SCIENCE NEWS

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ADVANCES IN THE STUDY OF TERRESTRIAL MAGNETISM

A BETTER understanding of events deep within the earth has been made possible during the past few years through research by scientific men who know how to read the language of the subterranean happenings as written in the varying of the compass needle from true north, Mr. John A. Fleming, acting director of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, stated in a lecture before the institution.

Mr. Fleming presented conclusions reached after careful study of all data collected during past centuries including information taken in recent years from more than 10,000 stations established in different parts of the world by the Carnegie Institution. Thus the most complete picture possible of the long period or secular variation of the earth's magnetism is obtained.

"The relation of large and rapidly changing rates of change of the intensity and direction of the magnetic field to the surface structure of the earth can scarcely be accidental," according to Mr. Fleming. "It is natural to expect that there is a causal relationship existing between crustal and subcrustal movements and these magnetic manifestations. Perhaps there are changing mechanical stresses, or possibly a changing distribution of internal heat, which in turn affects the direction or magnitude of subterranean electric currents."

The great secular variations, which over a period of several hundred years cause the compass needle to change its direction by as much as 15 to 20 degrees at some places on the earth, are now better understood, following detailed mathematical analyses of data for periods centering around 1842, 1882 and 1922 by investigators at the Department of Terrestrial Magnetism. Thus it is known that the main cause of the secular variation arises from a system of forces embedded in the earth. This variation is caused not only by a change in the direction of magnetization, but also by a change in its intensity.

Magnetic force has been decreasing more rapidly in the southern, or water hemisphere, than in the northern, or land hemisphere. The average equivalent intensity of magnetization over land areas is somewhat larger than that over ocean areas.

By studying very small wobbles of the compass needle important knowledge may be gathered about the condition of the earth's upper atmosphere and activity on the surface of the sun itself. Mr. Fleming said that the behavior of the compass needle offers the best present-day means of probing happenings a few hundred miles above the earth as well as 92,000,000 miles away.

Though the solar and lunar variations which he suggests for use in studying sun activity and the upper atmosphere are extremely small, they constitute a desirable form of observation because they are repeated daily and because they can be well isolated from other magnetic changes. To illustrate the size of these diurnal variations, Mr. Fleming assumed the existence of a two-mile-long compass needle in Washington. During daylight on a magnetically quiet day the end of this needle would move only ten feet.

RETURN OF THE GRIGG COMET

THE Grigg comet, a periodic visitor to the sun, has been rediscovered by Dr. George Van Biesbroeck of the Yerkes Observatory.

It is a faint object of sixteenth magnitude in the constellation of Orion, the group of stars that can be seen in the southwestern evening skies. The Grigg comet, however, can be seen only with the largest telescopes. The location of the Grigg comet when discovered on Saturday evening (March 5) was right ascension 5 hours 31 minutes 49.3 seconds and declination north 5 degrees 3 minutes. No tail was reported.

Astronomers throughout the world were notified of the reappearance of the comet by means of astronomical telegrams sent through Harvard College Observatory.

Dr. Van Biesbroeck was also the first to sight this periodic comet when it made its last return in 1927. The astronomer Grigg, whose name the comet bears, first discovered it in 1902. Then the comet was missed on its subsequent returns until 1922 when Mr. J. F. Skjellerup, an Australian astronomer, found it again. The comet is therefore sometimes called the Grigg-Skjellerup comet.

The Grigg-Skjellerup comet is one of nine periodic cometary visitors to this region of the solar system that may be expected this year. Those most likely to be observed are: Tempel's comet, Neujmin's second comet, Kopff's comet, Borelly's comet, Brooks's second comet, and Faye's comet.

On its previous visits the Grigg-Skjellerup comet has not been seen with the naked eye, and it is therefore very unlikely that it will be easily seen by the public.

THE ORIGIN OF A SUBMARINE GORGE

How the "new" submarine canyon in the sea floor off Georges Bank and the New England Coast made its sudden debut by acting as a huge dump wagon, sliding its load of Ice-age débris out when it was jarred by an earthquake, is told by Professor Francis Parker Shepard, of the University of Illinois.

Corsair Gorge is the name of the new feature on oceanographic maps of the North Atlantic. It apparently wasn't there before the earthquake of November, 1929, which wrecked most of the transatlantic cables off the Grand Banks, 600 miles to the north. It was there by Christmas of the same year, when it was first detected by the sounding apparatus of the steamer *Transylvania*. Its presence was confirmed through a careful survey by the U. S. Coast and Geodetic Survey.

Corsair Gorge stood as a challenge and a mystery to oceanographers. It did not appear to be the result of a sudden drop in the ocean floor. Neither did it seem to be a drowned river valley.

Professor Shepard disposes of its newness by advancing

the hypothesis that it is not new at all. He holds that the gorge originated as a deep cut, excavated by a river when the land was much higher than at present, probably millions of years ago. Then subsidence of the land decreased the valley. Later, during the glacial period when the sea level was hundreds of feet lower than now, great ice sheets spread out on to Georges Bank. Débris carried from the terminus of the ice by a network of streams probably filled the gorge till it lost its topographic expression.

So it stood for many thousands of years, perhaps until the recent earthquake gave it a kick. Then, like the load of a dump-wagon jolted from underneath, the accumulated débris slowly slid out of the trough, leaving it empty and ready for discovery by the first passing steamer with echo-sounding apparatus at work.

The movement was so slow that surface waves violent enough to betray the disturbance were not formed. Soundings of the ocean bottom at the mouth of the gorge reveal a zone of hummocks formed of the displaced sediments, further evidence of the great submarine landslide.

THE CAUSES AND EFFECTS OF ARTERIOSCLEROSIS

HARDENING of the arteries, called arteriosclerosis by medical men, is really not a disease but a device for mechanical protection of the arteries. It is not a condition due to old age nor is it necessarily incurable.

This unorthodox theory together with a new method of treating the condition has been proposed by Dr. J. Plesch, professor of internal medicine in the University of Berlin. In his report to the London *Lancet*, Dr. Plesch described one feature of his treatment for the condition as a "Biblical diet" because, like certain fasting or dietary rituals of various religions, it introduces a "dietary day" once a week and a three or four week period of dieting once a year.

His method of treatment consists in first removing the causes so far as possible. Next efforts are directed toward relieving the overtaxed circulation. This should not be done, however, by the direct use of drugs which lower blood pressure through paralyzing the blood vessels, as these do more harm than good, Dr. Plesch thinks. Instead he prescribes frequent rests in the recumbent position during the treatment. Finally there is the dietary regimen which consists chiefly in living on a diet free from nitrogen (protein) and salt (sodium chloride) for one day a week regularly and for every day during a three or four week period once a year. Fresh air and complete mental relaxation are other features of Dr. Plesch's treatment.

"Arteriosclerosis is a disease that sets in at every age, that can be arrested and that can be cured in the early stages and beneficially influenced in the later stages; it is not an ailment of old age which must of necessity be progressive and incurable," in the opinion of Dr. Plesch. "It is often found in youthful people and often absent in the aged; and when it does make its appearance in old age it rarely has any serious consequences."

Arteriosclerosis is only one feature of a constitutional disease resulting in a lack of tone which chiefly affects the smooth muscles of the blood vessels, Dr. Plesch thinks. The actual hardening of the arteries he takes to be a protective process rather than a disease.

"The primary cause of arteriosclerosis is the weakening both of the muscular and of the elastic elements of the walls of the blood vessels." If the weakened walls of the blood vessels are not able to offer enough resistance to the blood pressure they become stretched and dilated, he explained. At points especially exposed to high blood pressures, changes occur which are solely for the purpose of increasing the resistance of the walls. These changes, among them the hardening which gives the condition its popular name and which consists of deposits of lime, offer protection against breaks in the artery walls.

Dr. Plesch called attention to the fact that the examination after death of healthy young soldiers who fell during the war revealed a surprising prevalence of the condition. One careful investigator was able to prove that almost half the soldiers between the ages of 21 and 30, and well over half of those between the ages of 31 and 40 years showed hardening of their arteries, chiefly of the arteries of the heart.

CHILDREN'S DEATHS IN 1931

OFFICERS of the Metropolitan Life Insurance Company have found from a statistical study of their records that in spite of the continuing business depression and increasing unemployment, the death rate for children between one and fourteen years of age among families of insured wage earners was lower during 1931 than 1930. In 1931 this death rate was 2.65 per 1,000, while in 1930 it was 2.70 per 1,000. During the period from 1911 to 1915 it was 6.14 per 1,000.

The improvement is especially gratifying considering the changes in family economy which took place as a result of increasing unemployment during 1931. Much of the improvement in child mortality in 1931, as compared with the figures for 1930 and 1911–1915, can be ascribed to the cumulative effect of twenty years of work for child health by the public and private health promotion agencies of the country.

Part of the excellent record of the year 1931, itself, resulted from the continuation in that year, under most trying circumstances, of the health services established on the patterns laid down by the pioneers of child health conservation.

There was a greater decline in the death rate for children from one to four years than for the older children. This is considered a reflection of the decline in diphtheria mortality and in deaths from the other three important diseases affecting this age group, measles, scarlet fever and whooping cough. The whooping cough death rate was lower in 1931 than at any time on record. The death rate for diarrhea and enteritis, another important cause of death among small children, was at the lowest point since 1911 and the tuberculosis death rate for children of one to fourteen years also reached a new low point.

The death rate for white girls was lower than that for white boys or for negro boys and girls, but the death rate for negro girls showed the biggest drop between 1930 and 1931. The death rate for negro boys on the other hand showed a slight increase over the figure for 1930. The death rates by sex and race for 1931 were: white boys, 2.73 per 1,000; white girls, 2.23 per 1,000; negro boys, 4.73 per 1,000; negro girls, 4.02 per 1,000.

ADVANCES IN TELEVISION

TELEVISION to be shown on a large screen in the theater is a step nearer reality following the invention in the laboratories of C. Francis Jenkins in Washington of a new type of projector for the television receiving set.

In the new apparatus a fixed lantern slide on which the objects move instead of being stationary as they are on common still slides takes the place of the flying light-spot system of reproducing the picture. This electrical rather than photographic scanning is accomplished by the substitution of a transparent scanning disc which contains wires running out radially from its center like the spokes of a wheel for the common metal disc containing a ring of pin holes near its edge, it is explained in an article by Mr. Jenkins in *The Yale Scientific Magazine*.

In commenting on this article to a representative of Science Service the inventor said that the new method puts 3,600 times more light on the screen than the old pin-hole scanning system. Light to the screen is never cut off except by images of the objects and these images remain on the screen all the time. Never is the screen, or any part of it, blank, as is the case even in motion picture projection for about one third of the time.

The arrangement of apparatus with which Mr. Jenkins has been able to accomplish in the laboratory what has been impossible even with well-developed motion picture projection is very simple. Instead of being vertical, the transparent scanning disc is flat, and immediately beneath its wire spokes, which end where the usual metal disc would have pinholes, there is a glass plate containing a thin film of an acid. The wires and the acid are subject to voltage which is controlled by in-coming television signals.

A high voltage will cause sparks to jump from the ends of the wires to the acid. At low voltages there will be no spark. And each spark, Mr. Jenkins said, decomposes the acid and forms an air bubble in it. The bubble causes a dark spot to appear on the screen, but it quickly rises to the surface and breaks before another and slightly different image is formed in about one fifteenth of a second.

"The projected picture on the screen is, therefore," Mr. Jenkins explained, "exactly like the usual lantern slide picture except that it has motion; or like a motion picture except that it is made up of changing picture elements instead of changing picture frames on a film. Incidentally, the elementary picture dots are so blended that they are as inconspicuous on the theater screen as are the picture dots of a newspaper illustration."

Mr. Jenkins believes that this system will ultimately come into use for both theater and home television projecting. It is still in the laboratory stage of development.

ITEMS

SHOTGUN shells will be saviors as well as destroyers of game, if the congress passes a new federal tax of one cent each, proposed in a bill which will be introduced within a few days, with the backing of the American Game Conference. The bill will provide that all the money thus collected is to be used as follows: Not to exceed five per cent. of the total for federal administration, research and enforcement; 55 per cent. of the balance to be allotted to the game departments of the various states, based on the number of hunting licenses issued, for the increase of game and waterfowl. The remaining 45 per cent. will be expended by the federal government for the increase of waterfowl through acquisition or control, especially of breeding areas and also of additional refuge and concentration areas wherever they exist or can be restored.

WHETHER you get bitten by the harmless though annoying ordinary mosquito or by the malaria-bearing Anopheles depends in part on the "micro-climate"—that is, on small local variations in air moisture and temperature. This is indicated by researches of Professor Erich Martini and Ernst Teubner, of the University of Hamburg, which have been announced in the German scientific journal *Forschungen und Fortschritte*. The two German investigators placed mosquitoes of three species, an ordinary European species, a malaria carrier and a yellow-fever carrier, in specially constructed apparatus in which temperature, air moisture and other conditions could be closely controlled. They found that the common species and the yellow-fever carrier were favored by a high humidity, whereas the malaria carrier preferred a drier atmosphere.

WALKING-STICK insects, ordinarily so little abundant as to be a biological curiosity, will probably be a serious forest pest in some parts of Michigan during the coming summer. Their eggs are now lying on the forest floor in these threatened areas, in numbers ranging from thirty to more than a hundred per square foot, according to a report by Prof. Samuel A. Graham, of the University of Michigan. When they hatch into leaf-eating insects with voracious appetites, as bad as those of their relatives the grasshoppers, the consequences of their activities among the trees may well be imagined. There is one curious thing about the walking-stick's life cycle that may mean the salvation of the Michigan forests. In the oak forests of north central Michigan, the walking-stick eggs do not hatch the spring following their deposition, but lie over for two winters and a summer before they finally hatch.

THE mechanical brains and fingers of the dial telephone system have reduced the number of jobs for telephone operators in the United States by more than 69,000. This is the estimate reported by the U. S. Bureau of Labor Statistics, which has surveyed the progress of the dial telephone and its industrial effects. Complete conversion to the dial system means an average displacement of about two thirds of the operators. In 1921, less than three per cent. of the telephones in the United States were of the dial type. By the end of 1930, very nearly one third of the phones were dial equipped.