

# On the History of Biela's Comet and the Origin of Periodic Meteors

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In his classical volume on *Meteors*, Charles P. Olivier [1] starts the seventh chapter as follows : "The history of meteors which are connected with Biela's comet and that body itself forms one of the most fascinating and important chapters in the development of meteoric astronomy." The breadth and scope of the investigation of Biela's comet throughout no less than half of the 19th century, involved the leading cultural centres of the world. Thus, not only is Olivier's statement corroborated but the case of Biela's comet exemplifies the creative international cooperation that marks the spirit and role of scientific work above all in astronomy. As Biela's comet was probably most instrumental in tracing the affinity of periodically recurrent meteoric showers with the orbits of comets, our object is to point out some less known facts relating to this subject.

The study of the inter-relation of cometary orbits with periodic meteors was in an advanced state when F. Zoellner [2] reported to the Academy of Science in Vienna on 12th December 1872. Zoellner pointed out that after the history-making discovery of Schiaparelli, in 1866, which announced the affinity of orbits of some small comets with periodically returning meteoric showers, the attention of astronomers was particularly directed to such comets the orbits of which pass in the vicinity of our planet. Zoellner evidently refers to Schiaparelli's letter to his colleague, Father Secchi [3], in which the director of Brera Observatory in Milan offered the first report on the evidence of a connection between meteors and a comet, namely Perseids and Tuttle's comet, that annually provides a substantial meteor shower on or around 12th August. Although the disintegrated Biela's comet was responsible for a most spectacular meteor shower on 27th November 1872, nevertheless its previous behaviour prompted the search which eventually led toward Schiaparelli's discovery. Therefore, it is historically revealing to examine all circumstances involving this outstanding comet.

First of all, the generally little-known personality of Biela, whose name was to be associated with the history making comet, is in itself a colourful and adventurous example of a European changing historical destinies. Captain Wilhelm von Biela was born on 19th March, 1782 in Rossla, Saxony, and died on 18th February, 1856, in Venice, Italy. He was the last descendant of the old Czech Protestant nobility of the Lords of Bílá with estates near Děčín in northern Bohemia. Wilhelm's ancestor, Frederick from Bílá, in the time of the anti-reformation wars, in 1621, together with 27 leading Czech noblemen, was executed in the old plaza in Prague. The family then emigrated

into the region of Erfurt in Saxony, ever mindful of its ancestral origin and family tradition [4]. After his training in the Saxonian military school in Dresden, Wilhelm volunteered in the Austrian army and distinguished himself in the Napoleonic wars. With peace concluded, in 1815, then in his 34th year and nearly 190 years after his ancestors had left their homeland, Biela returned to Prague. To his military career he added the study of astronomy at Prague University under the direction of Canon Prof. M.A. David, director of Prague Observatory [5]. He made many of his observations when stationed with his garrison in Josefov, a little fortress town in eastern Bohemia. It was also in this town that he made the discovery of the history making comet on 27th February, 1826.

Biela was not the first discoverer of his comet. The memory of the discovery of the first predicted return of Halley's comet, in 1758, still rang vividly throughout the civilized world when on 8th March, 1772, Montaigne at Limoges, France, discovered a small comet that was to play another historical role. There was nothing unusual in this comet, nor in the comet that Pons of Marseille added on 10th November, 1805, to the large list he had already discovered. In view of the general interest then current, various astronomers preoccupied themselves with the computation of the orbit from all observational data available. Thus, for instance, Gauss, using Bessel's elements of the comet 1772, obtained a period of 4.7 years. Observations of the Pons comet of 1805 enabled the determination of a period of about 6.75 years. By that time the Prague amateur astronomer, Joseph Morstadt of Kolin, Bohemia, owner of a private observatory at Prague and friend of Biela, undertook the study of comets, including those of 1772 and 1805 [6]. When after twenty years of study Morstadt reached the opinion that the comet Pons of 1805 and that of Montaigne of 1772 both had an approximate period of 6.75 years and was expected by 1826, then Biela also decided to investigate the comet.

Biela was fortunate to rediscover the comet himself at its perihelion return on 27th February, 1826, and undertook to compute its orbit in which he proved Morstadt's supposition. Biela first made two brief announcements in the *Astronomische Nachrichten* [7]. The comet became an object of unusual interest because of its passage within a close proximity to our planet. All this encouraged Biela to complete his computation which, together with a comprehensive explanation, he submitted in a report to the Royal Bohemian Society of Science, dated 29th March, 1826 in Josefov, Bohemia [8]. This report with an extensive commentary by the director of Prague Observatory, Canon David, was later published by the Society [9]. Herein Biela leaves no doubt as to the identity of the comet of 1826 with that of Pons in 1805 and Montaigne in 1772, and David, teacher of Biela, verifies this identity with his judicious analysis of Biela's report. It was this computation of Biela together with his discovery that permanently associated the comet with his name.

Although relatively small, by this time Biela's comet had entered the world scene. Several eager astronomers computed the orbit and predicted with some variations the time of the comet's return. When Olbers, the famous Berlin astronomer, announced that Biela's comet would cross the earth's orbit on 29th October, 1832, at only 11 million miles from our planet, an actual rising panic in wide public circles in Europe prompted the venerable Viennese astronomer, Littrow, to publish a pacifying explanation. When the cometa ctually reappeared on 27th November, 1832, only twelve hours within Santini's computation, the widespread excitement seemed to have no limits. Of the vast amount

of published comments that followed this reappearance, the very revealing and historical letter of the astronomer, J.H.v. Maedler of Berlin, dated 22nd October, 1837, inevitably draws our attention [10]. Maedler therein refers to Morstadt's hypothesis on the relation of the meteors of November 13th to Biela's comet. He also reports on his own visit to Prague, where the subject was discussed at an astronomical conference with Morstadt himself who submitted the report. Although it was found later that meteors of November 13th were actually Leonids, this is indeed a most significant development long before Schiaparelli's announcement in 1866.

At the predicted 1839 perihelion passage, Biela's comet was unobservable because of the unfavourable position of the perihelion in the twilight zone. The course of events in relation to this comet, however, reached its climax at the comet's predicted return in 1846.

Again with only slightly varying values in the computed time of return, it appears that this time it was Di Vico in Rome who was first to sight Biela's comet on 26th November, 1845. The comet reappeared in its normal form and was soon observed by a series of European astronomers. On 29th December, 1845, however, Bradley and Herrick of Yale University seem to have made the first announcement that Biela's comet appeared to display a companion. This was followed by the same observation made by Lt. Matthew F. Maury, the first director of the newly founded Naval Observatory in Washington, an assiduous observer of Biela's comet. The story of the strange splitting was then first published in the *American Journal of Science* [11], followed by Maury's report in the *Monthly Notices* of the Royal Astronomical Society of London [12]. There is no doubt that the disintegration of Biela's comet, first sceptically criticized by such erudite observers as J.C. Challis of Cambridge, England, aroused an unprecedented interest and rehabilitated the story of ancient Ephorus of 371 BC, relating to a comet that broke into two sections. The separation of both components of Biela's comet increased daily within two months of the comet's appearance, until the end of February, 1846, when it reached 16 minutes of arc, more than half of the apparent Moon's diameter. Wilhelm v. Biela now followed these great celestial events from Venice, Italy, whither he had retired after being afflicted with an ailing heart in 1844.

On its next return in 1852, following the break-up in 1846, Biela's comet was this time first discovered by Father Secchi in Rome. The comet's companion was noted later, also by Secchi, on 26th August, 1852, then already separated by some 1.5 million miles. After this final appearance in 1852, the comet was seen no more. The echo of the appearances and behaviour of Biela's comet continued to reverberate and various speculations circulated until they achieved a definite form in Schiaparelli's publication in 1866. This was followed two years later by Littrow's further exposition that included the role of Biela's comet in this celestial exploration [13].

The climax of the existence of Biela's comet occurred on 27th November, 1872, on one of the comet's expected returns, when a most spectacular meteor shower of about 100,000 per hour, radiating from the constellation Andromeda appeared. This prompted Schiaparelli and Denza of Brera Observatory to publish a vivid report [14]. There could be no more dramatic, impressive and final confirmation of Schiaparelli's findings than that provided by the phenomenon of Biela's comet.

## REFERENCES

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