Polaris are reduced. Only the seconds of arc are given.

Date.	Circle Reading	Date.	Circle Reading.	Date.	Circle Reading.
1883.	″	1883.	″	1883.	″
Feb. 7	57.3	March 7	57.6	March 28	57.3
11	58.8	8	55.7	28	57.5
13	59.8	11	57.4	29	58.5
18	58.7	12	56.5	29	59.8
19	58.3	13	57.5	30	59.3
23	54.9	15	57.6	April 1	60.3
23	56.4	15	59.4	2	56.6
25	55.9	21	57.9	3	57.0
27	58.6	22	57.4	6	57.4
March 2	56.8	24	59.2		
2	57.4	26	60.1		

THE SOLAR ECLIPSE OF MAY 6, 1883.

[The following interesting account of the observations of the American and Foreign astronomers is kindly furnished by Mr. Winslow Upton, a member of the American Expedition from the Signal Service office, Washington, D. C.—Ed.]

The U. S. S. Hartford, which had conveyed the American and English observers from Callao, Peru, steamed away to Tahati on the 22d of April, leaving four of her officers and ten of her crew to assist in the observations. The American members of the party were Professor E. S. Holden, Mr. C. H. Rockwell, Dr. C. S. Hastings, Mr. E. D. Preston, Mr. W. Upton and Ensign S. J. Brown. The English members were Mr. H. A. Lawrence and Mr. C. R. Woods, both of South Kensington, London, and commissioned by the Royal Society to do photographic and spectroscopic work combined. A few hours after the departure of the Hartford, the French man-of-war L'Eclaireur arrived, bringing the following scientists: M. Janssen, eminent for his work in the department of physics; M. Trouvelot, formerly of Cambridge, Mass.; M. Tacchini, the successor of Father Secchi at Rome; M. Palisa, the discoverer of many asteroids, and M. Pasteur, a skilful photographer. This party located at a short distance from the former, the two working indepen-

dently while maintaining cordial relations with each other.

The two weeks preceding the eclipse were spent in preparation, and in making the preliminary observations. The weather was uniformly pleasant, with the exception of one severe rain-storm on May 4, though there was always the flying clouds characteristic of the trade-wind region, and numerous light tropical showers. The several observatories were constructed either of tents or of a wooden framework with canvas sides and roof. In the first of these was a 6¼-inch equatorial used by Professor Holden in his search for intra-Mercurial planets; in the second a 6¼ and a 4 1-10-inch equatorial, fitted each with a spectroscope, and used by Messrs. Rockwell and Hastings. The third tent contained a transit instrument and chronograph; while in the tent adjoining was a pendulum belonging to the United States coast survey, which improved the opportunity furnished by this expedition for making observations on the force of gravity. These instruments were used by Messrs. Preston and Brown. In the open air near by were mounted the photoheliograph, equatorial stand and siderostat, which enabled the English photographers, Messrs. Lawrence and Woods, assisted by Mr. Qualtrough of the Hartford, to operate eleven cameras at the same time. Adjoining these instruments were several telescopes portably mounted—a 2½-inch equatorial used by Mr. Preston to note the times of contacts, and by Dr. Dixon of the Hartford to make a sketch of the corona; a similar equatorial equipped with a polariscope and used by Mr. Preston, assisted by Mr. Doyle of the Hartford, and the linear spectroscope used by Mr. Brown, which was secured to the former instrument. A little removed from these, under the shade of high cocoanut trees, was the instrument shelter containing the meteorological instruments, and in an adjoining open space the radiation thermometers, anemometer and equatorial used by Mr. Upton. The latter was of 2½ inches aperature and furnished with a 30° prism placed in front of the objective, by which the spectrum of the corona could be examined.

On the morning of May 6 it seemed as if the preparations of the observers would be for naught, as the sky was over-

cast and the clouds threatened rain. Fortunately, after several showers, the sky cleared before the time of first contact, and though flying clouds concealed the sun at times, the observations were successfully made. A thin cloud partially concealed the corona for a few seconds in the first minute of totality, but with this exception the sky was clear during the critical period of totality, though the atmosphere was at no time wholly free from haziness.

The report of the observations to the National Academy, under whose auspices the expidition was conducted, will contain the details of the observations. Some of the results obtained can, however, be stated at the present time.

The length of the total phase, five minutes 24 seconds, made this eclipse especially adapted for searching for intra-Mercurial planets. The opportunity was improved by Professor Holden and by M. Palisa of the French party, but no new objects were discovered. At the same time photographs of the sky in the vicinity of the sun were obtained by M. Pasteur and M. Trouvelot devoted a portion of the time of totality to the same search without the discovery of any new object. The spectroscopic observations give interesting results, especially those made by Dr. Hastings. He used a 60° prism attached to a 6¼-inch equatorial there being two total reflecting prisms placed outside the slit, so that the spectrum of two opposite sides of the sun could be brought into juxtaposition and simultaneously examined. This was used to note the appearance of the green line in the coronal spectrum, known as the 1474 line, on the eastern and western limbs of the *Sun*, and their relative changes during the progress of the eclipse. It was found that at the beginning of totality the 1474 line on the eastern limb was about 12° in length and very bright, while on the western limb it was 4° in length and very faint. As the eclipse progressed this inequality vanished; the two lines became sensibly equal at mid eclipse, while at the close of totality the conditions of the beginning were again noted, the line on the *western* limb being the longer and brighter. Since so large a change is much greater than would be due to the moon's motion alone, the

observation is regarded by Dr. Hastings as furnishing conclusive proof that the outer corona is in the main due to diffraction. The same observer noted the D line dark in the coronal spectrum. The other spectroscopic observations gave bright hydrogen and magnesium lines in the corona, and the relative heights and brightness of the rings C, D, and 1474 were estimated. Observations with the polariscope indicated radial polarization.

The corona was bright, and characterized by five well-defined streamers; the chromosphere was quiescent and but few prominences were observed. The azimuths and distances from each other of the shadow fringes at the beginning and end of totalty were also determined and the usual contact observations made. Then meteorological observations showed a well-defined rise in barometric pressure, a rise in humidity, and a fall in temperature to that of night. The radiation instruments indicated that the receipt of heat by the earth was almost wholly checked. The direction of the wind was unchanged and its veloctiy uniform.

The English photographers obtained a complete series of negatives of the corona, giving its detail to the outer limits, and also negatives of its spectrum, showing bright lines. The phenomenon of the "reversal of lines" at the beginning and end of totality was also successfully photographed. The French astronomers also acheived success in their observations. M. Janssen saw dark lines in the coronal spectrum, and M. Tacchini in a spectrum similar to that of comets in one of the coronal streamers. A series of coronal photographs was also obtained.

It will be seen from the above that results of considerable scientific interest were obtained by the observations of this eclipse. The voyage to the remote station on Caroline Islands was a pleasant one, though devoid of incidents of special note. That portion made in the United States steamer Hartford from Callao, Peru, to the island and thence to Honolulu, was under specially agreeable conditions, and the members owe much of the comfort experienced on the voyage and of the success obtained in the observations to the numerous attentions and active co-operation of the

officers of the ship. The weather was uniformly good; no storms were experienced, and clear skies with steady winds were, almost without exception, the conditions of each day. On the trip from Caroline Island to Honolulu a stop of four days was made at Hilo, Hawaii, which gave the members of the expedition an opportunity to visit the active volcano of Kilauea.

D'ARREST'S COMET. *

L. MAHILLON.

On the 27th of June 1851, D'ARREST at Leipsic discovered a comet of exceptionally feeble brightness. After the comet had been followed for fifteen days D'ARREST and YVON VILLARCEAN announced almost simultaneously that its observed motion corresponded to an elliptic orbit, and that the new comet should therefore be ranked among the comets called periodic, which return at regular intervals to the part of their course near the *Sun*, where only they are visible. The comet was observed during about a hundred days; the discussion of its positions led YVON VILLARCEAN to assign to it a period of about six and one-half years, and an orbit which in the part farthest from the sun approached sensibly the orbit of the giant planet of our system, the mighty *Jupiter*, whose mass is about 340 times greater than that of the earth and whose influence might, therefore, modify the path of the comet and complicate the determinations of the epoch of its return.

It would be difficult to give an idea of the length of the calculations which led to the determination of its period. The task was, however, undertaken, and on the 1st of June, 1857 YVON VILLARCEAN announced in the "*Comtes Rendus de l'Academie des Science de Paris*" the return of the comet for the winter of 1857–58. According to the ephemerides which

* Translated from "*Ciel et Terre*," April 15th, 1883, by H. C. WILSON.