

SCIENCE NEWS

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THE OPTICAL SOCIETY OF AMERICA

ARTIFICIAL sunlight, methods of transmitting photographs by wire, the effects of glaring lights, the names of colors: these are among some of the problems being considered at the meeting of the Optical Society of America which opened its tenth annual convention at Cornell University on October 29. The meeting continued until October 31.

On the first day, Professor E. M. Chamot, of Cornell, told the scientists of his work in applying the microscope to the problems of chemistry, and on Saturday his colleague, Professor Simon H. Gage, will describe the latest improvements in the microscope. Telegraphic transmission of pictures is the subject of Dr. Herbert E. Ives, who is retiring as president of the society. Dr. Ives is connected with the research laboratories of the American Telegraph and Telephone Company, and has been chiefly instrumental in developing the method of transmitting photographs now in use. On Friday evening, Dr. Dayton C. Miller, of the Case School of Applied Science at Cleveland, speaks on "Contributions of optical measurements to physical theory." Dr. Miller has recently repeated experiments made originally by Dr. A. A. Michelson, of the University of Chicago, which have been said by many authorities to overthrow the theory of relativity, and this work will be described.

A method of changing the light from a nitrogen-filled incandescent lamp to the same color as that from the noon-day sun, without the use of dyed filters, colored glass or solutions, or any of the usual devices, was described by Dr. Irwin G. Priest, of the U. S. Bureau of Standards at Washington.

Dr. Priest's apparatus was designed in order to permit "artificial sunlight," important in many industries which require accurate color matching, to be standardized. It depends on the use of polarized light, which is light made to vibrate in one direction, instead of promiscuously, like ordinary light, by what the physicist calls a Nicol prism. If a beam of polarized light is allowed to fall on another such prism parallel to the first, it will pass through. If the two are at right angles, however, the beam will not pass through unless some material is placed between them which has the power of rotating the plane of vibration. Quartz, or "rock crystal," has this power, but does not rotate all colors to the same extent. By arranging the quartz plate and the prisms properly, the apparatus will appear blue if one looks through it. If light from an incandescent lamp is passed through, it will be converted into a light closely resembling daylight. As no actual colors are present in the system used to filter the light, there is nothing to fade, and it can be accurately standardized.

How the vacuum thermocouple, a delicate laboratory device which gives a small electric current when heated, has been used by astronomers to study photographs of stars and their spectra, was explained to members by Dr.

Edison Pettit, of the Mt. Wilson Observatory at Pasadena, Calif. In many astronomical problems the dark lines on spectrum photographs reveal many secrets if it is known which lines are most intense. In the new apparatus, the light from an incandescent lamp shines on a narrow slit, parallel to the lines on the photograph, through the photographic plate and then onto the thermocouple. As the plate is moved past the slit by a motor, the intensity of the light falling on the thermocouple varies and the readings of a galvanometer connected to it indicate the relative intensities of the lines.

What shall the various characteristics of colors, interesting alike to the artist and physicist, be called? Heretofore almost everybody who has written on the subject has had his own private system of naming, and in an effort to introduce some uniformity, the Optical Society of America has appointed a committee to study the various systems of names. According to the report of this committee questionnaires were sent to representatives of the three groups of art and art education, industry and research.

"Light" is the term most preferred for the "force by which objects are rendered visible," other suggestions being radiation, radiant energy and luminosity. "Gray" received the most votes for what is commonly called by that name, but "neutral color" and "achromatic colors" found a large number of adherents. "Value" and "brightness" was preferred to designate an arrangement where the samples became lighter.

THE SPEED OF LIGHT

ONE man in the world, Professor Albert A. Michelson, of the University of Chicago, now knows within twenty-five miles per second just what the speed of light is, and he promises that by the end of next summer he will have the figure correct within five miles, or perhaps even one mile, per second. Light travels with an approximate speed of 186,300 miles per second, so that the present figure is correct within approximately one ten thousandth of one per cent. of error, and the promised determination within five miles per second of the exact speed will be correct within three one hundred thousandths of one per cent.

Professor Michelson has been refining his measurements of the velocity of light through further experiments at the Mt. Wilson Observatory in California.

The light measurements were made between Mt. Wilson and Mt. San Antonio, a distance of about twenty-two miles. Professor Michelson projected a powerful light through a narrow slit onto a mirror which was spinning at the rate of about 30,000 revolutions a minute, which in turn projected it on a reflecting apparatus at the far station. The reflector returned the light to the original source. With an accurate knowledge of the rate at which the mirror is revolving and the distance between the two stations, Dr. Michelson found it easy to calculate the ve-

locity of a ray of light. With the perfection and refinement of the mechanical devices he plans to repeat the experiments in the summer of 1926. He said that he would try to measure the velocity between two stations about 100 miles apart. The present revolving mirror is to be replaced with one which is much larger and capable of projecting three times as much light over a given distance.

Professor Michelson points out that the velocity of light is increasing proportionally with the decrease in the velocity of the earth. With this decrease in the earth's velocity our unit of time measurement is constantly being lengthened, and as the relative length of our second becomes longer so will the velocity of light become faster, he said.

There are practical uses for an accurate figure for the velocity of light. Knowing the velocity, it is perfectly possible to reverse the experiments and measure distances between points with an error of less than one part in a million. This is an accuracy which no engineering instrument can ever hope to attain.

The experiments of the summer of 1924 gave 186,300 miles per second as the nearest approach to the actual figure. This figure, Dr. Michelson stated in announcing it, is accurate within twenty miles. He asked to be excused from giving the exact figures obtained this summer, stating that he preferred to wait until his next season's work shall have given him the nearest approach to absolute accuracy obtainable by present methods.

THE DETECTION OF OIL FIELDS

NEW oil fields and other valuable mineral deposits in regions where the tell-tale rock structures now lie buried far below the surface and random drilling is impractical, may be discovered at a relatively low cost by means of measurements of the heat in deep wells, according to W. T. Thom, Jr., geologist in the division of fuels of the U. S. Geological Survey.

Series of temperature measurements taken at different depths in wells of the Salt Creek dome in Wyoming, he said, show that there is a direct relation between these temperatures and the shape of the folds in the rocks associated with oil deposits. The sharpest rise in temperatures has been found near the crest of the dome and proportionately less sharp increases at various points on its flanks. Similar temperature differences have also been found in artesian wells in eastern North and South Dakota.

These relationships suggest, Mr. Thom said, that they may be used to locate concealed uplifts and buried hills such as control oil production in south-central Oklahoma and California. A single well showing an abnormally sharp rise in a series of measurements at different depths would indicate the existence of an uplift in near-by rock strata. Two wells would give a possible clue as to their relative position on the uplift, and three wells would give a suggestive guide as to the general direction in which the crest of the concealed uplift would lie.

Not only would this in many places reduce the amount of exploratory drilling required to discover oil and gas pools associated with such features, but small holes for temperature measurement could be put down the necessary thou-

sand or more feet with a diamond drill at a much lower cost than for ordinary oil well drilling. Moreover, systematic study of existing holes and artesian wells may lead to the discovery of oil in regions not now seriously considered, and yield enough evidence to justify wildcat testing of the oil possibilities of deeply covered rocks in the Great Plains states.

This method would serve as an effective supplement to other methods now being used but would in no sense supplant them. Mr. Thom's theory is that the rock strata were first folded up; then, in the course of geological time, the top of the fold was cut off by weathering, exposing the deeper-lying and hotter rocks at the crest of the ridge or dome.

INFLUENZA

DECLARING that it is impossible to prevent altogether another epidemic of influenza by methods of quarantine and isolation, Dr. E. O. Jordan, head of the department of bacteriology of the University of Chicago, discussed the efficacy of various preventive measures before the American Public Health Association in session at St. Louis.

Practical difficulties in the way of administering efficient vaccination on a world-wide scale during an influenza outbreak seem so insuperable that we can hardly make it the basis of a protective campaign, he said. Face masks he characterized as having limited applicability. Chlorine and similar gases he dismissed because they have not yet proved of decisive prophylactic value.

Dr. Jordan believes, however, that something can be done to lower the attack rate in favorably situated small groups, to protect some individuals altogether and to lessen the virulence on the part of the accessory microbes. Difficult to apply, and uncertain of success as it may be, the minimizing of contact seems at present to offer the best chance we have of controlling the ravages of influenza.

It is now clear that the first estimates of the loss of life caused by the influenza epidemic of 1918 were too low. The disclosures of the census of British India of 1921 and other data that have since come to hand make an estimate of 20,000,000 deaths in the whole population of the world probably not wide of the mark. This is comparably the worst catastrophe of the sort that has visited the human race since the Black Death of the Middle Ages.

Judging by the past nothing is more certain than that we shall some day have another visitation of this destructive infection. It is not to be doubted that if it were to descend upon us to-morrow we should, as public health workers and students of the disease, be little if at all better equipped to deal with it than we were seven years ago. It is conceivable, however, that if we occasionally remind ourselves of the gaps in our knowledge we shall be in a position to study more advantageously the manifestations of the disease even in the presence of an epidemic period. There are certainly also lines of direct investigation which can be prosecuted to-day with some hope of rendering ourselves better prepared to cope with the next epidemic.

If the influenza was not a new disease in most parts of the world it certainly was greeted like one and behaved like one, Professor Jordan continued. In many parts of the world the time of importation of the new disease, if it was a new disease, into a region where the so-called endemic influenza had previously prevailed, could be specified to a day. Its introduction into certain army camps in the United States is known to the day and hour.

EXPERIMENTS WITH TUBERCULOSIS VACCINE ON AFRICAN APES

A SERIES of experiments, continuing the efforts of years to find an effective vaccine against tuberculosis, are being carried out in tropical West Africa on the manlike apes. Dr. J. Wilbert, who has announced promising results for the Pasteur Institute, does not, however, venture to say how these may lead to the ultimate goal, anti-tuberculosis vaccination in man.

The experiments carry on the pre-war work of Dr. A. Calmette and C. Guérin, who produced a vaccine of tuberculosis organisms greatly reduced in virulence, which, they have repeatedly claimed, confers immunity without giving the disease. According to Calmette, the only effect of vaccination with this serum is to produce a "general disease like typhoid fever which cures itself spontaneously after fifteen to twenty days without causing the slightest tubercle formation."

Calves, guinea pigs, rabbits and monkeys treated with a small dose of the substance appear to become highly resistant to tuberculosis. The war caused a postponement of his attempt to carry the experiments further by trying the serum on man's nearest biological relation.

Human conditions were reproduced as far as possible in the ape colony. Fifty-nine chimpanzees lived under similar conditions of exposure. Nineteen were vaccinated, twenty were infected with virulent tuberculosis germs and twenty were kept unvaccinated as control animals whereby to judge the rest.

Of the nineteen vaccinated, eleven died of various causes, but never showed any sign of tuberculosis even at death, and the other eight are now in good health. Of the twenty unvaccinated animals kept as controls, nineteen died of tuberculosis and the other of an acute infection of another kind. Of the twenty animals infected with virulent tuberculosis, nineteen died of the disease and the other of intestinal trouble. Thus out of fifty-nine apes, only eight are now alive and all these had been vaccinated.

AN EXPEDITION TO GREENLAND

AN expedition to penetrate into the interior of the great ice sheet covering Greenland and learn the secrets of the weather in that area is being organized this winter by Professor W. H. Hobbs, of the University of Michigan, an authority on glaciers and geology.

Equipped with airplanes for preliminary exploratory work, with radio apparatus adequate to maintain constant communication with the outside world, and with scientific instruments to record meteorological data and observe the movements of the great Greenland glaciers, the party

to be headed by Professor Hobbs will start for the far northern Danish island-continent of Greenland in July of next year.

One of its objects will be the establishment of a weather observing station on the great plateau of ice some 150 miles inland, and 6,000 to 7,000 feet above sea level. Never before has this been accomplished. Professor Hobbs plans to maintain an observing staff at this station for a year in order to give to the meteorologists of the world information about the behavior of the weather in that part of the world which seems to be the place where storms either are born or die. The data to be radioed to civilization are expected to aid materially in the making of the daily weather forecasts in Canada and the United States.

The expedition will be under the auspices of the University of Michigan where Dr. Hobbs is professor of geology. Several American governmental bureaus interested in the scientific problems of the arctic have promised active participation in the expedition and the expedition will also cooperate informally with Dr. Lange Koch, leader of the Danish government's scientific party which will take the field at Scoresby Sound on the east coast of Greenland in July, 1926, at about the same time that Professor Hobbs's party is establishing its base nearly directly opposite on the west coast at Holstensborg, just below the arctic circle. Dr. Koch, who has had long training and experience in explorations in Greenland, will trek directly across the continent of Greenland from east to west, making scientific observations during the two months' journey. Previous to this he plans to map and investigate the geological features of the unknown portion of the west Greenland coast.

Regular exploration of the wind currents and temperatures of the upper air will be a feature of the routine observations at the two stations to be established. Large rubber sounding balloons will be used for this purpose. Since the inland station on the ice sheet will be over a mile high above the sea, and the coast station off the edge of the glacial ice will be over a half-mile high, it is expected that the balloons will succeed in probing and revealing the weather secrets of unusually high altitudes.

At least two airplanes with pilots and mechanics will be a part of the expedition and the rest of the party is now in the process of organization. Radio communication on short wave length will be provided between the two stations as well as with the United States.

ITEMS

AN exploration party under the combined auspices of the Tropical Plant Research Foundation and the U. S. Department of Agriculture has set out to discover what's in the woods in Cuba. The purpose is to learn what is the most profitable way of utilizing the Cuban forests and to find out what kind of insect pests are most harmful and how to combat these. The party, which expects to complete its work in a year, consists of Dr. H. N. Whitford, Dr. J. R. Weir, mycologist and forest pathologist of the U. S. Department of Agriculture, and one trained assistant.