SCIENCE NEWS

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EVAPORATION

AN invisible river, flowing straight uphill, returns to the air a large proportion of all rain and snow that falls. Its name is Evaporation.

At the Hydrologic Conference recently held at State College, Pa., Dr. C. W. Thornthwaite, of the U. S. Soil Conservation Service, outlined the magnitude of this skyward drainage, and told of progress in its measurement. Of one year's measured precipitation at the experimental farm at Arlington, Va., of the U. S. Department of Agriculture, nearly half was returned to the air by evaporation from the soil surface and transpiration through the leaves of plants.

The practical importance of this way of getting rid of surplus water was suggested by the speaker: "In central and eastern United States nearly all major flood-producing storms are terminated by invasion of relatively dry air masses of polar continental origin characterized by a thick turbulent layer and low concentrations of water vapor. These air masses provide conditions most favorable to evaporation and are able to absorb enormous quantities of moisture from the rain-drenched land. Since floods on large watersheds are most frequently due to general storms which must first restore to the soil reservoir water which had previously been lost by evaporation and transpiration it is evident that land use practices favoring evaporation will accordingly lessen the burden imposed on stream channels by excessive rains, both by retarding immediate run-off and by creating a water-storage capacity in the soil."

Dr. Thornthwaite stated that transpiration through plants carries off much more water than direct evaporation from the soil. For this reason, it is desirable to encourage maximum coverage with plants of high transpiration rate, in regions subject to floods. On the other hand, in regions where drought is the main danger, it is best to promote vegetation with low transpiration rates, so as to leave as much moisture in the soil as possible.

Until recently, direct measurement of evaporation from land surfaces was so difficult that it was considered almost impossible. Now, intricate mathematical formulae have been worked out that can give an expression to this mode of water disappearance.

RADIOACTIVE RUBIDIUM

RUBIDIUM, a chemical element closely related to the more common sodium and potassium, can be made to give off rays like those of radium. In this form it is a useful tool for studying the life processes of living plants. Dr. August Helmholz, instructor in physics; Dr. Charles Pecher, research fellow in the Radiation Laboratory, and Dr. P. R. Stout, junior chemist in the division of plant nutrition, have made these studies, which are reported in the *Physical Review*.

Potassium is an important element in plant nutrition. With the rays from the cyclotron, or "atom-smasher," it can be produced in a radioactive form. Then, fed to plants, its progress may be followed by the rays that it gives off as it reaches different parts. However, radioactive potassium quickly decomposes. Half of any amount is gone within twelve hours, and this has imposed a limit to its use.

Rubidium, however, is so similar chemically to potassium that it may be used in its place. Its radioactive form lasts for nineteen days. Another advantage is that very minute quantities may be made with high activity, but it can also be produced in relatively large amounts.

In preparing radioactive rubidium, these modern alchemists start with an entirely different element, strontium. Under the influence of 16 million volt atomic bullets from the cyclotron the transmutation into rubidium takes place.

SEED OF TREES FOR ICELAND

WESTERN HEMISPHERE help is going to Iceland in a hitherto unreported form. Thousands of seeds from two species of evergreen trees, gathered high on Colorado mountains, have been sent to Hakon Bjarnason, chief of the Iceland Forestry Service, by Jacob Jauch, of the U. S. Forest Service. The story of the sending of the seeds is told in the July issue of the *Journal of Forestry*.

The two tree species represented are corkbark fir and Engelmann spruce. Both are high-altitude trees, well suited for the severe weather conditions that prevail on the upper levels of the Rockies. Mr. Jauch states that he awaits with interest the results of this experiment to see if these trees will thrive in sub-arctic Iceland. Although the island republic lies just south of the Arctic Circle, he points out, the climate along its southern coast is so modified by warm ocean currents that it is actually no more severe than that of New York, and materially milder than the climate of the high Rockies.

Iceland once supported a much better timber growth than it now does. While the island was directly controlled by Denmark, it was pretty badly exploited and lost most of its trees and a considerable part of its best pasture land. Since Iceland declared its independence, acknowledging only the personal sovereignty of the Danish crown, its affairs have been better managed and efforts are being made to conserve and restore its natural resources.

So hard pressed are the Icelandic herdsmen, however, that constant vigilance has to be exercised to keep them from turning their sheep loose in growths of young birch trees, which the Iceland Forestry Service wants to grow up into usable timber. A good deal of Mr. Bjarnason's work has to do with maintaining fences around his woodlands.

TUNG TREES

SUPERIOR varieties of tung trees, source of the tung oil highly valued in the paint and varnish, linoleum, printer's ink and other industries, are being given an extensive test by the U. S. Department of Agriculture. Because the Chinese war has drastically reduced imports from the principal source of this oil, while domestic plantings now in existence supply only a very small percentage of American requirements, new sources within the boun-

daries of the United States are very seriously needed.

Tung cultivation should not be undertaken by amateurs, and it should not be attempted on a large scale even by experienced planters of other crops. Tung trees are very "fussy" about their soil, highly sensitive to cold, and in any case must reach the age of five years before they come into bearing. Still, any farmer far enough south (within about a hundred miles of the Gulf Coast) might find it profitable to set out a few trees, just as an experiment. Tung trees are quite ornamental, with glossy, heart-shaped leaves and beautiful flowers in spring.

Investigators of the Department of Agriculture, during the past three years, have selected five hundred trees in the extensive orchards already growing in the South as particularly promising. A second selection reduced the number to eighty. Thousands of young trees were propagated from this group. The freezing weather of last November cut down the nursery stock severely, but the survivors—some 40,000 of them—have been planted in thirteen test orchards along the Gulf Coast, from Texas to Florida.

In the meantime, chemists in the department have greatly improved the efficiency of oil extraction methods. American tung oil already commands a premium over the imported product, and the market is far from being saturated.

HORMONE PRODUCTION BY THE THYROID GLAND

HOLDING a clock on the thyroid gland to time its production rate as a chemical factory, investigators of the University of California at Berkeley find that it takes two hours to manufacture its highly complex hormone. This is the first time the formation of a hormone of any of the body's endocrine glands has been measured. The measurements were made by Dr. I. L. Chaikoff, Dr. I. Perlman and M. E. Morton, using tagged atoms of radioactive iodine from the atom-smashing cyclotron. The course of radioactive iodine fed to laboratory animals was traced from the stomach to the thyroid by an instrument sensitive to the radio waves given off by the charged atoms. It took but a few minutes for the tagged iodine to reach the thyroid gland, and within two hours after the iodine had been given it was synthesized into the thyroid hormone and on its way to various parts of the body.

There are two products of the thyroid; diiodotyrosine, the rôle of which is uncertain, and thyroxin, believed to be the true hormone. Under-production of thyroxin in youth will stunt physical and mental development. Overproduction of thyroxin in children results in giantism. This hormone is important in the adult, also. An overactive thyroid increases the rate of metabolism so that the body burns up energy substances faster than they can be replaced by food, making the subject thin and nervous, as in some goiter patients. A lazy thyroid results in physical and mental debility, and often abets extreme over-weight. So a better understanding of the course of the thyroid hormone in the body, made possible by the tool of radioactive iodine, may lead to important results.

DEAF CHILDREN

PUTTING little deaf children and those with good hearing together in a nursery school is helpful to both, if the school is well conducted, according to Carmelita Klorer of the Central Institute for the Deaf at St. Louis.

Miss Klorer has conducted experiments to observe the play of deaf and hearing children, together and separately. Deaf children, aged three years and two months to five years and five months, talked more than hearing children in almost every play situation. But when playing with other deaf children, or alone, the deaf child is apt to use far more gestures than when he plays with hearing children. Miss Klorer concludes that "This is perhaps the best argument favoring the combined nursery school, as the deaf realize that gestures are not always the best means of social intercourse."

Clay was a favorite play material of the deaf children, with blocks as second choice. Hearing children selected blocks and books with equal frequency, and clay almost as often. The deaf showed greater skill in handling constructive materials. When deaf and hearing children played together deaf children took the initiative, drawing the hearing children into their play.

Advocating grouping deaf children with those who hear in nursery schools, Miss Klorer states that both types need to be taught cooperative play, and social contact with their own ages, and opportunities to develop in emotions and in stability. For the deaf children, added values result from contacts that cause them to use speech rather than gestures, and give them a normal play environment.

ITEMS

How to avoid injury to citrus fruits while ridding trees of scale insects with cyanogen gas fumigation was the object of experiments reported by E. T. Bartholomew, W. B. Sinclair and D. L. Lindgren, of the Citrus Experiment Station of the University of California, at Riverside. In fumigating orchards, a tent is placed over each tree to be treated and the cloud of deadly gas released within the confined space. Too great a concentration of the deadly gas, or too long continuation, will cause injury to fruit, rendering it unmarketable. The experiments showed that one effective way to decrease cyanogen injury to fruits was to maintain a relatively high temperature overnight, before fumigating. A temperature of 80 degrees Fahrenheit was most effective in preventing injury, with effects at 65, 50 and 43 degrees lessening in the order named.

IT has been demonstrated that a death ray may prove a blessing to sanitation. Infra-red rays produced by a special incandescent lamp were turned on adult cockroaches. Those within eighteen inches of the invisible rays were pronounced dead four minutes later. Dr. Guy F. MacLeod, lecturer in entomology in the College of Agriculture of the University of California, reported these results of laboratory experiments on cockroaches, but could offer no practical method of using the rays to destroy pests in household or restaurant kitchens. Infra-red rays were also tried on various plant pests. Unfortunately, the plants were injured or killed before the infesting insects were killed.