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SYNCHRONIZATION OF ASTRONOMICAL, TELEGRAPHIC AND RADIO INSTRUMENTS

SYNCHRONIZATION of the electrical pulse of the world, so that all astronomical, telegraphic and radio instruments shall be in exact tune with each other, is proposed in a communication presented by Albert Einstein, famous German physicist, to the League of Nations Committee on Intellectual Cooperation on July 26.

The idea which Professor Einstein endorses was first suggested by Professor Arthur Korn, the German inventor of television apparatus. In the complexities of modern civilization, time-instruments accurate to microscopic fractions of seconds frequently determine the success or failure of important scientific work, govern industrial processes involving millions of dollars, and even guard the safety of human lives. Professor Korn's proposal is that instead of the many separate clocks now used, a single master pendulum of extreme precision be employed, and its beats be signalled throughout the world by radio.

"Periodical signals with a period of from 1–200 to 1–500 seconds might be taken from a precision pendulum by means of a television apparatus," suggests Professor Korn. "The length or duration of the signals might be graded so as to mark seconds and tenths of seconds. An agreement should be arrived at as to which wireless transmitting station should undertake this duty and as to the wave length. These signals should be received by relay stations in the various countries and broadcasted over smaller areas. Such stations need not be particularly powerful; five kilowatts would be sufficient. The synchronism might, if necessary, be transmitted further from these receiving stations by means of wires.

"Such a wireless transmission of world synchronism would, at first sight, appear to be costly," Professor Korn states. "But the cost would probably be amply compensated for by the considerable saving which the elimination of the individual synchronizing apparatus of telegraphic installations depending on close synchronism would represent. Since it would probably not be easy to reach a practical agreement in these matters between the great wireless companies, the governments should themselves intervene and reach an agreement at an international conference."

Commending the proposal, Professor Einstein outlined the procedure contemplated to put it into practical operation. He said: "The committee would invite the governments of the countries in which the larger wireless firms are established to convene an international wireless congress. This congress would then have to enter into the necessary agreements for the execution of the undertaking described.

"The object of this proposal is to overcome the mutual jealousies of the firms concerned and to prevent the scattering of forces and the complication of international communications which must necessarily result from the existence of several dependent synchronizing apparatuses."

SPIRAL NEBULAE

WHAT is described as a cloud of galaxies, containing more than a hundred spiral nebulae, each similar in nature to the group of stars of which the sun and all the visible stars are part, is the object under study at Harvard College Observatory by Dr. Harlow Shapley, director of the observatory, and Miss Adelaide Ames, of the observatory staff.

So distant is this cloud of nebulae that the light from the center of it takes about ten million years to reach the earth, though traveling fast enough to go from New York to California in a seventy-fifth of a second. Its diameter is approximately one fifth of its distance from the sun, says Dr. Shapley, so that a beam of light would take about two million years to cross it. Thus it is the largest thing known to science, and the most distant that has been measured.

The cluster is located in the neighboring constellations of Virgo and Coma Berenices, or Berenice's Hair, both of which are now visible in the western evening sky, and includes at least 103 well-defined spiral nebulae. One of these is known as Messier 61, and in it two German astronomers recently discovered a nova, or new star, which flashed out from previous obscurity. The brightness of this nova was so much fainter than such novae which occur in the sun's neighborhood that it confirmed the distance of ten million light years estimated by Dr. Shapley to be the distance of the cluster.

That these nebulae actually belong to one system is indicated by their concentration as compared with regions of the sky nearby where the nebulae are much scarcer. Of the 103 in the group, says Dr. Shapley, two thirds are within five degrees, or ten times the diameter of the moon, of the center, while thirty-seven are within three degrees of the center.

That the spiral nebulae, of which many thousands are known in various parts of the sky, are stellar systems or galaxies outside the system of which the sun is a member, was shown last year by Dr. Edwin P. Hubble, of the Mt. Wilson Observatory, who measured the distances of two of the most conspicuous of them. These two were both shown to be about a million light years away, and while they are considerably smaller than our galaxy, including the Milky Way, they are very similar to it. Dr. W. W. Campbell, president of the University of California and director of the Lick Observatory, one of America's most eminent astronomers, in an address before the American Astronomical Society following the announcement of Dr. Hubble's work, said: "We do not know, I must confess, that our stellar system is now a spiral nebula, or that it is the developed product of a spiral of ages past, but it does seem to have most of the known attributes of a spiral."

MINING METHODS FOR THE RECOVERY OF OIL

SINKING mine shafts into oil-bearing rocks instead of merely drilling wells is the method proposed for the more complete recovery of the precious liquid mineral by Leo Ranney, a New York engineer. A number of important oil companies have become interested in his process, and field tests on a large scale are a probable development for the near future.

The present method of sinking wells, Mr. Ranney explains, simply makes holes into the oil-bearing sandstone, and at best only about one fifth of the oil flows or is pumped to the surface. The rest is trapped in the cavities of the porous rock. By going down to the oil-bearing stratum it is possible to tap it in a large number of places, and thus greatly cut down the distance necessary for the oil to flow through the sandstone before it finds an outlet.

Mr. Ranney's oil-mining system contemplates cutting tunnels not in the oil rock itself, but in the hard stone either above or below it, usually below. From these tunnels small holes would be bored into the oil stratum at close intervals. Through these holes pipe nipples would be inserted, and then connected to pipe lines leading to the shaft, where the oil would be allowed to collect in a tank or pool, to be pumped to the surface. The flow of the oil into the collecting pipe system could be hastened by the use of compressed air or other means.

A prominent government official has suggested that naval oil reserves could be converted virtually into underground storage tanks by rigging them with such a collection system and then leaving the field unexploited until necessity should arise to bring out the oil quickly for use in an emergency.

GIANT CELLS OF THE BLOOD

THE mystery of the "giant cells" in the blood seems now at last to have been solved.

Dr. W. H. Lewis, of the Embryological Laboratory of the Carnegie Institution, has found by actual observation of cultures outside the body that the so-called "giant cells," present in pathological cases, especially in tubercular conditions, are formed by the fusion of a number of white blood cells.

The "giant" is a large cell with several, sometimes many, nuclei. There have been two theories as to their formation; one that they were made by splitting the nucleus; the other that they come by combination or fusion of separate cells. Instances of nuclear division have been noted and Dr. Lewis thinks that it is probable that many "giant cells" are formed in that way, but it is now certain that they are formed by fusion also.

The body of an adult person, Dr. Lewis estimates, contains from 250 to 500 trillions of living cells, every one different from every other one, just as personalities differ, but capable of being grouped in certain classifications according to their functions and structure. There are brain cells, nerve cells, muscle cells, bone cells, blood cells and many other specialized groups.

The majority of these cells have settled down in definite locations, formed definite contacts with their neighbors and perform definite, specialized functions. The rest are nomads or wanderers. They travel about the main highways of the body in the blood currents, but, not content with this, they penetrate the walls of the blood vessels and wander at will. According to Dr. Lewis, there are billions of these nomads wandering freely about the body all the time.

In return for this freedom, the wanderers render a valuable service to the stationary cells. They act as scavengers. They eat up the waste from the other cells, and in an emergency they gather in great numbers at any point of injury to clear away the wreckage. In case of a severe bruise, turning the flesh "black and blue," it may take the wreckers days or even weeks, but they stay on the job until the débris is cleared away and the ordinary tissue cells repair the damage.

Numerous and different as are these many varieties of cells, they have all arisen from the primitive cell of embryonic tissue, through the process of division and different lines of specialization.

Modified white blood cells were taken by Dr. Lewis from rat tumors and cultivated in sealed glass containers with a nutrient material for the cells to live on. In this way the behavior of individual cells was watched for weeks. They constantly came in contact in various positions. Certain cells were observed to fuse with "giant cells," the cell protoplasm being absorbed into the "giant" and their nuclei being drawn into the group or circle of nuclei of the "giant." Other cells, for some unknown reason, possibly because of a temporary chemical or functional difference, declined to fuse.

RATS KILLED BY COLLOIDAL ARSENIC POISON

THE Mellon Institute of Pittsburgh boasts of the presence on its campus of a veritable Pied Piper of Pittsburgh; for Dr. Oscar F. Hedenburg, holder of one of its industrial fellowships, has worked out a new method of using an old poison that promises to wipe out rats and mice in the wholesale fashion related by Browning in his famous poem.

In his search for the most efficient means for cleaning out rodent pests Dr. Hedenburg tried numerous unusual poisonous compounds, but finally came back to the old favorite white arsenic, or arsenous oxide, known since the days of the Borgias. He found, however, that the ordinary commercial product is too uncertain in its action, and that rats could sometimes swallow what should be killing doses and only get fat on them. The trouble seemed to be that the ordinary white arsenic was not ground fine enough, and that it would not dissolve satisfactorily in water. But when he ground it in water containing an organic colloid substance, like gum arabic or glue, the arsenic was reduced to an almost impalpable fineness—became, in fact, a colloid itself.

In this condition it was extremely effective and almost incredibly rapid. A bait containing one two-hundredth of an ounce killed a rat in thirty minutes, whereas the same dose of ordinary arsenic required twenty-four hours for fatal effect.

A large-scale test was made on a dump where scores of big rats fattened. Two pounds of poisoned bait was distributed, and many rats were seen carrying it off. Ten days later only a couple of rodents were left out of the whole population.

Dr. Hedenburg suggests that when his discovery is put into regular use and marketed, it may be put up into tubes as a paste, to make for economy in use, and that for safety's sake the paste should be colored blue.

THE ELIMINATION OF "HAFF SICKNESS"

DISCOVERY of the cause of the mysterious "Haff sickness" which was proving ruinous to a large part of the German Baltic fisheries industry, together with the elimination of the disease virtually by government fiat, is announced at Berlin by officials. It is one of the very few cases on record where an edict had power to end an epidemic, or at least what looked like one.

A little over two years ago, fishermen in the stretch of shallow water along the southern end of the Baltic between Koenigsberg and Danzig, known locally as "the Haff," began to develop a very painful and in some cases fatal disease. Its symptoms were extreme pain and a kind of paralysis of some of the leg muscles, together with certain physiological disturbances. It always attacked its victims while they were out in their boats, and generally in the early morning, while the mists still hung over the water. A few days on shore usually resulted in complete recovery, but a return to fishing might bring on repetitions of the malady. In a short time the Haff fisheries were badly demoralized.

The theory that it might be an epidemic of a germ disease quickly went by the board. The "Haff sickness" had none of the earmarks of an ordinary epidemic. Likewise the theory that it might be caused by the eating of spoiled fish or eels had to be abandoned, because many of the victims did not eat fish, and fish-eaters on shore never suffered from the disease.

The investigators finally came to the conclusion that there must be something in the water that rose into the morning mists and caused the disease by poisoning the air. Research along this line soon showed that they were right. The disease was really a kind of arsenic poisoning, caused by the discharge into the water of great quantities of factory wastes from cities on shore. These wastes contained arsenic compounds, which were altered into gaseous form by small organisms living in the water, and thus released into the air to plague the luckless fishermen. The arsenic was present in the factory materials only as an impurity, so that it was no hardship to the industries when the government ordered them to change to the use of other materials with a lower percentage of arsenic. Within a few months the "Haff sickness" had virtually vanished.

ITEMS

WATER gas which forms a part of most city gas, and is obtained by passing steam over hot coke, may become an important source of gasoline in the future. This is indicated by experiments of Professor Franz Fischer and his assistants working at the Kaiser Wilhelm Research Institute for Coal Products, at Muelheim on the Ruhr. The process makes use of a catalyst, a substance which accelerates a chemical reaction, but is not itself changed in the process, and by choosing the proper catalyst, temperature and pressure, not only gasoline, but wood alcohol, vaseline and other related substances can be obtained. To make gasoline, the water gas, from which all traces of sulphur must have been removed, is passed over a catalyst consisting of a finely divided mixture of cobalt with oxides of such metals as chromium or zinc, at a temperature of 500 degrees Fahrenheit.

AN insect belonging to the fly family that spends its whole life in salt sea water is the strange find reported to the Royal Society by F. W. Edwards and Dr. P. A. Buxton, of the British Museum. Dr. Buxton, who recently returned from a voyage to Samoa, found the insect associated with related forms whose larval or infant stages are spent in the water but whose adult life is lived in the normal aerial surroundings of most insects. This is said to be the first recorded case of an insect going through its whole life cycle in sea water.

PRACTICALLY all the important railroad lines of the United States plan to establish auxiliary motor lines as the result of a meeting of 120 railroad officials representing 51 lines, at which W. H. Lybord, vice-president of the Chicago & Eastern Illinois, was temporary chairman. The plan, sponsored by the permanent transportation section of the American Railway Association, is intended as a measure to decrease the loss in revenue due to inroads made upon income of railroads by motor busses and coaches.

THE seaweed collected along the Breton coast brings in the tidy sum of 30,000,000 francs yearly which at prewar values meant $5,000,000 a year. The first factory for the manufacture of iodine, its most valuable product, though seaweed is also an important source for potassium and sodium, was established as long ago as 1829 at Conquet in Brittany. Since it takes a ton of fresh seaweed, approximately, to make a pound of iodine, according to figures given by M. Maurice Deschiens in a recent address before the French Society of Industrial Chemistry, the huge amount of seaweed necessary to make the 50 tons of iodine turned out in Brittany in 1925 causes its collection and transportation to be one of the heavy factors of cost.

THERE have been over 200 cases of a mild form of typhus fever in Alabama and Georgia in the last three years, according to a report to the U. S. Public Health Service. This disease which was one of the plagues of antiquity and even now breaks out in alarming epidemics in Russia and Asia has shown thus far such a mild aspect that there is dispute among medical authorities as to whether it is in reality the same as the highly fatal type known in Europe. Thus far there have been only eight deaths reported. Laboratory evidence seems to indicate that the causative virus is identical, but there is considerable reason to believe that typhus in the United States is transmitted by some other means than by the body louse, the traditional carrier of the pest in the Old World.