SCIENCE NEWS

Science Service, Washington, D. C.

THE SEISMIC RECORD FOR 1931

THIRTY-FIVE earthquakes in three months, five of them major disasters to life and property in widely scattered parts of the world, is the appalling seismic record of 1931 to the end of March. Eleven quakes recorded in January, eleven in February and thirteen in March, culminating in the catastrophe that on the thirty-first overtook the city of Managua in Nicaragua, tell the story of an abnormally trembling earth.

These thirty-five earthquakes count only the ones important enough to figure in the day's news or to trace their autographs on the ever-vigilant instruments in seismological observatories. The lesser quakes that happen every day, the mere local shocks, were not counted. The data have been gathered for the use of scientists of the U. S. Coast and Geodetic Survey by *Science Service*, from the stations of the Jesuit Seismological Association, from official observatories of the United States and Canadian governments, and from numerous universities.

The first of the great earthquake disasters of the year came on January 14, when the wires bore the tale of ruin in towns of northwestern Argentina, followed by destructive floods and by volcanic eruptions.

On the very next day the city of Oaxaca, in southern Mexico, was ruined by an earthquake, and Mexico City itself, remote though it was from the center of the disturbance, was severely shaken and somewhat damaged; after-shocks on the sixteenth and seventeenth prolonged the terror in stricken Oaxaca.

On the second day of February came the New Zealand shock, destroying several fine towns, wrecking harbors and killing hundreds. This disturbance was of the peculiarly distressing kind in which there is a considerable tilting of the earth's crust, humping it up in some places and depressing it in others, reducing old established ground levels to anarchy. There were several after-shocks in the New Zealand area, notably one on the thirteenth.

March started out with a record of comparatively little damage, the earthquake of the fifth, along the coast of Chile, wrecking a number of houses but not figuring as a major disaster. The eighteenth of the month distinguished itself by staging two earthquakes, neither of which, however, figured in the world's tale of troubles.

Then, on the last day of the month, came the quake that overwhelmed the hapless Central American city in ruin, with sequelae that are only now struggling out by wire and radio.

THE NICARAGUA EARTHQUAKE AND THE PROPOSED CANAL

WHETHER the earthquake in Nicaragua will have the effect of wrecking the second American interoceanic canal before it is built is a question that will come up when Congress is again in session.

When the need for an interoceanic canal in the Western Hemisphere, long pressed by commerce, was brought home acutely to the American consciousness by the long voyage of the battleship *Oregon* during the Spanish-American War, Nicaragua was thought of more favorably than Panama. It was closer, the altitude was less, and the ground was not cluttered up by the French failure and scandal that made such an unhealthy atmosphere at the Isthmus.

But when it finally came to practical discussions before the Congress, the advocates of the Panama route rallied their forces. They pointed out that there were active volcanoes along the line of the proposed Nicaragua Canal, and that it was also in an earthquake country. Panama has no volcanoes and the earth there is quiet. There is a story of how Nicaraguan postage stamps showing a smoking volcano were sent to all members of Congress by the Panama backers, and helped to influence the final decision against the construction of the canal in such a "dangerous" country.

But since the building of the Panama Canal, the Nicaraguan earthquakes have kept pretty well away from the canal route and the Nicaraguan volcanoes have been behaving themselves. A new generation has inherited charge of public affairs, and the project of a second canal has received considerable impetus from the crowding of the Panama Canal that seems to be in fairly near prospect.

And now comes a wrecking earthquake, centering under one corner of Lake Nicaragua, which the canal would have to traverse, and ruining the city of Managua, which would naturally have a very considerable economic tie-up with the personnel of any major transportation work in the region. Such an earthquake could do immense damage to canal locks, power-houses and other mechanical appurtenances; or, if the canal were an ocean-level one, it might slide the side of a mountain into the narrow cut.

On the other hand, a good solid earthquake shock usually takes the mischief out of a given region, so that no more heavy shocks need be expected for a good many years to come. Earthquakes result from the building up of a state of tension in deep rock strata; after the slip has occurred the tension is relieved and only minor shocks follow. For this reason, the region around the northwestern end of Lake Nicaragua is safer from earthquakes to-day than it has been at any time during a considerable period of years.

THE USE OF PROTECTIVE SERA

A NEW chemical process that is expected to eliminate all danger from protective or curative serum administrations was reported by Professor J. Bronfenbrenner, of Washington University, St. Louis, at the Cleveland meeting of the American Association of Immunologists.

The use of these sera has become increasingly useful in treating diseases and for giving protection from diseases. Toxin-antitoxin for diphtheria and antitetany injections are familiar examples. Occasionally, however,

such serum injections are followed by grave complications and even death. This has made some physicians hesitate to use the sera.

Only one in 20,000 of those receiving serum for the first time develop alarming symptoms and only one in 50,000 die as a direct result of the treatment. The reason for the hazard is that some persons have a specific sensitivity to foreign protein. Such are the victims of asthma and hay fever. The same protein does not always affect all sensitive individuals, some being sensitive to the protein of horse serum and not sensitive to serum from other animals or to protein from other sources.

The human race may be divided into four categories with respect to their response to injections of these sera, Professor Bronfenbrenner pointed out. Some, about one tenth, have no ill effects after the injections. A small group, about one in 20,000, respond to injection of horse serum by an immediate violent reaction leading to collapse and sometimes to death.

The bulk of people when given serum injections have so-called serum sickness to more or less severe degree, varying from soreness at the point of injection to generalized fever and indisposition. These are considered normal in their reactions, however. The fourth group is composed of persons who may have reacted normally originally, but who became sensitive to serum as a result of previous injection. These may develop serum sickness very quickly and some of them may suffer severe complications and even die.

The process developed by Professor Bronfenbrenner and colleagues, Messrs. D. M. Hetler and I. O. Eagle, of Washington University, changes the chemical nature of the serum protein, so that it loses the quality of causing a specific reaction to it, but at the same time the immunizing or curative properties of the serum are left almost as effective as they were in the original serum. Studies with animals showed that the new preparation of sera is not toxic. Further improvement of the chemical procedures is being sought in order to leave the curative and immunizing properties of the sera unaffected in potency.

TREATMENT FOR LEUKEMIA

THE conquest of a fatal disease, leukemia, may soon be made as the result of experiments reported to the American Association of Pathologists and Bacteriologists, by Dr. W. C. Hueper, of the cancer research laboratory of the University of Pennsylvania.

Certain kinds of cancer are closely related to leukemia, which is a riotous growth of the white blood cells and a lessening of the red cells of the blood. The successful research by Dr. Hueper and his associate, Miss Mary Russell, may therefore be an important step toward the relief of cancer itself.

The first step in the development of the new treatment for leukemia was the growing of leukocytes, or white blood cells, in tissue culture outside the human body. Dr. Hueper was successful in causing the diseased overambitious white blood cells from a leukemic patient to thrive on artificial food given them in a glass tube. Leukemic white cells were injected in a perfectly healthy rabbit causing a fight to occur between the abnormal white blood cells injected and the protective chemical forces in the rabbit's blood that resist any unmannerly and unruly multiplication of the white cells. As a result there was built up in the rabbit's blood an unusual amount of substance that discourages the increase of white blood cells. Serum from the rabbit's blood containing this inhibitor was used for the treatment of leukemia.

So far only one human case of the disease has been treated and this was a case of long standing. The improvement of this patient was remarkable although a complete cure will probably not be possible. Using their own blood, Dr. Hueper and Dr. Ellice McDonald, director of the laboratory, made tissues of the cultures and showed that the anti-leukemic serum stopped the growth of the white blood cells. This causes them to be confident that the serum when applied clinically will check the disease.

Following closely upon the recent successful treatment of pernicious anemia with liver extract, Dr. Hueper's anti-leukemic serum promises to make an equally important conquest of disordered white blood cell conditions. Anemia is an abnormal lessening of the red blood cells, while leukemia is an abnormal increase of the white cells.

While leukemia is not a widely prevalent disease, it may be found in nearly every hospital of any size. Some forms seem to be hereditary. It is nearly always fatal. Often leukemias of long standing turn into the form of cancer known as leukosarcoma, a malignancy of the glands of the body.

THE SURVIVAL OF DRY BACTERIA

NOT all bacteria die when deprived of water and placed in arid surroundings, experiments of Dr. C. N. Stark and B. L. Herrington, of Cornell University, have shown. The investigation was undertaken in the hope of throwing light on the perplexing question of whether life without water is possible. According to one scientific view, perfectly dry bacteria would live forever. The opposite view is that in the complete absence of water life is impossible.

The facts can probably never be definitely determined, according to the report made to the Society of American Bacteriologists.

Those who believe that really dry bacteria will live forever can always maintain that death occurred as a result of the method of drying the bacteria, rather than from the dryness itself. Similarly it can be held by others that failure of the bacteria to die was due to incomplete drying. The problem is further complicated by inability at present to distinguish between free water, bound water and water of constitution.

By a special method bacteria were very rapidly dried to an extremely low moisture content. Of the organisms tested, two thirds of the streptococci originally present grew readily in culture media after 97 days under dry conditions. Only two or three per cent. of the original number of certain kinds of organisms were able to sur-

vive under the dry conditions. The material on which the organisms grow is an important factor. Exposure of extremely dry bacteria to free oxygen gas caused a pronounced killing of the bacteria.

A RHEUMATISM VACCINE

A VACCINE for rheumatism that holds promise of bringing to the medical profession a successful treatment for that common disease is now in an experimental stage of development, Professor Benjamin J. Clawson, of the University of Minnesota Medical School, disclosed in a paper read before the American Association of Pathologists and Bacteriologists.

Not for at least a year will it be possible for this new vaccine to be used by physicians generally. At present Professor Clawson is presenting his tentative results to his scientific colleagues, and his paper was entitled: "Experiments Relative to a Possible Basis for Vaccine Therapy in Rheumatic Fever."

Rheumatic fever, arthritis, or rheumatism, as the disorder is variously known, is a very common disease. It is wide-spread throughout the world. Professor Clawson in making his vaccine takes the causative organism, *Streptococcus viridans,* which he has repeatedly isolated from the blood of patients having acute and chronic arthritis. This germ is heat-killed to make a vaccine in a conventional manner. This vaccine is not injected under the skin as is a common practice, since this method would tend to make the patient more hypersensitive. Instead it is injected directly into the blood stream.

In testing his vaccine upon actual patients, Professor Clawson is treating approximately a hundred sufferers from the disease. The vaccine will not be given general use until the results of these tests are known.

ORIGIN OF COSMIC RAYS

COSMIC rays, the intensely "hard," all-pervading radiation that comes from somewhere in outer space, may come in some small degree from the sun.

This is indicated by recent researches of Professor Viktor Hess, of the University of Graz, one of the pioneers in cosmic ray research. With instruments set on heights in the Alps, he and other physicists have detected a very slight increase in the intensity of the radiation when the sun is at mid-heaven. This averages only about one half of one per cent. of the total radiation, but, according to Professor Hess, it is a constant, and hence probably a significant, variation.

If the sun really is the source of even a small fraction of the cosmic radiation, it lends support to the view held by a number of European investigators that these rays come from the stars, for the sun itself is a star, and not a very large one at that. Experiments conducted by two of Professor Hess's colleagues, Dr. O. Mathias and Dr. Steinmaurer, have indicated that there is about a two per cent. daily variation from average intensity. They are still engaged in checking up on this result.

Professor Hess adds, however, that even if the stars are definitely shown to be sources of cosmic rays, this does not wholly shut out the possibility of a part of the rays coming also from interstellar space.

ITEMS

DANGER lurks in typhoid vaccine if it is improperly prepared, stored too long or not accurately tested, said Professor Stuart Mudd, of the University of Pennsylvania, speaking before the American Association of Immunologists at their recent meeting. He discussed a small epidemic which occurred in an institution where inferior antityphoid vaccine was used. The value of the typhoid vaccine for giving immunity to typhoid fever depends, among other things, on the quality of the vaccine. Vaccine should be used within a few months after preparation.

POSSIBILITY that the later and more disastrous effects of the eye disease trachoma may be the result of two germs working together was demonstrated by Dr. Peter Olitsky, of the Rockefeller Institute for Medical Research, at the meeting of the American Association of Pathologists and Bacteriologists. Before his death Dr. Hideyo Noguchi, of the Rockefeller Institute, had isolated a germ from human cases of trachoma which he believed caused the disease. This germ could produce a disease resembling the early stages of trachoma in monkeys and apes. Continuing Noguchi's work, Dr. Olitsky with his colleagues, R. E. Knutti and J. R. Tyler, have produced a disease closely resembling the later stages of trachoma, in which blindness occurs, by the action of the granulosis microbe discovered by Noguchi in conjunction with other bacteria found in the eyelids.

INSTEAD of becoming extinct, moose are rapidly increasing in Sweden, thanks to restrictive game laws. During last year's brief open season of three days 5,082 animals were killed, according to official figures. This means an increase of more than 800 over 1929 and 1,360 over 1928. Since each animal is worth about fifty dollars, the total value of the moose killed in 1930 is about 1,036,400 kroner ($277,755). In spite of this heavy killing, the moose herds in central and northern Sweden increase annually, and cause many farmers actual losses because of the damage they do to crops and young trees. In most parts of the country the moose cows and calves enjoy constant immunity while the open season for bulls lasts but a few days, according to their prevalence in each district.

SEEDS of the Para rubber tree yield an oilcake and meal that is good feed for livestock, as shown by experiments at the Virginia Experimental Station. Earlier reports from the East Indies stated that the seeds are poisonous to farm animals, but this claim has not been borne out in these tests. The rubber-seed oil meal analyzes 33 per cent. protein and six per cent. fat, besides non-nutrient constituents. Cattle and sheep are said to relish it. The question of the suitability of the oil meal has come up as the result of experiments on the production of a commercial oil from the seeds of rubber trees on East Indian plantations, initiated by an American chemist, E. D. Gothwaite, of Belawan, Sumatra. He found that rubber-seed oil can be used to advantage as a drying oil, slightly inferior to linseed and tung oils in its qualities, and that after suitable treatment it might even be made available for use as human food.