SCIENCE NEWS

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DEFLECTION OF X-RAYS

X-RAYS can be refracted by solid substances, it was stated at the recent Washington meeting of the American Physical Society by Professor Manne Siegbahn, of Upsala, Sweden. Doubt has existed as to whether X-rays are diverted from their course by substances which they pierce, but this is removed by these investigations, in which the amount of the deflection was actually measured. It is well known that a straight stick put slanting into water, half in and half out, appears to be bent due to the fact that the liquid refracts the rays of light coming from the lower end of the stick to the eye. This is the principle on which the theory of lenses is based, since polished pieces of glass of the proper shape deflect a beam of light passed through them. The production of a band of spectral colors when a beam of light passes through the corner of a glass prism is caused by the varying refraction of the different colors which compose the white light, and which differ in wave length. A similar phenomenon was observed in the case of the invisible X-rays by Professor Siegbahn and his associates, who secured a photographic record of the fan of rays which resulted when a beam of X-rays was turned on a suitable crystal. X-rays can also be reflected from the surface of crystals if they strike at the right angle. This, again, is analogous to the reflection of light by mirrors.

IRON IN THE STONE AGE

THE use of iron was known to the Stone Age man, Dr. Albert Sauveur, of the Harvard School of Engineering, told the Third Pan-American Scientific Congress, meeting in Lima. Hammered implements of meteoric iron have been found in the ancient mounds in Ohio.

"So simple was the operation required for extracting a small mass of malleable iron that primeval man may well have discovered it by means of a fire accidentally lighted on ground where iron ore existed near the surface."

The first iron furnaces were a single excavation on the side of the hill facing the prevailing wind with an opening at the bottom for the draft. In this appliance the ore was heated, and in contact with charcoal, a small pasty mass of iron was obtained.

These primitive furnaces were called bloomeries. Very early in the development of the iron industries an artificial blast was introduced. In the south of Europe artificial blast furnaces were used long before the Roman invasion.

It was not until the early part of the twentieth century that steel began to take the place of wrought iron manufactured as it was in the days of Cort in the seventeenth century. With the development of Bessemer steel, although it needed high-grade ore, wrought iron was practically rendered obsolete. No improvement in the Bessemer process has been recorded; however, iron ore has been reduced by electricity as a source of heat and carbon as a reducing agent. Manganese steel appeared to startle the metallurgical world some years ago by its extreme resistance. It was not until 1914, however, that stainless steel, an alloy of steel, was announced by its discoverer, Harry Brearly. Its adaption for the manufacture of cutlery was immediately appreciated and it is now widely used for that purpose.

In concluding his outline of the development of iron Dr. Sauveur called attention to the rich deposits of ore in Chile and prophesied that they would furnish much of the material for American furnaces as the ore is from 65 to 68 per cent. of iron and is of Bessemer grade.

THE BRIGHT STAR ALGOL

ALGOL, the bright star in the constellation of Perseus, seen nearly overhead in the early evenings now, is not a single orb, as it appears to the naked eye, but actually consists of three, and possibly four, separate bodies, all revolving around in a complicated system, said Dean B. McLaughlin when speaking before the astronomers gathered in Washington to attend the meeting of the American Association for the Advancement of Science. Mr. McLaughlin, who is a member of the staff of the Sproul Observatory of Swarthmore College, has studied the star on the basis of the radial velocity, or the speed with which it approaches or recedes from the earth.

The most peculiar feature of Algol is the periodic variation in light which it undergoes, and which caused the ancients to call it "The Demon Star." This variation has been known for a long while to be due to a dark body, or satellite, which revolves around it in a period of a little over two days, and which, when it comes between the earth and the star, cuts off the latter's light. However, certain discrepancies which were found in the period of variation has made it evident that there is a third dark body which the eclipsing pair revolve around in a little less than two years. Mr. McLaughlin has discovered a further discrepancy, and he comes to the conclusion that these three bodies revolve around a fourth one in a period of somewhat more than a century.

THE CLIMATE OF THE EARTH

DR. W. J. HUMPHREYS, of the U. S. Weather Bureau, pointed out at the recent meeting of the American Association for the Advancement of Science that the sun has nothing to do with determining the climate of the earth as all the changes were produced essentially by the earth itself and no matter how constant the output of solar energy certain alterations of topography and other terrestrial conditions determine climatic changes.

It is further believed that during the warmer periods of prehistoric times the land areas were relatively restricted and of small elevation with the oceanic circulation free and open to high latitudes.

The colder periods, including the ice ages, were, presumably at times when land was extensive, mountains abnormally high, and oceanic currents restricted. At such times the mountain peaks would carry many glaciers of greater or less magnitude. At a time like this, when the climate was in a critical condition, a few violent volcanic eruptions would be disastrous. Every thick veil of volcanic dust appreciably lowers the temperature. This would lead to a greatly extended snow period during every season of the year. This cooling would be intensified by thinning the blanket of water vapor around the earth.

"In short," said Dr. Humphreys in conclusion, "the earth has produced its own climatic changes, through potent natural factors."

HEAT FROM THE SUN DURING AN ECLIPSE

LOOK out for a drop in temperature if you are in the northeastern states where the cone shaped shadow of the moon will mark out a path during the eclipse of the sun on the morning of January 24. H. H. Clayton, meteorologist, of Canton, Mass., described at the Washington meeting of the American Meteorological Society on January 3 the changes in temperature, humidity, barometric pressure and wind, which accompany the moon's shadow. "It is evident even to the senses that the temperature falls within the shadow of an eclipse," he said. "Part of this is due to the withdrawal of the direct heating effect of the sun's rays, and part to the actual cooling of the air by radiation." The temperature has been known to fall off as much as ten degrees, the coldest time being shortly after the totality of the eclipse.

Records of sensitive barometers have shown that superposed on the usual variations in air pressure is a wave due to the presence of the shadow, which has three crests, occurring shortly after the beginning of the phenomenon, at its height, and just at its completion. Disturbances in the moisture content and circulation of the air are likewise reported, but observers do not agree on these points.

PUBLIC HEALTH ADMINISTRATION

AN outline of the needs of a successful public health administration was presented before the Third Pan-American Scientific Congress, in session at Lima, by Dr. J. D. Long, assistant surgeon general, U. S. Public Health Service, and vice-director of the Pan-American Sanitary Bureau.

After outlining the antiquity of public health service, and describing in brief the sanitary measures exercised in ancient Babylon, Egypt, Persia, Greece and Rome, Dr. Long stated as his opinion that modern public health measures can be carried out to best advantage on a basis of local autonomy. If each community is allowed to work out its own local problems, and to meet them according to the means available, a more flexible system and better results are to be expected than where the administration is highly centralized.

Dr. Long also pointed out the desirability of separating the professional and technical end of the work from the administrative and clerical. Physicians and sanitary engineers should not be expected to spend too much time on office work. Frequently, moreover, a trained scientist is very valuable in his profession, but can not become a successful administrator.

The advantages of a thoroughly worked out public health system were strongly emphasized. In countries where the annual death rate is from thirty to forty per thousand the average expectancy of life is only about thirty years; whereas in countries like the United States, the Scandinavian nations, Australia and New Zealand, where the annual death rate has ben reduced to about twelve per thousand, the normal expectancy of life has been raised to fifty-six years, and the average loss of working time due to sickness is only about six days per year.

ITEMS

A NEW electric cell that is sufficiently affected by a beam of light that it gives enough current to operate mechanical relays without amplification was described by V. Zworykin, physicist at the Westinghouse Research Laboratory, at the opening session of the meeting of the American Physical Society in Washington. The device consists of a bulb in which there are four electrodes, and which is coated with a distilled alkali metal, with the exception of a small window for the admission of light, and filled with the rare gas argon under low pressure. One electrode acts as a filament and is heated to a low temperature, special shields preventing the light from reaching the sensitive coating.

THAT variations in the electricity of the atmosphere show a definite relation with activity on the sun, as measured by the number of sun-spots and which are known to undergo a cycle of about eleven years, was brought out by Dr. Louis A. Bauer, director of the Carnegie Institution's Department of Terrestrial Magnetism, in a paper presented before a joint session of the American Physical Society and the American Astronomical Society. Data have been obtained during the last eighty years, covering seven sun-spot cycles, and show that the relationship undoubtedly exists. "The indications are good," he said, "that, with increased improvement in method of measurement, atmospheric electricity may assist powerfully in solving the mooted question as to the manner in which striking occurrences on the sun, as sun-spots, may affect physical conditions on the earth."

BLUE MOLD, one of the worst spoilers of food, is a tough customer and hard to kill, according to results of experiments reported by Miss Katherine G. Bitting to the Botanical Society of America. In the experiments, mold spores and remains of cultures that had been grown twelve years ago and kept in a dry condition ever since were found to be still alive and capable of reproducing. Some samples, that had been grown on foods containing chemical preservatives, had been injured by their early experiences, as they showed by producing abnormal forms.