SCIENCE NEWS

Science Service, Washington, D. C.

THE DROUGHT

DROUGHT is doubly cruel to grain farmers and stockmen of Midwest and Northwest, because this year began with fair promises of returning abundance. During the past few years, dry fields had to be seeded in a spirit of grim chance-taking. But this spring it was different. The earth was moist at planting-time, and everything looked good. The young wheat sprouted bravely and the hopes of the farmers went up with the green blades.

But even while the wheat grew so hopefully, betrayal was at hand. From the first of March onward, the rains began to fail. At first the shortage was not severe; spring wheat was sown, and winter wheat took its fresh start, from the reserves of moisture in the soil. But the showers became ever fewer and scantier, and presently the reserve moisture in the soil, laid by for rainless days, was all gone. The crop was bankrupt. And Harry Hopkins had to buy a ticket to St. Paul, to face anew the menace of want on the front of the Northwest.

The promise of the early year was so fair that it is hard to believe in the reality of the disaster that has been brought to a sudden head by a few weeks of furnace-hot weather. After the terrible drought of 1934 ended, with sweeping rains in September of that year, precipitation continued nearly normal or even above normal for the whole afflicted wheat region, excepting only the blighted Dust Bowl at the southern end of the Great Plains.

The winter of 1935 especially set out to be helpful. True, it was very cold and full of howling blizzards, but by the same token it brought plenty of snow. The northern Great Plains had a better snow cover than they had had for years. A summary study by the U. S. Weather Bureau showed that the period of nearly-normal to supernormal moisture in the Northwest lasted for eighteen months; from September of 1934 until the late winter of 1936. Then the snow thawed, the farmers eagerly worked the unwontedly moist soil—and the drought began to creep up on them, betraying their optimism again.

The situation in the Northwestern wheat country is the really terrible thing, though it may presently find itself competing for front-page notice with a second center of drought that has been developing along with it, centering over Kentucky and covering the rest of the middle Ohio basin. The Southeast, robbed of its market vegetable crop by an early drought, has been relieved by recent rains, so that things now look more hopeful for the later crops—cotton, grain and pastures. The one-time Dust Bowl, converted into a Mud Bowl by torrential rains some weeks ago, is out of the drought picture for the present—though it may come back into it again.

The country's greatest single crop, corn, is not as yet in such severe danger, at least in the parts of the Corn Belt that were covered with last winter's mountainous snowbanks. Those banks of snow held more wealth than many pretentious banks of brick in the towns, for they replenished the depleted subsoil moisture and got the crop off to a very good start, though somewhat belated. The drought has been over the Corn Belt, too; but corn is a deep-rooted crop, and now has its feeders well down into the ground. So unless the heat becomes even worse than that of the purgatorial summer of 1934, the corn will come through.

DROUGHT AND ENGINEERING

WE are commonly prone to think of drought as a matter between the weather man on one side and the farmer and stockman on the other. It is their worry, primarily: let the scientist warn the food producers, and let the latter take what steps they can to protect themselves. That is just about how it looks to most of us, most of the time.

Yet engineering most decidedly is in the picture. The point is, that engineering has been there so long that we calmly accept it as a part of the natural landscape, and not as something man has done.

But if we consciously look at the situation, and compare it with what it was in pioneer days, before transit and level, pick and shovel and sledgehammer, then we may "come to" with something of a start. We read now that railroads stand ready to transport feedless, waterless stock to regions of more abundance, there to be kept alive until the drought breaks and they can go back home.

But in the early stockraising days, before railroads were as highly developed as they are now, and long before improved highways and big motor-trucks, stock had to go out of a drought-afflicted country under its own hoofed motor power, even as it had when Jacob's sons heard that there was grain in Egypt and so went down from the parched land of Canaan.

Such an exodus was always attended by terrible losses, both in animals that died outright, and in wasting away even of the survivors through the hardships of a forced march with little feed and almost no water. Engineering does not prevent droughts, but it has succeeded in mitigating their consequences very materially.

Engineering "in the little" also has its benefits and possibilities. One of the unremitting efforts of both federal and state agricultural engineers, in all the West, has been to teach men how to build dams, so that at least a piece of the creek might remain on the farm, to keep the stock alive after the rest of the water has all run by. It may be expected that the present drought, like its predecessors, will spread this gospel mightily among such as are still unconverted.

And incidentally, these dams will not merely save water, they will help to save the land, too, from the gnawing curse of soil erosion.

A NEW STEEL MILL

BY WATSON DAVIS,

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MAN and machine reach new heights of coordination in a steel strip mill, such as was exhibited at Lackawanna,

N. Y., near Buffalo, to a group of newspapermen by the Bethlehem Steel Company. Human brains and skill, both in design and operation, combine with precise and delicate control of large electrical power to roll in a few minutes a thick slab into a lengthy strip of steel sheet metal.

To see a red-hot chunk of steel pass successively through eleven huge sets of rollers, that squeeze it thinner, wider and much longer, is one of the best spectacles of modern industry. Clouds of steam arise from the cooling water sprays on the rolls, electric switches click, and the long radiant carpet of metal rushes down a path of smooth-running rollers to be coiled automatically like so much adding machine tape. Two and a half tons of steel ribbon, not touched by human hand or brawn, the creation of human brains and skill.

Behind this rapid metamorphosis of crude steel into sheets for automobiles, refrigerators, furniture, and a hundred other products, is precise electrical control. The modern rolling mill would be impossible without the flexibility and responsiveness of motors, thousands of them, mounted upon the machines. In a lofty central room, "pulpit" to steel men, where he may survey the whirling mill below, is the god of the machine, the operator, playing with skillful mind and fingers on the bank of the switches that are masters of the wheels below. In a vast electrical room, giant moto-generator sets whir, giving the direct current that drives the machines.

As much power is used by a strip mill as by a large ocean liner, some 35,000 horsepower for the new Bethlehem mill. Without the development of electrical power devices, particularly the direct current motor precisely controlled by resistance changes, such modern strip and sheet mills would not be possible.

Do not imagine that the human element is entirely lacking. Automatic as the machine appears in its smooth operation, yet constant manual adjustment is necessary in order that the strip may flow out smoothly. Essential is the proper relative motion of the squeezing rolls, speeding up as the rolling proceeds, and this fine adjustment is made by the human operator, second by second. And man had to make the machine.

Months and years of engineering experience were necessary to produce the American-developed continuous strip-sheet mill, of which there are now about twenty, besides the new one that arose in less than a year on waste land in Lackawanna.

The brawn of strong young arms is still necessary in the game of steel, but gone are the backbreaking, roasting tasks that Charles M. Schwab, veteran steel man, reminisced about when he saw the Lackawanna mill for the first time. Labor per ton of steel produced has been vastly reduced, yet leaders like E. G. Grace, president of the Bethlehem Steel Company, remind that more men than ever are employed in making steel. More steel per man employed, they argue, when it goes out into industry, creates more jobs. It will, to be sure, if purchasing power allows the public to gratify yens for more things of steel.

This recurring adjustment of man to new machines is one of the most troublesome situations confronting modern life. The machines are marvellously built and controlled. Better engineering of the human element is another and less solved problem.

ADVANCES IN CANCER RESEARCH

THREE significant advances in the fight against cancer appear in the last issue of *The American Journal of Cancer*.

A difference between the blood plasma in healthy persons and in patients suffering from cancer can be detected by the use of an instrument of modern physics, the spectrograph, is reported by Alexander J. Allen, Rachel G. Franklin and Edward B. Sanigar, of the Biochemical Research Foundation of the Franklin Institute, Philadelphia. Similar differences were found by this method in blood plasma from cancerous and normal animals. The difference is considered due to an increase in the fibrinogen-globulin content in the blood in cancer.

Occurrence of both cancer and leukemia in mice following injection of the cancer-causing coal tar compound, water-soluble 1:2:5:6-dibenzanthracene, was reported by Drs. Harold Burrows and J. W. Cook, of the London Free Cancer Hospital. Occurrence of leukemia is the interesting feature, since this fatal disease characterized by greatly increased numbers of white blood cells is thought to be similar to cancer. The experiments were preliminary ones designed to determine the cancer-causing potency of a new dibenzanthracene compound. Consequently it is believed to be too early to state that this compound caused the leukemia, though this seems possible.

Further information on the rôle of hormones in the causation of cancer was obtained in studies by Drs. V. Suntzeff, E. L. Burns, Marian Moskop and Leo Loeb, of Washington University School of Medicine, St. Louis. Long continued injections of the female sex hormone, estrin, increases the incidence of breast cancer in mice, these investigators found. The effect varies directly with the size of the dose and the hereditary tendency of a given strain to cancer. Cancer of the mammary glands was produced "at least as readily" by injections of female sex hormone in male mice of high tumor strains as in non-breeding females of the same strain. This shows that the mammary gland or breast of male mice is hereditary at least as predisposed to the development of cancer as the female gland.

HEALTH IN THE CCC CAMPS

LIFE in CCC camps proved much safer than life in the surrounding communities when an epidemic of menigococcic meningitis occurred in Missouri and Kansas last summer.

Now it can be told to doctors and the public, and in the forthcoming issue of *The Journal of the American Medical Association* Captain Dwight M. Kuhns, of the Army Medical Corps, Fort Leavenworth, Kans., reports on the control measures adopted in three CCC camps when the disease broke out.

The CCC boys, in addition to the usual quarantine,

daily medical examinations and inspection and sterilization of food and dishes, were treated early with antimeningococcus serum. Only one boy died, a mortality rate of 11 per cent. Outside the CCC camp, 83 per cent. of the patients died.

Aside from the serum used, the most effective control measure at the camps was to do away with all crowding. A space of three feet between cots was required, and head to foot sleeping was initiated.

In the end 395 persons were given meningococcus filtrate to determine its value as a skin testing and immunizing substance. None in the intervening ten months has developed meningitis, although at Tarkio, Mo., scene of the first outbreak, four cases developed among those not immunized.

In presenting this preliminary report, Captain Kuhns states that in order to prove the value of the meningococcus filtrate as a skin testing and immunizing agent it should be used in a large number of epidemics over a long period of time.

JAPANESE EARTHQUAKES

FOUR thousand earthquakes a year! This is the average number of perceptible ones for all Japan. It is small wonder that this country has proved a fruitful laboratory for seismologists.

Recently the Earthquake Research Institute of the Imperial University of Tokyo, Japan, held an exhibition of instruments, apparatus, maps, diagrams, statistics, etc., commemorating the tenth year since the establishment of the institute and the fifty-fifth year since the organized study of seismology began in Japan.

In 1880, the Seismological Society of Japan was organized by American, English and Japanese scholars in Yokohama and Tokyo for the study of conditions preceding, accompanying and following earthquakes. One of them, Sir James Alfred Ewing, later a principal of Edinburgh University, invented a horizontal pendulum seismograph in cooperation with Thomas Gray, who added a heavy bob suspended by a spiral spring with which to record vertical motion. The instrument which they worked out has been the model for seismographs throughout the world ever since.

Dr. Mishio Ishimoto, director of the institute, is the inventor of a number of instruments to aid in the study of earthquakes, chief among them being the tiltgraph and the accelerograph. With the tiltgraph, which has now been in use for eight years, it has been possible to prove the truth of the proposition of T. Terada, C. Tsuboi and N. Miyabe, that the crust of the earth (at least in Japan) is composed of blocks. These blocks appear to be several miles in diameter; a general upheaval of the ground is produced by the combined motion of the blocks.

As for the cause of an earthquake, while some hold that it originates from a pair of sliding "faults," or deep crustal cracks, the findings of the Japanese scholars indicate, rather, a movement of the magma, or plastic matter, under the crust of the earth. Mr. Tanahashi, of the Kobe Marine Meteorological Observatory, who is interested in the motions which initiate earthquakes, in the pushing waves and the pulling waves, has made a study of the distribution of initial motions; and he finds that a quake may start from several points at the same time, as, for example, in the deep-seated earthquake of June 2, 1931, when the source of motion was quadruple.

Inasmuch as Japan is traversed by six earthquake zones and has in the past 340 years suffered from 27 major earthquakes which took the lives of 161,822 people, it is to be expected that this country should be particularly interested in earthquake prediction. But, although statistics have proved the correlation between quakes and barometric pressure, its gradient, precipitation, tides, etc., these are only the trigger; and as the late Dr. Suyehiro remarked, "An unloaded gun can not be fired by pulling the trigger." Part of the task ahead is to learn when the gun is loaded, and with what.

ITEMS

WITH a new and second outer shell expanding and rushing outward at the record rate of 2,100 miles per second, the "new" star or nova now visible in the sky is unusually interesting to astronomers of Mount Wilson Observatory of the Carnegie Institution, at Pasadena. A gigantic outrush of gases in the form of a shell is usual with such novae, but two days after its discovery on June 18 Nova Cephei (or Nova Lacertae as it is also called, since it is on the border of the two stellar constellations) developed a second outburst which achieved the largest velocity thus far measured in any nova. Now dimmer than it was at the peak of its outburst, the star at its best is estimated to have been 100,000 times as luminous as the sun. Its distance from earth is estimated at 2,800 light years.

DROUGHT threatens the thirty million young trees that were set out in the shelterbelt area of the West before Congress doomed the whole project by cutting off all appropriations. The trees are still in good condition, but the soil around them will need cultivating unless the heavy investment already made is to be given us as lost. If work-relief is made part of the drought-relief program developed at the St. Paul conference, it is hoped that some of the funds may be made available for the protection of the shelterbelt plantings. All the remaining trees in the nurseries, over a hundred million all told, have been ordered to be dug up and given away by Congressional mandate. Probably most of these will perish, through lack of forestry knowledge on the part of the people who get them.

DROUGHT is not only an enemy in itself, it has given threefold aid to another enemy, the grasshopper. First, it has provided ideal living conditions, for 'hoppers love warm, dry weather. Second, it has stunted the crops, so that grasshopper feeding is that much more destructive. Third, by causing a shortage of all kinds of cattle feed it has boosted the price of bran, which is an essential ingredient of the poisoned bait used in the war against them. And with only a quarter of a million dollars of federal money available in the whole grasshopper area, any additional curtailment of the total munitions supply makes defeat in the campaign all the more likely.