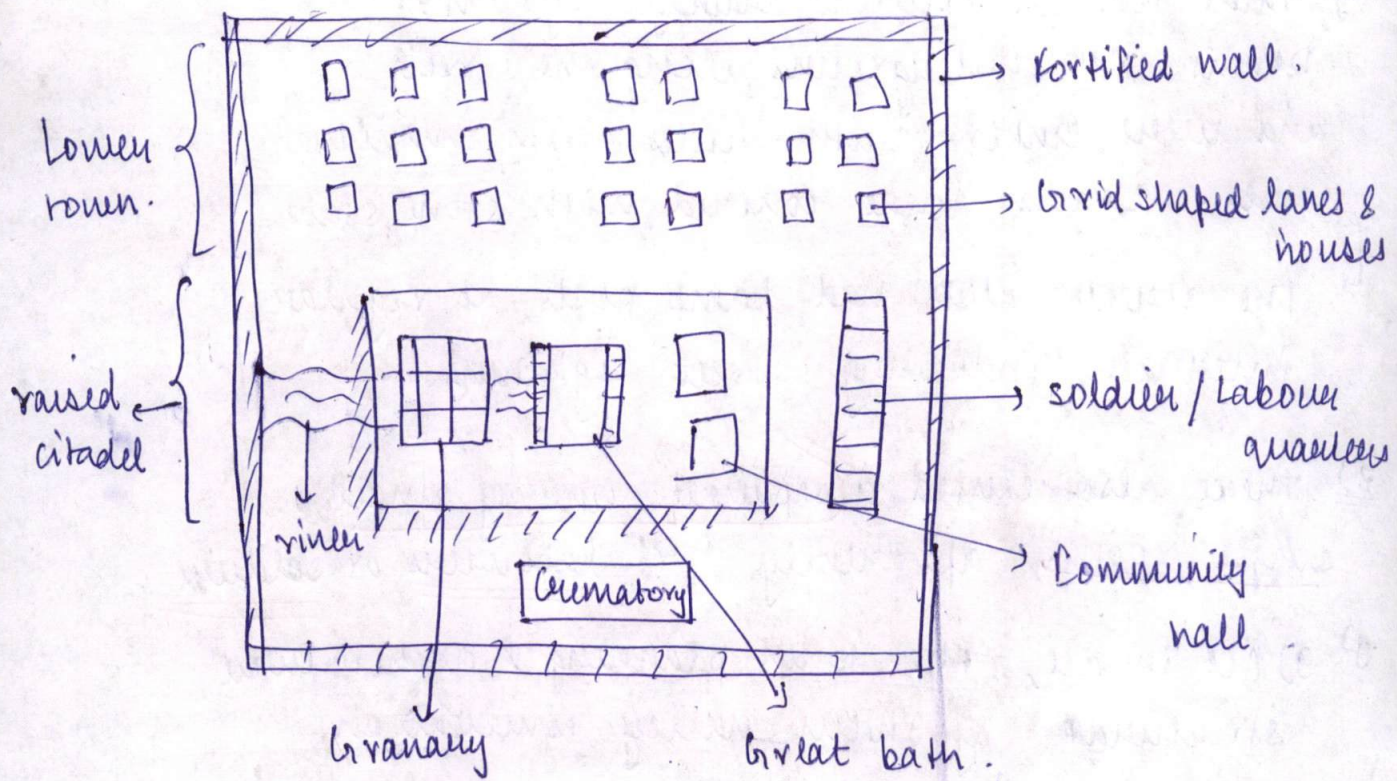
dimensions.

39 ft x
23 ft
& 8 ft deep.

explain
only
when
required.



↳ It is believed that great bath was used for religious fn. It was used by priests for purification purposes.



b) Lower town :- It had houses for common people arranged in a grid like system, that is roads cutting each-other at right angles.

- ↳ The houses had from two to a dozen rooms, a courtyard, a bathroom and a toilet. Some of the houses had an upper storey and a well within the courtyard.

↳ There was an excellent drainage system.

Drains ran underground along the streets and were linked with chutes from individual houses. Drains were covered with stone slabs.

↳ The streets also had lamp posts at regular intervals indicating street lighting.

8) There also existed a separate line of small single rooms, apparently for labourers or soldiers.

9) All in all, the town planning & architectural structural of Indus valley civilization was way ahead of its time.

2) Economy.

1) Agriculture along with domestication of animals was the chief occupation. Major crops that were grown included wheat, barley, rice, millets etc.

↳ There are evidences of irrigation & ploughing of field (Kalibangan) too. ; rice husk at Lothal.

2) Other occupations included craftsmanship, weaving, pottery-making and other metallurgic activities.

4) Harappans were also engaged in trading - both internal & external. This is evident through:-

↳ uniform weights & measures.

↳ seals, beads and other precious metal from various places point towards maritime trade links with Mesopotamia & Persian gulf.

3) Presence of granaries also point towards a taxation system. Granaries acted like state treasury, and were used to pay salaries of workers.

5) There must have been a system of private property as seals with inscriptions are considered as a marker of property.

③ Social life

1) There was a clear distinction between some urban centres and rest of the areas which had rural economy.

2) Social stratification in Harappan society is also seen. Presence of separate living places for common people and elites indicates towards ~~that~~ social inequality.

3) Another instance can be skilled artwork. Like seals or images must have been meant for upper classes while crude terracotta toys would have been for use of lower classes.

④ Political life

1) There should have been an efficient centralised political system to explain the remarkable uniformity in town planning, size of bricks, weights & measures etc.

2) However, no consonance is established on the ruling class. Some suggest that it must have been priests like ~~the~~ in Mesopotamia & Egypt. Statue of bearded priest king also supports this.

While others suggest that it must have been merchant class due to remarkable emphasis on trade & commerce.

⑤ Religious life

- 1) Harappans worshipped flora and fauna. A large number of seals depict pictures of trees like neem, peepal and banyan tree and unicorn bull, humped bull etc.
 - ↳ Some seals also show images of swastika pointing towards proto-Hinduism.
- 2) They also worshipped several gods & goddesses evident through presence of terracotta figurines.
- 3) All sites have showed terracotta mother goddess figurines pointing towards a fertility cult.
- 4) Male deity worshipped was 'Pashupati Mahadev' as represented on a seal recovered from Mohanjo-daro.
 - ↳ The seal shows a male figure with three horned heads seated in yogic padmasana posture and surrounded by animals like elephant, tiger, rhinoceros etc.
- 5) Phallus worship was also prominent during Harappan times.
- 6) Public religious rituals for purification and other purposes were performed as evident through great bath of Mohanjo-daro.
- 7) Harappans were perhaps familiar with yoga & meditation. too. This can be interpreted from yogic padmasana posture in 'pashupati seal' and



Pashupati seal

meditative stance (half-closed eyes) of statue of bearded priest-king.

8) There was belief in soul and life after death. This is depicted through burials having material objects - In some places, cremation was also prevalent.

9) Additional points to link with hinduism :- fire altars

↳ Evidence of fire worship, sacrifice and common pyre indicating towards sati practice have been found from Lothal & Kalibangan.

Elements of Vedic religion

↳ link with today's soc.

↳ Traditional weights & measures system was based on ratio of 16. Now, too. 1 Rs = 16 annas.

⑧ Script

↳ Developed writing; not deciphered yet but common consensus over some type of proto-Dravidian language.

↳ script present in form of short inscriptions on seals. It is pictographic & runs from right to left.

Till date, no conclusive evidence of temple has been found unlike temples found in contemporary civilizations of Egypt & Mesopotamia.

Q.39 Art & craft of Harappa?

1) Bronze metallurgy ~~and~~

↳ casting bronze into different tools & sculptures.

↳ Bronze casting done through lost-wax technique.

↳ most famous sculpture is of dancing bronze girl from Mohenjo-daro. She is shown in

✓ Tribhanga posture ^{sexual} adorning bangles and a necklace.



2) Pottery :- very fine wheel made wares.

Two type of pottery - plain & painted, former more common.

↳ Plain pottery - made of red clay.

↳ Painted " - black & red ware with

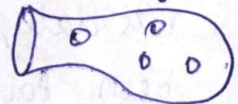
geometric & animals designs executed

on it in glossy black paint.

↳ Polychrome pottery & incised wares are rare.

↳ Perforated pottery also found - for straining beverages

--- diagram from Q.38 ---



3) Stone statues

↳ There are various lithic implements like celts, blades, grinders etc. ^{But the} Most famous are stone statues.

↳ Bearded priest statue from Mohenjo-daro. made in soapstone. It depicts a male with long & half-closed eyes as if showing a meditative stance.

Draped in a trefoil patterned shawl and adorning a head band or amulet.

↳ Another eg is of male torso made of red sandstone.

4) seal

↳ Majority of seals made of steatite; others include agate, copper, chert, terracotta etc.



↳ Most of them are square in shape.

↳ The seals usually bear a motif, most often animals like bull, elephant, tiger, unicorn and sometimes even trees & human figures.



↳ The motif is accompanied by a short pictographic inscription which has not yet been deciphered.

↳ Purpose of seals :- 1) Property identifier - used as modern day identity cards.
2) Trade & commerce.
3) Religious purposes - Pashupati seal, swastika seal.
4) used as amulets or ornaments

5) Terracotta figurines

↳ Fire-baked earthen clay modeled into crude toys & female figurines called mother goddess.

↳ Mother goddess represents fertility cult shown with exaggerated 2° sexual characters and fan-shaped head dress.



6) Beads & ornaments

↳ Bead industry at Chanhu-daro, Lothal.

↳ ornaments include amulets, necklace, rings, anklets worn by both sexes. made of precious metals,

gemstones like lapis lazuli & even bones & baked clay.

• Harappan script,

called Proto history because knowledge of writing was there but it can't be deciphered yet, people led a well settled life.

→ occur along with animal motifs on seals, on tablets, pottery etc.

→ short inscriptions (in Dholavira - large

→ pictographic

pictographic inscriptions board)

→ runs from right to left.

→ Till date 4000 characters identified

→ Purpose :- Mark private property ; keeping record of trade & commerce

→ Deciphering :- some say ancient form of sanskrit or some other Indo-European language
↳ widely held consensus that proto Dravidian script

as per Asko Parpola in his book.

↳ As per NK Verma, still used by Santals tribe in rituals.
• Deciphering the Indus script (1994).

Q.40 Theories behind the decline of Harappan civilization.

1) Foreign invasion theory

↳ Proposed by Wheeler (1947), Piggot (1950) & Gordon (1958). ~~They~~ ^{It} proposed that Indo-Europeans (Aryans) invaded Harappan land & caused their civilization to decline.

↳ Based on ancient literary text of Rig Veda, presence of Indo-European weapons at Harappan sites, periodic reinforcement of fortified walls and large mound of

Skeletons at Mohenjodaro.

→ This theory discarded today as decline started much before the date mentioned in Rig-Veda.

② Climatic change theory.

↳ given by Hausknecht & Stein in 1930s.

↳ climate became arid, decline of agricultural economy.

↳ No conclusive evidence.

③ Tectonic phenomena

↳ This theory elaborated by Raikes & Dales in 1960s on the basis of study of water deposited layers in Mohenjodaro, Chanhu-Daro etc.

↳ Opined that Indus was flooded suddenly due to tectonic phenomena, causing massive destruction.

↳ However, later evidence showed that tectonic upliftment of river cannot be surely demonstrated.

④ Hydrological changes

↳ suggested by Lambert (1967) & VN Misra.

↳ eastern shifting of Indus & its tributaries; inundation of arable land; decline in agricultural productivity.

↳ V N Misra proposed that drying up of Ghaggar and eastern shifting of Ghaggar tributaries to join the Ganga system, cut off large supply of water to Sutlej & Indus.

↳ decline of agriculture.

⑤ Physico-chemical explosion

↳ explained by Dimitryev.

→ There were sudden physico-chemical changes in atmosphere leading to Black lightning and a massive explosion. This caused destruction of civilization.

→ Evidence - charred bodies & melted stones.

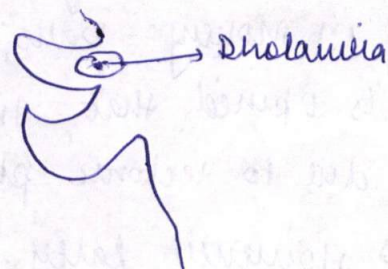
• Conclusion

→ No conclusive evidence & universal consensus on a single theory. However, there is a wide belief in drying up of Ganga course and decline of agricultural economy.

Q.41 Dholavira . (3000-1500 BCE)

→ on Khadii island, Gulf of Kutch.

→ ~~excavated~~ by discovered by SP Joshi in 1967-68 and later excavated by RS Bisht.



→ shows Ameri like pre-Harappan occupation too, in addition to mature & late Harappan phase

→ Features

↳ Fortified walls

↳ divided into 3 parts - Citadel, middle town & lower town.

In addⁿ to common fortification, these & have separate fortification too.

--- draw diagram ---

↳ Citadel :- raised platform, housed elite, had two majestic & elaborate gateways, an open space for social or royal congregation. presided over by the 'supreme authority'

↳ lower town - houses made of mud & stone walls instead of bricks.

↳ large inscription board.

↳ large water reservoir system - network of drains collect rain-water & led it to the reservoir.

↳ bronze sculptures & seals.

↳ bead industry; jewelry of precious metal & stones.

↳ stone querns, grinders, pestles etc.; terracotta figurines etc.

↳ facilitated external trade with Mesopotamia.

↳ funerary architecture :- hemispherical structures like Buddhist stupas.

→ recently granted the status of UNESCO world Heritage site.

Q.42 Post-Harappan culture.

- Intro :- It refers to the culture that emerged in the north-western part of Indian subcontinent b/w 1900-1300 BCE following decline of mature urban Harappan phase.

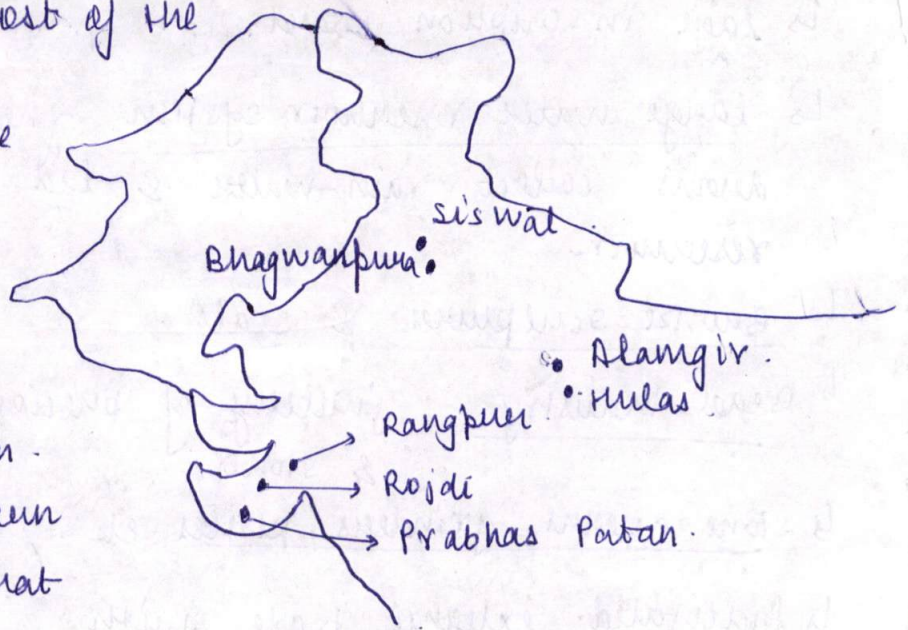
climatic regime

- Acc. to Marshall & Stein, climate started gradually changing to arid which led to decline of agri. economy.
- Acc. to Lunbrick & VN Misra, there was eastward shifting of rivers. (Ghaggar & its tributaries)

cultural Imp. sites

→ The decline saw most of the urban centres being abandoned. However, the decline was less prominent in rural areas.

→ Some of the post Harappan sites occur in Harayana, Punjab, western UP, Rajasthan, Gujarat

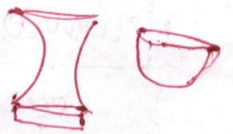


• Cultural Features

1) There is degeneration of townships & urban character. Several sites show a rural character with mud-brick structures.

2) Tools & implements - There are a variety of copper & lithic tools found. These include flat copper celts, axe, awls & mullers etc.
↳ However, the use of metal is not that specialised.

3) Pottery :- Pottery is ill-fired & coarse. The technique & quality of decoration is also poor. However, new shape-types like carinated & coconut-shaped jars appear.



↳ Jhukar & Jhangar culture of Sindh - Buff colored pottery followed by grey or black pottery.

↳ Rangpur culture of Gujarat - Red ware with a thick slip.

↳ Cemetery - II culture of Punjab - Reddish pottery with black motifs.

4) various objects of terracotta and beads are also found.

5) New urn burials ^{pattern} - at citadel mound of Harappa (Cemetery - H culture) - indicates external invasion.

6) Breakdown of external trade.

• Conclusion

Thus, Harappan period marked the zenith of human civilization in ~~the~~ human pre-history.

Q.43 Describe the contribution of tribal cultures to Indian civilisation.

• Intro :- The post-Harappan phase (around 1500 BC) saw the incoming of Aryans into the Indian sub-continent. This led to contact between the indigenous tribes and Aryans culminating in the form of comprehensive Indian civilization.

→ Several ancient texts, historical records and ethno-archaeological evidences show contribution of tribal cultures to Indian civilization in the following fields :-

1) Ethnic complexities - The cultural contact b/w vedic people and indigenous tribes led to both assimilation of tribes into the Aryan fold (Hinduization of tribes) as well as tribalisation of Aryans.

↳ (Eg) :- Ramayana mentions Bhils & Khassas
↳ Eklavya (Bhil tribe) - in Mahabharata

2) Social life :- Anthropologists suggest that Brahmins borrowed the gotra system from tribes.

↳ further, influence of tribal kinship system can be found in cross-cousin marriages & Indian civilisation in form of marriage by exchange.

3) Language - Several tribal words have been assimilated into Indian languages like Bala (Hair), Bana (arrow) etc.

4) Techno-economic life :- Use of iron was learnt by Aryans from the Asura tribe.

↳ Tribals also taught them the art of raising rice crops and other magico-religious ways of dealing with pests & diseases.

5) Political life - The system of chiefdom of tribes influenced the monarchic & republic systems of modern times.

↳ Sabhas, samitis & village assemblies are also of tribal origin.

6) Religion - There is wide influence of tribal religious practices such as :- worship of shina, vriksha and animals adopted from tribal culture. interplay of little & great tradⁿ led to processes of universalisation & parochialisation

↳ Certain deities like Subhadra, Jagannatha and Balaram ^{all} also worshipped among tribes.

7) Art & Music - The mythologies, music & medicines of tribals form the part of Indian culture.

↳ Eg:- Ayurveda has many tribal herbs & medicines like Asvagandhi

↳ Veena was borrowed from tribal instrument of Memonajan.

• Contemporary relevance -

1) Role of tribals in forest conservation and economy :- Leveraging traditional knowledge of tribals to bring about sustainable development through PRA, 2006, Joint Forest Management.

2) Tribal medicines are getting recognition at international stage.

Ethno
-medicines ↳ Eg:- Bhutias use Himalayan yew to treat cancer.

↳ Sea buckthorn used by Kinnari tribe of HP to treat stomach, heart & skin problems.

3) Role of tribals in national freedom struggle recognised by declaring Nov 15 as Tanjatiya Gaurav Din.

→ Maurist → Lakshmi Puja during Diwali is result of universelisation of little tradition of Sawati Puja.

Q.44

explain why societies changed from hunting & gathering to agri?

→ Neolithic revolution - end of Pleistocene - V. G. Childs (10,000 B.C.).

o. Changes

1) Farming - domestication of plants & animals.

↳ Eg:- seeds from Natuf (middle-east) wild. Mehrgarh etc.

2) Sedentary lifestyle

↳ Eg:- mud-houses at Mehrgarh.
↳ pit dwellings in Burzahom.

3) Tools & tech. - celts - clearing forests etc.

4) Pottery - store surplus

↳ Eg:- crude pottery from Aleppo, El-Badami.

5) Complex social & political system

↳ resolve conflict etc.

↳ social hierarchy

↳ Eg:- certain people buried with mat. goods.

• Reasons & explanations.

1) Climate change theory - V G Childe in 1906.

↳ Pleistocene → holocene; end of last ice age; (warm)

↳ climate became hot & dry, especially in near east.

↳ Big animals either became extinct or returned to deep jungles.

↳ Thus, agri first started in Near-East (Natufian Culture).

2) Demographic change model - by Lewis

↳ Population Tse. in early holocene. Binford (1968)

↳ imbalance b/w population & resources.

↳ reason :- climate change → decreased mobility & sedentism → population stress.

3) change in tool-technology.

↳ scholars like Barbara Bender (1978);

argued that change in tools-tech had bearing on population level & subsistence method

↳ using elts to clear forests.

4) socio-political change / complex socio-cultural systems
↳ complex systems developed; led to greater cooperation; Rise in population & agri.

5) Paleontological change theory.

↳ Leakey - around 10,000 BCB
archaic sapiens like Chancelade,
Grimaldi became extinct

↓
rise to modern H. sapiens sapiens

↳ more dextrous hands - precision &
power grip for agri-fan

like ploughing, threshing, grinding

↳ better dev. of frontal, parietal portions
of brain etc.

Q. H D Sankalia.

↳ 1) Nerava - 1956.

↳ 2) Lanhnaj - 1944-63

↳ 3) Deccan Neolithic - 1962

Q. V N Mishra.

↳ 1) Didwana - 1980

↳ 2) Luni

↳ 3) Baghor - 1967

↳ 4) Bhimberka

↳ lane III

F-23 1966
-76

Q. Robert Bruce Foote

↳ 1) Attirampakkam (1863)

↳ 2) Teni (Mesolithic)

0.1 Palaeoanthropology.

- Intro :- It is a sub-field of anthropology concerned with the origin and development of early human. It draws from & combines ^a paleontology, biological & cultural anthropology, primatology, geology.

Background

- The field began to develop in the second half of 19th century when important fossils were discovered.
 - ↳ Eg:- ^{in 1856,} discovery of ^{fossils} Neanderthals from Neander valley in Germany; ^{subsequently named} Neanderthals by ^{William King} William King.
- The important literary work in this direction were: → Thomas Huxley's 'Evidence as to man's place in Nature' (1863).
 - ↳ Charles Darwin's 'The Descent of Man' (1871)
- In 20th century, major anthropological findings came from south & East Africa ^(Tang) (Olduvai Gorge), 1960s, led by scholars like Leakey, Raymond Dart - ^{Tang Baby} (1924).
- The 21st century palaeoanthropology is concerned with DNA analysis ~~and~~ to establish evolutionary linkage of modern-day man.

Basic tenets

- 1. It revolves around study of buried hardened remains or impressions, called fossils of humans, prehumans and related primates.

2) Palaeoanthropologists also study geological information like climate succession, environmental conditions, plant populations etc. to get a more clear picture.

3) They are also interested in evolution and behaviour of our closest relatives - present day monkeys & apes.

4) Putting it all in context - They put together info collected from different sources to explain the evolution of human beings.

• Relevance

1) Helps in tracing evolutionary history of modern-day man - time when man developed bipedal walking, larger brain, flexible hands etc.

2) Multi-disciplinary study with archaeology provides a complete picture of human bio-cultural evolution.

3) Medical sciences - Comparative study of humans with primates have also led to development of many vaccines using lotter as a host.

↳ Eg :- Conium is made from weakened version of adenovirus from chimpanzees.

• Development in India

→ The first evidence was founded by Lewis in 1934, of Ramapithecus dental & jaw remains from Sivalik hills, India.

→ subsequently, in 1982 discovery of Narmada Man by Arun sonakia gave a huge boost to Palaeoanthropology in India.

Conclusion

Palaeoanthropology is a dynamic subject. With new fossil evidence and genetic analysis, the picture of human evolution is becoming more & more clear.

Q.2 Describe the paleoanthropological evidence from siwalik hills.

- Intro :- Siwalik hills of the Himalayas have yielded fossil evidence of two prominent Hominoids dating 12-14 mya (Miocene epoch) - Ramapithecus and Sinapithecus.

[If general contribution of Siwalik hills to Indian prehistory is asked write both - paleoanthropological evidence & Soan culture]

Discovery and distribution.

→ Edward Lewis in 1934, discovered dental and jaw remains near River Tinai in Siwalik hills. He named it as remains of Ramapithecus.

→ Sinapithecus fossil remains were also found from Siwalik hills in subsequent years.

→ other places where fossils of Sinapithecus have been located are :-

↳ Potwar hills (Pakistan), Lufang Valley (China), Hungary and some parts of Africa.

→ Leakey also found similar remains in Kenya & called it 'Kenyanthropus'

Habitat

Habitat included both dense rainforest and open areas such as ~~wooded~~ savannah.

as miocene saw increased temperatures & aridity

Physical Features

I Sinapithecus

- a) Cranial features :-
- 1) Small face with reduced snout.
 - 2) Large and thick enamelled molars, adapted for a diet of hard & gritty fruits and seeds.
 - 3) Large incisors but comparatively smaller canines.
 - 4) V-shaped dental arcade, slightly parabolic in Indian Fossil
 - 5) Vertical placement of incisors & canines as opposed to apes which have teeth in slight procumbent posn.
- b) Post-cranial features :-
- 1) The hand anatomy suggests climbing and suspensory behaviour.
 - 2) It was mostly arboreal like its predecessor Protopithecus but also moved on ground due to presence of grassland environment.
 - 3) Sexual dimorphism was present.
 - 4) His size was nearly the same as orangutan.
 - 6) little or no diastema found

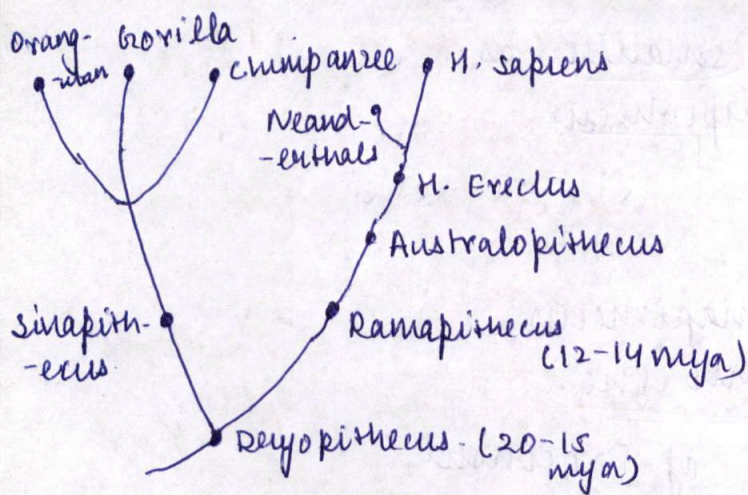
II Ramapithecus

- ↳ Lewis compared traits of Ramapithecus to humans and superficially associated it with early humans.
- ↳ However, later evidences suggested that Ramapithecus was more closely related to Sinapithecus.
- Many scholars believe that it is female of Sinapithecus.
- ↳ Features :-
- 1) The canines of Ramapithecus are smaller in size.
- Almost all features are similar to Sinapithecus except few (if asked separately write all features of Sinapithecus plus these extra)

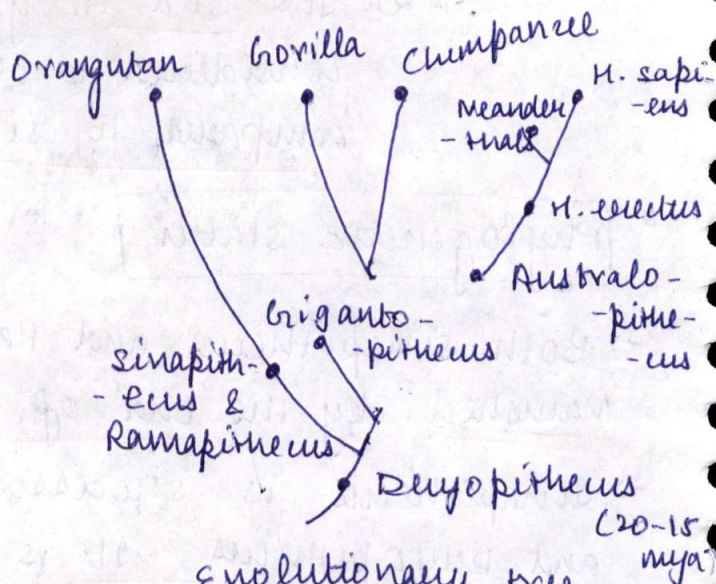
2. Its size in general is also considered to be smaller as compared to sinapithecus.

• Phylogenetic status

- Both sinapithecus and Ramapithecus vanished by the end of Miocene.
- sinapithecus is successor of Proconsul and Dryopithecus. It is considered to be ancestral to Orangutans.
- Earlier, Ramapithecus was considered to be the first step in evolutionary divergence of humans from the common hominoid stock.
- This was mainly because of its reduced canines which suggested that ~~in the course of time~~ ^{early} ramapithecus might have led to ^{early} humans which would replace canine functions by tools.
- However, later research by David Philbeam discards this hypothesis. Now, ramapithecus is regarded as result of Miocene radiation complex of Dryopithecus.
- It is considered to be more closely related to sinapithecus & ancestral to orangutans.



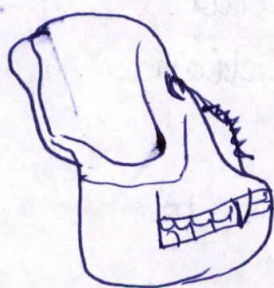
Evolutionary tree (as agreed up to 1990s).



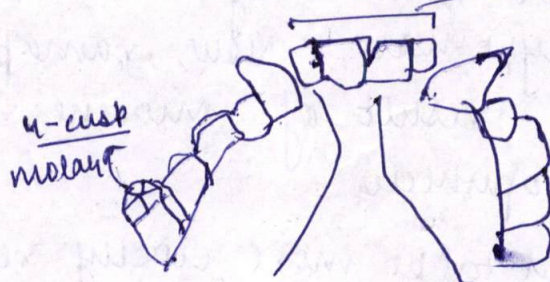
Evolutionary tree (as agreed today)

Conclusion

Thus, sinapithecus fossils are considered crucial in establishing evolutionary linkages. However, more fossil evidences are required from later miocene to establish a clear picture of origin of early humans.



Skull of *Sinapithecus* (= *Ramapithecus*)



Dental Dentition

(draw 4 incisors with gap b/w incisor & canine)

→ sub-species of sinapithecus

:- *S. punjabicus*, *S. wickeri*, *S. breviprobis*
(India) (Africa) (China)

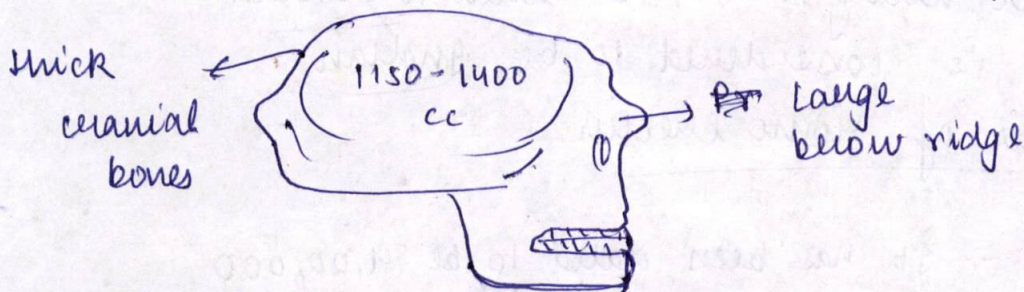
0.3 Naumada man.

- Intro :- Broken skull specimen with upper jaw was discovered by Dr. Arun Sonapia in 1982 from Hathnora, Madhya Pradesh (Naumada valley). It is called Naumada man and is considered to be Indian sub-species of Homo erectus.
- Time span - It has been dated to be 4,00,000 years old, much later than the H. erectus of Africa & Europe.
↳ Thus, it belongs to the lower paleolithic period.
- Further discovery :- A right clavicle bone was also discovered from the same region by A R Sankhyan in 1987. It is also described to be a part of Naumada man.
- Physical features
 - 1) Cranial capacity lies between 1150 to 1400 cc, within the range of H. sapiens. (erectus - 800-1000 cc)
 - 2) Cranial features - 1) Prominent brow ridges and absence of sagittal crest.
 - 2) zygomatic arch is thin like in H. sapiens.
 - 3) More anterior placement of foramen magnum indicating erect posture.
 - 4) Jaw is larger and more massive as compared to H. sapiens.
 - 5) Nose is flattened.
 - 5) Teeth are of ordinary size and canines are non-projecting. (don't write if 2 pages required)

3) Post-cranial features :-

↳ The clavicle is supposed to belong to a 25-30 year old female, the size of a modern adult pygmy of stocky build.

→ The build is archaic, robust & stocky.



• Cultural features

1) Naumada man belonged to Acheulian culture of Lower Paleolithic. Various stones like handaxes and cleavers are also found.

2) Naumada man was a hunter-gatherer evident through findings of bones of several animals alongside.



Handaxe



cleaver

3) He lived in small groups at campsites and used fire.

• Phylogenetic status

→ Dr. Sonakia assigned it as H. erectus Naumadensis due to its association with Acheulian culture of lower paleolithic.

→ Dr. Marie Antoinette-de Larnley labelled it as evolved H. erectus due to its high cranial capacity.

→ Other scholars like Dr. Sankhyan and Kennedy called it as archaic H. sapiens. However, this view is mostly rejected.

→ Dr. Sanjayan (2017) has also remarked that - Naamada man. indicates ~~towards~~ presence of common ancestors of Holocene short-bodied populations of Indian mainland, including pygmies in the Naamada valley. It is also supported by recent genetic studies and is useful in explaining human origins in South Asia.

• Conclusion

Naamada man is the only recorded evidence of human skeletal remains from Indian sub-continent. The findings concur with 'Out of Africa' model, however ~~the~~ robust & stocky characteristics of Naamada man are different from tall & well built western H. sapiens.

→ several issues on its phylogeny have been put forward

0.1 Ethno-archaeology.

• Intro :- Ethno-archaeology is developed as a sub-field of archaeological anthropology in the 1950s. It is concerned with ^{the} study of ethnographies of contemporary simple societies for the purpose of reconstructing pre-historic cultures, in conjunction with surviving archaeological antiquities.

Background

→ The first instance when simple societies of today were used to interpret prehistoric cultures occurred in the 1930s. The totemistic rock paintings done by Australian aboriginals were used to explain France-Cantabrian Palaeolithic art.

↳ This gained huge criticism from empirical archaeologists.

→ Subsequently, in 1960s Binford popularised the subject in form of New Archaeology, that is, reconstructing the activities based on antiquities found on site.

↳ L.H. Binford's study on Eskimos was instrumental in this.

→ In India, ethnoarchaeological studies have been conducted across a few Neolithic & Chalcolithic sites.

Basic tenets

1) It is a research methodology combining both archaeological evidences and ethnographic studies of simple societies through participant observation.

2) It is based on the idea that all aspects of culture are accessible through material records.

3) It proposed a hypothetico-deductive model based on the assumption that all socio-cultural changes in mankind occur under the same operative rule irrespective of time & space.

• Relevance

1) Provides an insight to archaeologists how the people in the past may have lived.

2) It is a useful mechanism for interpreting the functions of antiquities.

↳ Eg:- Circular huts (diameter 3m) of prehistoric times posed a question about their utility. Same could be understood by studying similar huts of Chenchu tribe who use them for cooking & storing food and not for sleeping.

3) It contributes towards filling gaps in history. For instance, the role of women or religious beliefs of prehistoric times.

• Criticism

not necessary that a product had same fn in

1) It provides not an empirical reality but only projected reality of the past (imaginative). prehistoric times as it does today.

2) There are concerns regarding choice of analogy, that is, which ethnic group is used to interpret antiquities of a particular culture. studied

• Conclusion

Hence, ^{research}ethno-archaeology ^oas a tool should be used very cautiously. It should be limited to cases where there is demonstrable continuity b/w archaeological cultures and contemporary simple societies.

Q.2 Explain the concept of survivals & parallels, and their role in ethnoarchaeology.

• Intro :- E. B. Tylor in his book, 'The Primitive Culture' (1871), first used the term survivals

to refer to cultural phenomena that are remnants of previous cultures and have outlined the set of conditions under which they were originally developed.

→ Parallels, meanwhile refer to cultural similarities that exist across cultures that may or may not have been in direct contact with each other.

• Role in ethnoarchaeology

1) Ethnoarchaeology is concerned with study of present societies for reconstructing the prehistoric culture, in conjunction with surviving archaeological remains.

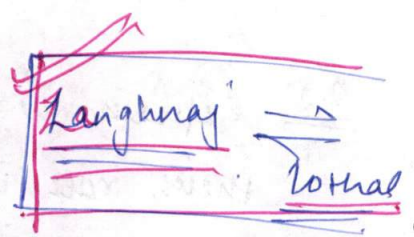
2) Role of survivals - They represent continuity b/w present and past cultures.

↳ Eg:- Making of pottery despite discovery of metal utensils.

3) In this way, survivals act as a link which help in interpreting the functions of certain antiquities.

↳ Eg:- Mock battles in nuptial rituals among Bhils are said to be survival of an earlier stage when marriage involved capture or kidnapping of women.

4) Other examples include the symbiotic relationship which existed b/w ^{the} farming & hunting-gathering communities of the past, say Chalcolithic period. still exists today in tribes of Deccan India -



→ Role of parallels : 1) Parallels indicate similarity b/w 2 cultures. This points towards ~~that~~ the assumptions that all socio-cultural changes in mankind occur under the same operative rule.

2) Eg : → Origs of Andaman & Nicobar are known to decorate their bodies with microliths. This could be seen as a parallel with prehistoric mesolithic culture.

↳ Circular hut example of Chenchu tribe

• Conclusion

Hence, the presence of siminials & parallels enhance the understanding of archaeological remains in contemporary soc.

In this way, they help in interpreting the lines of prehistoric man.

Similarly, even today tribals mostly enter the larger economic system as unorganised labourers.

(see this topic again)

→ This shows a parallel that whenever a complex economic system evolves, it absorbs the most vulnerable communities as labourers ~~which~~ working for the affluent strata of society.

Unit - 2

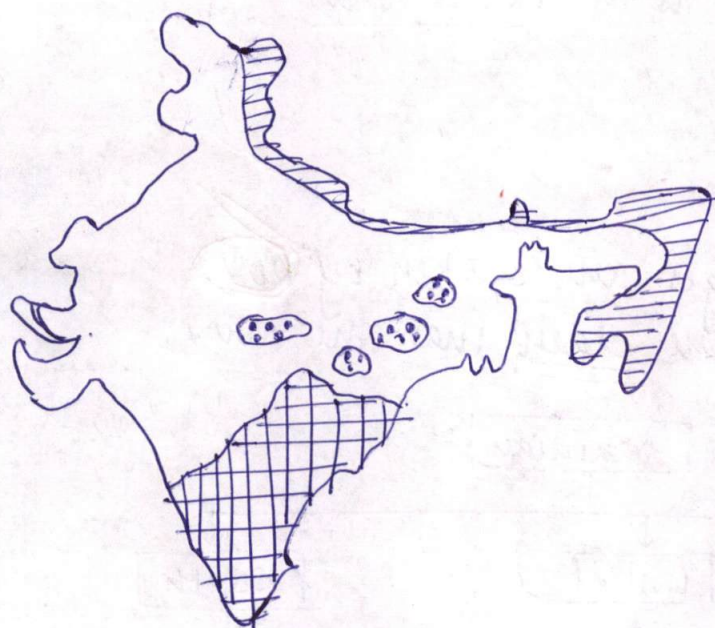
Q.1 Describe the linguistic elements in Indian population & their ~~population~~ distribution.

• Intro :- According to People's Linguistic Survey of India, 780 languages in 66 different scripts are spoken in India. Out of these, 480 are tribal and nomadic languages.

• Reason for linguistic heterogeneity :- It is due to diverse racial groups in India, coupled presence of with prolonged geographical isolation and subsequent migration.

↳ However, linguistic diversity always does not coincide with racial classification in India.

• Major language families in India



-  Indo-European (Aryan)
-  Dravidian
-  Austroasiatic
-  Sino-Tibetan

I. Indo-European (Aryan) family

→ Around 73% of speakers in India belong to this group. Hindi is by far the most popular language of this group - mother tongue of 44% of Indians.

→ Within India, it can be divided into two branches.

Indo-European

Dardic

Shina, Khowar, Kashmiri

These are the languages spoken in Pakistan, and Kashmir.

Indo-Aryan

It includes several sub-branches as follows:-

North-western

Punjabi, Sindhi, Lahnda, Dogri-Kangri

Southern

Marathi, Konkani

Eastern

Oriya, Bengali, Bihari, Assamese

Central

Hindi, Rajasthani, Gujarati

East-central

Awadhi, Bugheli, Chhattisgarhi

→ Sanskrit is regarded as the eldest Indo-Aryan language.

II. Dravidian Family

→ Dravidian languages are spoken by 20% of Indians. These are older than the Indo-European languages.

Dravidian

North

Kannukh, Malti

Central

Telugu, Gondi, Khond, Gwi

South

Tamil, Malayalam, Kannada, Tulu

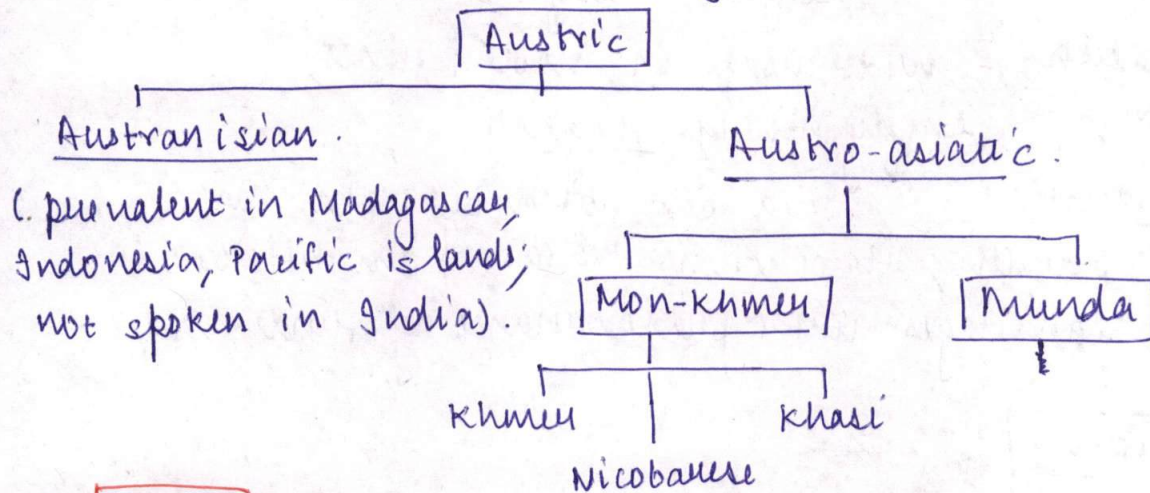
→ Out of these, Telugu, Tamil, Malayalam and Kannada are classified as classical languages having rich ancient literary heritage.

III Austro-Asiatic family (Nishada)

→ 1.38% Indians belong to this category.

This is regarded as the earliest language spoken in India.

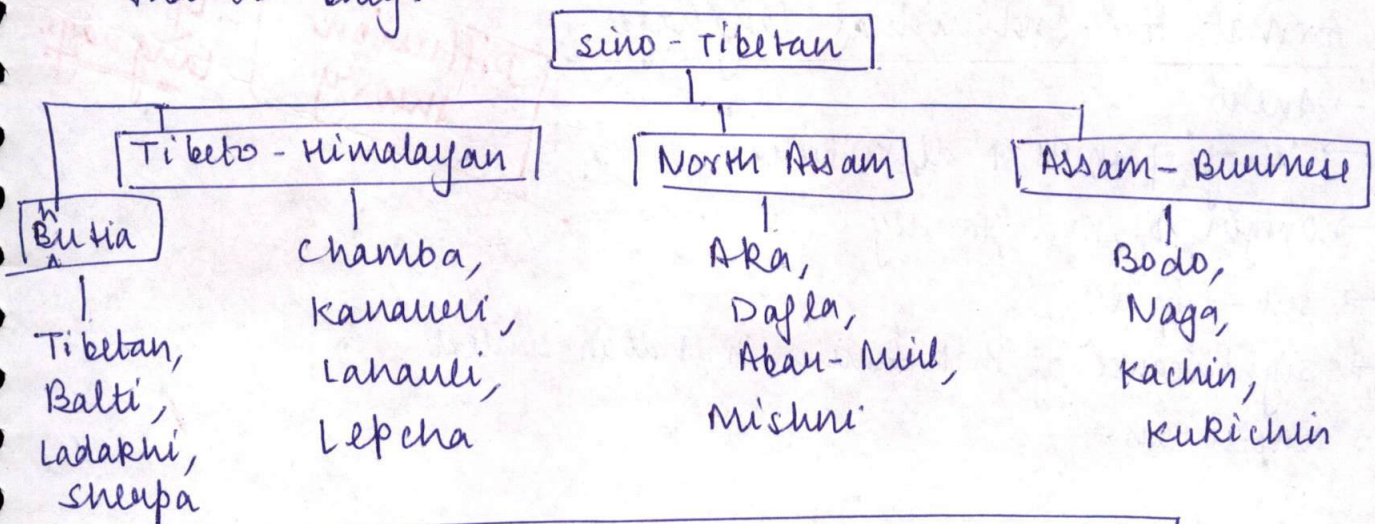
→ the speakers of this language are considered to be the Proto-Australoid type.



→ The Munda branch is the largest of the Austroic family and includes 14 tribal languages. Some examples are Santhali, Mundari, Kurmukh, Ho etc.

IV Sino-Tibetan family (Kuliat)

→ The speakers of this group constitute 0.85% Indians only.



Other elements of India's linguistic diversity

→ Apart from languages, more than 19,500 dialects are spoken in India as mother tongue as per

Press Trust of India

- India's common vocabulary consists of contributions from several other languages like:
- Sanskrit - bridge between Aryan and Dravidian languages.
 - Persian - influenced Marathi, Kannada, Bengali, Telugu & Tamil
 - English - wide usage in modern times, emergence of Hinglish
 - Hindustani - Idea promoted by Mahatma Gandhi; it contains words from different languages with predominance of Hindi-Urdu.

• Conclusion.

The immense linguistic diversity is source of both internal conflicts as well as integrative force of national identity. The focus should be on preserving these ancient languages while instilling a sense of common nation-identity among all.

* Format for Individual languages.

- Intro
- % of speakers + distribution
- Origin of that family
- sub-families
- significance of that family in Indian context.
- conclusion.

Diffusion theory - of language

• Indo-Aryan

- Intro :- As per PLI, 780 languages are spoken in India. Out of these, Indo-Aryan languages form the largest group of speakers accounting for around 73% Indians.

→ Distribution :- The Majority of Indian mainland ~~including~~ ^{excluding} the south India, N-E India and central India tribal belts.

----- map -----

• Origin of Indo-Aryan family

- Indo-Aryan languages are part of Indo-Iranic family which is part of much larger Indo-European family.
- It is believed that speakers of this language group migrated from Central Asia to Indian sub-continent during Pre-Vedic times.
- Since then, it has gone through several phases from use of Sanskrit in ancient times to Prakrit to several Modern languages (Hindi, Urdu, Bengali etc.).

• Classification.

--- ques 1 ---

- The most popular is Hindi - 44%.
- Sanskrit and Odia - classical languages with rich ancient literary heritage.

• Significance & other features

→ Tribal languages like Rajasthani & Bhojpuri

- 1). Most of the modern Indo-Aryan languages had impact of Sanskrit on their origin.
- 2). Sanskrit acted as bridge - - -] a.1
- 3). Persian influenced - - - languages
- 4). They were also used as administrative in ancient & medieval times (Mughals).
- 5). Mahatma Gandhi idea of Hindustani - - -

- Challenges & concerns :- 1) The policy decision to promote Hindi as an all-India language had faced backlash from Dravidian groups in the past.
- 2) ~~The three language formula~~ This has led to internal conflicts and linguism.

• Conclusion

There is a need to safeguard the interest of all linguistic communities by taking their concerns into account. Hence, the objective should be cohesion but not fusion and agglomeration but not assimilation.

• Dravidian

→ Intro - - -

→ Distribution - South India & - - Map - -

↳ Acc. to Risley's classification, the Dravidian ethnic group speak these languages.

→ Origin :- ^{1st evidence of 2nd century BCE on cave walls of Madurai & Tirunelveli} three schools of thought :-

indigenous origin.

came from

N-W to India during pre-historic times

Australian

origin to this family of languages.

→ The most acceptable argument

is native origin; Dravidian speakers were pushed to southern parts by Indo-Aryans who came from north.

→ Classification

- - - same as Cl. I - - -

→ out of these Telugu is the most spoken Dravidian language

→ Telugu, Tamil, Kannada & Malayalam - classical language.

↳ Eg :- Sangam lit. (Tamil)

→ Significance & other features

1) Dravidian languages have been influenced by Sanskrit and in turn, Sanskrit literature like Rig Veda also have some Dravidian ~~elements~~ loan words.

2) This indicates influence and proximity of two groups of language speakers in ancient times.

3) There are several minor languages too such as Tulu, Kota, Kungu, Toda etc.

→ Concern :- 1) Linguism and internal conflicts such as anti-Hindi agitation during the 1960s.

2) Some minor languages like Tulu have been categorised as Endangered by UNESCO as they are facing threat of extinction.

• Austro-Asiatic

→ Intro :-

→ Distribution :- - - - - map
↳ people - Proto-Australoid type.

→ Origin :-

↳ Called the earliest & most indigenous language spoken in India.

↳ The austro group consists of another sub-family called austroasiatic. The speakers of this sub-family are inhabitants of Madagascar, Indonesia & Pacific Island.

↳ Hence, it is believed that austro-asiatic languages in India.

→ It is believed that this language group originated in South-eastern China some time ^{south} b/w 2000 - 2500 BCE. ~~and~~ ^{The speakers then} migrated into the Indo-Chinese peninsula & west into India.

→ The influence of Indo-Aryan speakers split the ~~Austic~~ Austro family into Austro-asiatic & Austric.

→ Classification

→ Mon is the language of Burma and Khmer. is spoken by Sakai & Clanang tribes of Indo-China.

→ Nicobarese by people of Nicobar islands.

→ Khasi by Khasi tribes of Assam & Meghalaya.

↓
It acts as connecting link b/w Mon & Munda branch.

→ Munda largest of Austro family & includes 14 tribal languages.

↳ Principle Munda language is Kherwari. It includes languages like Santhali, Mundari, Ho etc.

Other division of Munda branch is Kukkur.

• Significance

1) Santhali, Mundari & Ho have rich oral literature consisting of songs & folklores.

2) The distribution of Austro languages coincide with distribution of Proto-Australoid ethnic elements hence it helps in ethnic classification of Indian population.

(3) Influence of Indo-Aryan

```
graph LR
    IA[Indo-Aryan] --- Austro[Austro-Asiatic]
    IA --- Austric[Austric]
    Austro --- Indian[Indian]
```

understanding
migration
pattern &
distribution
earliest
population

- Challenges - 1) many languages on verge of extinction
- 2) Difficulty in determining the exact no. of such languages due to lack of distinction b/w languages & dialect.
- 3) Many such languages are still to be discovered & described.

• Sino-Tibetan

→ Intro

→ Distribution :-

↳ However, worldwide the speakers of Sino-Tibetan languages are only 2nd after the Indo-European speakers.

→ Origin :- there is no concrete evidence about a single proto Sino-Tibetan language. However, there is consensus about ~~that~~ origin of this family in China. From here, the speakers migrated South-west to India.

→ ~~The Indian~~ Several phases of migration, external influence & geographic isolation led to development of different language types.

→ Classification

→ Assam-burmese has largest no. of speakers.

→ Ladakhi, Kannauri, Nimi & Naga have largest no. of speakers in their respective groups.

Significance

:- 1) Oral lit

2) help in ethnic mapping of Indian population
Provide valuable i/p about different waves of migration into Indian sub-continent.

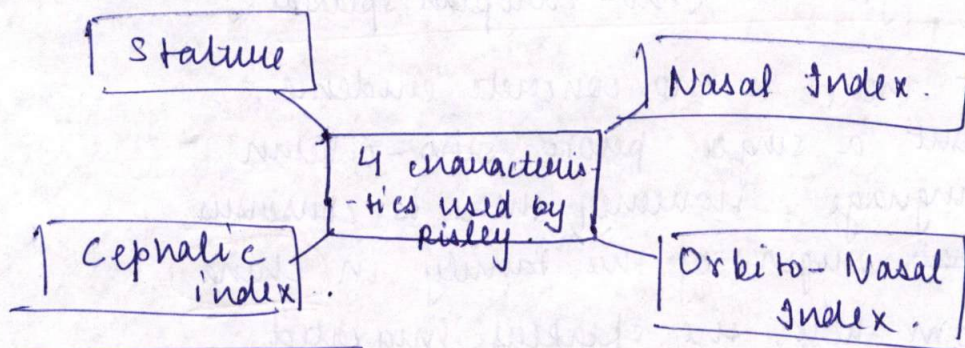
• challenge :- - - - same as Austria - - -

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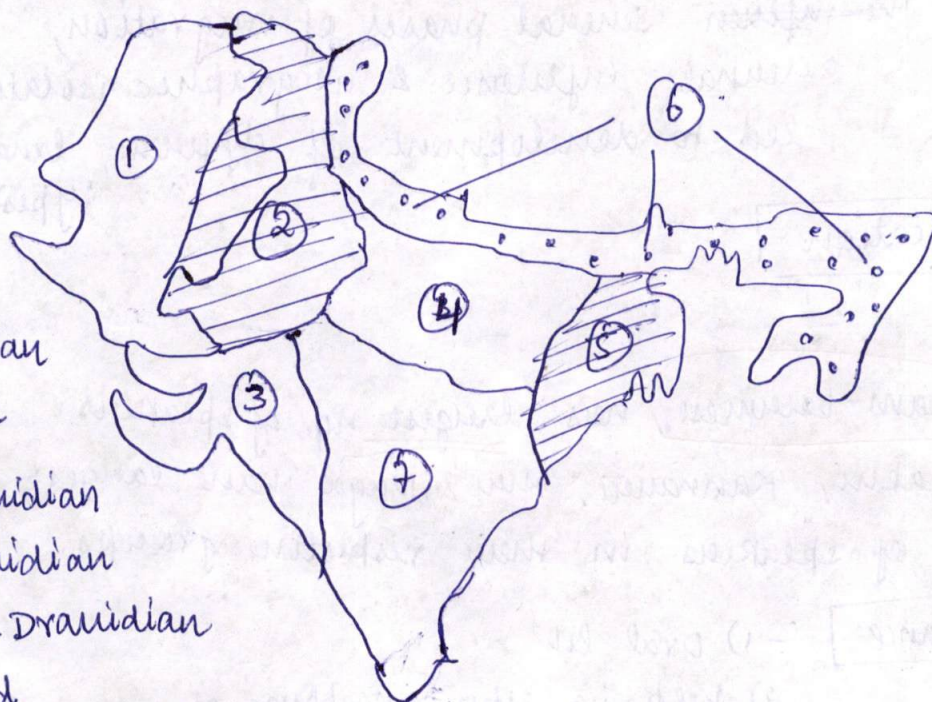
→ linguistic & separatist tendencies
by certain groups (like - demand
for Bodoland, Nagas etc.).

Q.2 Risley's classification of ethnic elements in India?

• Intro :- H H Risley undertook the first
racial classification of Indian population
in 1901. The same was presented in his
book 'The People of India' (1915). He divided
the entire population into 7 racial types
on the basis of anthropometric measurements:-



• Risley's classification



- ① Turko-Iranian
- ② Indo Aryan
- ③ Scytho-Dravidian
- ④ Aryo-Dravidian
- ⑤ Mongolo-Dravidian
- ⑥ Mongoloid
- ⑦ Dravidian

Physical types	Characteristics	Communities
1) Turko-Iranian	Tall stature, fair complexion, broad head, long & prominent nose.	Frontier provinces and Baluchistan (Pakistan)
2) Indo-Aryan	Tall stature, fair complexion, long head, long nose	Punjabi, Jats, Rajputs, Kashmiri, Khatis
3) Scytho-Dravidian	Medium stature, fair complexion, broad head, medium nose.	Maratha Brahmins, Coorgs
4) Aryo-Dravidian	^{medium} Below average stature, light brown to dark complexion, medium to long head, medium to broad nose	Uttar Pradesh, Rajasthan, Bihar
5) Mongolo-Dravidian	Medium stature, dark complexion, broad head, medium to broad nose	Bengali Brahmins, Bengali Kayastha.
6) Mongoloid	^{short} Below average stature, dark complexion with yellowish tinge, broad head, flat face, eyes with epicanthic fold	Assam, Burma & Nepal
7) Dravidian	Short stature, v. dark complexion, long head, dark curly hair, broad nose	Tamil Nadu, Andhra Pradesh, santhals of Chota nagpur.

→ H.H. Risley also held that caste in India has a racial basis. The social position of a caste stands in inverse ratio to average nasal index of its members.

(Broad nose
= high nasal index
= low social status)

• Criticism

- 1) The classification was based on preconceived notions and scanty evidence.
- 2) Excessive focus on nasal index.
- 3) Errors in describing physical features and location of racial types.
 - ↳ Eg:- Indo-Aryans are widely distributed across the entire subcontinent and not just constricted to North-western India.
- 4) Neglected the Negrito element in India.
- 5) Undue importance of Scythian (Iranian) element despite their short stay in India.

• Conclusion

Risley's classification is no longer valid in Indian context. However, this prompted many other scholars like Haddon, Bruce, Sankar to carry out similar studies.

Q. 3 Aryan Debate / Contribution of Risley to Aryan debate.

→ Rig Veda calls of Aryan invasion around 1500 BCE.

→ Many scholars like Wheeler (1947), Piggot (1950) & Gordon (1950) also consider Aryan invasion as the root cause of fall of Harappan civilization.

↳ Their conclusion is based on Rig Vedic text, presence of Indo-European weapons at Harappan sites & large mounds of skeletons at Mohen-jodaro.

→ British ethnographers like H.H. Risley has also given importance to Aryan invasion and their

intermingling with the natives while giving 7-fold racial classification of Indian population.

→ It is evident as two of Risley's 7 physical types show intermixing with Aryans.

↳ These are:- Indo Aryans (Punjabi, Rajputs, Jats)

↳ Aryo-Dravidians (UP, Raj, Bihar)

→ These 2 groups predominantly occupy the Northern plains. This is in consonance with the widely held belief that Aryans pushed the indigenous Dravidians to the South and occupied the north for themselves.

→ Acc. to Risley, greater the occurrence of Aryan element, lower will be the nasal index.

Risley's contribution.

→ Thus, he classified people with long noses (lower nasal index) as Indo-Aryan and broad noses (higher nasal index) as Dravidians.

→ He also said that caste in India has a racial basis.

↳ The higher castes were the Indo-Aryan types and had lower nasal index.

↳ even among Aryo-Dravidians, the lower caste were the ones in which Dravidian elements predominated.

↳ he also classified the tribals as Dravidian types.

origin

→ like Max Muller

IV

imp

The debate around Aryan invasion began after colonial scholars discovered remarkable similarities b/w languages of northern India

(esp. Sanskrit) and, Europe and Iran. They combinedly termed them as Indo-European languages.

↳ This led to the theory that Indo-European languages must have been brought to India by migrants from Central Asia. This process was called Aryan invasion.

* Genetic evidence :- Recent researches ^{on Y-chromosomal DNA} ~~have~~ showed that there was external infusion of genes into the Indian male lineage during the said period.

↳ 17.5% of Indian males belong to haplogroup R1a which is today spread across Central Asia & Europe.

→ Against Aryan invasion

→ Many believe that Aryan invasion theory was pushed by colonial rulers to establish the notion that Aryans from Eurasia civilised India and promote Divide & rule b/w upper and lower strata.

→ The Harappan decline is also not attributed to Aryan invasion now. Hydrological changes due to eastward shifting of rivers are taken as more probable reasons. - Lambert (1967) & V.N. Misra.

→ The genetic evidence from mitochondrial DNA analysis also show little evidence of external intrusion.

↳ Though this could be explained by only selective migration

of males from Central Asia.

• conclusion

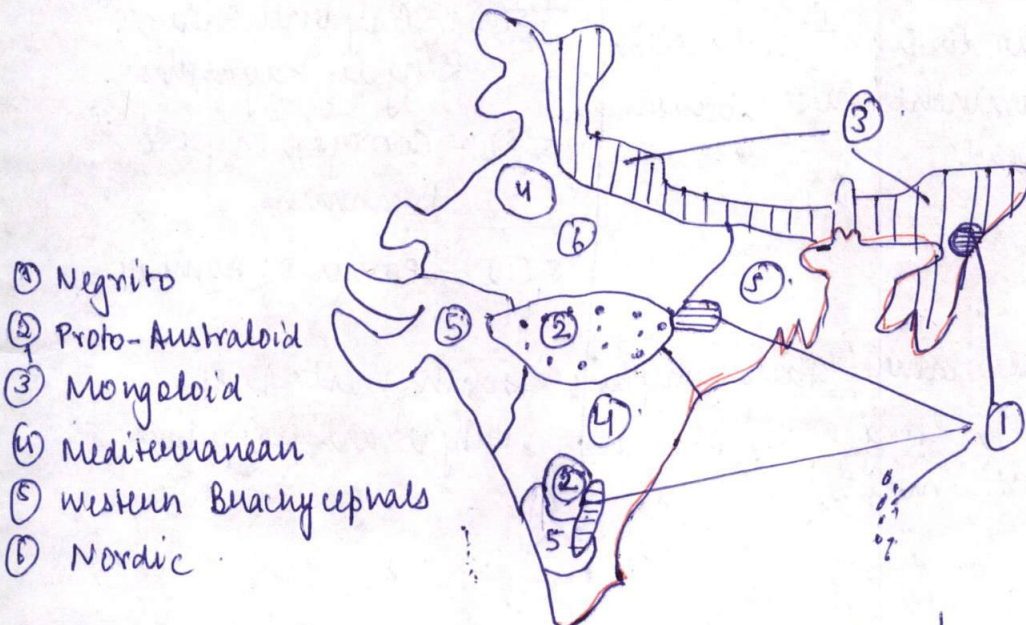
→ This is a hotly debated topic. Even if the Aryan had come to India, they are certainly not responsible for the Harappan decline. Nevertheless, such issues should not be the cause of enmity b/w various groups because at the end, all humans share 99.99% of same genome.

10.4 Guha's racial classification of Indian population.

• Intro :- B S Guha classified the Indian population into 6 major types based on anthropometric surveys of the 1931 census.

→ his inferences were based on 18 measurements including cephalic and facial index, skin color, hair and eyes.

• Guha's classification :



Type	Physical characteristics	Communities
1) Negrito	Short stature, dark complexion, frizzly hair with spirals, flat & broad nose, everted thick lip	South Indian tribes of Kaddars, Irulas, tribes of Raj Mahal hills, Andamanese

2) Proto-Australoid

short stature, dark skin color, wavy & curly hair, long head, flat & broad nose

Central Indian tribes - Bhils, Kols, Santhals
South Indian tribes - Chenchus, Badagas, Yeruvas

3) Mongoloid

short to medium stature, prominent cheek bones with flat face, oblique eyes with epicanthic fold

Sema Nagas, Lepchas, Chakmas and Tibetans of Bhutan and Sikkim

↳ a) Palaeo-mongoloid.
long headed broad headed

↳ b) Tibeto-mongoloid

4) Mediterranean

Medium to tall stature, long head, well developed chin, broad to narrow nose.

→ 4(a) :- Nairs, Tamil and Telugu Brahmmins

→ 4(b) :- Namboodiri brahmmins of Cochin, Brahmmins of Allahabad, Bengal

→ 4(c) :- Banias of Rajputana, Chhettris of Punjab

↳ a) Palaeo-Mediterranean

↳ b) Mediterranean

↳ c) Oriental type

5) Western Brachycephals

Medium to tall stature, dark to light complexion, prominent nose, broad head.

→ 5(a) :- Gujarati Banias, Bengali Kayasthas

→ 5(b) :- Coorgs, Mysore Brahmmins

→ 5(c) :- Parsis of Bombay

↳ a) Aepinoid

↳ b) Dinanic

↳ c) Armenoid

6) Nordic

Tall stature, fair complexion, long head, prominent nose.

North West India - Punjab and Rajputana.

• Relevance

1) Guha's work is considered most scientific and acceptable racial classification.

2) He also traced the origin and immigration of racial groups into the Indian sub-continent.

↳ Negrito - earliest inhabitants of India; belong to Negroid stock in Africa, Melanesia etc.

↳ Proto-Australoid - These were the settlers of Indus Valley civilization.

↳ Mongoloid - They entered from the North east region later than the above two types.

↳ Mediterranean - These are believed to come from South West Asia in 3rd-2nd century BCE.

Dravidian

↳ They probably introduced megalithic culture to India.

↳ Western Brachycephals - They came from several routes; the 3 sub-type show variation in skin color.

↳ Nordic - These were the last to come; they are also referred to as Aryans; comprise majority of upper caste in Northern India.

Aryans

• Criticism

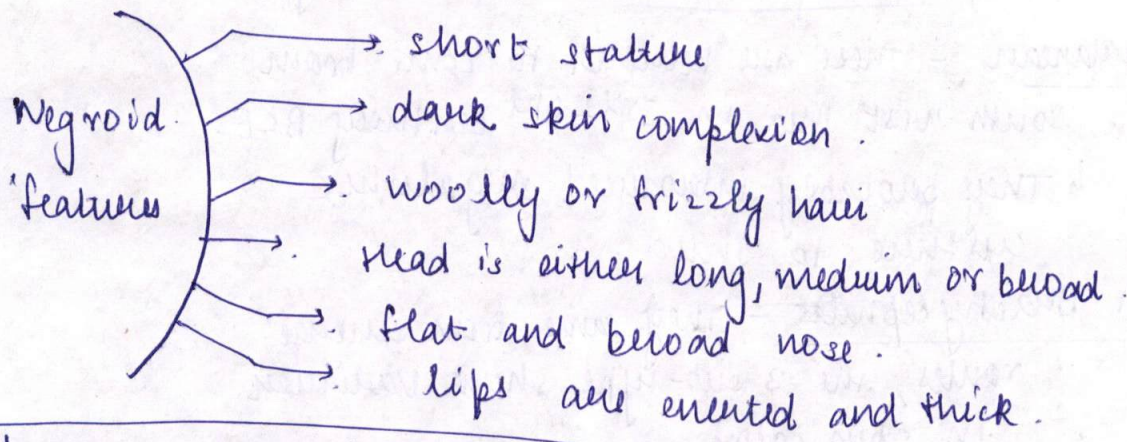
- 1) Guha traced origin of all racial groups outside India suggesting that no indigenous population developed in India.
- 2) His findings related to Negrito element are opposed by various anthropologists.
- 3) His proposal of sweeping distribution of Brachycephals has been criticised.

• Conclusion

Despite its criticisms, Guha's classification is widely accepted in understanding ethnic elements in Indian population.

Q.5 Discuss the Negrito problem in India.

• Intro :- The Negrito problem refers to the debate regarding presence of Negrito element within Indian population. Another dimension of debate is whether they were the earliest inhabitants of India.



Proponents of Negrito element in India

- 1). De Quatrefages in 1877 was the first was the first to propose Negrito element in Indian population.
- 2). JH Hutton studied Angami Nagas and observed occurrence of woolly and frizzly hair among them.
- 3). BS Guha also found elements of woolly and frizzly hair among Kadams of south India.
- 4). Basu and Guha have shown similarity between cranial material collected from Naga hills and Negrito skull.
- ↳ Based on these evidences, they concluded that negrito were the earliest settlers of India (Guha, 1931). They resemble the negroid stock of Africa and Melanesia.

• Opponents of Negrito element in India

- 1) Saukai also studied the Kadams of south India. He criticised Guha for putting too much emphasis on a single criterion (woolly hair).
 - ↳ According to him, Kadams showed more of proto-Australoid features.
- 2) Majumdar also criticised Guha and Basu based on the fact that if Negrito element was present, then it ~~would~~ should be frequently met in North India too, which is not the case.
- 3) Fisher has opined that woolly hair could be a result of mutation of wavy hair itself.
- 4) The recent serological studies, also show predominance of blood group A and not B even in most primitive Indian tribes. This indicates closer resemblance to proto-Australoids and not Negritos.
 - ↳ Even, when B blood group is present in some tribes like Bhils and Munda, they don't show other racial features of Negritos.

• Conclusion

Hence, it can be concluded that Negrito element must be a local phenomena in India which didn't contribute much in ethnic makeup of the entire population. It was perhaps the proto-Australoids who were the earliest settlers. However, nothing could be said with surety.

Q.6 . What are the various factors influencing population growth in India. / Discuss causes and remedial measures for population growth in India.

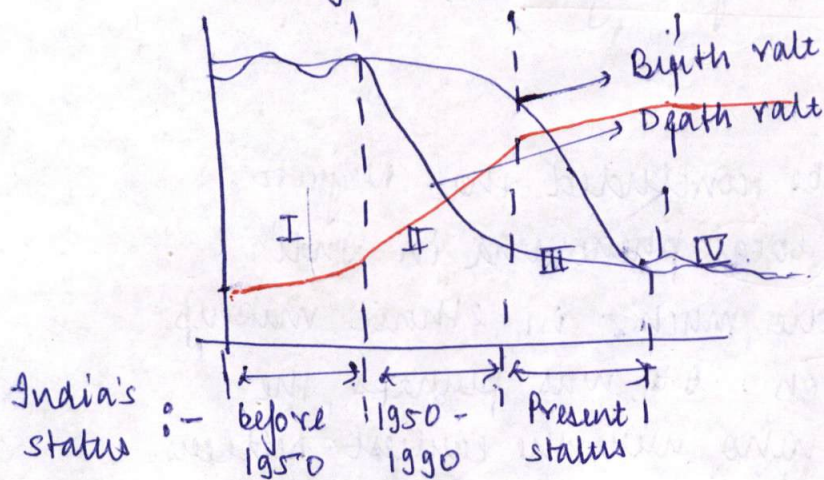
• Intro :- India accounts for 18% of world (around 1.2 bn) population in just 2.5% of land area. The recent NFHS-5 data shows that Total fertility rate ^(TFR) in India has dropped down to 2 (lower than replacement level of 2.1) indicating transition towards incipient decline of population.

→ However, the population in India will only peak between 2040-2050 at around 1.6 billion according to UNDP, Lancet etc. as per Economic Survey 2018-19.

Factors influencing population growth

1) High birth rate

→ The demographic transition curve brought about population explosion in India b/w 1950s - 1990. Many states like Bihar still have a TFR of 3. (NFHS-5).



2) Lower death rate

→ Mortality rate has declined due to better medical facilities, immunization, sanitation and hygiene.

→ The average life expectancy has increased from 49.7 in 1970-75 to 69.7 years in 2019.

→ Reasons for higher birth rate:-

1(a). Social :-> lower age at marriage.

↳ Lack of education and inadequate access to contraceptives

↳ Traditional beliefs like preference for sons.

↳ Lack of access to healthcare & family planning initiatives.

1(b) Economic :-> Poverty which makes more children an asset.

↳ Predominance of agriculture which demands high labour.

↳ slower pace of urbanisation.

↳ lower socio-economic status of women.

3) Migration

↳ This is not a major factor in influencing population statistics in India as immigration from neighbouring countries like Bangladesh, Pakistan, Nepal etc. is balanced by emigration to western and Gulf countries.

4) Government Policies

→ Various government initiatives like National Population Policy (2000), National Health Mission (2013) addressing reproductive and child care and RTE Act (2009), have contributed

significantly in slowdown of population.

→ several state governments like UP and Assam.

have recently introduced Population control measures based on ~~act~~ incentives & penalties. However, their need in light of ~~reduced~~ already ^{reduced} TFR is questioned.

• Remedial measures

- 1). Investment on education and healthcare
Kerala model has dual advantage of population control and leveraging the demographic dividend.
- 2). women empowerment - higher age at marriage (21 years) as proposed by recent Parliamentary bill coupled with access to education and healthcare can bring about real change.
- 3). Change in approach of family planning
- ~~no~~ no coercive measures but higher focus on HDI indicators.
- 4). Creation of employment opportunities with focus on skill development to wipe out poverty.
- 5). Decentralised implementation of various family planning programmes by local bodies

• Conclusion

Hence, population control policies should be in line with Cairo consensus of 1994.
Meanwhile, focus should be on leveraging the current demographic dividend.

(The structure & nature of Unit - 3.1
traditional Indian social system)

Q.1 Describe the philosophy & relevance of Purushartha.

• Intro :- Purushartha refers to four-goal orientation or aims of human life - Dharma, Artha, kama and moksha. Its objective is to attain harmony between immediate desire of long and prosperous life, and the ultimate desire of salvation.

• Dharma

→ As per V.P. Kane's, 'History of the Dharmashastra' (1930), dharma refers to :-

- 1). a person's rights and duties as a human being.
- 2). his duties and privileges as a members of the Aryan community, social group or caste (varna-dharma) and throughout the changing stations of life (ashrama-dharma).

→ Dharma, thus acts as a regulative principle in the life of a person.

• Artha

→ It refers to all the means to acquire worldly prosperity, such as wealth and power.

→ While referring to the materialistic aspects of life, it also lays emphasis on non-acquisition and renunciation of excess wealth.

• Kama

→ It refers to fulfillment of all desires of man including sexual desires.

→ It ensures perpetuation of kula (family & lineage) and aesthetic pleasure to man.

• Moksha

→ It refers to salvation, that is, liberation from the endless cycle of births and deaths.

→ It also implies self-realisation of inner spirituality in humans.

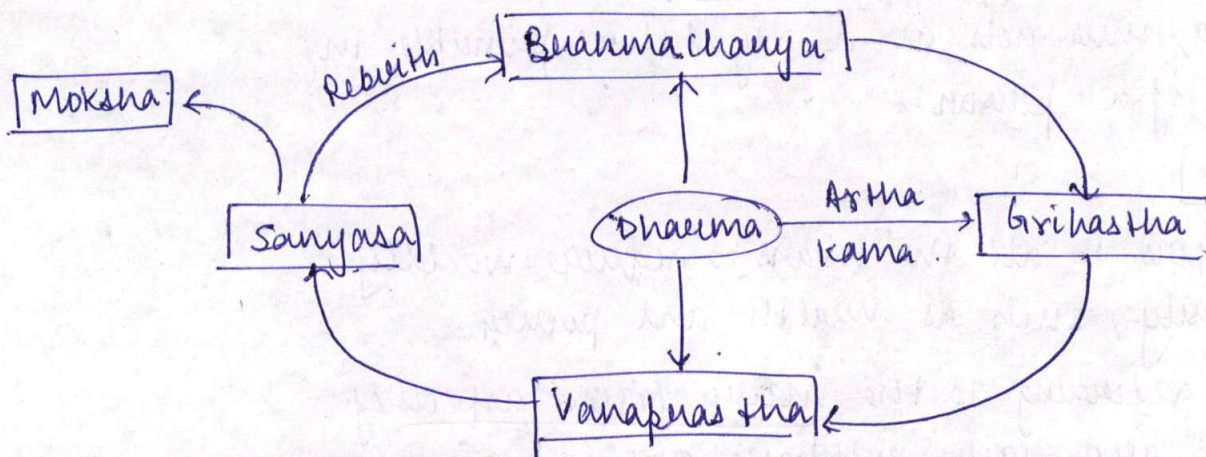
• Relevance of Purushartha

harmony & coordination b/w

→ The first three aims of Purushartha (Dharma, Artha and Kama) ~~are~~ is crucial for proper conduct of life.

→ Dharma regulates the enjoyment of Artha and Kama. Artha prevents breakdown of social structure by regulating economic pursuits. Lastly, Kama ensures perpetuation of family and therefore society.

→ All the four ideals of purushartha are integrated into various stages (Ashramas) of life as follows:-



• Conclusion

The doctrine of purushartha forms the basis of Indian ethical system. In contemporary times, the relevance of doctrine is still intact, however, it is not fully replicated in reality. due to need importance of Artha & Kama over Dharma.

Q.2 . Explain Varnashrama.

• Intro : - Varnashrama refers to four stages of human life. It also implies the values ~~at~~ and occupational obligations associated with each stage.

→ Varnashrama along with purusharth gives full expression to human life.

• The Four Ashramas are as follows: -

1) Brahmacharya (Student stage)

→ It refers to a period of formal education when the student leaves his home to stay with a guru. It begins with an initiation ceremony called Upanayana.

→ The student leads a life of piety, self-denial, discipline and celibacy.

→ The brahmachari only follows dharma without any indulgence in artha & kama, that is, his sole motive is attainment of knowledge.

~~→ It also marks fulfillment of rishi rina in form of 'guru dakshina'~~

2) Grihastha (householder stage)

→ This period begins with marriage.

→ In this stage, the trilogy of dharma, artha and kama is translated into action.

→ The man fulfills various duties in this stage such as perpetuation of family through santana, earning a living and supporting his family.

→ The grihastha is also required to repay all the rina - dev rina, rishi rina, pitra rina etc.

3) Vanaprastha (hermit stage)

- It is a stage of gradual withdrawal and marks the preparatory stage to ultimate sanyasa.
- The person renounces his household duties in this stage and devotes his time for religious pursuits.
- He abstains from kama and lives a simple and austere life.

4) Sanyasa (wandering ascetic stage)

- It is a stage of total detachment from the society and the material world.
- The person is indulged in preaching truth and knowledge in this stage.
- The sole objective is attainment of moksha.

• Relevance

- Relates life --- diagram of Q.1 --- along with purnashukta in the following way.
- Marks transition from materialistic life to spiritual one, thus striking a perfect balance.

→ Contemporary relevance :- Vanaprastha & sanyasa stages have been forgotten gradually due to influence of monetized economy and modern education.

↳ The desire for Artha & kama have become more dominant over dharma which only exists in theoretical form. This can be regarded as cause of most sufferings today.

0.3 Explain the concept of Rina.

- Intro :- Rina refers to the social debts or obligations each person is born with.

One has to repay all these debts in his lifetime (during grihastha ashrama) to attain salvation.

• Types of rina

- 1) Deva Rina :- It refers to the debt one owes to gods for their very existence.
↳ It can be repaid through recitation of Vedas, offering sacrifices, performing Yagnas etc.
- 2) Rishi Rina :- It refers ^{to} the debt one owes to his teachers (gurus) for passing him knowledge and thus removing darkness from mind & soul.
↳ It is repaid through guru dakshina, and propagating and sharing the acquired knowledge.
- 3) Pitra Rina :- It is the debt one owes to their parents and ancestors for their existence.
↳ It is repaid by reproducing progeny (santana), making them good humans and by performing traditions such as pinda-daan.
- 4) Atithi Rina :- It is the debt owed to the society and humanity at large.
↳ It is repaid by showing reverence towards guests and serving them in the best possible way.
↳ This obligation further strengthens social ties and solidarity.
- 5) Bhuta Rina (if space, mention) :- It is the debt owed to plants, animals, birds and nature.
↳ It is repaid by showing affection towards them and preserving them.

• Relevance of rina

- 1) The concept of rina makes an individual aware of his responsibilities towards his family, and society at large. ^{himself,}
- 2) It ensures that a person contributes towards upbringing of his children, service of parents and establishes a social network.
- 3) Thus, it is vital in harmonious functioning of the society.

→ Contemporary relevance

↳ The concept of rina has been modified and diluted in modern society due to several factors like economic inequality, modern education promoting individualism, urbanisation and industrialisation which have weakened the system of joint family.

↳ However, they still enjoy an important social base in India and can be used to make people aware of their responsibilities.

• Conclusion

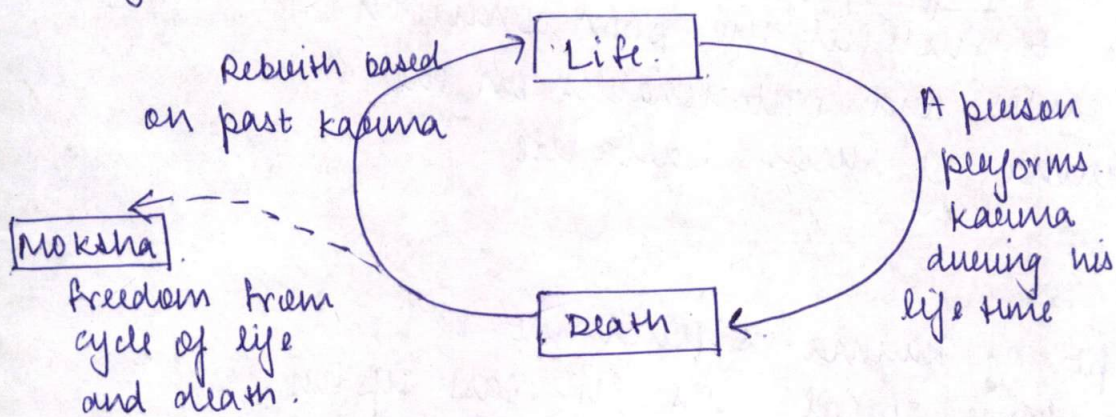
Hence, the concept of rina is fundamental to Hindu social order. It is linked to other philosophies of varnashrama, rebirth and karma.

Q.4 Explain the concept of Karma and rebirth.

• Intro : - Karma refers to the universal law of action and consequences of action. It implies → As per Nikam, that good actions produce good effects, while bad actions produce bad effects.

→ Rebirth refers to the belief in transmigration of soul even after the destruction of mortal body because soul is immortal. A person is reborn in another form until he attains Moksha.

→ This cycle of rebirth and death is regulated by Karma.



• Concept of Karma

1. It implies that an individual's future life is influenced by actions of his present life, which itself is a result of actions of past life.

2) According to Bhagvad Gita, Karma is eternal and one keeps performing karma at every moment of his life.

3) Karma can also be understood as a force which gives hope for the future by taking right actions in the present.

↳ It encourages resignation of the past and hope for the future.

• Concept of re-birth

- 1) It says that if people fail to perform their karma in the light of righteous dharma, they cannot attain salvation (moksha).
 - 2) As a result, they will take birth again and again in different forms until they fulfill their duties and obligations.
 - 3) It also implies that the form in which an individual is reborn depends on karma of his past life.
- ↳ This has a reinforcing effect on the caste system as it justifies the poor condition of lower castes and untouchables on the basis of karma of their past life.

• Relevance

- 1) The concept of karma should not be used to reinforce social evils like caste system.
- 2) Rather, it should be used as a deterrent to encourage people to avoid bad deeds as they will have to reap its consequences.
- 3) It also provides hope for the future as per S. Radhakrishnan. Thus, people should be motivated to perform good actions.

• Conclusion

The concept of karma and rebirth are closely inter-linked. They can be used to encourage people to lead a moral life and perform good actions.

• Joint family in India → at least 3 generations.

↳ both vertical & horizontal extension.

↳ common sharing of property.

↳ eldest male member - 'Karta' of the joint family; enjoys respect, confidence & the right to manage property.

↳ This acts as a social insurance for such members who are physically or mentally disabled.

↳ common kitchen & code of conduct - compatible with agrarian background.

↳ Joint family on decline : → western education promoting individualism

↳ empowered role of women

↳ change in property inheritance rules.

↳ urbanisation & industrialisation resulting in migration from urban rural to areas.

--- see Akshat Jain &

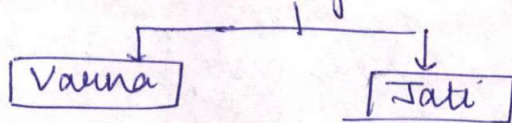
socio-cultural notes (Paper 1) for details ---

Unit - 3.2

Q.1 what is Indian caste system? Explain its characteristics

- Intro :- Caste refers to a form of social stratification which involves a system of hierarchically ranked, closed, endogamous strata, membership to which is ascribed.

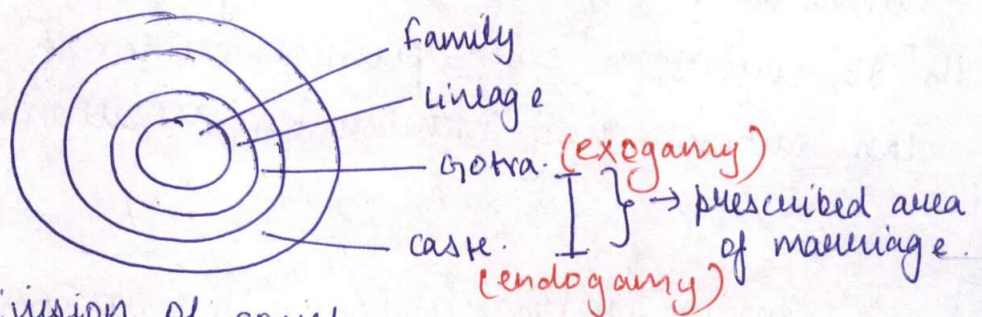
→ There are two models of caste in India :-



According to MN Srinivas, varna is only the ideal and theoretical view, while jati is the reality. actual view.

• Characteristics

- 1) Innate nature of caste - caste is an ascribed status which is determined by birth.
- 2) Endogamy - Each caste is divided into sub-castes, having their respective gotras. Caste endogamy and gotra exogamy are the prescribed marital rules.



3) Hierarchical division of society :-

The society is divided into 4 castes in hierarchical order :- Brahmins, Kshatriya, Varna and Shudra, followed by untouchables. Each group has its own rules and norms, and share a common identity.

↳ Jati system in India also show regional variation, that is, position of intermediate

sub-castes is not fixed and depends on local interpretation.

4) Commensality :- There are restrictions on sharing of food, water and other social intercourse between different castes based on the principle of purity and pollution.

Louis Dumont

↳ Case study :- Recently, upper caste students in Uttarakhand's Champanat district refused to eat

5) Occupational restrictions :- Every caste is assigned a particular occupational duty to which they must adhere to.

their midday school meals cooked by a Dalit woman.

6) Disabilities and privileges :- The higher castes (dvija) enjoy a number of privileges in religious & secular matters while the untouchables are denied even basic amenities.

This indicates prevalence of such notions in even today's society.

7) Caste councils :- Caste panchayats / councils compel obedience of members to various norms and rules of the caste system.

↳ It enjoys a socio-political authority and can outcaste any member for violation of rules.

→ Jajmani system enabled each caste to have a near monopoly over their hereditary occupation.

↳ Eg:- Brahmins ^{were} ~~are~~ supposed to engage in priestly duties and transmission of knowledge.

↳ Chamars (lower caste of North India) were supposed to do leather work.

→ This also created distinction on the basis of function.

principle of pure & polluted.

• Contemporary features of caste system

- - - - Q. 7 - - - -
same as

• Merits of caste system

- 1) It creates a sense of social & psychological security.
- 2) It creates a system of division of labour which maintains the society as a whole.
- 3) There is occupational efficiency as well as security of occupation.
- 4) It propagates controlled behaviour.

• Demerits

- 1) It hinders socio-economic development due to lack of social mobility.
- 2) Exploitation and oppression of lower castes.
- 3) It encourages the inhumane practice of untouchability.
- 4) It is detrimental to national unity and the democratic system.
- 5) It hampers social communication b/w different groups.

• Conclusion

Thus, Indian caste system is a complex phenomena with lot of regional variations. Its demerits outweigh the few advantages it has. As a result, the Indian constitution has prohibited untouchability (Art. 17) and any discrimination on the basis of caste (Art. 14, 15, 16).

Q.2 . Compare and contrast the varna and jati model of caste system.

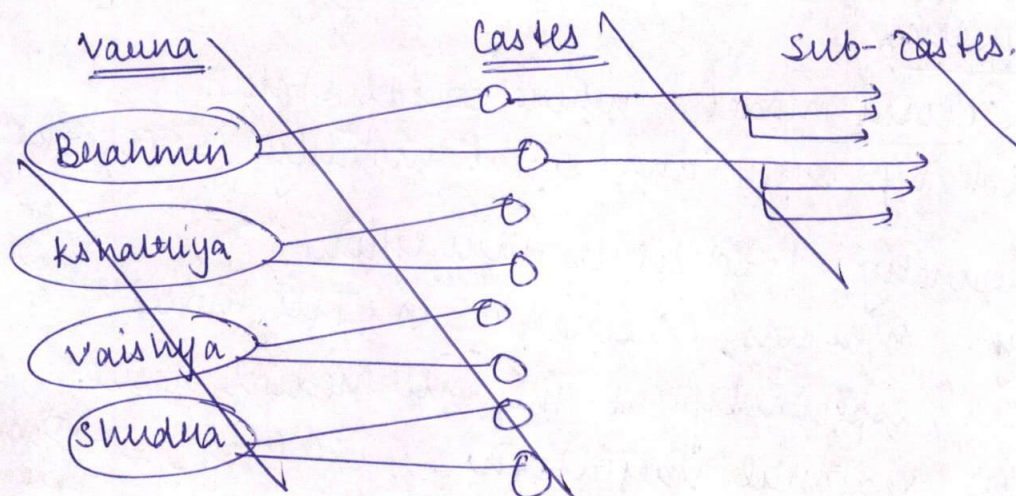
• Intro :- - - - same as Q.1 - - -

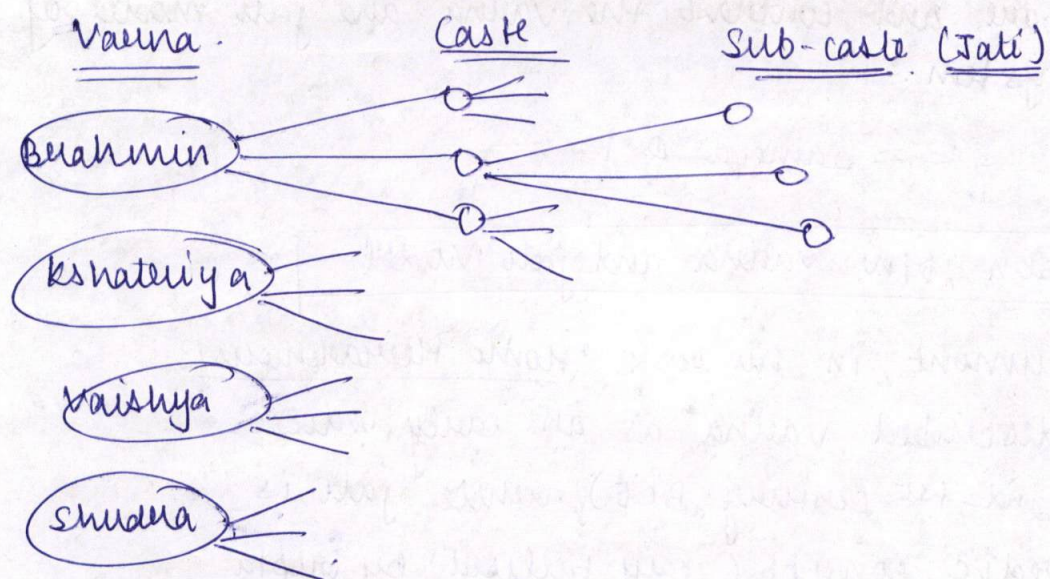
• Comparison b/w varna and jati model

1) Louis Dumont, in his book 'Homo Hierarchicus' (1966) described varna as an early vedic concept (2nd-1st century BCE), while jati is a post-vedic concept (crystallised by Gupta period - 500 AD).

2) Varna is ^{→ idealistic view} a loose and broad classification of Indian society into four major groups - Brahmin, Kshatriya, Vaishya and Shudra.

→ whereas, Jati is an empirical reality in India. According to Ghurye, each linguistic ^{region} has 200 caste groups which are further divided into 3,000 sub-castes.





3) Varna, originally means color and it must have been initially used to differentiate b/w Arya and Dasa in ancient India.

↳ A series of marriages between different varna might have given rise to large number of jatis.

4) Varna stood for achieved social status based on capacities and capabilities. Hence, it was an open system.

→ Jati is a closed model where social status is ascribed by birth and social mobility is restricted.

5) Varna hierarchy is definite throughout the country. whereas, hierarchy in Jati model is not fixed, especially at the intermediate level and shows regional variations. (Hind eg.) :- Dominant jatis of Jaats, Yadavs & Kurmis in N. India

6) There is no room for untouchability in the varna-system. whereas, untouchability is an integral part of Jati model.

↳ their political - economic posn higher than even highest varnas of Brahmins & Kshatriya

7) Varna has religious sanction while jati has social sanction.

→ Contemporary relevance :- The varna model is only theoretical in nature in India. Jati is more relevant as vast segment of people identify themselves with their jati.

↳ In metro cities, the jati model has faced some dilution due to people from diverse backgrounds living and working together.

↳ However, in rural areas, the system still has strong foundations.

• Conclusion

The efforts by government and civil society as per ideals enshrined in the constitution have brought about positive change in the jati system.

Q.3 . Discuss views of Louis Dumont on caste system in India.

• Intro :- Louis Dumont lays emphasis on caste system in India in his book 'Homo Hierarchicus' (1966). According to him, caste is a set of relationships between economic, political & kinship systems, sustained by certain values which are mostly religious in nature.

• Dumont's views

Dumont believed that all the features are sustained by coexistence of binary opposites of pure & impure - here

① coexistence of binary opposites of pure and impure :- Dumont ~~was~~ used the structuralist approach of Levi-Strauss while discussing caste system in India

↳ There are some religious factors which promote this view of pure & impure.

↳ He stressed on the superiority of higher 'pure' castes and inferiority of the lower 'impure' caste.

↳ It was this ideology which promoted the notion of untouchability, that is, pure should be kept away from impure to prevent getting polluted.

② ~~along with~~ Bongle (1908) in giving these main features of the caste system :-

2.1) hierarchy among castes which ranks one group as superior and other as inferior.

2.2) mutual repulsion and separation in terms of marriage, food and contact.

2.3) division of labour and consequent interdependence.

③ He laid emphasis on the attributes of each caste which makes them pure & impure.

↳ eg:- Attributes of purity are vegetarianism, wearing sacred thread, veneration of cow, ~~vegetarian~~ vegetarianism

↳ whereas, attributes of impurity are manual scavenging, disrespect of cow, consumption of meat & alcohol etc.

4). He also focussed on regional variations in the caste hierarchy based on local interpretations of what constitutes pollution.

↳ ~~for eg:-~~ in some places attributes of vegetarianism might be given more importance over

• Conclusion

5). He is of the view that caste as an ideology has remained static in India. This is primarily because of religious reasons.

• Conclusion

Thus, Dumont regards the concept of pure and impure as ~~the~~ basis of caste system in India, which is sustained by religious factors.

6) Varna model - early vedic
Jati model - post vedic times