

SUBJECT: Biology

TOPIC: Heredity and Evolution

DAIRY-LESSON PLAN

Pre-content/Content/ Post-content	Learning Outcome/Objective	
	General	Specific
Pre-content Genes, DNA, RNA, Proteins, Traits are passed on from one generation to another. Sex determination. Content: Variation, heredity, Mendel's contribution, how do traits get expressed? evolution, acquired traits, speciation, evolution and classification – evidences of evolution, homologous and analogous organ, , fossils, human evolution. Post-content: Making of fossils, to study certain traits/ diseases that run in the family How Mendel performed the experiments on pea : Demonstration of cross hybridization (emasculation, bagging, tagging)	Students will be able to: • appreciate that the change at the micro level/ genetic material leads to evolution at the macro level. • cultivate the habit of experimentation. • draw conclusion according to the observation/results obtained by Mendel.	Students will be able to: • describe how variation arises in organisms reproducing asexually. • learn the technique used by mendel while experimenting, using pea plants and the crosses made by him. • state the laws of inheritance. • explain how traits are expressed. • make a cross to show how sex is determined in humans. • describe natural selection and genetic drift with examples. • explain how speciation took place on the earth. • establish relationship between evolution and classification. • differentiate between homologous and analogous organs with examples. • differentiate between natural artificial selection. • list evolutionary relationship between human beings and their ancestors.

Homework and Assignments:

- NCERT exercise discussed in the class is given as the home task
- Worksheets discussed in the class and given as homework

AND PROGRESS**MONTH: October-November****CLASS: X**

Teacher's Activity	Student's Activity	Teacher's Observation and Remedial action taken
Teacher will – -ask the students to state one or more traits common to their parents and another one that is different. - call student volunteers to come forth – those having attached / free ear lobe and those who are tongue rollers/ non-rollers -explain dihybrid cross and then call students to make dihybrid cross on the board. -explain sex determination through flowchart Annexure 9(A) -conduct activity on Natural Selection Annexure 9(B) -conduct activity on Genetic Drift - show few specimens of homologous and analogous organs. -explain the concept of artificial selection with the example of wild cabbage. -explain the concept of fossils - explain the concept of evolution through PPT	Students will- conclude that- (i) the traits are passed on from one generation to another. (ii) there is variation among them Students will discuss the results. -come forth to make crosses on the smart board - fill in the Punnet Square -state the laws of inheritance given by Mendel - make the cross to study sex determination and will also learn the change in the chromosome number in the process. Annexure 9(a) -perform the activity and develop the concept of natural selection. Annexure 9(b) -perform the activity and develop the concept of Genetic Drift - observe the specimens and distinguish between homologous and analogous characteristics. - list the differences between natural and artificial selection -observe and notedown the methods to calculate the age of fossils -express their views in class on “Evolution can not be equated with progress”	Teacher will write the observations after completion of the topic/s

Teaching Aids: ICR, Activity Kit, Interactive board.**Methodology/Innovative Methods:** Activity based learning, discussion, debate etc.**Inter-disciplinary links:** English, Maths, Palaeontology, Art**HOD****Co-ordinator****Vice-Principal****Principal**

Annexure 9 (A),(a)

Natural Selection- A factor that brings about formation of new species

Class-X

Duration-40mins

Nature of the Activity- Group activity (2 students) followed by Individual worksheet.

Learning Outcome- The students will be able to arrive at the definition of Natural Selection

What we have to do?

Simulate how predators locate prey in different environments.

What do we require?

- News paper
- White sheet
- Forceps
- Stop watch
- Worksheet
- **Hole punch**

What do we need to know?

Speciation occurs when a population exhibits a continuous change, due to changes in the environment. These unit changes get accumulated over a period of time in a section of population which slowly alter its structure and function to give rise to a new species.

How will we proceed?

- **Teacher's activity-** Teacher will give the instructions along with the protocol(Student's activity)
Teacher will arrange for the materials
- **Student's activity**
 1. Cut 30 circles from newspaper and 30 circles from white sheet.(These are symbolic to two types of moths- Dark and Light)
 2. Place a sheet of white paper on the table and one student can spread 30 white circles and 30 newspaper circles over the surface.
 3. The other student should not look towards the student spreading the circles.
 4. The other student will act as a predator ,who will use forceps to pick up as many circles as he can in 15 seconds.
 5. Repeat this trial with white circles and news paper circles on a newspaper background.

What do we observe?

Record the data in chart below:

		Starting Population	Starting Population	Number picked up	Number picked up
Trial	Background	Newspaper	White	Newspaper	White
1	White	30	30		
2	White	30	30		
3	Newspaper	30	30		
4	Newspaper	30	30		

What have you learnt?

Observe the data you just filled in the table and answer the following questions on the basis of pattern you have observed

- 1.How are prey selected by predator?
2. Which moth coloration is the best adaptation for a dark (newspaper) background?(This is trial 1)
3. Give one evidence for your answer.(Q.2)
- 4.Which coloured moth would be found in larger number in the next generation after trial 1?
- 5.Which coloured moth would be dominating the population after 3 generations?
- 6.What is this phenomenon called as?

What would I like to know ?

Charles Darwin proposed the theory of origin of species through natural selection. It is the process whereby organisms better adapted to their environment tend to survive and produce more offspring. The term "survival of the fittest" was first used by the Victorian naturalist Herbert Spencer as a metaphor to help explain the concept of natural selection, the central element of Charles Darwin's revolutionary theory of evolutionary change, first published in 1859 in his famous book, *The Origin of Species by Means of Natural Selection*.

Extended learning

Observe the table given below and answer the questions-

Years	No. of Light Moths Captured	No. of Dark Moths Captured
2	537	112
3	484	198
4	392	210
5	246	281
6	225	337
7	193	415
8	147	503
9.	84	550
10.	56	599

1. What happens to the population of light moths after nine years? Why?
2. What happens to the population of dark moths after nine years? Why?
3. What do you infer from this activity?

Annexure 9 (B),(b)

Let's explore how we evolve!

Subject	Science
Class	X
Chapter/Unit	Heredity and Evolution
Topic	Genetic Drift
Time	40 min
Nature of Activity	Group

What will I learn (Learning Outcome)?

Students will develop the concept of Genetic Drift

Skills: Analyzing and Creating

What I have to do? To perform an activity with coloured paper beads (representing alleles) to understand how genetic drift can lead to the rise of new species.

What do I require? Paper cups, Beads with yellow and green colour

What do I need to know?

- Genetic drift is a mechanism of evolution in which allele frequencies of a population change over generations due to chance.
- Genetic drift occurs in all populations of non-infinite size, but its effects are strongest in small populations.

➤ Teacher's Activity

Teacher will-

1. explain the concept of genetic drift
2. arrange materials for the activity
3. divide the students in to groups
4. give instructions for the activity (Student's activity)

How will I proceed?

➤ Student's Activity

Students will-

1. put yellow beads in five cups and place it on their desk (desk A)
2. put green beads in five different cups and place it on the same desk.

3. take ten empty cups and place them on a separate desk.(desk B)
4. randomly pick a bead from one of the cups in desk A and transfer to one of the empty cups in desk B.
5. place a bead of same colour in the empty cup of desk A, so that it can be picked again as the activity proceeds.
6. continue till all the empty cups in desk B contain bead in it.
7. note down how many cups in desk B contain yellow beads and how many contain green beads
8. remove the beads from the ten cups in desk A.
9. randomly pick a bead from one of the cups on desk B and transfer to one of the empty cups in desk A.
10. place a bead of same colour in the empty cup of desk B, so that it can be picked again as the activity proceeds.
11. continue till all the empty cups in desk A contain bead in it.
12. note down how many cups in desk A contain yellow beads and how many contain green beads. This will be generation no.1
13. now arrange ten empty cups on desk B.
14. randomly pick a bead from one of the cups on desk A (generation no.1) and transfer to one of the empty cups in desk B.
15. place a bead of same colour in the empty cup of desk A, so that it can be picked again as the activity proceeds.
16. continue till all the empty cups in desk B contain bead in it.
17. note down how many cups in desk B contain yellow beads and how many contain green beads. This will be generation no.2
18. continue the activity till all the cups contain the same colour beads

What have I observed?

S.No.	Generations	No. of yellow beads	No. of green Beads
1.	Parental generation	5	5
2.	Generation 1		
3.	Generation 2		
4.	Generation 3		
5.	Generation 4		

(Students can continue till the number of beads of any one colour becomes zero and number of beads of the other colour becomes 10)

What have I learnt?

1. How are the beads selected by you?

2. Which bead would be found in larger number in the first generation?
3. Which bead would be dominating the population after 3 generations?
4. If bead represent alleles, what is this phenomenon called as?
5. In the above activity, shift in allele frequencies in a population over generations is due to
6. An evolutionary mechanism that produces ----- changes in allele frequencies in a population over time is known as-----.
7. Every population experiences genetic drift, but -----feel its effects more strongly.

What am I curious to learn?

Evolution is any shift in allele frequencies in a population over generations. Let us find out which factors lead to this shift, apart from genetic drift?

Let me evaluate myself

1. What is Genetic drift?
2. Specify the role of genetic drift in evolution.
3. If the two isolated populations separated by genetic drift become very different from each other, What is the consequence?

4. In a simple accident (stamping by an elephant foot) killed majority of the red coloured beetles from the population .With the help of this example, explain how does the population size affect evolution?

5. Imagine a bottle filled with marbles, where the marbles represent the individuals in a population. Explain how can a bottleneck event reduce genetic diversity?