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It is greatly to be hoped that progress may be made before long in this direction in the southern hemisphere.

The Rev. E. G. Roberts, of Masulipatam, has unfortunately been in ill-health and unable to continue his excellent meteoric work in India. He points out that much might be done there by a European with some talent for organisation.

The Report, which has been drawn up on the usual lines, may be regarded as consisting of two parts, the first of which deals for the most part with observations of meteoric showers ("Record of Meteoric Observations, 1900," and "Radiant Points of Meteoric Showers, 1900,") and the second of which has to do with individual fireballs and meteors ("The Fireballs of 1900," "Real "Paths of Fireballs and Shooting Stars observed at two or "more Stations in 1900," and "Bright Meteors observed during 1900").

Two Interim Reports have been presented during the year:— "The Perseids, 1900" (*see* the "Journal," Vol. X., page 420), and "The Leonids, 1900" (Vol. XI., page 56).

The Tables of "Real Paths," mentioned above, have been compiled by Mr. Denning and Prof. Herschel; that by Prof. Herschel (including fresh calculations for two meteors of 1899) supplementing Mr. Denning's by new data, and also containing additional determinations, with a series of valuable notes, in some cases where the placing of a different construction on discordant or indefinite observations has suggested itself. In these instances the tables show the probable differences to be expected between independent computations of real paths. To these and all other observers who have assisted in the work of the Section the Director begs to express his thanks.

Record of Meteoric Observations, 1900.

QUADRANTIDS.

The opening meteoric shower of the year furnished a fine display. On January 2 Mr. T. H. Astbury, at Wallingford, and Mr. J. H. Bridger, at Farnborough, watched from $5^h\ 20^m$ to 7^h and from $5^h\ 35^m$ to $7^h\ 3^m$ respectively. The former recorded six meteors, of which four were Quadrantids, and the latter three meteors including two Quadrantids, besides glimpsing three other meteors, of which one was, perhaps, a Quadrantid. Mr. Astbury noted three Quadrantids and four other meteors in a further watch from 10^h to 11^h, in the first 35^m of which, however, not a single shooting-star was seen; three of these seven were of the first magnitude.

Prof. Herschel's observations, made at Slough, between 11^h and $16^h\ 30^m$, add greatly to the history of the Quadrantid shower. During this long-continued watch 130 shooting stars were seen, 80 of these being mapped. The meteors were principally of the first and second magnitudes, but one was as bright as Venus and another three or four times more brilliant than that planet. Twenty-nine Quadrantids gave a radiant point at $229° + 52°$.

At Clapham watch was kept from $11^h\ 30^m$ to 13^h, with the result that 25 meteors (13 Quadrantids) were registered, and a few

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more imperfectly seen. Four Quadrantids were as bright as first magnitude stars. The meteors of the shower in question appeared to be most numerous at the following times :—

$11^h\ 42^m$ to $11^h\ 53^m$	- -	5 Quadrantids.
$12^h\ 54^m$ to $13^h\ 0^m$	- -	4 „

A first magnitude meteor, probably a Quadrantid, was observed at $11^h\ 47\frac{1}{4}^m$ by the Rev. S. J. Johnson, at Bridport.

As showing the progress of the shower at a later hour, it may be mentioned that a report from Mr. Bridger states that he has been informed that several shooting stars were seen at Chalfont, in Buckinghamshire, between 18^h and $18^h\ 30^m$, which "had tails and burst like rockets."

Sixteen meteors were recorded during the period January 20–27 by Mr. A. King, at Leicester, nine by Mr. Astbury, on January 24 and 25, and four (three others glimpsed), by Mr. Bridger on January 25. Not many of these seem to have proceeded from common radiants, those best indicated being at $85° + 42°$ and $132° + 34°$.

MARCH METEORS.

Mr. Bridger saw 33 shooting stars in March, the positions of 23 of these being definitely determined. The aggregate length of watches when discounted was $10^h\ 22^m$ (principally during the period March 20–31). Mr. King observed eight meteors between March 20 and 31, one being greater than, and two equal to, the first magnitude, and Mr. Astbury six between the same dates.

Prof. Herschel contributed a list of 28 meteors observed between March 26 and April 2 (the chief watches being between 10^h and 12^h on March 28, 10 meteors; $10^h\ 45^m$ and $11^h\ 45^m$ on March 30, 5 meteors; $8^h\ 15^m$ and $11^h\ 30^m$ on March 30, 4 meteors).

LYRIDS.

Mr. Bridger observed the Lyrid shower under very favourable weather conditions on April 19–21. The times of watches and numbers of meteors seen were as follows:—April 19, $9^h\ 43^m$ to $11^h\ 38^m$, 5 meteors; April 20, $8^h\ 58^m$ to $11^h\ 43^m$, 18 meteors; April 21, $8^h\ 28^m$ to $9^h\ 27^m$ and $9^h\ 48^m$ to $11^h\ 53^m$, 24 meteors. The numbers of meteors registered were 4, 9, and 15 respectively. Six Lyrids were noted on April 21 and one on each of the two other dates.

Mr. Astbury recorded four meteors in a watch from $9^h\ 44^m$ to $10^h\ 10^m$ on April 20, and six between almost identical times on the following night. Two of these latter were Lyrids. Two first magnitude meteors—the first white, the second red—were observed by the Rev. S. J. Johnson at $11^h\ 13^m$ and $11^h\ 23\frac{3}{4}^m$ respectively. Four meteors, of which one or, perhaps, two, were Lyrids, were seen between 10^h and $10^h\ 18^m$ on April 20 by Mr. H. Corder, at Bridgwater. Mr. King observed from 10^h to $12^h\ 30^m$ on April 20, and from $10^h\ 30^m$ to 13^h on April 21, registering four Lyrids on each occasion among totals of 15 and 12 meteors respectively. Mr. C. L. Brook, on board a ship anchored off the island of Tanera More, in Loch Broom, near Ullapool, on the west coast of Scotland, observed two Lyrids and 19 other meteors between

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10^h 15^m and 12^h on April 20. On the same date Mr. F. Elgee, at Middlesbrough, noted only two meteors, one, perhaps, being a Lyrid, from 10^h 30^m to 13^h.

Prof. Herschel has drawn up the following table of radiants deduced from the tracks of the meteors observed by Members of the Section, combined with those of 13 meteors recorded by Mr. J. C. W. Herschel, at Cambridge, and 16 by Mr. A. R. Hinks at the same place, on April 18–20, 127 shooting-stars in all having been under consideration.

Radiant or nearly Collocated Group of Radiant Points, including one Principal or Chief Radiant Point.	Number of Mapped Meteors.
Lyra	23
f, *g* Lupi (218°−31°±)	13
Corvids (175° to 190° − 25° to 30°), three meteors (one triply observed, Slough, Farnborough, and Wallingford).	6
α Scorpiids (250°−20°±) three meteors	
δ and π Herculids (255°+25°, and +37°±)	12
C and *F* Cerberids (270°+22°, and 285°+23°±)	13
η, ι Draconids (233°+63°±)	11
κ (and α) Cephei (310°+77°, 316°+61°±)	9
o, *b*, μ, and 26 Draconis	8
Canes Venatici and ϵ, η Ursæ Majoris	9
Valpeculids, Pegasids, or β and ζ Cygnids	9
Total	113

The Lyrid centre was at 275°+35° with a radius of 3° or 4°. [In the general table of radiant-points the positions given are those deduced from the meteor-tracks registered by various observers separately, such positions being also for the most part represented above.]

During the period April 15–21, 77 meteors were observed by Prof. Herschel, chiefly on the nights of April 19 (9^h 15^m to 10^h 45^m and 11^h to 14^h 15^m, 11 meteors); 20 (9^h 15^m to 11^h 15^m and 11^h 45^m to 14^h 15^m, 26 meteors); and 21 (9^h 40^m to 11^h 20^m and 11^h 40^m to 14^h 15^m, 34 meteors). About 15 Lyrids were seen, the principal radiant being at 277° + 30°.

MAY AQUARIDS.

Prof. Herschel recorded 21 shooting stars in the first week of May, two of these (both on May 3) being Aquarids. One of these latter was seen at Farnborough by Mr. Bridger, who kept watch for about 5^h in all on three mornings in the early part of the month. No other out of 10 meteors was an Aquarid.

On May 22, 11^h 3^m to 11^h $48\frac{1}{2}^m$; 24, 11^h 7^m to 11^h 58^m; 28, 11^h 43^m to 11^h 58^m, five, seven, and four meteors respectively were observed by Mr. King. Two others were noted on May 29. Several bright objects were included in these numbers, one being greater than, and two equal to, the first magnitude, and three equal to magnitude $1\frac{1}{2}$.

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JULY PERSEIDS.

Owing to the fact that a full moon was due about the maximum date of the Perseid shower in August, a special effort was made to obtain observations of the July portion of the display, and with a good measure of success. Before proceeding to more detailed remarks, it will be convenient to summarise, as far as possible, the hours of watch, &c., for the latter half of July.

Date.	Watch. From	Watch. To	Total Number of Meteors seen.	Observer.
1900.	h m	h m		
July 15 -	10 12	11 30	3	W. F. D.
„ 17 -	11 35	12 0	3	A. S. H.
„ 18 -	10 0	10 30	3	W. E. B.
„ „ -	10 16	11 40	7	W. F. D.
„ „ -	11 10	12 0	2	A. S. H.
„ 19 -	10 0	11 25	7	W. E. B.
„ „ -	11 38	11 59	3	W. F. D.
„ „ -	11 45	12 5	2	A. S. H.
„ 20 -	10 0	12 30	12	W. E. B.
„ „ -	11 15	12 0	6	A. S. H.
„ 21 -	11 0	11 30	3	A. K.
„ 22 -	10 57	11 15	3	W. F. D.
„ 23 -	9 45	13 30	30	W. E. B.
„ „ -	9 49	11 7	6	J. H. B.
„ „ -	10 30	13 0	13	W. F. D.
„ „ -	11 15	12 0	2	A. K.
„ „ -	11 55	12 15	6	A. S. H.
„ 24 -	9 52	11 5	11	J. H. B.
„ „ -	10 0	14 20	51	W. E. B.
„ „ -	10 40	11 40	11	A. K.
„ „ -	10 42	14 27	44	W. F. D.
„ „ -	11 50	12 10	2	A. S. H.
„ 25 -	10 15	11 15	6	W. E. B.
„ „ -	10 45	12 47	19	W. F. D.
„ „ -	11 0	11 35	5	A. S. H.
„ 26 -	9 45	11 45	10	W. E. B.
„ „ -	10 2	10 38	3	J. H. B.
„ „ -	10 30	11 5	9	W. F. D.
„ „ -	10 50	11 40	12	C. L. B.
„ „ -	11 49	12 2	1	T. W. B.
„ 27 -	11 40	12 0	1	A. S. H.
„ 28 -	9 25	11 14	16	J. H. B.
„ „ -	10 30	12 30	8	W. E. B.
„ „ -	10 45	12 0	5	C. L. B.
„ „ -	10 45	12 0	6	A. K.
„ „ -	11 40	12 40	12	W. F. D.
„ „ -	11 45	12 35	8	A. S. H.
„ 29 -	11 25	11 50	2	A. K.
„ 30 -	9 30	11 41	21	J. H. B.
„ „ -	10 14	10 26	3	T. H. A.
„ „ -	10 15	12 0	12	A. K.
„ „ -	10 30	14 30	57	W. F. D.
„ „ -	11 35	12 5	7	A. S. H.
„ 31 -	9 22	11 34	9	J. H. B.
„ „ -	10 20	11 0	2	W. E. B.
„ „ -	10 45	11 15	5	A. S. H.

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One of the meteors recorded by Mr. Denning on July 15, of the 4th magnitude, at $11^h\ 10^m$, was possibly a Perseid, though it may have rather belonged to a radiant at $25° + 44°$. On the 18th, however, a meteor of the 5th magnitude, noted by him at $10^h\ 38^m$, was an undoubted Perseid. A brilliant Perseid at $11^h\ 49^m$, on July 19, was observed by Prof. Herschel and Mr. Denning, while another was recorded at $12^h\ 12^m$, on July 23, by the same observers, and also at Clapham. The first Perseids seen at Clapham were two on the 19th and 20th respectively.

Mr. Denning observed 177 shooting-stars between July 15 and 30. Twenty Perseids were included in this number, 10 of these being noted on July 30. At $11^h\ 3^m$, on the 24th, there was an extraordinary dull nebulous meteor of the 4th magnitude travelling from $324° + 25°$ to $140° + 69°$, in about $7\frac{1}{2}$ seconds. Its radiant was $321° - 33°$. The Aquarid radiant furnished more meteors than the Perseid, there being a good display of the former in the last week of the month, with 15 on July 30. On July 26, at $12^h\ 12\frac{1}{2}^m$, a greenish 1st magnitude Aquarid, with a short course, was noted by the Rev. S. J. Johnson, at Bridport.

Prof. Herschel recorded in July 47 meteors, of which about eight were from radiants in Perseus. Five or six Aquarids were noted, chiefly on July 30 and 31, though one was seen as early as July 17. Besides the positions given in the table of radiant-points, Prof. Herschel forwarded the following list of weak centres observed at this period:—

240 + 63	310 − 10
242 + 47	312 + 59
280 − 14	314 + 49
297 − 11	343 + 10

The third and fourth of these are particularly interesting as being the radiants of the fireballs of July 24, $10^h\ 49^m$, and July 15, $10^h\ 13^m$, respectively.

From July 18 to 31, 129 meteors were observed at Clapham, 15 being as bright as, or brighter than, 1st magnitude stars. About 18 of the total number were Perseids, two-thirds of these appearing on July 23 and 24.

The total number of meteors seen in this month by Mr. King, at Ilfracombe, was 36, of which 29 were recorded (from July 21 to 30th). The only Perseid noted was seen on July 21. On July 24, three fine green meteors were observed. They moved with moderate velocity, and their radiant was at about $306° - 17°$.

Mr. Bridger's watches during the period July 23 to 31 resulted in the observation of 32 meteors, while 34 others were glimpsed. The probable numbers of Perseids were 2, 1, 4, and 2 on July 24, 28, 30, and 31 respectively. One or two Aquarids were seen, but the principal minor shower was the Cassiopeid with a radiant area within one degree.

Mr. W. H. Milligan watched at Belfast from $9^h\ 30^m$ to $10^h\ 30^m$ on each of the nights July 24, 25, 26, and 30, but reported that Perseid radiation was *nil*.

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Mr. C. L. Brook's list of 12 shooting-stars observed at Meltham includes two α Cygnids and some meteors from Perseus and Cassiopeia.

So much attention has been paid this year to the early Perseids that particular interest attaches to the following list of chief radiants for the period July 12 to 24, kindly supplied by Mr. Denning from his observations in past years:—

7° + 35°	284° − 13°	330° + 36°
16 + 31	290 + 59	333 + 12
24 + 43	292 + 52	333 + 27
47 + 43	295 + 85	333 + 72
60 + 49	296 ± 0	334 + 58
105 + 51	303 + 24	335 + 49
245 + 72	303 + 52	339 − 13
255 + 37	304 − 12	347 ± 0
270 + 47	310 + 79	350 + 37
271 + 21	315 + 47	351 + 52
274 + 68	317 − 11	

AUGUST PERSEIDS.

It has been already remarked that moonlight interfered with the observation of the August Perseids in their customary numbers. Watches were kept, however, for a lengthy period in the aggregate, and a fairly connected record of the shower obtained.

August 1.—$11^h\ 18^m$, a meteor of magnitude $1\frac{1}{2}$ observed by the Rev. S. J. Johnson; $11^h\ 35^m$ to $12^h\ 20^m$, eight meteors, including about three from radiants in Perseus, mapped by Prof. Herschel.

August 3.—$9^h\ 30^m$ to $11^h\ 30^m$, one very bright Perseid and three small ones seen by Mr. Milligan.

August 4.—$9^h\ 20^m$ to 10^h and $10^h\ 25^m$ to 12^h, 23 meteors noted by Mr. Brook, chiefly in the second watch; three meteors during the evening by Mr. Astbury, one a Perseid of magnitude $1\frac{1}{2}$; $10^h\ 5^m$ to $12^h\ 5^m$, 16 meteors (three Perseids), by Mr. King, at Leicester; from 11^h to 12^h, three meteors by Mr. Scriven Bolton, at Leeds.

August 5.—$9^h\ 30^m$ to $11^h\ 30^m$.—No definite radiation of Perseids observed by Mr. Milligan; one Perseid by Mr. Astbury; $12^h\ 15^m$ to $12^h\ 30^m$, three meteors (one Perseid) by Prof. Herschel; two meteors after $12^h\ 38^m$ by Mr. Backhouse, at Sunderland.

August 7.—$9^h\ 10^m$ to $11^h\ 58^m$, 16 meteors (six Perseids), seen by Mr. Bridger; one large meteor from W. of Cassiopeia by Mr. Milligan.

August 8.—One Perseid recorded by Mr. Astbury.

August 9.—$10^h\ 25^m$ to $11^h\ 25^m$, one Perseid and one other meteor (magnitude $1\frac{1}{2}$), noted by the Rev. S. J. Johnson.

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August 10.—9^h 30^m to 11^h 30^m, six Perseids by Mr. Milligan; a 1st magnitude Perseid by Mr. W. S. Tucker, at Williton; 10^h 18^m to 11^h 18^m, three non-Perseids by the Rev. S. J. Johnson; 10^h 50^m to 11^h 30, three Perseids and no other meteors by Mr. King; 11^h to 12^h, probably one Perseid in 20 minutes by Col. Markwick, at Devonport; 11^h 45^m to 12^h 30^m, a 2nd magnitude Perseid in Cassiopeia by Prof. Herschel.

August 11.—9^h 20^m to 11^h, 12 meteors (seven Perseids) seen by Mr. Bridger; 9^h 30^m to 11^h 30^m, eight Perseids by Mr. Milligan; 10^h 13^m to 11^h 13^m, three Perseids, one a greenish 1st magnitude meteor at 11^h 11^m, by the Rev. S. J. Johnson; 10^h 30^m to 12^h 15^m, eight meteors, including four from radiants in Perseus, by Prof. Herschel; 10^h 53^m to 11^h 45^m, eight Perseids, very swift and evanescent, one about 1st magnitude, by Col. Markwick.

August 12.—Possibly one Perseid, noted by Mr. Backhouse, at West Hartlepool, in a watch of 28 minutes; eight meteors in a short watch by Mr. Denning; 9^h 30^m to 11^h 30^m, 10 Perseids by Mr. Milligan; 10^h 20^m to 13^h, 19 meteors (16 Perseids) by Mr. King; 12^h 5^m to 12^h 50^m, seven meteors (four as bright as, or brighter than, 1st magnitude stars) by Prof. Herschel; a few Perseids during the evening by the Rev. S. J. Johnson.

August 13.—One very bright meteor E. of the cluster in the sword-hand of Perseus, seen by Mr. Milligan; 10^h 19^m to 10^h 56^m three meteors (one Perseid) by Mr. Bridger; 10^h $3c^m$ to 11^h 30^m, five meteors by Prof. Herschel; 10^h 45^m to 11^h 30^m, one meteor by Mr. King.

Most observers seem to have discontinued watching for Perseids after this date, but Mr. Denning observed five meteors from centres close to the theoretical position of the Perseid radiant on each of the dates August 16 and 22, and there seems little doubt but that these were connected with the well-known shower itself.

As regards the meteors observed in the latter half of August, Mr. Denning registered 81 from August 15 to 30, these being distributed as follows:—August 15, 2 meteors; August 16, 11; August 17, 3; August 18, 5; August 19, 5; August 20, 2; August 22, 27 (37 in all were seen in about $3\frac{1}{4}^h$, from 10^h 7^m to 13^h 23^m); August 23, 3; August 24, 14 (seven others were not recorded); August 26, 7; August 30, 2. The most important showers represented were of β Piscids, η Pegasids, and β Cepheids. Six meteors were of the 1st magnitude, one as bright as Jupiter, and two as bright as Venus.

Mr. Brook, in two watches, on August 20 (from 9^h 35^m to 10^h 50^m, and from 11^h to 12^h) observed 17 meteors. At 10^h 5^m a momentary reddish flash of the 1st magnitude appeared at about $327\frac{1}{2}^\circ - 22^\circ$.

Mr. King saw 16 meteors between 11^h 5^m and 12^h 50^m on August 21, and 24 from 10^h to 12^h 30^m on August 22, registering 14 and 21 of these respectively. Two β Piscids, which appeared on August 22, with four earlier ones (on July 30 and August 4)

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give a radiant-point at exactly the same position, 346° + 1°, as that found for the shower at Bristol.

A 1st magnitude meteor, probably a Cygnid, was recorded by the Rev. S. J. Johnson, at $10^h\ 52\frac{1}{2}^m$, on August 23, and four meteors were noted by Mr. Astbury, at Shifnal, between $9^h\ 30^m$ and $9^h\ 54^m$, on August 24.

SEPTEMBER METEORS.

On September 1 and 2, Mr. Denning watched for $2\frac{3}{4}^h$ each night, observing 22 and 21 meteors respectively. The principal shower was that of six ζ Cepheids. Mr. Denning has considered these early September meteors in conjunction with those recorded in the period August 15–30, and gives the radiants for the whole of the nights in question together. The Rev. S. J. Johnson observed a reddish meteor of the 1st magnitude, from a polar radiant, at $10^h\ 27^m$ on September 11, and a 1st magnitude ρ Boötid at $8^h\ 39\frac{1}{2}^m$, on September 19.

During this month Mr. Brook, at Meltham, recorded more than 60 meteors. Most of these were seen on September 17 ($1\frac{1}{2}^h$ between $9^h\ 58^m$ and $11^h\ 45^m$; 10 meteors), 18 (8^h to 10^h and $10^h\ 15^m$ to 11^h, 11 meteors; and September 19 (8^h to 10^h and $10^h\ 25^m$ to $11^h\ 15^m$, 20 meteors). The other nights of observation were September 13, 14, 15, 29, and 30, when 2, 3, 4, 6, and 6 meteors respectively were registered. On September 17 and 18 there were three η Cetids from a radiant at 23°–13°.

Mr. Bridger saw six meteors in watches from 8^h to $8^h\ 15^m$, and from $8^h\ 50^m$ to $9^h\ 45^m$ on September 25.

Seven meteors were observed by Mr. Denning on September 18, and one on the following evening. Up to $12^h\ 35^m$ on September 23, 17 were seen, and eight more on September 24, between about $8^h\ 40^m$ and $10^h\ 30^m$. He recorded nine shooting-stars on September 27, 16 on September 29, and 10 on September 30, making a grand total of 127 in $17\frac{1}{4}$ hours' watch on 10 nights. Cepheids were still appearing in the second half of the month. Mr. Bolton observed 11 meteors on the nights September 23 to 27, chiefly between 9^h and 10^h.

ORIONIDS.

During October Mr. Brook recorded 55 meteors. A few were seen on nearly every night between October 3 and 13, while on October 14, between $7^h\ 15^m$ and $8^h\ 45^m$, and also $9^h\ 45^m$ and $11^h\ 25^m$, 15 were noted. With three on the following night the total for the first half of the month was made up to 31. A δ Aurigid shower furnished two meteors on October 4, one on October 10, and two on October 14. Among the remaining shooting stars were two Camelopardids (77° + 73°) and two δ Geminids (103° + 26°), all on October 14.

Passing now to the Orionid period, it is found that the earliest meteor of this shower, of which record has been received, was observed by Mr. Brook at $10^h\ 46^m$ on October 17, leaving a streak for two or three seconds. This was during a watch of about $1^h\ 45^m$ between 9^h and 11^h, when nine meteors in all were seen. Two or three more Orionids were noted on October 21 among a

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total of 13 shooting stars, between $7^h\ 30^m$ and $8^h\ 25^m$, and also $10^h\ 50^m$ and $12^h\ 20^m$. Some of the weaker showers represented during the month were of α Aurigids and α Ursæ Minorids.

Prof. Herschel observed an early Orionid on October 17, at $11^h\ 43\frac{1}{2}^m$. On October 20, from $12^h\ 30^m$ to 13^h, five meteors (of which one was an Orionid) were mapped. Between $11^h\ 30^m$ and $12^h\ 35^m$ on October 23 eight meteors were recorded, three being Orionids. Eleven more shooting stars were mapped on October 27 from $8^h\ 45^m$ to 11^h, but no further Orionids were seen. A bright meteor of the shower (magnitude $1\frac{1}{2}$) was noted by Mr. King at $17^h\ 50\frac{1}{2}^m$ on October 18.

Mr. Denning observed 141 meteors during watches which totalled $12\frac{3}{4}^h$ in October. Radiants for Orionids were separately deduced for October 23 and October 26 to 27, and these confirm the stationary character of the centre of the shower remarked in many years by Mr. Denning. The usual contemporary shower of γ Geminids was well marked.

Seven meteors were noted by Mr. Bolton between October 13 and 23 (chiefly on October 21 and 23). None of these was an Orionid. One was especially remarked for its red colour (October 23, $8^h\ 5^m$).

The last Orionid was the only one observed by Mr. Astbury during watches for a total of about five hours. It appeared at $10^h\ 9^m$ on October 25, its radiant being a little to the east of $92° + 15°$. The shower from $96° + 17°$ which is entered in the list of "Radiant Points" for October 21 (six meteors) was still in evidence on October 25.

Two meteors were glimpsed by Mr. Bridger between $8^h\ 55^m$ and $9^h\ 20^m$ on October 26. Five were recorded (nearly all from probable radiants in Aries or Taurus) and four glimpsed from $9^h\ 34^m$ to $10^h\ 30^m$ on the following night. On October 26 at $9^h\ 50\frac{3}{4}^m$, a meteor of magnitude $1\frac{1}{2}$ was observed in Perseus by the Rev. S. J. Johnson.

LEONIDS, TAURIDS, &C.

Those who expected a great shower of Leonids in mid-November were again disappointed. From the observations received the display seems to have been comparable only with the second-rate returns among those that have taken place since 1869.

Mr. H. G. Tomkins forwards a series of observations made by a party organised by him at Allahabad. Fifteen volunteers, almost all natives of India, were instructed in the work, first meeting for this purpose early in November. Watch was begun on November 8 between 14^h and 16^h, and continued during the same period on successive nights until November 13, 14, and 15, when watch was kept from $10^h\ 30$ till daylight. The details of the observations are as follows:—On November 8, 9, 10, and 11 the numbers of Leonids seen were 2, 0, 3, and 23* respectively. On November 12 no report was sent in.

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* Mr. Tomkins notes that another person saw only seven, and therefore he thinks meteors other than Leonids may have been included in this number.

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OBSERVATIONS OF LEONIDS MADE AT ALLAHABAD, 1900.

Allahabad Time.	Number of Leonids.		
	November 13.	November 14.	November 15.
h m — h m			
10 30 — 11 15			0
11 15 — 11 20			1
11 20 — 12 10		0	0
12 10 — 12 15	0		1
12 15 — 12 20		1	
12 20 — 12 25		1	
12 25 — 12 30	1		
12 30 — 12 40		0	0
12 40 — 12 45		1	
12 45 — 13 45	0		
13 45 — 13 50			1
13 50 — 14 0		0	
14 0 — 14 5	1		0
14 5 — 14 25	0		
14 25 — 14 30	1	1	
14 30 — 14 35	0		1
14 35 — 14 40	2	0	2
14 40 — 14 50	0		0
14 50 — 14 55	1	1	
14 55 — 15 0		1	1
15 0 — 15 5		1	1
15 5 — 15 10		2	1
15 10 — 15 15		1	0
15 15 — 15 20	0	0	1
15 20 — 15 25			1
15 25 — 15 30		1	0
15 30 — 15 35		0	1
15 35 — 15 40		1	0
15 40 — 15 45		0	1
15 45 — 15 50	2		1
15 50 — 15 55	0	1	3
15 55 — 16 0		1	1
16 0 — 16 5	1	0	1
16 5 — 16 10	1	1	0
16 10 — 16 15	1	4	2
16 15 — 16 20	2	0	1
16 20 — 16 25	1	2	2
16 25 — 16 30	0	2	1
16 30 — 16 35		1	0
16 35 — 16 40	1	1	2
16 40 — 16 45		2	1
16 45 — 16 50		1	0
16 50 — 16 55		1	3
16 55 — 17 0		0	0
17 0 — 17 5	0	1	1
17 5 — 17 10		1	0
17 10 — 17 15		2	
17 15 — 17 20			1
17 20 — 17 30		0	0
17 30 — 17 35	—		—
Totals - -	15	33	33

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On November 13 the sky was cloudy in the E. from $10^h\ 30^m$ till about 13^h; it was also flecked with clouds towards dawn. On November 15, clouds came up about $12^h\ 20^m$, and from 13^h to $13^h\ 40^m$ the sky was very much overcast. After that time it cleared up.

The greatest number of meteors that appeared in any five minutes was four from $16^h\ 10^m$ to $16^h\ 15^m$, on the night of November 14, against seven from $16^h\ 45^m$ to $16^h\ 50^m$, on that of 1899, November 14, and 20 from $16^h\ 15^m$ to $16^h\ 20^m$ on that of 1898, November 15.

From the above table it is evident that, as far as India is concerned, the maximum of the shower occurred between 16^h and 17^h on November 14.

Prof. Herschel recorded 10 meteors on November 9, chiefly between 13^h and $14^h\ 30^m$. On November 13 seven meteors were seen between $7^h\ 45^m$ and $10^h\ 45^m$, and 23 between $12^h\ 20^m$ and $17^h\ 30^m$. Only three good Leonids were included in this number—at $13^h\ 32\frac{1}{2}^m$, $13^h\ 55\frac{1}{2}^m$, and $14^h\ 21^m$—but there were two rather dubious ones—at $15^h\ 39\frac{1}{2}^m$ and $17^h\ 11\frac{1}{2}^m$—and a wide one, probably—at $15^h\ 58^m$. On November 15 eight meteors were observed between $13^h\ 25^m$ and $13^h\ 45^m$, and on November 16 four between $10^h\ 40^m$ and about $11^h\ 40^m$.

Mr. E. C. Willis has forwarded a report of his observations, made at Norwich, from which he concludes that the maximum decidedly occurred on November 13. He also draws attention to the absence of Leonids between $17^h\ 30^m$ and 18^h on the same night, and particularly to the great dearth of these meteors on November 15. The number of Leonids and other meteors appearing in each of his extensive watches were as follows:—

Watch.	Leonids.	Other Meteors.	Watch.	Leonids.	Other Meteors.
d h m — h m			d h m — h m		
9 16 30 — 17 0*	0	5	14 13 0 — 13 15*	4	5
17 0 — 18 0*	0	0	13 15 — 13 30*	0	5
10 16 30 — 17 0*	0	2	13 30 — 13 45*	3	2
17 0 — 17 30*	1	3	13 45 — 14 0*	3	3
17 30 — 18 0*	2	4	14 0 — 14 15*†	1	1
11 16 30 — 17 0*†	0	4	14 15 — 14 25*†	1	1
17 0 — 17 30*†	2	3	16 0 — 16 15*†	0	1
12 Cloudy; no observations.			17 15 — 17 25*†	0	0
13 15 15 — 15 30*†	4	0	15 11 15 — 11 30	0	6
15 30 — 15 45*†	4	1	11 30 — 11 45	0	3
15 45 — 16 0*	1	3	11 45 — 12 0	0	2
16 0 — 16 15*†	0	0	12 0 — 12 15†	0	9
17 0 — 17 15*†	3	1	15 0 — 15 15*†	0	3
17 15 — 17 30*†	4	2	15 15 — 15 30*†	0	1
17 30 — 17 45*	0	0	15 30 — 15 45*†	0	0
17 45 — 18 0*	0	4	15 45 — 16 0*	2	4
14 11 15 — 11 30†	0	1	16 0 — 16 15*	0	2
12 0 — 12 15	0	4	16 11 30 — 11 45	0	5
12 15 — 12 30*	2	1	11 45 — 12 10†	0	5
12 30 — 12 45*	2	6	12 15 — 12 30	0	6
12 45 — 13 0*	3	2			
Total - -	- -	- -	12 15	42	110

* Moon above horizon. † Some clouds.

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On November 12 Mr. Brook registered two meteors, and on the following night 10, chiefly in a watch of 2^h 40^m between 15^h 15^m and 18^h 10^m. Three other faint meteors were from a radiant not far from θ Ursæ Majoris. Outlook was kept at intervals on the latter night from 11^h, but the only Leonids seen were five in about the last two hours of watch.

On November 12, at 9^h 28^m, Mr. T. W. Backhouse, at Sunderland, observed a meteor as bright as Sirius. Seven Leonids were seen on the succeeding nights, as follows:—November 13, 16^h 31^m; November 15, 14^h 3^m, 14^h 34^m, 15^h 20^m, 15^h 50^m, 16^h 9^m, and 16^h $9\frac{1}{2}^m$. In all, 19 meteors were noted in a total watch, discounted for clouds, of about $4\frac{1}{2}^h$.

Watches were much interrupted by clouds at Bristol, as at many other places. Mr. Denning found Taurids more numerous than Leonids on November 13 and 14. On the former night 17 meteors were recorded in four watches after 10^h and up to nearly 18^h. This number included three Leonids, all appearing between 12^h 59^m and 13^h 32^m. Three shooting stars only were seen on the second night, one being a Leonid and one a Taurid.

On November 15, Mr. Astbury kept watch from 11^h 25^m till 13^h 45^m, registering 17 meteors, including six Leonids. Three shooting-stars were from a radiant at $60° + 12°$, near γ Tauri. He compares the Leonids referred to above with those seen on 1899, November 14, from 16^h onwards, thus:—"Those "seen in 1899 were on the average brighter than magnitude 2, "intensely white, with beautiful streaks of a greenish blue "colour; those of the present watch averaged about magnitude "3, were reddish-yellow, and none of them exhibited anything "like the phosphorescent streaks seen in 1899."

On November 14, the Director kept watch at Westminster from 11^h 26^m to 12^h 15^m, and at Clapham from 13^h to 14^h 15^m. Two and six meteors respectively were recorded, the first four being of the 1st magnitude or brighter. The second, at 12^h 1^m, was a long-pathed orange Leonid, and another meteor of the shower appeared at 13^h 20^m. Between 12^h and 14^h 30^m, on November 15, 16 meteors were observed. Four were Leonids, while among the meteors of the two nights, two were δ Geminids ($110° + 22°$), and one was a Taurid from about $57° + 9°$.

The following observations were made by Mr. King, at Rearsby, about $7\frac{1}{2}$ miles N.E. of Leicester. Between 12^h 30^m and 16^h 45^m, on November 15, 18 meteors (six Leonids) were seen, and, of these, 13 meteors (three Leonids) recorded. He found that the maximum occurred between 14^h 30^m and 15^h. Watches had been kept on November 10, from 17^h 25^m to 18^h 15^m, and on November 13, from 17^h to 17^h 30^m, but without success.

Mr. C. B. Holmes commenced observations at East Barnet, at about 12^h 30^m on November 15, and mapped 13 meteors. From his diagram, seven of these appear to have been Leonids. The watch was terminated at 14^h, having been kept for 40 minutes in the absence of clouds.

The Rev. W. R. Waugh, at Portland, and the Rev. S. J. Johnson, at Bridport, did not observe any Leonids on account of clouds and fog. The former, however, saw a fine meteor, probably a Taurid, on November 16 at 10^h 30^m, about the size of

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Castor, over which star it passed from θ Geminorum to near ψ Cancri. On November 18, at about 10^h, a few small meteors were seen which seemed to be Taurids.

During the latter half of November another disappointment was experienced, this time with regard to the Andromedids.

On November 17, at $5^h\ 49^m$, the Rev. S. J. Johnson recorded a blood-red meteor of the 1st magnitude, passing very swiftly from $45° + 41°$ to $17° + 7°$.

Mr. Astbury observed 13 meteors in the period November 18–27. Five of these appeared between $7^h\ 45^m$ and $9^h\ 4^m$ on November 22, and included one Andromedid. On Novembor 27 a second Andromedid was noted.

On November 22, 23, and 27, two, two, and six meteors respectively were recorded by Mr. King, at Leicester. The total length of the watches was 3^h, but no Andromedids were seen.

On November 23, during $1^h\ 38^m$ of clear sky between $7^h\ 55^m$ and $10^h\ 8^m$, five meteors were observed, and three more glimpsed by Mr. Bridger. From $8^h\ 55^m$ to $10^h\ 22^m$ ($1^h\ 15^m$ clear) on November 27 the numbers were five and two. Two or three of these meteors were Taurids or Aurigids, and one was a nearly stationary Geminid at about $102° + 31°$.

Prof. Herschel recorded four shooting stars in $1\frac{1}{2}^h$, $7^h\ 30^m$ to 9^h, and seven in $1\frac{3}{4}^h$, $10^h\ 15^m$ to 12^h, on November 23. In three watches for an aggregate length of 2^h between $6^h\ 50^m$ and 10^h on November 25, 10 meteors were observed, and eight in three watches for $3\frac{1}{4}^h$ in all between $7^h\ 45^m$ and $11^h\ 50^m$ two nights later. Prof. Herschel notes that the whole, or very nearly the whole, of the active Taurid radiation of 1900 was produced, according to his observations, by the centres $57° + 18°$ (one meteor on October 23, seven on November 9–15, and two on November 23), and $57° + 9°$ (10 or 11 meteors, October and November). The principal among a large number of radiants deduced from the observations of November 9–27 are given in the list of "Radiant Points."

GEMINIDS.

During a total watch of 41 minutes on December 9, Mr. Backhouse observed two meteors, of which one was a Geminid. Two evenings later, in a watch of about the same length (free from cloud), four meteors (three Geminids) were seen. Again, on December 12 for about an hour, at intervals between $7^h\ 30^m$ and $11^h\ 10^m$ watch was kept, the resulting number of meteors being 12 (seven Geminids). During a similar watch on the following night 10 meteors (eight Geminids) appeared, and the last Geminid was seen at $9^h\ 53^m$ on December 15. In all 29 meteors (20 Geminids) were noted in watches amounting to $5^h\ 20^m$ ($4^h\ 43^m$ free from cloud). The magnitudes of the shooting-stars were of high average, as under:—

Magnitudes	= Sirius	0	1	2	3	4	5	
Geminids	1	—	7	6	2	3	1	= 20
Other meteors	1	1	2	1	2	—	2	= 9

Between 9^h and 10^h and $10^h\ 30^m$ and 12^h on December 11 Mr. Brook recorded 13 meteors (about seven from radiants in

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Gemini). Six other meteors, of which four were Geminids, were not registered, while two were observed on the preceding night. In all there were about 11 Geminids. On December 12 the watches kept were from 8^h to 9^h 20^m, and from 10^h 10^m to 12^h 15^m (3^h 25^m). Of the 17 meteors registered, 10 were Geminids, and of eight shooting-stars unrecorded, seven belonged to these showers. The Geminid maximum appeared to be between 10^h 51^m and 11^h 35^m, when 13 of these meteors were seen. The centre of the principal radiation-area was at about $111° + 31\frac{1}{2}°$, a place closely agreeing with the mean position of that of the main shower at this period.

At Leicester Mr. King watched from 10^h 30^m to 11^h on December 11, recording two meteors out of four seen in all. Neither of these was a Geminid. Between 10^h 10^m and 11^h on December 13, five meteors, including three Geminids, were registered. The same number of meteors was seen in a watch from 10^h 50^m to 12^h 5^m on December 15, but this comprised no Geminids. One meteor was as bright as Sirius, and four others more brilliant than 1st magnitude stars.

On December 13, between 8^h 10^m and 9^h, Mr. Astbury registered 14 meteors, 12 of which were Geminids. Another watch from 9^h 50^m to 10^h 30^m (about 25 minutes) yielded three more Geminids. He remarks that the shower, which, earlier in the evening had seemed unusually active, had decidedly declined. Several other meteors, evidently Geminids, were seen, but not sufficiently well to record. One meteor was brighter than, and six equal to, the 1st magnitude.

Prof. Herschel mapped 27 meteors in five hours' watch on December 13, 15, 19, and 21. On the first date 18 were observed, three being γ Geminids ($99° + 13°$)—*see* also table of "Radiant Points."

Radiant Points of Meteoric Showers, 1900.

B.A.A. Ref. No.	Date.	Name.	Radiant Point.	No. of Meteors.	Class.	Observer.
	1900.		$\alpha°$ $\delta°$			
926	Jan. 2 - -	Quadrantids -	230 + 50	7	M	T. H. A.
927	„ 2 - -	„ -	230 + 54	13	M	W. E. B.
928	„ 2 - -	50 Cassiopeids	22 + 67	4	R	W. E. B.
929	Mar. 20–30 -	ψ Ursids -	163 + 46½	4	M	J. H. B.
930	„ 29–Apr. 19	ζ Ursids -	205 + 52	4	M	A. K.
931	Apr. 19–21 - -	ζ Bootids -	221 + 20	4	M	J. H. B.
932	„ 20–21 -	97 Herculids -	266 + 26	5	M	A. K.
933	„ 20–21 - -	Lyrids - -	273 + 34	8	RK	J. H. B.
934	„ 20–21 -	„ -	274 + 33	8	RK	A. K.
935	„ 20–23	η Draconids -	237 + 58	4	M	J. H. B.
936	July 15–18 -	α Aquilids -	304 + 4	5	M	W. F. D.

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