SCIENCE NEWS

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THE USES OF SPECTROSCOPY

METHODS of putting the rainbow to work by means of the spectroscope were discussed last week at the International Conference on Spectroscopy at Massachusetts Institute of Technology. Over one hundred scientific men and industrialists by attending showed their interest in the spectroscope, which is one of the most powerful tools for research. It has innumerable uses and in various applications serves as a watch, detective, balance, speedometer, microscope, camera, tape measure, transit and forgery detector.

In addition to spectroscopists from this country and abroad, those attending included industrialists and investigators working in textiles, chemical engineering, explosive manufacturing, metallurgical engineering, astronomy, medicine, biology, coal mining, automotive engineering, paper manufacturing, wire making. Many uses of the spectroscope were reported.

One engineer had trouble with automobile radiator caps buckling. The spectroscope revealed impurities in the material undetectable by other means. Another told of a white paint which turned black on exposure to sun. Spectroscopy revealed minute impurities.

The importance of the spectroscope in metallurgical engineering was indicated by the fact that one company has made more than 33,000 spectroscopic photographs during research.

In crime detection the spectroscope has enabled investigators to identify materials on clothing.

A coal operator said that it can be told by spectroscopic examination from what seam coal comes. Mining engineers are using spectroscopes to detect minute impurities, which in some cases aid in finding larger amounts.

Because even small amounts of impurities may affect the life of rubber, manufacturers are greatly interested in spectroscopic methods of detecting them. These methods are also of great use in controlling the manufacture of optical glass.

In food industries, the spectroscope is valuable in checking ultra-violet irradiation and in analysis of materials. Dental researchers have found by spectroscope that mottled enamel is due to small impurities in certain drinking waters. In the case of an appendix operation where glass was found, the spectroscope revealed that the fragments did not come from a suspected catsup bottle in a restaurant.

Other instances of the use of spectroscopy ranging from examination of cranberries to raincoats, cable sheathing, gasoline and transformer oil were cited. One company suspected second-hand oil was being sold for use in transformers. The spectroscope confirmed it.

In discussion of light-wave standards, it was emphasized that the iron standard is not obsolete but will be supplemented by copper which gives wave-lengths of value in the region below one one-hundred-thousandth of an inch long. Here iron does not give enough lines to be satisfactory for standards.

Of special significance at the meeting was the large attendance of industrialists who, while not trained in spectroscopy, realize its possibilities for their industries and want to learn how they can utilize it.

IMAGE OF A FAINT LIGHT

FAINT light may be incapable of forming a distinct image of a very small area.

This extension of the uncertainty or indetermination theory of the new physics is being tested by Professor John Q. Stewart and Dr. A. M. Skellett at Princeton University in a photographic study. Preliminary results reported in a letter to *The Physical Review* seem to show that scratches on a glass plate are fuzzier in focus when photographed in very faint blue light than when photographed in bright light.

One of the philosophically intriguing consequences of the new wave mechanics in physics is the uncertainty principle of Heisenberg, who, in 1927, pointed out that it is possible to measure the exact position of a small particle, such as an electron, only at the expense of uncertainty as to its position. This principle of indetermination has been more disturbing to the older physical concepts than even the principle of relativity.

Three years ago Professor Stewart, reasoning by analogy, speculated that this matter of uncertainty might extend to faint light forming images. Since then he and his associates have been carrying out tests.

The source of light is a pinhole in a dark room, the pinhole being illuminated from behind through a blue filter. At a distance of 2.5 meters (about 2½ yards) is mounted a glass slide having numerous fine scratches forming a scale of tenth millimeters. A sturdy camera photographs these fine markings using only light from the pinhole. Faint light exposures varying from an hour or two up to twelve days have been made and compared with bright light exposures. The faint light exposures show a decidedly more blurred focus than the photographs made with brighter light. The experiments are being continued.

THE HUMAN EGG-CELL

THE importance of quality in human egg-cells is stressed by Dr. George L. Streeter, director of the department of embryology of the Carnegie Institution of Washington, in a report on his most recent investigations. As many as 25 per cent. of fertilized ova are not good enough to reach the stage of birth, he says. Such biological false starts die at some time during the prebirth period.

Even after birth, however, the influence of the egg-cell's make-up still continues, according to Dr. Streeter. "Whether the infant survives its first year—and in fact a large number of them fail to do this—depends in considerable part on the original quality of the egg," he continues. "If they withstand the usual experiences of life until between 50 and 60 years old and then succumb to its aggregate wear and tear, they conform to the

actuary's 'expectation of life at birth' and to the embryologist's expectation of the performance of an egg of average quality. It is only the extraordinarily good egg that is still going strong at 80 years, and we see him (or her) do this in the absence of any exquisite hygienic régime or environmental favor.

"The egg as a whole, of course, consists of a multitude of elements and it is the sum, or rather integration of these, that determines its fate. If we would know the quality of the egg, we must therefore determine the quality of its parts. As a whole the egg may be a satisfactorily performing mechanism, although certain portions of it are of poor quality. One finds, in fact, that it is normal for the component elements of the egg to differ among themselves in such qualities as endurance and capacity for growth. One also finds that these differences vary in different eggs and that they are hereditary."

PERNICIOUS ANEMIA

PERNICIOUS anemia is not necessarily the result of the lack of the preventive vitamin B_2. Failure to digest this vitamin, even though it is present in the stomach, may also bring on this troublesome illness. So physiologists and medical scientists attending the meeting of the American Association for the Advancement of Science were informed by Dr. Maurice B. Strauss and Dr. William B. Castle, of the Thorndike Laboratory, in the Boston City Hospital and the Harvard Medical School.

Pernicious anemia, their report stated, may result from the failure of the stomach juice to digest vitamin B_2 or a closely related substance. Vitamin B_2 is found in meat, eggs, milk, liver, the outer layer of rice, yeast and wheat germ. Without any symptoms of indigestion, such as gas or pain, the patient may lose an essential factor from the stomach juice with the result that pernicious anemia develops. This stomach factor is neither the stomach acid nor common ferments, so that its absence can only be detected by special biological tests. All the usual factors of the stomach juice may be absent, but this very necessary one still remains.

If this factor is absent, no matter how much food containing B_2 the person eats, the anemia will remain. However, if every day he drinks two or three ounces of stomach juice from a healthy individual after he has eaten foods containing vitamin B_2, the anemia will be cured.

In pregnancy certain women lose this stomach factor temporarily. They then develop pernicious anemia of pregnancy. After they have had their children this stomach factor returns to normal, and they recover from the anemia. Other women, in order to keep their figures thin during pregnancy eat so little food containing vitamin B_2, that they too develop anemia, even though the stomach juice remains normal. Both factors are necessary to keep the blood normal.

In India and other tropical areas there is an anemia very much like pernicious anemia. Individuals with this disease may have a normal stomach juice, but may have eaten so little vitamin B_2 containing food that they develop the same kind of anemia as people whose stomach juice is abnormal.

ITEMS

STUDY of the cosmic rays has taken an Indian physicist to high ridges of the Himalayas 19,500 feet above the sea. The mountain climb is part of the world-wide cosmic ray survey organized by Professor A. H. Compton, of the University of Chicago. By gathering data on the intensity of the rays from space as they strike the earth at different altitudes and in different latitudes, physicists hope to learn the character of this radiation. Reporting his journey, to the Urusvati *Journal* of the Himalayan Research Institute, Professor J. M. Benade expresses the belief that he has carried the cosmic ray search to a new height record for mountain work. Professor Benade is professor of physics at Forman Christian College, Lahore. His part in the world survey is to take measurements of rays in Ceylon, Java, Singapore, Penang, Rangoon, Calcutta, Lahore, and at the highest attainable altitudes in the Himalayas.

COSMIC rays entering the earth must consist in part of both negative and positive charged particles. For if the particles were only electrons or only positives, mathematical computations show there would exist electric potential differences of thousands of billions of volts between points that are relatively close together as astronomy counts distances, such as the distance light travels in a year. This suggestion was made by Dr. W. F. G. Swann, director of the Franklin Institute's Bartol Research Foundation, in a communication to the American Physical Society. Some investigators have suggested that the cosmic rays consist of a mixture of electromagnetic radiation or photons and negatively charged particles or electrons. Recent experiments by Dr. Swann's associates have produced evidence that some of the particles may be speeding hearts of light atoms, positively charged. Dr. Swann renews his theory that the cosmic rays may originate in the heavenly bodies and sees no theoretical reasons why both negative and positive particles should not be emitted with high energy from them.

BY projecting a magnified image of the impression of a star on a photographic plate to a small white screen, astronomers at the Yale University Observatory are measuring these plates with much less eye-strain than formerly. In much of this work the actual plates are measured under a special form of microscope whose motions back and forth and up and down can be accurately determined. The strain of examining these images through the microscope eyepiece, then reading the micrometer heads that tell its motion, then recording the readings, is often considerable. Dr. Frank Schlesinger, director of the Yale Observatory, and his associate, Dr. Arthur L. Bennett, have developed the new method, in which a powerful light shines through the plate, then through the microscope. Above is a small mirror which reflects the light downwards to a white screen made of magnesium carbonate. The entire apparatus acts as a magic lantern, the plate being the slide, and the image on the screen may be magnified thirty diameters or more. This overcomes much of the usual strain, and comparative tests show that there is no decrease in accuracy.