

frequently, until the fronds become thoroughly dried, care being taken each time that the parts are properly arranged.

From the press the transfer to the portfolio is an easy process. Here arrangement must be left in a great measure to the taste of the collector. A few suggestions may, however, be of service. When ferns have two kinds of fronds—barren and fruitful—specimens of each should be obtained; and it is desirable to have two specimens of the fronds of every species so that the front and back may be shown side by side, the front being generally distinguished by greater depth and richness of coloring, while the back has its arrangement of spore cases, and their coverings. The order of arranging the fronds should be according to genera, and in a portfolio provided with guards and containing sheets of stout white paper, such as is used by botanists. The specimens should be lightly fastened to the paper by means of fine threads passing over and secured at the back of the sheet. A label should be attached to each specimen bearing the name, when it can be ascertained, and the time and place of gathering. In this way can be arranged an object not only of interest to the botanical student, but a thing of beauty that must be admired by all who have, in any degree, taste to appreciate the beautiful in nature.

(For the Acadian Science Club.)

## LECTURES ON MINERALOGY.

### III.—PHYSICAL CHARACTERISTICS OF MINERALS.

The chief physical properties to be determined are: 1, *Hardness*, which is determined by the ease or difficulty with which it is scratched. The following minerals may be taken as a *scale of hardness* for comparison. 1. Talc, 2. Gypsum, 3. Calcite, 4. Fluorite, 5. Apatite, 6. Feldspar, 7. Quartz, 8. Topaz, 9. Sapphire, 10. Diamond. The hardness is usually determined by trying the mineral with the finger nail, the point of a knife, or by drawing a sharp edge across a piece of glass, then comparing with the *scale*. Should it be the

same as calcite it is said to have the hardness of 3; if it is a little harder than this, but not so hard as fluorite, it is 3.5. The numbers above 7 & 8 in the scale are not often needed. H., is the abbreviation used to denote hardness.

II. *Specific Gravity* (Gr). The relative weight of the mineral compared with water, may be determined approximately after a little experience by its sense of weight in the hand.

III. *Cleavage*, the tendency to break in certain directions. It may be described as *eminent, distinct, indistinct, in traces, or difficult*. It is also named according to the direction in which it takes place.

IV. *Fracture*, the kind of surface obtained by breaking where there is no cleavage. The following are the principle forms noticed, *even* when the surface is flat, *uneven* when the surface is rough, *hackly*, when covered with sharp jagged points. *Conchoidal*, when covered with curved surfaces.

V. *Color*, depending on the kind of light reflected or transmitted. A *play of colors* is an expression used where several prismatic colors appear on turning the mineral. *Irridescence*, where prismatic colors are seen within a crystal. *Tarnish*, where the surface color has been changed by exposure.

VI. *Streak*, the color of the mark made by the mineral on some hard white surface like unglazed porcelain. It simply shows the color of the finely pulverized mineral, which is often quite different from the solid specimen. Its determination is of considerable importance.

VII. *Luster*, depending on the manner in which light is reflected. The kinds of lustre are: 1. *Metallic*, the luster of metals; where it is imperfect it is called *sub-metallic*. 2. *Vitreous*, luster of broken glass. The term *sub-vitreous* is also used. 3. *Pearly*, like pearl. Talc is an example. 4. *Resinous*, like resin, or zinc blende. 5