SCIENCE NEWS

Science Service, Washington, D. C.

THE RECENT MAGNETIC STORM

A TERRIFIC disturbance on the sun was the cause of the worst magnetic disturbance in years which blacked-out telegraph lines, disturbed radio communication, and interfered with long distance telephony on Easter Sunday. Unusual radiation from the sun swept down upon the earth, setting up vast currents of electricity in the upper atmospheric layers, 60 to 90 miles above the earth, and shooting electrical currents through the earth to mix up or make inoperable communication lines, especially those that use the earth as one side of the circuit.

Not until scientists have been able to inspect and study automatic records made at various magnetic, radio, astronomical and other laboratories will the full extent of this Easter magnetic storm be known accurately. However, preliminary studies show that it was more severe than the famous storm of 1938 which occurred on Easter Saturday, April 16. In that storm a telegraph station in Oslo was set on fire by the current generated in its wire circuits, and telephone bells rang without anyone calling.

During the 1938 disturbance—when Northern Lights were seen as far south as the north coast of Africa, and France had a one-night fear that the glow in the sky was the start of a war—the electrical currents in the atmosphere of the earth amounted to several million amperes. The current magnetic storm is believed to have been even more severe, and probably is the worst since that of May, 1921.

The most famous magnetic storm on record is that of 1859, when so much electricity was generated in telegraph lines that batteries were no longer needed to operate instruments. The natural electricity was, in fact, used to operate telegraph tickers.

A large sunspot group visible to the naked eye properly protected by smoked glass, was in its best observing position on Sunday, but three previous appearances of the same group had brought no magnetic effects. Evidently the solar disturbance was a gigantic flare-up rather than just a sunspot. Significance in the coming of this storm close to the time of the spring equinox is seen by some, due to the sun and earth being lined up at that time.

Magnetic instruments of the U. S. Coast and Geodetic Survey's magnetic station at Cheltenham, Md., showed that the current magnetic storm was extremely intense. At the magnetic observatory at Tucson, Ariz., the recording instruments went off the record, so violent was the magnetic disturbance. It is believed that perhaps the only complete record of the magnetic disturbance will come from the magnetic observatory of Carnegie Institution at Huancayo, Peru, where a specially-built insensitive instrument is installed for just such occasions.

The magnetic storm was world-wide in extent. It began at 8:49 A.M., E.S.T. on Easter Sunday and was still in progress 24 hours later. The horizontal intensity of the earth's magnetic field at the height of the disturbance was over 1,000 gammas, compared with a range of only 50 gammas on an ordinary day. A range of 200 gammas is considered a magnetic storm, according to Dr. A. K. Ludy, of the U. S. Coast and Geodetic Survey. A gamma is a unit of magnetic intensity. It appears that electrical circuits suffered disrupted service to a large degree during the storm. The storm of 1938 appeared, in contrast, to affect radio communication more than it did wire circuits.

It is explained, however, that the seriousness of a magnetic storm, from the standpoint of disrupted communications is not a complete index of its intensity. All magnetic storms are world-wide in scope, but regions are found where the intensity is a bit greater than the average. If these maxima happen to occur in a region (like the Northern Hemisphere) where wires and radio are widely used, the magnetic storm may produce a serious communications blockade. If the maxima come in a sparsely settled region the world worries little about it.

The situation is quite like that for earthquakes which arouse little interest if they occur in remote parts of the world away from civilized centers where they can cause life or property damage.—WATSON DAVIS.

VIRUSES THOUGHT TO HOLD SECRET OF LIFE'S ORIGIN BUT DISCOVERY OF TRANSITION POINT BETWEEN LIVING AND NON-LIVING WILL BE DIFFICULT

VIRUSES, best known as causing diseases like infantile paralysis and influenza, may some day reveal the secret of the origin of life. Discovery of the exact transition point between living and non-living, however, even if it can be made through virus studies, will be difficult, Dr. Thomas M. Rivers, director of the Hospital of the Rockefeller Institute for Medical Research and an authority on viruses, stated at a recent meeting of the New York Academy of Medicine.

When bacteria, slightly larger disease-causers, were discovered, Dr. Rivers pointed out, it was thought that these tiny organisms were the key to the origin of life in the world in general. Now some scientists believe that this is the case for viruses.

"At present there are a number of ideas regarding the nature of viruses," Dr. Rivers said. "According to one, viruses represent the results of retrograde evolution that might have proceeded to the point of a single living molecule; to another, they are examples of how life begins; to still another, they are autocatalytic agents, that is agents, presumably without life, which in some unknown manner are capable of inciting the production of more of themselves through the building up, breaking down, or rearrangement of materials or molecules in their host cells; finally, they are transitional forms between the living and the non-living.

"There is one objection to all these ideas, namely, each

stresses the point that all viruses must be similar in nature. However, to me it appears not unlikely that if the concepts set forth by the different workers are within the realm of possibility more than one of them may hold within the virus group, and that viruses are not necessarily all alike in nature.

"In other words, I am of the opinion that some of the viruses may be minute, highly parasitic microorganisms, the midgets of the microbial world, capable of reproduction only within susceptible host cells; that others may represent forms of life more or less unfamiliar to us; and that still others may be fabrications of their host cells aided by the processes of autocatalysis.

"What life is and where the transition from the nonliving to the living takes place, if it does, in the scheme just set forth is not known. Indeed, the transition may be so gradual that it will be difficult for investigators to determine the particular point at which it occurs."

THE INDUSTRIAL USES OF CORN

RESEARCH to find industrial uses for corn will have to go clear down to details of molecular structure of the starch, proteins and other constituents of the corn grain, according to a statement made by Dr. Henry G. Knight, chief of the bureau of agricultural chemistry and engineering, U. S. Department of Agriculture, in an address given before the Sixth Annual National Farm Chemurgic Conference at Chicago. Dr. Knight outlined to his audience some of the lines of attack contemplated in the research program for the Northern Regional Laboratory, now building at Peoria, Ill.

Dr. Knight's figures indicated that corn, the country's biggest single crop, has an apparently inevitable flow toward food. Only 9 per cent. of the crop leaves the farm for the hoppers of industrial plants. Of this, about a fourth goes right back to the farm as feed for animals, and another half becomes human food in one form or another. In other words, the actual percentage of the total corn crop that enters non-food uses is very small.

Starch, which makes up the bulk of the corn grain, also makes up the bulk of corn's present industrial output. By far the greater part is used as starch or after conversion into compounds of smaller molecular size, the most familiar of which are glucose and alcohol. Practically nothing has been done in the direction of building the molecules up into bigger ones, as molecules of starch's kin-compound, cellulose, have been built up into such products as rayon, synthetic plastics, transparent wrapping sheets, and so on. Exploration of such possibilities for starch is to be an important part of the work of the new Northern Regional Laboratory.

Another corn product having possibilities in industrial build-ups is corn oil. At present, practically all corn oil is used in food. But if larger industrial uses are found for corn starch and its products, correspondingly more corn oil will become available, for which it will be desirable to find non-food uses if possible.

One important group of compounds in corn oil consists of linoleic acid glycerides, which may be adapted to molecular build-up techniques, Dr. Knight pointed out. He added, "The use of this component of corn oil in surface coatings, rubber-like structural materials, flotation agents, adhesives, sprays, lubricants, and lubricant addition agents, etc., on a large scale is not an unreasonable expectation."

Corn proteins, left over after industrial processing, now go mainly into feedstuffs, and are used to some extent indirectly in human foods. Industrial uses for them represent a practically unexplored field.

Industrial and power alcohol is not now being successfully manufactured from corn, due largely to the price competition of cheaper materials. However, a program of research into all possible angles of the power alcohol field, more basic and comprehensive than anything hitherto attempted, is planned for the new Regional Laboratory.

A NEW ALLOY OF MANGANESE AND COPPER

AN alloy as strong as steel, but as noiseless and as free from "chatter" as rubber, is only one of the series of new metals being evolved in the manganese experiments of the U. S. Bureau of Mines, according to Dr. R. S. Dean, chief engineer of the metallurgical division of the Bureau.

In a demonstration before the Colorado Mining Association, Dr. Dean dropped a piece of brass and a piece of steel on the floor with a clang. Then he dropped a piece of the new alloy. There was a slight thump but no ring or clang whatever—much the same as if a piece of hard rubber had been dropped.

The new alloy is of manganese and copper properly heat-treated, "It dampens or absorbs vibrations like rubber or good cardboard, which convert noise into heat." "The silent properties of rubber are sought after, but there are many places in industry where it can not be used. Generally speaking, rubber substances are unusable in tension—rubber axles or drive shafts are hardly feasible. Here we have an alloy with the strength and modulus of elasticity of mild steel, that has the noise-absorbing properties of rubber. This opens up many new possibilities; chatterless spring suspensions, noiseless gears, a muffler for a whole host of bothersome industrial sounds. This alloy is being tried for those uses now."

The new manganese-copper alloys are made possible by the reduction of manganese by electrolysis, which permits metal 99.96 per cent. pure to be made, as against 96 or 97 per cent. purity by older methods. The less pure manganese is used mostly for alloying with iron.

An alloy of the new purer manganese, with 2 per cent. copper and 1 per cent. nickel, resembles copper in ductility and other qualities, but by heat treatment it can be given an electrical resistance 1,000 times that of copper.

Another manganese-copper-nickel alloy has a tremendous hardening range, from that of copper to that of die steel, Dr. Dean said. This hardening can be so controlled that the interior of a tool or casting can be as soft as copper while the surface is hardened like that of steel.

Still another property of some of the new manganese alloys is low heat conductivity. This opens vistas of pot-handles and holders made of metal but which stay as cool as wooden handles.

A NEW TYPE OF VACUUM TUBE

A NEW type of vacuum tube for amplifying and repeating weak electrical messages that carry long-distance telephone communication has been developed at the Bell Telephone Laboratories. It is confidently expected to give many years of continuous 24-hour-a-day service.

The present telephone tube, which the new advance replaces, has a theoretical average lifetime of 18,000 hours. The new tube will exceed this several times, scientists report.

Best comparison of the new and the old is that after 22,000 hours of service (two and a half years) only 55 per cent. of the old style tubes were in service. With the new tubes 95 per cent. were in service after the same interval of time. From comparison of the "death" curves of the two vacuum tubes telephone engineers estimate, conservatively, an average lifetime several times longer for the new tubes than for the old.

For the layman, whose nearest contact with vacuum tubes is probably in his radio set, this new advance will probably be a worry for he knows that his radio tubes are guaranteed only for a life of 1,000 hours of operation. The worry will be the same type of difficulty which arose last year when Dr. F. B. Jewett, vice-president of the American Telephone and Telegraph Company, was vigorously questioned at the Monopoly Committee hearings in Washington about other telephone repeater tubes having a life of 50,000 hours.

It was disclosed then that the principles which give long life to telephone tubes can be applied to the tubes used in radio sets, but that high cost would probably rule them out. Moreover, excessive long life of such tubes, which is the key demand on telephone circuits, would permit them to outlast the rest of a common radio set many times. It would be like putting jewel bearings in a dollar alarm clock.

The extra long life of telephone repeater tubes comes about because of the extreme care in their production, plus a most rigid test, prior to use, which eliminates many tubes which might quickly show failure in service.

ITEMS

A "STRONG" submarine earthquake shock occurred off the western end of the Aleutian island chain, according to the U. S. Coast and Geodetic Survey where the epicenter has been calculated from information relayed by Science Service from seismological observatories. The earthquake occurred on March 27 at 7:31 A.M. Eastern Standard Time. The epicenter was 52 degrees north latitude and 176 degrees east longitude. Seismological stations reporting the shock included: Fordham University; Georgetown University; Pennsylvania State College; Ottawa; Bozeman, Mont.; Sitka, Alaska, and Honolulu.

THERE was nothing "unusual" about the Easter cold wave, according to the U. S. Weather Bureau. It was a perfectly normal mass of chill air, moving down the map from Alaska and points northwest. The only thing out of the ordinary was that it was a little larger than average, and later than a chill of similar intensity has been for a number of years. Also, of course, Easter was considerably in advance of the usual date.

A PRODUCTION tax of nearly 4 per cent. was levied last year on the corn crop of the northeastern states, by one insect pest, the European corn borer, according to estimates of the U. S. Department of Agriculture. Value of the field and sweet corn crops in the corn borer's range last year was approximately $106,000,000; borer damage amounted to $4,000,000. This is nearly twice the estimated damage for the 1938 corn season. The European corn borer's range is still confined mainly to the states east of the Mississippi and north of the Ohio. For some reason the insect has been slow in invading the great corn areas of the prairie states.

FIVE great stone heads, each weighing more than 20 tons, are the newest ancient American mystery. Unearthed in Mexico by a joint expedition of the National Geographic Society and the Smithsonian Institution, four of the mammoth carved heads are reported as having broad noses, thick lips and prominent eyes. How Indians transported such heavy basalt boulders, six to eight feet high, to the swampy plain near La Venta, in the state of Tabasco, is not yet understood. Nearest basalt found by the archaeologists is 100 miles away. The age and the significance of the stone heads are other unsolved mysteries.

HIGH-PITCHED noises have a greater depressing effect than lower-pitched ones of the same degree of loudness, according to Drs. Edward J. Van Liere, Paul E. Vaughan and Davis W. Northup, West Virginia University School of Medicine. At a high pitch, a noise about as loud as a riveter slows down secretion of digestive juices and acid in the stomach more than the same noise at a low pitch. The same studies showed that variation between individuals is important, some being able to stand the same amount of noise better than others. The work was described at the New Orleans meetings of biologists.

GLASS real-looking flowers were placed on exhibit in a first-day-of-spring exhibit at the Hayden Planetarium, New York, beginning on March 20, at 1:24 P.M., EST, when the sun crossed the equator and spring officially opened. The flowers were made by the late H. O. Mueller and his son, Herman Mueller, who is now glassblower at the American Museum of Natural History, for Mrs. S. Stanwood Menken, and later presented to the Museum by her son, Arthur B. Menken. They represent, in lifelike color and fine details of structure, such springtime favorites as violets, crocus, narcissus, laurel and rhododendron.

MENINGITIS cases in England and Wales have increased since the war began to a number greater than the previous record high reported in 1915. "Epidemiologists who studied the behavior of outbreaks during the last war are not surprised that the prevalence of the disease has been unusually great and are apprehensive of a considerable epidemic in the near future," according to the editor of the *Lancet*. Meningitis is essentially a disease of recruits, that is, of newcomers to community life who have not had time to become adapted to or latently immunized by the germs in their new environment. War mobilization, and the black-out and bitter winter weather which interfered with proper ventilation are blamed for the present alarming increase in cases.