REPORT OF THE SUPERINTENDENT
OF THE
UNITED STATES COAST SURVEY,
SHOWING
THE PROGRESS OF THE SURVEY
DURING
THE YEAR 1871.

WASHINGTON:
GOVERNMENT PRINTING OFFICE,
1874
APPENDIX No. 14.


DEAR SIR: I have the honor to report upon my participation in the observations of the solar eclipse of 22d December, 1859. When, on being appointed a member of the United States Eclipse Expedition to the Mediterranean, I received the gratifying order to accompany the party that, under your personal leadership, was to be stationed in Sicily, I believed that, besides contributing my share in the astronomical observations, the particular duty came nearest to me to bring to bear what knowledge of the country, acquired there by a longer stay in former years, might be furthering the purpose of the expedition. It is consoling, to say that while, in the former, the scientific investigation, by a freak of the weather only a very partial success fell to my lot, for the rest, my company at least indirectly has been, as I hope, of some usefulness. This, however, for a great part, is owing to the characteristic hospitality and readiness to assist of the citizens of Catania, the names of some of the gentlemen who thus have been of special help to me I shall take the pleasure to mention below.

In the preliminary preparations at home I directed my attention to fit my apparatus with the means to permit ease and effectiveness, for investigating the solar appendages by direct vision. The eclipse of August, 1859, as observed by myself and the members of my party at Des Moines, Iowa, had inspired me with a certain structural arrangement, both in protuberances and in corona, that a closer scrutiny of these phenomena seemed to me particularly desirable. I had at my position an excellent telescope of Steinheil, of four inches aperture, five feet focal length, the gift of Mr. Litchfield on occasion of the preceding eclipse. Its object-glass is of exquisite perfection; it has large powers ranging from 40 to 300, each perfectly mounted, with setting-circles and tangent-screws for right-ascensional motion. I had now made, in addition, (by Mr. Chubbuck, of Utica,) a slide, which holds simultaneously three of the eye-pieces, so that, by the touch a spring, the power may be changed from the lowest to the highest in a second or less without loss of time and without disturbing the position of the telescope. Thus, when all the three eye-pieces are adjusted to focus, and the object is seen near the center of field through the lowest power, in less than a second the highest power may be brought to bear upon it. The consideration that nebulous and gaseous bodies like comets usually reveal their various features only when viewed and examined under varied proportions between light and power, led me to expect much of the described arrangement in scrutinizing the luminous appendages of the sun.

Moreover, near to and at the site of the ordinary small seeker carried by the tube, (magnifying about fours times,) I had attached one of those beautiful little instruments called "hand comet-seekers" by Steinheil. The one in my possession, only six inches long, magnifying two and a half times, with an aperture of one inch, has a field rather more than 17°, which enables the observer to take in at one glance the whole of the eclipse-phenomena, even to the remotest rays of the corona. These together, may be said to represent, upon one and the same instrument, five separate telescopes, differing in power and extension of field. The small seekers alone had a sun-glass; a wedge of neutral tint could be applied to either of the three eye-pieces of the large tube for graduating the light according to circumstances.

The instruments were packed in four boxes, and went, with the apparatus of the expedition, from Liverpool by sea directly to Messina. As it was your wish that I might be early in Sicily to reconnoiter for the observing-stations, I left Clinton on October 25, and arrived at Liverpool on November 14. Then, after a few days' sojourn in London, where we conferred with

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Mr. Lockyer and some of the other English observers, by the way of Southampton, Gibraltar, and Malta, I reached Catania on December 7. Here I had the pleasure of meeting Mr. Charles A. Schott, already arrived two days before; also the Italian observers were already on the spot, centered at Augusta, and Professor Caretiero, director of the observatory of Palermo, and vice-president of the Italian commission, directed a greeting dispatch of welcome to the Americans on Sicilian soil, which was only responded to in Mr. Schott's and my name.

The following days were spent in looking at localities in the neighborhood of Catania, where the instruments of the various observers might be established, and I arranged my reconnoitering trips over the slope of Mount Etna, and as far as Lentini and Curtarrenti. The zone of totality (as indicated also on the accompanying sketch) covered the whole southeastern coast of the island of Sicily, including Cape Passaro, its northern limit intersecting the east coast of the island a few miles south of Torrmina. It would have been of some interest if observers could have been stationed along the whole coast from Cape Passaro to Torrmina, forming a line nearly at right angles to the path of the moon's shadow, and extending nearly across the whole width of it. Various circumstances, however, combined to prevent this scheme. Transportation, especially in the southern part of the island, is still very difficult, no carriage road leading to Cape Passaro or its surroundings. Already, for this reason, the more powerful instruments were necessarily restricted to the neighborhood of the larger towns. Moreover, the photographic and spectroscopic apparatus, besides needing a longer accurate preparation and adjustment in a fixed position, were to be stationed not too far from the central line of totality, in order not to have too much contended the duration of two minutes in maximum. Fortunately, there were the three towns of Augusta, situated very near the central line, and Syracusa and Catania, about half way from it to the southern and northern limits respectively. The Italian astronomers had established themselves at Augusta; at Syracuse was the party of the United States Naval Observatory; for our photographers, and as headquarters for time and latitude observations, the best opportunity was pre最合适 at Catania.

There remained the distribution of the portable telescopes for direct eye-observation, which, supplementing the spectroscopic investigation in this eclipse, it was hoped would essentially contribute to solve the enigma of the nature of the corona. Between English and American new united, there were on hand, prepared for this purpose, observers sufficient in number to attach the characteristic apparatus at stationary points more or less exactly across the whole zone of totality. A still more promising arrangement, however, seemed to be offered spontaneously by Mount Etna.

Usually, this mountain becomes snow-covered, and ceases to be accessible beyond the region snow-covered in the latter half of October. This year the mountain was quite exceptionally free of snow. I saw distinctly the Cassiopiea entirely free only two days before the eclipse. It seemed as if upon the mountain itself invited the observers. The idea of having a series of stations with lesser and lesser densities of atmosphere (as the Cassiopiea the barometric pressure is only 3400 or two-thirds of that on the level of the sea) was too tempting; it would put decisively an end to the question whether the corona is simply an effect of our atmosphere. Consequently, number of forces were dispatched for the slope of Mount Etna, arranged, so to say, upon the first co-ordinates—that of altitude. The highest point was reached by General Abbot, United States Engineers.

I have tried to represent in one view upon the accompanying sketch the final disposition of all the stations in Sicily as they were occupied by parties of the various unions co-operating. There may be placed on record yet, as near as I could ascertain, the names of the observers of each station.

I. ITALIANS:—

Augusta.—Cascineto, Scoddi, Donati, Biamini, Aquello, De Lisa, Photographer Tagliarini.

Terrasoven.—P. Tacchini, Lorenzo, Landress, Nobile, A. Tacchini, Diaunino Miller, Serra.

Slope of Mount Etna, (in about 8,000 feet elevation.)—Cassio Schott.

II. AMERICANS:—

Catania, (Garden of the Benediction.)—Schott, Lane, Photographers Pitt, Chapman, Burgess.
beautiful cleanness—snow-clad now, as it had exchanged its dark hue of yesterday for a white holiday dress to honor the occasion. Quickly the mists, that had been kept in readiness with their pack middles, were loaded with the instruments, and gay-hearted we ascended to the top of Monte Rossi; for the weather seemed to have exhausted its wrath, and everything went on promising beyond all expectations. Signals for time were exchanged with Mr. Schott, the sun shining bright through the parted sky. By the village carpenter, whom I had hired to assist, the parallactic top piece of the telescope was mounted on a wooden base. I was 1st Adjusted approximately to the meridian, pointing by it the eye a little east of the Monticugola, (an eruption crater of 1763), where from Waltherhausen's chart I judged the meridian of Monte Rossi to pass.

The beginning of the eclipse was noted at—

18° 40' 50" chronometer time ;
15° 39' 59.9" sidereal time ;
09 30 30.4" mean time ;

I am not sure, however, but that this was too late by some seconds; for the strong midlands which agitation the sun's limb may have concealed the real indentation of the moon upon the disk, several seconds before I became aware of it. Besides, though the instrument was placed on the side sheltered by the top, it was not quite exempt from being shaken by currents of wind, to which that earlier isolated peak is freely exposed. Mr. Einbeck, with his smaller glass, observed the first contact at—

18° 40' 25.5" chronometer time ;
15° 39' 54.6" sidereal time ;
09 30 35.9" mean time ;

and estimates that the true contact may have occurred about two or three seconds earlier. During the partial eclipse, while smaller and smaller was growing the solar crescent, the moon's edge was always very steady and sharply defined. A great many people by and by gathered around us—one might almost say the whole male populace of Nicolosi had climbed the mountain. They were most orderly and respectful, however, and remained modestly at the distances, beyond the limits marked off by two American flags; so that there was hardly room of the guard of three gendarmes, whom the /sabaudi/ of the province of Catania kindly had had the foresight to order to accompany us.

Meanwhile a very suspicious looking cloud came creeping around the northwest corner along the slope of Mount Etna, drawing alarmingly nearer and nearer in proportion as the sun's sickle became larger. It was a quarter of an hour yet until totality; already I saw our companions at the Terenitana enveloped in dense mist; five minutes later, and with a few more minutes the whole universe opens up rain-drops with hail and sleet, so that for protecting the object-glass I had to put the cup on. The hail sleet had the effect of driving the crowd of people precipitately down hill toward home. The minute for the commencement of total eclipse was just approaching; those wore moments of great anxiety. There is hope yet! I see the end of the cloud! there is clear sky below it, on the horizon in the northeast. How slow the cloud moves! but the clear spot is widening. "Time is up!" But, perhaps, there is some error in the computation, for the darkness is no greater yet than a thick dense cloud alone would produce; we can read the chronometer all the time with the greatest ease. Throwing our eyes again upon that clear opening in the northwest, that exists over the whole landscape a certain awn. It is the tinge produced by the shadow. There can be no doubt the total eclipse has begun. The cloudy veil is rapidly gliding away: its following edge is approaching the place where the star of the day must rise. We are ready with our apparatus to receive the last rays of the sun. We are ready with our apparatus to receive the total eclipse of the sun. The clouds began to clear, and the total eclipse of the sun was complete.

The correction and rate of chronometer have been adopted as computed by Mr. Schott.

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At Nicolosi we joined our companions from the higher stations on Mount Etna, who, equally unfortunate, moreover had had to sustain a greater degree of indigesency of the weather. Late in the evening we reached Catania.

It may not seem amiss here to touch shortly upon the hypothesis advanced by some at the time, that the cloud interfering with our observations in Sicily just at the critical moment, causing and passing by almost as rapidly as the observation of the sun, possibly might have been produced by the eclipse itself. The moon, it was argued, interposing itself before the sun, hence shutting off the solar heat, effected a cooling of the particles of air, and condensed the vapors in the line of the shadow. Indeed, if we incline to adopt the explanation advanced by a distinguished physicien of the origin of the solar spots, and in particular of the formation of the nucleus of the sun, we might here find an analogon. But if such was the case, we might be capable of producing its own cloud, why is it that a total eclipse has ever been seen at all? In the present instance, the data are at hand for subverting that hypothesis. The various series of meteorological observations since published show unmistakably that the atmospheric pressure over almost the entire front of the Mediterranean began to diminish already on the day before the eclipse, the barometer thenceforth continuing to fall steadily. The cloudy and stormy weather experienced, therefore, was preparing long before the eclipse began, and we can see nothing extraordinary in their coincidence. The same may be said likewise in regard to the variation of the magnetic needle observed by the Italian party at Terra Nova.

In concluding this report I think it my duty to record the names of the gentlemen who, with so much kindness and disinterestedness, furthered our undertaking in Sicily, and who therefore have a just claim upon us for gratitude. In the first place, among these I must mention the Marquis di San Giuliano, who, besides endeavoring in many ways to make the sojourn at Catania personally pleasant to the members of the expedition, offered liberally, if desired, as observing stations, the comfort of his villa at Viscerbesi, at Villasmundo, and on the Caraccioli above Catania. Of these, the last one now has a place in science through the observations made there by the Superintendent's party. The aid of Mr. A. Perri, consular agent of the United States at Catania, was frequently called into requisition, too often perhaps in quite trivial matters. He gave his assistance unsmallingly; for this and for his other acts of kindness, a grateful memory remains with every one of us. Prof. O. Silvestri, whose zeal and interest in the good success of the observations may be inferred from his participating in the hardships of one of the Rina parties, gave important assistance to our photographers by the use of his chemical laboratory. To my tried friend, Prof. G. Zarria, I owe much valuable information about localities; he contributed to Professor Watson's good success by presenting a letter of introduction to the hospitable Messrs. Modena, di Carabini. Many other gentlemen aided us in various ways, to name all of whom simply would be impossible. "Our thanks are due for a standing invitation to visit the rooms of the Casino and of the Cabineetto letterario Giovin. The Council of the city of Catania, Signor Marchese di Cicala, to whose authority the abandoned convent S. Nicola of the Benedictines now is subject, was always anxious with prompt orders to satisfy our wishes. From the Sicilian custom-house officers we experienced the greatest politeness. The Italian government, as is known to you, had given direction for the unimpeached entry of our instrument-boxes. The same liberal spirit pervaded the intendente of the province in providing that we might do our work unmolested. And, in thanking you, dear sir, for having offered us the occasion of seeing again a country that I had once seen sobbing under political absolutism, I may not omit to mention—"if it does not seem improper in this place to speak of one's sentiments,—how, in looking down from the top of Monte Etna over the plains, I could not help feeling with joy that we, from the land of freedom, had come to a country not only blessed by nature in every respect, but, now, free too.

Yours, with respect and truly,

C. H. F. Peters.

Prof. Benjamin Peirce,
Superintendent U. S. Coast Survey, Chief of U. S. Eclipse Expedition.