CLASS 10
SELF ASSESSMENT – 1

LAB ACTIVITY 1

Experiment to show the presence of starch in a leaf.

Aim: To test the presence of starch in a leaf.

Materials Required: Leaf, beaker, test tube, water, alcohol (spirit), iodine solution, petri dish, dropper, tripod stand with wire gauze, burner, and forceps/tweezers.

Diagram showing the setup of apparatus:

Procedure:

1. Take a leaf from a plant that was kept in sunlight.
2. Boil the leaf in **water for 2–3 minutes**.
3. Then boil the leaf in **alcohol (spirit) using a water bath** until it becomes colourless.
4. Wash the leaf with **warm water** to soften it.
5. Place the leaf in a **petri dish** and add a few drops of **iodine solution**.

Observation:

1. The **green parts of the leaf turn blue-black** after adding iodine.
2. The **non-green parts remain brown or yellow**.

Conclusion: The appearance of a blue-black coloration indicates the presence of starch in the leaf extract.

Precautions:

1. Keep the plant in a dark room for three days so that all the starch gets used up.
2. We should boil the leaf in Spirit over a water bath carefully.
3. We should boil the leaf till it will become pale white.

Lab Activity 2

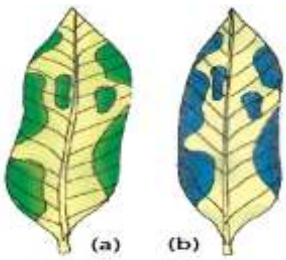
Experiment: Chlorophyll is necessary for photosynthesis (Variegated leaf Experiment).

Aim: To show that chlorophyll is necessary for photosynthesis.

Materials Required: Variegated leaf plant (money plant/croton), beaker, alcohol, water, burner, iodine solution, forceps.

Procedure:

1. Take a **variegated plant** and keep it in the **dark for 2–3 days**.
2. Keep the plant in **sunlight for a few hours**.
3. Pluck a leaf and note the **green and non-green parts**.
4. Boil the leaf in **water for a few minutes**.
5. Then place it in **alcohol** and heat in a water bath to remove green colour.
6. Wash the leaf and add **iodine solution**.



Variegated leaf
(a) before starch test
(b) after starch test

Observation:

1. Green parts of the leaf turn **blue-black**.
2. Non-green parts do **not change colour**.
3. Leaf becomes **colourless** after boiling in alcohol and alcohol turns green.

Conclusion: Starch is present only in **green parts**. So, **chlorophyll is necessary for photosynthesis**.

Precautions:

1. Use a **healthy variegated leaf**.
2. Heat alcohol in a **water bath only** (not directly).
3. Wash the leaf before adding iodine.

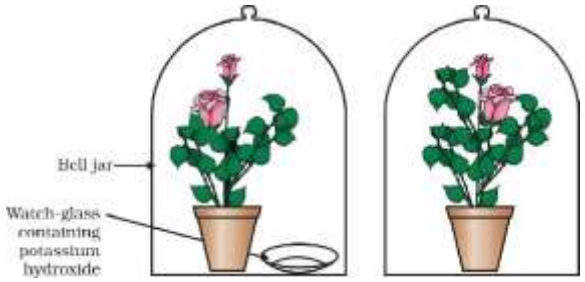
LAB ACTIVITY 3

Experiment to show the Carbon dioxide is essential for photosynthesis.

Aim: To show that carbon dioxide is essential for photosynthesis.

Apparatus: Two potted plants, two bell jars, potassium hydroxide (KOH), small dish, vaseline, iodine solution.

Diagram showing the setup of apparatus:



Procedure:

1. Take two healthy potted plants and keep them in the dark for 2–3 days.
2. Place each plant under a separate bell jar.
3. Keep a small dish of KOH in one jar to absorb carbon dioxide.
4. Keep the other jar without KOH.
5. Seal the jars with vaseline and keep them in sunlight for a few hours.
6. Take a leaf from each plant and test with iodine solution for starch.

Observation:

The leaf from the plant with KOH does not turn blue-black.

The leaf from the other plant turns blue-black.

Conclusion: Carbon dioxide is essential for photosynthesis.

Precautions:

1. Close the bell jars tightly.
2. Both plants should get same sunlight.

LAB ACTIVITY 4

Experiment: Sunlight is essential for photosynthesis.

Aim: To show that sunlight is necessary for photosynthesis.

Materials Required: Potted plant, black paper, clips, iodine solution, beaker, alcohol, burner.

Diagram showing the setup of apparatus:

Procedure:

1. Take a **potted plant** and keep it in the **dark for 2–3 days**.
2. Cover part of a leaf with **black paper** and fix it with clips.
3. Keep the plant in **sunlight for 2 hours**.
4. Pluck the leaf and **remove the paper**.
5. Test the leaf with **iodine solution for starch**.

Observation:

The part of the leaf exposed to sunlight turns **blue-black**, while the covered part does not.

Conclusion:

Sunlight is **necessary for photosynthesis**.

Prepared by,

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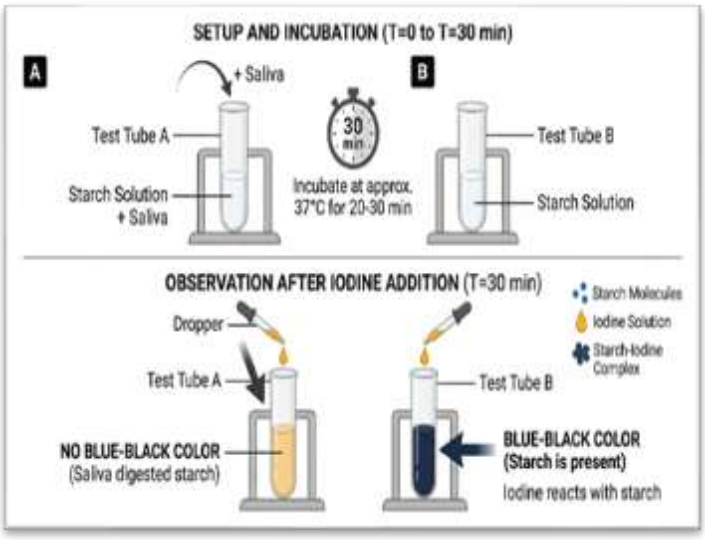
LAB ACTIVITY 5

Experiment to show the action of saliva on starch.

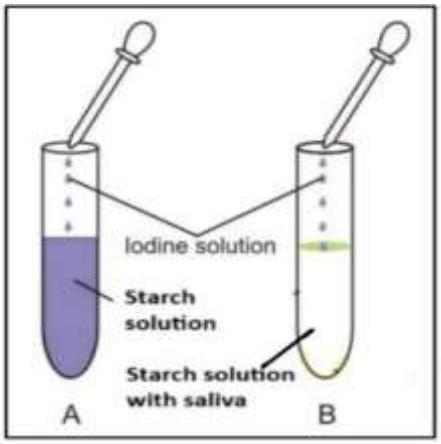
Aim: To show that effect of saliva on starch.

Materials Required: Two test tubes (A and B), 1% starch solution, saliva, iodine solution, dropper, test tube stand.

Diagram showing the setup of apparatus:



(Or)



Procedure:

1. Take **1 ml of starch solution** in two test tubes A and B.
2. Add **saliva to test tube A**.
3. Keep test tube B **without saliva**.
4. Leave both for **20–30 minutes**.
5. Add a few drops of **iodine solution** to both.

Observation:

1. Test tube B turns blue-black.
2. Test tube A does not turn blue-black.

Conclusion:

Starch is present in test tube B but not in A.This shows that Saliva **digests starch into simple sugars**.

LAB ACTIVITY 6

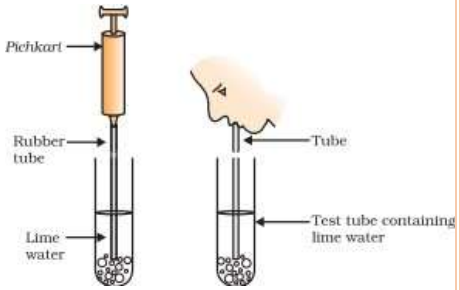
Experiment: Carbon dioxide is more in exhaled air.

Aim: To show that exhaled air has more carbon dioxide than inhaled air.

Apparatus: Two test tubes, lime water, straw/syringe/pichkari, test tube stand.

Procedure:

1. Take two test tubes and label them **A and B**.
2. Fill both with equal amounts of **fresh lime water**.
3. Blow **normal air** into test tube A using a syringe/pichkari.
4. Blow **exhaled air** into test tube B using a straw.
5. Observe which test tube turns milky faster.



Observation:

Lime water in **test tube B** turns milky faster than in test tube A.

Conclusion:

Exhaled air contains **more carbon dioxide** than inhaled air.

Precautions:

1. Use **fresh lime water**.
2. Blow **slowly and carefully**.
3. Take **equal amounts** of lime water in both test tubes.

Prepared by,

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LAB ACTIVITY 7

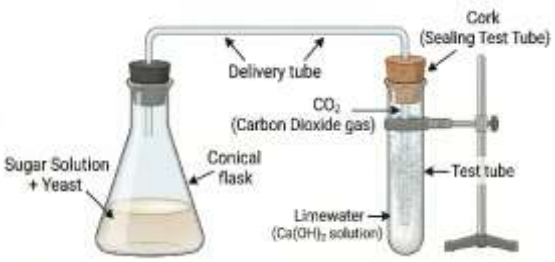
Experiment: Anaerobic Respiration in Yeast.

Aim: To show that respiration can occur without oxygen.

Apparatus: Sugar solution/fruit juice, yeast, conical flask/test tube, cork, bent glass tube, lime water.

Procedure:

1. Take **sugar solution** and add some **yeast**.
2. Pour the mixture into a **test tube or flask**.
3. Close it with a **cork fitted with a bent glass tube**.
4. Dip the other end of the tube into a test tube with **lime water**.
5. Leave it for some time and observe.
6. Open the cork after some time and **smell the solution**.



Observation:

1. Lime water **turns milky**.
2. The solution has a **smell of alcohol**.

Conclusion:

Yeast carries out **fermentation** and produces **alcohol and carbon dioxide**.

Precautions:

1. Use **fresh yeast and lime water**.
2. Keep the setup **airtight**.
3. Do the experiment in a **well-ventilated place**.

LAB ACTIVITY 8

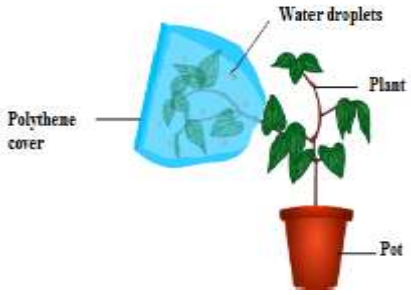
Experiment: Transpiration in Plants.

Aim: To show that plants lose water through their leaves.

Materials Required: A healthy potted plant, polythene cover, rubber band.

Procedure:

1. Take a healthy, well-watered plant.
2. Keep the plant in sunlight.
3. Cover one leafy branch with a polythene cover.
4. Tie the cover tightly with a rubber band.
5. Leave it undisturbed for a few hours.



Observation: Water droplets appear inside the polythene cover.

Conclusion: The leaves release water in the form of vapour. This process is called **transpiration**.

Precautions:

1. Use a healthy plant with broad leaves.
2. Make sure the polythene cover has no holes.
3. Tie the cover tightly.
4. Do not disturb the setup.

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Project Work-1
Life Processes

Preliminary Information:

Name: _____ **Grade: 10** **Roll. No:** _____

Name of the project: Effect of Exercise and Pranayama on Breathing Rate.
Type of the project: Individual / Group.
Duration: 1-2 hrs.
Reference Material: State Board Class – 10 text book, NCERT & CBSE text books and You Tube Videos.
Guide Teacher:

Aim: To observe how physical activity and yogic breathing techniques (pranayama) affect breathing rate in humans.
Objectives:
1. To understand the relationship between physical activity and respiratory rate.
2. To compare the effects of vigorous exercise vs. pranayama on breathing patterns.
3. To analyze how the body maintains oxygen balance during different activities.
4. To develop awareness of breathing control and its impact on health.

Materials Required: Stopwatch or timer, Notebook, Quiet space for pranayama, Space for jumping jacks or running.
Procedure:
Part A: After Exercise (Aerobic)
1. Sit calmly and count your resting breathing rate (breaths per minute).
2. Do 30 jumping jacks or run in place for 2 minutes.
3. Immediately after stopping, count your breathing rate.
4. Record again after 1 minute and 3 minutes of rest.

Part B: After Yoga/Pranayama
1. Sit in a calm position. Do alternate nostril breathing **(Anulom-Vilom)** or deep belly breathing for 5 minutes.
2. Count your breathing rate before and after the session.
3. Note how you feel (relaxed, energetic, etc.)

Data Table:

Condition	Breathing Rate (breaths/min)		Observation
	Common	Myself	
Resting Before Activity	16		Normal, calm
After Exercise (0 min)	30		Heavy breathing, fast
After Exercise (1 min rest)	24		Still elevated
After Exercise (3 min rest)	18		Almost normal
Before Pranayama	16		Normal
After 5 mins of Pranayama	12		Slower, deeper, more relaxed

Analysis:
• Exercise caused an immediate increase in breathing rate to meet oxygen demand and remove CO_2.
• Pranayama reduced the breathing rate, indicating improved oxygen efficiency and mental calmness.
• This shows two opposite but healthy responses of the respiratory system – one to stress (exercise), and the other to relaxation (yoga).

Conclusion:
• Breathing rate increases during physical activity due to higher oxygen demand.
• Yogic practices like pranayama slow down breathing, improving oxygen efficiency and calming the nervous system.
• Both are beneficial: exercise builds stamina; pranayama improves breath control and mental health.

Experience of the Student (Self-reflection):
"After doing jumping jacks, I felt tired and my breath became fast. It took a few minutes to return to normal. But after doing pranayama, I felt calmer and more focused. My breathing slowed down naturally. It was a peaceful experience."

Acknowledgement:
I sincerely thank my Biological Science teacher for helping me understand the practical impact of breathing and the role of exercise and yoga in maintaining good health.

Project Work-2
Life Processes

Preliminary Information:

Name: _____ **Grade: 10** **Roll. No:** _____

Name of the project: **Comparison of Excretory Products in Humans and Plants**
Type of the project: Individual / Group.

Duration: 1-2 Days.

Reference Material: State Board Class – 10 text book, NCERT & CBSE text books and You Tube Videos.

Guide Teacher:

Aim: To study and compare the different types of excretory products produced by humans and plants.
Objectives:
1. To understand the process of excretion in humans and plants.
2. To identify the types of waste materials excreted by each.
3. To observe how excretory products are eliminated or stored.
4. To compare the excretory mechanisms of two living systems.

Materials Required: Charts or diagrams of human and plant excretory systems, Whiteboard or chart paper, Leaves, flower petals, or any classroom plants, Human body charts or models.
Procedure:
1. Discuss and record the major excretory products of humans (e.g., urea, sweat, CO_2).
2. Observe classroom plants and note resin, gum, latex, and oxygen release through stomata.
3. Create a comparative table listing excretory products and their elimination methods.
4. Classify each product as gaseous, solid, or liquid.

Data Table:
Comparison of Excretory Products:

Organism	Excretory Products	Type	Mode of Excretion
Human	Urea	Liquid	Through urine via kidneys
Human	Sweat	Liquid	Through sweat glands (skin)
Human	CO_2	Gaseous	Through lungs during breathing
Plant	Oxygen	Gaseous	Through stomata in leaves
Plant	Water vapor	Gaseous	Through transpiration
Plant	Resins, Gums, Latex	Semi-solid	Stored in bark or vacuoles

Data Analysis:
• Humans have specialized organs for active excretion (kidneys, lungs, skin).
• Plants passively excrete through transpiration and storage.
• Human excretory products are harmful if retained; plants use storage or diffusion.

Conclusion:
Excretion is essential for survival in both humans and plants. Though both produce waste, their methods and products vary due to different biological structures and needs.

Experience of the Student (Self-reflection):
"I was amazed to learn that even plants excrete waste! I had always thought only humans did. It was interesting to compare how both systems work in different ways to stay healthy."

Acknowledgement:
I thank my Biological Science teacher for guiding me through this project and helping us observe and compare the amazing ways living things manage waste.

Project Work-3
Life Processes

Preliminary Information:

Name: _____ **Grade: 10** **Roll. No:** _____

Name of the project: **Comparison of Nutrition Methods in Plants, Humans and Animals.**
Type of the project: Individual / Group.
Duration: 1-2 Days.
Reference Material: State Board Class – 10 text book, NCERT & CBSE text books and You Tube Videos.
Guide Teacher:

Aim: To study and compare the different modes of nutrition in plants, humans, and animals.
Objectives:
1. To understand various modes of nutrition (autotrophic and heterotrophic).
2. To observe differences in how organisms obtain and utilize food.
3. To classify organisms based on their nutritional habits.
4. To develop comparative analysis skills through chart-based study.

Materials Required: Textbook diagrams and nutrition flow charts, Whiteboard or chart paper, Plant samples (leaf, cactus, mushroom photo), Visual aids or models of digestive systems of humans and animals
Procedure:
1. Observe pictures or charts showing different organisms and their food intake.
2. Discuss and classify them into autotrophs or heterotrophs.
3. Identify if they are herbivores, carnivores, omnivores, or saprotrophs.
4. Create a comparative table based on nutrition type, mode, and examples.

Data Table:
Comparison of Nutrition Types

Organism	Nutrition Type	Mode of Nutrition	Example of Food Intake
Green Plant	Autotrophic	Photosynthesis	Uses sunlight, CO_2, and water
Mushroom	Saprotrophic	Absorbs from decaying matter	Feeds on dead organic matter
Human	Heterotrophic	Ingestive	Rice, vegetables, meat, etc.
Cow	Heterotrophic	Herbivorous	Grass
Lion	Heterotrophic	Carnivorous	Flesh of other animals
Amoeba	Holozoic	Phagocytosis	Engulfs food particles

Data Analysis:
• Plants make their own food (autotrophs), while animals and humans depend on others.
• Animals have diverse nutrition methods: ingestive (humans), absorptive (fungi), or engulfing (amoeba).
• Nutrition type is related to body structure and habitat.
All living organisms require nutrition, but the method varies greatly. While plants are self-sustaining, animals and humans have developed complex ways to consume and digest food.
Experience of the Student (Self reflection):
"While doing this project, I found that different living things eat in different ways. Plants make their own food using sunlight. Humans and animals need to eat plants or other animals to live.
I was surprised to learn that mushrooms feed on dead things, and amoeba catches food by surrounding it. It was fun to compare how cows eat grass, lions eat meat, and plants don't eat at all. I now understand that every living thing has its own way of getting food."
Acknowledgement:
I thank my Biological Science teacher and classmates for their support and discussions during this project.

Project Work-4
Life Processes

Preliminary Information:

Name: _____ **Grade: 10** **Roll. No:** _____

Name of the project: **Daily Water Intake and Urine Output – A Study on Human Excretion.**
Type of the project: Individual / Group.

Duration: 7- 14 Days.

Reference Material: State Board Class – 10 text book, NCERT & CBSE text books and You Tube Videos.

Guide Teacher:

Aim: To observe and analyze the relationship between daily water intake and urine output in varying weather conditions.

Objectives:
1. To understand the functioning of the human excretory system.
2. To analyze how water intake and weather affect urine output.
3. To develop observation, data collection, and analysis skills.

Materials Required: Notebook Measuring cup or bottle (marked in mL), Stopwatch or clock, Thermometer or weather info (optional)

Procedure:
1. For 3 consecutive days, measure and record the total amount of water you drink.
2. Count and note how many times you urinate during each day.
3. Use a measuring container to estimate the total urine output.
4. Record the weather conditions each day (hot or cold).
5. Optionally, observe urine colour (lighter means more diluted).

Data Table:

Day	Water Intake (ml)	Times Urinated	Urine Output (ml)	Weather	Urine colour
1	1800			Hot	
2	2200			Warm	
3	1500			Cold	

Data Analysis:
• On hotter days, more water is lost through sweat, resulting in slightly reduced urine output.
• On colder days, less sweating occurs, and more water is excreted as urine.
• Light-coloured urine usually indicates sufficient water intake.

Conclusion:
The amount of water intake and weather conditions significantly influence urine output. The human body adjusts excretion levels based on hydration and temperature to maintain balance.

Student Experience (Self-Reflection):
"I understood how important water is for our body and how our kidneys work to remove waste. I found that on hot days, I sweat more and urinate less. On cold days, I had to go to the washroom more often. This was a fun and easy way to understand how the excretory system works."

Acknowledgement:
I thank my Biological Science teacher and parents for encouraging and guiding me through this practical observation project.

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CLASS 10

SELF ASSESSMENT – 2

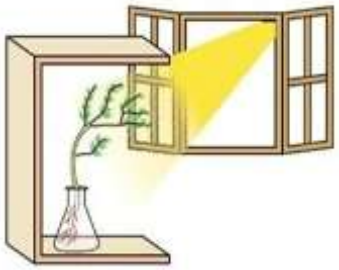
LAB ACTIVITY 1

Experiment: To Demonstrate Phototropism.

Aim: To prove phototropism in plants.

Materials required: Conical flask, water, wire mesh, germinated bean seeds, cardboard box (open on one side), light source / window light.

Procedure:



1. Fill a conical flask with water.
2. Cover the mouth of the flask with wire mesh.
3. Place 2–3 germinated bean seeds on the wire mesh.
4. Take a cardboard box open on one side.
5. Keep the flask inside the box so that light enters from one side only.
6. Leave the setup undisturbed for 2–3 days.

Observation:

1. The shoot bends towards the light.
2. The roots grow away from the light.

Conclusion: The shoot system grows towards the light and the root system away from light, downwards into the soil.

HOW DO ORGANISMS REPRODUCE

LAB ACTIVITY 2

Experiment: To Observe Reproduction in Yeast.

Aim: To observe how yeast reproduces asexually by budding.

Materials Required: Yeast powder, sugar, warm water, beaker/test tube, glass slide, cover slip, dropper, methylene blue stain, and microscope.

Theory: Yeast is a single-celled fungus. It reproduces by *budding*, where a small bud grows on the parent cell and later separates to form a new yeast cell.

Procedure:

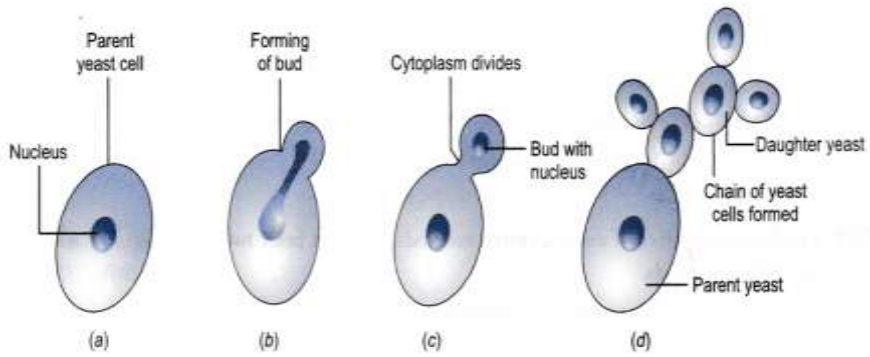
1. Mix a little yeast powder with warm water and add a pinch of sugar. Stir well.
2. Keep the mixture in a warm place (about 25–37°C) for 1–2 hours.
3. After some time, take a drop of the mixture and place it on a glass slide using a dropper.
4. Add one drop of methylene blue stain to the slide.
5. Place a cover slip carefully over the drop.
6. Observe the slide under a microscope.

Observation: We can see small bud-like structures on the yeast cells. Sometimes, several buds form chains of cells.

Conclusion: Yeast reproduces asexually by *budding*, where a new cell grows from the parent cell.

Precautions:

1. Use warm (not hot) water.
2. Handle the slide and microscope gently.
3. Dispose of the materials safely after the experiment.



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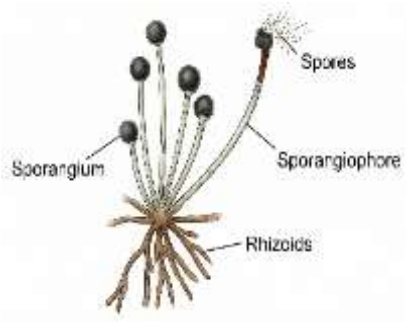
LAB ACTIVITY 3

Experiment: To Observe Spore Formation in Rhizopus.

Aim: To see how *Rhizopus* (bread mould) grows and forms spores on bread.

Materials Required: Bread slice, water, Petri dish or plate, magnifying glass.

Procedure:



1. Wet a slice of bread with a little water.
2. Keep it in a Petri dish or cover it with another plate.
3. Place it in a cool, dark, and moist place.
4. Watch the bread every day for a week using a magnifying glass.

Observation:

1. After 1–2 days, white cotton-like growth appears on the bread.
2. Later, black dots appear on it, these are the spores of Rhizopus.

Conclusion: *Rhizopus* grows on moist bread and reproduces by forming spores.

Precautions:

1. Don't touch the mould with your hands.
2. Keep the bread undisturbed.
3. Wash hands after the activity.

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SELF ASSESSMENT – 2

PROJECT WORK 1 **Class: X**

Name of the lesson: **Control and Coordination**

Title of the Project: Effect of Music/Sound on Concentration

Aim: To study how music, silence, and time of the day affect human concentration and brain activity.

Objectives:

1. To understand the role of the brain in concentration.
2. To compare concentration levels in silence, music/noise, early morning, and late night conditions.
3. To observe how external and internal conditions influence focus.

Materials Required: Stopwatch/clock, Short passage, Volunteers (students), Mobile phone/music player for background sound

Procedure:

Ask the volunteer to sit in a quiet room.
Give a short passage (5–6 lines) to read silently for 2 minutes.
After 2 minutes, ask the volunteer to recall/write what they remembered. Record the result.
Repeat the same activity with background music/noise and record the result.
Repeat again early in the morning (fresh brain) and at night (sleepy condition).
Compare the results under different conditions.

Observation Table:

Condition	No. of words in passage	No. of words correctly recalled	Concentration Level
Silence (No sound)	30	22	High
With music/noise	30	12	Low
Early morning (fresh brain)	30	25	Very High
Night (sleepy condition)	30	10	Very Low

Data Analysis:

1. Percentage of correct recall:

- **Silence** = (22 ÷ 30) × 100 = 73%
- **Music/noise** = (12 ÷ 30) × 100 = 40%
- **Early morning** = (25 ÷ 30) × 100 = 83%
- **Night** = (10 ÷ 30) × 100 = 33%

2. Comparison:

- Early morning condition gives the highest concentration (83%).
- Silence condition also shows good focus (73%).
- Music/noise reduces concentration to 40%.
- Night condition shows the lowest focus (33%).

3. Range (difference between best and worst):

- 83% (morning) – 33% (night) = 50 percentage points difference.

4. Trend/Pattern:

- **Fresh brain (morning) > Silence > Music/noise > Night.**
- Both external factors (sound) and internal factors (body freshness) strongly affect concentration.

Conclusion:

The experiment showed that concentration is highest in the early morning and in silence, as the brain is fresh and free from distractions. In contrast, music, noise, and late-night conditions reduce focus and memory recall. This proves that both external factors (such as sound) and internal factors (such as time of day and mental freshness) strongly influence the brain's ability to concentrate.

Student's Experience:

I understood that studying in silence and especially in the early morning helps me focus better. The project was interesting because I could clearly see the difference in my own concentration when comparing sound, silence, morning, and night conditions.

Acknowledgement:

I thank my teacher for guiding me and my classmates and family for helping in this project.

Resources: State Board Class 10 Textbook, NCERT & CBSE Textbooks, YouTube Videos.

Prepared by,

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PROJECT WORK 2 **Class: X**

Name of the lesson: **Control and Coordination**

Title of the Project: Understanding Endocrine Glands in Humans

Aim: To study and understand the structure and function of endocrine glands in humans and how they regulate various body processes through hormone secretion.

Objectives:

1. To identify the major endocrine glands in the human body.
2. To understand the functions of each gland and the hormones they produce.
3. To learn how these hormones affect different body functions.

Materials Required:

1. Chart paper and markers for creating diagrams
2. Diagrams/models of the human endocrine system
3. Colored pencils for labeling diagrams
4. Scissors and glue

Procedure:

1. Introduction to Endocrine Glands: Study the endocrine system using textbooks.

2. Identify major glands: Pituitary, thyroid, parathyroid, adrenal, pancreas, testes, and ovaries.

3. Create Diagrams:

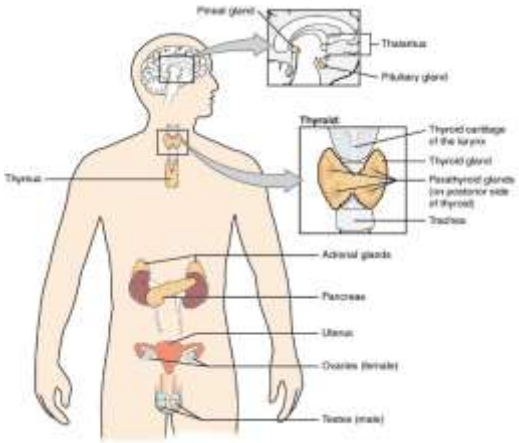
a) Draw and label a diagram of the human endocrine system.

b) Show each gland and the hormones they produce.

Hormones, Glands, and Functions:

Hormone	Gland / Organ	Functions
Insulin	Pancreas (behind the stomach)	Lowers blood sugar Stores glucose as glycogen
Glucagon	Pancreas (behind the stomach)	Increases blood sugar Converts glycogen to glucose
Thyroxine (T4)	Thyroid Gland (in the neck)	Regulates metabolism Supports growth & brain development
Adrenaline (Epinephrine)	Adrenal Glands (on top of kidneys)	Fight or flight response Increases heart rate & energy
Cortisol	Adrenal Glands (on top of kidneys)	Stress response Raises blood sugar, reduces inflammation
Growth Hormone (GH)	Pituitary Gland (base of the brain)	Stimulates growth of bones & muscles Regulates metabolism
Prolactin	Pituitary Gland (base of the brain)	Promotes milk production
Oxytocin	Pituitary Gland (base of the brain)	Uterine contractions Milk ejection
Testosterone	Testes (male reproductive system)	Male reproductive traits Muscle & hair growth
Estrogen	Ovaries (female reproductive system)	Female reproductive traits Controls menstrual cycle
Progesterone	Ovaries (female reproductive system)	Prepares uterus & maintains pregnancy

Diagram:



Conclusion:

The endocrine glands regulate many body functions through hormones. Each gland has a unique role in growth, metabolism, stress response, and reproduction. Hormonal imbalance can disturb normal health.

Experience of the Student: This project helped me understand the importance of endocrine glands in human life. Drawing diagrams made learning easy. I learned how hormones affect growth, metabolism, and reproduction.

Acknowledgement: I sincerely thank my Biology teacher for guidance and my classmates and family for their support.

Resources: State Board Class 10 Textbook, NCERT & CBSE Textbooks, YouTube Videos.

SELF ASSESSMENT – 3

LAB ACTIVITY 1

(HERIDITY)

Aim: To demonstrate the genotypic ratio as 1: 2: 1 in F2 generation.

Materials required: A watch glass, red beads and green beads.

Procedure:

1. Taken a mix of red beads and green beads of 4 each.
2. Asked a student to come to the table, close her eyes and take any two beads.
3. Thus asked 4 students to do so.
4. Finally noted the colour of the beads in their hands.
5. Repeated this activity for 10 times and noted the observations.

Observation: It is observed that 7 to 8 times the beads were in the ratio of 1:2:1.

Inference: It is explained by Mendal that in monohybridization the genotypic ratio of F2 generation of tall and dwarf (example) will be 1:2:1.

LAB ACTIVITY

Class: 10: Our Environment

(Experiment: Eutrophication (effect of fertilizers on algal growth)**)**

Aim: To demonstrate how adding nutrients causes excess algal/microbial growth in water (eutrophication).

Apparatus: Two clear jars, pond or tap water (or water + a little soil), small amount of soluble fertilizer (or kitchen liquid fertilizer: diluted milk or diluted tea/coffee is a mild substitute), spoon, light source.

Procedure:

1. Fill both jars with equal amounts of the same water. Label Jar A (control) and Jar B (nutrient).
2. Add a small pinch of fertilizer or a tablespoon of diluted milk to Jar B, do nothing to Jar A.
3. Keep both jars in the same place with light. Observe daily for 7–10 days for cloudiness, green film or smell.

Eutrophication

Observation:

Jar B: water becomes greenish/cloudy, surface film or odour may appear, sign of algal/bacterial growth.

Jar A: remains clearer.

Conclusion: Adding extra nutrients to water increases the growth of algae and microbes. This makes the water dirty and reduces oxygen in it. Such nutrient pollution harms aquatic life and is called eutrophication.

Precautions:

1. Use clean jars and keep both jars under the same light conditions.
2. Add only a small amount of fertilizer to avoid overgrowth or bad smell.
3. Do not shake or disturb the jars while observing the changes.

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Biodegradable vs Non-biodegradable Decomposition

Aim: To compare decomposition rates of biodegradable and non-biodegradable materials in soil.
Apparatus: Two small pots, soil, fruit peels, paper, plastic wrapper, synthetic thread, marker, spoon.
Procedure:
1. Fill two identical pots with soil.
2. In **Pot 1**, bury similar-sized pieces of **fruit peel + paper** (biodegradable).
3. In **Pot 2**, bury **plastic piece + synthetic thread** (non-biodegradable) about 5 cm deep.
4. Label both pots.
5. Water both pots equally and keep in the same conditions.
6. After 2 weeks and after 1 month, dig up the items and record the changes.

Biodegradable and Non-biodegradable Materials:

Type of Material	Examples	Significance
Biodegradable	Fruit peels, vegetable scraps, paper, cardboard, leaves, wood, cotton cloth, jute, food waste, garden waste	Broken down by microorganisms. Do not pollute the environment. Increase soil fertility when they decompose.
Non-biodegradable	Plastic bags, plastic bottles, glass, metal cans, aluminium foil, thermocol, synthetic cloth (nylon, polyester), rubber, e-waste, batteries	Do not decompose easily. Cause long-term soil and water pollution. Harm animals and damage ecosystems.

Observation:
Biodegradable items: Soft, partially or fully decomposed, size reduced.
Non-biodegradable items: Remain unchanged, no decomposition.
Conclusion:
Biodegradable materials like fruit peels and paper break down easily in the soil because microbes act on them, so they disappear or become soft over time. Non-biodegradable materials like plastic and synthetic thread do not decompose and remain almost the same even after many days. This shows that biodegradable waste is safe for the environment, while non-biodegradable waste causes long-lasting pollution.

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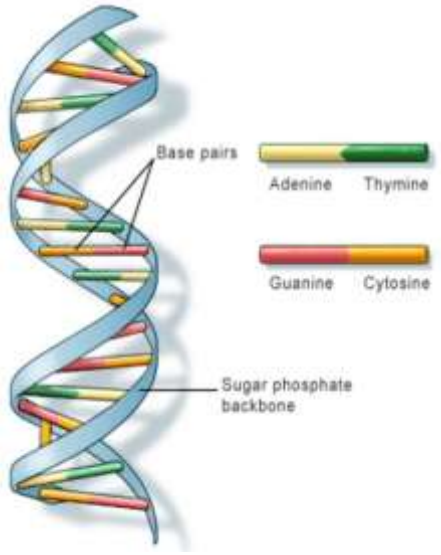
Class X
Project Work

Project: **DNA Structure and Function.**
Lesson: **Heredity**
Aim: To study the structure and function of DNA.
Objectives:

- To understand what DNA is
- To know the structure of DNA
- To learn how DNA carries hereditary information
- To identify base pairs

Materials Required: Chart paper, colored papers, beads or clay, sticks, glue, pencil, scale.
Procedure:

1. Collected information about DNA.
2. Drew the structure of DNA.
3. Prepared a 3D model using beads/clay.
4. Labelled all parts clearly.
5. Wrote observations and conclusion.



Content:
What is DNA?
DNA (Deoxyribonucleic Acid) is the material that carries genetic information from parents to offspring.
Structure of DNA:

- DNA has a **double helix shape** (like a twisted ladder)
- It has two strands
- Made up of small units called nucleotides

Base Pairs in DNA

- **Adenine (A) pairs with Thymine (T)**
- **Guanine (G) pairs with Cytosine (C)**

Content Table:

Component	Function
DNA	Carries genetic information and controls all body activities.
Nucleotides	Basic building blocks of DNA made of sugar, phosphate, and nitrogen base.
Sugar-Phosphate Backbone	Forms the outer structure and gives support to DNA strands.
Nitrogen Bases	Store genetic information (Adenine, Thymine, Guanine, Cytosine).
Base Pairs	Join two DNA strands (A–T and G–C pairing).
Double Helix	Gives DNA its twisted ladder shape.
Genes	Segments of DNA that control specific traits.
Chromosomes	Structures that carry DNA in cells.
Replication	Process by which DNA makes an exact copy of itself.

Analysis:

- DNA carries genetic information in all living organisms.
- It is made up of nucleotides and base pairs.
- The structure of DNA helps it store and pass information.
- DNA controls body features and activities.
- DNA can replicate to pass information to the next generation.
- Small changes in DNA lead to variations in organisms.

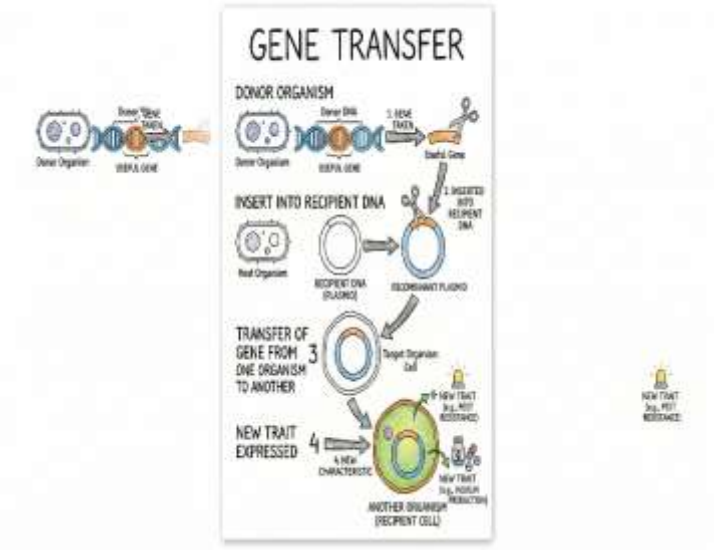
Conclusion:
DNA is the basic unit of heredity and carries information for all body characteristics.
Student Experience: I learned about DNA structure and its importance. Making a model helped me understand it better.
Acknowledgement: I thank my teacher and parents for their support and guidance.
Resources: NCERT Class 10 Science Textbook, School notes, Internet.

Lesson: **Heredity.**
Name of the Project: **Genetic Engineering (Modern Heredity Technology).**
Aim: To study genetic engineering and its importance in modern science.
Objectives:

- To understand genetic engineering
- To know how genes can be modified
- To learn its uses in daily life
- To understand its benefits

Materials Required: Chart paper, pencil, colors, pictures (optional), notebook.
Procedure:

1. Collected information about genetic engineering.
2. Drew simple diagrams showing gene transfer.
3. Listed uses in medicine and agriculture.
4. Prepared charts neatly.
5. Wrote conclusion and observations.



Content:
What is Genetic Engineering?
Genetic engineering is the process of changing or modifying genes of an organism to get desired traits.
How it Works:

- Scientists take a useful gene from one organism
- Insert it into another organism
- The organism shows new characteristics **Uses of Genetic Engineering**

1. In Medicine:

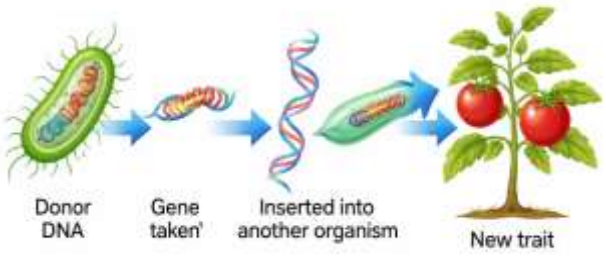
- Production of insulin
- Treatment of diseases

2. In Agriculture:

- Pest-resistant crops
- High-yield plants

3. In Environment:

- Cleaning pollution (bioremediation)



Content Table:

Field	Uses
Medicine	Insulin production, vaccine production, gene therapy, medicines and hormones.
Agriculture	Improved crops, drought-resistant and disease-resistant crops.
Environment	Pollution control, waste management, bioplastics production.
Forensics	DNA fingerprinting (crime cases).
Industry	Production of enzymes and biofuels.
Food Industry	Making cheese, bread, and curd.
Research	Studying genes and developing new ideas.
Animal Husbandry	Better quality animals (more milk, fast growth).
Biotechnology	Cloning of organisms.
Nutrition	Development of nutrient-rich foods.

Analysis:

- Genetic engineering is useful in many fields like medicine, agriculture, and environment.
- It helps to produce better medicines and improve crops.
- It also helps in solving problems like pollution and diseases.
- This technology makes human life easier and better.

Conclusion:
Genetic engineering is a powerful modern technology that helps improve plants, animals, and human health.
Student Experience: I learned about modern genetic technology. This project helped me understand how science is useful in real life.
Acknowledgement: I thank my teacher and parents for their support and guidance.
Resources: NCERT Class 10 Science Textbook, School notes, Internet.

Lesson: Our Environment

Name of the Project: Food Chain and Food Web in the Local Environment.

Aim: To understand food chains and food webs by observing the local ecosystem.

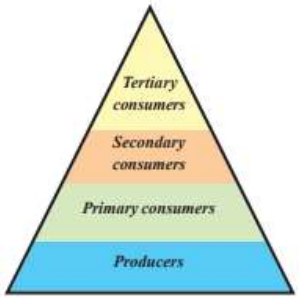
Objectives:

1. To identify producers, consumers, and decomposers.
2. To draw simple food chains and food webs.
3. To understand energy flow in an ecosystem.

Materials Required: Notebook, pen/ pencil, camera (optional)

Procedure:

1. Visit a nearby garden/park.
2. Observe plants, insects, birds, and small animals.
3. Identify producers, herbivores, carnivores, and decomposers.
4. Draw at least two food chains from your observations.
5. Combine them to form a simple food web.



Trophic levels

Producers, Consumers, and Decomposers Table:

Category	Examples Observed in Local Garden/Park	Role in Ecosystem
Producers	Grass, flowering plants, small shrubs, trees	Produce food using sunlight (photosynthesis)
Primary Consumers (Herbivores)	Grasshoppers, caterpillars, butterflies, squirrels	Eat plants and obtain energy directly from producers
Secondary Consumers (Small Carnivores)	Frogs, lizards, birds (sparrow, myna)	Eat herbivores and help control their population
Tertiary Consumers (Top Carnivores)	Eagles, owls, snakes (if observed)	Top-level predators; maintain ecological balance
Decomposers	Fungi, earthworms, soil bacteria	Break down dead organisms and recycle nutrients

Analysis:

• **Producers** (plants) were the most abundant, showing that vegetation forms the base of the ecosystem and supports all other organisms.

• **Primary consumers** such as grasshoppers and caterpillars were commonly found eating leaves or plants, showing their direct dependence on producers.

• **Secondary consumers**, including small birds and lizards, were fewer in number, proving that energy decreases at higher levels in a food chain.

• **Tertiary consumers**, such as eagles or snakes, were rarely observed, which supports the pyramid of energy concept—top predators are least in number.

• **Decomposers** like fungi and earthworms were present in moist soil, showing nutrient recycling is continuously happening.

The table clearly shows how different organisms are connected and depend on each other for food, forming interlinked food chains, which together create a food web.

Conclusion:

Food chains show direct feeding relationships, while food webs represent multiple, interconnected chains that make the ecosystem stable and balanced. All categories, producers, consumers, and decomposers are essential for the smooth functioning of the environment.

Resources: Class 10 Biological Science text book, local garden/park observations, online diagrams of food chains and food webs.

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Lesson: **Our Environment**
Name of the Project: **Eco-Friendly Alternatives to Plastics**
Aim: To study environment-friendly alternatives to common plastic items.
Objectives:
1. To list everyday plastic items.
2. To find eco-friendly substitutes.
3. To raise awareness about sustainable living.
Materials Required: Notebook, pen, household items.
Procedure:
1. Make a list of 10–12 plastic items used at home or school.
2. Search for eco-friendly alternatives such as cloth bags, metal bottles, paper items, and bamboo products.
3. Prepare a comparison table showing plastic items and their substitutes.
4. Write the benefits of using sustainable alternatives.

Eco-Friendly Alternatives to Plastics and Their Sustainability:

Plastic item	Eco-Friendly Alternative	Why it is better
Plastic bag	Cloth bag	Can be reused many times; does not pollute.
Plastic water bottle	Steel bottle	Long-lasting and safe; no plastic waste.
Plastic straw	Paper/steel straw	Breaks down easily or can be reused.
Plastic cup	Paper/steel cup	Less waste; safer for the environment.
Plastic food container	Steel/glass container	Reusable; no harmful chemicals.
Plastic toothbrush	Bamboo toothbrush	Natural material; biodegradable.
Plastic spoon/fork	Wooden/steel cutlery	Reusable (steel) or biodegradable (wood).
Plastic wrapper	Paper wrapper	Breaks down quickly; less pollution.

Analysis of Sustainability:
• Eco-friendly alternatives do not harm the environment like plastic.
• Most of these items are reusable, so we do not throw waste again and again.
• Natural materials like cloth, bamboo, paper, and wood break down easily, so they do not stay in soil or water for hundreds of years.
• Using these alternatives helps keep our school, home, and Earth cleaner.
• If everyone chooses eco-friendly products, the amount of plastic pollution will reduce a lot.

Overall, the alternatives listed are **renewable, biodegradable, reusable, or recyclable**, making them far more sustainable than plastic. Their adoption reduces pollution, conserves resources, and supports a healthier environment.

Conclusion:
Eco-friendly alternatives are better than plastic because they can be reused or break down easily. They keep our environment clean, reduce pollution, and help protect animals, soil, and water. If we all use cloth bags, steel bottles, paper cups, and bamboo items, the Earth will become healthier and safer for future generations.

Resources: Class 10 Biological Science text book, Environmental awareness websites, Local eco-friendly product stores.

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Lesson: Our Environment
Name of the Project: Study of Degradable & Non-Degradable Waste in our School
Aim: To classify school waste into degradable and non-degradable categories.
Objectives:
1. To observe waste generated in school.
2. To classify waste into degradable and non-degradable.
3. To suggest improvements in school waste management.
Materials Required: Observation sheet, Pen, Dustbin samples
Procedure:
1. Visit 3–4 dustbins in classrooms, corridors, playground, and the school canteen.
2. Observe and list the types of waste thrown.
3. Classify each item into:
   - **Degradable waste** (paper, leaves, fruit peels, food waste)
   - **Non-degradable waste** (plastic wrappers, pens, foils)
4. Record all findings in the observation sheet.

Degradable and Non-Degradable Waste in our School:

Type of Waste	Examples Observed	Nature	Remarks
Paper waste	Rough papers, notebooks, tissue paper	Degradable	Can be recycled
Food waste	Fruit peels, leftover food, canteen waste	Degradable	Can be composted
Plant waste	Fallen leaves, small twigs	Degradable	Useful for compost/leaf manure
Plastic waste	Plastic wrappers, bottles, chips packets	Non-degradable	Main cause of pollution
Packaging foils	Aluminium foil, silver foil	Non-degradable	Must be collected separately
Stationery waste	Broken pens, refills, scale pieces	Non-degradable	Needs plastic recycling bins

Analysis:
Paper waste was most common in classrooms, showing regular use of notebooks and rough sheets.
Food waste was mostly near the canteen and can be composted instead of being thrown away.
Plastic wrappers and bottles were the major non-degradable waste, proving many students use packaged snacks.
Broken pens and plastic stationery were also present, so a special recycling bin is needed.
The data shows that **non-degradable waste is high** and must be reduced, recycled, and separated properly.
Degradable waste can be reused through composting, which reduces the total waste in the school.
Conclusion:
Proper segregation of degradable and non-degradable waste can greatly improve school cleanliness.
Recycling plastic and composting food/plant waste helps reduce pollution and supports a cleaner, healthier environment.
Resources: Class 10 Biological Science text book, School cleanliness committee reports, Swachh Bharat Abhiyan waste management guidelines

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