

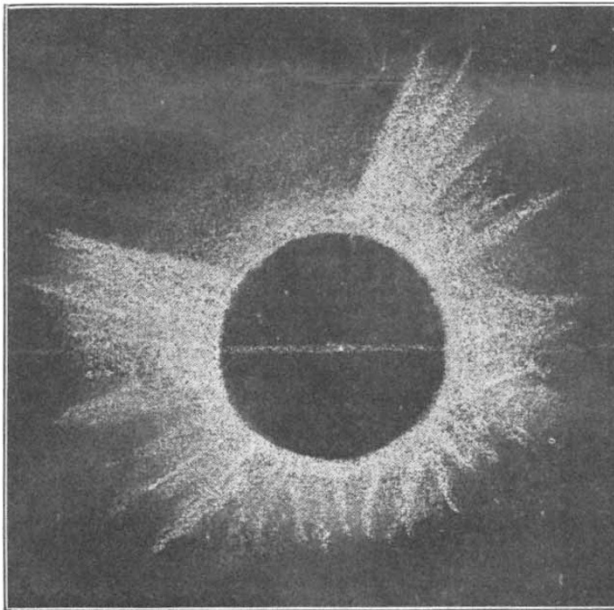
in the distance separating each pair of stars, a value of the constant of aberration, and a second part of the work was to make a comparison of the measured and computed distances, which would give the corrections to be applied to the refraction tables. A series of subsidiary investigations, the results of which are given on page 203, was also completed. The result of the whole investigation furnishes as a definite result: Constant of Aberration = $20'' 443 \pm 0'' 010$, which differs only very slightly from the commonly accepted value obtained by Struve, and this within its own limit of probable error. The volume is accompanied by some excellent illustrations of the instrument and the novel dome which protects it. The second part of this volume contains the observations of the right ascensions of the stars observed with the prism apparatus made by Mr. Albert S. Flint.

NEW FEATURE ON MARS.—A telegram from Kiel announces the observation of a bright prominence on the terminator of the planet, by Messrs. Hussey and Holden, at the Lick Observatory on Wednesday last, August 27. The planet is well situated for observation at midnight, being at present some five or six degrees north of α Tauri.

THE ECLIPSE AT BODÖ AND NORTH FINLAND.

WE give this week a reproduction of the drawing of the corona made near Bodö, which accompanied Dr. Brester's letter in our last issue (p. 390).

Further particulars have been received concerning the doings of the Russian Expedition under Baron Kaulbars, which observed in Russian Finland. There was an unusually large develop-



Dr. Brester's drawing of the Corona.

ment of the corona, the extensive and often oblique rays of which surrounded the dark disc of the moon. One of these rays reached a length double that of the sun's diameter. Some of the rays crossed each other, and Baron Kaulbars writes to the *St. Petersburger Zeitung* "that the remarkable proportions of the corona coincide with the opinion according to which this phenomenon is only very little developed with a *minimum* of sun-spots, for he had been able to see only very insignificant spots on the sun at rare moments during observations extending over several weeks."

Other expeditions to the Maritime Province of the Amur appear to have been very successful.

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ON THE RÖNTGEN RAYS.¹

WHO would have dreamt at the last annual meeting of the Victoria Institute, that before a year was out, we should be able to see on a screen, to receive on a photographic plate, which is afterwards developed, the skeleton, or a portion of the skeleton of a living man, or at least a living child? And as the modes of exciting these rays improve, we shall probably go on, step by step—indeed already, I believe, the whole body of a full grown man has been penetrated by these rays, the discovery of which we owe to Dr. Röntgen.

I feel some diffidence in bringing this subject before you, because I have never, myself, made experiments with the Röntgen rays. Nevertheless I have read a good deal about them, following what others have done, more especially where it connected itself with the subject of light, to which I have paid a good deal of attention. So I cannot but have a tolerably definite idea in my own mind as to the nature of these Röntgen rays which has been a matter in dispute and, I may say, is still in dispute, although I think opinions are generally coming round to that which I will bring before you in the end.

Now before I go to the Röntgen rays direct, I must touch on previous work which gradually led up to them.

For a very long time it has been known that an electric discharge passes more readily through tolerably rarefied air, than through air of greater density, and so with other gases. If we have a longish closed tube, provided with electrodes at the ends by means of platinum wires passing through the glass, if the air be tolerably exhausted from it, an electric discharge passes, comparatively speaking, freely through it, forming a beautiful skein of light, if I may so speak, and under certain circumstances that skein of light is divided into strata in a very remarkable manner. These strata fill the greater part of the tube from the positive electrode, or anode, as it is called, till we get nearly, but not quite, to the negative electrode, or kathode. There is a dark space separating the end of the positive discharge which, as I said, under suitable conditions and sufficiently high exhaustion, shows stratification, from a blue glow enveloping the negative electrode or part of it. The luminosity about the kathode is somewhat indefinitely bounded on the side of the stratification.

When, however, the exhaustion is carried still further, at the same time the strata become wider apart, and the luminosity recedes from the kathode and expands, forming a sort of glowing halo much more sharply defined on the inside than the outside; in that respect resembling the ordinary luminous halo—not the corona—occasionally seen round the moon. We have here, then, these two dark spaces, one outside the halo, where the luminosity gradually fades off, and another dark space on the inside, where the luminosity is more sharply defined, and which reaches to the negative electrode.

Now it is the phenomena in connection with this second dark space that I have more particularly to bring before you. As the exhaustion is rendered higher and higher, the inner dark space gets wider and wider until at a sufficiently high exhaustion it fills the whole tube or bulb. Mr. Crookes has worked more especially at this subject, and, indeed, the tubes which are now used for the production of the Röntgen rays, are generally called "Crookes tubes." I have seen in some of the foreign periodicals the word "Crookes" used to signify one of these tubes. Mr. Crookes' researches in very high vacua led him up to that most remarkable instrument, the radiometer, the nature of which led us to form clearer conceptions, than we had hitherto done, of the nature of the motion of molecules in gas; or rather, when the theory of the radiometer was made out, presented us, as I may say, with a visible exhibition of the thing in actual working.

Now these researches, which led Mr. Crookes to improve his vacuum, naturally led him to examine the electrical phenomena produced by excessively high vacua.

I have said that it was with the second or inner dark space that I had chiefly to do. When the exhaustion is sufficient, that fills the whole tube.

Now what takes place in this dark space? Suppose we interpose a screen, such as a plate of mica with a hole in it. A portion of the discharge from the negative electrode goes through that hole and continues onwards in a straight course until it reaches the wall of the tube. When it reaches the wall

¹ An extract from the Annual Address to the Victoria Institute, by Sir G. G. Stokes, F.R.S., the President.