ASTRONOMISCHE NACHRICHTEN.

N^o. 840.

Ueber den Saturn und dessen Ringe, von Herrn *W. R. Dawes*.

The present autumn has hitherto afforded but few opportunities of making very delicate observations with high telescopic powers. On two or three nights however, the planet Saturn has been well seen with my $8\frac{1}{2}$ foot refractor, and especially on Sept. 25th, when, notwithstanding considerable fog, a power of 460 was borne with admirable distinctness. The following extract from the records in my journal on that night, compared with the accompanying sketch*), will shew what I was enabled to observe.

„1852, Sept. 25. $8\frac{1}{2}$ foot achromatic. Saturn: power 460, a double convex lens. Extremely distinct when the fog is not too thick to afford sufficient light. A very narrow dark line on the outer bright ring: the portion (of the ring) exterior to this line is less luminous than the portion interior to it. The brightest part of the outer ring is that close to the division between it and the inner bright ring.“

„The shading on the inner bright ring is streaky, and it extends towards the exterior edge of the ring to within about one fifth of its whole breadth. A dark and distinct shading, like a sharply defined belt, is seen near the inner edge, but the edge itself is obviously much brighter, though the brighter portion is extremely narrow.“

„The dark ring is visible, but is very faint owing to the fog; and occasionally its exterior portion only is seen.“

„The projection of the dark ring on the ball is by no means black: neither is the southern edge of the dark line much, if at all, blacker than the rest of it. It appears as though the shadow of the faint ring were not really black, rendering it probable that the faint ring may be partially transparent. There is a striking contrast between the dark gray projection of this ring, and the shadow of the ball on the bright rings, which is perfectly black.“

In explanation of this last paragraph I may state, that the appearance of the faint ring had from its first discovery suggested to me the idea of fluidity, at least on its surface; and I had determined to test its degree of solidity by examining, in the early part of the planet's apparition in this year,

the quality of the shadow cast by the faint ring unto the ball. I expected that, if the faint ring were as solid as the bright rings, its shadow might be perceived as a black line at the southern edge of the gray projection of the ring, at the time when the elevation of the earth above the plane of the ring considerably exceeded the elevation of the sun above the same plane. No night sufficiently favorable for such an observation occurred here till Sept. 25th, when the difference of elevation of the earth and sun was not quite one degree. But though the whole breadth of the dark line, composed of the projection of the faint ring and its shadow, was obviously broader than could belong to the projection alone, no difference could be perceived in the degree of darkness at its southern edge.

On the ball of the planet, the broad belt south of the equator is seen this year more plainly divided into two than it was either last year or the year before. In 1850 the darkness of the shading gradually diminished from the equator till it was lost in the general duskiess of the south pole. In February 1851, a line of light partially divided the belt into two pretty broad belts, of which the one nearest the equator was the darkest and most distinct. In October of the same year, the division was usually more obvious, but varied perceptibly on different sides of the planet, as I remarked in my paper printed in Nr. 793 of the *Astr. Nachr.* But during the present autumn it has been easily and almost uniformly visible. A narrow and well defined belt has formed at about 40° or 45° of south latitude. Around the south pole the belt-like cap is decidedly lighter than the rest of the hemisphere, as was observed also last year.

The statements of different observers respecting the appearance of the outer ring are very perplexing. In my own telescope, a narrow dark line has been visible both last year and this, a little exterior to the middle of its breadth, and it seems to form the interior boundary of a darker portion of the ring, producing a decided impression of a division of the ring at that place. On the contrary, the descriptions and pictures of the planet by Mr. *Bond*, Mr. *Otto Struve*, and Mr. *Lassell*, though made by the help of far larger telescopes, indicate no variety of shading at all upon this ring! This difference is very remarkable and I know not how it can

*) Die hier erwähnte Zeichnung des Saturns vom 25sten Sept. habe ich weggelassen, weil sie in der Hauptsache von der im November von Herrn *Dawes* entworfenen Zeichnung wenig verschieden ist. *P.*

be accounted for, unless we suppose that a perfect correction of aberration, and a moderate quantity of light, with comparatively high power, may constitute the most favorable combination for the display of very fine dark lines on a luminous ground. The performance of microscopes on a similar class of objects seems to give some support to such an idea.

In the picture which accompanies this paper I have endeavoured to embody the phenomena above described; and when placed about five feet from the eye in a strong light, it is a very exact representation of the planet as it appears in my telescope under fine circumstances with a power of 460 times.

I have omitted to state, that I continue occasionally to see a very narrow dark line between the faint ring and the bright ring, indicating a separation. On Sept. 20 I have entered in my journal. „The faint ring at times comes out well. There appears to me to be a dark line between it and the bright ring. Power 366.“

My first estimation (in 1850) of the breadth of this line (viz. 0^u3) was certainly much too large, and was founded principally on the belief, that if less, it could not have been seen at all in such a situation. Very careful estimations, both last year and this, have led me to conclude that its actual breadth, even when best seen, can not be half that quantity. It is in fact rarely visible.

Wateringbury, November 1852.

W. R. Dawes.

Since my observations on Saturn in September last, the suspicion I then entertained of the „partial transparency“ of the obscure ring have been proved to be correct by the ball having become visible through its substance. I understand that Captain *Jacobs* of the Madras Observatory noticed this on the 22nd of Sept. with a 6-inch objectglass by *Lerebours*, power 277, and on Oct. 16 Mr. *Lassell* observed the same at Malta with his 20-foot reflector; being at the time quite unaware that it had been seen before. Very few opportunities of verifying so delicate a phenomenon have occurred here, the weather having been unusually bad for many weeks; but on three nights in last month, and especially on the 30th, the edges of the ball were traceable with my telescope quite down to the interior edge of the inner bright ring. This appearance, as well as the present arrangement of the belts which has somewhat varied since Sept. 25th, is shewn in the sketch of the planet which accompanies this communication. There is a remarkable irregularity in the outline of the shadow of the ball on the outer edge of the inner bright ring, as shewn in the sketch. This was first noticed, I believe, by Mr. *Lassell* when the shadow fell on the western side. I have distinctly recognised it on more than one occasion since the shadow has fallen on the eastern side.

Wateringbury, December 1852.

W. R. Dawes.

Nachrichten von Herrn *W. Lassell* über seine Beobachtungen auf Malta.

Taking advantage of the favorable positions of the planets Saturn, Uranus and Neptune, I brought over here this autumn my twenty-foot Equatoreal Telescope, and since the middle of October have been observing principally these objects. The advantages of a lower latitude, a far purer and more serene sky, together with perhaps some further improvement of the figure of the speculum, have enabled me to obtain views of these remote members of our system far exceeding what I ever saw before. Saturn, as might be expected, has occupied a large share of attention, and I inclose a drawing which, however it may fail of rivaling the original in beauty, is a pretty faithful picture of what I see. Perhaps the most remarkable phenomenon which I now notice for the first time is the evident transparency of the obscure ring; both limbs of the planet being distinctly seen through it where it crosses the ball, quite through to the edge of the inner bright ring.

To my apprehension I cannot better describe the entire aspect of the obscure ring than by comparing it to an annulus of black crape stretched within the bright ring, which, where projected against the black sky, as at the ansae, would, from its reflecting some light, appear of a dark gray shade, and where projected on the ball, would from its transmission of a portion of the reflected light of the ball, appear of a much lighter gray.

What the precise nature of this marvellous appendage can be would be an interesting subject of speculation, exhibiting as it were a connecting link between nebulous and solid matter. The precise definition of its edges, renders it unlike any other specimen of nebulae; while on the other hand its certain translucency deprives it of all resemblance to the other solid bodies of our system.