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THE SOLAR ECLIPSE

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Niuafou Island, October 22.—Luck was with us. It rained during the night and again only two hours before totality, but it cleared in time and the total eclipse of the sun that we have traveled thousands of miles to observe was seen through clear skies with a very slight haze. The entire program was carried through successfully, though of course the photographs we took here today will provide material for study for many months after we return to the States.

The sun's corona, which flashed out around the dark disc of the moon during totality, was of the medium type that is to be expected at such a time as this, when we are about half-way between a time of maximum sun-spots and one of minimum. Two pronounced streamers of the corona projected out from the glow which completely surrounded the sun. We also saw half a dozen prominences, red flames of hydrogen, but none of these was very large.

At both the beginning and end of the total eclipse, the Bailey's beads appeared, resulting from the last sliver of sunlight shining out through valleys along the edge of the moon. The shadow bands appeared also on the earth's surface before the beginning and after the end of totality. These dark ripples were about an inch wide and about eight inches apart. They traveled over the earth at a speed of twelve miles an hour in a north-northwest direction. No bands were seen during totality.

We were also interested in watching the natives of this little island as the magnificent spectacle of a total eclipse appeared in the heavens. They were interested in it, but were quiet and did not seem to be frightened.

This is the eighth eclipse expedition that I have participated in, and the seventh eclipse that I have seen, for in Norway, in 1927, on my seventh expedition, my luck failed, and clouds prevented any observations. Before this trip I traveled about sixty thousand miles for eclipse observations, but had only seen the sun eclipsed for a paltry fifteen minutes all together. Now I have seen it eclipsed for about a minute and a half longer. This eclipse was not quite as long as we had expected, for the beginning was on time, but the end was a bit early. Such slight deviations from prediction, however, are to be expected.

Mrs. Mitchell and I came here by way of San Francisco, but we shall keep on going around the world, returning by way of Europe and New York early in January. Other members of our party, however, will return by the more direct route. Dr. Adams and members of the New Zealand party, who also had complete success, will return home as soon as they can dismantle their apparatus.

Niuafou Island, October 24.—Photographs of marvelous beauty, showing the sun's corona during the eclipse of this week with great detail, have rewarded the weeks of preparation and effort in connection with the American expedition's eclipse observations here on Tin Can Island.

We have just developed many of the photographs taken during the short period of totality and they confirm our feeling that this expedition's success has been unequaled in astronomical annals. The development of photographs on this tropical island with no running water and even with little water of any kind has been a difficult task.

Professor R. W. Marriott, of Sproul Observatory, who had charge of corona cameras, has now developed most of the coronal photographs, and the sixty-three-foot tower and the sixty-five-foot horizontal telescope took pictures of great beauty. The smaller cameras also gave splendid negatives. The photographs show that the corona exhibited streamers to the east and west and that it was midway in shape between the coronas characteristic of maximum and minimum sun-spot periods. An interesting coronal dome shaped like a gigantic strawberry is a prominent feature of all the photographs.

Last night I spent the whole night from dark to daylight in developing the spectrogram taken with two powerful concave gratings. The photographs show exquisite definition from thirty-two hundred ångstrom units in the violet region of the spectrum to seventy-eight hundred in the red portion. More than thirty lines of the hydrogen series exhibit themselves and these spectra contain eight coronal lines. The green coronium lines show exquisite structure and details a coronal disturbance agreeing in position but differing in shape from a prominence.

Our observations of time carefully computed show that the moon arrived early, the eclipse beginning two seconds earlier than calculated in advance and ending half a second early.

The spectra photographs taken by the New Zealand party showed good definition from the blue to the red region and the dispersion of the spectra taken with their prismatic camera is about one tenth that secured by instruments.

TELEVISION FROM A COLOR MOVIE

Television from color movie film, with all the colors reproduced; a method of securing television reproduction of fine detail without the use of extraordinarily wide frequency bands, either by radio or wire; and improved reproduction of color values in two-way television: these are some of the latest advances made by investigators at the Bell Telephone Laboratories. Speaking at the meeting of the Optical Society of America, held at the University of Virginia on October 30, Dr. Herbert E. Ives, under whose supervision the researches have been carried out, told of these new wonders.

The transmission of color movie film is done with the Kodacolor process, used in amateur 16-millimeter

movie cameras. In this process a series of minute ridges running the length of the film yields a positive film in which the image is made up of a series of fine horizontal lines. The position of these lines with respect to the ridges determines the color which they show on the screen. This is because the ridges act as cylindrical lenses and direct the light for the screen picture through one or more of three vertical color filters placed before the lens.

For the television arrangement, a scanning disc, with a series of fine holes, rotates in front of the film as it moves in front of a light. Then a lens projects the image on to three photoelectric cells side by side. No color filters are used, but the cells are arranged so that one picks up the red image, one the green and one the blue. In the television receiver, which is the same as that used in previous experiments in transmitting color images from real subjects, the current from each of these cells is fed into a glow lamp which reproduces the original color. The light from these three lamps is combined, and so the eye sees the reproduced image in full color.

One of the chief limitations of television, either in color or monochrome, and particularly when transmitted by radio, is the broad band of frequencies required. In radio work, the ten kilocycle band used for broadcasting, that gives ample width for sound reproduction, is much too narrow. Even the hundred kilocycle band, now authorized by the Federal Radio Commission for experimental use, is only sufficient to give a picture showing as much detail as a small newspaper halftone picture.

Dr. Ives described experiments, made with wire transmission, by which the original wide frequency band is divided into three bands, each of which is transmitted separately and recombined in the receiver. With this method, he said, an image made of 13,000 elements was obtained. This would be about as good as a newspaper halftone picture two inches square. Many technical difficulties are introduced by this method, however, for the characteristics of the three channels must be very carefully matched, or the recombination of the three sections can not be effected successfully.

The improvement in the two-way television is to illuminate the subject with a moving spot of red and blue light, instead of blue light alone, as used at first. With only blue light a result is obtained similar to that in photographs made with ordinary film without the use of a color filter. Even bright reds appear black, and yellow appears dark gray. With the two-color scanning, the reproduction, though in a single color, gives brightnesses more accurately corresponding to their actual value. This is possible because of the use of photoelectric cells of caesium oxide in conjunction with the ordinary potassium cells. The former are sensitive to red and the latter to blue. The booth is illuminated with yellow green light to which neither is sensitive.

BOTULISM IN THE UNITED STATES

A DEFINITE increase in the number of cases of botulism has occurred during the past two years, Dr. K. F. Meyer, director of the Hooper Foundation for Medical Research of the University of California, reported to the American Public Health Association at its recent meeting at Fort Worth, Texas. With the exception of two cases of botulism traced to shallots packed in Italy, home preserved vegetables, fruits, fish and meats have been the products responsible for the cases of poisoning in the recent outbreaks.

Botulism is a type of food poisoning caused by the presence in the food of an organism called *Clostridium botulinum*. This organism liberates a very powerful poison which causes illness and often death in persons eating infected food. Certain types of food are particularly apt to contain the organism, and home canned or preserved foods are more apt to have it now than commercial products.

"Commercially preserved food has not been connected with any of the recognized cases of botulism since 1925," Dr. Meyer said. Scientific canning procedures have replaced guess work in every branch of the industry which packs food liable to botulinus spoilage.

The moisture content of the food is an important factor in the number of deaths from this poisoning, Dr. Meyer explained. Meat and fish products in the form of pastes, soft sausages of the mettwurst variety and pickled fish have caused a larger number of deaths than hams or other relatively dry pork products in which the poison is unevenly distributed. About 88 per cent., or nearly nine tenths, of the intoxications observed in the United States were caused by vegetables of various sorts preserved in brine.

Plant products were involved in about three fourths of the cases in 192 outbreaks. Animal products were involved in less than one fifth.

"Home canned string beans continue to play a very important rôle, due largely to the well-known fact that spoilage of this vegetable when preserved is so slight that the housewife or cook will often fail to detect it. Furthermore, string beans are often served in salads and any odor which might arouse suspicion is usually masked by the vinegar or mayonnaise dressing," he stated. "Home canned corn has also been a frequent offender. From the public health standpoint it is imperative that the principles developed by the canning industry be applied to the methods of home canning."

All canning methods, whether commercial or at home, should aim at absolute sterility of the product to insure freedom from the organisms of botulism.

The rural sections of California, Washington and Colorado seem to furnish the majority of cases of botulism, while New York stands fourth, and Oregon, Idaho, Montana, North Dakota and Wyoming have recently contributed their share.

The spores from which the organism develops are found in the soil throughout the United States, England, Germany and France. The food acquires its dangerous botulinogenous properties from the soil and also probably from fecal contamination by animals, recent observations showing that certain varieties of the organism are found in the intestinal canal of animals.

AN AMERICAN "STONEHENGE" IN COLORADO

INDIANS in Colorado long ago constructed for their religious rites mysterious circles of stones that call to mind the great stone circle at Stonehenge in England, is the discovery by Professor E. B. Renaud, of the University of Denver, as the result of an expedition on behalf of *Science Service*.

Professor Renaud, who made a long, difficult journey over prairie trails to investigate the local rumor of an Indian fort, found that the "fort" was really a series of circles of gray and brown sandstone slabs set on a high cliff overlooking the Apishapa River and the surrounding country. The circles of stones would have had no usefulness as a defense. Nor are they like rings marked off for wigwams. The labor involved in carrying the slabs and aligning them according to a pattern can hardly be justified unless the enclosure had some ceremonial function.

The Colorado circles are not constructed on so grand a scale as the prehistoric Britons achieved at Stonehenge, but the Indians had a most impressive setting for their rites. One group of circles ranges from one pace to nine paces in diameter, and the group is more or less surrounded by a slab fence with an opening at one end. At another site along the Apishapa, Professor Renaud discovered another group of circles made of larger monoliths, and here he found that each circle had an upright stone post in the center. "A solar cult may be suggested by the circular shape and the presence of a central monolith." So far as is known nothing similar to the stone circles has been reported heretofore in the Southwest states.

ITEMS

SEDIMENT from the Mississippi River, deposited around the delta in the Gulf of Mexico, is thought by Dr. William Bowie, of the U. S. Coast and Geodetic Survey, to have been responsible for the small earthquake felt in New Orleans on Sunday, October 19. According to the theory of isostasy, developed largely by Dr. Bowie, the whole earth is in "isostatic" equilibrium. That is, the mountains are of lighter material than the lower regions, and together they all balance. As material shifts, whether by deposit of sediment or by erosion, the equilibrium is restored by movements of the parts of the earth, and sometimes these movements produce earthquakes.

HERDS of wild elk from their haunts in the foothills of the Olympic Mountains have moved down to graze along the highway to Lake Quinault. So many of the large animals cross and recross the road as to frequently halt automobile traffic. Unlike the elk herds in Yellowstone National Park, the Roosevelt elk of the Olympics have abundant winter pasturage unhampered by heavy snows. They have increased until there is a possibility of an open season during the autumn of 1931.

MORE solid carbon dioxide, commonly known as "dry ice" is now used than the liquid form of the gas, in which it was formerly marketed. D. H. Killefer, chemist of the Dry Ice Equipment Corp., New York City, told members of the American Chemical Society at the recent meeting in Cincinnati that nearly thirty thousand tons of this former laboratory curiosity will be used during 1930. This is greater than the total amount of liquid carbon dioxide used in 1927, the latest year for which figures are available. It is used for refrigeration, because of its advantages over ice in being colder and in not melting, but changing directly from the solid form into the gas.

FROM the interior of the earth beneath Jackson County, Colorado, comes snow white, solid carbon dioxide, which freezes at 70 degrees below zero, Fahrenheit. Professor F. F. Hintze, of the University of Utah, reported to the American Institute of Mining and Metallurgical Engineers that enough is obtainable in one day to fill a train. Professor Hintze explains that the carbon dioxide is contained in the earth as a gas under very high pressure, not as the cold solid. But when it comes to the surface, mixed with about 10 per cent. oil, it expands so fast upon being released from confinement and gives up so much heat that it freezes both itself and the oil. In its frozen state engineers would apply this gas to the refrigeration and preservation of food.

THE amount of potash in the soil of the orchard appears to have an important bearing on the storage life of the apples produced. Dr. Franklin Kidd and Dr. C. West, of the Low Temperature Station, Cambridge, have found that the storage life of apples on which they worked increases as the amount of available potash in the soil increases. Trees grown in soils deficient in available potash yield apples which are particularly susceptible to low-temperature breakdown in cold storage. In order to insure a long storage life it therefore seems important that there should be a good supply of available potash in the soil.

PROFESSOR JOHN W. M. BUNKER, of the Massachusetts Institute of Technology, and Robert S. Harris, research associate at the institute, reported to the American Public Health Association, at its recent meeting, a much wider range of ultra-violet rays than that commonly thought effective helps in the prevention or treatment of rickets. Their report was based on a two-year study of 800 animals. The wave-length range generally thought effective is between 3022 and 3026 ångstrom units. An ångstrom unit is about one two hundred and fifty millionth of an inch. When this range is extended to include ultra-violet rays of shorter wave-lengths, greater protection against the disease is obtained.

BLOOD group tests to determine a child's paternity should not be made until at least two weeks after birth, Dr. Carl H. Smith, of Cornell University Medical College, advises in a note to the American Medical Association. Dr. Smith has found from a study of blood groupings that for the first ten days or so the infant's blood group is influenced by the direct transmission before birth of some of the mother's blood. After that period, the child's own blood group becomes fully established and a fair, reliable test can be made.