SHRI SWAMI VIVEKANAND SHIKSHAN SANSATHA, KOLHAPUR

Vivekanand College, Kolhapur (Autonomous)

Home Assignment -2019-20 (B.Sc.-III) Semester-V

Index

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Shri. Swami Vivekanand Shikshan Sanstha's
VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)
Department of Zoology
Academic year 2019-20

Date – 16/09/2019

NOTICE

All students of B.Sc. III hereby informed that, submit Home Assignment for Continuous Internal Evaluation (CIE) of B.Sc. III Semester V up to 30/09/2019 at Zoology Department (Lab.49). The question for home Assignment is given bellow. Submission is mandatory to all.

Paper IX- Functional Anatomy of Non-Chordates 10M

Q. 1). Explain Nutrition in protozoa

Q. 2). Describe water vascular system in sea - star

Paper X- Biostatics, Bioinformatics and Medical Zoology 10M

Q. 1). Explain Correlation and explain its types.

Q. 2). Give detailed account of Pathogenicity of Plasmodium vivax and note on its control measure.

Paper XI- Molecular Biology , Biotechnology and Biotechnique 10M

Q. 1). Define semiconservative DNA replication ? Explain mechanism of DNA replication in prokaryotes.

Q. 2). Describe Gel electrophoresis.

Paper XII-Endocrinology, Environment Biology and Toxicology 10M

Q. 1). Describe structure and function of thyroid gland.

Q. 2). Describe Characteristics of fresh water habitat and Give faunal adaptation of lotic water habitat.

for Head,
Department of Zoology
Vivekanand College,
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SHRI SWAMI VIVEKANAND SHIKSHAN SANSATHA, KOLHAPUR

Vivekanand College, Kolhapur (Autonomous)

Home Assignment -2019-20 (B.Sc.-III) Semester - V

Attendance

Sr No.	Roll No.	Name of the Student	Attendance			
			IX	X	XI	XII
1.	8241	YEGADE GANESH SHANKAR	P	P	P	P
2.	8242	MARIYA FAIYAZ BAGWAN	A	A	A	A
3.	8243	SHRADDHA MANGESH JADHAV	P	P	P	P
4.	8244	VINAY SUBHASH JADHAV	P	P	P	P
5.	8245	PRATIKSHA SARDAR GURAV	P	P	P	P
6.	8246	RUTUJA SANJAY BHANDARI	P	P	P	P
7.	8247	KAMBLE SACHIN SANJAY	P	P	P	P
8.	8248	RUTUJA SANJAY MANE	P	P	P	P
9.	8249	NIKITA ABHAY CHOPADE	P	P	P	P
10.	8250	MOHINEE UMASHANKAR KOLI	P	P	P	P
11.	8251	SHINGARE AMOL SURYAPPA	P	P	P	P
12.	8252	PATIL SUYOG RAVSAHEB	P	P	P	P
13.	8253	JEWRANI GEETA RAJKUMAR	P	P	P	P
14.	8254	KUMBHAR SAURABH PRATAP	P	P	P	P
15.	8255	GHODAKE PRUTHVIRAJ MARUTI	P	P	P	P
16.	8256	KAMBLE PRASAD MACHHINDRA	P	P	P	P
17.	8257	KAMBLE PRADNYA PRAKASH	P	P	P	P
18.	8258	KAMBLE RAJANI VASANT	P	P	P	P
19.	8259	HANDE VAISHANAVI AMAR	P	P	P	P
20.	8260	POONAM KIRAN RUGGE	P	P	P	P
21.	8261	RICHA RANJIT GHOTANE	P	P	P	P
22.	8262	SAMRUDDHI ANIL SHAHAPURKAR	P	P	P	P
23.	8263	PATIL SANKET NEMGONDA	P	P	P	P
24.	8264	INGALE ANJRUDH UDAY	P	P	P	P
25.	8265	SOURABH KISHOR BORGAVE	P	P	P	P
26.	8266	SADANAND GANGARAM NALAWADE	P	P	P	P
27.	8267	KADAM SOURABH MAHADEV	A	A	A	A
28.	8268	NIRANJANDAS ANANDA SANGVADEKAR	P	P	P	P

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Vivekanand College, Kolhapur (Autonomous)

Home Assignment -2019-20 (B.Sc.-III) Semester-V

Marksheet

Sr No.	Roll No.	Name of the Student	Marks			
			IX(10M)	X(10M)	XI(10M)	XII(10M)
1.	8241	YEGADE GANESH SHANKAR	10	10	10	10
2.	8242	MARIYA FAIYAZ BAGWAN	Ab	Ab	Ab	Ab
3.	8243	SHRADDHA MANGESH JADHAV	10	10	10	10
4.	8244	VINAY SUBHASH JADHAV	10	10	10	10
5.	8245	PRATIKSHA SARDAR GURAV	10	10	10	10
6.	8246	RUTUJA SANJAY BHANDARI	10	10	10	10
7.	8247	KAMBLE SACHIN SANJAY	10	10	10	10
8.	8248	RUTUJA SANJAY MANE	10	10	10	10
9.	8249	NIKITA ABHAY CHOPADE	10	10	10	10
10.	8250	MOHINEE UMASHANKAR KOLI	10	10	10	10
11.	8251	SHINGARE AMOL SURYAPPA	10	10	10	10
12.	8252	PATIL SUYOG RAVSAHEB	10	10	10	10
13.	8253	JEWRANI GEETA RAJKUMAR	10	10	10	10
14.	8254	KUMBHAR SAURABH PRATAP	10	10	10	10
15.	8255	GHODAKE PRUTHVIRAJ MARUTI	10	10	10	10
16.	8256	KAMBLE PRASAD MACHHINDRA	10	10	10	10
17.	8257	KAMBLE PRADNYA PRAKASH	10	10	10	10
18.	8258	KAMBLE RAJANI VASANT	10	10	10	10
19.	8259	HANDE VAISHANAVI AMAR	10	10	10	10
20.	8260	POONAM KIRAN RUGGE	10	10	10	10
21.	8261	RICHA RANJIT GHOTANE	10	10	10	10
22.	8262	SAMRUDDHI ANIL SHAHAPURKAR	10	10	10	10
23.	8263	PATIL SANKET NEMGONDA	10	10	10	10
24.	8264	INGALE ANJRUDH UDAY	10	10	10	10
25.	8265	SOURABH KISHOR BORGAVE	10	10	10	10
26.	8266	SADANAND GANGARAM NALAWADE	10	10	10	10
27.	8267	KADAM SOURABH MAHADEV	Ab	Ab	Ab	Ab
28.	8268	NIRANJANDAS ANANDA SANGVADEKAR	10	10	10	10

Head,
Department of Zoology
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Name - Ganesh Shankar Yegade.

Signature of Supervisor

Shri Swami Vivekanand Shikshan Sanstha's
VIVEKANAND COLLEGE (Autonomous), KOLHAPUR

Class B.Sc III (Zoology) Div Paper - IX (10) Roll No. 8241

Suppliment No. Functional Anatomy of Non-chordates Subject Zoology

Test / Tutorial No. Home assignment

Q1. Explain Nutrition in protozoa.

→

Nutrition :-

It is a process in which food is taken in, digested, absorbed and assimilated.

Protozoa, obtain nourishment in many ways some synthesize their own food, others have it made for by them by algae living in their cytoplasm and still others wait passively until food comes within reach.

The modes of nutrition in protozoa are conveninently grouped under the following charts :

Nutrition in Protozoa

- Holophytic Nutrition e.g Euglena
- Holozoic nutrition e.g Amoeba
- Pinocytosis e.g Amoeba
- Myxotropic e.g Pennema
- Saprozoic e.g Chilomonas
- In Parasitic e.g Trichomonas

This are further elaborated under the following headings :

1) Holophytic Nutrition:-

All those phytoflagellates possessing the chloroplast or chromatophores synthesize their food by the process of photosynthesis. As the energy is supplied by sunlight to carry on the food making activity, this method involving self-feeding is referred to as photophy. CO_2 & water which are raw material enter into a complex cycle of chemical reactions & produce dextrose sugar from the dextrose paramylon. e.g Euglena

2) Holozoic nutrition:-

Majority of Protozoans derive nourishment by ingesting other organisms both animals & plants. Such protozoa are called holozoic & the mode of nutrition is said to be holozoic nutrition. This mode of nutrition involves development of organelles for capture of food.

A) Food & feeding

The food of holozoic protozoa consist of micro-organisms like other protozoans, diatoms, rotifers, crustaceans larvae, etc. The method involves ingestion of food is referred to as phagotrophy or phagocytosis.

The Amoeba are said to ingest food in four ways

i) By import:-

This method involves taking in food into the body upon contact with very

little movement on the part of the organism. Passive organisms like algae are imported.

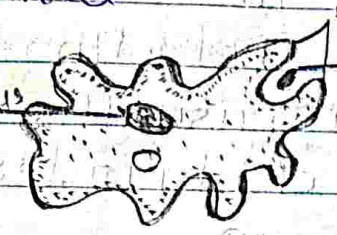


Fig: Import in Amoeba.

ii) By circumfluence:-

By this method amoeba engulfs the food organism upon contact by rolling over it. in order to arrest it completely.

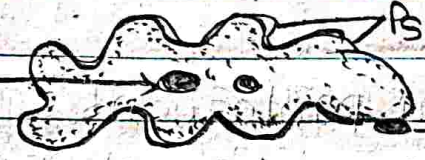


Fig: Circumfluence in Amoeba

iii) By circumvallation:

This method is applied when amoeba has to feed upon an active prey. In this process it extends it pseduopodia around the food, which later fuse to form a food vacoule

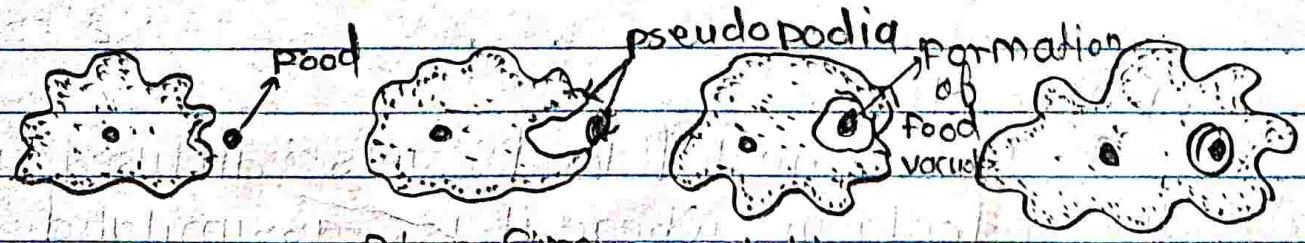


Fig: Circumvallation

iv) By invagination:-

In this method food is sucked upon contact with ectoplasm. The food then sinks into the endoplasm

The heliozoans & radiolaria pull the prey that comes with the help of axopodia.

The foraminiferas produce delicate reticulopodia forming a net to which stick food particle.

In ciliates, the oral apparatus is meant for food capturing with beating cilia. Food is taken inside the oral groove.

The suctorians feed with the help of their tentacles which are usually knobbed at the tip. With the help of tentacles the prey is paralysed by hypnotoxin.

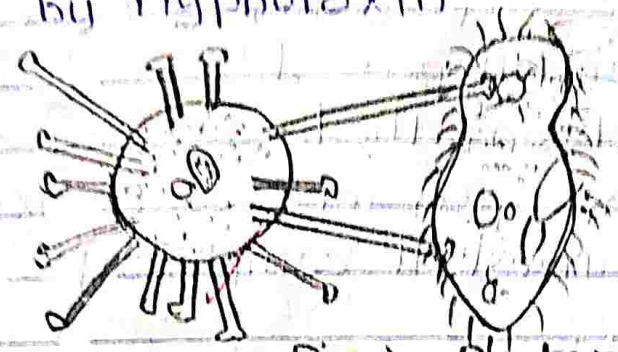


Fig:- Suctorians.

B) Digestion:-

The food of protozoans is digested within the food vacuoles which usually keeps on circulating in the endoplasm. Within the food vacuole the reaction is first acidic & then it becomes alkaline. Many proteolytic & carbohydrates splitting enzymes have been found.

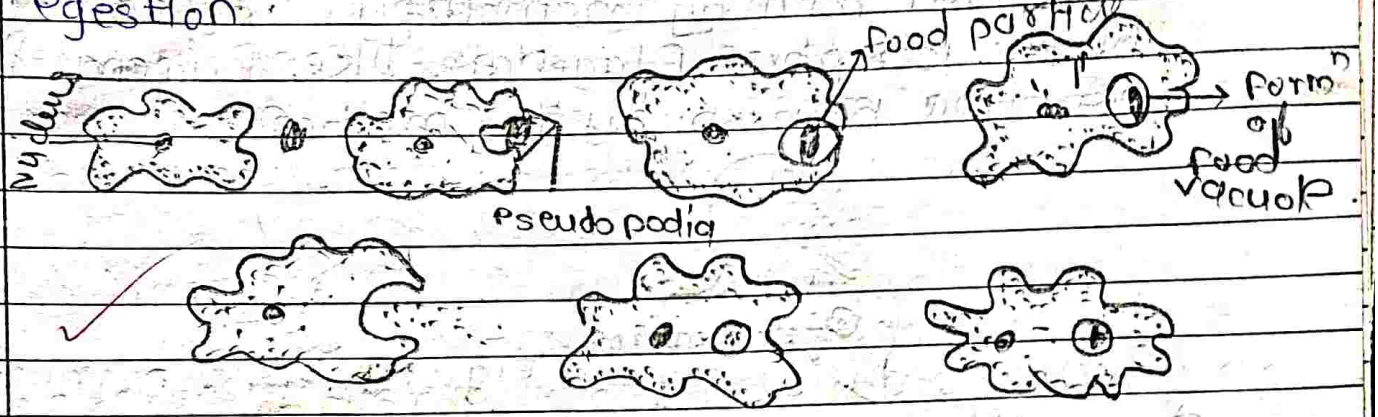
C) Absorption:-

The digested food gets diffused into the endoplasm, where it is assimilated into the protoplasm. The excess food may be stored as glycogen, paramylon, lipid & chromatid bodies, etc.

D) Egestion:-

The indigestible residue of the food is expelled from the hinder part of the body in the case of moving amoeba at any point.

Ciliates often possess cytopyge for egestion.



3) Pinocytosis:-

In addition to phagocytosis, pinocytosis or cell-drinking has been reported in amoeba and certain flagellates and ciliates. This involves the ingestion of liquid food by invagination through the surface of the body. Pinocytosis channels are formed at some part which opens & are pinched off as food vacuoles e.g Amoeba

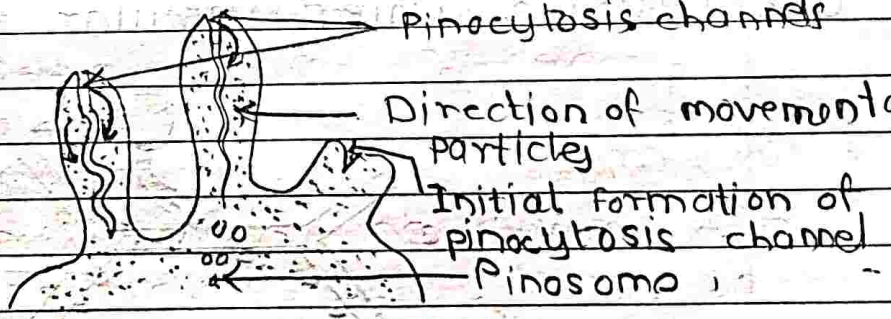


Fig: Pinocytosis in amoeba

4) Saprozoic Nutrition

Saprozoic nutrition involves the absorption of food by osmosis i.e through the general surface of the body. This method of food getting is reffered to as Osmotrophy. The food consist in the form of solution of dead organic matter, rendered so by the decomposing bacteria. e.g Mastigoamoeba

5) Myxotropic Nutrition:-

This is a combination of more than one mode of nutrition. Many protozoa using photosynthesis as a mean of food-synthesize

also taken in some part of their diet in dissolved form by osmotrophy or solid form by phagotrophy. Flagellates like Euglena & Peranema nourish by this method.

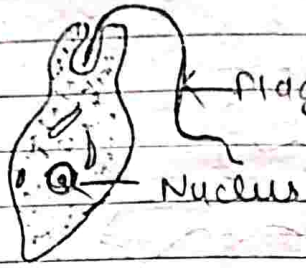


Fig:- Myxotrophic nutrition.

6) Nutrition of Parasites -

The food getting mechanisms used by the protozoan parasite are generally the same as those of their non-parasitic relatives. Many intestine inhabiting zoomastigophores (Trichomonas) have a distinct mouth. The feed generally by phagotrophy or osmotrophy.

Q.2 Describe water-vascular system in sea-star.

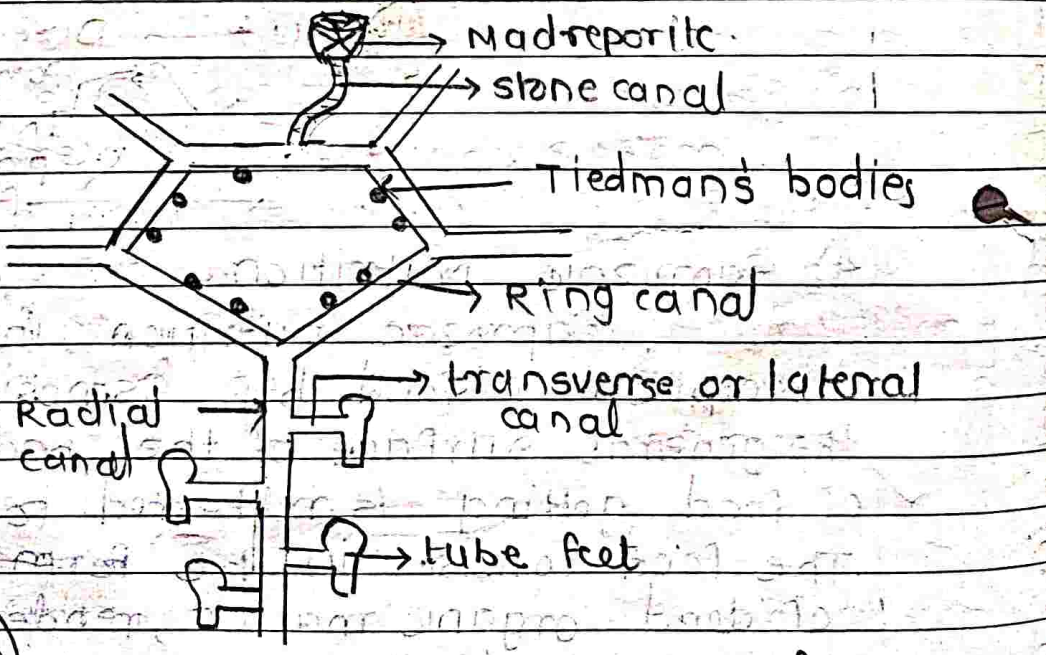


Fig:- Water vascular system of sea star

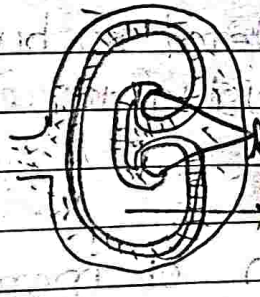


Fig:- section of stone canal

Locomotion to the sea star is mean of an entirely new system which is peculiar to the echinoderms. It is a sort of hydraulic-pressure mechanism, known as the water-vascular or the ambulacral system.

1) Madreporite:-

The sea-water that operates the hydraulic system enters the water-vascular system through the button madreporite or the plate. As already noted it is a hard rounded & calcareous plate on the aboral surface of the central disc of the body. It is situated in an interradial position i.e between the bases of two of the arms of bivium. Under magnification, the surface of the madreporite is marked by furrows, which are as many as 250 in numbers. So the whole plate appear as sieve or rose of a watering can.

2) Stone canal:-

The ampulla leads into a vertical, S-shaped stone canal or madreporic canal which opens below by its oral end into a ring-canal, around the mouth. The stone canal is so named because its wall are strengthened & supported by a series of hard calcareous rings. Its cavity is lined by ciliated cells, the movement of which draw water into the canal. It is divided centrally by ridge so as to divided it into two passages, so water can circulate orally as well as aborally.

3) Ring Canal:-

The ring canal is wide, pentagonal or five-sided, ring like canal, situated

around the mouth, just to the inner side of the peristomial ring of ossicles and directly above the outer hyponeural ring sinus.

4) Tiedeman's bodies:

The ring canal gives off interradially from its medial surface, five pairs of small, yellowish, irregular or rounded glandular bodies, called racemose or Tiedeman's bodies. In Asterias, only 9 Tiedmann's bodies occur, the 10th being replaced by the corresponding position being occupied by the stone canal. This are said to be lymphatic glands & probably manufacture the amoebocytes.

5) Polian vesicles:

In most sea stars the ring vessel also gives off interradially on its outer side a series of elongated, pears shaped muscular sacs with long neck formed the polian vesicles. The serve as central organ for regulating the pressure in ambulacral system.

6) Radial canals:

The ring canal gives off five long and ciliated radial canals, one entering each arm and ends in the terminal tentacles.

7) Lateral canals:

Each radial canals, gives off alternately on either side a series of short narrow, transverse or side branches called lateral or podial canals. Those of each side long & short alternately arranged. Each lateral canal is provided with valves

Data Page

8) Tube feet :-

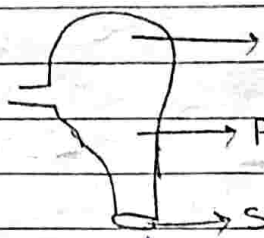


Fig: Tube feet

As already noted, the tube feet can be seen projecting externally in two alternating rows on either side in the oral ambulacral groove of each arm. As the lateral canals along each side are alternately long & short, it gives the apperance of four rows of podia instead of two.

Locomotion

The water-vascular system provides an hydraulic pressure mechanism for locomotion It is filled with a fluid similar to the sea-water in composition. Any slight loss of fluid in the system is compensated by sea-water intake through the madreporite. The beating of cilia of the ambulacreal system causes the sea-water to enter through the madreporite. After passing through the stone-canal, ring canal, radial canals & lateral canals, it reaches the tube feet and their ampullae.

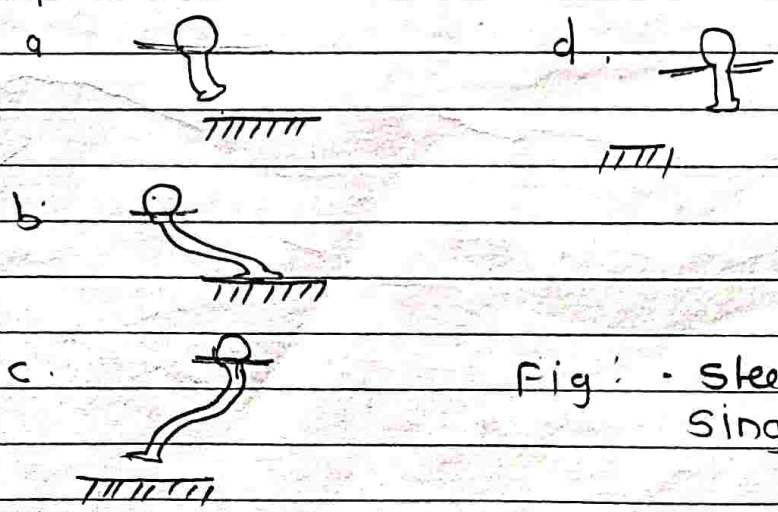


Fig: - Sleeping cycle of single tube feet.

Ganesh Shankar Yegade.

(13)

" ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार "
- शिक्षणमहर्षी डॉ. बापूजी साळुंखे

Signature of Supervisor

Shri Swami Vivekanand Shikshan Sanstha's

VIVEKANAND COLLEGE (Autonomous), KOLHAPUR

Class B.Sc III (Zoology) Div Paper - X (10) Roll No. 8241

Supplyment No. Subject Biostatistics, Bioinformatics & Medical Zoology Subject Biosta Zoology

Test / Tutorial No. Home Assignment

Q1. Explain correlation and explain its types.

→ The statistical tool for measuring the degree of relationship between the two variables i.e a change in one variable results in positive or negative change in the other variable.

Defination :-

Correlation is the tendency of simultaneous variation between two variables

Properties :-

1) Correlation indicates the degree of relationship between two variables
2) The change in one variable is accompanied by corresponding movement in the other variable.
3) According to Tuttle, correlation is an analysis of co-variation between two or more variable
4) The concept of correlation analysis and term correlation originated with Gatton in 1888
5) It is denoted by r i.e $-1 \leq r \leq 1$
6) It is measure of the closeness between two variables.
7) If $r = +1$ correlation is perfect positive
8) If $r = -1$ correlation is perfect negative.
9) If $r = 0$, then there is no correlation between two variables.

Significance :-

The study of correlation is of great significance in practical life, because.

1) It enables us to study nature, direction & degree of relationship.
2) It helps us to estimate the change in one variable with another.
3) It facilitates decision making
4) It helps in making predication.

I) Types of correlation :-

Depending on its extent correlation between two variables is of following types :

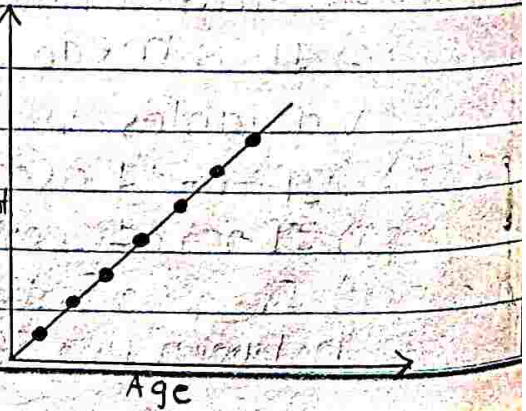
i) Perfect positive correlation :-

When the two variables more proportionally in the same direction, i.e the increase in one variable leads to corresponding increase in other variable.

1) Here two letters X & Y are variables are directly correlated to each other.
2) The correlation coefficient (r) = +1 i.e both variables increases or decreases in the same proportion.

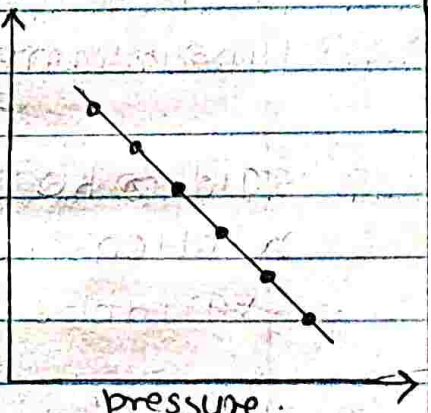
Following data shows perfect positive correlation between X & Y variables.

X	Y
10	20
15	30
20	40
25	50
30	60

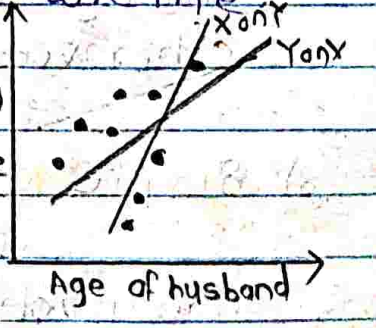


2) Perfect negative correlation:
When one variable increases with a constant interval and other decreases with constant interval, then it is called perfect negative correlation.
1) Here the two variables X & Y are inversely proportional to each other. i.e one when rises, other falls in same proportion.
2) The correlation coefficient (r) = -1.
3) Following example shows perfect negative correlation.

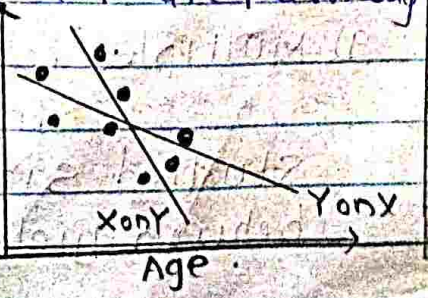
X	Y
75	80
77	75
79	70
81	65
83	60



3) Moderately positive correlation:
When two variables denoted by X & Y are partially positively correlated is termed as moderately positive correlation. Here the correlation coefficient lies between 0 & +1 i.e $0 < r < 1$. In moderately positive correlation, the scatter will be around imaginary line.

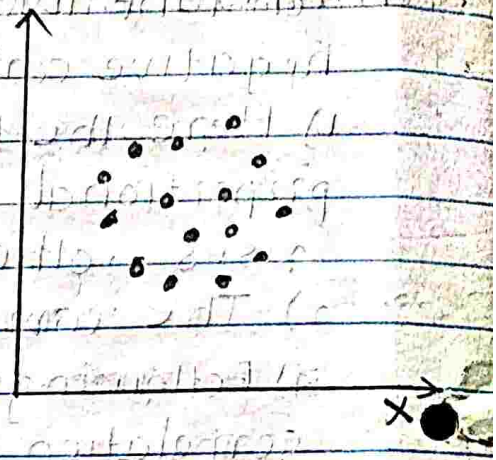


4) Moderately negative correlation:
When two variables denoted by X & Y are partially negative correlated, the correlation is moderately negative correlation. Here correlation coefficient lies between 0 & -1 i.e $-1 < r < 0$



5) Absolutely no correlation:-

When two variables are completely independent of each other, the correlation is termed as no correlation. Here the value of correlation coefficient (r) is 0, indicate no linear relationship between two variables. Here both variable x & y are completely independent. Here no imaginary line can be drawn.



6) Linear correlation:-

Correlation between two variables is said to be linear if there is some constant relationship between two variables, when two variables are plotted a straight line is formed.

7) Non-linear correlation:-

The relationship between two variables is said to non-linear or curvilinear if corresponding to a unit change in one variable, the other variable does not change at same constant.

8) Simple correlation:-

In simple correlation only two variables are involved i.e in this type of relationship between is in between two variables.

9) Multiple correlation:-

In this three or more variable are studied simultaneously e.g study of relationship between yield of wheat per acre, the amount of

rainfall and the fertilizers applied.

10) Partial correlation:-

In partial correlation, relation between more than two variables is considered but correlation is studied only between two variables, other variable is assumed to be constant.

05

Q2 Give detailed account of Pathogenicity of Plasmodium vivax & note on its control measure.

→ Plasmodium is an intercellular sporozoa parasite causing malaria in man. The parasites live in the R.B.Cs and liver cells of man & alimentary canal and salivary glands of female Anopheles mosquito.

Plasmodium vivax has complete its life cycle in two i.e its digenetic. It's primary host is Man & secondary host in female Anopheles mosquito.

1) Primary or definitive host:-

Female Anopheles mosquito is the primary host of Plasmodium in which it completes it sexual life cycle.

2) Secondary or Intermediate host:-

Man is secondary host of plasmodium in which it complete its asexual life cycle.

The lifecycle of Plasmodium can be divided into three phases:-

i) Asexual schizogony
ii) Sexual gamogony
iii) Asexual sporogony.

Date
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Asexual cycle of Plasmodium in man:-

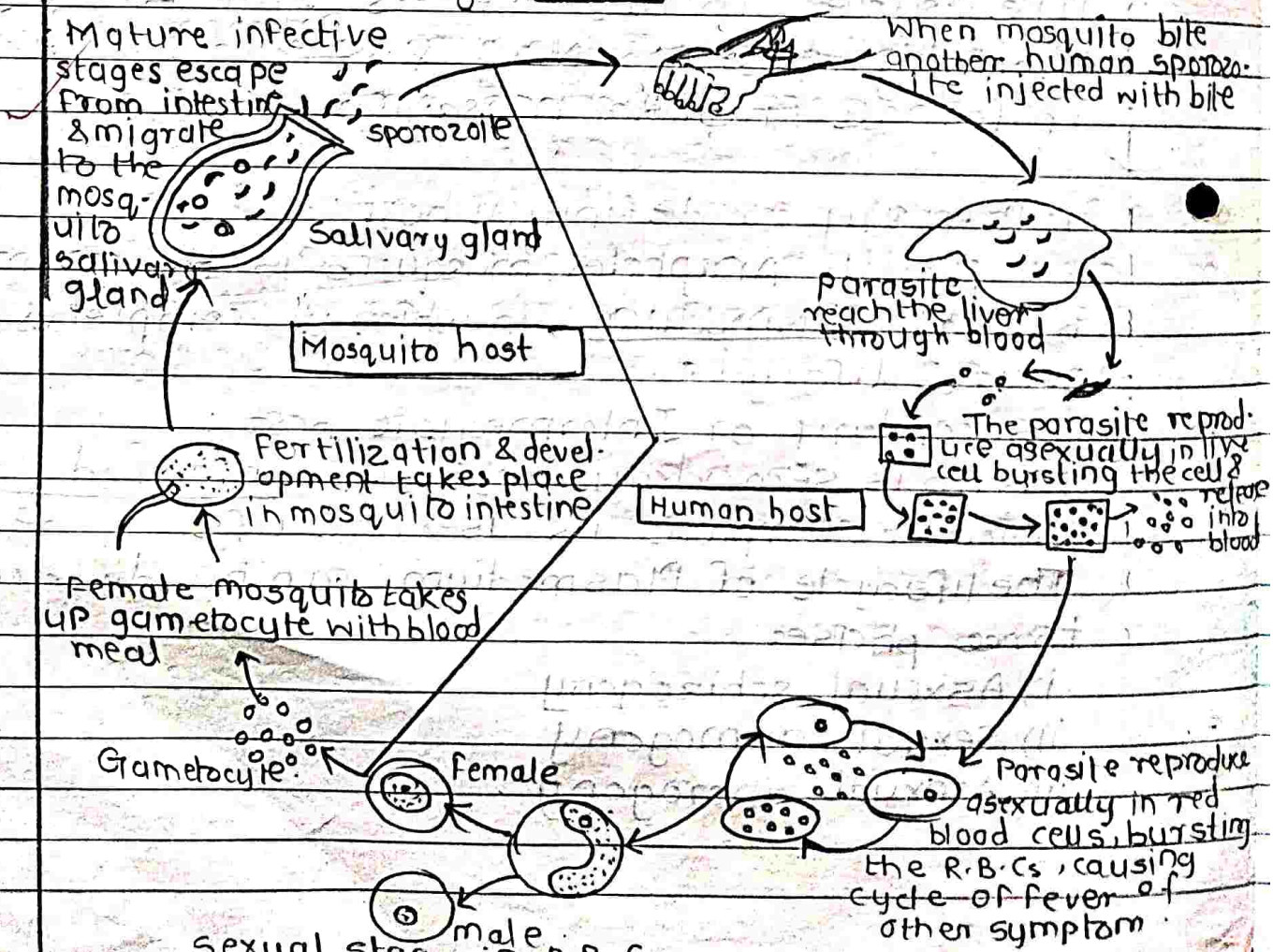
Infective form of plasmodium is known as sporozoites. Sporozoites are 11-12 μ long slender, uninucleated sickle shaped structure present in salivary glands of infected mosquito. When an infected female Anopheles mosquito bites a healthy man, a large number of sporozoites enter into the blood stream of man.

1) Asexual schizogony:-

Schizogony is the asexual phase of reproduction of Plasmodium. It takes place in liver cell of man. Schizogony can be divided into following phases:

a) Pre-erythrocytic schizogony
b) Exo-erythrocytic schizogony
c) Erythrocytic schizogony
d) Post-erythrocytic schizogony

Fig: Lifecycle



a) Pre-erythrocytic schizogony:

In liver cells, sporozoites grow to form a large and spherical schizont. Schizont divides by multiple fission to forms a large number of cryptozoites. They may either pass into the blood circulation to start erythrocytic schizogony or enter fresh liver cells to start. It completes in 8 days.

b) Exo-erythrocytic schizogony:

After re-entering fresh liver cells each cryptozoites divides to form a large number of metacryptozoites similar to pre-erythrocytic schizogony. Meta-cryptozoites are of two types Smaller micro-metacryptozoite & larger macro-metacryptozoite. The micro-metacryptozoite enter R.B.Cs to start erythrocytic schizogony, while macro-metacryptozites enter fresh liver cells to continue exo-erythrocytic schizogony. It normally takes 4 days to complete

c) Erythrocytic schizogony:-

As stated above, the erythrocytic schizogony begins when the R.B.Cs of blood are attacked either by pre-erythrocytic cryptozoite or by exo-erythrocytic micro-metacryptozoite. It normally takes 8 to 12 days after above 2 phases, stages of erythrocytic schizogony are.

i) Trophozoite stage:-

The merozoites after entering into the blood stream, feed on erythrocytes, become rounded and modify into trophozoite.

ii) Signet ring stage:-

As the merozoites grows a vacuole is formed at the centre & nucleus is pushed to one side. It give ring like appearance. Hence it is called signet ring stage.

The parasite ingests haemoglobin & decompose it into protein and haematin. Protein is use as food whereas unused haematin forms toxic Yellowish-brown malarial pigments, haemozoin.

iii) Amoeboid stage:-

As the signet ring parasites grows, vacuole disappears & the parasite becomes amoeboid in apperance, thrusting out pseudopodial processes. This stage is called amoeboid stage. At this stage RBC develop numerous granules called schuffner's granules.

iv) Schizont stage:-

Parasite grows in size, becomes rounded & almost completely fills the RBC. called schizont.

v) Rosette stage:-

The nucleus of schizont divides by multiple fission to form 6 to 24 daughter nuclei. These nuclei arrange at the periphery while the toxic haemozoin granules accumalate at the center of RBC. It appears as a flower rose, so called rosette stage. Nuclei of rosette stage are surrounded by a little cytoplasm & are develop into merozoites. When RBCs rupture merozoites are released into blood.

d) Post-erythrocytic schizogony:-

Sometime some merozoites produced in erythrocytic schizogony reach the liver cells & undergo schizogony development in liver cells. This is called post-erythrocytic schizogony

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Sexual cycle of Plasmodium in Man-

2) Sexual gamogony:-
Formulation of gametocytes:
After many generation in about 4-5 is the blood some merozoites increas in size to form two types of gametocytes, larger macro (9-10 μ), less numerous & contain large nucleus. Macro gametocytes are larger (10-12 μ), more numerous & contain smaller nucleus.

II) Sexual cycle of Plasmodium in mosquito.
When a female Anopheles sucks the blood of a malaria patient, the gametocytes reach the stomach of mosquito & formation of gamete takes place as follow.
a) Gametogenesis:-
Process of formulation of a gametes (male & female gametes)
i) Formation of male gamete - The nucleus of microgametocyte divide to form 6-8 daughter nuclei. The cytoplasm gives flagella like structure
ii) Formation of female gamete - The mega gametocyte undergo some reorganisation to form a single haploid mega gamete or female gamete.
iii) Fertilization - The male gamete enter the female gamete through the fertilization cone formed at female gamete and form diploid zygote.
iv) Ookinete stage - The zygote remains inactive for sometime and then elongate into a worm like ookinete or vermicule which is motile.
v) Oocyst - The ookinete gets enclosed in a cyst. The encysted zygote is called Oocyst.

The Oocyte absorbs nourishment & grows in size.

3) Asexual sporogony:
The nucleus of Oocyte divides repeatedly to form a large number of haploid daughter nuclei. At the same time, the cytoplasm develops vacuoles & gives numerous cytoplasmic masses. The daughter nuclei pass into each cytoplasmic mass & develop into slender sickle-shaped sporozoites are formed in each Oocyte. This phase of asexual multiplication is known as sporogony. Lastly oocyst burst and sporozoite are released in hemolymph of mosquito. From there it is transferred to salivary glands. When mosquito bites healthy person, then it is sporozoites are transferred to it.

* Control measure
1) The ABCD of malaria prophylaxis -
① Awareness of the risk of malaria
② Bites - reducing likelihood of bites from mosqui
③ Chemoprophylaxis
④ Diagnosis and prompt treatment to prevent complication.
2) The adult mosquito comining to bite can be killed by hands.
3) Traps like small wire guaze can be used
4) Mosquito can be killed by spraying DDT, Flit, pyrethrum & other insecticides
5) Sterilization of ~~ste~~ mosquitoes is now being achieved in some parts of world.
6) Reduce stagnant and standing water.
7) Gambusia fish can be used to control larva
8) DDT, DDD, BHC can be used as larvicides.

Ganesh Shankar Yegade.

(23)

" ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार "
- शिक्षणमहर्षी डॉ. बापूजी साळुंखे

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Class B.Sc III Div Paper - XI (10) Roll No. 8241

Suppliment No. Molecularbiology, Biotechnology & Biotheanicw Subject Zoology

Test / Tutorial No. Home Assignment

Q: Define semiconservative DNA Replication? Explain mechanism of DNA replication in prokaryotes.

→ Replication of DNA means formation of new DNA strand from the parent DNA.

Semiconservative DNA replication:

The process of DNA replication in which in which the newly formed DNA contains half of parent strand & other half is newly synthesized.

The Mechanism of DNA replication is briefly discussed below.

The replication of DNA in prokaryotes is studied below and it completes in three steps.

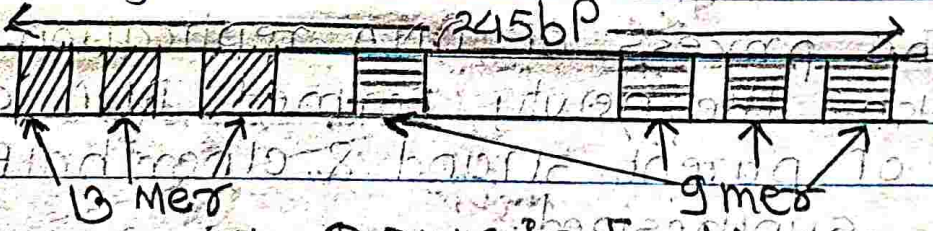
i) Initiation
ii) Elongation of DNA chain
iii) Termination

DNA replication in prokaryotes is semiconservative type.

1) Initiation of replication :-

In the E.coli chromosome this process comprises three steps (1) Recognition of origin (2) Opening of DNA duplex to generate single stranded DNA & (3) capture of DnaB protein (helicase $5' \rightarrow 3'$)

In Ecoli chromosome replication begins at specific site is called Oric [ori means origin & C represents chromosome]. About 245bp in size, this is bounded on the left by a 13bp sequence which repeat thrice & by 9 bp sequence on the right which repeat four times. It is the point, where replication of DNA start & fork originates



Dia Oric in Ecoli

Both the 13mer & 9 mer sequence are dA.dT rich region. In the 9 mer sequence DNAprotein binds after one DnaA unit has bound more units automatically binds increasing. The 20-40 monomers bound to the 9-mer in Oric. DnaA protein from the central core around which the rest of the ORIC DNA become wrapped & DNA may bent. This bending is mediated by HU protein.

The AT rich sequence at 9mer & 13 mer sequence here are easy to melt. The length of DNA replicon under of the control of a single origin is called replicon.

Bacterial chromosome, plasmid & viral

genome has single replicon. Then DnaB & DnaC form a complex. Then the complex is guided by DnaA protein into melted region & DnaB protein in the melted region is called as preprimimg complex.

DnaB (helicase) is transferred to exposed

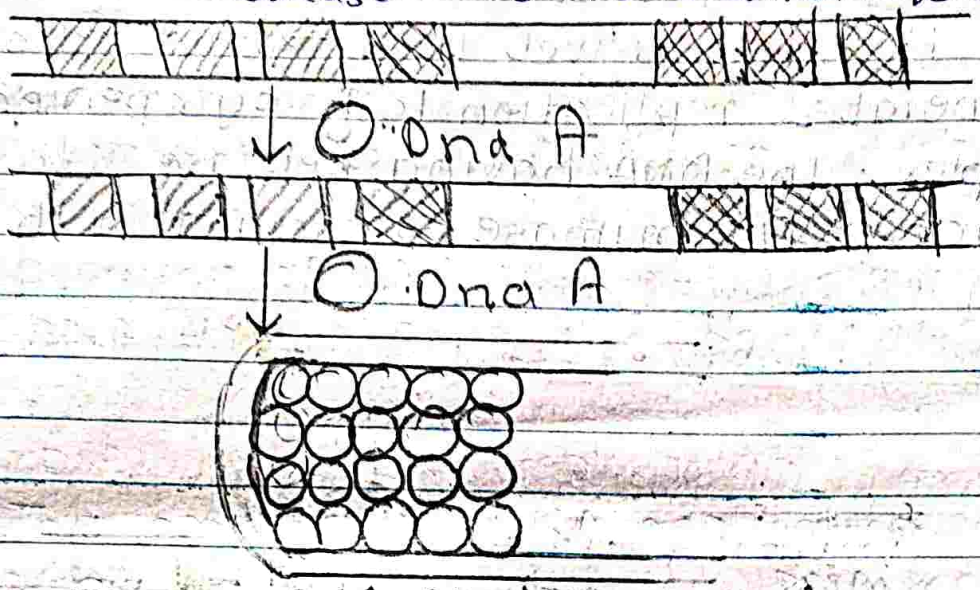
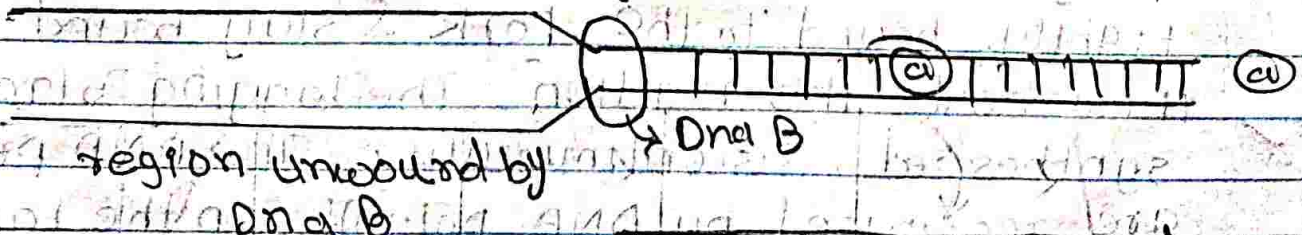
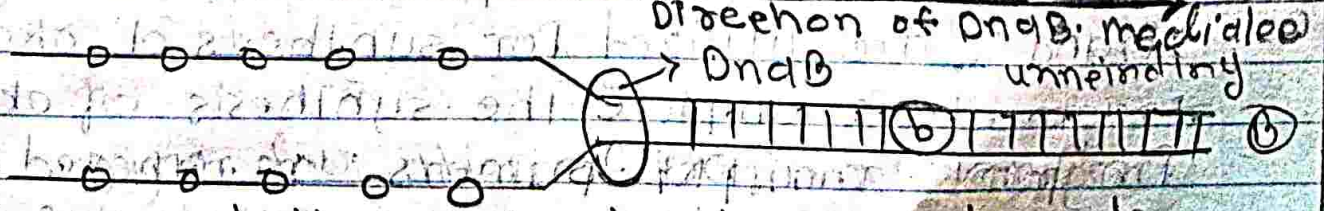


Fig-2 DNA Binding to ori C

Fig-3 The open complex: DNA strands have set at 13 bp repeats.

single stranded DNA & causes unwinding of the DNA in the presence of ATP, SSB protein This results in unwinding of DNA duplexes





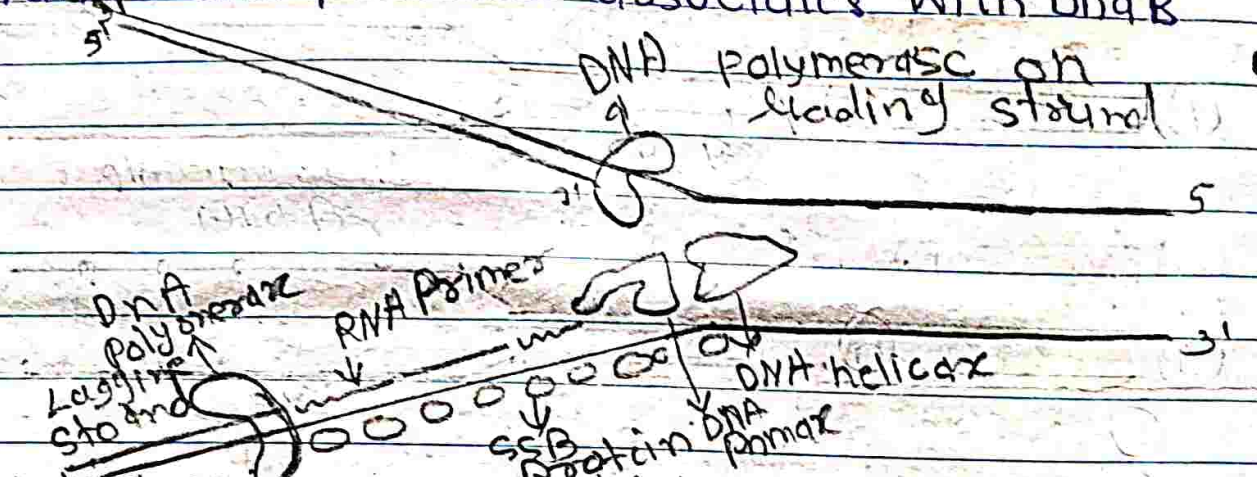
DnaB helicase unwind the two strands SSBs bind to the two strands, thereby

2) Elongation of DNA chain:

This step requires the presence of the following enzyme & factors.

1) DnaB or helicase 2) Primase (DnaG) 3) DNA Pol III 4) SSB protein 5) RNAseH 6) DNA polymerase I 7) DNA ligase.

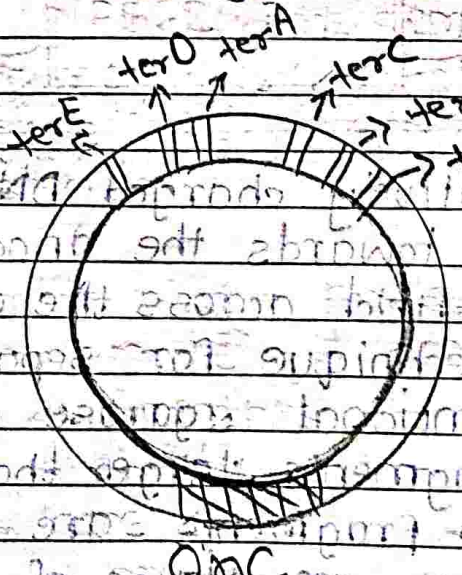
Helicase travel in 5' → 3' direction, it generates replication fork by opening of DNA Duplex. The DNA having helicase is lagging strand. DNA primase associates with DnaB



forming primosome which synthesizes primers. For lagging strand & single RNA primer for leading strand. DNA poly III synthesizes the same strand to which DnaB is bound & travel in opposite direction. DnaB, Dna primase & Dna poly III work together in elongation. They remain tightly bound to the fork & stay bound throughout the reaction. The lagging strand is synthesized discontinuously. The RNA primers are recognised by DNA poly III on the lagging strand & are utilized for synthesis of okazaki fragment & complete the synthesis of okazaki fragment. Then RNA primers are removed by DNA poly I & the gaps are filled with DNA. The DNA ligases forms the phosphodiester bond.

that link free 3' end of primer replacement of the 5' end of the okazaki fragement. The leading strand is continuously synthesized. In the bidirectional DNA replica the leading strand is primed once on each of the parental strands. The RNA primer of the leading strand is synthesized by RNA polymerase enzyme. DNA poly III causes elongation of the leading strand & finally DNA polI & ligases enzymes gives final touch to the leading strand as in case of lagging strand.

3) Termination of replication:- In the E.coli genome there are two termination regions on either side of point. Sequence that causes termination are called as ter sites. This site contain a short sequence of about 23bp that causes termination in vitro. There are six sites in this region. A portion called tus bind to the ter site with high Affinity & this binding stops helicase.



Position of ter sites

2) Gel electrophoresis

Ans→ The charged molecules can be seprated by applying an electric field which is called electrophoresis. It is applied for sepration of RNA, DNA & proteins. DNA have negative charge, thus migrates to anodes. On the basis of types of support medium electrophoresis is differentiated in some types

A) Agarose Gel Electrophoresis:-

Agarose gel are more porous than polysaccharide gels and have comparatively larger pore size. Therefore, it is used for separation of large sized macromolecules such as DNA. Agarose is a linear polymer of D-galactose and 3-6 anhydro-L-galactose. which is extracted from seaweeds. By changing the concentration of agarose pore size of the gel can be determined.

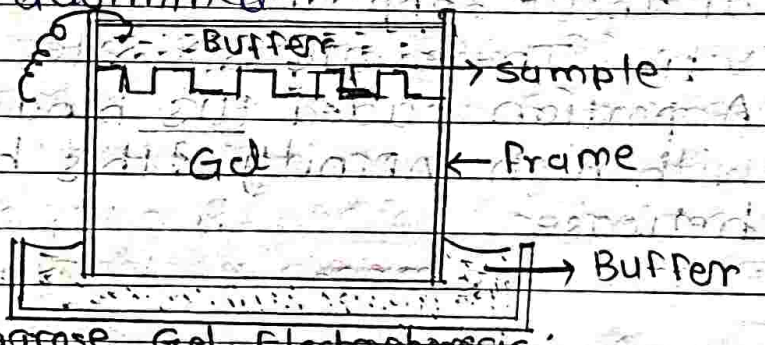


Fig:- Agarose Gel Electrophoresis.

B The negatively charged DNA migrates at neutral pH towards the anode after application of electric field across the gel. It is the standard technique for separation of nucleic acids. Conventional agarose gels cannot resolve fragments larger than 20kb. Because larger DNA fragments are unable to migrate through pores or sieves of gel as small fragments do.

B) Pulsed Field Gel Electrophoresis:-

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Schwartz and Cantor (1984) conceived the the PAGE to separate the several megabase long DNA molecules All linear ds DNA molecules, larger than a certain size, migrate through agarose gel almost at similar rate. But agarose gel almost at similar rate are unable to resolve linear DNA molecules largen than 750kb in length. It changes the direction of electric field in such a way that larger DNA molecules fragments align more slowly with the direction of the new field than do the smaller DNA molecules. The pulsed eelectric field applied to a gel force the DNA molecules to reorient before continuing to move like snake through the gels. Large DNA molecules are trapped in their tube every time when direction of electric field is changed. Until they are re-oriented along the new axis of electric field, they cannot make further progress through the gel. Unlike a single, constant electric field in conventional electrophoresis two perpendicularly oriented alternating electrid field are applied in PAGE For sepration of molecules. The smaller molecules change the direction quickly, move fastly & seprated from the largen molecules.

c] Polyacrylamide Gel Electrophoresis (PAGE)

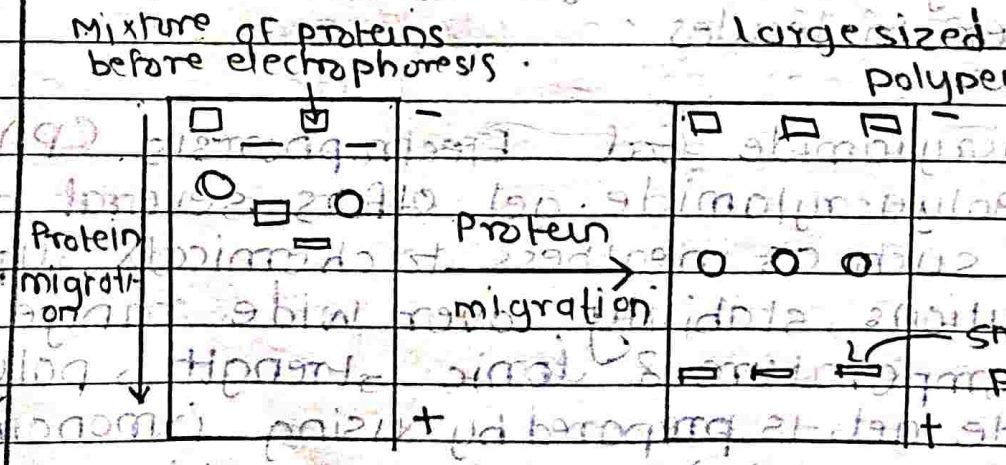
Polyacrylamide gel offers several advantages such as inertness to chemicals superior resolutions, stability over wide range of pH, temperature & ionic strength, polyacrylamide gel is prepared by using i) monomers (e.g acrylamide N,N methylene biasacrylamide ii) Initiator: N,N,N,N-tetramethylethylene diamine (TEMED) (ii) propagators (ammonium

iv) terminator or inhibitor (oxygen / air)

The pore size of PAG can be changed by varying the concentration of acrylamide and bisacrylamide monomers in a fixed volume of gelatin solution. Free radicals formed by ammonium sulphate activated the acrylamid gel long polymer chain is activated acrylamide with successive acrylamide molecule. Further bisacrylamide brings about gelation & cross linking through polymerisation. This results in formation of complex network of acrylamide.

D) SDS-PAGE

Some proteins are having similar charge. Therefore, such proteins are treated first with an ionic detergent called sodium dodecyl sulphate (SDS) before start & during the course of electrophoresis. Thus such electrophoresis is called SDS-PAGE. Identical proteins are denatured by SDS resulting in their sub-units. The polypeptide chain get opened and extended. On the basis of their mass but not the charges, the molecules are separated.



SDS-PAGE analysis of proteins

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Class B.Sc III Div. Paper - XII (10) Roll No. 8241

Supplement No. Endocrinology, Environmental biology & Toxicology Subject Zoology

Test / Tutorial No. Home Assignment

Q1 Describe structure & function of thyroid gland.

→ Structure of thyroid gland:-

1) This is the largest endocrine gland in the body weighing 25 to 30 gms & measures about 5 cm in length & 3 cm in width.
2) It is located in the anterior region of neck just below the larynx.
3) Ventrolateral to the trachea.
4) Thyroid is derived from the endoderm of the embryo.
5) It varies in size as per age, sex & diet.
6) It reddish brown in colour.
7) It is bilobed & highly vascular.
8) The two lobes right & left are joined by connective tissue called isthmus which is at 2nd to 4th tracheal cartilage.
9) The structural & functional units of thyroid glands are follicles.
10) Externally the gland is covered by thin connective tissue capsule.
11) From the capsule arises number of septa called trabeculae which divide the interior of gland into the lobules.

12) Each lobule consist of many thyroid follicles total number of thyroid follicles are about 3 million.

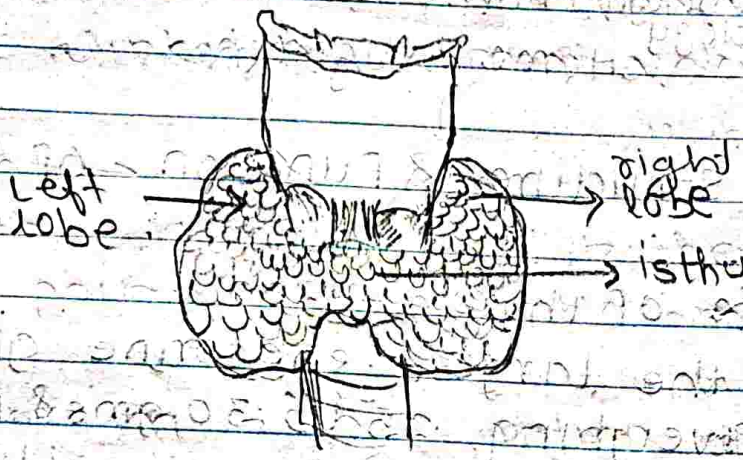
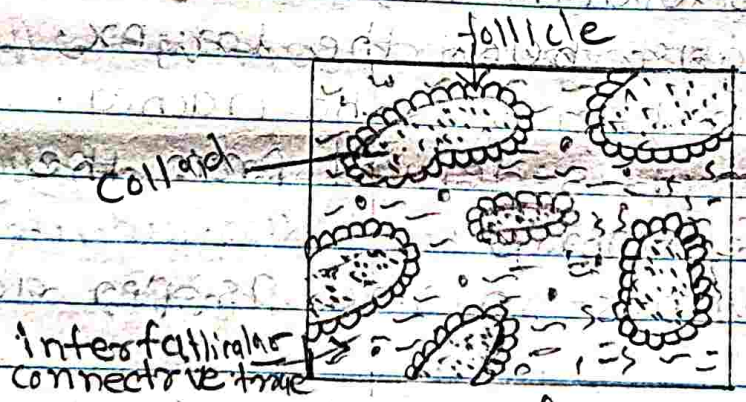


Fig: Thyroid gland



T.S of Thyroid gland

Functions of thyroid gland:-

1) Thyroid gland is a vital hormone gland.
2) It play important role in the metabolism, growth & development of the human body.
3) It helps to regulate many body function by constantly releasing a steady amount of thyroid hormones into the blood streams.
4)

4) It synthesize, store & discharge the thyroid hormone which are thyroxine.

Q.2. Describe characteristics of fresh water habitat & Give faunal adaptation of lotic water habitat

⇒ Characteristics of fresh water habitat :-

Fresh water biology is the study of relationship between, organism and the fresh water environment.

Study of all aspects physical, chemical biological & geological of fresh water is termed as Limnology.

Fresh water habitat occupy relatively small portion of earth surface (0.001) as compaires to marine & terrestrial habitat

A) Stratification & water movement ⇒
i) It is mainly due to different densities resulting from differential heating of lake water
ii) It depends upon temperature & presence of strong wind i.e wind pattern.
iii) The lake is stratified into epilimnion, thermoline & hypolimnion.

B) Suspended solids →
They are of two types.
1) Autochthonous matter : which are generated from lake itself

2) Allochthonous matters:- They are originated from outside the lake & brought into it.
Erosion, transportation, & deposition of solid material within a running water is closely linked to current velocity.

c) Light →
i) Light largely control to the depth to which rooted phytoplanktons & attached algae can grow.
ii) According to penetration of light, a lake can be divided into trophogenic zone & trophophytic zone.
iii) Tropholytic - where photosynthesis occur.

d) Temperature
i) Productivity & the health of the fresh water ecosystem is affected due to change in temperature.
ii) Stratification is due to temperature fluctuation.

e) Current & stream pattern:-
i) The velocity of the current in running water depends on the nature of their gradient and substratum.
ii) In contrast to lentic waters wind has little influence on current in running water.

f) Fresh water ecosystem is divided into three zone i.e littoral zone, limentic zone, profundal zone.

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Faunal adaptation of lotic water habitat.

a) Ionic & osmotic concentration –
1) Freshwater habitat / ecosystem is constantly under the threat of gaining water (swelling) & losing ions.
2) All freshwater animals are capable of osmotic regulation.

b) Permeability →
1) Permeability to water (PW) to sodium (PNa) is very low for these animals.
2) Due to relatively large gradients, there will be sustaintial osmatic gain of water & diffusional loss of ions.
e.g. The larva of mosquito may give 3% of its total body water volume per day osmotically.

c) Ion uptake →
1) Rate of ion uptake is quiet high in freshwater animal & Na^+, K^+ & Cl^- are major ions.
2) Ion uptake is commonly through skin & gills in fishes & in invertebrates.

d) Permanent Attachment
Freshwater sponges, coelentrates & larvae of trichoptera are found permanently attached to the stones.

e) Presence of hooks & suckers –
1) Some animals have hooks & sucker to hold on substratum.
2) They are well developed in many animals.
3) Snails & flatworms have sticky ventral surface with the help of which they are able to adhere

themselves to the submerged objects.

f) Positive Rheotaxis -
Most of the animals living in streams are positively rheotaxis i.e they are adapted to move against the water current.

g) Positive Thigmotaxes →
They tends to adhere close to the bottom surface.

h) Cyst formation →
1) Freshwater animals has an ability to form a cyst around them due to drastic environmental condition, like dessication, folding of water drying of ponds, etc.
e) Cyst is common occurance among the freshwater protozoans & annelids.

i) Respiration -
Various aspects aquatic insects & their larvae show different types of parts developed for respiration for e.g.
1) Respiratory siphons 2) Abdominal gills
3) Rectal gills.