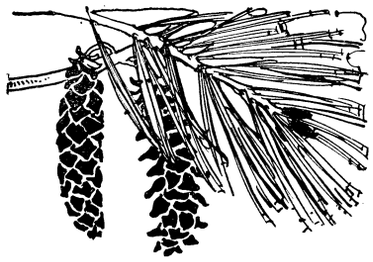
PLANT PATHOLOGY

NATURE RAMBLINGS
by Frank Thone



Tangled Lives

THERE ARE throughout the plant and animal kingdoms hosts of species that have forsaken their ancestors' honorable ways of getting a living: patiently making food out of air and water and sunlight, in the case of green plants, or the vigorous, forthright killing and eating practised by the more familiar animals. These parasitic creatures creep about the world, fastening themselves on the bodies of unwilling hosts or insinuating themselves into their internal tissues, and there spend their degraded lives eating food they never had any part in preparing or capturing.

This way of life is repulsive to our way of thinking, and the very appearance of a parasite sets most of us to squirming. But there are some parasites that are not content even with an ordinarily abnormal existence: they must complicate it by insisting on having two or more different hosts at different times in their lives. And they will not complete their evil cycle unless they can do it in just the prescribed way.

The several white pine species in this country, for example, are at present having the struggle of their lives with a fungus disease called blister rust. It causes big, watery blisters to appear on the branches, and eventually kills the trees, or at least ruins them for timber or ornamental purposes. It spread through the white pine woods of the East like wildfire once it was introduced from Europe, and now has crossed the Canadian line southward into the even greater white pine stands in the Rocky Mountain and Pacific areas.

Yet this fast-spreading disease could not do the pines a penny's worth of harm if there were not in the woods also considerable numbers of wild currants and gooseberries—or cultivated gardens of these fruits nearby. For the blister rust fungus must go from pine to currant or gooseberry, and from the bush back to pine again. It cannot travel from tree to tree, nor from bush to bush. The currant-gooseberry genus is its nurse, that nourishes it when it is young, and then lets it go on to heartier food when it is a bit more grown.

The same relation of "alternate hosts" is maintained by the black stem rust of wheat and other cereals. This fungus requires the presence of European barberry bushes to give it a start in the spring, although once started it can travel from wheat to wheat all summer. A somewhat similar cycle is followed by the crown rust of oats, with buckthorn bushes playing the role of alternate hosts.

Science News Letter, May 13, 1933

Cover Picture

ALMOST as silently as you view the new domed building in the cover picture, this all-steel structure is rising at the U. S. Naval Observatory in Washington. There is no hammering of rivets to fray the nerves of humans and upset the accuracy of the delicate Naval Observatory clocks that regulate timepieces throughout the country.

Economy, rigidity of construction and light-proof domes are also claimed as advantages of welding.

In addition to this building, 35 feet high and 33 feet in diameter, a smaller one 25 feet in height is being erected. The dark curved steel piece in the foreground is the cover for the opening of the large dome.

These buildings are to house new 15- and 40-inch telescopes.

Science News Letter, May 13, 1933

BIOLOGY

One-Celled Animals Grown On Wholly Inorganic Diet

ANIMALS feeding and growing new generations of themselves, on a wholly inorganic diet of a type hitherto considered suitable only for plants equipped with the green synthesizing pigment chlorophyll, have been reared in the zoological laboratory of the Johns Hopkins University by Prof. S. O. Mast and Dr. D. M. Pace.

The animals were the one-celled primitive species known as *Chilomonas paramecium*. They were "planted" in a sterile culture medium containing sodium acetate, ammonium chloride, magnesium sulphate and potassium phosphate. Under normal conditions the animals reproduce rapidly by division into two parts, and they usually contain relatively large quantities of starch and fat. In the culture solution they gave rise to 3.4 new generations a day. When sodium silicate was added their reproduction rate went up to 3.9 generations a day.

When the solution was made up minus the organic salt, sodium acetate, the reproduction rate went on at the same level for three or four days, but then the animals died. But in the same totally inorganic solution with a heavy increase in carbon dioxide in the air over it—20 per cent. instead of the normal 3 per cent.—growth and reproduction went on indefinitely and specimens produced were well filled with starch and fat.

A hint of the cause of death when both the acetate and the carbon dioxide were low is contained in the fact that under these conditions the individual animals are very small, containing little starch and fat. Death under these conditions is therefore probably due to starvation.

For some unknown reason, the silicate salt seems to be necessary in the all-inorganic culture solution. If it is omitted, the animal divides a few times and then dies. Silicon is not usually an indispensable element to either plants or animals. The Johns Hopkins investigators suggest that in this case it probably acts as a catalyst, that is, as an agent for producing chemical transformations without itself taking part in them.

The results obtained, they state in conclusion, indicate that only eight chemical elements are necessary: nitrogen, carbon, hydrogen, oxygen, potassium, magnesium, phosphorus and sulphur. But they hold that traces of a number of other elements are probably also necessary.

Science News Letter, May 13, 1933