Gordon MacKenzie

The Young Naturalist

This is Young Naturalist Year: 1966-1967
Do you have a Young Naturalists Club in your community?

YOUNG NATURALISTS CLUB F. O. N.

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Lichens—Age Rivals of Trees

Living things contact the environment in which they live in one of three ways: they move around in it as we and most animals do; or, like most plants, they are rooted in soil or, like corals and mosses, they cling to the surface of underlying materials or a "substrate". You can place every organism in one of these groups of movers, rooters, and clingers. The lichens (pronounced *lie-kens*) belong to the last group.

The pictures should give you a rough idea of how lichens look but I shall describe in a later article what common kinds there are and how one can tell them apart.

Where Lichens Grow

Lichens grow on quite a number of substrates such as bark, wood, mosses, bare soil, and rocks of all kinds. Most lichens are rather choosy and tolerate only one kind of substrate. If you know the lichen species you can, for instance, often predict how acid its substrate is and whether the rock on which it grows contains much lime. Some of the most common lichens, however, tolerate more than one substrate and have been found growing even on lacquered wood, iron, glass, leather, and skulls. The last-named kind was once regarded as a powerful ingredient of magic potions.

Other than a few dissolved minerals, lichens do not take up food from their substrate. What could they get out of glass or iron anyway? Like the familiar green plants, they produce their own food with the energy of light and with carbon dioxide gas and water as raw materials. But unlike the rooted green plant, a clinger cannot draw water continuously from the soil, nor can it hold water in its body and so resist drying out as most land animals do. The clinging lichens solve the problem in another way: they are, in fact, specialized for drying out. Many survive drying out for years and are fully awakened from their dormant state a few minutes after they have been wetted. Among the plants which one can see with the naked eye, only some mosses can match this feat. Once a rooter or a mover is dried, it has usually died.

Some lichens grow in woods like these, but this article tells about other situations in which they may be found.

Each lichen has quite narrow limits as to the amount of moisture it tolerates and the lichenologist can tell from the kind of lichens on the trunk of a tree or on the rocks on the shore of a river or of the sea, how long the substrate will be wet during an average year. Lichens are thus excellent indicators of the climate of their environment.

Growth Is Slow

As most lichens are dormant and dry for the greater part of their existence, they can live actively and grow only during short intervals. These amount to roughly a fifth or a tenth of the year in southern Ontario but may drop to a hundredth of the total time in polar regions and some deserts. An outcome of this fact is that lichens grow rather slowly and may become very old. Many of them grow in our region a few millimeters a year and become several decades old before their

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Left: Woolly Panic-grass; upper right: Sumach; lower right: Clubmoss. *O. Addison*

How to Make Driprints

It is interesting to be *doing* things with nature as well as *looking at* things. Making prints of leaves and plants is one of the "easy to do" woodlore activities.

Collect irregular or divided leaves or even whole small plants. Always identify your plants or leaves, then flatten them by pressing them between layers of newspapers and placing a weight on top. The moisture is quickly absorbed by the paper.

For making driprints you will need:

1. Special driprint or ozalid paper from a blue printing or architects' supply store. Mention that you intend printing by sunlight because the paper comes in different "speeds". A medium speed is preferable. The paper comes in large rolls and the colours available are blue on green, black on white and blue on white. Have your supply cut into pieces 5″ x 7″ or 8½″ x 11″ and keep it in heavy dark wrapping paper in a dry place. Do not buy a large quantity because the paper deteriorates very quickly.

2. A sheet of glass the same size as the paper selected; a strong wide picture frame in which the glass is to be fitted; two thicknesses of flannelette cut the same size as the glass; a sheet of plywood to form a backing; "turn" buttons fastened to the four sides of the frame to clamp the back in place. The closer the contact between the glass, the specimen and the paper, the better the print will be.

3. A large, wide-mouthed, gallon jar. Buy sixteen ounces of 24-26% ammonia (household ammonia fumes are not strong enough) from the drug store. Soak absorbent cotton or a small piece of cheesecloth with the ammonia and place in the bottom of the jar. Cover this with a piece of screening (this keeps the paper from coming in direct contact with the damp cotton). Place a lid on top of the jar. The ammonia fumes contained in the jar will act as a developing agent. CAUTION: The fumes are strong and care should be taken to avoid inhaling them.

Arrange your specimen on the glass in subdued light. Place the driprint paper (tinted side down) over the specimen. Next cover it with the flannelette and the backing board and clamp it all down tightly with the turn buttons. Expose the specimen to sunlight being careful not to cast a shadow across the glass or to let your fingers extend over the frame. Expose until the paper changes to white (about a minute). Take the paper out of the frame and place it in the jar. The print will develop as if by magic.

In making blue prints, the above method will be found satisfactory. The developing solution, however, is made by dissolving one heaping tablespoon of potassium bichromate crystals in one gallon of water. (The blue print store will supply this at very little cost.) OTTELYN ADDISON

Club News

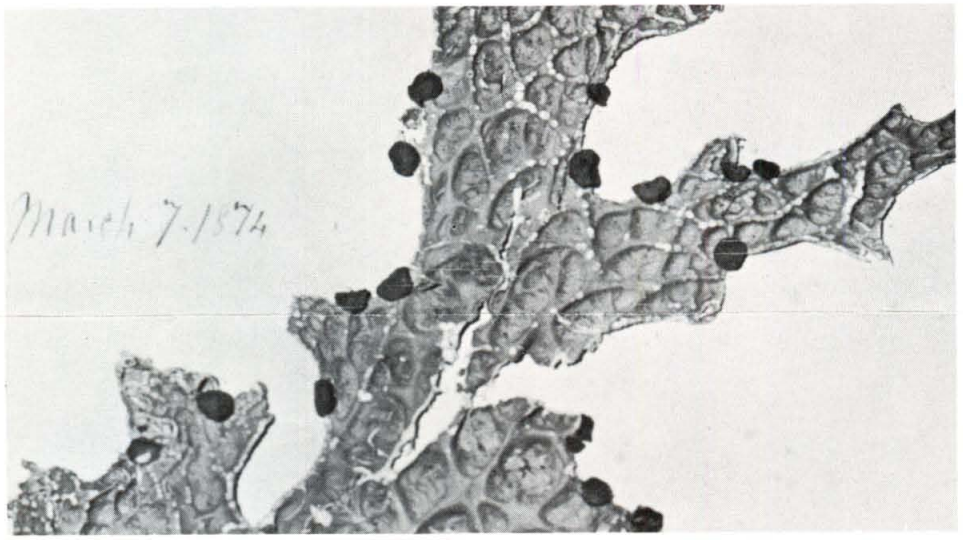
The Toronto Junior Field Naturalists' Club

The Toronto Junior Field Naturalists' Club is sponsored by the Toronto Field Naturalists' Club and is affiliated with the Federation of Ontario Naturalists. The Club was founded in 1931, and it has met at the Royal Ontario Museum since 1941. In thirty-five years the membership has grown from seventy-five to its present total of over three hundred members.

Indoor meetings are held on the first Saturday of each month, October to May, for children of ages eight to sixteen years. The meetings are held from 10.00 am to 12.00 noon. The first hour is spent in the museum theatre where the children enjoy motion pictures and short talks by certain members. For the second hour of the morning the members join their own special interest groups.

The Club publishes an annual magazine called *Flight* that contains stories, poems, and drawings contributed by the members. The annual fee is one dollar, and this entitles the member to a copy of *Flight*.

R. J. MacLellan



Photos by R. E. Beschel

The broad-lobed *Lobaria pulmonaria* grows in moist climates on trees. In a little drier climates it can find enough moisture only on wet cliffs. In southern and eastern Ontario it is nearly extinct.

The leafy lichen *Parmelia conspersa* grows only on open acid rock. The margin has straw-coloured lobes. In the middle of older patches grow brown disks that produce spores.

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substrate weathers or rots away. In polar regions and on high mountains many lichens grow only a fraction of a millimeter in one year and the oldest lichen patches rival the age of the oldest trees on earth, exceeding several thousand years. The speed of their growth depends directly on the climate and this speed is also a very useful indicator of the climate where weather stations are scarce.

You might try yourself to find out how fast lichens grow. The easiest way is to take a good close-up photograph of a lichen-covered rock with a scale attached as shown in the first picture. Make a sketch of the place so that you can find it again, and repeat this photograph after one or several years. You can also place a transparent sheet, e.g. a plastic bag, over a rock or a tree trunk and trace the outline of the individual lichen patches with a fine felt pen. Take this transparent sheet home after marking the exact place and repeat the tracing after one or several years. The latter method is not quite as exact as a photograph.

Sensitive to Pollution

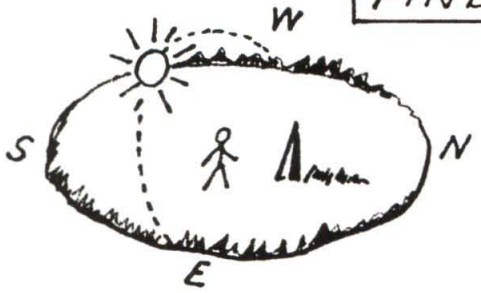
If you live in or near a city you will find only a few tiny lichen crusts on mortar and cement, and none on bark, wood, or soil. Most lichens are quite sensitive to air pollution. A good lichen cover on trees is the best indicator that the area has not yet been affected by the city with its drier climate and its multitude of noxious gases and dusts in the air. The progress of industry and the increase in fumes and smoke have already killed most lichens over greater parts of Europe and in places thirty miles away from cities like New York or smelters like Sudbury. Some of the more sensitive lichens disappear even greater distances away from cities, but this may also result from a slight warming and drying of the climate in the last hundred years. The broad-lobed lichen *Lobaria pulmonaria* is shown in the top photo. The lichenologist *A. T. Drummond* wrote one hundred years ago that this lichen was extremely common on tree trunks in eastern Ontario. Today it grows only on a few shaded cliffs in the moister regions towards Algonquin Park.

If you start some growth-observations now, you will be able to tell in a few years how pollution has affected your indicator lichens and whether the air has stayed reasonably clean.

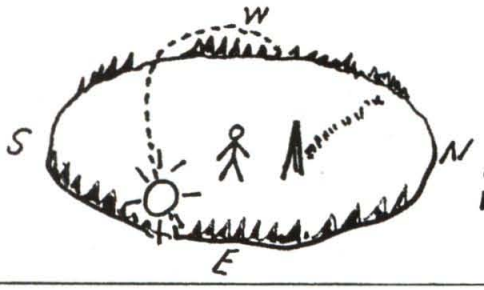
Roland E. Beschel

THE YOUNG EXPERIMENTER

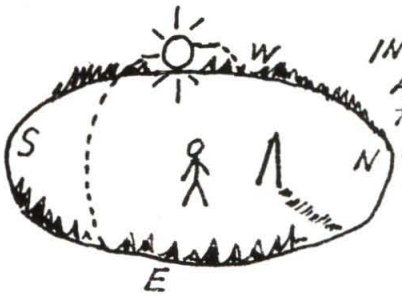
FINDING NORTH BY THE SUN



AT NOON WHEN THE SUN IS HIGHEST, NORTH MAY BE EASILY FOUND BY NOTING THE DIRECTION OF THE SHADOW CAST BY AN UPRIGHT STICK.



IN THE MORNING THE SHADOW CAST BY THE STICK POINTS APPROXIMATELY WEST



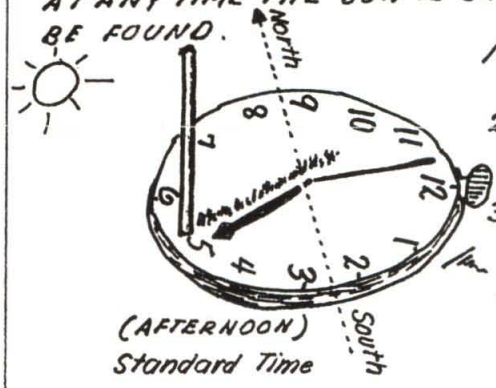
IN THE AFTERNOON THE SHADOW POINTS APPROXIMATELY EAST

IN FINDING NORTH BY THE SHADOW METHOD YOU CANNOT ALWAYS WAIT FOR NOON. (YOU MIGHT HAVE TO WAIT ALMOST A DAY!). IF YOU KNOW THE TIME OF DAY YOU CAN PREDICT THE DIRECTION THE SHADOW OF A STICK WILL FALL AT NOON AND THEREFOR FIND NORTH.

THE SUN APPEARS TO MOVE THROUGH THE SKY DURING THE DAY BECAUSE OF THE ROTATION OF THE EARTH. SINCE THE ROTATES 360° IN 24 HOURS THE SUN APPEARS TO MOVE $\frac{360^\circ}{24} = 15^\circ$ EVERY HOUR ACROSS THE SKY.

THIS MEANS THAT THE SHADOW OF AN UPRIGHT STICKS CHANGES ITS DIRECTION ABOUT 15° EVERY HOUR.

BY MEANS OF A POCKET WATCH AND A PENCIL THE DIRECTION OF NORTH AT ANY TIME THE SUN IS SHINING CAN BE FOUND.



1. PLACE WATCH ON FLAT SURFACE
2. STAND A SMALL STICK AT END OF HOUR HAND
3. TURN WATCH SO THAT SHADOW OF STICK FALLS ALONG THE HOUR HAND.
4. A LINE DRAWN HALFWAY BETWEEN THE END OF THE HOUR HAND AND 12 O'CLOCK RUNS NORTH AND SOUTH.
   (IN SUMMER YOU MAY HAVE TO SET YOUR WATCH BACK ONE HOUR TO PUT IT ON STANDARD TIME)
5. WORK OUT A RULE TO DETERMINE WHICH END OF THE DOTTED LINE IS NORTH FOR THE MORNING AND AFTERNOON.

WHY IS THE LINE DRAWN HALFWAY BETWEEN THE HOUR HAND AND 12 'O'CLOCK ?
HINT: THE HOUR HAND TURNS AT TWICE THE RATE OF THAT OF THE SHADOW.

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