microscope slides showing the interior of cell nuclei, in illustration of the way in which genes not only reproduce themselves but also may produce entirely new genes. Dr. Bridges has suggested that evolution began with a single gene, and that this, by multiplication and changes in its chemical nature, eventually gave rise to the thousands of diverse genes found in the most advanced animals and plants. These changes may have come about through the impact of radium rays or other active forces of nature.

Dr. Charles B. Davenport of the Carnegie Institution of Washington showed a number of large-scale charts of living cells, showing changes in material lying directly on the outside of the nuclei. These, he suggested, indicate how the genes determine the course of bodily development.

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AGRONOMY

Plants' "Uplifting" Tendencies Affect Character of Soil

PLANTS, constantly sucking upward the water that trickles and oozes downward through the ground, profoundly affect the character of the soil in which they grow, Sir E. John Russell, director of the Rothamsted Experimental Station at Harpenden, England, told fellow-agronomists at the Amsterdam meeting of the Sixth International Botanical Congress.

In the eastern part of England the water drainage through cultivated soils is only about one-half that through uncultivated soils, he said. The whole nature of the soil is affected, and the marked differences between feebly and strongly leached-out soils turn very largely on the intensity of action of plant roots in removing the soil water.

"Associated with this removal of water is also a transfer of mineral substances and nitrates from the subsoil to the aerial parts of the plant," Sir John continued. "Calcium, potassium and silica in particular are lifted in quantity to the leaves and stems: when the plants die they fall back on the surface of the soil. The details vary with individual plants, and in the end striking differences may result.

"The general result is, however, that this process counteracts the washing down by the rainfall, and it confers upon the soils of mild humid countries one of their characteristic properties that the upper layer tends to be richer in calcium and potassium and to be more nearly neutral, than the lower layers. These characters are of profound ecological significance and react greatly upon the vegetation."

The plant roots evolve considerable amounts of carbonic acid, the speaker pointed out. This evolution of carbon dioxide is of special importance in dry regions where soils tend to be alkaline, for it offers the possibility of reducing the alkalinity and so profoundly changing the vegetation. Experiments are being tried in various regions to find crops which by evolving large amounts of carbon dioxide from their roots, can be used for the reclamation of alkali soils.

Plants also exercise marked influence on each other through their roots, Sir John declared. The legumes, or plants of the pea-bean-clover family, not only obtain nitrogen for their own needs through the activities of the bacteria that live in their root nodules, but also excrete it and make it available for other plants.

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GENETICS

Effects of X-Raying Show In Later Generations

X-RAYING plants to produce hereditary changes in their offspring is not limited in its effects to what happens in the immediate outcome. An X-rayed plant may produce offspring with new peculiarities, such as changed leaf-size or flower-color, which will duly appear in subsequent generations. But these generations may also begin to produce other changes, even without being X-rayed themselves.

Changes of this character, and an explanation for them, were described before the meeting of the Sixth International Botanical Congress, by Prof. T. H. Goodspeed of the University of California, one of the pioneers in the field of X-ray genetics. While the details of the process are highly technical, the essential fact underlying the three types of cellular change he described is a state of instability, of continuing change, induced in the chromosomes by the first impact of the X-ray bombardment. In effect, the X-rays having cracked the shell, all sorts of things may continue to pop out for a long time to come.

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FORESTRY

Forest Fire Renders Soil More Liable to Erosion

SOIL conservation and forest conservation, two national problems of which the American public is now most acutely aware, meet and intensify each other when fire sweeps a forest. Not only does a treasure in timber vanish upward in smoke, but an even greater treasure, the forest soil itself, vanishes downward through erosion.

How bad the erosional after-effects of forest fire can be is related by Charles A. Connaughton of the U. S. Forest Service (*Journal of Forestry*, August). Mr. Connaughton studied well over three thousand test plots in burnt-over forest land, comprising both cut-over areas and virgin timber.

In general, the more severe the fire, the more severe also was the subsequent erosion. On the steeper lands, lightly burned areas, on which the fire took only the top layer of the forest floor litter showed relatively little erosion. Only about ten per cent. of such plots were eroded. But when the fire had been really severe, as high as 80 per cent. of the plots showed erosion.

Less Damage in Virgin Timber

Fire brings more erosional damage to cutover land than to virgin timber, the studies showed. While the worst damage on the steepest land was not greatly different in the two classes, there was a wide spread between post-fire erosion in cutover and virgin sites where the fires had brought only partial destruction, leaving the living trees and most of the underbursh still able to hold the soil with the myriad fingers of their roots. Taking a sweeping average of Mr. Connaughton's figures, a fire short of complete destruction in virgin timber is followed by only about half as much soil erosion as a fire of the same grade in the second growth on cutover land.

Of course, where soil is eroded away from a burnt-over forest site, it is difficult to make trees grow there again—impossible, if the erosion is severe enough to lay bare the underlying rock. But the damage is apt to be felt by people who never see or think about the forests. Hundreds of miles away, the freshets that gush through the erosion gullies accumulate as floods in the greater rivers, piling out of their banks to wreak destruction, and leaving behind them, on lowland farms and industrial areas, burdens of silt that should still be up in the hills, growing trees.

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