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ABSTRACT

Included is a compilation of 21 simple experiments for use by elementary teachers and aides. The experiments are grouped into these categories: plants, insects, and senses. The materials required are not specialized and would generally be available in the classroom or from a local store. A number of films are recommended and are available from the Center. This work was prepared under an ESEA Title I contract. (PR)

SCIENCE EXPERIMENTS FIELD AND CLASSROOM

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Science Experiments for the Field and Classroom

Compiled by:

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Part 1: PLANTS
Films available from the Center
2047 Seed Dispersal (I)
2005 A Plant Through the Seasons-Apple Tree (P-I)
2071 What Plants Need For Growth
2077 Trees and Their Importance (I)
2103 A Story of Discovery; Why Plants Bend Toward Light (I)
2093 A Tree is a Living Thing (P-I)
2065 Osmosis (I)

Ex. 1: Plants Grow.
Materials: Paper towels
Radish seeds
Plate or dish

To show the growth of seeds, put two or three paper towels over a dish and sprinkle some radish seeds on the paper. Use three more towels to cover the seeds, and then moisten the paper cover. Examine the seeds each day to observe the amount of growth. Be sure to water the paper each day.

Ex. 2: Continuous growth.
Materials: Bean seeds
Small containers
Dirt.

Fill containers with dirt and have children plant seeds. Water the containers when they appear to be dry, but don't flood them as this will slow the growth of the plant. In this experiment, leaves, stems, and flowers will appear if you continue to water the plants for a long enough period of time.

Ex. 3: Plants Need Air
Materials: Paper cups
Glasses
Bean, radish, or pea seeds.

Fill the containers with dirt and plant the seeds. Water the plants in the paper cup moderately and the plants in the glass with all of the water that the glass will hold. Point out that the air bubbles that come to the surface no longer are where they can be used by the plant. After ten days, compare the growth of the two groups of plants.

Ex. 4: Plants Need Food
Materials: 3 containers
soil
clean sand
chemical fertilizer
seeds

Obtain a quart of sand and clean it by running water over it until all traces of

soil and debris are removed. Stir the sand to be sure that no soil remains. Fill 2 containers with this clean sand and the third with soil. Add water to all three containers and continue to water until plants appear. (rainwater or distilled water works better in this experiment than tap water) When the plants are about 2 inches tall, continue to water the plant in soil and one in sand with water. To the other add fertilizer and water. Then compare the growth of the plants a week later.

Ex. 5: Plants move
Materials: 2 pieces of glass about 4 inches square
paper towel
rubber bands
seeds

Place 3 layers of paper towel on one piece of glass and sprinkle radish seeds on it. Then put the other piece of glass over the seeds and press together firmly with rubber bands. (Don't crush the seeds) Stand the glass plates on end in a water supply. The towels will conduct the water seeds. After the root of the seeds is about an inch long, turn the plates so that the roots are pointed to one side. The roots will then change their course and again grow down in response to gravity.

Ex. 6: Plants Move Toward Light
Materials: Containers
Soil
Seeds

Fill the containers with seeds and soil. Water the soil and allow the seeds to germinate and the plants to get an inch or two above the ground, then move them to the dark side of the room and after a few days they will be seen to grow toward the windows as their leaves attempt to get more light.

Ex. 7: Food for Germination
Materials: Containers
Soil
Bean seeds

Fill the containers with soil and plant some of the bean seeds. Also plant some of the embryos (tiny plants found inside the seeds) The seeds with their food supply will grow, but the seeds without the food will not grow.

Ex. 8: Plants conduct water up.
Materials: Celery
Glass
Food coloring

Fill a glass with water and add some food coloring. Into this place a stalk of celery that has leaves. The end of the celery should be cut so that the conduction tubes are open. After a short period of time the celery will turn the color of the dye as the water is drawn up into the stalk.

Ex. 9: Water passes into the plant.
Materials: Potato
Glass

Cut the center out of one end of a potato and put the potato in the glass of water so that the hole in the center is facing up, and the bottom of it is below the line of the water in the glass. Toothpicks can be used to keep the potato from falling into the glass. After a day or two water will be found in the hole of the potato.

Ex. 10: Leaf Collections

On a field trip have the students collect as many different types of leaves as they can. Press these leaves between newspapers in the pages of a heavy book for about four days then remove them and mount them on a piece of heavy paper with glue.

Part 2: Insects
Films available from the Center
1003 Flies and mosquitos: Their Life Cycle and Control (P-I)
1020 Insect Zoo (P-I)
2046 Spiders (I)

Ex. 11: Insect Life Cycle
Materials: Bananas
Grapes
Quart Jar
Wire
Cardboard

Fruit flies are usually grown in a jar containing a mixture of crushed grapes and bananas. Remove the cover of the jar and let a few flies collect in the jar. Cover with cheesecloth or a nylon stocking and soon the jar will be full of insects for further experiments or for food for frogs and other small animals that might be kept in the room.

To collect the life cycle of the fruit fly you will need a platform that is suspended from the mouth of the jar on a wire. The platform needs to be above the mixture at the bottom. When the cardboard platform is covered with the four stages of the fruit fly remove it and place samples of each stage in alcohol to kill and preserve them.

Ex. 12: Fruit Fly Response to Light
Materials: Fruit flies
Long olive jar
Black construction paper

Transfer some fruit flies from your storage jar to the olive jar. Then cover one end of the jar with black construction paper and observe the reaction of the flies.

Ex. 13: Fruit fly response to heat.
Materials: Fruit flies
Long olive jar
hot water

Transfer some fruit flies from your storage jar to the olive jar. Then place one end of the jar in hot water and watch what happens to the insects.

Ex. 14: Insect Collections
Materials: Carbon Tetrachloride CCl_4
Pins.

All students like to collect things and insects are no exception. Insects that are brought to school or collected on field trips can be killed by a small amount of carbon tetrachloride on a piece of cotton. When they are dead they should be mounted on pins so as to keep their legs and head intact with the body.

Part 3: Animals
Films available from the Center
2012 Adventures of a Baby Fox
2018 Animals Useful to Man (I)
2041 Bird Homes (P-I)
2042 Farm Animals (P-I)
2075 Living Things are Everywhere (P)
2030 Living Things Depend on Each Other (P)
2088 Looking at Amphibians (P-I)
1005 Looking at Birds (P)
2025 Looking at Mammals (P)
2090 Looking at Reptiles (P-I)
1029 Robin Redbreast (P)

Experiments with animals hard to conduct in the classroom, however many small animals can be brought into the classroom and kept as pets if they are provided with food and water and shelter. Examples are frogs, lizards, fish, ants, and other insects.

Part 4: Senses

Ex. 15: Touch
Materials: Many different common objects that the children know.

Put the objects into a paper bag and let the children reach in one at a time and count the number of different things that they feel. After all have felt the objects, have them name them. Remove them from the bag as they give the proper name for each item.

Ex. 16: Heat and Cold
Materials: Ice
Warm water
Small blunt metal instrument about the diameter of a pencil

We feel hot or cold with our whole body, even though the areas that receive hot and cold are spread some distance from each other. Point out that there are small nerve endings that pick up hot and cold sensations. There are some places that heat and cold cannot be felt, and some places where hot things feel cold and cold things feel hot. Blind fold the student and touch different parts of his forearm with the hot, warm, and cold rods and have him tell which rod touched him.

Ex. 17: Taste
lemon
sugar water
Grated bakers chocolate

Different parts of the tongue taste different things. The front of the tongue is sensitive to sugar, but the back and middle are not very sensitive to sweet substances.

Show the sensitivity of the tongue to sweets by putting a drop of sweet solution he back of the tongue. then one on the tip of the tongue and ask which is sweeter.

Salt and sour tastes are sensed along the sides of the tongue. Test for these in a similar way as you did with sugar.

Bitter substances are detected on the back of the tongue. Test for these using a small flake of bakers chocolate.

Ex. 18: Sound Travels (2054 Sound and How It Travels (P)
Materials: Water
rocks
string
paper cups
tooth picks
wax candle

Sound travels in air in all directions. To show this have the children sit in a circle and one person beat a drum in the center of the group. The sound waves can be compared to the waves produced in a still pond when a rock is thrown in the center of it.

Sound travels in liquids. To show this fill the basin with water and hit two rocks together under water.

Sound travels through a solid. To show this make a telephone out of the two cups and about twenty-five feet of string. Punch a hole in the bottom of the cups and insert one end of the string inside each cup. Break the toothpick in half and tie the end of the string around the toothpick. When the string is drawn tight, the toothpicks should rest on the bottom of the cups. Wax the string by running a candle over the entire length of the string; this improves sound transmission. The telephones are now ready for use. Have one student hold a cup to his ear and the other talk in his phone.

Ex. 19: Sound is produced
Materials: Small box
Rubber bands
Yard stick

Sounds are produced by a vibrating object. Place a yardstick on the desk, allowing at least half of the length of the stick to protrude beyond the desk. Have one student hold the stick firmly to the desk and another student pluck the end of the stick. If no sound is produced, bend the stick farther before releasing it. To make the stick vibrate more rapidly, shorten the amount that hangs over the edge of the desk.

Any object that vibrates rapidly will produce a sound. Rubber bands stretched over a wooden box can be used to make a musical instrument. Other instruments can be made from filling bottles with differing amounts of water blowing over them. You might want to have each child make his own instrument and play some songs with them.

Ex. 20: Wheels and Rollers Help Us Do Work
Materials: Nail
Rope
Dowels or round pencils
Board 1 ft. by 2 ft.

Have one of your students sit on a board into which you have driven a nail and attached a rope. Have one of the other students pull him a short distance across

the floor. Then put some round dowels or pencils under the board and have him pull the other student again.

Ex. 21: Telegraph Sender and Receiver
Materials: Covered wire
Tin strips out from ditto fluid can
2 large nails
4 small nails
1 dry cell

Telegraph key is made from a piece of metal one inch wide and six inches long. Nail this key to a piece of wood with the bare end of a piece of wire under it and in contact with it. The key should be above the top of the large nails to which another piece of wire has been attached. Attach the wire from the metal strip of the key to one terminal of the dry cell. The wire from the nail of the sender goes to metal strip of the receiver. The receiver is made the same way as the sender, except that the nail of the receiver has ten to twenty turns of wire around it. The metal strip of the receiver is about 1/8 inch above the nail. The wire from the wound nail is attached to the other battery terminal.

Other films that might be used in motivating and teaching science

2115 Cattleman: A Rancher's Story (I)
2104 Discovering the Forest (I)
2073 Electricity and How It is Made (P)
2058 Fresh Water Pond (I)
2070 Health In Our Community (I)
1045 Heat and How We Use It (P)
1010 Life In a Vacant Lot (I)
1011 Life Story of the Earthworm (I)
2027 Life Story of a Social Insect: The Ant (I)
2039 Life Story of the Grasshopper (I)
2057 Light and Color (I)
1015 Light and Dark (P-I)
2010 The Marsh Community (I)
2048 Our World of Science (P-I)
2062 Produce from Farm to Market (I)
2028 Science Conserves the Forest (I)
2111 Simple Machines: The Inclined Plane Family (I)
2096 Simple Machines: The Lever Family (I)
2021 Why Foods Spoil (I)
1021 Your Protection Against Disease (P)