SCIENCE NEWS

Science Service, Washington, D. C.

SOIL 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.

The world's earliest large-scale civilizations, in the Tigris-Euphrates and Nile valleys, have had diverse histories, Dr. Lowdermilk pointed out. The history of the land now called Iraq has had marked ups and downs. This is at least partly due to the fact that its agriculture depended on irrigation canals, which were at times permitted to silt up and become useless. For the past thousand years or more, the valley that was once the Garden of Eden has been in a "down" phase of its history, impoverished, underpopulated.

Egypt, on the other hand, has depended on the annual Nile flood for its irrigation, so that its only problems have been much simpler ones of drainage, to prevent the water table from becoming too high and to eliminate saline deposits from certain spots in the soil.

Apparently the device of terracing sloping fields was first used by the ancient Phoenicians, in the fields on the mainland back of Tyre and Sidon. As the necessities of the growing city populations pressed ever harder on the means of support, the stone-supported terraces were pushed ever higher up the hills. If the work had to be done at present-day wages the cost would be very high. Nevertheless, these ancient terraces have justified their existence. Where they have been well taken care of they are still functioning, after more than 2,000 years of use. Where they have been neglected and allowed to break down, the soil has slid into the valleys and choked the rivers, leaving the rock sticking out of the hillsides.

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."

RENEWABLE RESOURCES

LIVE on income, not capital; use renewable resources, rather than exhaust non-renewable ones. Such is the national policy that was urged by Dr. H. L. Shantz, of the U. S. Forest Service, in an address before the meeting of the American Association.

The nation's resources were divided by Dr. Shantz 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, the speaker pointed out, 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.

Dr. Shantz pointed out that "Plant cover is most important as a source of energy and as a means for holding the soil. When this cover is gone, it becomes almost impossible to hold the soil. It is doubtful if plowlands can endure permanently, but where there is a closed cover of vegetation the soil is permanently safe."

THE TOTAL SOLAR ECLIPSE

WITH Soviet Russia involved in a major war, it seems likely that the next total eclipse of the sun will not be nearly as well observed as if that nation had remained at peace.

The eclipse will occur on September 21, when the tip of the moon's shadow will touch earth in southern Russia, east of the Caspian Sea. Then it will sweep eastward, over the Sea of Aral, in southern Siberia, China, including the cities of Hankow and Nanchang, the northern tip of Formosa and the other of the southern Japanese Islands, and over the Marianna Islands, of which American-owned Guam is southernmost.

In preparation for the event, the Soviet Academy of Sciences last year set up a commission, with V. Fesenko as chairman, to plan the observations. As a result an elaborate program was evolved, with some 200 observers scheduled to operate from 16 different observing points, the most favorable being in the mountains of Kazakhstan.

At its longest, the sun will be covered by the moon for about 2½ minutes.

Subjects for study during the eclipse period were to be: the Einstein theory; the sun's corona, best observed at eclipse time; its innermost atmospheric layer; the chromosphere; the sudden explosions in the sun that seem to cause electrical and magnetic disturbances on earth and the zodiacal light, a glowing band sometimes seen near the sun. In addition to ground parties, some observations have been planned from airplanes and stratosphere balloons, which would rise above possible clouds.

Now that the Soviet Union is so vitally concerned with defense from Hitler's attack, it seems quite likely that the efforts of her scientific men which would have been expended on the eclipse may be diverted. On the other hand, since some preparations have already been made, at least part of the program may be carried out even in wartime. A large booklet of 55 pages, in Russian and English, was issued last year, giving a full account of the problems and numerous technical data about the eclipse. If this has been widely distributed it may help Russian amateurs to make observations even if the professionals can not.

Since the eclipse track traverses China, including much of the occupied region, the Japanese may make some observations from the Asiatic mainland as well as from their islands. Probably no American observations will be made, since Guam, though on the southern edge of the path, is not a suitable location, and it is unlikely that the Japanese, who control the northern islands of this same group, will welcome foreign visitors.—JAMES STOKLEY.

A NEW SOURCE OF ALUMINUM

A NEW domestic source of aluminum for the United States has been unlocked after years of research and experimentation. Alunite, a white rock usually gray or pink tinted, has long been known as a combined sulfate of potash and alumina. Huge deposits in southern Utah, the largest in the world, were worked during the first World War for potash.

When the United States became self-sufficient for potash from other domestic sources, a practical process to obtain from alunite the material alumina, raw source of all metallic aluminum, was sought. The present source of alumina is bauxite, of which the United States has limited deposits in the South and is mainly dependent on high-grade imports from British and Dutch Guiana.

The U. S. Bureau of Mines recently estimated that there were 13,788,675 tons of pure alunite in Utah, Arizona, Colorado, California, Nevada and Washington, of which Utah has 11,680,000 tons.

Numerous patents have been issued on alunite processes, but all proved impractical in cost competition with bauxite until Kalunite, Inc., of Salt Lake City, after ten years of research and experiments in laboratory and pilot plant conducted by Dr. Arthur Fleischer, developed and patented the new process. This process produces alumina from alunite at a cost of $35 a ton, which means metallic aluminum at 11.865 cents a pound. This will permit it to compete in cost with Bayer alumina (the process used by the Aluminum Company of America).

Experts report that the metal produced from Kalunite alumina is equal in grade to that produced from Bayer alumina. There are available in the Marysvale region in Utah at least 3,800,000 tons of ore that can be treated by the Kalunite process for the cost reported. The amount of ore is sufficient to assure a life of at least ten years for a plant producing 200 tons of alumina a day.

The Kalunite method produces alumina by the dilute sulfuric acid process and also produces as a by-product potassium sulfate. In brief, the Kalunite process starts with the long-known method of producing potassium alum and potassium sulfate from alunite. The potassium alum is utilized in order to take advantage of its property of separation by crystallization from solutions.

The alum is then put into an autoclave, which resembles an ordinary kitchen pressure cooker except that greater pressures are used. In the autoclave the normal potassium alum is changed to basic alum which is insoluble in water or dilute sulfuric acid. The alum is then calcined to separate the sulfuric acid from alumina resulting in the non-chemical mixture of alumina and potassium sulfate. The latter is removed by leaching.

THE NEW VAN GENT COMET

HOPES that the new Van Gent Comet, which is moving into the northern sky after its discovery by an astronomer in Java, will become visible to the naked eye are not to be realized. This is shown by a calculation of the comet's path made by L. E. Cunningham, of the Harvard College Observatory, discoverer of Cunningham's Comet, which did reach naked-eye visibility last winter.

Mr. Cunningham's figures, based on orbital data computed by Dr. F. J. Bobone, at the Argentine National Observatory, showed that in mid-July Van Gent's Comet will pass just below the bright star Arcturus, visible in the southwest in the evening in the constellation of Boötes. Then it will move towards the figure of the Great Bear, and in October will be a short distance below the bowl of the Big Dipper.

At the present time it is approaching the sun, which increases its real brilliance, but it is moving away from the earth, which partly counteracts the rise in brightness. On July 1 it will be about two thirds of the sun's distance from us, or 60,000,000 miles. It will be about 130,000,000 miles distant on September 3, when closest the sun. After that, it will get closer until December 8, when it will be 74,000,000 miles away, but by that time it will be well outward bound from the sun.

In early September it will appear brightest, when it will reach magnitude 7.5, not enough to be seen with the naked eye, but visible through small telescopes if one knows just where to look.

"DUST-BOWL" CONDITIONS IN GERMANY

GERMANY seems to have made, in this war, one of the same mistakes we made in the last one, though to be sure on a smaller scale. In 1917, the cry was raised in this country, "Food will win the war!" Western farmers were encouraged to break up grasslands until then unplowed to raise wheat for our associates in the struggle. A few years after the Armistice came drought and dust storms.

An editorial writer in the German conservation journal,

Natur und Kultur, laments the draining of swamps and bogs, the clearing of heaths and moors, and the "improvement" of rivers which were undertaken on a wholesale scale after the establishment of Nazi power, as parts of the national campaign for agricultural self-sufficiency. Warning voices were disregarded.

Wasteland clearance was one of the favorite projects of the Arbeitdienstkorps, German equivalent to our Civilian Conservation Corps. They did a Teutonically thorough job of destroying trees and bushes, draining swamps and lowering the water table under wet streamside lands. All this blossomed into grain or hay fields, or truck farms raising vegetables for the cities.

In even shorter time than it took for nature's Nemesis to overtake similar indiscretions in this country, the penalty began to be exacted. German summers since 1938 have had rather pronounced dry spells. The light, peaty soils of the drained swamps have gone with the wind.

To be sure, the areas affected are not great as compared with the one-time Dust Bowl of this country, but in a land of the relatively limited extent of the Reich they loom much larger. Also, the dust storms themselves, reaching heights of only a couple hundred yards, are as nothing compared with our black blizzards, that climbed miles into the air and swept from the Plains to the Atlantic. But again, in a land with so little soil to spare, every lost acre counts heavily.

The evils have already been recognized, Dr. Wetzel states, and steps to remedy them are being taken.

ITEMS

STARCH has been synthetically made from glucose in the laboratories of the University of California, by Dr. W. Z. Hassid and R. M. McCready. This is the first case on record of the production of starch by any means except the action of plants themselves. The reaction was brought about with the aid of an enzyme known as phosphorylase, which was isolated from potato juice. In its presence, glucose first combined with phosphoric acid (a compound occurring in all green plants) to form a substance called phosphorylated glucose. The enzyme then broke this compound down into its original constituents, glucose and phosphoric acid, and recombined the glucose molecules into starch.

A NEW rot-proofing treatment for fabrics has been invented by Helen M. Robinson, of the Bureau of Home Economics of the U. S. Department of Agriculture. Miss Robinson's process is covered by a public service patent, so that it may be used freely by any one, on a non-exclusive basis. The process consists in immersing the fabric first in a solution of a copper or cadmium salt, then in a solution of morpholine, which is a complex organic compound. The reaction takes place within the fibers of the fabric itself, thoroughly impregnating it and discouraging the growth of mildew and other rot-causing fungi. The goods is stiff at first, but regains its pliability upon drying. Color and texture are not affected.

EXTRACTION from ragweed pollen of a colorless, nitrogen-containing chemical believed to be one of the major causes of hayfever was announced by Professor Harold A. Abramson and Dr. D. H. Moore, of the Columbia University School of Medicine, and Dr. H. H. Gettner, of Mount Sinai Hospital, at the Wilder D. Bancroft Colloid Symposium held at Cornell University under the auspices of the National Research Council and the American Chemical Society. Professor Abramson reported that the molecular weight of the chemical was found to be "surprisingly low—only 5,000." This small size is significant, it appears, from his explanation that in order to produce hayfever, pollen must not only be blown into the nose and eyes but the molecules causing the symptoms must pass through the mucous membranes into the deeper tissues beneath.

EXCAVATING a recently found log stockade built by Indians in Georgia, government archeologists expect to show modern America what an old Creek Indian town looked like. A presidential proclamation authorizing addition of five acres of land to the Ocmulgee National Monument near Macon, Georgia, makes possible the excavations. CCC enrollees supervised by National Park Service archeologists will do the work. Postholes of the stockade are so well preserved that every log can be placed where the Indians had them, if the stockade is reconstructed. House sites of the Indian village are marked by little green plots of ground, different in texture from land that had no construction on it. Mounds that were landmarks of the ancient settlement are in evidence, and the gaming grounds, where the Creeks played their favorite games, can be made out.

ONE of the new sulfa drugs, sulfadiazine, is as effective in pneumonia and other similar infections as the best of the older chemical treatments, but with less discomfort due to the treatment, is reported by Dr. Maxwell Finland, Elias Strauss and Osler L. Peterson in the *Journal* of the American Medical Association. Toxic effects were relatively mild and infrequent, only 9.2 per cent. becoming nauseated. Sulfadiazine was used in the treatment of four hundred and forty-six patients with various infections. It appeared to be highly effective in the treatment of the following diseases: pneumococcic, staphylococcic and streptococcic pneumonias; meningococcic infections; acute infection of the upper respiratory tract including sinusitis; erysipelas; acute infections of the urinary tract, particularly those associated with Escherichia coli bacilluria and acute gonorrheal arthritis.

RECOVERY from one attack of infantile paralysis is no insurance against further attacks from the disease, according to Dr. Howard A. Howe, of the Johns Hopkins University, and Dr. David Bodian, of the University of Chicago, who spoke before the American Neurological Association. They reported experiments with animals that show that immunity resulting from the disease is local, just where the virus has traveled along the fiber pathways of the nervous system. Animals convalescing from an attack which affected the brain were able to contract the disease again through the nose. And two monkeys that had had an attack of infantile paralysis confined to a limited section of the spinal cord contracted another typical case of the disease in the previously uninvaded portion of the central nervous system.