BOTANY

Trees Grow on Stilts In Great Smoky Mountains

VISITORS to Great Smoky Mountains National Park are often puzzled by finding, along moist slopes bathed in almost perennial mist, birch trees that seem to stand on stilts. Instead of having their roots embedded in the earth in orthodox tree fashion, these birches are apt to be standing up, as though on tiptoe, on anywhere from three to half-a-dozen roots that lift the base of the trunk a foot or more clear of the earth. Some of the trees look almost like gigantic insects, spraddling along over fallen logs and other obstacles.

The factor responsible for this strange tree behavior is the perpetual mist of the Great Smokies, that gives the mountains their name, explains Dr. Stanley A. Cain, research associate of the Waterman Institute of Indiana University. By keeping everything always moist, it makes possible the germination of seeds on fallen logs, on top of mossy rocks, and in many other places that would be too dry in ordinary woods, where the precipitation is lower and the evaporating power of the air greater.

The seedlings thus started send their roots down the moist sides of their supports. These roots take hold in the soil. Eventually the original supporting log decays and disappears, leaving the young tree literally "up in the air," supported only by the multiple "false trunks" formed by its roots.

These birches of the Great Smokies are emulating the behavior of the famous banyan trees of the Orient, and the strangling-fig vines of the tropics generally. The banyan is not a tree, properly speaking, but a sprawling vine. It gets its start in the branches of a tree of some other species, and sends long roots down to take hold in the soil.

Finally it smothers or strangles its supporting tree. But by this time its numerous dangling roots have become solidly established as pillar-like false trunks. The banyan then goes on indefinitely, spreading in all directions and sending down scores of new supporting roots, until it is a veritable one-tree grove.

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BANYAN BIRCHES

A log once lay between their straddling roots, but has long since decayed and vanished.

RADIO

Tuesday, August 27, 3:30 p. m., E.S.T.

BEFORE COLUMBUS CAME, by Dr. H. J. Spinden, Curator of Prehistoric and Primitive Art, Brooklyn Museum.

Tuesday, September 3, 3:30 P. M., E.S.T.

OUR HIGHWAYS, ARTERIES OF THE NATION, by Dr. S. S. Steinberg, University of Maryland.

In the Science Service series of radio addresses given by eminent scientists over the Columbia Broadcasting System.

ENTOMOLOGY

Female Katydids Lisp Faint Answers to Males

KATYDIDS, shrilly shouting their interminable arguments over an imaginary Katy's responsibility or lack of it for some unknown deed, are all males. Their noise is really a lovesong, intended for the charming of some coy, green-winged damsel of their own kind.

But the female katydid is "not so dumb after all," reports Dr. B. B. Fulton, of North Carolina State College.

"It has often been supposed that the female was so charmed by the musical efforts of the male that she sought out his leafy abode," he says. "But there is now evidence to show that in some species at least she stays at home and merely sends out a katydid code signal meaning 'here I am if you want me.' "

Dr. Fulton was led to his discovery of the female katydid's ability to speak for herself when the time comes, by hearing very faint responses on the part of unmated females when males were raising a disturbance in the neighborhood. These were tiny lisping sounds, no doubt the katydid equivalents of a shy "yeth, thir."

They must have required extraordinary hearing abilities on the part of the males, Dr. Fulton comments. But they sufficed. The ardent suitors sought and found their waiting mates.

Female katydids make their very faint responses by rubbing special surfaces on their wings together, just as the males do. Only the file-teeth used for the purpose are much smaller than those on the males' wings. Dr. Fulton examined a large number of katydid specimens in his collection, and found that in many species some kind or other of these file-toothed voice-organs on the wings were present.

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ENTOMOLOGY

Wasps Squeeze 'Balloon Eggs' Through Very Narrow Tube

WASPS that lay "balloon eggs" through an opening only one-twelfth their diameter, and that build "sippers" like soda straws to obtain food which they have never seen are the extraordinary insects described by Dr. B. B. Fulton of North Carolina State College.

The insects are tiny wasp-like creatures that lay their eggs on the larvae of the grain moth, a destructive pest of corn. The smaller wasp larvae feed on the grain-moth larvae, destroying them and thus unconsciously doing the human race a good turn.

But to get the egg to the moth larva is no easy task for the female wasplet. First she must drill a hole through the grain in which the larva is feeding. This she does with her ovipositor, which is a combination of drill, probe, sting, and egg-laying device.

Having reached the larva's lair, she stings it into a paralytic state. Then the egg-laying process begins. The egg is squeezed, shell and all, through the channel of the ovipositor, although it is a dozen times the diameter of this tiny tube. It bulges out like a small balloon as it emerges from the end.

The egg is so large that part of it must still be in the insect's body while the other end is being squeezed out of the tube. Dr. Fulton offers the opinion that it "must

flow through like sand in an hourglass." Yet the egg assumes a normal egg-shape after it is laid, none the worse for its experience. Laboratory experiments, pulling and squeezing these tiny eggs, showed a remarkable degree of toughness and resiliency.

The adult female of this species also feeds on the grain moth larvae herself, though she never sees them. She does this by puncturing a larva with her ovipositor. While the tip is still imbedded in the stung larva, the ovipositor exudes a viscous fluid which hardens on the outside, forming a tube.

The insect then withdraws her ovipositor, leaving the tube intact. Through this the insect drinks the blood of the larva "as daintily as a college girl sipping soda water through a straw."

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ENTOMOLOGY

Did Spiders Teach Man The Weaving of Nets?

See Front Cover

GREEK legend has it that Arachne, the first mortal spinster, learned so perfectly Athene's art of weaving that she became presumptuous enough to compete against the goddess, and as a punishment was transformed into a spider.

Whatever may be the justification for the old story, it would seem at least as likely that men learned from spiders the weaving of nets to trap birds and other small quarry, more directly than women did the art of weaving cloth. While nobody knows when or how nets were actually invented, it is easy to speculate that some Neolithic hunter, idling among the riverside reeds on a day when birds were shy, may have watched a spider spread her net for her own winged prey, and so received the inspiration to try something of the same kind to catch his food with more certainty and less labor.

Arachne may have taught men the use of birdlime, too, for the cross threads in her web are sticky with a glue of her own making, which is the ultimate prey-catching device that makes the whole mechanism effective.

So fine are the treads, even thus coated, that under ordinary circumstances they are quite invisible. But after a cool night they may be so beaded with tiny dewdrops that they can be photographed. It was in this state that Cornelia Clarke caught the web shown on the cover of this number of the SCIENCE NEWS LETTER.

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ECOLOGY

Prairie's Own Soil Management Superior to That of Man

MAN, the land-hungry, the land-exploiting, ultimately the land-ruining, can learn much from the prairie grasses and herbs that formed the original sod in the Corn Belt states, some fragments of which still remain unplowed, especially in Nebraska and the Dakotas. Studies reported by Drs. J. E. Weaver and Evan L. Flory of the University of Nebraska indicate that the soil management practised by the prairie sod excels that carried on by man in practically every important respect.

Man's soil management is a business of extremes. His tillage, for field crops such as corn and cotton, keeps the soil stirred and loose all the time, a ready prey for erosion by wind and water. Prairie sod thrives without this constant disturbance—earthworms are plows enough. Man strives to give a field to a single plant species as a monopoly, and to kill all other growths as weeds. Prairie sod turns the acres into a mixed community of many species; there is competition in it, to be sure, but there is a sort of tolerance even in the competition. Man's crops cover the soil only during a part of the growing season; before planting and after harvest the soil is naked to the attack of the elements. Prairie sod is a constant protecting mantle; the seeds of its various constituent plants ripen at different times the whole summer through.

Cooler Air Over Sod

Quantitative measurements of climatic and other factors bring out dramatically the superiority of sod-economy over plow-economy. On a given summer day, the air in a cornfield at four feet above the ground was hotter by four degrees than air at the same level over the prairie. At four inches the difference was 11 degrees, at the soil surface itself the cornland was 21 degrees hotter than the prairie sod, and just below the soil surface the cornland was 38 degrees hotter.

This difference is reflected not only in the greater strain put on the endurance of the plants themselves, but in the conditions which the important nitrogen-fixing microorganisms of the soil have to face. The cornland was too hot for them to live, while the temperature of the prairie sod soil was still within survival limits.

The evaporating power of the air showed like differences. At the height of the plants, it was 27 per cent. greater over the cornfield; at half the height, 106 per cent. greater, and near the soil surface the difference was 68 per cent. to the disadvantage of the corn. These heightened evaporation rates are of critical significance in time of drought, when soil water conservation is of supreme importance.

Drs. Weaver and Flory do not contend that all the West should be returned to grass. There must obviously be corn and wheat, alfalfa and soybeans. Nevertheless, they contend, "we may profitably consider the natural environment. Not until the native environment in its relations to water, humidity, temperature fluctuations and other critical factors of both air and soil have been compared with that of overgrazed and cropped areas will it be known how widely we are departing from Nature's plan of a stable environment."

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So supplementary means must be devised. Important are flood-water reservoirs, which will hold back part of the water until the rest has been drained off, and then release their impoundings as rapidly as possible. There have been proposals to build such flood checks right in the Ohio itself, as well as in some of the other larger tributaries of the Mississippi from the west. These the committee doubts, but it gives its approval to a considerable number of flood-water dams on other tributaries, and even suggests that these may be the key to flood defense.

But in spite of all this, floods will still develop. Here a third strategy comes into play. If you cannot hold your adversary back, yield and let him rush through a path of your own choosing. This is the principle of the so-called floodways of the lower Mississippi. These are auxiliary flowage paths for the river, with guide levees along their sides. In normal years they remain empty, and may even be farmed. But when a Great Flood comes, once in a generation or oftener, the weaker "fuse plug" levees that close their upper ends are permitted to give way, and the surplus waters pour through on their way to the sea.