SCIENCE NEWS

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SOME PAPERS READ BEFORE THE DURHAM MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

CONTROL of soil erosion is being placed on a thoroughly scientific basis for the first time in the world's history, was pointed out by Dr. Hugh Bennett, chief of the U. S. Soil Conservation Service, in an address given at the meeting of the American Association for the Advancement of Science. The ancient world developed some remarkable engineering works designed to stabilize hillside soil, but not until the American soil conservation program got under way was there a convergence of such a diverse array of knowledges and skills as now puts up a defensive battle against erosion. Any given project will call for the services of crop experts, engineers, foresters and possibly other types of scientific workers. Before actual work is started on a farm or group of farms, a thorough survey is made. Each field is classified according to soil type, slope, extent of erosion and land use. Maps based on such surveys guide farmers in the more advantageous and economic use of their land. Already 90 million acres have been thus surveyed. Particular attention has been given to the problem of producing crops without constantly turning the soil over and thus exposing it to accelerated erosion. The Soil Conservation Service has developed a technique known as "stubble mulching." Crop residues are left on the surface while the soil underneath is plowed with a subsoil tiller. The residues thus provide surface protection which checks runoff by keeping the surface soil in such condition that nearly all the water soaks into the ground. This reduces evaporation from the surface and helps protect the land against both wind and water erosion.

DR. W. C. LOWDERMILK, of the U. S. Soil Conservation Service, in an address before the opening session of the American Association for the Advancement of Science, pointed out that North Africa and the Near East, scourged for the thousandth time by war, have suffered even more during intervals of peace than from the havoc of actual armed strife. Partly because of war-caused paralysis of civil life, partly from internal disorder and weakness, soil-conserving practices begun by good farmers ages ago have been permitted to fall into disuse, and the impoverished soil has eroded to bedrock. Dr. Lowdermilk drew a lesson for America from the history of these classic lands. Here, too, there has been neglect and wastefulness in land use, and soil erosion has started at an alarming rate. However, the speaker concluded, "this destructive force did not go unheeded. Far-sighted students of land foresaw the dangers of soil erosion. But it was not until experimental studies were begun by which it was possible to measure comparative losses of water and of soil under various types of cropping, slopes and climates, that the magnitude of the menace could be measured. On the basis of these researches, a nation-wide program of demonstration projects in erosion control and soil conservation showed the farmer and the technician alike how this enemy of civilization might be controlled. Out of these steps has grown a movement for conservation of land resources which was founded upon the lessons of the past and science of the present. Continued progress in this movement of conservation must be founded on the adaptation of the findings of research to problems in land use that become more and more intricate as the demands upon the land increase."

DR. H. L. SHANTZ, of the U. S. Forest Service, pointed out that the nation's resources were divided into two categories, renewable and non-renewable. The latter are of mainly mineral origin. Some, notably the metals, last a long time and can be reworked several times before they vanish out of circulation. Others, especially coal, oil, natural gas and fertilizer deposits like phosphates and potash, are completely expended the first time they are used. Non-renewable also are species of plants and animals: once exterminated, they can never return. Renewable resources include water power, plant products and animal uses of plant products. These came back in cycles; every year in annual crops, over longer periods in forest products, perennial in water power. These are the things that should be used most freely, and should be substituted for non-renewable resources where that can be done, as in the use of plastics instead of metals. The soil occupies an intermediate position. If it is permitted to waste itself through erosion, it is strictly a non-renewable resource. If it is properly conserved, it moves into the renewable category.

SNOW was the subject of a paper by Dr. Henry I. Baldwin, of the New Hampshire Forestry and Recreation Department. Dr. Baldwin told of measurements taken of snow depth under various types of forest cover. Early in the winter, he said, trees serve as snow umbrellas, preventing much of the white precipitation from reaching the ground. Later, when snow depth in the woods is as great as or greater than it is in the open, the trees conserve moisture, preventing the snow from returning into the air as water vapor. Young stands of trees, in Dr. Baldwin's observations, intercepted relatively more and conserved less than older stands. Hardwoods exerted less influence than conifers; young hardwood sprouts least of all. Snow in the forest lasted from one to three weeks longer than it did in the open.

NEW ENGLAND shares with the Pacific Northwest the obscure honors of having most cloudy weather in this country, was reported by W. B. Liverance and Professor C. F. Brooks, of Harvard University. This northeastern cloudy area extends as far west as the Great Lakes, and is characterized by its processions of storms marching down the St. Lawrence Valley. Of possible sunny days, New England gets only 50 per cent. This contrasts with the extreme Southwest, which gets 85 per cent. of all possible sunshine.

NEW evidence that Mount Washington was completely immersed in the vast sea of ice that once covered most of the northern United States was advanced by Professor Richard P. Goldthwait, of Harvard University. A pocket of soft, sticky till, which could have been produced only by a glacier and which contains a few pebbles carried up the mountain from lower valleys by the ice, was recently uncovered during excavations for new buildings on the mountain-top. Such glacier-borne stones, also found elsewhere atop the Presidential Range, came from ledges between 2,000 and 4,000 feet farther down. There is evidence that the last of the glacial ice disappeared from the top of Mount Washington not more than 25,000 years ago.

CONDITIONS leading to icing, the worst nightmare of aviators, are being thoroughly but safely studied by putting a laboratory on solid earth at airplane altitude. The program of icing research being conducted at the summit of Mount Washington were described by David L. Arenberg, of the Blue Hill Observatory of Harvard University. Under investigation are such points as measuring the liquid water content of icing clouds, development of the critical changes in the transition from frosty rime to solid ice, relation to icing of such factors as drop size, wind, temperature, etc. The observatory is also serving fliers in the region by transmitting warnings of ice-forming conditions aloft.

GEORGE W. TRAYER, of the U. S. Forest Service, stated that wood wins wars, despite the apparent primacy of metals. It has the further advantage over metals, that it can be grown as a renewable crop if good forestry practice is observed, whereas metals are definitely limited and exhaustible resources. Even in airplanes, where aluminum and magnesium have replaced the spruce and fabric of the earlier flying fighters, wood is staging a comeback. Plastic-bonded plywood is coming to the rescue of an industry harassed by a shortage of light metals. Smaller planes of this revolutionary new construction, with laminated wooden propellers, have proved entirely practicable for training purposes—and training planes are needed by tens of thousands. A modern army's needs for wood are almost beyond counting. They range all the way from lumber for barracks and heavy timber for bridges to wooden poles for holding up camouflage nets and wooden crates for the safe transport of ammunition. Chemical uses for wood are important in warfare. Wood pulp can supply cellulose for nitrating into explosives quite as good as that derived from cotton linters. Black powder, still used to a limited extent in modern war, contains charcoal as an essential ingredient. Compressed wood charcoal now replaces the coconut-shell charcoal of World War I in the canisters of gas masks.

HEAVY war-time demands for wood threaten to work hardship on New England forests because they are so close to the points of most acute demand and transportation is at a premium, was pointed out by C. Edward Behre, also of the U. S. Forest Service. In pre-emergency days, New England's forests were supplying less than half of the region's needs for lumber, pulp and other wood products, and the present great increase in demand, coupled with overloaded railroads and a shortage of ships, are creating a difficult problem. The problem is further aggravated by a threatened fuel shortage, which will result in a considerable use of wood as replacement for coal and fuel oil next winter. Mr. Behre concluded by calling for public control as the only way to avoid confusion in meeting the prospective demand for major forest products and to prevent needless sacrifice of the productive resources. Nothing is more important, he added, than that our productive resources be in position to support labor and industry in the post-war readjustment.

THE latest results in a 90-year-old mathematical problem, that of map coloring, were reported to the section of mathematics by Professor Daniel C. Lewis, Jr., of the University of New Hampshire. The problem is to prove that various districts in a map, the forty-eight states of the United States, for instance, may be tinted with only four colors and still not have the same colors touching, on opposite sides of a common boundary line. It is known that three are not enough, while half a century ago it was proved that any map, no matter how large or complicated, could be colored with five colors. So far no one has ever constructed a map that can not be colored with four tints, but mathematicians are still seeking a rigorous proof of this. Two lines of attack have been made on the problem. One is the notion of an irreducible map, that is, one that can not be colored with four colors, but such that any map with fewer districts can be. Last year it was shown that an irreducible map can not have less than 36 districts. It is hoped eventually to prove that an irreducible map can not exist at all. The other method is known as that of chromatic polynomials, and Dr. Lewis has been working in this field in collaboration with Dr. George D. Birkhoff, of Harvard University. He told of their latest researches, which show that the characteristic methods used in working with irreducible maps can be adapted to more general considerations involving the polynomials. Hence, these latest developments include the previous work, and probably bring nearer the complete solution of the four-color problem.

CHEMICAL lures may eventually be used as protection for crops, instead of the barrages of poison spray with which plants have to be drenched now-a-days. It may become possible to mislead insect pests to lay their eggs in chemically scented traps, instead of on plants, was suggested by Dr. V. G. Dethier, of John Carroll University. Dr. Dethier has been experimenting with many kinds of insects and many kinds of chemical compounds found in plants, to get some idea of what induces certain species to lay their eggs on just one or a very few kinds of plants. The cabbage butterfly, which never lays its eggs on anything but the leaves of cabbages and related plants, was attracted by compounds found in just that group of plants. The orange puppy, a troublesome pest of citrus trees, is lured by the scent of two chemicals, citral and methyl-nonyl-ketone. The tent caterpillar has a decided preference for poison in small quantities: it hastened to a bait of hydrocyanic acid and benzaldehyde. Dr. Dethier demonstrated that insects are guided by their

chemical sense by impregnating filter paper with the chemical compounds preferred by various species. Each insect went to the paper scented with its favorite luring odor and proceeded to make a meal of it, despite its lack of other resemblances to leaves and its obvious indigestibility.

CONQUEST of human hunger in the United States was demanded by Gove Hambidge, editor of the U. S. Department of Agriculture Yearbooks. It is not so much the absolute want of sufficient food, or even the acute lack of certain vitamins that results in such gross symptoms as rickets and pellagra that most demands national attention, he said; fortunately for us, actual starvation and acute vitamin unbalance are relatively uncommon in this country. The real need is for correction of marginal or partial lacks that reduce efficiency and the sense of well-being below their potential optimum point. This calls for a four-point program: (1) research into the nature and magnitude of nutritional needs, (2) translation of technical knowledge thus gained into terms "understanded of the common kitchen," (3) discovery of the magnitude and distribution of malnutrition, (4) research into its causes. Mr. Hambidge said: "I can think of no more fascinating challenge to cooperation than the conquest of hunger in the United States. For it will mean that the nutritionist, the medical man, the educator, the psychologist, the sociologist and economist, the agricultural scientist, the farmer, the worker in the food industries, the community leader and the ordinary citizen will have to pull together in many ways, some of which have not been tried before. The whole picture of the rôle of food in the human body given us by modern science shows that this effort is not only worth while but vital at this time. The right food is by no means the only factor, but it is certainly the most fundamental one in health, strength and morale. If there ever was a time when every citizen, bar none, needs to be at top pitch in health, strength and morale, this is it."

DR. WILLIAM RAAB, of the Medical College of the University of Vermont, stated that heart diseases, of several different types, are due to abnormal functioning of the suprarenal glands, small bodies above the kidneys that furnish adrenalin and other hormones necessary for the normal functioning of the body but harmful in excess. In experiments on rats it was found that the heart muscle seems to have a peculiar affinity for adrenalin and its associated hormones. The animals' hearts absorbed more of these adrenocortical compounds than did other organs. An overdose, above a certain definite concentration, inevitably resulted in death by heart failure. Experimental data are backed up by clinical results, the speaker claimed. In the too-common and exceedingly painful heart disease, angina pectoris, it was found that physical exercise resulted in excessive discharges of the hormones into the blood stream, and these in turn provoked typical attacks. In a number of cases, where the glands were partially inactivated by x-ray treatment, these abnormal discharges were abolished for many months, with parallel disappearance of the anginal attacks. He traced similar apparent connections between abnormal discharges from the suprarenal glands and other types of heart disease, including essential hypertension and congestive heart failure. Assay of the heart muscle, in autopsies of patients who had died of heart failure, showed abnormal amounts of the hormones. Usually these were excessive, but in some cases subnormal concentrations were found. Summarizing his results, Dr. Raab stated: "It can be said that normal functioning of the heart muscle is dependent on the presence of normal amounts of adreno-cortical (AC) hormones in its tissue. Both abnormal increase and diminution of the myocardial AC are likely to bring about heart failure. Intense AC discharges into the blood stream going on over years and decades stimulate, exhaust and finally damage the myocardial tissue in a similar manner as they stimulate and ultimately damage the muscular walls of the arteries."

ITEMS

WITHIN five minutes of the time that a hydrogen eruption on the sun was recorded at the Mount Wilson Observatory in California, a definite fade-out of radio signals received at Washington from Toronto was recorded at the National Bureau of Standards. Though such records are ordinarily studied only monthly, T. R. Gilliland, of the Radio Section, examined them for July 3, the date of the eruption, at the request of Science Service. He found that, within five minutes after the eruption began on the Mount Wilson film, the intensity of the Toronto signal dropped nearly to zero for about five minutes. Then it recovered, but later in the morning it dropped again, and remained down for about two hours.

COOKING by the sun's rays may be made easy with a new invention just granted U. S. Patent 2,247,830. It was issued to Dr. Charles G. Abbot, secretary of the Smithsonian Institution, who has for a number of years been experimenting with methods of using directly the energy from the sun. One object of the invention is "to provide a novel solar heater which is highly efficient, compact, cheap to manufacture, durable and easily used by the inexperienced." Another is that it "may be made of any desired small size without decreasing the efficiency." To collect the sun's rays there is a metal mirror, bent to the shape of a parabola. Its long direction is parallel to the axis of the earth, and there is a clockwork to turn it during the day to follow the sun. In this mirror, where the solar rays are sharply focused on it, is a double-walled glass tube, through which circulates a black liquid with a high boiling point. This absorbs the rays and is heated. The hot liquid then circulates through an oven at the upper end of the device, so that it may be used for cooking.

STATING that the "existing Atlantic commercial air services have proved totally inadequate," daily, and even twice-daily, flights are urged in an editorial in a recent issue of the British aviation weekly, *Flight*. It points out that "The number of people to whom time is all-important is considerable now, and will grow rapidly as our association with the United States increases in volume and closeness," and that "at the very least there should be a daily service, and the time will probably come when a service every twelve hours will be assured of a full load on every trip."