SCIENCE NEWS

Science Service, Washington, D. C.

THE WORK OF PROFESSOR SPEMANN

PROBING experimentally into the minute beginnings of life in its embryonic stages, a methodical German investigator discovered there cells that act as leaders, showing the way for the cells around them to develop into brain, spinal cord and other parts of the tiny structure that eventually grows into a man or a woman. Because of that discovery, Professor Hans Spemann, of Freiburg, has become the Nobel laureate in medicine for 1935.

American scientists learning of the award agreed that Professor Spemann is one of the great world leaders in the particular branch of medicine known as experimental embryology. Although he is not the first to study embryology by the experimental method, he was one of the first to become dissatisfied with merely watching the embryo grow, in an effort to learn the secrets of how this tiny structure developed into a baby cat or dog or child. So he began experimenting with the growing embryo.

Among other experiments, he transplanted some of the leader cells into another fertilized egg to see what would happen. In this way it was discovered that a spinal cord, for example, could be made to develop where one ordinarily would not have been found. The leader cells that stimulated development of the spinal cord continue to stimulate surrounding cells to develop into a spinal cord, even if the leaders are removed from their original location and placed elsewhere in the tiny embryo.

These leader cells are known by various names, such as activators or inductors. At first they were thought to influence surrounding cells of the embryo by an abstract process called activation. Further research showed, however, that the effect is one of chemical stimulus. The same effect can be produced by the leader cells after they have been killed by heat as when they are alive and growing. The chemicals which make up the cells have this power to stimulate other cells.

Professor Spemann is internationally known not only for his own discoveries, but for the school of experimental embryology which he has built up in his laboratories. Among his followers in the path of science is one of his three sons, Dr. Fritz Spemann, who is teaching biology at Frankfurt-on-the-Main. A daughter, Mrs. Margaret Cloos, is the wife of Dr. Ernst Cloos, member of the faculty of geology at the Johns Hopkins University.

CAUSE OF THE HELENA EARTHQUAKES

GROWING pains of the comparatively young mountains around Helena, Mont., are responsible for the scores of earthquakes that have shaken and damaged recently the region in central Montana where the Missouri River begins to gather water.

Earthquakes are the price paid by the crust of the earth for its evolution and progress. And in that sense the Rocky Mountain region and the Pacific Coast, because they are younger geologically, are more progressive and likely to give man and his buildings jolts from time to time.

The major shock, of October 19, occurred 70 miles north of Helena in the Little Belt Mountains, the range northeast of that city. Not particularly unusual are the scores of minor shocks that are reminding inhabitants unpleasantly of the big shake. More unusual was the previous Saturday's foreshock, the physical premonition of the major tremor to come.

Scientific shock troops are on the scene of the disaster and have taken up a position in the basement of Helena's federal building. Rushing from California by fast motor truck, Franklin P. Ulrich, seismologist of the U. S. Coast and Geodetic Survey, brought two instruments and set them up to catch the dying tremors of the quake. Late on Monday night an accelerograph and a vibration meter began writing their wavy records in order that the scientists may learn more about how the tremors occur. Passing through a snowstorm in the dash to Helena from the coast, Dr. Ulrich's truck had a minor skidding accident and U. S. Forest Service officials gave aid in getting the seismological instruments to Helena.

Many permanent seismographs miles away from Montana wrote with their pen and photographic fingers the story of the quake as telegraphed by vibrations of the earth itself. At Pasadena, St. Louis, Washington, Chicago, Tucson, Ukiah and elsewhere, as well as at Bozeman, Mont., closest seismograph to the quake, scientists read the records, turned them into code and then telegraphed them to Science Service, where the information was relayed to the U. S. Coast and Geodetic Survey. In this way the exact location of the center of the quake was more accurately determined in Washington than it could be in Montana. The fault or rock cleavage in the mountains that slipped and thus set up the vibration may not be found. The actual slippage of the rocks probably occurred deep in the earth and in this quake probably did not come to the surface of the ground as it sometimes does.

Montana's other important quake of recent years occurred in 1925 and was centered in the region of Lombard, south of Helena and more near the head of the same valley. At that time geological investigations caused the issuance in government reports of warnings that other fractures in the mountains were probably carrying unrelieved strains that would probably cause future earthquakes.

Earliest record of an earthquake in the region was brought back by the famous Lewis and Clark expedition, one of the white man's first penetrations into Montana. One day in 1805 an earthquake was felt and sounds like distant artillery fire or thunder were heard. In 1883 the Gallatin Valley region had strong shocks, but no damage was done because there were few inhabitants.

U. S. Coast and Geodetic Survey seismologists over the week-end sent 500 questionnaires to postmasters and leading citizens in a wide area around Helena, asking them to give the government the benefit of their earthquake experiences. This is expected to supplement the record of

instruments. The government seismologists are of the opinion that Saturday's major shock was not really as strong as the 1925 Montana quake, but that it was more localized. They rate it 8 or 9 on the earthquake intensity scale with 10 a really bad quake.

Builders and architects of the region should take a lesson from the earthquake, seismologists warn. Buildings for a very few dollars extra construction cost can be made to withstand severe earthquakes. The difficulty has been in the past that few took earthquake risks seriously until the earth began to shake.

TIDE IN ROCKS AT PITTSBURGH

PITTSBURGH is rising and falling from 13 to 23 inches each day, according to measurements made at the research laboratories of the Gulf Refining Company in that city.

Dr. Paul Foote, director of the laboratories, told members of the National Research Council's industrial tour for banking and business executives that long-time measures of the force of gravity showed the startling effect of land rise and fall due to moon tides in the solid crust of the earth.

Such gravity measurements, Dr. Foote pointed out, are necessary in geophysical oil prospecting and are widely used by field parties to detect oil deposits thousands of feet below the surface. The extremely sensitive gravity apparatus is constantly being checked and tested in the laboratory and from these continuous records Pittsburgh's rise and fall each day is disclosed.

The sensitivity of the equipment is such that forces equal to only one ten-millionth of gravity are detectable. This is about like saying that if a fireman on a 500,000-pound locomotive threw off a piece of coal weighing only one quarter of a pound the apparatus could detect the weight difference.

The importance of geophysical prospecting, by which geophysicists discover oil wells without making costly test drills, lies in a reduction of wasteful chances. In the Texas Gulf Coast region, where oil is plentiful, there is but one chance in 1,000 of hitting oil by simply sinking a well. By the geophysical method, chances are now lowered to only one in ten or even less.

Coupled with the sensitive gravity measurements are magnetic and earth-wave reflection tests. The magnetic measurements determine the minute changes in the force of the earth's magnetism due to different layers of rock below the surface. The magnetic materials are in the basic levels, and oil-bearing rocks are found above them. Thus if the depth of the magnetic layers can be determined, the prospector-scientists know the maximum depth they will have to drill. In this way the search is narrowed.

Tremor measurements are taken also on earthquake wave apparatus, the seismograph. Small charges of dynamite are set off which set up earth tremors. Some come direct to the recording instruments set up along the earth's surface. Others, however, go downward and are reflected back upward off underlying layers and indicate the presence of various types of rock strata which may contain oil.

Linking the three methods together—gravity, magnetic and man-made earthquake measurements—mountain ranges which lie 5,000 feet below the surface have been discovered. The Amarillo Mountains in Texas are typical of these regions, which lay hidden below the earth's surface until disclosed by geophysical prospecting. Above the buried mountains lie the oil-bearing sands and salt domes of the great Texas oil field.

A NEW MAGNETIC ALLOY FOR LOUD-SPEAKERS

A NEW magnetic alloy, whose permanent magnetism is so powerful that it will lift sixty times its own weight, was shown at the laboratories of the General Electric Company at Schenectady, on the first stop of the Tour of Industries being sponsored by the engineering division of the National Research Council, for business and banking executives.

The purpose of the tour is to emphasize the importance of scientific research for industry, not only in developing new products and better ways of making old ones, but also to replace testimonials and high-pressure selling, in the court of consumer acceptance, with scientific truth and tested realities, according to Dr. Maurice Holland, directer of the engineering division of the National Research Council, who organized the tour.

The fifty invited leaders of business and finance are visiting six of the leading industrial laboratories as representatives of more than 1,600 similar research centers throughout the nation, which spend $750,000 a day for scientific industrial research.

The new magnetic alloy shown to the visitors at the General Electric laboratories is made of aluminum, cobalt, nickel and iron, and will have important applications in the radio industry for the construction of high-quality radio loudspeakers at low cost.

Present dynamic loudspeakers, said W. E. Ruder, of the research laboratory, in describing the new development, require strong magnetic fields obtained by use of electromagnets. The new permanent magnetic alloy will replace these more costly electromagnets. Illustrative of the unforeseen developments possible through scientific research, Dr. Ruder pointed out, is the fact that the new alloy was not originally developed for its magnetic qualities. It was made to serve as a heat-resisting alloy which would not deteriorate at high temperatures.

In Japan, on the other side of the world, Professor T. Mishima, of Imperial University, Tokyo, discovered the magnetic properties of a somewhat similar alloy. When the Japanese research was made known, the American laboratory needed only the development of a heat-treating process which would bring out the full magnetic properties of the alloy. The new material is not available for fabrication from standard bars but must be cast in the required shapes and finished by grinding.

FACTORS IN THE DEVELOPMENT OF CATARACT

ULTRA-VIOLET rays, heat and calcium (lime) salts are three interrelated factors in the production of cataract, Dr. Janet Howell Clark, of the Johns Hopkins School of

Hygiene and Public Health, has reported to the Society of Hygiene of the Johns Hopkins University and the American Physiological Society. How the cataracts of old people and of workers in certain industries develop may now be explained on the basis of Dr. Clark's research.

Cataract is an opacity of the eye lens or its capsule. Because one can not see through an opaque lens, blindness results. The protein of the eye lens and other protein solutions are denatured or changed by the action of ultra-violet light. When this light denatured lens protein is heated or if a small amount of calcium or lime salts is present, the protein coagulates and becomes opaque.

The initial process of light denaturation may occur in the lens protein without any visible opacity, because normally only potassium salts are present and calcium salts are not. Presumably, although Dr. Clark did not make the point, this is the reason why not every one develops cataract as a result of the every-day exposure of the eyes to some ultra-violet light from sunshine.

"There is probably always some denatured protein present in the lens as the result of exposure to sunlight, and the amount may increase with age owing to the lowered metabolism of the lens. This denatured protein does not precipitate in the presence of potassium, but a calcium concentration as low as five hundredths of one per cent. in the lens is sufficient to precipitate it at body temperature." An accumulation of denatured protein in the lens in old age combined with a higher amount of calcium in the blood may therefore be responsible for senile cataract.

The coagulation of light-denatured proteins is greatly hastened by heat. It is probable, therefore, that the larger number of cases of cataract in workers with molten glass and metals is due to an increased rate of precipitation of light-denatured protein when the lens is heated above body temperatures by exposure to large sources of heat such as these workers experience.

To prevent the denaturation of the lens, which seems to be the first step in cataract formation or production, Dr. Clark recommends that the eyes should be protected from radiation or light containing even moderate amounts of ultra-violet rays.

ITEMS

AN exceptionally large and brilliant meteor, so bright that it was clearly visible against the setting sun, was reported to Harvard Observatory by Professor William R. Ransom, of Tufts College. It was sighted on October 22 at 5:10 P. M. in practically broad daylight almost due west and traveling almost vertically. It appeared fairly high in the sky, traveled on a path about thirty degrees long, and disappeared about twenty degrees above the horizon. Its head was about half as wide as the full moon. It had a rather large tail and was brilliant bluish-white in color. Several other similar reports were made to the Harvard astronomers. The meteor was also seen from New York City.

FOREST fires, raging in the Los Angeles region and menacing elsewhere, might have been far worse this fall if the woods had not been full of C. C. C. workers. Latest figures available at the National Forest Service show that forest fires this fall in national forests over the country as a whole, have numbered 9,512, as against a preceding five-year average of 7,601—an increase of about twelve per cent. But the total area burned this year has been only 192,040 acres, as against a five-year average of 417,603 acres—a decrease of well over half. Forest Service officials give full credit to the C. C. C. workers for this creditable showing in reduction of loss. In the first place, armies of fire-fighters stand "at the ready" all the time, so that counter-attack against the flames is much more prompt than it used to be. But more basic and permanent has been the work of the C. C. C. in building fire roads, clearing fire breaks, cleaning up accumulations of slash and snags.

RAINFALL for the coming winter season in the lowlands of southern California is expected to be about equal to the average for the seasons during the period 1916–1934. In the mountains the indications are for about five per cent. excess over this eighteen-year average. Statistical calculations based on surface temperatures of the ocean, by Professor George F. McEwen, of the Scripps Institution of Oceanography, have yielded these "indications"—for Professor McEwen prefers not to give them the more positive names of forecasts or prophecies. Similar calculations for air temperatures indicate that in San Diego it will be cooler than average this winter, while a little farther to the north, in Santa Ana and Riverside, it will be warmer than average.

NEW finds of the art of the Crô-Magnon cave men have been made in two caverns in the province of Guadalajara, Spain, by a father-and-daughter team of archeologists, Juan Cabré and Maria de la Encarnacion Cabré. The style of the drawings identifies them as belonging to the Aurignacian period of Old Stone Age culture; they include as subjects plants as well as animals, and men or at least man-like figures—for the human representations are far less realistic than those of animals. The man-like drawings are shown in both hunting and fishing scenes, and at least one of the figures is shown swimming. Many of the animals represented are extinct, or at least are no longer found wild in Europe. These include bison, aurochs, rhinoceros, wild horse and wolverine. Among animals still existing in the wild state are deer and goats, together with the representation of one bird.

A NEW chemical method of making crude rubber plastic, as a preliminary to the production of rubber products, is announced by E. I. du Pont de Nemours and Co. The older method of plasticizing crude rubber consisted of the power-consuming technique of grinding and mashing it. Ira Williams and C. C. Smith, of the du Pont research staff, have found that chemical treatment will turn the crude rubber into the desired plastic form. The discovery is considered to be the most important work since the development of the synthetic rubber—DuPrene. A large saving in power is possible by the new method and it is believed that the quality of the final rubber products —tires, etc.—will be slightly improved. Technical chemical details of the discovery have not yet been made available.