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Static Electricity

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lished by Romeyn B. Hough Company, Lowville, N. Y. It is beautifully illustrated, shows the distribution of each species, and has complete descriptions. "A Handbook of the Native Trees of Iowa" is a useful reference and can be secured from the Extension Service, Iowa State College, Ames, for five cents per copy.

Interesting class discussions can be developed around such topics as (1) Economic Value of Forests; (2) Forest Regions of the United States; (3) Protection of Our Forests. Other topics will suggest themselves. Much helpful material can be secured in the "Forestry Primer" published by the American Tree Association and obtainable from the Forestry Department, Iowa State College, Ames.

O. R. CLARK

STATIC ELECTRICITY

General Science

There is ample evidence that many electrical phenomena were observed in early times. Thales, of Greece, about 600 B.C., observed that amber when vigorously rubbed would attract light bodies such as scraps of thin paper. When a piece of magnetic iron found in Asia Minor was seen to attract bits of iron it was suggested that the two phenomena might be identical, but early in the seventeenth century Dr. William Gilbert pointed out the difference and brought the words "magnetism" and "electricity" into use.

Over in Magdeburg, Otto von Guericke, who had made an air pump and experimented with atmospheric pressure, constructed an electrical device. He took a ball of sulphur and as it turned in his hands, electric charges were developed to a remarkable degree. Still later Benjamin Franklin, the versatile American statesman and scientist, demonstrated that the lightning which was superstitiously believed to be "fire sent down from heaven," was identical with the electric spark produced by von Guericke in the laboratory. About the same time Volta, in Italy, made an electrophorus or induction device—the fore-runner of the modern static machine.

When the air in the school room is warm and dry, the teacher of general science may easily demonstrate the presence of an electric charge. Suspend from any convenient point a silk thread to which a small ball of pith, from a corn stalk, has been tied. Now rub a warm dry glass tumbler or flask with a dry piece of silk cloth and hold the glass near to the pith ball. If the glass has been electrified, the pith ball will be attracted to it. The glass is then said to have an electrostatic charge upon it or to be "charged." If the pith ball ceases to be attracted and flies away from the glass by repulsion, we say that the pith ball has acquired the same kind of charge and that like charges repel each other. Now if a fountain pen or a piece of sealing wax is rubbed with dry warm woolen cloth or fur and has thus become electrified, it will attract the charged pith ball which was repelled by the glass. This is because the charge upon the pen is opposite to that upon the glass and unlike charges attract each other. If next the pith ball is touched by the finger it will lose its charge and become neutral and in that condition will be attracted by either the pen or the glass since it no longer holds a charge.

It has become customary to call the charge upon the glass a positive charge and that upon the pen or wax a negative charge. The entire experiment may be reversed if desired, that is, one can begin with the fountain pen and demonstrate the same laws, charging the pith ball positively or negatively as desired. Since the pith ball loses its charge every time the hand touches it, we decide that the hand is a conductor of electric charges (or of electricity) and the charges are "grounded,"—conducted to the ground. Since the silk, touching the pith ball, does not cause it to lose its charge, we say that silk is a non-conductor or insulator.

A device formed of one or more suspended pith balls constitutes a pith ball electroscope, an instrument to demonstrate the kind of charge possessed by a body. If the pith ball is repelled we know that it has the same charge, both bodies being either negative or positive.

These simple tests will enable the teacher to show that rubber, silk, wax, wool, fur, paraffin and glass are insulators or non-conducting substances, since they tend to retain charges, while the hand, a wet string or a metal will convey charges and must be called conductors.

Remind the pupils that the insulating materials which they have seen on telephone poles or as coverings on electric wires are all insulators. Show them that in house lighting the buttons on lamp switches are of hard rubber and the lamp sockets are of porcelain or of metal lined with dry cardboard or other insulating material. Wherever electricity is used care must be taken to avoid wet hands, wet gloves or metal of any kind in touching parts which are charged or may be carrying a current. Encourage the pupils to experiment at home by sprinkling some dry sawdust, cork dust or bits of tissue paper on a card board, supporting an inch or so above them a pane of dry warm glass resting on two convenient books. When the glass is rubbed with a piece of silk, particles will fly up and cling to the electrified glass. Have them run a comb through the hair or stroke a cat's fur in the dark. Sparks can be seen and they have here a miniature electrical storm, including lightning and some suggestion of thunder. S. F. HERSEY

MAPS AS LABORATORY MATERIAL

Physiography

If the study of physiography is to be made real, vital and practical, the classroom recitation should be accompanied by some kind of well-planned laboratory work. The nature of the exercises should vary with the region in which the teacher works. Where it is possible to take classes out of doors to see the action of the various agents that are at work changing the surface of the earth, the classroom recitation is motivated in a way that cannot be secured from a mere verbal discussion. To make the study broader, the teacher should use the topographic map. This can be interpreted to pupils in such a way as to bring out, next to the actual field trip, the changes that are going on in different parts of the world. This article will deal with the field which should be covered in the study of physiography, and will suggest some of the most important maps which can be used for each phase covered.

It is understood that the teacher should attempt to correlate the study of physiography with man's activities, wherever possible, so that the problem in hand is not a physical one only.

Methods of showing land form with maps

Nearly every one is familiar with wall maps and knows how they can indicate relief and topography. Use is made of various colors to indicate different elevations. Hachures are short dashes which, by their spacing indicate the degree of slope. The dashes always extend in the direction of the slope. Hachure maps are quite often used in railroad folders. In the modern topographic map, land forms and relief are shown by means of lines. In the study of physiography then, the topographic map should be carefully developed so that every member of the class can read in the map the details of out-of-doors.

Some Things to Emphasize in the Study of Topographic Maps

1. What are various kinds of maps and how do they show relief?
2. In what ways does the topographic map differ from an ordinary map?
3. What is a rectangle? How many are there on a topographic map?
4. How are latitude and longitude shown on the map?
5. What is a scale? Why is a scale necessary?
6. Can the pupil name and express the different kinds of scales on maps?
7. What is the relation between the scale and the area of the map?
8. What features are shown on the topographic map? How are they shown?
9. How do contour lines show relief? How express maximum and minimum relief?
10. What are the conventional signs for house, school, railroad, public highway, church, bridge, permanent stream, intermittent stream, permanent lake, intermittent lake, township and county and state boundaries?
11. What is a contour line?
12. What is the contour interval?