SCIENCE NEWS

Science Service, Washington, D. C.

MOUNTAIN CHAIN FORMATION

A THEORY of mountain-chain formation based on the slow sliding of whole continental blocks over a substratum of volcanic glass was proposed at the American Philosophical Society in session in Philadelphia, by Dr. Reginald A. Daly, of Harvard University.

According to Dr. Daly's theory, great sections of the earth's crust, slowly heaved and tilted out of a stable position, gradually migrate in the direction of their slope. This slope may be very slight, and migration very slow, even a few inches a century, yet it goes on for such long periods that great changes, even the formation of huge mountain ranges, may take place.

Such a "downstream" migration of a continental block, Dr. Daly said, could not be imagined over a fixed and rigid base; but "for good reasons we may assume the earth's crust to be underlain by a universal substratum of basaltic glass at a temperature of 1,200 to 1,600 degrees Centigrade, or 2,200 to 2,900 Fahrenheit. The rigidity or stiffness of the substratum is great because of the hydrostatic pressure upon it; yet, as in the case of pitch, the resistance to flow breaks down with the passage of time, if a permanent, one-sided pressure or stress be applied to the substratum material."

Two things happen to a migrating continent, Dr. Daly continued. The edge of the "downstream" side, upon reaching the limit of its migration and encountering resistance, wrinkles and crumples into mountain folds, like the outer edge of flowing tar or molasses. On the "upstream" side the crust is stretched and finally cracked, allowing the interior magma to come to the surface as great non-volcanic lava flows.

SPIRAL NEBULAE

MANY of the spiral nebulae and the irregular nebulae in parts of the sky outside the Milky Way, which have long defied the efforts of astronomers to see them as other than continuous areas of light, have surrendered to the largest telescope in the world, the great 100-inch reflector at the Mt. Wilson Observatory in California, Dr. Edwin Hubble told members of the American Philosophical Society at the recent Philadelphia meeting. Photographs made of these objects by Dr. Hubble have revealed the stars of which they consist and demonstrate that the reason these stars have not been seen before has been because of lack of sufficiently powerful instruments, just as the Milky Way itself, consisting of millions of stars, appears continuous to the unaided eye. The irregular nebulae are now shown to be objects like the Magellanic Clouds, seen in the southern hemisphere and resembling the Milky Way, but so distant that the largest instruments hitherto in use have not been able to resolve them.

Dr. Harlow Shapley, director of the Harvard College Observatory, who recently announced the discovery that two gaseous nebulae, one in the large Magellanic Cloud and the other in the spiral nebulae Messier 33, are each so large that a beam of light would take two centuries to pass from one side to the other in either, has continued his comparisons of the cloud and the spiral. Determination of the distance of the spiral has made possible a measurement of its diameter which turns out to be about 15,000 light years, while that of the cloud is about 14,000 light years.

Besides being about the same size, they are both of the same brightness, each, taken as a whole, being about a million times as bright as the sun. The smaller groups of stars within each are about the same size and brightness, so that Professor Shapley concludes that they are of similar nature. The importance of this idea, he points out, is that the Magellanic Clouds are much closer than the spirals and hence they can be studied to gain information concerning the distant spirals.

THE LEWIS AND CLARK EXPEDITION

THAT the members of the famous Lewis and Clark expedition, which made the first long overland trek to the Pacific Northwest one hundred and twenty years ago, were more than military men and geographers, was demonstrated recently before the American Philosophical Society's annual session at Philadelphia, by Professor R. DeC. Ward, of Harvard University, and Professor Rodney H. True, of the University of Pennsylvania.

Professor Ward told of the field work in meteorology done by Captain Lewis, whose remark "I have observed that the thunder clouds in the western part of the continent proceed from the westerly quarter as they do in the Atlantic States" is probably the first specific mention of this important weather fact. Captain Lewis also noted the more rapid evaporation on the western plains; he observed the rate at which his ink dried on the paper as a gauge of the climatic dryness.

That botany as well as weather was studied on this famous expedition was commented on by Professor True, who has studied some unpublished correspondence between President Jefferson and Bernard McMahon, of Philadelphia, who cultivated plants and seeds brought back from the West by Captain Lewis. Among the native plants thus brought into cultivation were the Osage orange, well known as a hedge plant; the ornamental shrub snowberry, several varieties of currants that have since taken an established place among cultivated ornamental shrubs, as well as a number of herbaceous plants. Notable among the latter were two genera, then newly discovered and named in honor of the leaders of the expedition. Lewisia, the bitter-root, is now the state flower of Montana, and Clarkia, a member of the evening primrose family, is a fine ornamental flower.

TROPICAL CLIMATES

SEASONAL, or even daily, changes of residence were suggested as a means of lessening the insidious influence of tropical climate on the white man, by Dr. Bowman C. Crowell, professor of pathology at Jefferson Medical College, at the meeting of the American Philosophical Society.

Climate and disease, the two factors that have prevented the white race from establishing itself in the tropics, can be successfully combated. The productiveness of the warm countries is so great that it might be economically feasible to provide for the cooling of houses and in other ways to make it possible for the white man to be comfortable and healthy in the tropical environment.

"There is difference of opinion as to the effect of tropical climate," said Dr. Crowell. "Science has not been able to measure the unquestionably harmful influence on the nervous system of a constant temperature, bright sunshine, brilliant colors and the absence of seasonal variations. The equilibrium of the white man's nervous system and his energy and initiative are further disturbed by contact with impassive and at times stupid colored natives, by their untrustworthiness, and by the tendency to the abuse of stimulants and by the general lowering of the moral tone. Scientific investigation has not shown, however, that climate is any insuperable barrier to the white man's successful continued life in the tropics, and further serious investigation of the subject is imperative.

The method of control and prevention of most of the important transmissable diseases, such as cholera, plague, malaria, typhus, yellow fever and African sleeping sickness, are partially or fully known, he pointed out, and practical application of this knowledge is now largely a question of sufficient incentive.

PURE ALUMINUM

PURE aluminum, the goal of many years of research, will now be available in commercial quantities through the development of a new refining process described by Dr. Francis C. Frary, speaking before the American Electro-Chemical Society at Niagara Falls. The term "pure aluminum" is, of course, still a relative one, but its use is certainly now justified because the new "Hoopes" refining process makes this metal with less than two one-hundredths of one per cent. of impurity, even on a full commercial scale.

Previously the highest purity aluminum ordinarily available contained 99.7 per cent. of this metal. Some of the new product is as pure as 99.983. The principal impurity is copper, but traces of iron and silicon are also present. To make this exceedingly pure metal a special refining process using melted salts of sodium, aluminum and barium fluoride is used. The impure molten aluminum is carried by the electric current upward through the molten layer of these salts and is separated on top in a molten form from which point it can be poured or ladled off into molds.

This pure aluminum has a beautiful silver color and luster which it retains very well. The bluish tinge characteristic of commercial aluminum as found in the ordinary kitchen is eliminated because of the low content of iron and silicon. The first of these impurities causes a grayish color and the second a purplish color; and either causes the metal to become dull and lusterless on comparatively short exposure.

OXYGEN AND THE GROWTH OF BACTERIA

THE breaths of bacteria and other microscopic organisms were the subject of a discussion before the meeting of the National Academy of Sciences by Drs. F. G. Novy and M. H. Soule, of the University of Michigan.

The investigators grew cultures of their organisms in a special apparatus that enabled them to control the amount of oxygen supplied and to measure the oxygen used by the culture as well as the carbon dioxide given off by it. The study of the respiration of the primitive animal forms that cause African sleeping sickness showed that they required oxygen, that the gas exchange was much the same as in the case of bacteria, which are plants, and that their rates of respiration differed according to the kind of food with which they were supplied. An over-supply of oxygen slowed down and finally stopped their growth.

The bacillus of tuberculosis also gave different results according to the kind of food it got, but was not nearly so sensitive in the matter of oxygen supply. It could grow at least a little in an atmosphere containing as little as one half of one per cent. of this necessary element, and was not discouraged in an atmosphere of pure oxygen. Dr. Novy stated as his opinion that the tubercle bacillus grows slowly in the human body not because it gets no oxygen, but because it gets very little. It can not grow in a total absence of oxygen.

THE POLLUTION OF WELLS

THE belief that bacteria from outhouses can be carried only a few feet under ground has been proved a delusion as a result of recent extensive experiments. Bacteria from excreta deposits may find their way into the water of a well more than 200 feet distant, thus endangering the health of all who use that water supply, according to Professor C. W. Stiles, of the U. S. Public Health Service, who described the experiments at the meeting of the National Academy of Sciences.

The weather and the direction in which the ground water flows both influence the fate of bacteria left in the ground. Pollution extends only in the direction of the ground water flow. Rainfall causes the ground water level to rise. It picks up the bacteria, which are near the surface, and carries them further, spreading pollution In dry weather, the water level falls, and the bacteria tend to filter out into the soil.

If dry weather continues sufficiently long, the bacteria die. Under favorable conditions, however, they may live under ground up to two years and eight months, and chemical pollution put in the ground for experimental purposes almost three years ago is still being recovered from wells at varying distances.

ARTISTRY IN "ANNIE LAURIE" MEASURED BY SCIENCE

THE elusive quality that makes a piece of music "art" when sung by one soloist, and "just a song" when ordinarily well sung by another can be made visible and can be measured, according to a report by Dr. C. E. Seashore and Milton Metfessel, of the State University of Iowa, to the National Academy of Sciences.

Twelve singers, of varying artistic abilities, sang "Annie Laurie" in the laboratory of the two scientists, and records of their voices were made on paper in the form of wavy marks by a photographic process. These wavy charts, some more irregular than others, were displayed before the academy meeting. The distinct personality of the sound waves of each voice could be seen in the record, and the amount of artistic emotion expressed by each singer could be measured.

The emotional quality in singing is not obtained by following the written score with strict precision, but by minute deviation from the notes, Dr. Seashore says. A mediocre singer may sing more accurately than a great opera star, but the famous star has mastered the expression of emotion by subtle variations in pitch, time and intensity. And, as everything that the singer conveys to the listener is conveyed by means of the sound waves, a study of the sound waves shows every detail of the singer's technic and artistry.

The photographic method of recording music is advocated for scientific purposes because it produces a permanent record with minute detail.

THE BISON IN CANADA

CANADIAN successes in the effort to preserve from final extinction the last herds of American bison were reported before the mammalogists, by R. M. Anderson, chief of the division of biology of the Victoria Memorial Museum at Ottawa, Canada. Beginning with the low-ebb year of 1889, when it was estimated that in the United States and Canada there were only about a thousand survivors of the once vast herds of bison, Mr. Anderson sketched the share of the Canadian government in the work of rescuing the species.

The Canadian government received as a nucleus three animals from Texas in 1897, thirteen from the Lord Strathcona herd in Manitoba in 1898, and two from the Corbin herd in New Hampshire in 1902, all being sent to Banff. In 1907 the government purchased the entire Pablo herd in the Flathead reservation in Montana, 702 head in all, 410 of which were placed in Elk Island Park and the balance in the Buffalo Park at Wainwright. In 1909, 325 head were transferred from Elk Island Park and 77 head from Banff to Buffalo Park, and in 1910 30 head were purchased from the Conrad Estate of Kalispell, Montana.

The Buffalo Park comprises a fenced area of 160 square miles at Wainwright in which the buffalo have increased rapidly under protection. In 1913 there were 1,188 head and in 1915 over 2,000. In 1922 they were taxing the resources of the park and a number were killed. The herd was further thinned in 1923 and about 2,000 animals were killed and the meat and hides sold on the market. At the present time—1925—the Canadian government has about 8,000 buffalo at Wainwright, 348 at Elk Island Park and 22 at Banff, a total of about 8,370 head.

ITEMS

COMMERCE and industry will be required to contribute to the financial support of scientific research in France, if a measure passed by the Chamber of Deputies is also approved by the senate. The bill provides for a tax of five centimes on each 100 francs paid in salaries by industrial and commercial concerns. The sum which the tax would raise for French scientific laboratories is estimated at 14,000,000 francs a year. This is about $700,000 according to the present rate of exchange.

PARISIAN radio fans are hopeful that a new substance to replace the galena crystal will prove to be the dreamed-of super-crystal, and not just another substitute. The substance was discovered by chance by Félix Thuaud, prominent French steel manufacturer. While studying the by-products of steel, Thuaud noticed a material that was somewhat like the crystal used in radio sets. He chipped off a few pieces and had radio fans try them. Their report was that concerts were heard over longer distances and with greater clearness than with galena points. Thuaud also found that it was not necessary to hunt for special points of contact, as the new material was adequately sensitive at any point. The basis of the material is a combination of silicon and iron, with the former dominant. The product can be made in an electrical furnace or in an ordinary crucible. It can be sold at about one fourth the price of substances now used.

A NEW thermometer, which measures accurately temperatures as low as 380 degrees below zero, Fahrenheit, was described to members of the American Philosophical Society by Dr. W. A. Noyes, professor of chemistry at the University of Illinois. As mercury freezes at such a low temperature a bulb connected with a very narrow tube containing air is used. As the air expands and contracts with variations in temperature a small globule of mercury, kept at a temperature above its melting point, moves back and forth, thus serving as an index.

TEN thousand children every year die from tuberculosis and very many more are irreparably injured owing to infection from tuberculous cattle. This statement was made by Dr. M. J. Rowlands, late senior pathologist at University College Hospital, London, in an address to the People's League of Health, but it was accompanied by the reassuring assertion that it was the speaker's conviction that tuberculosis could easily be eliminated from cattle if they are suitably fed. "It is quite unnatural," he said, "to drain off from cows the vast quantities of milk that are now taken, and the effect is to remove from the cows the vitamines essential to health. It must be remembered that vitamines are only present in natural foods for a few months in the year," the speaker said. His own experience as a breeder has been that if vitamine-containing foods are given to cattle the herds could be maintained entirely or nearly free from tuberculosis.