

η ARGUS AND ITS NEBULA. BY F. ABBOTT, F.R.A.S.,
F.R.M.S.

[Read 14th November, 1871.]

I beg to bring under the notice of the Society some preparatory results arrived at by the Council of the Royal Astronomical Society, relative to the fluctuations of the Nebula, &c., about the object η Argus.

In the Monthly Notices R.A.S. there appears the following note, together with two additional papers and drawings from Hobart Town.

“On account of the interest attached to the question of the variability of the nebula of η Argus, the Council have determined to print as well Mr. Abbott’s communications as the remarks upon them by the late Sir J. F. W. Herschel, and the Astronomer Royal. For convenienc of reference it may be mentioned that Mr. Abbott’s former papers are printed in the *Monthly Notices*, vol. xxi., p. 230, (June 1861); vol. xxiv., p. 2, (November 1863), with plate; vol. xxv., p. 192, (April 1865, paper dated 18th February); and vol. xxviii., p. 200, (May 1868, paper dated 29th February), with a plate; and that there is a paper by Sir J. F. W. Herschel, vol. xxviii., p. 225, ((June 1868; and one by him and Lieut. Herschel, vol. xxix., p. 82, (January 1869), with five plates.”—Ed.

The Council have referred the subject to the Astronomer Royal, who makes some comments on previous observations to which I have temporarily replied as notes and queries, pending the appearance of the object in a favourable position for new observations, which will be about the month of February, when the notes from the Astronomer Royal will be dealt with seriatim.

The following passages occur in Mr. Airy’s remarks on the subject:—

“I duly received the packet of papers relating to Mr. Abbott’s observations on η Argus; and with these I have perused also the preceding papers in various volumes of the *Monthly Notices*. The subject is really a very puzzling one.

“As regards stars only the map of 1870, and the map of 1871 have so much difference (not a great deal) that I conceive them to be certainly independent; and yet they have so much similarity as to give strong probability to their faithful representation of the visible objects. See in particular the line of four stars convex towards η Argus.”

“These four stars have some agreement, not quite good, with four of Sir J. Herschel’s. But other stars in the concavity of the bend are wanting in Sir J. Herschel’s.

“* * * * I do concede to Mr. Abbott the merit of first pointing out that the nebula has shifted its position with regard to the star η Argus, and has changed its form materially, both which points I regard as certain. * * * *

“Allow me to suggest that papers of this kind ought to be pre-

served more carefully. Mr. Abbott's maps were crimped up till I could not read them. I have flattened them, and will endeavour to persuade Mr. Dunkin to keep them flat."

In the first paper referred to from Lieut. Herschel and Sir W. F. Herschel, page 83, line 21, the former repudiates his own observations as follows :—

"You know how difficult it is to represent faithfully one's impression of a nebula by a hurried pencil drawing, and will understand that the accompanying copy (based on all) has no pretension to accuracy. *In fact it is a wretched attempt.*"

On comparing drawings Nos. 1 and 2 by 'Lieut. Herschel, although both were taken about the same time, it would be extremely difficult to recognise them as applying to the same object. The last two plates, 4 and 5, are by Sir John Herschel, as noted, semi-reversed by being pricked off from his engraving of 1834, or Cape observations.

Now, if we apply to this mode of procedure the article in the *Astronomical Register*, by G. F. Chambers, on July 7th, 1866, it will appear difficult to reconcile its authority :—

"SIR JOHN HERSCHEL'S DRAWINGS OF NEBULÆ.

"To the Editor of the *Astronomical Register*.

"Sir,—I have lately made a discovery which, whether it be really such or no, at any rate has not, so far as I am aware, ever been pointed out. *All Sir J. Herschel's drawings of Clusters and Nebulæ are represented as they cannot be seen.* The way this has come about appears to be as follows :—The sketch is placed on paper in exactly the position which the object has in the (inverting) telescope. This sketch is copied on to the copperplate also exactly as it stands on the paper, and the result is that when the paper is printed the picture is reversed right and left. The inconvenience of this plan is manifest as concerns observers working with the telescope, and seeking to make comparisons between what they see and what Sir John indicates that he saw ; but worse than all this, Lord Rosse and, so far as I have noticed, all other celestial draftsmen, adopt the common-sense plan of making their drawings to show exactly as the telescope shows, consequently other sketches placed in juxtaposition with Sir J. Herschel's wholly mystify and delude the reader ; indeed I am free to confess that I have myself thus been taken in. More than once have I sought in vain to reconcile the engraving of the nebula in Orion, appended to Herschel's *Outlines of Astronomy*, with the original viewed in an ordinary inverting telescope. Fortunately for me, I only copied into my book a limited number of Herschel and Rosse sketches, but in Guillemin's book Sir John's device leads to a far more serious amount of confusion.

"I am, Sir,

"Your obedient servant,

"Sydenham,

"July 7th, 1866.

"G. F. CHAMBERS."

In some of my early papers I have given an opinion that

no two very dissimilar telescopes will show nebulous matter alike ; take, for instance, the nebulæ as portrayed by the Earl of Rosse with those of Sir J. Herschel, and compare them together with the drawings of G. P. Bond. The instruments used by these observers respectively were a 56 feet reflector, with 6 feet speculum ; a 20 feet reflector ; and an achromatic of 22 feet 6 inches in length, with an object glass 15 inches in diameter. The difference between them leads to much confusion in Guillemin's fine book of the heavens. I have also a strong opinion that the variations in the position of this fluctuating object will have more or less effect in the sketches made of it at different times.

The Astronomer Royal takes exception to my drawings on the ground of inaccuracy in points of geometry. If Mr. Le Seur's opinion that the star η shines with the light of burning hydrogen, and has consumed the nebula, is thought to be correct ; or, if the communicated opinions of Dr. Halley and the late two Herschel's that a nebula may concrete into individual stars, are of any account, how can geometry be applied to the object under consideration without certain fixed points ?

An elaborate paper, with a drawing, has been prepared by H. C. Russell, Esq., B.A., the Government Astronomer of New South Wales, and read at a meeting of the Royal Society of that colony, which I lay on the table. Mr. Russell, while doing full justice to the object with the Sydney telescope, has given due credit to the observations previously made at Hobart Town.

If the Astronomer Royal had offered some opinion as to the cause of the fluctuations of this extraordinary and interesting object it would have been a boon to physical astronomy.

As regards the accuracy of the Hobart Town drawings I can refer to Mr. Pignuit, of the Survey Department, who is now present, by whom they were checked and confirmed previous to their transmission to the Royal Astronomical Society.

The following is a reply to the notes and queries made by the Astronomer Royal on the "Observations of η Argus and its nebula." Monthly Notices, R.A.S., for June 9th, 1871, pp. 233 and 234:—

"Note 1.—See in particular the line of four stars convex towards η Argus.

"These stars have retained their apparent position, &c., more than any others in the same object, although variations to a small degree have taken place. In carefully looking over the drawings it will be found that a similarity exists in the position of many of the stars, but as a rule some changes have taken place.

“In regard to the use of geometry it was never my intention to apply it, but only to sketch the object as an eye draft, and by adopting the term ‘line of sight,’ it was intended to simplify by always observing the object in one position, *i.e.*, the telescope lying in a direct line W.N.W. to E.S.E. (the drawing being reversed), and at an angle of from 70° to 80° above the horizon, according to the state of the atmosphere at the time, *and in this line of sight* all the drawings have been made; and in an easy sitting position, with the light shaded from everything but the paper, the object has always been carefully delineated.

“With regard to ‘all the stars agreeing with either Sir John, or Lieut. Herschel’s configuration,’ I never expected they would, as apparent changes have more or less constantly been taking place.

“The question asked in No. 7, ‘the drawing (Lieut. Herschel’s) had undoubtedly reached Australia, has Mr. Abbott copied it?’ I answer no! The whole of my drawings were made previous to, and independent of any others.

“In making comparisons it would be desirable to refer to the original drawing, as in the lithographs, which are on a reduced scale, some trifling inaccuracies occur.”

[Sent October 7th, 1871, to the Hon. Secretary, R.A.S., and to Mr. R. A. Procter, together with the plates and paper read before the R. S. of Tasmania.]