Scorpio.

	B.A.C.	1837. Mag.	1864. Mag.	No. of Obs.	Colour.	Notes.
α	5498	1·28	1·2	1	Orange	Companion easy with 3-in. aperture
γ	6018	3·98	..	..	White	$= \iota_1$
ε	5632	2·71	..	..	Orange; yellow	$= \varkappa$
θ	5395	2·29	2·3	1	White	$= \lambda$
ι_1	6004	3·53	..	..	,,	$= \gamma$ Cent. D star f 5′; 11, 13; 2″
$\varkappa$	5970	2·91	..	..	,,	$= \varepsilon, > \upsilon$
λ	5915	1·87	2·05	1	,,	$= \theta$, nearly $= \theta$ Cent.
μ_{+2}	5638	μ_1 3·67 / μ_2 4·16	3·60	1	,,	$\mu_1 = \mu_2$!
ν	5382	3·42	3·0	1		h. has another value. 4·58
π	5289	3·35	3·65	1		$= \varkappa$ Cent.
σ	5447	3·50	3·5	1		$= \beta\,\gamma$ Triang. Aus.
τ	5539	3·44	3·5	1	,,	$= \sigma$

Triangulum Aust.

α	5578	2·23	2·2	1	Orange; yellow	2·7 rejected
β	5233	3·46	3·57	3	White	
γ	6255	3·51	3·60	2	,,	
ε	5103	..	..	..	Orange	
Spica		1·41	1·2	1	White	$= \beta$ Centauri
α *Circini*		3·78	3·9	1		
α *Pictoris*		3·77	3·7	1		

On the supposed Re-discovery of Biela's Comet. (No. 2.)

By Captain Tupman.

The letter of Professor Klinkerfues in the last number of the *Monthly Notices*, combined with the now well-known singular circumstances attending Mr. Pogson's observations, naturally leads all those who have not gone into the matter geometrically into the belief that the long-lost Comet of Biela has been really seen again.

The lines of sight, or "directions of observation," on December 2 and 3, pass at such a distance to the north of the known orbit of Biela's Comet that accurate heliocentric co-ordinates of the comet's position in space cannot thereby be obtained.

As much depends upon the actual orbit in which the meteors of November 27 were moving, I have computed the elements from the observed position of the radiant point on the assumption of a

periodic time similar to that of the Comet. The radiant point given by Professor Alexander Herschel in the *Monthly Notices*, vol. xxxiii. p. 75, which is probably the most accurate, is in

Longitude	40° 47′	App. Equinox 1872·9.
Latitude	+ 30 35	

and adopting this, I find the following elements of the orbit for the same equinox :—

Perihelion Passage, 1872, December 26·90	
Longitude of Perihelion (π)	111° 48′
,, Ascending Node (Ω) ...	245 57
Inclination (I)	13 24
Perihelion Distance (q)...	·8265
Eccentricity (ε)	·7670
Motion	Direct.

The elements of Biela's Comet are (for same equinox) :—

P.P.	1872, October 6·4 (?)
π	109° 24
Ω	245 54
I	12 34
q	·8718
ε	·7600
Motion	Direct.

An alteration of less than 1° in the position of the radiant point would have made all the elements of the meteor-orbit absolutely identical with those of the comet, whereas a considerable alteration of the assumed periodic time would have had an almost inappreciable effect. Hence the meteors were certainly moving in the very same orbit as the comet was moving in at its former appearances.

Now the coincidence of these two sets of elements is of the utmost importance in the matter under consideration. It proves that the perturbations of the node, inclination and radius vector of a body moving in the same orbit as the comet, and twelve weeks behind, are (in this instance) sensibly the same as those of the comet itself; also that an exceedingly near approach to the Earth cannot produce an appreciable disturbance of the orbit elements.

These facts bear upon Mr. Pogson's observations in the following manner. If the comet were really twelve weeks behind time, and passed close to the Earth on November 27·33, as

assumed by Professor Klinkerfues, it must have appeared afterwards in these positions :—

		Geocentric Longitude.	Latitude.
	d	° ′	° ′
1872, Dec.	2·5086	215 18	− 29 30
	3·5030	216 36	− 29 13

And if the nucleus be supposed to be a little in advance, its apparent place will be somewhat *behind* on the line joining these two positions prolonged backwards ; that is, with somewhat less longitude and greater south latitude.

Mr. Pogson's positions, expressed in ecliptic co-ordinates, are,—

	° ′	° ′
Dec. 2·5086	221 50·7	− 20 31·0
3·5030	224 56·6	− 19 45·0

The discordances of the longitudes, considering each by itself, may be explained by supposing a further retardation of the Comet; but the other discordances are not to be accounted for by any reasonable alteration of the circumstances. The discordance in absolute latitude would be the result of advancing the node 3°, of shortening the radius vector by ·033°, of reducing the inclination to $7\frac{1}{2}°$, or of partially effecting two or more of these changes ; but it has been shown that with these elements in particular no such alterations can be admitted, not even to the extent necessary if all three were simultaneously disturbed.

Without going any farther, it is obvious that the same body moving in an orbit parallel to that of the meteors could not have been seen in *both* the Madras positions. By an alteration of the place of the node, it might have been in either of them, but with an apparent motion *per diem* of + 1° 18′ in longitude, and + 0° 17′ in latitude. On the supposition of *two* bodies having been seen, they would each have this apparent motion. Now Mr. Pogson's letter contains internal evidence, amounting to positive proof, that he saw one and the same comet on both occasions, for the observed motions in R.A. of $2^s·5$ in 4 minutes, and of $17^s·9$ in 28 minutes, are both in perfect agreement with the total change of 15 minutes in 24 hours. The actual change of longitude was therefore + $3\frac{1}{2}°$, and of latitude + 0° 46′ in 1 day. This was pointed out to me by Professor Herschel after my last communication on the subject. Such apparent motion could only exist in an orbit differing essentially from that of the meteors.

Since, therefore, it cannot be admitted that Mr. Pogson observed two bodies, the only conclusion to be drawn is, that the one he did see was neither Biela's Comet nor a meteoric aggregation travelling in the same orbit, nor a body that had passed anywhere near the Earth on November 27, or subsequently, in spite of the extraordinary circumstances attending its discovery.

Portsmouth, Feb. 25, 1873.