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Heredity and Environment Kit

Student Laboratory Kit

Introduction

Why are people the way they are? Is it a result of nature (genetics) or nurture (environment)? What about in plants? Discover the balance between heredity and environment in determining the traits of an organism.

Biological Concepts

- Heterozygous
- Genotype
- Dominant vs. recessive
- Phenotype

Materials

- | | |
|--|--|
| Filter paper, 9-cm, 2 | Pipet |
| Lightproof storage area or covers | Tobacco seeds (from parents heterozygous for albinism), 50 |
| Marker | Water |
| Petri dishes, disposable plastic, 100 × 15 mm, 2 | |

Safety Precautions

This activity is considered non-hazardous. Wash hands thoroughly with soap and water before leaving the laboratory.

Procedure

1. Label the bottom of one Petri dish "light" and the bottom of another Petri dish "dark." Include your name and date with the label.
2. Place a piece of filter paper into the bottom half of each of the two Petri dishes. If necessary, trim the paper with a scissors so that the paper lays flat in the bottom of the dishes.
3. Soak the filter paper with tap water using a pipet. Drain any excess water that is not absorbed into the paper.
4. Sprinkle 25 tobacco seeds evenly over the moistened filter paper in each of the two Petri dishes. Be sure the seeds are spread out evenly in the dishes.
5. Replace the covers on the two dishes. Place the dish labeled "light" in a well-lighted area (greenhouse, window area, under lights, etc.) as directed by your teacher. Place the dish labeled "dark" in a completely darkened area where it will receive absolutely no light. (This could be in a drawer, closet, or under a lightproof box or cover.)
6. Allow the seeds to germinate for one week. Let the dishes sit undisturbed except to add water if the filter paper should become dry. If the dish in the dark needs added water, add it quickly and in a reduced light environment.
7. Observe the Petri dishes at the end of one week. Some seedlings will be pale in color (albino) with little or no green pigment. Other seedlings will have green areas forming. When nearly all the seedlings have germinated, count each seedling as either green or albino. Record your results in Chart 1 on the Heredity and Environment Worksheet.
8. After making your counts of "light" and "dark" seedlings, reverse the location of the Petri dishes for 2–3 days. Place the "light" dish in the dark and the "dark" dish in the light.
9. After several days observe the Petri dishes again and record the number of each kind of seedling in Chart 2 on the Heredity and Environment Worksheet.
10. Answer the questions on the Heredity and Environment Worksheet.

Heredity and Environment Worksheet

Chart 1. Before Reversal

Date: _____

	Seeds in Light		Seeds in Dark	
	Green	Albino	Green	Albino
Number				
Ratio of Green:Albino				

Chart 2. After Reversal

Date: _____

	Seeds in Light (original "dark")		Seeds in Dark (original "light")	
	Green	Albino	Green	Albino
Number				
Ratio of Green:Albino				

Questions

1. If the parents of the tobacco seeds used in this experiment were heterozygous for albino (green being dominant), what ratio of green to albino would you expect in this generation of tobacco plants? Did the expected ratio result? In the light? In the dark?

2. How do you explain what happened when you reversed the environmental conditions?

3. Defend which is most important for tobacco seedlings—its heredity or its environment. Use your data to help defend your answer.