

instants. I could not perceive that there was any shading of deeper intensity than the rest in any part of the obscure portion of the ring, which I have usually called the 'crape veil.' Under the singularly favourable circumstances of these three evenings, (the state of the air being almost unprecedented, and the telescope with 20 and 22 inches aperture leaving nothing to desire in sharpness of definition), my attention has been directed in the most concentrated manner to the structure of the recently observed appendage of *Saturn*, which has been called the dark ring; and I arrive deliberately at the following conclusions:—That there is no evidence to me of any *division* between the 'crape veil' and the anterior portion of what has been hitherto considered the inner ring; though there is a faint shading, which begins about the middle of the bright inner ring, deepening towards the 'veil;' but even when it touches it, it is much less dark than the 'veil,' and it touches it without the intervention of any black division or sky between. And a careful survey of the whole surface of the veil on both sides of the ball shows me no irregularity of depth of shade, much less any *division* separating it into two.

"To perpetuate the impression of these telescopic visions of the planet I made a drawing of it as it appeared on the 10th of September, accompanied by the nearest two satellites. Of this drawing I have had a lithographic copy made, with as much faithfulness as I have been able to secure, some impressions of which accompany this paper.

"I must, however, acknowledge that it falls short of the beauty of the telescopic image; the drawing of the several ellipses of the boundaries of the rings not being quite symmetrical, especially the exterior outline on the north preceding side. The belt on the ball is also a little too dark, and its edges too hard. In other details it is pretty faithful; the kind of edge which appeared to me to form the exterior boundary of the veil, especially so."

On the Planet Saturn and his Rings. By Mr. Dawes.

"The night of October 26th (up to about 11^h 45^m, when it suddenly clouded) was remarkable for distinctness of definition; and I employed part of it in examining the planet *Saturn* with high powers on my 8½-foot refractor. The results of the scrutiny were in some respects different from what I had ever seen before, and I hope they will not be uninteresting to the Society.

"The sky was hazy, the stars shining with a dim lustre ('*stellis acies obtusa*'). But on turning the telescope upon *Saturn*, I was struck with the beauty of the definition. A power of 585 (determined by measuring the emergent pencil) was borne with admirable distinctness, and the phenomena observed were as follows:

"On the *outer bright ring* was steadily visible a *very narrow*

black line, a little exterior to the middle of the ring. It appeared to be far too dark, narrow, and sharply defined to be merely a shading or belt, and gave the decided impression of being a division of the ring. This I had seen, but less perfectly, on September 11th; and I have had glimpses of it on other nights.

“The *principal division* between the bright rings was steadily seen throughout its whole extent till lost behind the ball; and was beautifully black and sharply defined.

“But the most remarkable appearances were observed on the *inner bright ring*. Its exterior portion to about one-fourth of its whole breadth was very bright, being of about the same colour as the brilliant zone on the ball immediately to the north of *Saturn's* equator. Interior to this, the shading off did not appear, as under ordinary circumstances, to become deeper towards the inner edge *without any distinct or sudden gradations of shade*. On the contrary, it was clearly seen to be arranged in a series of *narrow concentric bands*, each of which was somewhat darker than the next exterior one. Four such were distinctly made out. They looked like *steps* leading down to the black chasm between the ring and the ball. The impression I received was that they were *separate rings*; but too close together for the divisions to be seen as black lines. The slightest undulation of the image was sufficient to confuse the different shadings, and to destroy the step-like appearance.

“Immediately interior to the inner edge of the bright ring was a *black elliptic line*, forming a distinct separation between the bright and the faint rings. This I have satisfactorily made out on several good nights during both the last and the present apparition of the planet, and especially on the 11th of last September, which was here remarkably fine; but never before with such perfect steadiness as on the present occasion. I could trace it, occasionally, along the inner edge of the bright ring, fully half-way to the ball.

“The *exterior faint ring* was pretty steadily visible, though very faint to-night from the dull condition of the planet. Yet occasionally, for several seconds together, both its outer and inner edge were distinctly seen;—the inner edge being distant from the inner edge of the bright ring about one-third of the interval between that edge and the ball.

“From the thick state of the air, the *interior faint ring*, of whose separate existence I satisfied myself last winter, was only occasionally seen. On several previous nights, however, during the present autumn, I have seen it far better, as, from its excessive faintness, it requires clear air as well as good definition. On September 11th I had an excellent view of it, and it was then seen to extend very nearly, if not quite, to the middle of the interval between the bright ring and the ball. I have never, I believe, obtained a glimpse of it beyond this.

“Where the ring crosses the ball, the *shadow of the ring* appeared as a very narrow black line contiguous to the *northern edge* of the ring. At the southern edge of the same portion of the ring,

the projection of the faint rings on the bright zone of *Saturn* appeared, I thought, as black as the shadow itself; being considerably broader, and seen in contrast with the most brilliant portion of the planet; while the *shadow* was thrown upon the belt-like cap which covers the northern part of the ball.

“The superiority of exquisite definition with only a moderate quantity of light, in bringing out the minutiae of planetary surface, over a far greater brilliancy of the object with less perfect distinctness, was strikingly exemplified by the observations of October 26. On that night *Saturn* had not half its usual brilliancy; yet, with the exception of the faint rings, no part of the planet appeared to be deficient in light; on the contrary, with an emergent pencil less than $\frac{1}{90}$ th of an inch in diameter, its image in the telescope when best seen possessed the distinctness of an engraving.

“So peculiarly attractive as the planet *Saturn* has always been to telescopic observers, with large instruments especially, it seems almost unaccountable that the appearance of *a dark line on the ball at the interior edge of the ring, while the shadow of the ring was evidently thrown to the other side of it*, often as such a state of things must have been visible, should not long ago have suggested the existence of a dark interior ring; for this seems to be the only hypothesis capable of accounting for such an appearance: and it would have been perfectly tenable if no evidence of the existence of such a ring had been found in the light, now obvious enough, in the interval between the bright ring and the ball.”

Notice of Saturn and his Rings. By Mr. Isaac Fletcher.

“On several very fine nights towards the close of October last, I carefully examined the planet *Saturn* with my 6-foot equatoreal of $4\frac{1}{7}$ inches aperture, and on every night I distinctly and steadily saw the new obscure interior ring, which was discovered last year by Messrs. Bond and Dawes. On each occasion I estimated its breadth at almost exactly one-third of the space between the inner edge of the bright ring and the planet. Its colour to my eye is a *dusky grey*. In all the observations a power of 300 was found most efficient. Of the division of the outer ring my telescope afforded no evidence whatever. This, of course, I anticipated from its limited aperture.

“On the 12th of this month (November) I paid a visit to my friend Mr. Pattinson, of Scots House, near Newcastle-upon-Tyne; and about 8 o'clock in the evening we directed Mr. Pattinson's equatorially mounted achromatic telescope of $10\frac{1}{2}$ feet focus, and $7\frac{1}{4}$ inches clear aperture upon *Saturn*, and subjected the planet to a rigorous scrutiny. At this hour the state of the atmosphere was exceedingly favourable for delicate observation; and with powers 400 and 440 the definition of the planet and rings was almost perfect, the outlines being exceedingly hard and sharp. The presence of the moon was of course unfavourable for seeing very faint

objects; notwithstanding this, however, the interior obscure ring was obvious and distinct, but we had no evidence of its being multiple. In moments of best vision Mr. Pattinson and I were both quite satisfied of the existence of a very *narrow, faint line* on the outer ring; and we were both of the opinion that this line was nearer to the *outer* than to the inner edge of the ring. This line was only visible at intervals, and after the most steady gazing; nevertheless, the evidence obtained was sufficient to satisfy us of its existence. In a short time, the state of the atmosphere deteriorated very considerably, and we were unable to obtain any further views of this faint line, which may fairly be assumed to be a *division* in the outer ring.

“I am induced to make this communication to the Royal Astronomical Society, not because it contains any *new facts*, but because it confirms in some important particulars the observations of other astronomers. Mr. Pattinson’s equatoreal is a recent specimen of the skill of Mr. Cooke of York.”

Note on the Appearance of Saturn and his Rings.

By Mr. W. De la Rue.

“I have had an opportunity of observing *Saturn* since my return from Paris, and of making a sketch of its present aspect. In a few days I hope to complete a drawing, and will send it for inspection to the Royal Astronomical Society.* The time of observation was between the 12th and 15th hour of the 13th August, one of the finest nights I have ever had, notwithstanding a very slight haze illumined by the bright moonlight.

“The division between the two principal rings was as black as if drawn with ink, and extended quite up to the shadow of the planet on the ring: the details, that is, the light and dark portions of the two rings, were seen very beautifully with all the powers employed from 150 to 450.

“Four satellites were visible, one so close to the southern pole of the planet that I believe it to be the first or nearest.

“The *dark* ring was very fine, its inner edge being perfectly sharp and well defined, and extending much nearer to the planet than it appeared to me to do when I made my last drawing; the circumstances, however, were much more favourable on this occasion, the atmosphere remaining steady for several seconds at a time, which enabled me to observe much more calmly, and, consequently, to make a less hurried sketch. The real shadow of the rings on the planet was only a very narrow black line; the dark ring crossing the planet was not nearly so black as the division between the two principal rings.

“Lastly, the shadow of the planet on the dark ring was curved.

“P.S. No division was visible in the dark ring, which was quite uniform in colour.”

* An exquisite drawing by Mr. De la Rue was sent with the above account.