

ASTRONOMY

# Success of Eclipse Expedition Is Reported by Leader

**"Photographs of Marvelous Beauty" Developed on Tropic Island "With Little Water of Any Kind"**

By Radio From

**DR. S. A. MITCHELL**, Scientific Head U. S. Naval Observatory Eclipse Expedition to South Pacific, and Director of McCormick Observatory, University of Virginia.

**N**IUAFOU Island, South Pacific.—Photographs of marvelous beauty, showing the sun's corona during the eclipse of last week (total eclipse of sun on October 21-22) 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. (SCIENCE NEWS LETTER, Oct. 4 and 25, 1930).

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 unequalled 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.

Prof. 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 sunspot periods. An interesting coronal dome shaped like a gigantic strawberry is a prominent feature of all the photographs.

## Eclipse Arrived Early

I spent a 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 angstrom 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 line shows 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. Such slight deviations from prediction, however, are to be expected.

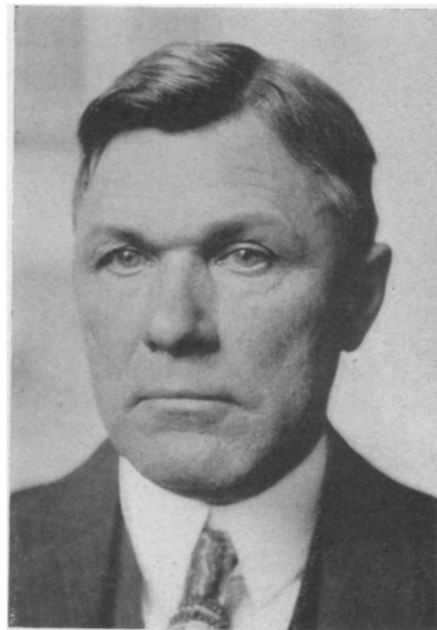
The spectra photographs taken by the New Zealand party showed good definition from the blue to the red region and the dispersion of the spectra taken with their prismatic camera is about one-tenth that secured by instruments.

## "Luck Was With Us"

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 travelled 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 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 sunspots 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



**DR. S. A. MITCHELL**

*He has traveled 60,000 miles to see fifteen minutes of eclipse.*

about eight inches apart. They travelled 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 travelled 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.

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 also return home as soon as they can dismantle their apparatus.

By Science Service Staff Writer

A total of 41 photographs were taken of the corona, in addition to the plates

made in the Einstein camera and the spectrograms. Commander C. H. J. Keppler, U. S. N., administrative head of the party reported in a radio message to the U. S. Naval Observatory in Washington. The Einstein plates are expected to shed further light on the problem of whether light from a distant star is bent as it passes the sun. This effect was predicted by Einstein's theory

of relativity, and was verified on previous eclipse expeditions, but more measures of it will be desirable. Many months of work on the plates, comparing them with plates of stars in the same region made when the sun is in another part of the sky, will be required before any results can be announced, however.

*Science News Letter, November 1, 1930*

#### ENGINEERING

## Power for Claude Process Like Infinite 300-Ft. Waterfall

### Famous French Scientist Tells Americans of Success Of Matanzas Tests and Announces Large New Plant

**P**OWER equivalent to that of a cataract pouring an unlimited volume of water endlessly over a 300-foot fall is stored in tropic seas. This power is not locked tightly in minute molecules and electrons, like atomic energy; it is now ready to be released by the engineer, as some has already been, to lighten the labor of man.

Prof. Georges Claude, famous French scientist, thus expressed faith in his process for utilizing the temperature difference between the surface and deep waters of tropic oceans during a lecture before the American Society of Mechanical Engineers in New York last week.

Professor Claude came to America from Matanzas, Cuba, where after overcoming many difficulties, he conducted experiments with his process which proved highly successful. (SCIENCE NEWS-LETTER, October 4, 1930).

The tests, covering a period of three years, have resulted in the collection of information that will make possible the construction in the near future of a plant of 25,000 kilowatts capacity which Professor Claude said, will probably be located near Santiago de Cuba. A plant of this size is large enough to supply the normal power requirements of thousands of people.

#### The New \$3,000,000 Plant

The new plant will cost approximately \$3,000,000. In terms of output this is a greater cost than that of modern steam plants, but it compares favorably with the cost of hydro-electric installations. The French scientist stated, however, that his recent tests show him that a much larger plant, yet no larger than

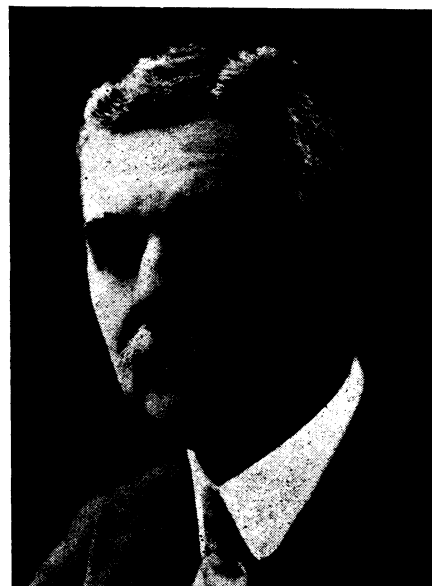
many now in operation, can be built for an installation cost of \$60 per kilowatt, which is an unusually low figure.

How the warm oceans contain the power of endlessly falling water was clearly explained by Professor Claude. He said:

"By no means is it in question to extract power from waves, from tide, from streams. What we had in mind, my friend Boucherot and myself, was to utilize the prodigious fact which in tropical seas by the paradoxical collaboration of sun and the poles, maintains an important and almost invariable difference of temperatures between the surface sea water continually heated by the sun from 75 to 85 degrees Fahrenheit and the deep sea water, which a very low circulation from the poles to the equator maintains close to the freezing point of water, that is, 40 to 43 degrees Fahrenheit at a depth of 3,000 feet."

The scientist declared that regardless of what process was used, a well-known principle of thermodynamics affirms the fact that from such a difference in temperature it is possible to get power. He then explained his method in which the ocean water, itself, acts as the medium for converting the temperature difference into power.

In the Claude process warm surface water is changed into steam by boiling at a very low pressure. The tepid water is not heated; it is merely subjected to a vacuum and when the pressure gets sufficiently low the water turns into steam. The steam passes through a turbine, which it turns to produce power, and then goes to the condenser. Here



PROF. GEORGES CLAUDE

*Defended his process for getting power from tropic seas against the criticisms of "those who will never understand that there are cases where it may be interesting to spend 80 kilowatts to receive 25."*

the cold water from deep in the ocean condenses the steam, thus maintaining the vacuum which causes the warm water on the other side of the turbine to continue to evaporate.

The plant at Matanzas, the scientist made clear, was never intended to be a commercial success. It was known from the beginning that more power would be required to pump water from the ocean and for other auxiliary purposes than would be produced. This was the first test of the process with actual ocean water. Professor Claude wanted actually to overcome the difficulty of sinking a pipe line to the ocean bottom and he wanted to see if the sea water would boil without excessive foaming which would be injurious to his turbine.

No turbine of the type needed has been built and he had to use a standard commercial make which is designed for steam under high pressure. This was a small unit, and he had to pump ten times as much water as it needed. If less water had been taken from the bottom of the ocean, it would have gotten too warm before reaching the surface.

"For these and some other similar facts," Professor Claude summarized, "my plant was condemned from before its birth to spend much more energy than it would ever produce and to provoke accordingly the jokes of those who will never understand that there are