

GENERAL SCIENCE

Dangers in World Situation Stimulate Effort in Science

Duty of Providing Continuity Essential for Progress Rests on Few Remaining Scientists Working in Freedom

SCIENCE in a world at war responds by stimulated and increased activity, declares Dr. Vannevar Bush, president of the Carnegie Institution of Washington, in the Institution's annual report.

The duty of carrying on and providing the continuity essential for the best progress, he says, rests mainly on the few remaining scientists who can still continue in freedom to extend basic knowledge in a turbulent world.

"Fortunately," continues Dr. Bush, "the emergency has brought a quickened pace and a new intensity in scientific activities throughout this country, even in fields which are remote from the preparedness program. When a nation is in danger, and this danger becomes fully appreciated by its people, slumbering loyalties are aroused, petty disagreements disappear, and simple patriotism regains its rightful place.

"A democracy may exhibit a confusing dissidence in times of peace, but the very freedom of expression which produces discord as each small group pursues its limited objectives acts powerfully to unite and stimulate when common self-interest becomes focused by a single clear threat. Mass thinking takes time to crystallize, and is accompanied always by disturbing impurities and contaminations, but the strength of the resulting product is very great.

"Science feels this influence early. The urge to do something for humanity, by improving its knowledge of its environment, is so allied to the urge to do something definite to protect one's country from aggression that all scientific effort responds to the stimulus. This is one of the reasons why fundamental scientific advance, and in fact basic intellectual accomplishment of many kinds, is often accelerated rather than retarded by national stress."

Science News Letter, December 21, 1940

Atomic Power Nearer

WHAT, in theory, might have proved a stumbling block in obtaining atomic power from the famous

Uranium 235 seems removed, according to the report of the Institution's department of terrestrial magnetism.

U-235, it is believed, may be a useful power source if it can be isolated in sufficient quantities. When hit by an atomic fragment called a neutron, the nucleus of an atom of this kind of uranium splits into two parts, with liberation of energy, and the emission of more neutrons. These, in turn, might split other nuclei, and so on, in a chain reaction.

During 1939, Dr. Emilio Segre, at the University of California, found an unknown substance of which half decayed in 2.3 days, and which was not the result of a fission, or splitting. If "the 2.3 day substance arose also from U-235," says the report, "enough neutrons might be consumed by this non-fission process

to prevent the propagation of a chain."

Dr. P. H. Abelson, of the Department of Terrestrial Magnetism, and his colleague, Dr. L. R. Hafstad, attempted to identify the mysterious substance, but could not do so. Recently, however, Dr. Abelson visited the University of California's laboratory at Berkeley. There, with Dr. E. McMillan's collaboration, he succeeded in showing that the 2.3 day process arises from element 93, of weight 239. This is one of the short-lived elements heavier than uranium, which do not ordinarily exist in nature. It in turn, originates from U-238, another form, or isotope, of uranium.

"Hence," this part of the report concludes, "the considerations regarding a possible chain-process using U-235 are clarified."

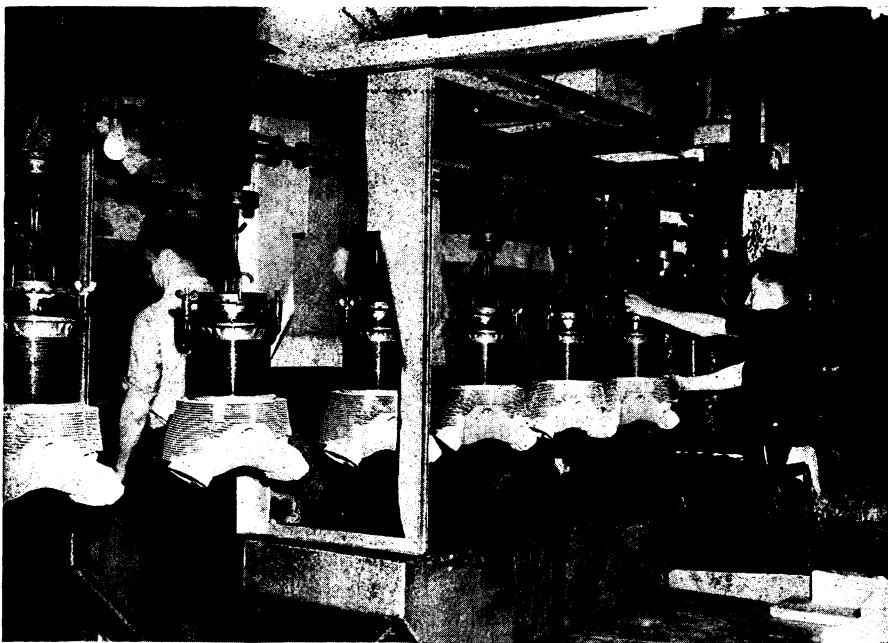
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Measuring Sun's Effect

A NEW way of measuring the sun's effect on the earth, in causing magnetic disturbances, has been inaugurated, despite the fact that war threatened to stop the flow of much valuable information from other countries.

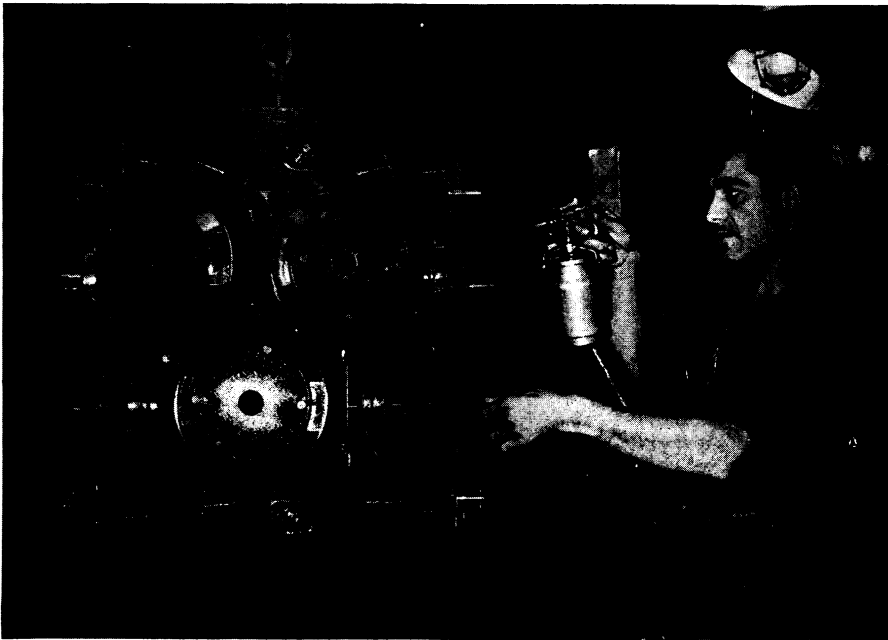
States the report:

"Through joint studies with the U. S.



SPEEDING DEFENSE

Moving on a conveyor chain are thousands of potential horsepower to propel the wings of war. In this photograph, taken in a new paint shop of the Wright Aeronautical Corporation in Paterson, N. J., are shown cylinders as they are dipped in the vat of finishing enamel in a continuous process. The painted cylinder at the extreme right is being whirled to remove excess paint.



SAFETY WITH EFFICIENCY

The workman, who is spraying a crankcase of a Double-Row Cyclone aircraft engine, does not wear a protective face mask because a powerful fan forces the unused spray towards a water curtain in the background that carries off the excess paint. This photograph is from the Wright Aeronautical Corporation's paint shop in Plant No. 2.

Coast and Geodetic Survey, the K-index was established as a valuable abstract of the magnetograms, providing even single observatories with good estimates of world-wide magnetic conditions. This index is now currently derived from data obtained by seven American-operated observatories, and is published weekly by Science Service. It gives, for the first time, a detailed homogeneous series for the intensity of solar corpuscular radiation affecting the earth, useful both in its terrestrial aspect—as in scientific or commercial radio work—and for its bearing on solar physics. Violent magnetic storms with $K = 9$ occur only a few times near a sunspot-maximum, but it is equally rare that any full 3-hour interval is perfectly free from disturbance. This means that the earth is almost constantly, even near sunspot-minimum, under the influence of (presumably solar) particles, weak as this influence may be at times.”

Science News Letter, December 21, 1940

Embryo Growth Rates

STUDIES of the rate of growth of various organs in early stages of the human embryo have been made by an ingenious indirect method, described by Dr. George W. Corner, the new director

of the Institution's department of embryology.

Since it is obviously impossible to make direct measurements when the whole embryo is not any larger than a millet seed, and besides has already been sliced into thin sections and mounted on a microscope slide, a different method has to be used. The one adopted by the Carnegie embryologists consists in tracing on paper of uniform thickness the exact outlines of the parts to be studied as they appear under high magnification, and then cutting out the outlined sections and weighing them on delicate balances.

Some of the things that have been discovered about two embryos in the fourth week of their development are: relatively enormous spread of nutritional surface, extremely small amount of heart tissue at this early age, and faster growth of brain than spinal cord even in the fourth week of human prenatal life.

Science News Letter, December 21, 1940

Compounds Between Stars

FOR a long time astronomers have known that the space between the stars is not as empty as it was once thought, but that certain elements in the form of very diffuse gases exist there.

These are principally calcium, sodium, potassium and titanium.

Recent researches at the Mt. Wilson Observatory, the report announces, combined with theoretical studies at the Dominion Astrophysical Observatory in Victoria, B. C., show that there are compounds as well as single elements in interstellar space.

In spectrum photographs which analyze the light from distant stars have been found all the important lines that, it was predicted from theory, would result from the compounds CN and CH. The position of these lines shows that they originate between, rather than in the stars. CH and CN do not exist as separate compounds on earth, only in combination with other atoms. CH is a molecule which consists of an atom each of carbon and hydrogen; CN of carbon and nitrogen.

“It is highly probable,” states the report, “that the two or three remaining unidentified sharp lines which are fairly prominent will also be found to be due to the molecules of familiar gases.”

Science News Letter, December 21, 1940

Colorless Corn Plants

ALBINO animals are interesting freaks, often valuable because of their rarity. Albino plants beyond the seedling stage are practically unknown, because they automatically starve to death, lacking as they do the green pigment, chlorophyll, necessary for the manufacture of basic foods.

Physiologists of the Institution, however, under the leadership of Dr. H. A. Spoehr, have been able to keep albino corn plants alive for four months and more, by feeding them on sugar and other nutrients. In this way they have begun to obtain an understanding of some aspects of plant nutrition hitherto inaccessible. It has been discovered, for example, that such plants can manufacture plenty of starch if supplied with ordinary cane sugar, a process hitherto considered impossible. It has also been found that they cannot get adequate nutrition out of glycerine and other compounds, which have until now been looked upon as possible plant foods.

Parallel experiments have been carried on with plants artificially albinized by putting them into the dark while still young. Sunflowers so kept on a diet of sugar and the necessary minerals have grown and even blossomed, producing normal yellow-rayed flowers although their leaves wholly lacked green color.

Science News Letter, December 21, 1940