SCIENCE NEWS

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ARTIFICIAL LIGHTNING

MAN-MADE lightning has now left the laboratory and gone out of doors to compete with the natural article in testing electric lines. This announcement is made by the General Electric Company in making public the first details of experiments that have been made by their engineers in the Berkshire mountains in northwestern Massachusetts.

The apparatus was mounted on a small truck and placed at the base of one of the tall transmission towers. Outside the truck a spark gap consisting of two brass spheres was used, and from this wires led to the overhead spans. When the engineers operated the apparatus, a bolt of hundreds of thousands of volts of electricity, with all the characteristics of lightning, was sent over the lines to be recorded with a special camera operating in a millionth of a second. The records were made five or ten miles away, at Pittsfield, where the power from the Turners Falls Power and Light Company is received over the lines for distribution to the city.

Lightning, enemy of electric transmission, has been studied by electrical engineers ever since man started, a half century ago, to transmit power over wires. To-day lightning is still the major source of interruption on transmission lines, but the engineers are continually developing new tools and methods of attack so that the changes of designing a lightning-proof line become better each year.

Artificial lightning generators capable of producing a half million volts were made years ago. A million volts were attained shortly thereafter, and a few weeks ago 5,000,000 volts were attained in Pittsfield laboratory experiments. Use of such equipment led to the discovery of many additional facts about lightning voltages, but the work necessarily was confined within the laboratory.

Work with actual lightning on high-voltages transmission lines was started last year, and, during a thunderstorm in the foothills of the Allegheny Mountains last July, General Electric engineers obtained a cathode-ray oscillogram or picture with its high-speed camera showing the effects of a natural stroke of approximately 2,500,000 volts on the transmission wires. But lightning refuses to sit for its picture when and where desired. Obtaining the one record was a considerable achievement.

Having obtained one record of an actual lightning bolt and its effect on a transmission system, it became possible for engineers to duplicate the performance at will. Lightning characteristics had been determined, and it remained only for the investigators so to arrange their high-voltage generators that, on a smaller scale, the same type of discharge could be produced when and where desired.

Construction of a portable impulse generator then made it possible to apply surge voltages at different places along the Turners Falls Power and Light Company lines. Approximately 40 miles long, and extending from the Connecticut River to Pittsfield, the lines were built for 110,000 volts and are carrying 66,000. The impulse generator is so constructed that the engineers have available short or long waves, and either high or low voltage.

In the early days of electricity it was customary for generating stations to be crippled during thunderstorms, and most houses had combination gas and electric fixtures, and possibly also a supply of oil lamps and candles for emergencies. Such provisions are hardly necessary to-day, for engineering investigations have shown how to build lightning arresters that will protect equipment against the surges caused by lightning. And the work that is being carried on to-day is bringing nearer that day when interruptions will be even more infrequent.

THE MONEY OF THE INDIANS OF THE ATLANTIC STATES

WAMPUM, the money of the Indians of the Atlantic states, such as the Delawares, was not the "filthy lucre" of civilized man, but a sacred thing. In fact, all transfer of property, from one Indian to another, was really a gift. The passage of wampum to the donor was not in the nature of payment for value received, but as a charm to protect from any evil influence that might be transferred with the gift and make itself manifest as illness in the recipient. This has been found out by Dr. Frank G. Speck, professor of anthropology at the University of Pennsylvania and a leading authority on American Indians of the east.

"In the exchange of vendable property, even extending to gifts between friends," said Dr. Speck, "there lurked a potency for evil that might develop in who knows what quarter, producing malice or resentment among the parties concerned. It could even result in bodily poison to one or both. It is strictly correct to state that in the attitude of the eastern Indians toward such affairs, the passage of shell money, or wampum as they called it, from the hands of the receiver of a gift or purchase to those of the giver performed the function of medicine. The wampum protected them against spiritual infection and its manifestation in the body in the form of sickness. Wampum was a purifier, purging the transaction from latent evil force. And should evil have leaked through the transaction the wampum would function as a purgative for its keeper. The same wampum was a spiritual emblem believed by them to have come originally from supernatural sources and embodying within it profound supernatural dynamics.

"We can understand why a compact sealed with the transfer of wampum was as sacred as one sworn on an oath by the Bible, the Koran or the beard of Abraham! It was such an attitude toward exchange and currency that our colonial forbears encountered when they bartered for land and peltry with the aborigines of New England and the Middle Atlantic States. The colonists handed out their exchange with the European notion of intrinsic

value, receiving the return with the native idea of spiritual and supernatural interplay.

"The Dutch in buying Manhattan for 60 guilders of trinkets undoubtedly drove a shrewd bargain with the Delawares. But who has told us that in the eyes of these same Delawares the currency was the symbol not the value equivalent of their relinquishment of their exclusive hereditary rights to the land as well as its products? This ridiculous price merely was to them but a symbol over which they transferred their good-will and their spiritual power over the 'forces' dormant in the land, clearing away the poison that might have been engendered by the inequality of value in the transfer, should there have been any. The aboriginal Indians of the East were psychics even in such factual matters as money. The colonists were pragmatists even in spiritual matters. Here lay the basis of conflict unreconcilable between the two culture spheres that met, bartered and quarreled in the settlement of the Atlantic seaboard. The one backed by unnumbered, metal-armed, aggressive and adventurous men from a tumultuous old-world as against a few thousand stone-age, passive hunter-farmers."

AIRPLANES IN ENTOMOLOGY

AIRPLANE pursuit tactics are being used by the U. S. Department of Agriculture to discover the flight habits of destructive insects.

The airplanes equipped with insect traps were recently placed in service in Mexico to study the movements of the pink boll worm moths which are suspected of unlawfully emigrating to this country.

The pink boll worm is one of the most destructive pests of cotton, and has long been combated on the border between Texas and Mexico by the quarantine service of the Federal Horticultural Board. It was felt that the cotton-growing regions of the southwest could be made more secure against the invasion of this and other bugs if more were known about the flight of the moths from the heavily infested regions.

The traps consist of a sticky fly-paper preparation which holds the moth when it flies against it. The airplanes are sent over territory above which the moths are believed to be flying, and by opening the trap, specimens are obtained. Age, sex and direction of flight of the insects from infested cotton fields are noted and the scientists believe these data will enable them to determine the season and direction in which the moths travel. The abundance of the moths in the upper air and the altitude which they attain will also indicate the distance they may travel.

Arrangements were made with the Mexican Government which allowed the airplanes to fly across the border and conduct the investigations in Mexico without interference. In fact, the Mexican Department of Agriculture is giving hearty cooperation in all the investigations.

THE CONTROL OF ASTER YELLOWS

ASTER yellows, a destructive plant disease whose virus will filter through fine-grained porous porcelain, can nevertheless be stopped by a fence of screen wire with meshes 18 to the inch. This paradox has been developed at the Boyce-Thompson Institute at Yonkers, N. Y. It depends on the fact that the virus is carried from plant to plant by an insect, the leafhopper, just as malaria, yellow fever and other human diseases are borne by insects. The staff members of the Boyce-Thompson Institute who are working on the yellows problems noticed that the guilty leafhoppers do not fly very high, usually not more than two or three feet.

They therefore penned several experimental garden plots in 18-mesh screen to heights of four, five, six and eight feet, and healthy aster plants were set out in them. Other asters were set out in the open, unprotected by screens. By August 6 approximately one third of the unprotected plants were afflicted with yellows, while the asters within the screens were all still healthy. A week later a few cases had developed in the plots with the lowest screens. By September 16 the yellows had invaded the screened areas, attacking 20 per cent. of the plants. But in the meantime the unscreened plants outside had fared much worse, showing a casualty list of 80 per cent.

It is believed that at least in some cases the disease-carrying leafhoppers got into the screened plots by flying through the gates when they were opened by workers in the garden, rather than by going over the tops of the enclosures.

THE TREATMENT OF SORE FINGERS

THE popular method of treating a pricked finger by squeezing it and soaking it in very hot water often has disastrous effects, according to a statement made by Dr. R. Kennon in a recent address before the Liverpool Medical Institution. The unfortunate results of such treatment have often been gangrene and amputation. Hangnails, thorns, pricks and insect bites are frequently the starting-points leading to loss of fingers or even hands and arms.

"The more educated lay people are all too ready to imagine that the thorn or needle has carried germs into the depths," stated Dr. Kennon, "so a vigorous squeeze initiates the treatment, to make the part bleed and wash back the organisms. A moment's thought would show that it would be just as sensible to try to squeeze water out of wet socks without first removing the boots."

This treatment actually spreads the organisms beneath the skin and further injures the tissues, thus providing a starting-point where bacteria may multiply.

Antiseptic solutions, particularly the group of carbolic compounds, are also a source of danger, Dr. Kennon said. Such solutions if used at all should be very weak. Germs can not be killed on the body without destroying the underlying soft tissues, Dr. Kennon reminded his audience. Furthermore, carbolic compounds have an analgesic action on the fingers. This temporary relief from pain may give the patient a false sense of security and lead to delay in seeking medical attention. Also, it can mask the danger-sign of throbbing pain and is thus misleading to the physician.

Much worse than squeezing or over-strong antiseptic solutions is the hot fomentation, Dr. Kennon said. Water-logging the fingers lowers the resistance to infection and the intense heat only increases the pain and tenderness.

A sore finger should be kept dry and protected from squeezing and further injury by a thimble or celluloid guard, Dr. Kennon advised.

HEALTH IN CHINA

IN China every known disease exists, and floods, wars and famines are common. But the political and economic situation affects the people's health more than any of the diseases, in the opinion of an official of the U. S. Public Health Service who has recently returned from China. Ignorance and terrific poverty are of course responsible for the prevalence of tuberculosis, smallpox, cholera, intestinal diseases and diseases resulting from faulty diet.

Sanitation in the western sense is completely lacking for all but the wealthy Mandarin class. In fact, vast numbers of the Chinese population have not even a roof to cover them while they sleep, or to protect them from the elements. Their entire property consists of the rags they wear as clothing. The rickshaw coolies, hot and sweating after their last run, have nowhere to sleep at night but the pavement. Such exposure combined with underfeeding makes tuberculosis especially prevalent among them.

The use of human excrement for fertilizer causes great prevalence of diseases like hook-worm, dengue, dysentery and typhus, which are due to bacteria and parasites of the intestines. No foreigner dares to eat uncooked food in China. Salads of raw lettuce, celery, tomatoes, etc., are so dangerous as to be prohibitive. In spite of all precautions, foreigners nearly always get dengue fever if they are in the country for any length of time.

A fungus infection of the feet, known as Hong-kong foot, is very common. It is spread by the barefoot coolies, but shod Mandarins and foreigners also acquire it.

The civil wars are of course responsible for great loss of life. This is due not so much to the numbers killed in battle as to the starvation that results when the able-bodied men of a large district are called from the fields to the armies. Crop failure is the first consequence and famine the second. In a country as thickly populated as China, failure of one crop spells disaster far more complete than in other less densely peopled countries.

The introduction of western medicine has helped to a small extent. However, until the country is more settled politically, scientific medicine, hygiene and sanitation can not hope to reach more than a very small fraction of the people. These because of their terrific poverty can not really avail themselves of scientific knowledge when it is given them. Even elementary cleanliness is costly and becomes prohibitive, when food itself is uncertain or lacking.

ITEMS

THE development of the United States from the time of Columbus to the present will be graphically depicted by exhibits from 23 bureaus of the United States Government at the International Exposition to be held at Seville, Spain, from March 15 to December 15. The exhibits will be mainly of scientific, historic and educational significance, and are financed by a congressional appropriation of $700,000 granted by the Congress. All nations colonized in whole or part by Spain will be represented at the exposition. Among the American exhibits will be the most authentic and detailed model of the Panama Canal ever constructed. Radio equipment capable of picking up and broadcasting programs from the United States will be installed in the American buildings. All the exhibits from this country are housed in three specially constructed buildings, one of which will be the permanent home of the American Consulate at Seville at the close of the exposition. Every effort was made to make this building an example of the most modern construction for such use. Many labor-saving devices are being installed, and it is believed that it will serve as a model for future consulate offices.

A NEW natural plant dye has been discovered in species of cactus by Professor H. Molisch, well-known German chemist. This brick-red-carmine color has been named "cacto-rubin" and is produced when the cells of the cactus plant die. It is invisible in living cactus plants. It is thought that it may originate through some enzyme action.

THE leather goods industry is faced with a future shortage of tanning materials, because all chestnut trees in this country are doomed, due to the chestnut blight. This fact was presented recently to the House Appropriations Committee by Dr. C. A. Browne, chief of Chemical and Technological Research of the U. S. Bureau of Chemistry. At the present time, Dr. Browne said, we use in the tanning of leather thirty million dollars' worth of tanning materials, of which twenty million dollars' worth is produced in this country. Half of that supplied in the United States, however, comes from the chestnut. The U. S. Bureau of Chemistry would like to begin now looking for substitutes for the chestnut in the tanning of leather. They wish to investigate the possibilities of mangrove, saw palmetto and canaigre for this purpose. No money has been allowed for these investigations during the fiscal year 1930, in the Agricultural Appropriation bill, which recently passed the House and is now before the Senate.

THE Baker collection of 300,000 insects received during the past year by the U. S. National Museum is so valuable to entomologists that Congress has been asked to appropriate $1,000 for its proper storage. Dr. Baker, an American resident in the Philippine Islands for many years, collected the insects from the Philippines and the Malayan countries. He willed the collection to the National Museum. Collections in the National Museum are appraised at $115,000,000, Dr. Wetmore testified before the House Appropriations Committee, but could not be duplicated for twice that amount.