SCIENCE NEWS

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AN EXPLODING STAR IN CYGNUS

THE first nova or exploding star to appear in many months has been discovered in the constellation of Cygnus by Dr. Fritz Zwicky observing from Mt. Palomar, Calif. Observatories all over the world have begun observations upon the remarkable changes in this star's spectrum which will contribute to the knowledge of stellar structure and of atomic structure as well.

Not quite bright enough to be seen with the unaided eye, the nova now at eighth magnitude is probably as bright as it ever will get. Inspection of astronomical photographs at Harvard Observatory show that it had been photographed more than fifty times since June 8 when it was of about tenth magnitude.

Dr. Harlow Shapley, director of Harvard Observatory, stated that "It is likely that the nova reached its explosive maximum in early spring when too near the sun for discovery. During this summer it has been oscillating between the seventh and eleventh magnitudes. Ultimately it will fade away. Its distance is probably greater than a thousand light years."

Dr. Walter Adams, director of Mt. Wilson Observatory, reported the discovery to Harvard Observatory, whence the news was distributed by radio and telegraph to observatories both in the Americas and in Europe and Asia. Lund Observatory in Sweden relayed the information to observatories in both United Nations and Axis countries.

The spectrum of the nova shows bright bands with multiple absorption components. A complete curve of the light variations is being prepared from the Harvard photographs.

THE SCARCITY OF PHYSICISTS

ONE good physicist is bred per year per million inhabitants.

This estimate, made by Sir Lawrence Bragg, of Cavendish Laboratory, Cambridge, England, was based on the number of physicists turned out annually by the British universities, and is confirmed by the Central Register of the Royal Society, which corresponds to our National Roster. At the beginning of the war, the British had listed 1,200 physicists in a population of 45,000,000. Assuming an average working life of thirty years, this comes also to about one per million per year.

A survey made in the United States in connection with the National Roster of Scientific and Specialized Personnel shows that one good physicist in a million men applies to the U. S. A., too.

This ranks the physicist among the scarcest of war "materials." The demand in both England and America exceeds the supply, and the universities have been pressed to train as many men as possible to fill the gap. The physicist, like the poet, is born and not made, an editorial in *Nature* contends. He can not be made on demand by any system of training. However, the British editorial argues, Sir Lawrence Bragg's definition of a good physicist as "a man capable of independent thought, with a flair for his subject," has set the standard too high. Many of the tasks for which physicists are required can be very adequately performed by men and women less gifted.

There has been a very substantial increase in the size of the physics classes in British universities and colleges. While this may not add materially to the numbers of "good physicists" it will add substantially to the numbers available for the more routine but no less important posts for which originality of a high order is not necessary. And this will enable the strictly limited number of men with a real flair for research to be assigned to the tasks that they alone can do.

THE TREATMENT OF CANCER WITH X-RAYS

THE experimental treatment of cancer with x-rays generated by 3,000,000 volts of energy was described at the Chicago meeting of the American Roentgen Ray Society by Dr. Richard Dresser, who reported that the high intensity of the ray created by the experimental machine permits a depth dose much greater than has been obtained even with great amounts of radium; and by Professor John Trump, of the Massachusetts Institute of Technology, who described the physical characteristics of the extremely short ray. Operating on the electrostatic principle, by which static electricity is produced by friction, the apparatus is insulated by air under pressure.

A small number of selected patients have been treated with rays created by the new machine. Dr. Dresser stated that the 3,000,000-volt x-rays have essentially the same physical properties as gamma rays of radium. The penetrating effect of these rays of such extremely short wave-length is such that the maximum therapeutic treatment effect occurs not on the patient's skin, but some distance below in the subcutaneous tissue. Thus the new machine may make possible larger doses of radiation directed at deep-seated cancers with proportionately less effect upon the skin and adjacent normal tissue.

These preliminary clinical findings substantiate the observation that as the wave-length of an x-ray beam is decreased, the skin tolerance and depth dose are increased.

LARGER SUGAR CROPS

SCIENTIFIC control has been developed by Dr. Harry Clement, of the Hawaii Agriculture Experiment Station, whereby plantings of sugar cane in any location may be consistently made to yield 100 per cent. of the theoretical yield.

In the beginning of the study a field experiment was set up to show the relative importance of soil and climate. This experiment was unique since the type of climate in the two fields differed radically, although they were only a few miles apart. The temperature of the areas was the same, but one had a low rainfall and high sunlight intensity, while the other was a cloudy region with moderate rainfall. To make sure that the soil for the crops

was identical, dirt from one was transported to the other. When cane was grown in the two soils under the same climate conditions, the yield was the same. Yet, when cane was grown in these two soils in their respective climates the one yielded 134 tons per acre of good quality cane while the other gave only 65 tons of medium quality.

All attempts to correlate the differences in growth with soil, nitrogen, phosphorus and calcium levels in the plant were without success, but an almost perfect correlation (.999) was obtained when the physical factors of leaf area, crop density and sunlight were considered.

Thus it was evident that yield and quality are dependent, largely, on the atmospheric energy absorbed by the plant. Since the amount of atmospheric energy varies from season to season and from year to year, it is clear that the growth and quality of the plants will also vary. It follows, then, that the index to the fertilizer program lies in the plant as it integrates the influences of the atmosphere.

A system of indices has been established for sugar cane which makes possible the continual adjustment of practices to requirements. The primary index, the sugar content of the sheaths of certain young leaves, reflects the balance existing between the metabolism of the plant and energy available. When this index is normal (about 10 per cent. sugar, dry weight) the plant is growing at the desired rate for the particular climate. If the index rises, the plant is building carbohydrates at a faster rate than it is using them, that is, it could be growing faster than it is. If the index falls below normal, the plant is growing faster than it should and hence quality suffers.

Whatever the primary index shows is the key to adjustments. If the index is abnormal, secondary indices for moisture, nitrogen, etc., are consulted for the cause, and correction in irrigation or fertilizer applications are made accordingly while the crop is still in the fields.

Using this program, much of the guess work in crop management is eliminated. Economically the program pays for itself many times over in saving of fertilizers and of water, not to mention the high yields of good quality crops.

THE EXTERMINATION OF INSECTS

THE farmers' annual blitz season is on. The enemy? Hordes of Oriental fruit moths, potato fleas, boll-weevils, cotton leaf-worms, Japanese beetles, velvetbean caterpillars and hundreds of other varieties of insects. However, the latest communiqué of the Department of Agriculture reports that everything is under control, with only a little mopping up still to be done.

A fresh infiltration of wheat-eating Hessian flies, sweeping east from Kansas to Pennsylvania, are being thwarted by a drastic scorched-earth policy. Since this newest menace is nourished in its larval stage by the juice of tender young wheat stalks, it can be combatted by the ruthless destruction of "volunteer" or random between-crop growths of wheat which offer breeding ground to the thirsty Hessian maggots. It is also circumvented by "delayed seeding," since a touch of frost is harmless to wheat but slows down flies.

Our important wartime crops of peanuts and soybeans have been menaced by white-fringed beetles, leaf-hoppers and velvetbean caterpillars, which can be dusted with cryolite from low-flying airplanes. The white-fringed beetle is a new importation from South America, which research experts in Agriculture's Bureau of Entomology and Plant Quarantine believe is now under control.

The beetle called grape colapsis, fond of soybean in its grub stage, can be foiled by rotation of crops. The cotton season has presented, in addition to the annual boll-weevil menace, an urgent epidemic of cotton leaf-worm, or Alabama ardillacea, which migrates annually from the tropics. Thanks to calcium arsenate, dusted from airplanes, this is now under control, except for the northern edge of the cotton belts. Entomologists are now working on a new cotton pest—the pink boll worm. Except for a few enemies such as the gipsy-moth, crickets and grasshoppers, government entomologists content themselves with research, information service and regulation of harbor and inter-state plant quarantine, letting the farmers carry on the actual warfare.

The innumerable pests which eat stored grain, wool and tobacco in warehouses are an ever-present problem, requiring a vigilant policy of fumigation and "dusting the air" with arsenate compounds.

Although nicotine bentonite is sometimes used in spraying fruit, the most common defense weapon is arsenic, now being absorbed by the war against human enemies. Although no shortage of arsenic has been felt so far, farmers and government experts are not too hopeful about next year's supply.

Fruit pests alone number between 250 and 300 varieties, while another myriad of species attack potatoes, vegetables and all forms of truck crops. Booby traps composed of poison bait are used for some varieties: spraying, dusting, rotation of crops for others. The corn earworm can sometimes be taken in by breeding longer husks on corn. Those worms you'll be eating with your apples this fall are most apt to be youthful codling moths or Oriental fruit moths.

ITEMS

THE unusual dampness which in most agricultural areas had delayed the maturing of crops, and aroused fears of frost damage should frost come early this year, have given way to good growing weather—warm and with plenty of sunshine. According to reports issued by the U. S. Weather Bureau, in some places corn grew twice as fast as normal for this time of the year. On the whole, in fact, growing conditions have been unusually favorable throughout the whole season, and crop yields 12 per cent. higher than in any past year are predicted. If the fall weather continues good, the final yields may exceed present forecasts. In any case there is a big harvesting job ahead.

QUANTITIES of precious copper, zinc, lead, nickel, tungsten, chromium and other strategic metals are being rescued from low-grade deposits and mine wastes by air bubbles, which float them to the surface. The low-grade ores are ground in water and small amounts of chemicals are added which selectively attach themselves to the grains

of the valuable minerals and float them to the surface. This process of "froth flotation" has been used for many years, but E. I. du Pont de Nemours and Company announces the development by themselves and others of new chemicals which improve the process and make it more economical. The precious minerals are skimmed off the surface and subsequently smelted and refined, thus adding to the supply for our war implements.

To insure production of the highest quality of dehydrated foods for the armed forces of the United Nations, the U. S. Department of Agriculture announces the opening at Albany, N. Y., within the next few weeks of the first school to train commercial manufacturers in improved methods of processing developed in government research laboratories. Because of the urgent need to conserve shipping space and to prepare foods in a form which will keep indefinitely in any climate, the training program will be expanded sometime this fall to include a school at Rochester, N. Y. The training program is being jointly conducted by the Agricultural Research Administration and the Agricultural Marketing Administration, which is the Lend-Lease purchasing agency. Subjects included in the courses will be selection of vegetable varieties, storage problems, processing, packaging and laboratory control, to provide maximum quality for this fuel for the fighting men of the United Nations. Recent improvements in dehydration processes make possible the shipment of dry vegetables, milk, meat and other foodstuffs in only a fraction of the space formerly required. Yet when mixed with water at the battle front, they are reconstituted with nearly all the nutrient value and fresh flavor still intact.

THE death rate from tuberculosis in the United States continues to decline, despite an upswing of cases in European countries, according to the report of the National Tuberculosis Association. Last year 44 persons died of tuberculosis for every 100,000 population, compared with 46 the previous year. This totals 59,173 persons dead and 105,714 new cases reported. Despite continued improvement in the death toll, there is slowing up of the downward trend of cases in this country. Dr. Kendall Emerson, managing director of the association, points out that under wartime conditions tuberculosis may show an increase here, just as it already has in warring countries of Europe. Various theories have been offered to explain the increase abroad. Among them are decreased resistance, due to longer hours of work, strain, anxiety, inadequate diet, broken rest, overcrowded homes and shortage of medical and nursing personnel. There is every reason to believe that, as the war goes on, these factors will operate in this country unless voluntary and public health authorities are able to use all their resources. Every effort is being made to keep tuberculosis out of the armed forces. Army doctors are fully equipped for x-raying and are authorized to reject all those who may have or who have had the disease.