PLANT PHYSIOLOGY

NATURE RAMBLINGS

by Frank Thone

Tree Thermostats

TREES have thermostatic methods of their own for resisting both freezing in winter and overheating in summer, Prof. E. S. Reynolds, plant physiologist of Washington University and of the Missouri Botanical Garden, has discovered in measurements of tree-trunk and air temperatures over a period of four years.

Prof. Reynolds inserted automatic, recording, electrical resistance thermometers in the heart of a tree-trunk and in the cambium or growth layer just under the bark. He also used a similar, shaded instrument to record the air temperatures alongside those of the trees.

In the winter period the tree temperatures changed more slowly than the air temperatures. The lag became especially pronounced just when the temperature reached the freezing point. Often for a period of 24 to 60 hours after the air temperature had dropped several degrees below the freezing point the tree temperatures remained steadily at about the freezing point.

Likewise when the air temperature rose well above the freezing point the tree temperature would not pass above this point for a long time.

However, once this point was passed in either direction the temperature of the trunk followed that of the air rather closely. Dr. Reynolds regards this more or less extended period of steady temperature at the freezing point as dependent upon the release of heat during the freezing of the water in the tree and the equivalent absorption of heat later in the process of melting the ice.

Resistance to extreme temperatures in summer followed a different pattern. Thus under these conditions the temperature at the center of the tree dropped to between 60 and 63 degrees and the cambium was less than 90, when the air temperature was above 105.

The tree's ability to keep its trunk cooler than the torrid surrounding air seems to be tied up with two factors. The air spaces in the wood can hold larger quantities of water vapor as the temperature rises and more spaces are developed in the finely tubular tissues of the wood. This latter occurs because of the breaking of the slender sap columns due to the severe pull exercised on them by the rapidly transpiring leaves.

From the nearby wet tissues water is evaporated rapidly into these nearly empty spaces until they are saturated with water vapor. The great amount of heat that is required to evaporate water is one of the best known physical phenomena. The tree thus keeps itself cool, at all times when it is in good foliage, by the absorption of heat from the tissues by this evaporation as if from a kind of internal sweat.

When it is remembered that the tender, growing cambium zone is not far beneath the surface of the bark, which is often heated to high temperatures by direct sunshine, the value of this cooling process is more evident.

Prof. Reynolds also points out that his studies raise anew the old question of the possible rise of water in trees in the form of vapor. This was once one of the most-discussed of plant physiological theories, but has been more or less in abeyance lately. However, if water vapor is a regular part of the tree's temperature regulating mechanism, there is at least a possibility that it is also transported upwards, to be condensed back into liquid in leaves or twigs.

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PUBLIC HEALTH

Biblical Plagues Still Weaken Egypt's Health

THE BIBLICAL plagues still afflict the land of Egypt.

Far from being a never-repeated reign of terror, the plagues with which Moses frightened a Pharaoh into releasing the Israelites were fearful because of their familiarity. And they still recur in more or less serious form, like our own epidemics and other trials.

The sequence of health hazards which the Nile brings each year was deplored recently before the World Federation of Education Associations by a physician of the government health service in Cairo, Dr. Isabel Garvice.

Pointing out the Biblical antiquity of these conditions, Dr. Garvice said that every August, then and now, the rising Nile turns blood-red from its load of heavy mud.

To drink this water is to invite sickness and death. Yet the Egyptian peasant is convinced that drinking well water would turn his hair gray and make him old before his time. Rather than risk such calamities, he clings to his year-round habit of drinking from river or canal, and the blood-red water brings the plague of boils. The children, says Dr. Garvice, often have ten to twenty boils on face and body.

As the flood waters lessen, come the plagues of frogs, flies, and death to the babies.

Even the three days of darkness which enveloped the earth in the Bible siege of plagues, is still experienced. The darkness takes the form of sandstorms, which are still terrible in upper Egypt and still last three days.

"All these things," said Dr. Garvice, "are put down to the will of God and accepted with resignation by the peasant."

But the Egyptian government is determined to cope with its plagues. Children, under compulsory schooling, are being taught health habits and given medical attention. Rural villages are shown hygiene films. Medical centers are established. The conquest of the plagues is advancing—slowly.

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