SCIENCE NEWS

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COAL MINE EXPLOSIONS

Coal mine explosions like the one which claimed seventy-nine lives at Millfield, Ohio, are preventable disasters, because they probably need never occur if every mine were to make use of the precautionary measures, especially rock dusting, already worked out by mining engineers, is the belief of Mr. George S. Rice, chairman of the Mine Safety Board, of the U. S. Bureau of Mines.

Coal when in the form of dust suspended in air is explosive; and in coal mines, as in blasting powder plants, every precaution is necessary in order to prevent explosions and fire. At this time of the year when the mines are working to capacity, and coal dust becomes dry from the entering cool dry air, operators should be particularly vigilant and cautious.

Government recommendations and state regulations have placed in the hands of mine operators information regarding the most effective methods of guarding against disasters. All open lights or other sources of ignition, whether from lamps, open sparking machinery or flaming explosives should be avoided.

Another approach to the problem, besides the elimination of sources of ignition, is the thorough ventilation of the mine and the treating of the explosive coal dust by what is known to mining engineers as "rock dusting."

Rock dusting is a recently adopted method of making the coal dust non-explosive. Finely pulverized inert material is spread in the mine and mixed with the coal dust so as to dilute it. If more than 65 per cent. of the mine dust is incombustible, the mixture can not explode in a dust cloud. Every portion of the mine must be thoroughly and constantly rock dusted for complete safety. Just as one match in a powder magazine brings disaster, so one explosive area in a mine may cause the loss of miners and mine.

The safety division of the U. S. Bureau of Mines has found that notwithstanding the fact that mining engineers generally recognize the fact that wide-spread explosions can be almost absolutely prevented in coal mines by this method, rock dusting is not yet used in the majority of our coal mines. Despite the fact that thorough rock dusting would cost less than one cent per ton of coal, only a small percentage of the mines in this country are thoroughly rock dusted. In Ohio, of the approximately 600 mines operating, according to latest reports only about 5 are rock dusted. A larger number are partially rock dusted and this lessens the hazard to a degree. The Millfield mine was not even partially rock dusted.

It is estimated that the cost of equipping mines with the most modern and best safety measures, and of maintaining them in working condition would add less than 10 cents per ton to the cost of coal. Yet a major explosion may cost as much as a million dollars.

WASTE NATURAL GAS

The billions of cubic feet of natural gas wasted to the atmosphere in the production of oil can be pumped back into the wells from which it came in order to force to the surface oil that would otherwise be lost.

Not only will gas returned to the wells increase production, but if little gas is allowed to escape from a producing well more oil will be obtained. This fact was brought out in a paper on improvements in production practice presented by W. W. Scott, of the Humble Oil and Refining Co. of Houston, Texas, before the annual meeting of the American Petroleum Institute.

"In any oil pool that depends upon gas movement for production, and one in which it is possible for a single operator or a group of operators to develop the pool as a unit," Mr. Scott said, "the cost of conserving gas and returning it to the reservoir will be amply repaid by reduction of lifting cost and increased production from the pool."

As an example of the important rôle played by natural gas in the production of oil, Mr. Scott mentioned the Sugarland field located in the Texas Gulf Coast area about 25 miles southwest of Houston, which, he said, holds a unique position among present-day fields.

"In this field," he continued, "it has been possible to produce oil in such a way as to allow the average pressure on the reservoir to fall off as slowly as possible with a given amount of production. . . . All the gas produced with the oil is collected and about 85 per cent. or more has been compressed and returned to the reservoir. The injection pressure is approximately 1,400 pounds." Greater ultimate production and lower pumping cost were said to be the advantages of this procedure.

THE EARTHQUAKE OF OCTOBER 19

After nearly three weeks of work, collecting reports from people who felt it, Captain N. H. Heck, of the U. S. Coast and Geodetic Survey, has located the position of the earthquake near New Orleans on Sunday, October 19. Captain Heck, who is chief of the survey's division of terrestrial magnetism and seismology, said that the determination of the center of this quake was delayed because of the lack of reports at the time from seismograph stations. The center was about 65 miles to the west of New Orleans, not in the gulf, as was supposed at first.

This quake was located by the old method of isoseismals, that is, lines of equal force of the earthquake. By collecting information from a large number of people who felt the shaking, it is possible to form a good idea of its intensity at various locations. These can be plotted on a map, like the isobars, or lines of equal air pressure, on a weather map. The intensity of the quake weakens as one gets away from the center, so the isoseismals are roughly circular. Their center then marks the center of the quake.

To collect and plot these data take considerable time, but if the quake is recorded by a few seismograph instruments at scattered points, the location of the center can be made with much greater speed. The Louisiana

quake, however, was not a very violent one, and so was not detected on many instruments.

For large quakes, the survey, working in cooperation with the Jesuit Seismological Association and *Science Service,* is able to locate their centers within a few hours, often before any news filters through from the shaken region. Scientists at a number of seismograph stations as soon as they get a record of a quake, telegraph it to Washington in a special code. From one station's record it is possible to locate the quake on a circle a certain distance from it. With several stations, a number of such circles can be drawn and their intersection marks the center of the earthquake. With a large number of stations, individual errors can be detected, and the center located with great accuracy.

A few years ago, using this method, the survey located the center of a quake in a remote province of China, about twelve hours after it happened, but not for several months later did a survivor of the earthquake, which cost thousands of lives, reach civilization with the news.

CAUSE OF THE COMMON COLD

NINETEEN college girls are the latest heroines in the attack of medical science on the common cold. Through their temporary suffering from the colds with which they were experimentally infected by Drs. Perrin H. Long and James A. Doull, of the Johns Hopkins University Medical School, these volunteers aided in the discovery of the important fact that the infecting agent of the common cold is a filterable virus, so minute that it passes through the finest of filters and so difficult to grow that it can not be cultured by ordinary methods. These are important steps toward the conquest of this disease that is particularly prevalent in the fall and winter, but much more research will be necessary before a prophylactic can be offered the suffering public.

The college-girl subjects of the experiments are known in the reports only by their initials, as is customary in medical reports. One of them volunteered to be the subject of experiment twice, the others were the subjects of only one experiment each. The results extend and confirm the views of earlier investigators who showed that the common cold is an infectious disease transmitted from one person to another by something present in the nasal secretions of people ill with colds. But the search for the organism has been narrowed down to one that is in the same class so far as size is concerned, as the causative agents of smallpox, hoof-and-mouth disease and even of more dreaded diseases.

They proved that the filterable virus of cold is present in liquid that had passed through the finest of filters, the Berkefeld W porcelain filter and the Seitz filter of asbestos. These strain out organisms that are passed by filters that heretofore have been considered extremely fine, and the filtrate is actually sterile from the standpoint of ordinary bacteriological technique. Yet this filtrate passed on the colds to the college-girl subjects.

As it has been impossible to cultivate the cold virus in the way that ordinary germs are grown, the next step planned in the attack on the cold is to attempt artificial culture growth of the virus. By introducing the submicroscopic cold germs to the presence of living cells kept alive in test-tubes, it is hoped that the cold virus may be grown artificially. That may give an opportunity to try to develop a protective vaccine.

Because colds are prevalent in the fall and winter and infrequent in the summer, the experimental work is done in the summer to minimize the chance of human test subjects picking up colds accidentally. The researches just reported in the *Proceedings* of the Society for Experimental Biology and Medicine were made last summer and now continuing research is being planned for next summer.

The John J. Abel Fund for Research on the Common Cold, supported by the Chemical Foundation, conducted the researches. Dr. Long will continue the work next year while Dr. Doull this fall joined the faculty of the Western Reserve University.

GUAYULE RUBBER

THE guayule plant, source of America's new home-grown rubber, will not stand too much coddling. Certain luxuries of cultivation, principally ample irrigation, cause it to lie down on the job.

Dr. David Spence, technical director in charge of guayule culture near Salinas, Calif., described to the American Chemical Society, at Los Angeles, Calif., his recent experiences in making desert bushes grow rubber. The first really substantial California crop, due this winter, promises to give the rubber industry something to think about.

Guayule, an unimposing, scrubby bush of the sunflower family, seems to have been cast out by nature to fight for a living with cacti, creosote bushes and the like in the arid desert wilds of Mexico. Peons earn a scant living by uprooting the plant, transporting it by donkey to the coast and selling it to rubber producers.

American rubber interests have long been fearful of an emergency involving embargo on tropical rubber. Under the leadership of Dr. Spence, they have chosen California as the most likely state in which to develop the domestic product.

If the guayule plant is forced to endure a drouth of several months, it will produce a multitude of fine droplets of rubber all through its larger stems and roots, particularly near the cambium or new-wood layers. As high as 18 per cent. of the total weight of the bush is actual rubber in the new high-bred strains of the plant being propagated at Salinas. If, however, the plant be given a continuous supply of moisture in the manner common to ordinary agricultural crops, it just forgets to grow rubber. Life is apparently too soft. The plant simply vegetates and makes an immense amount of worthless brush. The central valleys of California afford a climate suited to this situation. No rains of any significance occur between May and October, and comparatively little in April and November.

California guayule rubber was subjected to recent tests in auto tire formulas in a local plant. Results indicate

that it is nearly equal to Hevea or tropical rubber in tensile strength, elasticity, etc. Chemically it seems to be identical with the ordinary caoutchouc of commerce. The Salinas experiments promise acreage yields close to those of the tropics. Closer plantings may run the yields even higher than those of Hevea.

THE STUDY OF LEPROSY

THE same group that is studying the tuberculosis bacillus has been asked by the Leonard Wood Memorial to undertake the study of leprosy. The research will be directed by the Medical Research Committee of the National Tuberculosis Association, of which Dr. William Charles White, of the U. S. National Institute of Health, is the chairman.

As in the recent attack on tuberculosis, hundreds of thousands of leprosy bacilli will be grown in the laboratories of the H. K. Mulford Co. These will be taken to the Sterling Chemical Laboratory of Yale University where they will be analyzed under the direction of Professor Treat B. Johnson. At the same time the clinical studies with leprosy patients will be carried on at the government institutions for the care of lepers and in those of the Leonard Wood Memorial. The germs causing the two diseases are members of the same family. They even grow in the same cells of the human body, the monocytes. The germs of tuberculosis, however, invade mainly certain parts of the body, such as the lungs, while the leprosy bacilli occur chiefly in the skin.

Some 15 or 20 strains of lepra bacilli have been cultivated from human cases, but until recently it has never been possible to produce leprosy in any animal by transferring any of these germs to the animal's body. This has now been accomplished by Professor K. Shiga, of the Imperial Medical Faculty at Seoul, Korea. He claims to be able to produce leprosy in rats by injecting the lepra bacilli into rats whose powers of resistance were weakened by having lived on a diet lacking in vitamins.

ITEMS

A FIVE-YEAR search for definite evidence of the first American immigrants, who are thought by anthropologists to have come to this continent in prehistoric times from Asia, was recently described in a report to the American Philosophical Society by Dr. Aleš Hrdlička, curator of the division of physical anthropology of the U. S. National Museum. Under Dr. Hrdlička's direction, the museum has been carrying on intensive anthropological and archeological work in Alaska since 1926. The remaining full-blood Alaskan people, both Eskimo and the rapidly vanishing Indian, have been studied, and old sites have been examined for traces of their prehistoric predecessors. In these latter investigations there was discovered a wholly unexpected rich and highly artistic Eskimo culture, represented mainly in implements of walrus ivory which have since become fossilized. This culture antedates the well-known recent Eskimo culture.

"LUBRICATED mountains," which have moved considerable distances and formed a landslide topography of unsurpassed grandeur and magnitude, have been found in the John Day River area of interior Oregon, by Dr. Edwin T. Hodge, of the University of Oregon. In the vicinity of Maupin butte, overlooking the John Day chasm, "great masses measured in square miles" have moved toward the river, producing landslide pockets and lakes. The topography is due to the fact that the Columbia River lavas, hundreds of feet thick in places, poured over the John Day River clays, a formation which is easily unconsolidated and softened by ground water. The clays form a lubricant on steep slopes over which the heavy, greatly jointed Columbia basalt slides. Frequently, huge masses of the overlying lava have broken loose and slipped down the valley walls. Although the "greased" basalt found in the John Day basin of central Oregon moved from its original position before the coming of white man, Dr. Hodge sees no reason why similar slides should not occur in the present age, providing the underlying clays receive sufficient ground water.

STUDIES showing that the virus thought to cause infantile paralysis is remarkably stable and resists treatment that would destroy a number of dangerous disease germs, have been reported by Miss B. F. Howitt, working under Dr. Karl F. Meyer, of the Hooper Foundation for Medical Research of the University of California. The virus is able to resist treatment with chemicals which kill streptococci, staphylococci and colon bacilli. After being precipitated, whirled around in centrifuges at high speed, washed, filtered, mixed with acetic acid, heated to 136 degrees Fahrenheit, placed on ice and otherwise subjected to chemical purification, the fluid thought to contain the virus and also the material taken out of it in the process were capable of causing infection in some instances. By repeated centrifuging and precipitation with lead acetate, the fluid can be rendered as clear as distilled water, and yet it is still capable of destroying the function of certain parts of the nervous system or of dealing death.

SWEDISH chemists are at present engaged in research for the recovery of by-products from the manufacture of wood pulp. According to a recent announcement, two Swedish chemists attached to the Swedish College of Pharmacology have obtained a patent on a method for the extraction of phytosterin from sulphate soap (pine oil). It is claimed that this substance will prove a substitute for lanoline and rape oil as the base of salves and marine oil. It is further stated that at least 18,000 tons of pine oil can now be recovered from the manufacture of sulphate pulp in Sweden, whereas the actual production is only about 5,000 tons. If sulphate soap corresponding to a quantity of 18,000 tons of pine oil is treated for production of phytosterin it would yield about 450 tons of this product, which, if used for marine oil, would yield no less than 90,000 tons of oil. Although the practical utility of the method has not yet been tested on a large scale the inventors think that it will prove a valuable means to reduce the cost of the pulp-making and thus make the operations far more profitable.