The Total Eclipse of 1896

BY SIR ROBERT BALL

or many a long day astronomers had looked forward with special interest to that total eclipse of the sun which was to happen in the autumn of 1896. This was the case, even though from some points of view it was not a particularly favourable phenomenon of the kind. The duration of totality – the only phase, be it observed, which is of much importance for the advancement of science – was, in this case, but a short one. At no spot on the earth could it last longer than two minutes and a half. This is a briefer interval than has not unfrequently been available in some other eclipses. Those moments, so precious to astronomers, have occasionally mounted up to a period more than double as long.

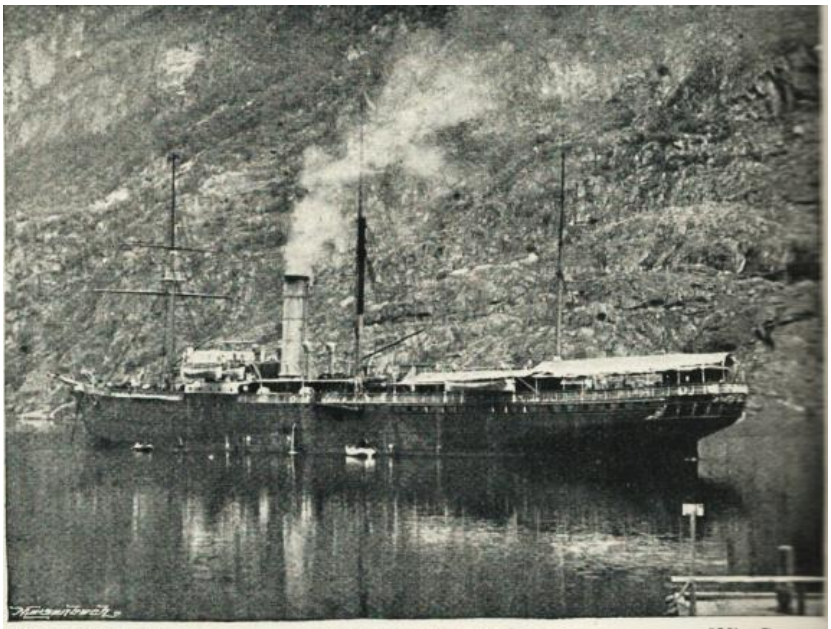
In estimating the value of an eclipse there are, however, other important points which have to be considered besides that of the length of time during which the moon wholly cuts off the direct sunlight. The localities to which a total eclipse best displays its beauties are often very difficult to reach, even if they be not entirely inaccessible. An eclipse can be of but little service to astronomers where the line along which its earthly shadow courses happens the lie across the broad ocean, through the middle of the Sahara or amid the mighty solitudes of the Antarctic Continent. But if the track of the eclipse crosses accessible regions, an attempt to reach some of them will assuredly by made. The energy of astronomers is such, that they are not unwilling to make even a very long journey in pursuit of the shadow they want. They will go to Spain or to Egypt, to California or to Japan. Such a chance will attract them to the glorious tropics of Ceylon, or to the dreary latitudes of Kerguelen Land. But the great merit of this particular total eclipse lay in the fact that it offered good sites for observation much nearer home. Granting only the necessary weather conditions, it could be seen in Western Europe.

The eclipse track across continent and ocean formed a belt nearly one hundred miles wide. From its origin in the North Sea it entered Norway at Bodö, swept over the mountains and snowfields of the interior, and quitted Scandinavia again at Vadsöe on the eastern coast. There the eclipse shadow was calculated to take to the sea again, and after traversing a waste of Arctic waters, was to arrive at Nova Zembla, cross that dreary country, and speed for thousands of miles to the east. It thus appeared that the possible places of observation at our end of the line of shadow were reduced to three. There was Bodö on this side of Norway, there was Vadsöe on the other side, and there was the western coast of Nova Zembla. As far as the last-mentioned country is concerned, the question was soon settled. Nova Zembla is uninhabited, and the distance of this inhospitable region is so great, that it did not seem suitable for an expedition on a large scale. Sir G. Baden Powell had, however, the enterprise to make a voyage thither in his yacht *Otaria*, accompanied by Mr. E. J. Stone, the Radcliffe observer at Oxford, and Mr Shackleton. I had also the honour of receiving an invitation to

accompany this expedition. My arrangements were, however, already made to go to Vadsöe, in Norway, so that I was compelled to forego this very tempting opportunity of seeing a remote region I should much have liked to visit. It is gratifying to known that Sir G. Baden Powell's zeal in the cause of science was amply rewarded. The astronomers of his party had a splendid view of the great phenomenon, and secured most valuable photographs. As the world knows, Sir G. Baden Powell's made his return trip further memorable by his opportune meeting with Nansen as that intrepid explorer was making his return to civilisation.

The astronomical conditions of the eclipse were not quite so favourable at either of the two Norway stations as they were at Nova Zembla. At Bodö, the sun had at the time of totality an altitude somewhat less than 8deg., and the totality did not last for more than one minute and thirty-one seconds. At Vadsöe the conditions were certainly better than at Bodö, for the altitude of the sun was about 15deg., and the duration of the darkness was one minute and forty-six seconds. At Nova Zembla, however, the altitude was still higher, while the duration was almost exactly two minutes. It should, perhaps, be explained that the greater the altitude of the sun at the time of an eclipse the better is the prospect for observers. They have then more chance of escaping the clouds and mists which so often hang round the horizon. In this respect Bodö is not so advantageous as the other Norwegian site. Influenced by this consideration, Vadsöe was finally chosen as the station to be occupied by the Government observing party. As the weather turned out, our choice was certainly an unfortunate one. Had we only been content with going so far as Bodö, we should have fared well; as it was, we illustrated the unhappiness of going farther and faring worse.

Thus it happened that the Government Eclipse Expedition of August, 1896, decided to take up positions on the east coast of Norway. Of that expedition there were two branches, one under Dr. A. A. Common, President of the Royal Astronomical Society, and the other under Professor Norman Lockyer. It was with Dr. Common's party that I became associated as an unofficial member. With the view of having a better chance of clear skies over some at least of the observers' heads, it seemed prudent to sub-divide the expedition; it was, therefore, arranged that the two branches of the Government party should proceed to stations which were separated by a considerable interval. Professor Lockyer took up his position on the south side of the Varanger Fjord, while Dr. Common was on the north, the distance between the two places being about thirteen miles.



From a Photo. by] THE "NORSE KING." *[Miss Boom.*

A remarkable arrangement was made for the transport of Dr. Common's party to its site of observation. Messrs. Gaze, of tourist renown, made a proposal to convey the astronomers and their instruments to their destination, to keep the ship there for the necessary time, and to bring them back again. Their offer was accepted, and accordingly the enterprising fir,, in preparation for this novel tourist trip, chartered the *Norse King*, a steamer of 3,000 tons, belonging to Messrs. Pirrie, of Newcastle. The capacious vessel afforded accommodation for about 160 passengers. Among those who engaged berths were a large number of members of the British Astronomical Association, accompanied by their president, Mr. Maunder, of Greenwich Observatory, and their ex-President, Dr. Downing, Superintendent of the "Nautical Almanac." The astronomers present also included Dr. Isaac Robers, F.R.S., Mr. Green, and other well-known observers; several artists were of the party, as well as many photographers. They were glad to avail themselves of the rare opportunity of visiting parts of Norway to which access is very unfrequent – not to mention the splendid phenomenon which was the primary object of the trip, and which all had hopes of witnessing.

With a full ship we left Tilbury on July 25th, and reached Stavanger after a moderately good crossing of that North Sea which often has such terrors for those who dread the waves. We called at one of two other places on our way up the coast to the North. Especially did we visit Bodö, looking with much interest on a town which not only lay within the Arctic circle, but which had been the subject of much discussion as a possible eclipse station. We found the inhabitants of Bodö fully alive to the distinction the heavenly bodies were about to confer on their town, for was it not the place where the mighty shadow was first to touch land, and thence to run its swift and silent course half-way round the earth? The Norwegians looked forward to the great spectacle with much interest, and had made certain arrangements for its observation.

SIR ROBERT BALL ON THE DECK OF THE "NORSE KING."
From a Photo. by Miss Bacon.

As the *Norse King* proceeded on her course towards the North Cape, the gradual lengthening of the day and the gradual banishment of the night was an experience of much interest to many of us. The desolate coast-line, broken by mountains of remarkable grandeur, the extraordinary cloud effects, the presence of great ice-sheets, from whence glaciers descended nearly to the sea level; the numerous eider ducks and other birds, with which we were unfamiliar at home, clearly showed how rapidly we were advancing through the Northern latitudes. We stopped a few

hours to enjoy a delightful drive in the neighbourhood of Harstad, in the Lofoden Islands, where the verdure and beauty of the scenery were rather suggestive of Devonshire than of the Arctic regions. With this exception we made but little delay, and on we pushed to the North Cape. This we rounded without tarrying to go on shore, saluting as we passed a party who we saw on the summit of the cliff, where it would appear that a restaurant had been provided for the benefit of those who attain the most northerly point of Europe. We were a day or two late for the famous spectacle of the midnight sun. At the time we were in those latitudes the sun set in the sea, only to rise again immediately afterwards. Of course, we enjoyed the delightful novelty of continuous daylight for the whole twenty-four hours; and a precious boon this is to those who are responsible for the navigation of a great ship in these regions, where the course lies often through narrow and tortuous channels. Were it not for the incessant daylight, a great part of our voyage would have had to be taken through the open sea outside the islands. We found it delightful to loiter on the spacious decks by day or by night, hour after hour, in the most delicious weather, while, under skilful guidance, the vessel traversed the ever-winding sounds and fjords, disclosing at each turn some fresh beauty in the scene.

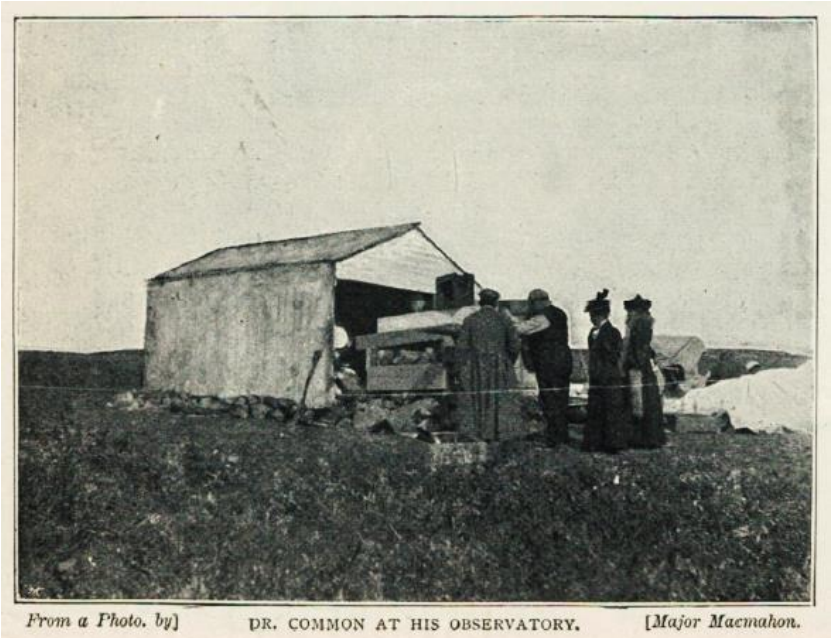
After the North Cape was passed, we took an easterly course, and on the night of Sunday, 2nd of August, at the end of a beautiful voyage, we reached Vadsöe, in the Varanger Fjord. It was midnight when the rattle of the chains, as the anchor was let go at the bow of the *Norse King*, showed that we had reached the station which was to be our abode for a week.

Midnight though it was, some energetic members of the British Astronomical Association hailed a boat and rowed and rowed to the island, which forms the south boundary of the Vadsöe Harbour. A rapid survey was sufficient to show them that this place offered an excellent station for the numerous party of fifty or more observers who had bought instruments of the most varied kinds for the solution of almost every problem that a total eclipse can offer. It was decided that the transfer of their instruments from the ship to the shore should be commenced in the morning.

The first visitor to the *Norse King* was naturally the Custom House officer, who came on board almost as soon as the screw had ceased to turn. In excellent English he assured us that he was aware of the purpose for which we had come, and that he had received instructions to place no impediment whatever in our way. He at once accepted our assurance that the scores of boxes and cases we were about to land were not cunningly devised vehicles for flooding Finmarken with contraband goods. He told us we should have no trouble from his department, and he kept his word. Indeed, we may say that from first to last these authorities rendered us every convenience and facility. The Norwegian Customs safe-guarded their own interests by keeping an officer of theirs as a passenger on our ship during her sojourn in Norwegian waters. We knew nothing of his presence, except that he was always ready for a little social chat, or to help us with information of other kindly service. We parted from our Customs officer, as we left the Norwegian coast, on the best of terms.

Early on Monday morning, Dr. Common and I called on Governor Prebenson, who resides at Vadsöe, as being the most central position in the extensive territory of Finmarken, over which his rule extends. He at once offered us every facility: he pointed out the moor which ascends northwards from the little town, and gave us liberty to choose on it whatever site we liked. On this, as on subsequent occasions, he and his family showed us gracious hospitality, the recollection of which we shall cherish as among the most pleasant incidents of our trip to the Arctic regions. It was naturally very interesting for us to hear how daily life was conducted under conditions so very different from those which prevail in our latitudes. A summer of continuous daylight we saw and experienced, and so we asked about winter. What, for example, was Christmas Day like at Vadsöe? Our hosts explained that if the weather was good on Christmas Day, it would be possible for one sitting at the window to read a book by daylight for about twenty minutes at noon, but that reading without artificial light would be impossible at any other period of the twenty-four hours. I may remark that, in reply to a similar question at Bodö, the residents had assured us with some pride that in their excellent climate only one day had been experienced within the last five years when artificial light was absolutely necessary at noon. The denizens of foggy London may, in some moments of unusual depression, be induced to envy the climate of Arctic Bodö.

From a] MR. MAUNDER (PRESIDENT OF THE BRITISH ASTRONOMICAL ASSOCIATION) AND MRS. MAUNDER. *[Photograph.*

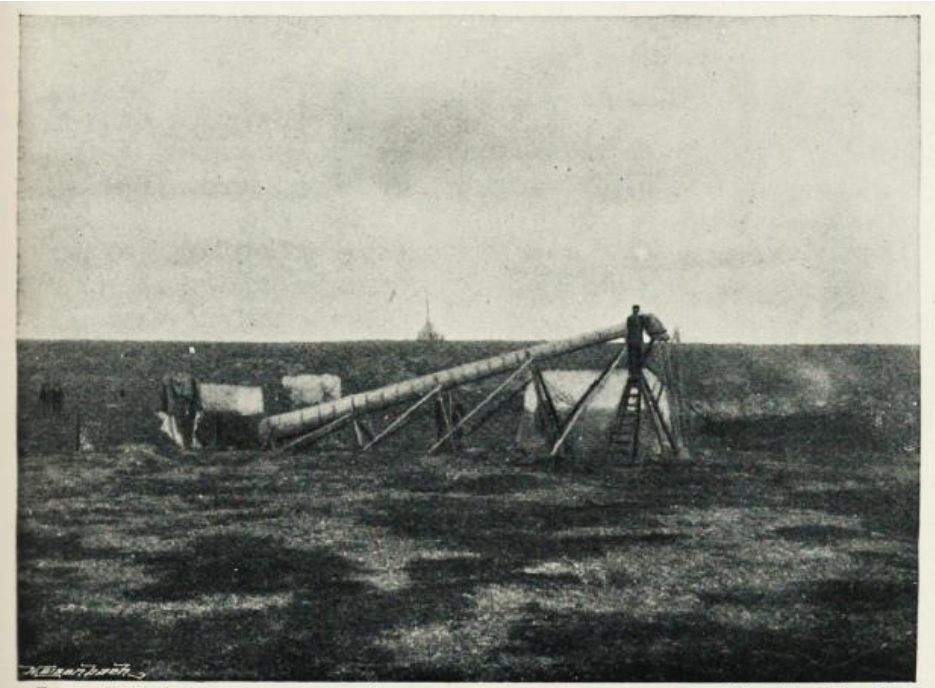


From a Photo. by] DR. COMMON AT HIS OBSERVATORY. *[Major Macmahon.*

Any attempt at condolence with the inhabitants of these regions on the supposed unhappiness of an Arctic winter would seem quite misplaced. They have joys that we cannot experience. The children as well as their parents have many happy hours on those marvellous snow-shoes the "ski," the capabilities of which were taught us by Nansen's voyage across Greenland. Each lady and each gentleman has also her or his private reindeer sleigh,

and thirty miles is not by any means an unusual day's journey by this delightful mode of locomotion. One of the admitted drawbacks to winter in Arctic Norway is the tediousness of a journey by sea from one part of the country to another. In that season navigation is so much obstructed by the barely intermitted darkness, that a journey of eighteen days is necessary when the Governor of Finmarken travels from his official residence at Vadsöe to the seat of Government at Christiania.

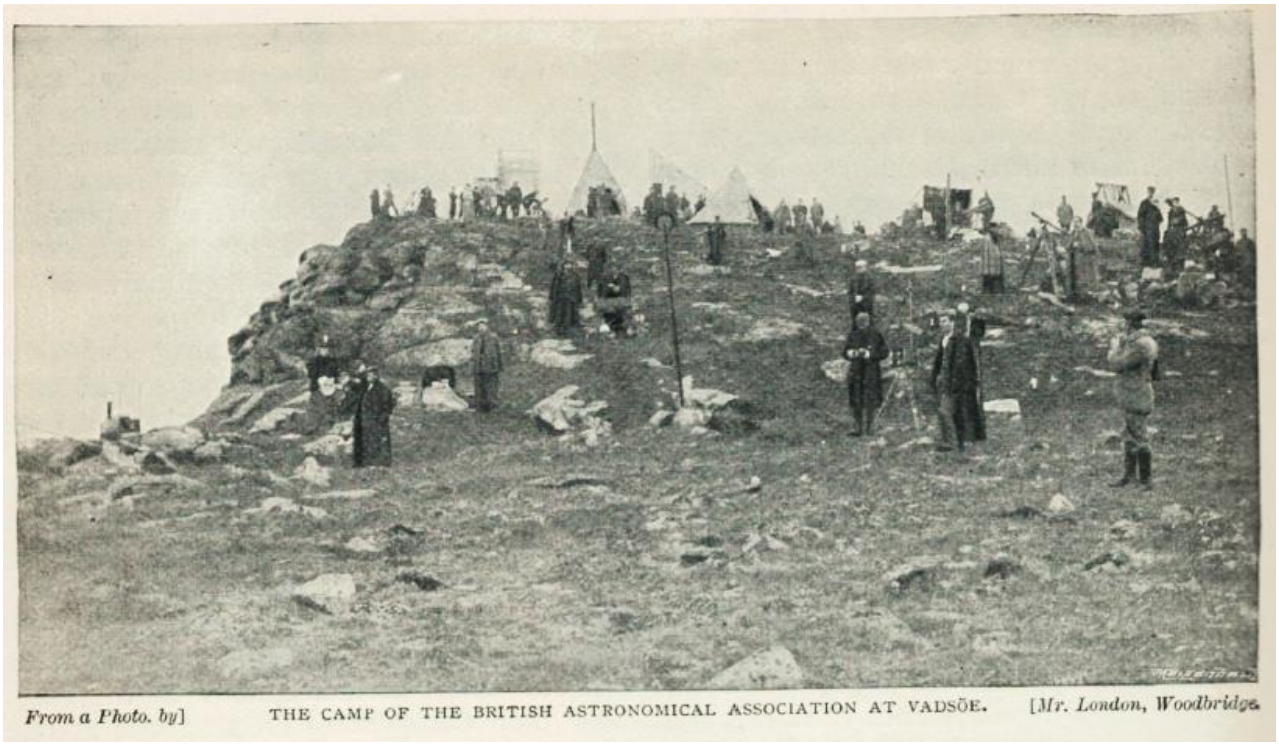
In the course of our walk to survey the wide expanse of country from which the choice of an observing station might be made, Dr. Common and I visited the camp where our old friend, Dr. Copeland, the Royal Astronomer of Scotland, had already taken up his position. There we found that a mighty tube, 40ft long, was being reared to the heavens. There was no occasion to mount this like the ordinary equatorial telescope, which can be directed round to any part of the sky. It was, of course, only proposed to use it during the 106 seconds while the total eclipse lasted. It was therefore sufficient to point the telescope and fix it perfectly, directed towards the exact place which the sun would occupy during those critical seconds. The necessary motion was given to the plate instead of to the tube. With this tremendous instrument Dr. Copeland proposed to take correspondingly great photographs on square plates which where 18in. on each side. In such pictures the eclipsed sun would lie behind the black spot 4in. in diameter, at the centre of the plate which represented the moon. This would give ample room all round for the faint outlying parts of the corona.



From a Photo. by] DR. COPELAND'S 40FT. TELESCOPE AT VADSÖE. *[Mr. Allen, Keswick.*

It would appear that among the winter diversions of Vadsöe is the sport of tobogganing, and the wooden erection which forms the commencement of the slide is a conspicuous object on the moor. It was immediately to the east of this structure, a little more than a mile distant from the pier, that Dr. Common decided to plant the observatory of the Government eclipse party. A few hours of energetic work sufficed to transport the various boxes of instruments to the camp, and then the work of erection was a once commenced. There were many hands to help, and there was much to be done. The bushes had to be cleared away, the ground had to be fenced in, stones had to be collected for the foundations, and the wooden huts had to be reared. The cases had then to be opened. Great instruments of much delicacy had to be lifted out, put together, and adjusted, and a photographic room had to be prepared. Provision had to be

made for protecting the instruments from rain, but the traditional honesty and good behaviour of the Norwegians rendered it a little more than a matter of form to observe any other precautions. Although there was plenty of assistance, yet the whole period of six days was not found a moment too long for bringing to completion all the necessary arrangements. This will be admitted when we learn that, on this occasion, Dr. Common for the first time employed in eclipse work the new and beautiful instrument known as the Coelostat, by which the effect of the apparent movement of the heavens is neutralized in a very ingenious manner.



From a Photo. by] THE CAMP OF THE BRITISH ASTRONOMICAL ASSOCIATION AT VADSÖE. *[Mr. London, Woodbridge.*

The party of the British Astronomical Association encamped on the island had been equally busy, and a visit to their camp presented a remarkable scene. The numerous observing parties had so organized themselves as to be able to utilize to the utmost the fleeting eclipse moments. The precious 106 seconds were carefully sub-divided for the distinct operations by the different observers. An electric wire ran round the several observing stations by which the lapse of the seconds was to be so signalled that each observation should be made at the intended moment. The experience thus obtained will be most useful to the members of the Astronomical Association in their expedition to India to observe the great eclipse next January.

One afternoon I crossed with Dr. Downing and the Bishop of Brechin to the other side of the fjord, in response to a very hospitable invitation given by Captain King Hall, R. N., commanding H.M.S. *Volage*, of the Training Squadron. It was on board this shop that Professor Lockyer was sojourning while his preparations for the great event were being made on an adjacent island. Never before was so singular an organization called into existence for the observation of a celestial phenomenon. The experienced eclipse observer had carefully selected from among the ship's company those who showed sufficient aptitude

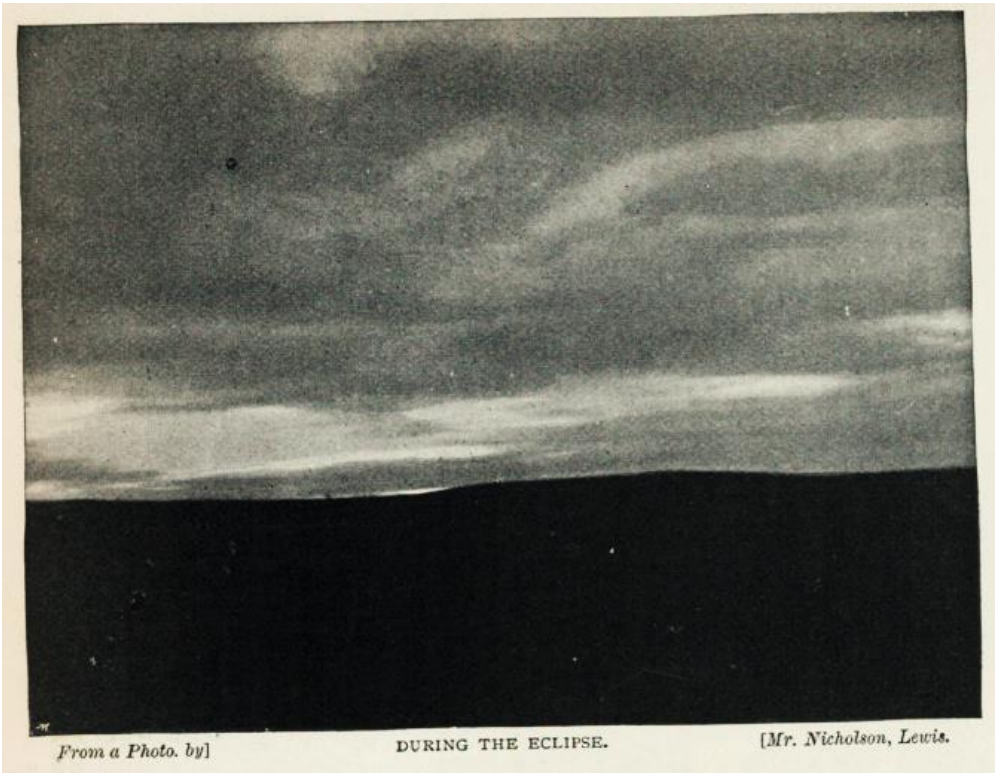
for the various branches of observation that he desired to carry out. For instance, it is much to be wished that drawings of the corona should be made by those who have the faculty for accurate sketching. In this case it was not proposed to use telescopes or any other optical aid. To excel in this particular feat of draughtsmanship some special gifts would, however, be clearly necessary. An unfamiliar object of some complexity has to be sketched in a period but a little longer than a minute and a half. Professor Lockyer selected the men who were to form his drawing staff in the following very effective manner. Having provided those who were to be tested with drawing materials, he showed a picture of the corona on a screen with the help of a limelight lantern. The candidates were than allowed 106 seconds for the sketch. From those who made the best attempt, he formed a drawing corps of about twenty, any of who might be relied on to give a fair picture of the corona as it appeared to the unaided eye.

It was only to be expected that the work to be undertaken by Professor Lockyer should contain as a special feature the photographic representation of the solar surroundings, by the prismatic camera with which he had already obtained such beautiful results in previous eclipses. With the help of Dr W. Lockyer and Mr Fowler, as expert astronomers, and with the aid of many members of the ship's company, he had arranged that a large number of photographs of varying lengths of exposure should be obtained. One of the "eclipse drills," in which Mr Fowler exposed fifty plates within a period of 106 seconds, was specially interesting; one marine stood by to hand the frames containing the plates to the observer, while another received them. A bluejacket made the exposures, acting under the direction of one of the officers, who was charged with the important duty of timekeeper. But this was only one of several different lines of observation. Professor Lockyer's staff was sub-divided

From a] PROFESSOR LOCKYER AND OFFICERS OF THE "VOLAGE." *[Photograph.*

into many different parties, and of those serving on H.M.S. *Volage*, more than seventy, including Captain King Hall himself, were told off for particular duties on the eclipse morning.

As the last day of preparation drew to a close all had been got into readiness, and everything depended on what the weather might be like on the early Sunday morning of August 9th, 1896. I do not think anyone had much sleep the previous night. Several other ships were arriving, until the little port of Vadsöe was crowded as it had never been crowded before. There was the *Kong Harald* with a large party, among whom was Professor Rambaut, the Royal Astronomer of Ireland. Other ships bore to the same point many other astronomers, including Professor A. S. Herschel and Mr. A. Berry, of King's College, Cambridge. About 2 a.m. I went ashore with some other members of Dr. Common's party. We found the town of Vadsöe, noted under ordinary circumstances only as an emporium of dried fish and cod-liver oil, was on this occasion in a state of scientific excitement. The population, including the Fins and Lapps, clad in their quaint and brightly coloured costumes, were wending their way to the moor at the back og Vadsöe, from the many little eminences on which an excellent view of the eclipse might be expected. A number of bluejackets from the British men-of-war had been placed at the disposal of Dr. Common. They were told off to guard the margin of our camp. Around the fence which bounded it the Arctic inhabitants collected in clusters, watching with breathless interest the unusual preparations of the astronomers. But, though the splendid Coelstat and other elaborate appliances in Dr. Common's camp were all being got ready in accordance with the arranged plan, and though the photographic slides were duly charged with their plates, yet the sky looked so unpromising, that we had little expectation of success.



From a Photo. by] DURING THE ECLIPSE. *[Mr. Nicholson, Lewis.*

I was personally engaged to observing, or more often trying to observe, with a small equatorial telescope. It is a beautiful instrument, which has been presented to the Cambridge Observatory by Professor Adams, my illustrious predecessor in the Lowndean Chair. But on this occasion its excellent qualities were of but little avail, the heavens were so greatly overcast. The introductory phenomenon of first contact could not be seen, the sun was behind a cloud at the moment when the moon made its invasion of the brilliant surface.

From where I was stationed the sky soon afterwards brightened a little, and the orb of the day came forth brilliantly, showing that the phenomenon had commenced and that the moon had by that time effected a distinct encroachment upon the bright margin of the luminary. Nearly an hour had yet to elapse before the supreme moment of totality was reached. Out hopes and fears alternated during this interval. I must say, however, that at no time was the sky good enough to offer us much expectation of being able to make any really satisfactory observations of the corona. But, still, we did think that we might be fortunate enough to see something of this wonderful object.

These hopes were not to be realized. During the great phase of totality a dense curtain of clouds hid the sun and moon from our view. Of the eclipse in the heaven nothing could be seen. All that could be done was to note its effects upon the earth. Such effects were so grand and so impressive, that those who beheld them felt amply repaid for having travelled all the way to Vadsöe.

Just as the last thin crescent of sun was on the point of disappearing, the great shadow of the moon was observed sweeping down from the distant mountains, plunging the fjord into solemn darkness, and then, as the shadow advanced with the speed of a cannon-ball, we found ourselves overwhelmed with the only night we had experienced during that Arctic summer. An impressive silence brooded over the many spectators during those 106 seconds, at the close of which the restoration of daylight took place with a suddenness almost startling. The total eclipse of 9th August, 1896, was at an end.

From a Photo. by] "ALL WE SAW OF THE ECLIPSE." *[Mr. Lunt, Ealing.*

Typed up by Philip Jennings, 2014.