

THE ECLIPSE AS SEEN ON THE NILE.

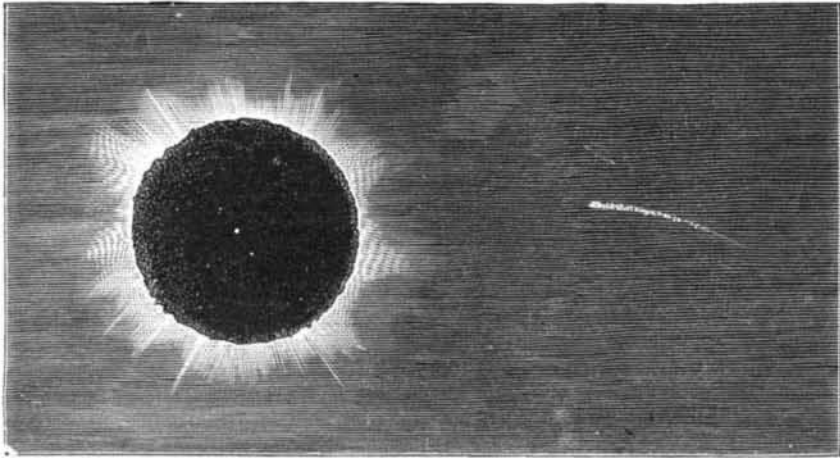
For the observation of the total eclipse of the sun, which took place on the 17th ult., a point on the river Nile, in Egypt, was selected by prominent European astronomers. We have in previous numbers given an account of some of the results of the various observations. We now present some further particulars, and also illustrations, which include a picture of the instruments in position, and a view of the new comet, seen close to the sun at the moment of totality, the engravings being from *L'Illustracion*; and a view of the temporary observing station, on the bank of the Nile, is from the *Illustrated London News*. We also give, from the same journal, another view of the grand old river Nile, during one of the annual inundations, with the Great Pyramid in the distance. We recently printed in our SUPPLEMENT (No. 332) an interesting article by Mr. Richard A. Proctor, in which some very strong arguments were presented going to show that the Great Pyramid, in addition to its use as a burial place for royalty, was especially constructed as an astronomical observatory. The main pas-

named Tewfik, after his Highness the Khedive. The special correspondent of the London *Daily News*, who was present during the eclipse, says:

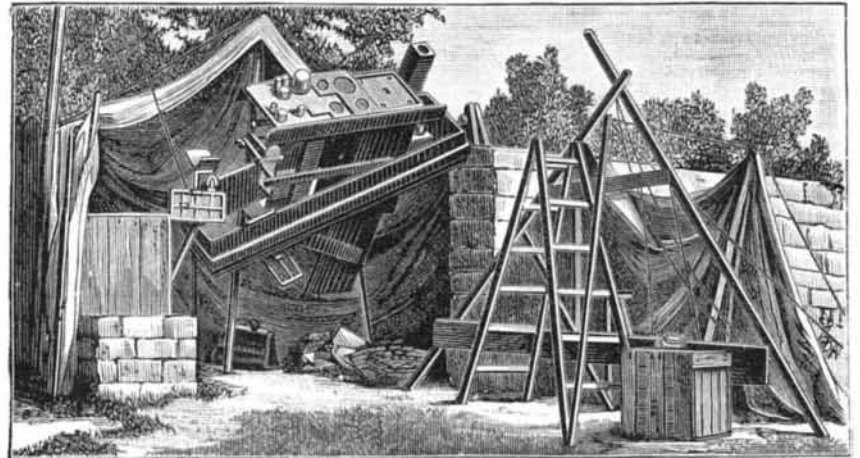
"This eventful morning was the finest we have yet had, cool and without a cloud. A great crowd of natives in picturesque costumes lined the road and the hill between the camp and Sohag. The shore of the Nile, except before the observatories, was packed with dahabiyehs bringing the governors of the provinces and other notables to observe the eclipse and do honor to the strangers. Thanks to Moktar Bey, in charge of the camp, and a force of soldiery, there was no confusion. Along a line of three hundred yards the French, English, and Italian observers were left in undisturbed possession of tents and observatories. Nevertheless, while the sky darkened and assumed a leaden hue, the hills bounding the Nile bathed in purple, the great silence gave way, and from river and palm-shaded slope arose a shout of wonder and fear, which reached its climax at the moment of the sun's disappearance; nor ceased then, for, in addition to the horror of an eclipse—which the natives here, as in India,

Sonorous Vibrations.

At a recent meeting of the London Physical Society, Mr. W. F. Stanley read a paper on "Sonorous Vibrations," especially those of the tuning fork. The larger and more visible movements of a sounding body do not appear to be best fitted to propagate musical sounds, as was shown by placing disks on the prongs of a powerful fork, which, when vibrating, could then only be heard a short distance, whereas by its smaller longitudinal motions when placed on its resonator it produced a penetrating sound. The vibration down the stem of the fork was shown not to depend upon a vibrating ventroid, as suggested by Chladni, for a fork cut in the end of a solid steel bar communicated sonorous vibrations equally well to the resonator. To set a fork in vibration it was necessary to bow one prong only; therefore, in this case, the vibration must proceed along the prongs. A light fork, one meter long, was fixed in a heavy vise, and it was shown by it that vibrations passed down one prong and up the other alternately. By means of dust, ripples were shown to run down an ordinary fork in vibration. Light pieces of



FROM A PHOTOGRAPH SHOWING THE ECLIPSE AND THE COMET NEAR THE SUN



ARRANGEMENT OF INSTRUMENTS USED IN OBSERVING THE ECLIPSE.

sage way into the interior of the Pyramid forms an inclined tube that points to the polar star. Within this tube the Egyptian astronomers observed the heavenly bodies, computed their motions, and determined the procession of the seasons. This was the most perfect observatory ever made, until telescopic art revealed a mode of exact observation without the aid of such massive structures.

The British scientific expedition lately sent to the banks of the Upper Nile was commissioned to make observations of the total eclipse of the sun there visible, during one minute and twelve seconds of time, on Wednesday, the 17th of June; and these observations have been made with entire success. The chief members of the expedition were Mr. Norman Lockyer and Dr. Arthur Schuster, assisted by Mr. Woods (who was deputed by Captain Abney), and also by Mr. Lawrence, and accompanied by Mr. W. Black, and others. On their arrival in Egypt they were received by Esmat Effendi, an Egyptian astronomer, one of the household of the Khedive, and by Stone Pasha, Chief of the Egyptian Staff. A suitable place for their temporary observatory had been chosen at Sohag, on the Nile, seventy miles above Thebes; and there was a steambot, placed by the Khedive's Government at the disposal of the English and French

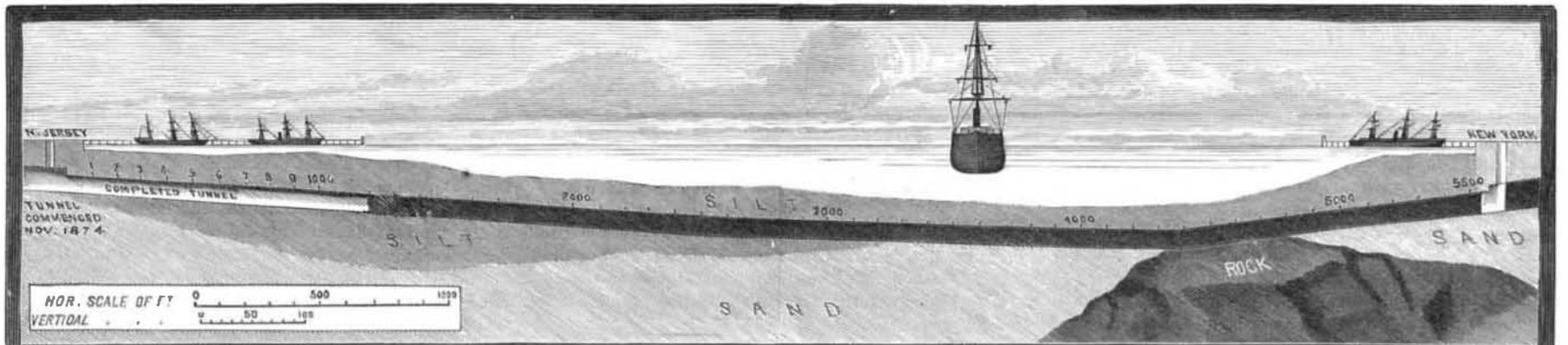
attribute to the act of a dragon—there appeared in the heavens on the right of the sun an unmistakable scimitar. The eclipse had, in fact, revealed the existence of a new comet. Despite the short totality, many valuable results have been obtained. I am permitted to send a copy of the collective telegram sent to the various Governments, showing many new facts touching the sun's atmosphere; though matters have not become much simpler, which means more work. The layer, to which much absorption has been ascribed, seems vanishing from existence. The band K in the spectrum of the corona fully explains the eclipse coloring.

"Among the results, the most satisfactory are photographs of the corona, and a complete spectrum obtained by Schuster on Abney's plates. H and K are the most intense lines. A study of the red end of the spectrum of corona and protuberances was made by Tacchini. A comet near the sun was a striking object; it was photographed and observed by the naked eye. Bright lines were observed before and after totality at different heights by Lockyer, with intensities differing from Fraunhofer's lines; by Lockyer and Trépied an absolute determination was made of the place of the coronal line 1474 in Kirchhoff's scale; by Thollon and Trépied the absence of dark lines from the coronal spectrum was

metal were fitted to the ends of a powerful fork, and these immersed in mercury, the reflected surface of which was shown on a screen, where it was seen that the whole mercury surface was broken into fine ripples. It was suggested that such small waves are also perceived by the ear. By these, certain conditions of harmonics could be better accounted for, as, for example, by division; in smaller waves the rarefaction of a note in space would not suffer in interference by the condensation of its octave falling in the same space and time.

PROGRESS OF THE HUDSON RIVER TUNNEL.

The accompanying diagram shows the progress of the excavation of the tunnel under the Hudson River. The advance during the past six months on the New Jersey side has been very rapid, the North Tunnel having been carried forward over 500 feet beyond the point indicated in our issue of Feb. 4. The completed tunnel now measures 1,200 feet. The character of the river bed continues to be the same tough silt encountered nearer the shore. Owing to the descending slope of the tunnel, the air pressure has been increased with the advance of the work, so that it is now 30 pounds to the square inch. The tunnel is divided by two bulkheads, the



PROGRESS OF THE HUDSON RIVER TUNNEL.

expeditions, which conveyed them to their destination without delay. The Governor of the district of Sohag also furnished a dahabiyeh, or river-boat, with an escort and guard of soldiers; and Colonel Moktar Bey was most active in assisting the expedition.

We give an engraving from a photograph of the scene at Sohag, with the encampment and temporary establishment of the astronomers and their party. At the right hand of the view is the tent used as a store-room; next this is an inclosure, protected by a cane fence, in which were placed Mr. Lockyer's two six-inch telescopes, and Dr. Schuster's photo-heliograph, which was to be used in the same manner as in his expedition to Siam, in 1875, but with the greatly improved apparatus devised by Captain Abney. The steamer and the dahabiyeh, above mentioned, are shown lying in the river; several members of the expedition, attendants, and Egyptian soldiers are seen in the foreground; and there is one of the simple native machines for raising water from the Nile to irrigate the fields. The new comet is to be

noted. Tacchini and Thollon, with very different dispersions, noted many bright lines in the violet. Thollon observed spectrum of the corona, and Schuster photographed it. The hydrogen and coronal line were studied in the grating spectroscopy by Buisieux, and with direct vision prism by Thollon. Rings were observed in the grating by Lockyer, of the first, second, and third order. The continuous spectrum is fainter than 1878, stronger than 1871. An intensification of the absorption lines was observed in group B, at moon's edge, by Trépied and Thollon.

"The whole of the spectrum with blue lines on a continuous background has been photographed. Prominences photographed with the prismatic camera (showing, of course, ring spectrum). Three photographs taken of the corona. A comet close to sun photographed with the prismatic and also ordinary cameras."

THE greatest pressure in a steam boiler is at the bottom. The water adds 1 pound pressure for each 27 inches depth.

first about 450 feet from the caisson, the second about the same distance in advance. No work has been done on the South Tunnel.

On the New York side, the difficult nature of the ground has prevented any rapid advance. The earth is a mixture of sand, gravel, and small bowlders, requiring the most careful and skillful management to prevent accidents. The heading is now about 35 feet from the caisson.

Shad on the Northern Pacific Coast.

The first shad caught north of the Columbia River were taken from Puget Sound, at Olympia, Washington Territory, in the latter part of May. One was full grown. Five years ago shad eggs were sent from the Atlantic by the United States Fish Commission and put in the Sacramento River, and young ones have occasionally been caught in Monterey, San Francisco, and Humboldt Bays since that time. Two years ago one or two were caught in the Columbia, and quite a number last year.