BOTANY

NATURE RAMBLINGS

by Frank Thone

Martian Plants

➤ LICHENS got their first widespread airing over the radio recently, when some astronomical observations on Mars were at first "interpreted" by non-scientific writers as proofs that plant life at the level of lichens and mosses existed on our neighbor-planet. Most radio commentators, incidentally, mispronounced the word "lichens," making it rhyme with "kitchens"; the accepted pronunciation is exactly like that of the common verb, "likens".

The general climate of Mars has been most aptly compared to that which would exist at the top of a desert mountain twice the height of Everest. Nothing much there, it would seem, to support rich vegetation; certainly nothing to supply the manifold needs of a high human civilization, such as romancers have pictured on Mars. Lichens, however, might survive. They are the earth's toughest plants, first to appear on barren rock anywhere on earth, whether it be under the blazing Sahara sun or on the bleak nunataks of Greenland.

To imagine lichens on Mars, however, requires the acceptance of not one kind of plant but two. For a lichen is not a single plant like a buttercup or a mushroom; it is a fairly complex colony consisting of two quite different kinds of plants. It is a close web of colorless fungus threads holding within it swarms of one-celled lower plants known as algae. Often they are the same kind of plants that, growing alone, form green film on the bark of trees in moist places and are often though erroneously called "moss".

This intimate mutual entanglement of two different kinds of plants is often pointed out by biologists as a good example of what they term "symbiosis". That difficult-looking word is simply Greek for "living together." It is used to describe the close association of any two different species where both appear to derive some benefit, and both make their contributions to the common welfare. It doesn't always work out as ideally as that, but at any rate that is the theory.

These masses of fungi and algae that assume the distinctive forms we know as lichens are of three different main types. There are crustose or crust-forming lichens, that look like daubs of dried paint, some of them brilliant reds and yellows. There are foliose or leafy lichens; "rock tripe" is one common name applied to them. Finally, there are fruticose or twiggy lichens, best exemplified in the familiar reindeer moss, and in the "moss" that beards the murmuring pines and the hemlocks in the prelude to Longfellow's Evangeline.

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Chlorophyll Has Disk Form

➤ CHLOROPHYLL, the green pigment in plants on which all life ultimately depends, comes in almost ultramicroscopic little disks or wafers, held together in groups of from 40 to 60 by a structureless matrix. Electron microscope studies confirming these structural details have been made by Drs. Sam Granick and K. R. Porter of the Rockefeller Institute for Medical Research, New York.

Easily visible under even moderate powers of the ordinary compound microscope are the saucer-shaped larger green bodies known as chloroplasts, which in turn are made of masses of these newly explored smaller units, known technically as "grana".

Existence of the grana was suggested a number of years ago, on the basis of studies with the highest powers of the ordinary microscope. However, because each individual granum has a diameter only slightly greater than one wavelength of visible light, they could be only just barely glimpsed by that method. Not until the enormously higher magnifications of the electron microscope became available could further research be carried on.

Drs. Granick and Porter used ground-up chloroplasts of spinach in their studies. Minute drops of the green suspension were placed on thin transparent films and carefully dried, then exposed to the electron microscope beam and photographed. Some of the preparations were given an exceedingly thin coat of gold, and this delicate metal "cast" used in further study and photography.

Diameters of the grana average about 6000 Angstroms, and their thickness is approximately one-eighth their diameter. (An Angstrom is the unit of measurement for light wavelengths; it is roughly a quarter-millionth of an inch.) Diameters of grana in different groups differ slightly, but all those within a given group are of uniform size.

Chemical studies on this exceedingly minute scale are of course difficult, but the two investigators are now endeavoring to determine in what part of the chlorophyll complex the light-capturing green and yellow pigments are held.

Details of the studies appear in the *American Journal of Botany* (Dec. 1947).

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