XXI.—*Additional Observations on the Polarisation of the Atmosphere, made at St Andrews in 1841, 1842, 1843, 1844, and 1845.* By Sir DAVID BREWSTER, K.H., D.C.L., F.R.S., &c.

(Read 2d January 1866.)

Since the publication of my "Observations on the Polarisation of the Atmosphere," a long and elaborate Memoir on the same subject, by Dr R. RUBENSON, has appeared in the Acts of the Royal Society of Sciences of Upsal.* The observations which it contains were made with the finest instruments, and with a degree of accuracy which had not been attempted by previous observers. They were begun at Upsal in 1859, and carried on at Rome between the 6th of June and the 5th of August 1861, at Segni in the Campagna, between the 6th and the 27th of August 1861, and at Rome from the 5th of October 1861 to the 27th of July 1862.

Although Dr RUBENSON has devoted a section of his work to ascertain the cause of atmospherical polarisation, another section to the determination of the place of maximum polarisation, and a third to the causes which disturb the polarisation of the atmosphere, yet the chief object of his labours was to study the daily variation of the polarisation of the maximum point; and so fully has he treated this important branch of his subject, that the description of his polarimeter, of his method of using it, and the discussion of his observations, with the observations themselves, occupy three-fourths of his Memoir.

In his section on the Cause of Atmospherical Polarisation, Dr RUBENSON is led to the same conclusion which I had deduced from my earliest observations, namely, that the light of the blue sky is polarised by reflexion from the molecules of air, and not from vesicles of water with parallel sides, as maintained by CLAUSIUS, nor, as conjectured by others, from extremely minute drops of water, nor from molecules of aqueous vapour in an intermediate state between that of gas and that of vesicles.

According to ARAGO, the distance of the place of maximum polarisation from the sun was $89^{\circ} 6'$, the mean of six observations. I found 89° to be the mean of a great number of observations, but, like ARAGO, I considered 90° to be the nearest approximation to the place of maximum polarisation. Dr RUBENSON found it to undergo, as I did, great variations, chiefly from 88° to 92° , the general mean of

* Series 3d. tom. v. This Memoir has been published as a separate work in 4to, pp. 238. Upsal, 1864.

which, from his observations, was $90^{\circ} 2'$, half of which is so near to the polarising angle of air, which is $45^{\circ} 0' 32''$, as to place it beyond a doubt that the light of the blue sky is polarised by reflexion from its particles.

In his section on the Causes which Disturb the Polarisation of the Atmosphere, Dr RUBENSON found, as I did, that clouds and fogs and smoke were the cause of the greatest perturbations; and he also found, as I had done,* that the intensity of the polarisation was reduced by the crystals of ice floating in the atmosphere which form the halo of 23° .

Dr RUBENSON has not observed the secondary neutral point which I found sometimes accompanying the neutral point of ARAGO, when it rises above the horizon, or is setting beneath it, and he has never been able to see, even under the fine sky of Italy, the neutral point which I discovered under the sun, and which, I believe, has not been seen by any other observer than M. BABINET.

In 1854, M. FELIX BERNARD† made several observations at Bordeaux, in order to determine the intensity of the maximum polarisation at different hours of the day. Though made only on four days of the month of October (from the 16th to the 19th inclusive), he found "that in proportion as the sun approaches the meridian the value of the maximum polarisation diminishes; that this value increases, on the contrary, in a continuous manner as the sun recedes from the meridian, and that it reaches its maximum when the sun is very near the horizon, the amplitude of this variation being about 0.09."

On the 16th October 1854, the maximum polarisation increased gradually after mid-day from 25° to 0° of the sun's altitude, from 0.6236 to 0.7051; and on the 19th October, from 5° to 35° of the sun's altitude, it diminished from 0.7083 to 0.6106. On these two days the maximum polarisation, at an altitude of 20° , was 0.6582, and 0.6464 respectively, the mean of which is 0.6523, differing only 0.12 from 0.64, as computed from FRESNEL's formula by M. BERNARD, from my observation in 1842, that when the sun's altitude was 20° , the intensity of the maximum polarisation at 90° from the sun was equivalent to that which would be produced by reflexion from the surface of glass, whose index of refraction was 1.486, at an angle of $65^{\circ} 30'$ ‡.

Before he became acquainted with the Memoir of M. BERNARD, Dr RUBENSON had completed his observations on the same subject; and, though they lead to a similar result, yet they possess a peculiar value from their having been made with the finest instruments, in different localities,—in almost all the seasons of the year, and under various states of the atmosphere.

From a careful examination of his observations, Dr RUBENSON arrives at the

* Treatise on Optics, p. 394, and Edin. Trans., vol. xxiii. p. 226.

† *Comptes Rendus*, tom. xxxix. p. 775, October 1854.

‡ Johnston's Physical Atlas—*Meteorology*, p. 10; or Phil. Mag., series 3d, vol. xxiv. p. 453, December 1847.

general conclusion “that *the atmospheric polarisation is subject to a diminution during the morning, and to an increase during the evening*, without one’s being able to assign with certainty the precise hour of the minimum polarisation.” These changes Dr RUBENSON found to be often influenced by perturbations commonly of short duration, and taking place indifferently at all hours of the day. They frequently arise from clouds or smoke, and probably often from *cirrus* too faint to be seen. According to Dr RUBENSON, the blue colour of the sky, in a normal state of the atmosphere, and 90° from the sun, is feeble at sunrise, increases rapidly in intensity, and attains to its maximum some hours before noon, the number of hours being different at different seasons. The intensity of the colour diminishes towards noon. It then increases, reaches a second maximum after some hours, and then diminishes quickly towards sunset. The relation between the blue colour of the sky and the intensity of its polarisation, is a problem which remains to be solved.

In 1859, M. LIAIS made observations on the polarisation of the atmosphere during his voyage from France to Brazil, and at San Domingo in the bay of Rio Janeiro. His observations were made at the beginning of dawn and at the end of twilight, with the view of determining the height of the atmosphere. From the observations made at sea he obtained 320, and from the observations made on land 340 kilometers, or 212 miles, as the height of the atmosphere.*

The most recent observations on the polarisation of the atmosphere were made by M. ANDRÉS POEY, between 1862 and 1864, under the tropical sky of the Havannah. The observations themselves have not been published; but he states, as one of the most important of their results, that “at sunrise and sunset the system of atmospherical polarisation ought necessarily to present two planes of rectangular polarisation, one vertical, passing through the eye of the observer and the sun, and the other horizontal, with four inversions of the signs, and four neutral points 90° from each other.”

M. POEY adopts my theory of atmospherical polarisation, and the analogy which I pointed out between the lines of equal polarisation and the isochromatic lines of biaxal crystals, and between the same lines and those of uniaxal crystals when the sun is in the zenith,—the neutral points now meeting in the sun.†

It will be seen, from the preceding details, that the subject of atmospherical polarisation has become one of the most important branches of optical meteorology. It has already thrown much light on the constitution of the atmosphere; and when it has been studied in different climates, and at different altitudes above the sea, by Alpine travellers and scientific aeronauts, it will doubtless have still more valuable applications.

* *Comptes Rendus*, &c. tom. xlviii. pp. 109–112.

† See *Comptes Rendus*, &c. tom. lx. p. 781, Avril 17, 1865.

Under this impression I have been induced to submit to the Society the rest of four years' observations which I made at St Andrews, and which, along with those already published, will exhibit the optical condition of the atmosphere on many days during every month of the year.

1841, April 28.—Wind west ; fine day.

Mean Time.

3^h P.M. Polarisation a maximum in the plane passing through the sun and the zenith, and at $88^{\circ} 16'$ from the sun.

When the sun, or the antisolar point, rose or set, the neutral line of the polariscope bands, held and moved vertically, was a hyperbola, as shown in fig. 1.

Fig. 1.

1841, April 30.

Mean Time.

2^h 5^m

Polarisation a maximum in plane of zenith and sun, and at $78^{\circ} 25'$ from sun.

1841, May 6.

Mean Time.

3^h 30^m

Polarisation, when a maximum, greater in plane of zenith and sun than in any other plane. At sunset the difference small. The polarisation was greater in the S. horizon than at the same point in the N. horizon, probably from the sky being there freer from haze.

1841, May 8.

Mean Time.

10^h 10^m

Polarisation, or R , = $25\frac{1}{2}^{\circ}$, and a maximum in plane of zenith and sun. In the N.E., at an altitude of 40° , $R = 14\frac{1}{2}^{\circ}$, and also much less in S.W. horizon.

1841, May 9.

Mean Time.

12^h NOON.

Sky greenish-blue. In plane of zenith and sun $R = 13\frac{3}{4}^{\circ}$. At 4^h $R = 24\frac{1}{2}^{\circ}$ and $22\frac{1}{2}^{\circ}$ in different places, and *always greatest where the sky was bluest.*

1841, May 11.

Mean Time.

3^h 45^m P.M.

$R = 24\frac{1}{2}^{\circ}$, and a maximum in plane of zenith and sun. In other planes, $R = 22\frac{1}{2}^{\circ}$.

1841, May 12.

Mean Time.

10^h 15^m A.M.

The sky blue and unusually clear throughout the day. Barom. 30.1; Therm., 9^h P.M. 48° .

$R = 26\frac{1}{2}^{\circ}$ in plane of zenith and sun and a maximum. In other planes, $22\frac{1}{2}^{\circ}$.

11 40

$R = 28\frac{1}{2}^{\circ}$ in plane of zenith and sun. $21\frac{1}{2}^{\circ}$ in lower planes.

White clouds ; cumuli in motion.

Mean Time.	
12 ^h 0 ^m	R = $27\frac{1}{2}^{\circ}$ in plane of zenith and sun. R = $20\frac{1}{2}^{\circ}$ near horizon. R = $25\frac{1}{2}^{\circ}$ at intermediate points.
1 20	R = $26\frac{1}{2}^{\circ}$ in plane of zenith and sun. R = $21\frac{1}{2}^{\circ}$ near E. horizon.

Near the large white cumuli R diminishes.

Mean Time.	
4 ^h 30 ^m	R = $30\frac{1}{2}^{\circ}$ in plane of zenith and sun. R = $25\frac{1}{2}^{\circ}$ in horizon.
6 0	R = $27\frac{1}{2}^{\circ}$ in plane of zenith and sun. R = $24\frac{1}{2}^{\circ}$ in horizon.
7 10	R = $30\frac{1}{2}^{\circ}$ in plane of zenith and sun. R = $28\frac{1}{2}^{\circ}$ in horizon.
7 35	R = $30\frac{1}{2}^{\circ}$ in plane of zenith and sun. R = $29\frac{1}{2}^{\circ}$ in horizon.
7 45	R = $28\frac{1}{2}^{\circ}$ in plane of zenith and sun. R = $28\frac{1}{2}^{\circ}$ in horizon.

See Edin. Trans. vol. xxiii. pp. 213–223, for the places of the neutral points on this day.

1841, May 14.—The sky in the forenoon has very little blue in it, being in its colour a French grey. R less than $14\frac{1}{2}^{\circ}$.

Mean Time.	
3 ^h 30 ^m	R = $14\frac{1}{2}^{\circ}$, and R = $18\frac{1}{2}^{\circ}$ in a bluer part of the sky.

According as the thin white haze which masked the blue colour of the sky was removed or returned, the place of the neutral points constantly varied in their position.

In the evening the sky became clear, and R became $24\frac{1}{2}^{\circ}$ and $26\frac{1}{2}^{\circ}$.

1841, May 16.—See “Edinburgh Transactions,” vol. xxiii. p. 223.

1841, May 16.—Barom. 29·4. Windy. Considerably above the horizon R varied from $17\frac{1}{2}^{\circ}$ to $14\frac{1}{2}^{\circ}$, as the blue sky was more or less distant from the white moving clouds.

At 7^h, when the blue was purer, R = $22\frac{1}{2}^{\circ}$ at 45° of altitude in the S.

At 7^h 42^m R = $24\frac{1}{2}^{\circ}$ at 20° altitude in the N.

1841, May 17.—Barom. 29·5.

Mean Time.	
1 ^h 20 ^m	R = $17\frac{1}{2}^{\circ}$, the maximum polarisation at 99° from sun in the plane of zenith and sun.
2 0	R = $17\frac{1}{2}^{\circ}$ and $15\frac{1}{2}^{\circ}$ at lower altitudes.

The following observations, from May 24 to June 3, were made in Edinburgh:—

1841, May 24.

Mean Time.	
11 ^h 10 ^m	R = $17\frac{1}{2}^{\circ}$ maximum in plane of zenith and sun. R = $14\frac{1}{2}^{\circ}$ in horizon.

After a cloud had passed the polarisation was diminished.

Mean Time.			
3 ^h 15 ^m		R = 22½° maximum in plane of zenith and sun. R = 14½ elsewhere.	
5 0		R = 26½ maximum in plane of zenith and sun. R = 24½ in horizon.	
		BABINET's neutral point near the sun.	
7 0		R = 22½° in zenith and horizon.	
		Height.	
7 0		ARAGO's neutral point.*	22° 5'
8 0		Do. do.	17 48
9 0		Do. do.	15 50
		R = 20½° in zenith.	
		R = 22½ in horizon.	

1841, May 25.

Mean Time.		
6 ^h 0 ^m		ARAGO's neutral point in horizon, and the hyperbolic neutral line distinct.

1841, May 27.—Slightly hazy.

Mean Time.		
4 ^h 45 ^m		R = 20½° in zenith. R = 19½ in horizon. BABINET's neutral point not seen.

1841, May 28.

Mean Time.		
11 ^h 0 ^m		R = 15½°. Hazy bands, ill-defined and <i>ragged</i> .

Observations resumed at St Andrews.

1841, June 3.—In the morning, R = 14½° and 18½°.

Mean Time.		
6 ^h 0 ^m P.M.		R = 25½° in zenith and horizon.
6 27		ARAGO's neutral point not above horizon.
6 36		Do. do. very near the horizon.
6 43		Do. do. above and close to horizon.

See Edin. Trans. vol. xxiii. p. 214, for the height of ARAGO's neutral point.

1841, June 6.—Barom. 29.9.

Mean Time.		
4 ^h 45 ^m P.M.		R = 14½° through zenith. R = 23½ 45' above S. horizon. R = 22½ in S. horizon.

In and near the horizon, the white bands of the polariscope are *bluish* on the side of the neutral line from the sun. Maximum polarisation more than 90° from sun, and diminished by clouds coming on.

Mean Time.			Arago.†
6 ^h 0 ^m		} Sky very clear.	{ 18° 36'
8 20			{ 19 28
8 30			{ 21 20

* The height of ARAGO's neutral point is to be understood as above the antisolar point, and that of BABINET as above the sun.

† The numbers under ARAGO and BABINET are the heights of their neutral points above the antisolar point and the sun.

Mean Time.		Arago.
8 ^h 36 ^m	Sun set. Haze in S.E.	
8 45	R=28½° through zenith, and 26½° in horizon.	
9 10	R=28½° through zenith, and in S. and N. horizon.	17° 20'
9 17		21 39
9 30		22 12
	Haze continued.	

1841, June 8.—Barom. 30. Fine day.

Mean Time.	
11 ^h 40 ^m	R=21½° through zenith. R=19° in W. horizon.
1 5	R=29½° through zenith.
4 10	R=26½° through zenith. R=27° 30' from N.E. horizon.
4 30	R=28½° 45° above N.E. horizon.
4 45	BABINET'S neutral point and the neutral hyperbolic line clearly seen.
5 50*	R=20° to 24° as the sky was more or less clear.

At this hour the curious phenomenon shown in the annexed figure was seen, two hyperbolic neutral lines meeting in the sun.

Mean Time.	Babinet's N. Point above sun.
6 ^h 42 ^m	13° 24'
7 50	26 37
8 28	15 16
9 10	20 24
9 30	15 0

Fig. 2.

Mean Time.		Arago.
6 ^h 45 ^m		
7 30	R=27½° maximum polarisation.	19° 50'
7 35		20 25
8 20	R=24½° in S.W. horizon.	
8 23		21 10
9 10	Faint clouds near.	22 6
9 30		23 41

1841, June 9.—Barom. 20.9. Fine day ; mackerel-sky occasionally.

Mean Time.		Babinet.
3 ^h 55 ^m	Fine pure sky. R=25½° in N. horizon.	5° 0'
4 30		12 0
6 30	R=26½° + in zenith and horizon.	17 15
7 7†		13 15
7 30	Fine cirri above the sun.	14 30
7 37		16 7
8 0	R=28½° in zenith and horizon.	17 20
8 40		18 5
Mean Time.		Arago.
7 ^h 45 ^m	Antisolar point below horizon.	21° 0°
7 54		20 45
8 21		20 35
10 7		24 45

At 8^h 40^m clouds suddenly covered the whole horizon.

* See Edin. Trans. vol. xxiii. p. 221.

† During the preceding quarter of an hour a stratum of cirri surrounded the neutral point, and was just absorbed, when the observation was made.

1841, June 10.—See “Edinburgh Transactions,” vol. xxiii. pp. 214 and 223.

1841, June 11.—Barom. 29·8. Wind north-east.

Mean Time.			Arago.
h	m		
4 ^h	45 ^m	R=26½° in zenith, and 24½° in horizon.	
6	38	R=27° in zenith and horizon.	
7	34		19° 37'
7	42		19 3
8	5		19 0
8	18		18 52
8	36		18 50
8	52		18 32
9	3		19 12
9	15		19 17
9	25		19 20
9	33		21 37
9	45		23 39
9	55		25 22
10	0		25 13

Mean of observations within less than 4° of the horizon, 18° 40'. The evening was not so fine as yesterday.

1841, June 12.—Barom. 29·85. Wind north-east.

Mean Time.		
h	m	
9 ^h	0 ^m	A.M. R=24½° in horizon, 26½° in zenith, and R=25½° about 20° alt. S.W. and S.E.
11	22	R=24½° in zenith.
1	0	P.M. R=23½° in zenith. Sky fine.

The day became cloudy, but suddenly cleared up at 8^h P.M., when R=28½° in zenith and horizon.

Mean Time.			Arago.
h	m		
8 ^h	18 ^m		17° 22'
8	36		17 15
8	52	Therm. 50° R=28½° in horizon.	18 8
9	3		17 30
9	15		18 42
9	25		18 50
9	33		20 52
9	45		21 54
10	0		24 43

Mean of observations within less than 4° of the horizon, 17° 39'.

Mean Time.			Babinet.
h	m		
8 ^h	25 ^m		17° 13'
8	54		17 12
9	8		17 20

1841, June 14.—Barom. 29·6.

Mean Time.			Arago.
h	m		
7 ^h	45 ^m		18° 35'
7	51	R=26½° in N.E.	19 15
8	5		18 53
8	18		18 58
8	36		

1841, June 15.—Barom. 30·0 at 9^h, and 29·8 at 10^h A.M.

Mean Time.		Arago.
8 ^h 36 ^m		18° 45'
8 52	R=25½° at 40° alt. N.E.	18 32
9 3		18 9
9 15		18 7
9 40		21 16
9 52	R=28½° at 40° alt. N.E.	21 52

1841, June 21.—Barom. 29·4.

Mean Time.		Babinet.
7 ^h 42 ^m	R=24° at 40° alt., S. 21½° in zenith.	21° 30'
7 52	Clouds passing over the neutral point.	20 44
8 0		20 0
9 15		20 28

1841, June 2.—Barom. 29·68.

Mean Time		Arago.
3 ^h 0 ^m P.M.	R=14½°. A faint whiteness over blue sky.	
8 31		17° 37'
8 47	R=14½° in horizon, and 25½° in zenith, and 24½° in alt. 40° S.W.	19 58
9 0		18 45
9 15	Sky not pure this evening.	18 5
9 30		18 0

1841, June 23.—Barom. 29·72. Sky impure.

Mean Time.		Arago.
8 ^h 5 ^m	Clouds below the neutral point. Observations not satisfactory.	21° 30'
8 23		17 25
8 45		20 35
8 52		20 48

1841, June 27.—After three days of eastern haur and rain.

Mean Time.		Arago.
10 ^h 0 ^m A.M.	R=19½° in zenith plane, the sky being cloudy.	
1 0 P.M.	R=14½° at 20° alt. in E. Barom. 29·6 and rising.	
7 30		21° 21'
7 45	R=22½° in zenith plane, and 21½° at 30 alt.	22 5
8 0		21 42
8 18		20 12

When light clouds covered the sky round and over the neutral point, the polarisation was + or vertical from the zenith to the horizon.

1841, June 28.—After a bad rainy day and the wind east, the sky cleared up in the evening and the wind became west.

Mean Time.	Arago.
8 ^h 50 ^m P.M.	18° 26'
9 13	18 43

1841, July 17.—See "Edinburgh Transactions," vol. xxiii. p. 214.

1841, July 24.

Mean Time.		Arago.
6 ^h 40 ^m	R=14½°; cloudy sky.	25° 55'

1841, July 28.—Barom. 29·37. A clear blue sky; cloudy.

Mean Time.		Arago.
7 ^h 10 ^m	R=26½° to 28½°	18° 12'
7 40		18 43
7 57		17 53
8 10		18 5

1841, July 31.—Cloudy. Neutral point covered with minute cirri.

Mean Time.		Arago.
8 ^h 0 ^m		16° 45'
8 14		17 25

1841, August 6.—After two days of rain.

Mean Time.		Arago.
8 ^h 5 ^m P.M.	R=29½°. A cloud had passed.	16° 28'

1841, August 8.—Morning rainy; splendid evening.

Mean Time.		Arago.
6 ^h 50 ^m	R=29½°	16° 17'
7 5	R=28½°	18 20
7 35	Clouds came on.	17 53

1841, August 10.—After rain.

Mean Time.		Arago.
7 ^h 45 ^m		18° 15'

1841, August 17.—Clear and windy.

Mean Time.	
9 ^h 0 ^m A.M.	R=21½° in zenith, and 15½° near horizon.

The blue of the sky, though very clear, was whitish, which always reduces the polarisation. Same day at Perth.

Mean Time.		Arago.
7 ^h 15 ^m	R=24½° in zenith, and 20½° in horizon.	20° 38'
7 30		19 24

During the whole day the blue sky became whiter and whiter, and the polarisation fell below 14½° out of the scale of the Polarimeter. Small black clouds appeared upon the white sky.

The observations, from the 6th to the 17th August, were made at the Bridge of Earn.

1841, August 31, September 6th and 12th. See "Edinburgh Transactions," vol. xxiii. p. 214.

1841, September 6.—See "Edinburgh Transactions," vol. xxiii. pp. 215, 223.

September 12. " " " pp. 215, 223.

1841, September 13.

Mean Time.			Arago.
h	m		
5 ^h	55 ^m	A.M. R=25½° zenith; 23½° horizon.	19° 10'
5	58		20 0
6	32	P.M. R=25½° zenith.	18 16
6	38		18 0
6	42		17 27

1841, September 15.—Barom. 29·61. Splendid day.

Mean Time.			Arago.
h	m		
10 ^h	0 ^m	A.M. R=27½° in zenith plane, and 25½° in horizon.	
10	18	R=28½°. Maximum 88° from horizon.	
6	0	P.M.	19° 54'
6	8		18 18
6	10	Sky not altogether pure.	18 47
6	28	R=27½° in zenith plane.	18 5

1841, September 21.—Barom. 29·95. Sky not pure; an eastern haur for three preceding days.

Mean Time.			Arago.
h	m		
4 ^h	50 ^m	R=15½° in zenith, and 14° 30' above S. horizon.	
4	55	Sky whiter in zenith than in horizon.	21° 59'

1841, September 23.—Barom. 29·47. Air damp, but no rain.

Mean Time.			Arago.
h	m		
6 ^h	0 ^m	P.M. R=26½° in zenith, and 17½° 15° alt. S.	13° 30'

The sky impure. Neutral point covered with small black clouds; an eastern haur supervened.

1841, September 26.—Barom. 29·25. Day showery.

Mean Time.			Arago.
h	m		
5 ^h	49 ^m	P.M. R=22½° zenith; 26½° in horizon.	22° 2'
6	10	Not free of clouds about neutral point.	20 2
6	15	The sky purer.	21 50

1841, September 29.—See "Edinburgh Transactions," vol. xxiii pp. 215, 223.

1841, September 30.—Barom. 29·03.

Mean Time.			Arago.
h	m		
4 ^h	27 ^m	R=26° in zenith plane, and 25° 10' above S. horizon.	
4	37	Sky whitish. Black cloud passed over neutral point.	20° 20'
4	43		19 49
4	49		22 29

1841, October 3.—Barom. 29·8. Wind north-east; cold.

Mean Time.			Arago.
h	m		
4 ^h	1 ^m	R=27½° in zenith plane, and 26½° above horizon.	
4	44		21° 15'

A cloud passed, and the neutral point descended.

1841, October 12.—Barom. 29·1. Beautiful morning; the sun rose free of clouds.

Mean Time.			Arago.
6 ^h 17 ^m	}	A.M. R=28½° in zenith, and 26½° in horizon.	21° 25'
6 24			18 20
4 54			18 1
5 10	}	P.M. R=25° in zenith; 27½° near horizon.	19 57

1841, October 18 —Barom. 29·5. Wind west; a very fine day.

Mean Time.			Arago.
3 ^h 0 ^m		R=29½° in zenith, and 26½° near horizon.	
4 42			20° 5'

1841, October 23.—See “Edinburgh Transactions,” vol. xxiii. pp. 215 and 224.

1841, October 25.—A cold day with a little rain. Wind north, and came round to the east at 4^h.

Mean Time.			Arago.
3 ^h 57 ^m		R=29° in zenith plane.	19° 10'
4 13	}	R=29½° in zenith plane.	20 20
4 17		Slight clouds.	20 31
4 23		R=28¾° in zenith plane; 27½° 8° above S. horizon.	20 1

1841, October 26.—Barom. 29·6. Fine day and cold.

Mean Time.			Arago.
2 ^h 0 ^m		R=25½° in zenith, sun shining; 27½° sun not shining.	
2 29		ARAGO'S neutral point rose in the N.E. above sea.	
2 29		R=25½° in zenith; 28½° in horizon.	14° 55'
4 22		R=29° in zenith; 29½° in horizon.	22 17
4 35			20 40
4 47		R=28° in zenith; 27½° in horizon.	20 35
4 53			22 39
			Babinet.
4 24			15° 5'
4 37			15 55
4 50			16 55
4 55			15 36

1841, October 28.—Barom. 29·9. Fine day.

Mean Time.			Arago.
3 ^h 15 ^m		A cloud had just left the neutral point.	16° 48'
8 39			19 40
4 23		A little cloud left about the neutral point.	20 2
4 39			21 50
4 50			21 28
			Babinet.
3 19		R=29½° in zenith; 28½° 10° altitude N. and S.	12° 15'
3 35			11 50
4 15		Maximum polarisation more than 90° from sun.	13 28
4 25			14 27
4 42		R=26½° in zenith, and at 10° above N. horizon.	14 5
4 47			15 4

1841, November 2.—See “Edinburgh Transactions,” vol. xxiii. pp. 215 and 224.

November 4.

November 15.—Barom. 29·5 ; therm. 35. Haze and clouds.

Apparent Time.

2^h 0^m

R=27½° in zenith and horizon.

2 15

3 56

4 1

4 5

3 41

3 54

4 3

4 7

Arago.

13° 20′

18 10

17 40

19 50

Babinet.

16° 31′

17 55

16 36

16 0

1841, November 16.—R=30° in zenith ; 26½° near horizon.

Apparent Time.

3^h 45^m }

3 47 }

Sky whitish blue.

Arago.

{ 17° 58′

{ 17 10

1841, November 17.—Barom. 29·43. Frost. See “Edinburgh Transactions,” vol. xxiii. p. 228.

Apparent Time.

11^h 35^m A.M.

12 0

2 1

2 25

2 40

3 15

3 23

3 54

2 30

2 48

3 19

3 51

R=26½° in zenith ; 14½° near horizon.

Polarisation between the sun and horizon.

R=29½° in zenith ; 26½° near horizon.

Fine day and fine sky.

R=29½° in zenith ; 26½° near horizon.

Arago.

14° 24′

Babinet.

11° 30′

11 50

11 30

13 15

14 0

17 6

Arago.

22° 31′

23 34

21 30

19 0

1841, November 23.—Barom. 29·3. Cold, damp day ; wind west.

Apparent Time.

3^h 57^m

4 0

Arago.

18° 51′

Babinet.

15° 24′

1841, November 25.—See “Edinburgh Transactions,” vol. xxiii. pp. 216, 224.

1841, Dec. 1.

Apparent Time.

4^h 3^m

4 14

4 5

4 10

R=28½° ; 30° above S. horizon.

Arago.

16° 41′

17 51

Babinet.

15° 34′

14 52

1841, December 5.

Apparent Time.
11^h 0^m A.M. $R=25\frac{1}{2}^{\circ}$ in zenith plane.

1841, December 7.—Neutral line convex towards the sun.

Apparent Time.		Babinet.
8 ^h 51 ^m A.M.		15° 4'

1841, December 11.—Barom. 29.4; therm. 41.

Apparent Time.		Arago.
3 ^h 46 ^m	$R=28\frac{1}{2}^{\circ}$ in zenith, and in 20° above horizon.	18° 27'
3 51		16 16

Although the sky appeared free of clouds, yet, upon close examination, extremely faint and transparent clouds reflecting no light, but rather darker than the sky, covered the whole heavens.

1841, December 17.—Beautiful morning.

Apparent Time.		Babinet.
9 ^h 7 ^m A.M.	$R=27\frac{1}{2}^{\circ}$ in S.W. horizon.	
9 13	Neutral line concave to sun.	13° 10'
10 30	$R=27\frac{1}{2}^{\circ}$ in zenith plane; $25\frac{1}{2}^{\circ}$, 30° above N.E. horizon.	

1841, December 18.—Splendid sky; without a cloud.

Apparent Time.		Babinet.
8 ^h 53 ^m A.M.		15° 55'
9 8		Arago. 19° 52'

At 9^h the maximum polarisation $R=28^{\circ}$ in zenith plane, and far beyond 90° from the sun.

Apparent Time.		Arago.
3 ^h 17 ^m P.M.		19° 5'
3 32		17 25
3 22	$R=28^{\circ}$ in zenith; $27\frac{1}{2}^{\circ}$ in horizon.	Babinet. 17° 20'
3 36		18 25

1841, December 22.—Fine frosty day; clear sky.

Apparent Time.		Babinet.
9 ^h 23 ^m		14° 10'
9 33		Arago. 20° 10'

$R=27\frac{1}{2}^{\circ}$ in zenith plane; $24\frac{1}{2}^{\circ}$ in S.W. horizon, and $26\frac{1}{2}^{\circ}$, 10° above.

1842, January 6.—Fine day.

Apparent Time.		Arago.
2 ^h 34 ^m		19° 6'
2 38		Babinet. 16° 18'

$R=21\frac{1}{2}^{\circ}$ in zenith plane; $28\frac{1}{2}^{\circ}$, 30° above E. horizon.

1842, January 7.—Very fine day, with haze.

Apparent Time.			Babinet.	
h	m		°	'
9 ^h	18 ^m	A.M.	15°	51'
12	0		13	53
			Arago.	
11	52		20°	34'
12	4	P.M.	22	0
12	9	R = 22½° in zenith.	22	37
3	25		20	40
4	17		19	49

At 9^h 18^m. R = 24°, a maximum in horizon. The neutral line was *convex* to the sun. Sky clear, without clouds.

1842, January 16.—Ground everywhere covered with snow.

Apparent Time.			Babinet.	
h	m		°	'
4 ^h	12 ^m		19°	25'

1842, January 17.—Fine clear day; therm. 36.

Apparent Time.			Babinet.	
h	m		°	'
8 ^h	37 ^m	A.M. R = 24½° at 35° alt. 20½° in horizon.	16°	55'
3	47	P.M. R = 25° in zenith; 24½° in horizon. Neutral line concave towards the sun.		

1842, January 21.—Barom. 29.77; dry, frosty day.

Apparent Time.			Arago.	
h	m		°	'
3 ^h	34 ^m	{ R = 27½° maximum polarisation in zenith plane, and 24½° near horizon. }	19°	40'
3	31			
			Babinet.	
			19°	3'

1842, January 25.—Snow covers the ground. Barom. 29.4.

Apparent Time.			Arago.	
h	m		°	'
1 ^h	12 ^m	P.M. { ARAGO'S neutral point in horizon. R = 17½° in zenith plane, and +15° in horizon. }		
2	15		16°	45'
2	12	R = 18½° in zenith, and 15° in horizon.	19	21
3	40	R = 18½° in zenith, and at 50° altitude, 15°.16	20	
			Babinet.	
2	15		17°	20'
3	36		18	30

1842, January 27.—Barom. 29.2; therm. 36° at 8^h 30^m.

Apparent Time.			Arago.	
h	m		°	'
8 ^h	34 ^m	A.M. { R = 24½° near horizon; neutral line concave to sun. }		
2	20	P.M.	11°	50'
4	37		20	40
2	32	R = 25° in zenith plane and S. horizon.		
4	35	{ Thin clouds, almost invisible everywhere but above the sun }	Babinet.	18° 40'

1842, January 28.—Barom. 29·6. Fine day; fresh.

Apparent Time.			Arago.
2 ^h	7 ^m P.M.		13° 5'
3	23	{ R=22½° in zenith; 25½° in E. horizon. R=26½° in zenith; 27½° in S.E., and 26½° in S.W. horizon.	21 15
3	43		20 25
4	5		19 41
3	21		Babinet. 18° 48'
3	47		18 10
4	2		16 52

1842, January 29.—See "Edinburgh Transactions," vol. xxiii. pp. 216, 224.

1842, February 2.—Very fine day, and clear sky till 2^h.

Apparent Time.			Arago.
11 ^h	30 ^m A.M.		16° 50'
		ARAGO's neutral point not risen. R=25° in zenith plane, 20½° in horizon.	
2	0 P.M.	A thick, impure sky.	

1842, February 3.—Fine day.

Apparent Time.		Arago.
4 ^h	43 ^m	20° 20'
4	45	Babinet. 22° 1'

1842, February 4.—Barom. 30·15. Fine day; cloudy.

Apparent Time.			Arago.
3 ^h	14 ^m		18° 40'
4	0	{ R=20½° in zenith, 24½°, 50° alt. W. horizon. R=25° in zenith, thin whitish clouds, 24½° in E. horizon, 10° alt., 22½° in alt., 20° W. horizon.	20 37
4	44		20 14

1842, February 5.—Barom. 30·05. Fine day; sky perfectly clear.

Apparent Time.			Arago.
1 ^h	51 ^m		17° 25'
1	44		23 10
3	48		22 15
4	9		20 50
4	31		20 30
3	51	{ R=28½° in zenith, 26½° to 18½° on E. horizon, neutral line convex to sun.	
4	7		Babinet. 17° 20'
4	33	R=27½° in zenith.	19 42
9	5 A.M.	R=22½° 30° alt. S.W. horizon.	20 38
12	34 P.M.	R=27½° in zenith, 20½° in horizon. Dark haze in horizon from E. to W. by N.	
2	6	R=27½° in zenith to 14½° in horizon.	

1842, February 10.—Fine day, but cloudy.

Apparent Time.			Arago.
2 ^h	57 ^m		16° 45'
3	58	R=24½°, 25° above W. horizon.	19 20
4	45	R=26½° in north.	17 43
3	59	R=29° in zenith, and at alt. 30° E. horizon.	Babinet. 18° 38'
4	5		19 4
4	41		21 50

Clouds came on, followed by great rain and wind, at 10^h P.M.

1842, February 11.—Rain in the forenoon till 2^h 30^m.

Apparent Time.		Arago.
3 ^h 19 ^m	R = 24½° 30° above S.E. horizon.	17° 33'
3 55	R = 29½° in zenith. Sky quite clear.	21 8
4 20	R = 29½° in zenith. Sky quite clear.	19 45
4 38		20 5
		Babinet.
3 22	R = 28½° in zenith, and in N. horizon.	16° 19'
3 53		17 0
4 23		19 34
4 36		
4 5	{ R = 29½° in zenith. Neutral' line convex to sun. R = 28½° 15° alt. }	18 36

1842, February 12.—Barom. 29·3. Rainy, with wind. Cleared up at 4^h.

Apparent Time.		Arago.
4 ^h 18 ^m	Clouds passed away.	17° 28'
4 20		Babinet.
3 55		17° 12'
	R = 24½°, but reduced to 20½° when watery clouds passed over the sky from W. to S.	

1842, February 15.—Rain in morning, then fine day. Wind west.*

Apparent Time.		Babinet.
4 ^h 25 ^m	R = 27½° in zenith to 22½° in S.E. horizon.	21° 58'
4 44		20 24
4 55	Barom. 30·05, therm. 43°; wind west.	20 30

Clouds came into S. horizon at 4^h 55^m, and the whole of the N. and N.E. horizon, especially above the sea, was covered 6° or 8° high with a dark band of distant haze.

N.B.—At 3^h 48^m, when the neutral point was 1° 57' high, there was just above the sea horizon, H H, a portion *m n* of + bands, a continuation of those on the sea, so that there were two neutral points here. These were more fully developed at 3^h 58^m, as shown in a former paper.†

Fig. 3.

1842, February 16.—Barom. 30·16.‡

At noon, sun's alt. 21°, there is clearly a faint neutral point a little above the horizon, and 19° below the sun.

At 2^h 48^m, though the bands at ARAGO's neutral point are all +, as in fig. 4, they are most weakened at *m n*, which is the effect of the secondary cause. R = 19½° in zenith, and in both horizons at 25° alt.

Fig. 4.

* See Edin. Trans., vol. xxiii. pp. 216, 224.

† *Ibid.*, vol. xxiii. p. 222.

‡ *Ibid.*, vol. xxiii. pp. 217, 228.

At 3^h 10^m the weak polarisation at *m n* now extends down to H H. $R=22\frac{1}{2}$ in zenith, and in horizon at 25° alt.

Fig. 5.

At 3^h 44^m the two neutral points are developed, as in the annexed figure, the — bands *x x* being just distinctly visible.

1842, February 18.—See “Edinburgh Transactions,” vol. xxiii. pp. 217, 229.

1842, February 19.—Fine day, with wind.

Apparent Time.		Arago.
2 ^h 58 ^m	$R=26\frac{1}{2}^\circ$ in S.E. horizon, alt. 20°.	
3 7	Neutral point 2° alt.	13° 38'
3 20	Secondary neutral point seen.	14 42
4 15	Fleecy clouds over neut. point. $R=24\frac{1}{2}^\circ$ S. hor.	20 0
4 40	$R=24\frac{1}{2}^\circ$ in zenith plane.	19 28

1842, February 21.—From 4^h 52^m to 4^h 57^m, a secondary neutral point to that of ARAGO was gradually but imperfectly developed.*

1842, February 22.—Dull, cold morning, which cleared up about 1^h 25^m, when $R=21\frac{1}{2}^\circ$ in clear sky, from which clouds had passed.

Apparent Time.		Arago.
3 ^h 24 ^m	$R=25\frac{3}{4}^\circ$ in zenith, $22\frac{1}{2}^\circ$ near W. and E. horizon.	15° 40'
3 38		17 29
3 44	{ Negative bands do not touch the sea horizon. Secondary neutral point in the horizon. }	20 26
4 2		20 50
4 28		23 8
5 8		19 2
		Babinet.
4 6	Pol. of moon, $R=3^\circ$; $R=27\frac{1}{2}^\circ$ in zenith.	17° 15'
4 24		16 19
5 6		19 5

1842, February 24.—Barom. 29.0.

Apparent Time.		Arago.
3 ^h 47 ^m		17° 20'
2 32	$R=26\frac{1}{2}^\circ$ in zenith, $27\frac{1}{2}^\circ$ in S.E. horizon.	
3 51	$R=23\frac{1}{2}^\circ$ in zenith, and $25\frac{1}{2}^\circ$ at 35° alt. N.W. horizon.	

1842, February 25.—Dull day; frost in morning; cleared up at 4^h 2^m.

Apparent Time.		Babinet.
5 ^h 9 ^m	$R=28^\circ$ in zenith, $26\frac{1}{2}^\circ$ in E. and W. horizon	17° 50'
		Arago.
5 12		18° 5'

* See Edin. Trans., vol. xxiii. pp. 217, 224, 228.

1842, March 2.—A wet day, the place of the sun being seen as a white spot.

Apparent Time.

2^h 20^m The polarisation everywhere extremely feeble. BABINET's neutral point was nearly 75° above the horizon, or about 54° above the sea! See March 16.

1842, March 4.—Cloudy and sunshine.

Apparent Time.

1^h 18^m $R = 25\frac{1}{2}^\circ$ in zenith, and $22\frac{1}{2}^\circ$ at 30° alt. W. horizon.

1 48 One plate of glass at 60° incidence compensates the polarisation on the sea horizon opposite the sun.

3^h 53^m

3 58

5 23

5 26

Arago.

11° 13'

12 22

17 55

Babinet.

17° 22'

5 38 $R = 27\frac{1}{2}^\circ$ in zenith, and $22\frac{1}{2}^\circ$ in horizon.

1842, March 7.—11^h 30^m $R = 28\frac{1}{2}^\circ$ in zenith, to $18\frac{1}{2}^\circ$ in horizon, but at 1^h 30^m, after showers of hail and rain, $R = 22\frac{1}{2}^\circ$ in zenith.

1842. March 10.—Sky clear, and wind in west.

Apparent Time

11^h 0^m $R = 27\frac{1}{2}^\circ$ in zenith.

11 15 Neutral point seen below sun.

3 14 $R = 28^\circ$ in zenith, $24\frac{1}{2}^\circ$ in horizon.

4 0 ARAGO's neutral point not risen.

4 10 The + bands scarcely seen in horizon.

4 13 $R = 28^\circ$ in zenith.

Arago.

4 15

12° 55'

4 20

13 56

4 27 { The secondary neutral point just touching the sea }
horizon. 14 54

1842. March 13.—12^h 36^m $R = 26\frac{1}{2}^\circ$ in zenith. Sky clear.

Apparent Time.

4^h 27^m The breach in the + bands not completed.

4 39 But at 4^h 39^m the neutral point is formed.

Arago.

12° 15'

12 6

Both on the 10th and 13th ARAGO's neutral point is above the horizon, though masked by the cause which produces the secondary neutral point. Over a space of $3\frac{1}{2}^\circ$ above the sea horizon, the + bands almost wholly disappear before the — ones are perceptible, and the neutral point is distinct on the sea horizon.

1842, March 16.—Barom. 29·96, the sun occasionally shining through a thickish haze in a sky without blue. Wind slight in south-west.

Apparent Time.

10^h 45^m Polarisation the same as on March 2; BABINET's neutral point 30° above the sun, or more than 60° above the horizon!

1842, March 17.—Barom. 29·77. Much rain last night. Wind west; white clouds flying.

Apparent Time.

10^h 20^m $R = 26\frac{1}{2}^\circ$ in zenith plane, and soon after $24\frac{1}{2}^\circ$.

10 50 $R = 20\frac{1}{2}^\circ$ in zenith plane, and in a clear sky, over which clouds have passed.

1842, March 18.—Barom. 29·09. Wind and rain, day cold, and wind in west.

Apparent Time.

3^h 27^m R=25°, diminishing to 20°.

5 28

5 55

6 12

Arago.
15° 48'

18 10

17 48

Babinet.

19° 10'

5 30 R=30° in zenith plane.

5 57

17 40

6 10

20 12

1842, March 19.—Barom. 29·0.

Apparent Time.

3^h 54^m Polarisation of moon, 20½°; R=23° in zenith.

4 39 R=24° in zenith plane; sky very clear.

5 44

6 14 Polarisation of moon, 20½°; R=22½° in zenith.

6 19

Arago.

10° 37'

19 45

18 47

18 45

Babinet.

19° 30'

5 48 R=26½° in zenith plane.

6 12

19 45

6 21

17 26

1842, March 24.—Cleared up at 1^h. Fine day.

Apparent Time.

2^h 0^m R=22½° 50° above the horizon.

4 0 R=20½° in zenith plane.

1842, March 26.—Barom. 29·3. Cold wind from point north of west.

Apparent Time.

5^h 49^m

6 16

6 31

Arago.

18° 32'

19 25

18 4

Babinet.

5 52 R=28½° in zenith plane.

6 34

19° 20'

19 40

1842, March 28.—Sky clear.

Apparent Time.

4^h 20^m R=26½° in zenith plane, and 18° and 20° in horizon.

1842, March 29^h.

Apparent Time.

6^h 20^m

6 36

6 18

Arago.

17° 55'

17 50

Babinet.

18° 40'

1842, March 30.—Wind; flying clouds.

Apparent Time.

6^h 27^m R=28½° in zenith, to 23½° in horizon.

6 45

6 52

6 24

Arago.

18° 13'

17 55

19 37

Babinet.

6 48

20° 40'

3 10 R=21½° in zenith plane.

19 54

1842, April 2.

Apparent Time.		Arago.
6 ^h	5 ^m	19° 15'
7	4	19 42
		Babinet.
6	36	18° 5'
6	38	19 8
7	4	20 18

1842, April 3.—Fine clear sky; hail in the afternoon.

Apparent Time.		
11 ^h	45 ^m	{ BREWSTER'S neutral point most distinctly seen. } 13° 0'
		{ Distance from sun,

1842, April 5, 6, 8.—See “Edinburgh Transactions,” vol. xxiii. pp. 217, 225, and 229.

1842, April 9.—Barom. 30·16. Wind east; bitterly cold.

Apparent Time.			Arago.
3 ^h	25 ^m	R = 22½° in zenith plane. The sky clear.	
5	46		22° 7'
6	55	} Effect of fog.	{ 15 20
7	0		{ 16 2
			Babinet.
5	49	R = 15½° in horizon.	17° 10'
6	57		19 30

Between 5^h 49^m and 6^h 57^m a fog came on, and there were no neutral points.

1842, April 10.

Apparent Time.		
4 ^h	5 ^m	R = 18½° in zenith, and 14½° in horizon.
4	22	R = 27° in zenith, and 14½° in horizon.

BABINET'S neutral point very near the sun, and no neutral point seen below the sun.

1842, April 13.—Barom. 30·12. Fine day.*

Apparent Time			Arago.
5 ^h	48 ^m		16° 20'
6	20		17 55
6	54		19 40
7	10		19 45
7	19	R = 30½° in zenith.	19 4
7	29	R = 32½° in zenith.	22 10

R increased from 25° at 4^h to 32½° at 7^h 29^m.

1842, April 15.—See “Edinburgh Transactions,” vol. xxiii. p. 230. Haze from west.

Apparent Time.			Arago.
5 ^h	40		16° 25'
5	48		18 40
5	57	R = 14½°, in zenith 18½°, 20° above N. horizon.	18 21
6	28	White nebulousity.	18 50
7	0		
			Babinet.
5	50		28° 20'

* See Edin. Trans., vol. xxiii. p. 225.

1842, April 16.

Apparent Time.			Arago.
5 ^h	54 ^m		17° 25'
6	31		22 22
6	59	R=27½° in zenith, 22½° in N. and 18½° in S. horizon.	19 50
7	21		18 55
7	35	R=18½° at moon.	0 45
7	46		23 50
			Babinet.
5	58	R=23½° in zenith, much less in horizon.	25° 40'
6	33	R=23° in zenith, 21° in W. and 18½° in E. horizon.	19 8
6	57		20 3
7	23	R=29½° in zenith, and 24½° in both horizons.	17 45
7	37	R=31° in zenith, and 29½° in horizon.	17 35

1842, April 17.—Slight haze.

Apparent Time.			
3 ^h	30 ^m	{ BREWSTER'S neutral point distinctly seen, R=19½° in zenith, and 12° in S. horizon.	
5	34	R=17½° in zenith, 22½° in horizon; clear sky.	Arago. 20° 10'
6	3	BABINET'S neutral point just risen.	Babinet. 19° 30'
7	35	R=28½° in zenith plane.	

1842, April 18.—Barom. 30·0.

Apparent Time.			Babinet.
7 ^h	14 ^m	Pol. moon=27½°, 29½° in zenith.	18° 45'
7	23	Pol. moon=28½°, 30½° in zenith.	Arago. 17° 45'

1842, April 19.

Apparent Time.			Arago.
7 ^h	17 ^m		16° 35'
7	20	Pol. moon 14½° and a maximum.	Babinet. 18° 15'
7	37	22½°, and maximum 26½°.	19 10

1842, April 20.—See "Edinburgh Transactions," vol. xxiii. pp. 218, 230.

1842, April 21.—, , , p. 222.

Apparent Time.			
11 ^h	30 ^m	R=23½°, maximum at 90° from sun.	
1	10	R=25½°, maximum at 90° from sun.	
7	20		Arago. 17° 55'
7	48	A fog came on.	14 24
7	22		Babinet. 20 15

1842, April 22.—Fine day.

Apparent Time.

11^h 10^m A.M. $R=17\frac{1}{2}^{\circ}$; maximum polarisation in zenith 90° from sun.

2	0	$R=27^{\circ}$ at 90° from sun in zenith plane.	Brewster. 12° 10'
3	0	$R=29$ at 88 from sun in zenith plane.	11 10
4	10	$R=29\frac{1}{2}^{\circ}$ at 90° from sun.	
6	55		Arago. 20° 25'
6	58	Thin clouds.	Babinet. 22° 15'

1842, April 24.—Barom. 29·84, rising.

Apparent Time.

3 ^h	0 ^m	{ A haze. BABINET'S neutral point 70° high; BREWSTER'S not yet risen. After the haze had increased the sky cleared.	
6	21	Altitude of ARAGO'S neutral point above horizon.	8° 40'
6	10	" " "	13 0
6	10	Secondary neutral point exactly in horizon.	

1842, April 25, 26, 27, 28, 29.—See "Edinburgh Transactions," vol. xxiii. pp. 218, 230.

1842, May 2.—Barom. 29·93; wind east.

Apparent Time.

6 ^h	18 ^m		Arago. 23° 45'
7	1	$R=22\frac{1}{2}^{\circ}$ zenith to $18\frac{1}{2}^{\circ}$ in horizon.	24 45
7	45		20 15
6	21	$R=28\frac{1}{2}^{\circ}$ maximum in zenith plane.	Babinet. 16° 30'

1842, May 3.*—China-ink sky; wind east.

Apparent Time.

9 ^h	0 ^m	A.M. $R=19\frac{1}{2}^{\circ}$ maximum polarisation in zenith to $14\frac{1}{2}^{\circ}$ in horizon.	
11	0	$R=19\frac{1}{2}^{\circ}$ maximum polarisation in zenith to $14\frac{1}{2}^{\circ}$ in horizon; bands ragged.	
11	29	$R=20^{\circ}$; maximum at 89° from sun.	Arago. 10° 15'
12	15	$R=20^{\circ}$.	9 25

1842, May 4.

Apparent Time.

5 ^h	56 ^m		Arago.
6	2	{ The — bands of secondary neutral point distinct, and this point commenced.	17° 34'
6	13		
6	16	The secondary neutral point distinctly formed.	21 1

* See Edin. Trans., vol. xxiii. p. 230.

1842, May 9.—Barom. 29·83.

Apparent Time.			
5 ^h	42 ^m	R=22½° in zenith plane.	Arago.
6	7	Bands all positive.	19° 15'
6	18	Positive bands still in horizon.	
6	39		22 47'
7	28		23 21
			Babinet.
6	45		15° 0'
7	30	R=19½° in zenith plane.	16 5

1842, May 15, 16, 17.—See “Edinburgh Transactions,” vol. xxiii. pp. 218, 230, 231.

1842, July 16.—At Lacock Abbey, Wiltshire.

R=23° in a singularly fine day, this low polarisation indicating nebulosity, which collected and produced rain.

1842, August 2.—At St Andrews; Barom. 30·0.

Apparent Time.			
5 ^h	9 ^m	R=20½° in zenith, and 14½° in horizon.	
5	27	{ The bands opposite the sun begin to weaken, and there is a second neutral point.	
6	15		
6	0	Negative bands distinctly seen.	Arago.
6	26		20° 36'
7	29		25 11
7	54		23 1
9	13		22 41
			33 40!
			Babinet.
6	32		13° 40'
6	39	{ ARAGO's secondary neutral point distinctly formed. A dark band along the horizon, below ARAGO's neutral point.	

1842, August 4.—Slight rain in morning; Barom. 29·5; wind west.

Apparent Time.			
5 ^h	54 ^m	R=25½° near horizon.	
6	41	ARAGO's secondary neutral point in horizon.	
7	6	R=29½° in clear blue sky.	
7	9	Altitude of ARAGO's neutral point above horizon,	15° 40'

1842, August 5.—Rain in forenoon. I observed a singular sky in the west,

A _____ Darker Blue. _____ A
 m ~~~~~ m ~~~~~ m
 B _____ Pale Blue. _____ B
 H _____ Whitish. _____ H

Fig. 6.

to the north of the sun and below him. The whole sky, from A A to the horizon H H, was clear, but the part A A was darker than B B, and of a deep China-ink blue, while B B was much paler. But, what was singular, these differently coloured spaces were separated by an irregular line m m m, showing that the whole space m m m H H was a thin sheet of cloud or vapour, terminating abruptly at m m m.

Apparent Time.			
5 ^h	40 ^m	R=17½°, maximum polarisation at alt. 40°.	Arago.
7	21	R=27½° in zenith plane, and 26½° at alt. 40°.	17° 10'
7	25	A cloud approaching the neutral point.	16 35
7	40	R=28½°, maximum in zenith plane.	19 30

1842, August 6.—Barom. 29·6; rain at 5^h P.M.

Apparent Time.

7^h 50^m R=28½° max. in zenith plane to 24½° in horizon.
 7 56 Altitude above horizon of ARAGO's neutral point. 19° 10'

Clouds around the blue space.

1842, August 11.—Barom. 29·62; rain in morning.

Apparent Time.

5^h 30^m R=23½° in zenith plane, and 20½° in S. horizon.
 5 51 + Bands opposite sun almost gone at 1¼° above hor.

6 14	}	Altitude of the two neutral points above the horizon.	}	Arago.
6 46				6° 40'
7 40				14 35
8 4				20 35
7 43	}	R=29° in zenith.	}	Babinet.
8 10				18° 25'
				12 0

1842, August 17.—See “Edinburgh Transactions,” vol. xxiii. p. 231.

1842, August 22.—Warm; fine day.

Apparent Time.

2 ^h 20 ^m	{	R=24½° maximum polarisation in zenith plane to 19½° in horizon.		Arago.
5 52				18° 36'
6 37		R=27½° in zenith plane.		21 16
7 26		R=28½° in zenith plane.		19 56
7 49				22 8
7 52				Babinet.
				13° 8'

1842, August 28.—See “Edinburgh Transactions,” vol. xxiii. p. 231.

1842, September 9.—Barom. 29·1, after rain.

Apparent Time.

5^h 53^m R=26½° maximum polarisation in zenith, to 25½° in horizon.
 6 38 Arago.
 18° 57'

1842, September 13.—Barom. 29·93. Fine day.

Apparent Time.

4 ^h 39 ^m		R=28° maximum polarisation in zenith plane.		Arago.
4 50	{	R=27½° maximum polarisation in 30° alt. N.W. horizon, to 24½° in horizon. In S. horizon, alt. 30° 26½° to 22½° in horizon.	}	15° 35'
5 29				18 35
5 58				20 17
6 36		R=29½° maximum polarisation. Pol. of moon 19½°.		20 0
7 2				16 24
5 31		R=29° maximum polarisation in zenith.		Babinet.
5 56				14° 25'
6 38		R=29½° maximum polarisation in zenith.		15 40
7 6				16 6
				19 8

1842, September 17.—Barom. 29·45, after a rainy day.

Apparent Time.
6^h 48^m P.M.

6 53

R=28½° maximum polarisation in zenith.

Arago.
17° 20'
Babinet.
16° 25'

1842, September 18.—Fine blue sky. Barom. 29·57.

Apparent Time.

3^h 0^m

R=21½° in zenith plane to 19½° in horizon.

3 45

R=22½° in zenith plane to 20½° in horizon.

4 20

R=25° in zenith plane to 23° in horizon.

4 46

Fringes all + opposite sun and in horizon.

4 47

Arago.

5 6

15° 28'

5 36

16 36

5 56

20 16

5 21

R=27½° max. polarisation in zenith to 24½° in hor.

19 40

1842, September 28.—Fine day.

Apparent Time.

4^h 32^m

R=28° maximum polarisation in zenith plane.

Arago.

4 58

18° 36'

1842, September 29.—Fine day; cold; wind east.

Apparent Time.

4^h 37^m

R=30½° maximum polarisation in zenith.

Arago.

5 11

17° 34'

1842, September 30.—Fine day.

Apparent Time.

4^h 18^m

R=29½° max. polarisation in zenith to 26½° in hor.

4 24

Neutral point not risen. Bands +.

Arago.

4 55

16° 11'

5 47

18 18

Babinet.

4 58

15° 23'

5 44

R=29½° maximum polarisation in zenith plane.

17 28

1842, October 15.—Fine day. Barom. 30·0, rising.

Apparent Time.

4^h 32^m

R=29½° maximum polarisation in zen. to 26½° in hor.

Arago.

5 11

18° 0'

5 42

25 30 !

Babinet.

4 34

15° 23'

5 9

17 26

5 46

20 0

1842, October 19.—Barom. 29·3. Cold.

Apparent Time.

4^h 56^m

R=27½° maximum polarisation in zenith plane.

Arago.

5 5

19° 11'

5 8

20 9

Babinet.

16° 39'

1842, October 20.—Barom. 29·62. Fine day; cold.

Apparent Time.		Arago.
4 ^h 15 ^m	R=26½° near S. horizon. Clouds in zenith.	14° 46'

1842, October 21.

Apparent Time.		Arago.
4 ^h 49 ^m	Neutral point above a cloud.	18° 13'

1842, October 24.—Barom. 29·33. Rain in the morning; cold.

Apparent Time.		Arago.
4 ^h 28 ^m		18° 46'
4 32	R=27° maximum polarisation in zenith plane.	Babinet. 21° 59'

1842, November 9.—Barom. 29·06, after a storm of wind and rain.

Apparent Time.		Arago.
4 ^h 41 ^m	Polarisation of moon in S. horizon 25½°.	17° 20'

1842, November 14.—See “Edinburgh Transactions,” vol. xxiii. pp. 218, 226.

1842, November 15.—Barom. 29·72. Hard frost in morning.

Apparent Time.		Arago.
2 ^h 12 ^m	Secondary neutral point in horizon.	17° 50'

1842, November 20, 21.—See “Edinburgh Transactions,” vol. xxiii. pp. 219, 226.

1842, November 27.—Barom. 29·15, rising. A dark band along the horizon.

Apparent Time.		
3 ^h 57 ^m	R=27° in zenith, and 18½° in horizon.	
	ARAGO's secondary neutral point in horizon, and primary one considerably up.	

1842, December 3.—Barom. 29·95. Fine day.

Apparent Time.		
12 ^h 46 ^m	ARAGO's neutral point not risen.	
12 46	R=27½° maximum polarisation in zenith, 20½° in hor.	
2 16	R=28½° maximum polarisation in zenith, 18½° in hor.	Arago. 19° 20'
4 23		24 22
4 28		Babinet. 20° 15'

1842, December 17.—Barom. 29·58, rising after rain.

Apparent Time.		Arago.
3 ^h 16 ^m		18° 5'
3 19	R=29° maximum polarisation in zenith.	Babinet. 17° 50'

1842, December 18.—Barom. 29·79. Raining occasionally.

Apparent Time.		Arago.
11 ^h 13 ^m		13° 45'
12 23		14 42

1842, December 22.—Barom. 29·38, falling. Rain.

Apparent Time.
2^h 43^m

2 46

R=29° maximum polarisation in zenith plane.

Arago.
17° 50'
Babinet.
16° 10'

1842, December 23.—Barom. 29·01, after rain.

Apparent Time.
3^h 0^m

3 3

R=30° maximum polarisation in zenith plane.

Arago.
18° 16'
Babinet.
19° 4'

1842, December 24.—Barom. 29·33.

Apparent Time.
12^h 3^m

12 44

R=26½° maximum polarisation in zenith plane.

1 32

R=28°

”

”

2 24

R=27°

”

”

3 8

R=29°

”

”

3 37

R=27½°

”

”

Arago.
15° 28'

15 5

17 30

18 40

17 52

19 14

Babinet.

2 27

{ The point of maximum polarisation rising as the
sun's altitude diminishes. }

18° 28'

3 5

20 6

3 39

17 55!

1842, December 26.—Barom. 28·88.

Apparent Time.
1^h 3^m

3 27

R=26½° maximum polarisation, alt. 30°.

Arago.
16° 25'

17 15

3 30

R=28° maximum polarisation in zenith plane.

Babinet.

17° 40'

1842, December 27.—Barom. 29·35. Sun shining through a dry haze, which continued all day. The lines in the sun's spectrum singularly sharp.

Apparent Time.
11^h 48^m

12 4

R=26½° maximum polarisation in zenith plane.

1 45

R=23½° maximum polarisation in zenith plane,

14½° in horizon.

2 35

R=24° maximum polarisation in zenith plane.

3 15

R=27½°

”

”

R=29½°

”

”

Arago.
15° 50'

17 15

20 25

21 30

19 0

Babinet.

12 9

12° 25'

1 50

14 40

2 38

16 5

1842, December 28.—See “Edinburgh Transactions,” vol. xxiii. pp. 219, 226.

1842, December 29.—Barom. 29·50. Clear in north.

Apparent Time.
11^h 40^m

12 0

Arago.
15° 25'

15 29

Babinet.

11 44

{ R=26½° maximum polarisation in zenith plane.
Slight clouds.
R=28½° alt. 50°. Sky clearer. }

17° 49'

1842, December 30.—Boisterous day; thin white clouds.

Apparent Time.		Arago.
2 ^h 0 ^m	R = 22½° maximum polarisation in zenith plane.	15° 5'
2 24		

1842, December 31.—Windy, and sky cloudy.

Apparent Time.		Arago.
11 ^h 53 ^m	R = 27½° maximum polarisation in zen. Sky impure.	16° 40'

1843, January 4.—Fine day.

Apparent Time.		Arago.
11 ^h 32 ^m	R = 27½° maximum polarisation in zenith.	14° 41'
11 43		14 30
11 35	R = 23½° to 18°. Haze coming on.	Babinet. 15° 47'
1 51	Altitude of ARAGO's neutral point above hor. 4° 30'.	
	R = 24½° to 18½°. Haze to east and south.	

1843, January 5.—At Rankeilour M'Gill; clear and cold.

Apparent Time.		Arago.
11 ^h 27 ^m	{ R = 28½° maximum polarisation, 18½° in horizon. Neutral line convex to sun. }	14° 44'

1843, January 10.—Barom. 28·5; very cold.

Apparent Time.		Arago.
2 ^h 3 ^m	R = 29° maximum polarisation in zenith plane.	14° 25'
2 41	Polarisation of moon 21½°, 24½° in horizon.	

1843, January 11.—Barom. 28·72. Fine day.

Apparent Time.		Arago.
12 ^h 35 ^m	{ R = 26½° maximum polarisation. Nebulosity in zenith. }	15° 15'
1 47	R = 29½° maximum polarisation in zenith. Clear sky.	
2 55	R = 28° maximum polarisation. Slight nebulosity.	19 50
3 10	Polarisation of moon 15°.	

1843, January 21.—A misty day.

Apparent Time.		Arago.
2 ^h 46 ^m	R = 19½° maximum polarisation in zenith 30° at 14° alt.	16° 40'
3 18	Misty.	10 6

The mist increased, and the maximum polarisation everywhere reduced to 1½°, and the two neutral points descended to the horizon several degrees.

1843, January 28.—Barom. 29·45. Very windy.

Apparent Time.		Arago.
12 ^h 28 ^m	Neutral point below horizon.	14° 10'
12 47	" "	14 0
1 57	" "	11 5
3 51	Misty.	22 41!
		Babinet.
3 54	R = 28½° maximum polarisation to 20½° in horizon.	
12 28	R = 26½° " " to 18½° " "	14° 45'
		4 F

1843, January 30.—Barom. 29·50. Windy.

Apparent Time.			Arago.
12 ^h	18 ^m	Neut. point below horizon, $R=21^\circ$, maximum clear.	15° 40'
1	47	{ Neut. point below horizon, $R=24\frac{1}{2}^\circ$ in zenith to 14 $\frac{1}{2}^\circ$ in horizon.	12 25
2	28		
3	52	{ $R=28\frac{1}{2}^\circ$ maximum polarisation in zenith, to 21 $\frac{1}{2}^\circ$ in horizon.	16 29
4	2		
			18 32
			Babinet.
3	55		19° 0'
3	10	{ $R=27\frac{1}{2}^\circ$ maximum polarisation in zenith, to 21 $\frac{1}{2}^\circ$ in horizon.	18 25

1843, February 15.—Very cold day; clear only in north.

Apparent Time.		Arago.
2 ^h	57 ^m	16° 5'

1843, February 16.—Barom. 29·18, rising. Fine sky.

Apparent Time.			Babinet.
11 ^h	56 ^m	$R=25^\circ$ maximum polarisation, 20° in horizon.	
12	57		9° 40'
			Brewster.
12	57		11° 25'
			Arago.
3	28	{ $R=29\frac{1}{2}^\circ$ maximum polarisation in zenith, 24 $\frac{1}{2}^\circ$ in horizon.	12° 52'
4	3		
		{ $R=29\frac{1}{2}^\circ$ maximum polarisation in zenith, 26 $\frac{1}{2}^\circ$ in horizon.	18 40
5	0		
4	7	$R=30^\circ$ „ „	17 52
5	4		14 52
			17 26

1843, February 17.—Barom. 29·6. Sky not clear in N. horizon.

Apparent Time.		Arago.
3 ^h	6 ^m	11° 28'
3	30	14 14

1843, March 4.—Barom. 30·08.

Apparent Time.			Arago.
3 ^h	35 ^m	$R=14\frac{1}{2}^\circ$ maximum polarisation in zenith plane.	16° 45'
3	46		17 30
3	54	Secondary neut. point 50' high. Hazy in horizon.	17 57
4	6		20 30

1843, March 7.

Apparent Time.			Arago.
4 ^h	40 ^m	$R=24\frac{1}{2}^\circ$ maximum polarisation in zenith.	17° 0'

1843, March 8.—Barom. 30·13. Wind east; hazy.

Apparent Time.			Arago.
4 ^h	14 ^m	$R=24\frac{1}{2}^\circ$ maximum polarisation.	17° 47'

1843, March 12.—Barom. 29·34, after rain.

Apparent Time. Arago.
 4^h 2^m { R=25½° maximum polarisation. Polarisation { 13° 15'
 of moon 7°.

1843, March 25.—See “Edinburgh Transactions,” vol. xxiii pp. 220, 226.

1843, March 28.—Barom. 29·84. Wind east; dry.

Apparent Time.	Arago.
6 ^h 2 ^m	16° 45

1843, March 29.—Barom. 29·88. Fine day, cold; wind east; dry.

Apparent Time.			Arago.
3 ^h 51 ^m	R=28½°	25½° in S. and 26½° in W. horizon.	
5 58			18° 35'
6 26			19 33
			Babinet.
6 1	R=29½°	maximum polarisation in zenith, 28° in hor.	18° 22'
6 24	R=29½°	" " " "	18 27

1843, April 7.

Apparent Time.	Arago.
6 ^h 54 ^m	19° 0'
	Babinet.
6 48	16° 29'

1843, April 10.—Barom. 29·74. Very cold wind, north-west.

Apparent Time.	Arago.
6 ^h 23 ^m	20° 42'
	Babinet.
6 25	22° 23'

1843, April 11.—Barom. 29·80. Very cold.

Apparent Time.		Arago.
6 ^h 43 ^m	R=28½° maximum polarisation. Sky whitish blue.	17° 30'
6 48		17 45

1843, April 12.—Barom. 29·77.

Apparent Time.	Babinet.
4 ^h 35 ^m	41° 35'

The sky was covered with a thick haze; the sun barely seen through it, and showers of hail falling occasionally. The bands a maximum above the sun, but disappeared 9° above horizon. A neutral point was seen at 25° alt. opposite the sun, but the bands below it seemed + ! though extremely faint.

1843, April 17.—See "Edinburgh Transactions," vol. xxiii. p. 226.

Apparent Time.		Arago.
6 ^h 30 ^m	R=25½° maximum polarisation in zenith, 20½° in hor.	22° 32'
7 4	R=29 " " "	20 44
7 30	R=29½ " " "	20 10

1843, April 19.—Nebulosity in zenith. Clouds round horizon.

Apparent Time.			Arago.
7 ^h 30	R = 25½°	maximum polarisation in zenith plane.	18° 35'
7 33			Babinet.
			19° 0'

1843, April 28.—Barom. 29·44, after rain. Clear sky after clouds had cleared away.

Apparent Time.			Arago.
7 ^h 9 ^m			20° 23'
7 40			19 37
			Babinet.
7 3	R = 29°	maximum polarisation in zenith plane.	16° 46'
7 44	R = 29	maximum polarisation in zenith, 20½° in hor.	18 0

1843, April 29.—See “Edinburgh Transactions,” vol. xxiii. pp. 226–27.

1843, April 30.—Barom. 30·07. Morning, and rising. Not a cloud.

Apparent Time.			
1 ^h 0 ^m	R = 26½°	maximum polarisation in zenith, 22½° in horizon.	
4 15	R = 26½	”	”
5 43	Secondary neutral point forming.		
			Arago.
6 4			11° 20'
6 52	R = 29°.	maximum polarisation in zenith, 22½° in hor.	19 20
7 33	R = 29½	maximum polarisation in zenith, 22½° in hor.	19 35
7 58			19 3

A brown haze rising up upon the blue sky. See “Edinburgh Transactions,” vol. xxiii. p. 231.

1843, May 2.—Barom. 30·07. Wind east; no sun.

BABINET’S neutral point near zenith, and polarised bands scarcely seen, excepting at 90° from sun.

1843, May 3.—See “Edinburgh Transactions,” vol. xxiii. p. 227.

Apparent Time.			Arago.
6 ^h 49 ^m			18° 26'
			Babinet.
6 53	R = 30°	maximum polarisation in zenith, 27° in hor.	14° 20'

Very clear in zenith, with a whitish sky.

1843, May 6.—Wind east; uniform China-ink clouds over the sky, through which the sun shone brightly, but ill-defined.

4^h 43^m.—Polarised bands distinct over the face of the sun and above him, but exceedingly feeble opposite the sun.

1843, May 11.—Barom. 30·0. Fine day.

Apparent Time.			Arago.
2 ^h 30 ^m	R = 20½°	maximum polarisation in zenith plane.	
6 0	Neutral point not up.		14° 34'
6 12	R = 23½°	maximum polarisation in zenith.	18 15

Whitish-blue sky. White clouds in horizon.

1843, June 13.—Barom. 30. Wind east.

Apparent Time.		Arago.	
6 ^h	56 ^m	19°	15'
9	10	20	25
		Babinet.	
7	0	25°	10'
9	13	15	30

$R = 27\frac{1}{2}^\circ$ maximum polarisation in zenith plane.
 $R = 29\frac{1}{2}^\circ$ in zenith, horizon clear.

1843, June 14.—Barom. 30·07. Splendid day ; wind east.

Apparent Time.		Babinet.	
6 ^h	12 ^m	13°	30'
7	59	15	30
		Arago.	
7	0	11°	5'
7	56	18	20

$R = 29\frac{1}{2}^\circ$ maximum polarisation in zenith, $21\frac{1}{2}^\circ$ in hor.
 $R = 29\frac{1}{2}^\circ$ „ „ „ $22\frac{1}{2}^\circ$ in hor.
 $\left\{ \begin{array}{l} R = 29\frac{1}{2}^\circ \text{ maximum polarisation in zenith, } 22\frac{1}{2}^\circ \text{ in } \\ \text{horizon. Neutral point in horizon.} \end{array} \right\}$

1843, June 15.—See “Edinburgh Transactions,” vol. xxiii. p. 231.

1843, June 16.—Barom. 30·0. Sky covered with white nebulosity.

Apparent Time.		Arago.	
12 ^h	20 ^m	10°	45'
7	0	17	50
7	38	15°	55'
		Babinet.	
7	41	15°	55'

$R = 25\frac{1}{2}^\circ$ maximum polarisation in zenith plane.
 $R = 29\frac{1}{2}^\circ$ maximum polarisation in zenith plane.

1843, June 21.—See “Edinburgh Transactions,” vol. xxiii. pp. 220, 227,

1843, June 22.—Barom. 29·90. Wind east ; fine day.

Apparent Time.		Arago.	
8 ^h	42 ^m	19°	15'

Antisolar point in horizon. Clouds in zenith.

1843, June 23.—Barom. 29·92. Fine day.

Apparent Time.		Arago.	
7 ^h	17 ^m	15°	35'
7	26	17	30
8	58	18	30
		Babinet.	
7	30	15	10
9	0	16°	50'

$R = 25^\circ$ maximum polarisation in zenith, $18\frac{1}{2}^\circ$ in hor.
 $R = 27\frac{1}{2}^\circ$ maximum polarisation in zenith, 22° in hor.

1843, June 24.—Barom. 29·92.

Apparent Time.		Arago.	
7 ^h	8 ^m	17°	47'

1843, June 26.

Apparent Time.		Arago.	
7 ^h	25 ^m	21°	6'
8	52	17	33

Neutral point in the middle of a bright orange cloud.

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1843, July 3.—Barom. 29·57, rising.

Apparent Time.		Arago.
7 ^h	29 ^m R=26° maximum polarisation in zenith, 20½° in S. hor.	16° 28'

1843, July 6.

Apparent Time.		Arago.
6 ^h	50 ^m R=28½° maximum polarisation in zenith, 22½° in hor.	11° 45'
7	1	14 15
7	21 R=18½° polarisation of moon.	17 32
8	13 R=29° maximum polarisation in zenith plane.	19 30
8	55	18 15
		Babinet.
7	25	13 40
8	15 R=28½° polarisation of moon.	16 3
8	52	17 11

1843, July 11.—Barom. 30·0, rising.

Apparent Time.		Arago.
6 ^h	55 ^m R=29½° maximum polarisation in zenith; clear sky.	12° 28'
7	51 White clouds forming in many places.	21 11!
		Babinet.
7	54	19° 10'

1843, July 21.—Barom. 29·5; no rain.

Apparent Time.		Arago.
7 ^h	34 ^m Thin clouds in zenith and near sun.	20° 4'

1843, July 24.—Barom. 29·87, rising; no rain.

Apparent Time.		Arago.
6 ^h	58 ^m	17° 52'

1843, August 6.—Barom. 29·77, after a wet day.

Apparent Time.		Arago.
7 ^h	27 ^m R=29½° maximum polarisation in zenith; sky clear.	18° 49'
		Babinet.
7	49	17° 39'

1843, August 9.—Fine day; rain yesterday.

Apparent Time.		Arago.
7 ^h	37 ^m	19° 34'
8	3	18 17

1843, August 10.—Splendid day; haze in zenith; slight white clouds. Barom. 29·97; hot.

Apparent Time.	
11 ^h	38 ^m R=24° maximum polarisation in zenith plane.

17° 50'

16° 32'

17° 23'

6 48 Babinet.
6 53 R=30° maximum polarisation in zenith, $23\frac{1}{2}^{\circ}$ in S. hor. $16^{\circ} 26'$

17° 42'

18 54

18° 22'

17° 8'

1843, November 7.—Barom. 29·30, rising; fine day.

Apparent Time.		Arago.
4 ^h 29 ^m	R=29½° maximum polarisation in zenith, 26½° in S. hor.	18° 22'

1843, November 14.—Barom. 30·13, rising; fine day; wind north-west by west.

Apparent Time.		Arago.
4 ^h 12 ^m		18° 33'
4 17	R=28° maximum polarisation in zenith plane.	Babinet. 18° 45'

1843, November 20.—Barom. 29·27, rising; cold day.

Apparent Time.		Arago.
4 ^h 36 ^m		21° 32'
4 37		Babinet. 18° 13'

1843, November 29.—Fine day.

Apparent Time.		Arago.
3 ^h 31 ^m		14° 14'

1843, December 1.—Barom. 29·94; fine day.

Apparent Time.		Arago.
4 ^h 10 ^m		18° 8'
4 12		Babinet. 19° 26'

1843, December 6.—Fine day; wind west; clear sky everywhere.

Apparent Time.		Arago.
3 ^h 3 ^m		16° 58'
3 7	R=28½°, 90° from sun.	Babinet. 18° 11'

1844, January 23.—Barom. 27·8, rising; fine day.

Apparent Time.		Arago.
3 ^h 34 ^m		18° 51'
3 37	R=27° maximum polarisation in zenith plane.	Babinet. 17° 31'

1844, January 25.—Barom. 29·84; rain till 2^h P.M.

Apparent Time.		Arago.
4 ^h 20 ^m		18° 16'
4 26	R=28° maximum polarisation in zenith.	
4 38	Polarisation of moon 17½°.	Babinet. 19° 0'

1844, February 3.—See “Edinburgh Transactions,” vol. xxiii. pp. 220, 227.

1844, February 6.—Snow on ground.

Apparent Time.			Arago.
3 ^h	13 ^m		19° 1'
3	19	R=25° maximum polarisation in zenith plane.	Babinet.
4	2	R=27 maximum polarisation in zenith, 19½° in hor.	17° 58'

1844, February 7.—Clouds over zenith; snow.

Apparent Time.		Arago.
2 ^h	18 ^m	18° 13'

1844, February 16.—Barom. 29·74; wind west; fine day.

Apparent Time.			
12 ^h	14 ^m	R=26½° maximum polarisation, to 19½° in horizon.	
1	58	R=26½	20½
3	1	R=23½	18½
			Arago.
3	14	Neutral point in horizon.	
3	20		10° 14'
3	24	Secondary neutral point in horizon.	14 33
3	33	Sky clouded.	15 31
4	6	Secondary neutral point disappears.	
			Babinet.
4	32		19° 49'

1844, February 21.—See “Edinburgh Transactions,” vol. xxiii. p. 220.

1844, February 27.—Barom. 29·12., rising. Thaw.

Apparent Time.			Arago.
3 ^h	16 ^m	Polarisation of moon 17½°.	
3	44		14° 10'

1844, March 7.—Barom. 30·03, rising. Fine day.

Apparent Time.			Arago.
4 ^h	48 ^m	{ White nebulosity in zenith; R=13° maximum polarisation. }	19° 20'

1844, March 27.—Barom. 29·70, rising.

Apparent Time.			Arago.
5 ^h	40 ^m	Polarisation of moon 22½°.	20 40'

1844, April 11.—Fine day and fine evening; wind west.

Apparent Time.			Arago.
6 ^h	23 ^m	R=27° maximum polarisation, 22½° in horizon.	18° 23'
7	1		18 37
			Babinet.
6	24		20° 50'
7	3		19 19

1844, April 22.—Fine day. Barom. 29·80.

Apparent Time.			Arago.
6 ^h 29 ^m	R=27½°	maximum polarisation, 22½° in S. horizon.	19° 31'
7 15			20 34
			Babinet.
6 37			21° 32'
7 18	R=28½°	maximum polarisation, 22½° in S. horizon.	17 28

1844, April 24.—Barom. 29·87. Fine day; windy.

Apparent Time.		Arago.
6 ^h 1 ^m		16° 55'
6 38		20 30
		Babinet.
6 3		15° 58'

1844, April 26.—Barom. 29·84, rising.

Apparent Time.	Arago.
6 ^h 24 ^m	19° 20'

1844, April 27.—Barom. 30·07, rising.

Apparent Time.		Arago.
7 ^h 1 ^m	R=14°	20° 50'
		Babinet.
7 2	A great whiteness in the sky.	23° 22'

1844, May 2.—Barom. 30·25.

Apparent Time.				Arago.
5 ^h	52 ^m			21° 5'
6	0	R=15½° maximum polarisation in zenith, 14½° in hor.		22 25
6	33	R=17	„ „ 14 „	23 20
7	22	R=20	„ „ 14½ „	22 25
				Babinet.
6	5			13° 40'

1844, May 3.—See "Edinburgh Transactions," vol. xxiii p. 231.

1844, May 7.—Barom. 29·80. Whitish sky.

Apparent Time.			Arago.
7 ^h 3 ^m	R=26½°	maximum polarisation, 20½° in horizon.	20° 2'
			Babinet.
7 5			16° 30'

1844, May 15.—Barom. 30·0, falling. Fine day.

Apparent Time.		Arago.
6 ^h 36 ^m		16° 50'
6 52		20 5
7 46		21 40
		Babinet.
6 50		16° 10'
7 51		21 15

1844, June 3.—Barom. 29·86. Wind west.

Apparent Time.		Arago.
8 ^h 46 ^m		20° 58'
		Babinet.
8 52		20° 35'

1844, June 10.—See “Edinburgh Transactions,” vol. xxiii, pp. 220, 227.

1844, June 13.— ,, ,, ,, ,,

1844, August 20.—Barom. 29·77, rising. Fine day.

Apparent Time.			Arago.
6 ^h 57 ^m	R=23° maximum polarisation, 27° in horizon.		17° 1'
7 38	R=27½° ,, ,,		20 40
8 8			21 25
8 46			19 0
		Babinet.	
8 50	R=29°		17° 15'

1844, August 26.—Barom. 29·77, rising. Fine day.

Apparent Time.		Arago.
6 ^h 18 ^m	Neutral point among small mottled clouds.	29° 0'

1844, August 29.—Barom. 29·92, falling. Fine day. A China-ink sky.
BREWSTER'S neutral point distinctly seen.

Apparent Time.	
2 ^h 20 ^m	R=19½° maximum polarisation in zenith plane.

1844, September 21.—Barom. 30·1; cold and clear sky.

Apparent Time.		Arago.
6 ^h 16 ^m	R=28½° maximum polarisation in zenith, 25½° in hor.	18° 55'
		Babinet.
6 18	Polarisation of moon 17½°.	17° 11'

1845, January 11.—Fine day, cold; wind west.

Apparent Time.		Arago.
2 ^h 10 ^m	R=28½° maximum polarisation in zenith.	8° 15'

1845, January 20.—Barom. 29·48. Fine day; frosty.

Mean Time.		
3 ^h 10 ^m	R=29° maximum polarisation in zenith.	Above Horizon.
3 15	Alt. of ARAGO'S neutral point,	12° 56'
3 17	Alt. of BABINET'S neutral point; clouds came on,	22 0

1845, January 24.—Barom. 29·55, rising.

Mean Time.		Above Horizon.
3 ^h 37 ^m	Alt. of ARAGO'S neutral point,	11° 0'
3 59	Alt. of ARAGO'S neutral point,	17 30
4 4	Alt. of BABINET'S neutral point,	19 35
4 39	Alt. of ARAGO'S neutral point,	13 35
4 41	Alt. of BABINET'S neutral point,	24 0

1845, January 31.—Therm. 18° at 10^h P.M. of the 30th; 8^h A.M., therm. 12° .
 Barom. 29.54. rising. Fine frosty, clear day; ground covered with snow.

Mean Time.		
12 ^h	55 ^m	R = $26\frac{1}{2}^{\circ}$ in zenith and in horizon.
12	55	ARAGO's neutral point in N, hor.; sun's alt. then $14^{\circ} 45'$.
1	40	ARAGO's neutral point still in horizon.
1	40	R = $26\frac{1}{2}^{\circ}$ in zenith.

1845, February 1.—Barom. 29.80. Frosty day; cloudy till 3^h.

Mean Time.			Above Horizon.
3 ^h	30 ^m	Alt. ARAGO's neutral point,	$8^{\circ} 15'$
		R = $20\frac{1}{2}^{\circ}$ maximum polarisation in zenith to $14\frac{1}{2}^{\circ}$ in hor.	
3	45	Alt. ARAGO's neutral point,	14 30
		R = $22\frac{1}{2}^{\circ}$ maximum polarisation.	

1845, April 8.—Barom. 29.06.

Mean Time.			Above Horizon.
5 ^h	35 ^m	Alt. ARAGO's neutral point,	$9^{\circ} 10'$
6	1	" " "	20 20
5	39	Alt. BABINET's neutral point,	25 10
6	4	" " "	15 25

1845, April 15.—See "Edinburgh Transactions," vol. xxiii. p. 220.

1845, July 14.—On the top of Scuirmore, near Glenquoich.

Mean Time.			Above Horizon.
5 ^h	24 ^m	Altitude of ARAGO's neutral point,	$6^{\circ} 40'$
		R = $23\frac{1}{2}^{\circ}$ maximum polarisation in zenith plane.	

1845, September 6.—Barom. 30.10. Fine day; a milky sky.

Mean Time.			Above Horizon.
1 ^h	10 ^m	R = 17° maximum polarisation in zenith plane.	
5	31	R = 23° ARAGO's neutral point.	$11^{\circ} 0'$
5	41	ARAGO's secondary neutral point seen in horizon.	13 24
6	36	ARAGO's neutral point,	19 10
5	43 }	BABINET's R = $28\frac{1}{2}^{\circ}$ maximum polarisation, 24° in	{ 24 0 20 24
6	28 }	horizon.	

1850, July 1, 15, 29.—See "Edinburgh Transactions," vol. xxiii. p. 237.

1850, July 9.—Barom. 29.79, rising. Fine clear sky.

Mean Time.		
6 ^h	56 ^m	Bands just visible at the land horizon.
7	5	Bands invisible close to land horizon.
7	21	During the previous 21 minutes no trace of the + bands was seen. At 7 ^h 21 ^m they were seen, and became rapidly brighter.

The positive action which here produced the secondary neutral point was not strong enough to produce it by exhibiting the + bands counteracting the — ones, at some height above the horizon; but it was strong enough to neutralise them for 21 minutes, and to weaken them greatly when they did appear.