

Astronomical Art & Artifact

Gustav Hahn's Graphic Record of the Great Meteor Procession of 1913 February 9



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ABSTRACT: The Great Meteor Procession (GMP) of 1913 February 9 (also the Cyrillid Shower, or the Great Fireball Procession, or Great Meteoric Stream, or the Canadian Fireball Procession of 1913 February 9) was one of the most remarkable astronomical incidents to be seen over southern

Canadian skies. The professional artist Gustav Hahn was among numerous observers who reported the GMP to C.A. Chant. The professional astronomer clearly thought that the professional artist had deftly used his artistic skill in the service of scientific accuracy. This paper provides a summary of the meteoritic event, the first in-depth analysis of how Hahn created his lasting visual record of the GMP, and argues that Chant and the RASC took measures hitherto unprecedented by a Canadian astronomical periodical to reproduce and disseminate a vivid copy of a striking astronomical image of a remarkable event.

"I have been in the habit of watching the heavens since 1865 and have never noticed anything similar. There are meteors occasionally seen with multiple, crumbling heads and broad spark trains, but the wonderful stream of successive meteors seen on February 9 seems, like Saturn's rings, without a parallel" – Denning 1913, 404

"... the most important and interesting meteoric event of the past ninety years..." – Pickering 1922, 633

The records of some of the most impressive, astonishing, and intriguing astronomical events attest to the surprise experienced by those who happened to look up at the right place at the right time. Contemporary accounts of the great comet of 1744, the 1799 and 1833 Leonid showers, and SN 1987A have come down to us coloured by wonder, either open or veiled depending on the temperaments of the observers (Kronk 1999, 408-411; Brown 1999, 287-291; Littmann 1999; Madore *et al.* 1996). The role of chance in delivering unexpected marvels for visual observation might seem to have been greater in the past, before all-sky camera networks, digital sky surveys, patrols, and probes, computer-generated ephemera, and the theoretical constructs that assisted at their birth, presently feed on their data, and will in turn be transformed by their results. The factor of chance and our capacity for surprise are potent still in human experience of the phenomenal sky through the senses and the imagination. Nearly a century ago, the Great Meteor Procession (GMP) was spectacular enough to surprise, delight, and awe the most experienced of meteoriticists, not to mention the casual observer. The same event would doubtless have a comparable impact today.

What did witnesses experience on that memorable night, and how was the scientific record of the phenomenon established?

The GMP Witnessed

C.A. Chant's name is inextricably linked with the lasting scientific record of the GMP. It is a capital irony of the observational history of the event that he neither saw the meteors,

nor heard their passage, nor felt their shock waves. Perhaps before the night itself was spent, Chant was informed of the GMP by witnesses among neighbours, friends, and members of the Society. He was interviewed by a reporter for *The Globe* – predecessor of the *Globe and Mail* – either then or early on the next morning (and one suspects he was similarly contacted by other news organs). The event was front-page news:

SCORES OF METEORS ILLUMINATE THE SKY

Hundreds of People Watched a Beautiful Spectacle Lasting Two or Three Minutes

A meteoric performance of stupendous dimensions occurred in the heavens last night.... Scores of meteors shot through the skies...and so brilliant was the accompanying illumination that hundreds of people in various parts of the city witnessed it.... For an hour after the phenomenon *The Globe* was besieged with telephone calls from people either eager to give or obtain information about it. There were curious divergences in the stories told to *The Globe* by eye-witnesses of the falling meteors.... Prof. C.A. Chant of the University of Toronto told *The Globe* he had not seen the celestial show but judging from the description given to him he thought it must have been an ordinary meteoric performance. It was not scheduled, he said, but no extraordinary importance could be attached to it.

(*Globe* 1913 February 10, 1)³

Newspapers up and down the observational path of the GMP likewise accorded front-page coverage to the event the next day (*e.g. Berlin Record* 1913 February 10, 1).



Figure 1 — Gustav Hahn, *Great Meteor Procession 1913 February 9*. Watercolour and guache on paper. UTARMS A2008-0023. Copyright Natalie McMinn. Reproduced with permission.

Chant evidently soon changed his mind about the ordinariness of the “meteoric performance.” Several days later, *The Globe* and other Toronto dailies made good on their offer to Chant to publish *gratis* notices requesting eyewitness accounts, and the request was picked up by other papers along the observational path of the GMP (Chant 1913a, 145). *The Globe’s* ran as follows:

Asks Information About the Meteors — *Prof. C.A. Chant of the University of Toronto is seeking information regarding the meteoric display of Sunday evening. Reports from those living some distance from Toronto would be especially valuable, particularly in regard to the position in the sky in which the meteors were seen — that is, whether apparently overhead or to the east, the west or any other direction; and if not overhead how high above the horizon they were. Prof. Chant wishes as definite information as possible regarding the following: Time of occurrence, position in the sky, direction of the motion, how many were seen in all, how many at once, how long [the] whole phenomenon lasted. if any sound was heard and what it was like; if the bodies remained intact or broke up, if bodies had tails and how long they were, [and] how long any one body was in sight.*” (*Globe* 1913 February 13, 8)⁴

The public appeal provided Chant with abundant material for a substantial paper, including details of 143 reports of witnesses and eleven accounts of possibly related meteoric events (Chant 1913a).⁵ Chant must have worked expeditiously to have his paper ready for the May 1913 issue of the *Journal*. It

remains the largest published collection of eyewitness accounts, and with Chant’s synthesis and analysis, the starting place for any discussion of the GMP. According to Jack Heard, “It was probably the first astronomical research paper of any account coming from this University [*i.e.* the University of Toronto],” and Lincoln LaPaz referred to it as “monumental” (Heard & Fernie 1979, 128; LaPaz 1956, 402). The details of the phenomenon that follow are derived from Chant 1913a and other scientific literature that appeared in its wake.

The sky over Toronto was clear when the lead meteor came into sight around 21:05 EST, and the whole procession continued for about 3.5 minutes, ending at approximately 21:08:30 EST (Chant 1913a, 146-149; Pickering 1923a, 98 argues for 5-6 minutes). The meteors seemed to arrive in groups, and as to be expected, observers differed as to the number of groups and the number of members within each group. Some witnesses were under the impression that the GMP consisted of more than 50 separate groups of meteors, others reported no more than three (*e.g.* Chant 1913a, 171). The number of individual meteors ranged just as widely, from 15 up to 1000s (Chant 1913a, 148-149). The general direction of the GMP as seen from Ontario was NW to SE (Chant 1913a, 146, 150) with corrected average heights estimated variously between *ca.* 40-80 km. According to Chant, the path over observers on the ground covered 10% of the Earth’s circumference, which was later extended by reports published by Denning to over 25%, and even further by O’Keefe, from Didsbury, Alberta, to past Cabo de São Roque near the eastern tip of Brazil (Den-

ning 1916, O’Keefe 1968; Pickering 1923b, 447 estimated the length of the GMP at 2414 km). The meteors were considered to be relatively slow moving, both by those who submitted eyewitness reports and those who reduced the data in the reports to model the orbit of the GMP. Estimates varied between *ca.* 4 km/s to 16 km/s (see Chant 1913a and the sources in note 5 below for the data in its rawest form, and Pickering 1923 a, 103-104 for a summation of the published reductions up to that time).

Estimates for the lengths of the tails of the individual members of the GMP or that of the groups comprising it varied from *ca.* 5 to 80 km (Pickering 1923a, 103). Some observers reported colours, such as white, blue, “fire red,” and “golden yellow” (Chant 1913a, 174-178; 170; 147 respectively). One observer said the most luminous meteor was brighter than Venus (Chant 1913a, 173). A handful of observers remembered associated aural phenomena, such as the explosive fracturing of the bolides, a “thunder-like rumbling” in the wake of the procession, or a shaking of the ground or a building (Chant 1913a, 148, 159-161).

Eyewitnesses were struck by the aesthetic aspect of the phenomena that left them feeling “spellbound” and “privileged,” inducing them to employ adjectives such as “finer,” “beautiful,” “wonderful,” “amazing,” “magnificent,” “outstanding,” “remarkable,” “entrancing,” “grandest,” “splendid,” and “awful [*i.e.* in the older sense of sublime]” (Chant 1913a, 185-186; 169, 176, 180, 182, 184, 192-193, 197, 202, 206, 212).

The GMP Theorized

Events out of the ordinary seem to draw extraordinary explanations, like sailors to grog, mosquitoes to spring stargazers, or “UFOs” to the mid-West. Some who sought to account for the GMP valiantly attempted to keep a firm grasp of Occam’s razor while doing so. Others, however, were less concerned with commensurability or incommensurability with the laws of classical physics, conformity to established celestial mechanics, or the simple salvific virtues of well-tempered caution.

Chant’s conclusion was that “It would seem that the bodies had been travelling through space, probably in an orbit around the Sun, and that on coming near the Earth they were promptly captured by it and caused to move about it as a satellite” (Chant 1913a, 151). It was, in other words, a meteor stream that entered into a temporary Earth orbit due to gravitational capture, according to his reading of the evidence regarding the path, direction, velocity, and height of the objects. Chant presented his analysis and conclusions rationally, with commendable restraint and due qualifications, and he was open to considering well-argued emendations to his interpretation (*e.g.* the Rev’d Davidson in Chant 1913b, 441-443).

Denning, in his earliest printed speculation, while he accepted Chant’s view in its essentials, modified the latter’s estimates

for altitude, speed, and distance (he is apparently the first to coin the phrase “Chant trace”), and he proposed a single mass that broke up as the parent body for the meteors. He wrote of attempting to fix a radiant for the meteors (Denning & Chant 1913a). Monk threw mild doubt on Denning’s theory of a breakup of a single mass, and wonders if origin of the GMP was not rather to be found in planetary volcanic ejecta (Monck 1914, 114-115).

Approximately a decade after the event, W.H. Pickering, in a succession of papers in *Popular Astronomy*, confirmed the main tenets of Chant’s analysis, and like Denning before him, attempted to refine determinations of the path and origin of the meteors (Pickering 1922, 1923a-c). Pickering was at pains to point out contra Denning that “This remarkable phenomenon was in no sense a meteoric shower,” but, in agreement with Chant and Denning, that the meteors were “prior to their final destruction a series of minute temporary terrestrial satellites” (Pickering 1922, 632). He speculated that the GMP was made up of both stony and iron meteorites (!), and that they were of unusual size (Pickering 1923a, 100-103; 1923b, 445). Fisher (1926), in the same journal, cast doubt on Chant’s and Pickering’s theories of meteors as temporary satellites, and Harvey Nininger (1934) raised the possibility that a much lesser display of 1934 February 12 could be related to the GMP, after detailing what he thought were relevant parallels.

Five years later, Wylie (1939) offered what he thought was a cogent argument denying the reality of the GMP, a view he aired in subsequent decades (1953a-b): “This sensational story is based on nothing more than a fine shower of shooting stars in the Toronto area, a very few fireballs or shooting stars observed in other places, and practically nothing from the United States” (1953b, 145). Wylie was not an eyewitness to the event in 1913.

Wylie’s views were roundly rejected by LaPaz (1956), who was able to utilize previously unpublished eyewitness accounts from the United States (Mebane 1955; 1956). LaPaz endorsed the soundness of Chant’s analysis as modified by Dennison, Pickering, and others. The distinguished NASA meteoriticist John A. O’Keefe, apparently unaware of LaPaz’s treatment, through more rigorous analysis came to the same general conclusion, supporting the soundness of Chant’s work over Wylie’s (O’Keefe 1959).

It was O’Keefe who first proposed the name “Cyrillids” for the GMP, identifying it as a shower without a radiant or cometary connection, hence naming it after a saint’s feast day occurring in some calendars on February 9 (1961, 562). O’Keefe, while confirming the reality of the Chant trace and the modified versions of Chant’s satellite orbit, attempted to invoke the presumed orbital dynamics of the GMP as a mechanism for terrestrial delivery of “lunar” tektites, part of his lengthy campaign to prove that tektites were of lunar origin. As late as 1991, he repeated the hypothesis with the further modifica-

tion that the Cyrillids, before they processed across the Chant trace, were part of a circumterrestrial ring of “lunar” tektites (O’Keefe 1991).

The GMP has even attracted attention outside the ranks of the astronomical community. The Canadian entomological taxonomist and outstanding ichthyologist Bill Ricker co-authored a study with the ichthyological mathematician Jon T. Schnute that attempted to extend the path of the Chant trace westward into pre-Christian times via First Nations’ oral traditions (Ricker & Schnute 1999; Schnute 2006, 103-104).

It is as regrettable as it is predictable that interest in the GMP was evidenced by UFOlogists even prior to the coining of the term. (Mebane (1956, 407), not a believer in little green men, cites a believer from 1926). The GMP was mentioned often enough in pursuit of irrational causes that the reliably rigorous William K. Hartmann (1968, 961-962) had to dispose of the alien spacecraft interpretation in the Condon report! Hartmann’s discussion should have been the end of it for all but the conspiratorially inclined. For some ailments, there is no cure.

D.A.J. Seargent, in his entertaining *Weird Astronomy* (2011, 257-267), groups the GMP with the now much better known Tunguska Event (1908 June 30). The connection is more analogical than taxonomic: a) both were out of the ordinary; b) neither has been explained to the entire satisfaction of the diverse interested scientific constituencies (less has been settled about Tunguska than the GMP); and c) both have been invoked by little-green-men conspiracy theorists (Rubtsov 2009, 291-310 for Tunguska).

It is also interesting to note the silences in the literature where one might reasonably expect to encounter the GMP. It tends to receive scant mention in the few books on the history of astronomy in Canada (the most extensive such treatment remains Millman & McKinley 1967, 279-280). Its absence from McKinley’s famous monograph (1961) and even more so from Burke’s standard history of meteoritics (1986) is surprising. Less unexpected is its lack of mention in Jenniskens’ exhaustive work on *Meteor Showers and Their Parent Comets* (2006), given that no comet paternity has been seriously pursued for the GMP.

It is a testament to the quality of Chant’s work of collecting, collating, and analysis that a modified version of his interpretation of the events on the night of 1913 February 9 still stands as both the best-supported account of the GMP and the authoritative anthology of observations. One account in particular was influential in forming Chant’s conception of the GMP, and through him, that of all scientists who used his published anthology of observations. It was an eloquent account of few words, yet as the frontispiece to Chant’s “monumental” paper, it literally came before all other eyewitness records. It was Gustav Hahn’s painting of the GMP. It is arguably the most important extant hand-drawn meteoritical image by a Canadian.

The Artist

The artist, Gustav Hahn (1866-1962), belonged to a family of German origin that supplied Canada with several generations of trained and cultivated professionals in the graphic, plastic, and musical arts. As with many figures entwined in the formative fabric of Canada, the Hahn’s still await their historian.⁶ Gustav was born in the Swabian state of Baden-Württemberg, and received his training in Stuttgart at the Kunstgewebeschool and the Technische Hochschule. He became a Canadian vector for *Jugendstil* (German Art Nouveau) in Canada. He divided much of his career between teaching as a faculty member of the Central Ontario School of Art and Industrial Design/Ontario College of Art (now the Ontario College of Art & Design University), and his own flourishing and fashionable interior-design studio catering to the wealthy and influential of late-Victorian and Edwardian Toronto (Gibson 2006, 36 and fig. 2.20; Sauer 2009, 140-141). Few of his commissions survive *in situ*; a more lasting legacy might be sought in his place in the biographies of students, acquaintances, and friends now considered more prominent, such as Group of Seven members Franklin Carmichael and Franz Johnston, or the Arts & Crafts architect Eden Smith (Mason 1998, 18; Adams 1993). Conveniently, he was an amateur astronomer with connections to the Society through Chant.

Family example may have played a formative influence in nourishing Hahn’s astronomical interests, for his father was Dr. Otto Hahn, a lawyer with a doctorate in geology, who made his mark with *Die Meteorite (Chondrite) und ihre Organismen* (1880; *Chondritic Meteorites and Their Life Forms*). It was not a fortunate way to make, or rather un-make a scientific reputation. While *Die Meteorite* was notable for the novelty of its photographs of thin sections (and the skill that went into making them), Hahn was roundly criticized for uncritically interpreting the visual features in his thin sections as fossils of once-living organisms, and therefore as “evidence” for the seeding of life throughout the Universe by the delivery mechanism of meteors, panspermia (Burke 1986, 171-172; Crowe 1986, 405-406). The reception of Hahn’s book killed panspermia as a theory for at least eight decades. Otto’s work did, however, mean that his son grew up with a research collection of meteorites in the house.

Prepared by the family interest in matters meteoritical and a thorough training and long experience in accurate draughtsmanship, Gustav Hahn was the right man at the right place at the right time when the GMP roared overhead. In Chant’s words:

In obtaining my results I used only observations on which I thought I had especial reason to depend. Mr. Hahn, who supplied the drawing for the frontispiece, besides being an artist is an amateur astronomer. He is the son of the late Otto Hahn of Toronto, who possessed a large and valuable collection of meteorites” (Denning & Chant 1913, 412-413).

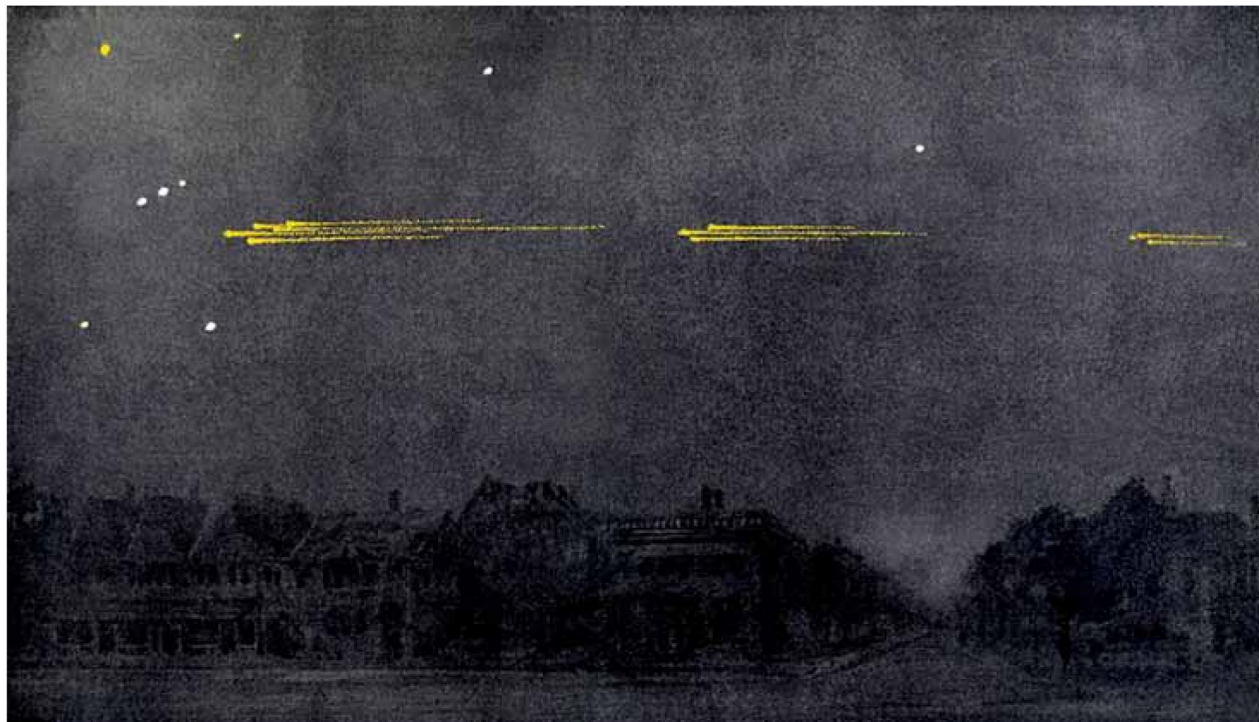


Figure 2 — Gustav Hahn, *Great Meteor Procession* 1913 February 9. Relief half-tone print with hand-painted details on tinted paper, from JRASC 7,3 , pl. IX (frontispiece).

The Scientific Image

The original of Hahn's scientific image of the GMP is now in the University of Toronto Archives and Record Management Services (UTARMS), accession number A2008-0023 (Figure 1). For decades it was on display in the administrative offices of the David Dunlap Observatory. The image has received some notice within the last year thanks to its casting in a minor supporting role in a *Sky & Telescope* piece by Olson and colleagues on Frederick Edwin Church's canvas "The Meteor of 1860" and Walt Whitman's poem "Year of Meteors (1859-1860)," and a follow-up story by Dan Falk in the *Toronto Star* concentrating directly on Hahn's painting (Olson *et al.* 2010; *Toronto Star*). The description below is the first full account of the image and aspects of its creation.

The painting measures 37×21.7 cm. The support is un-textured cream-coloured paper of medium thickness. It was not possible to directly check the paper's pH, but there are no immediately visible signs of deterioration due to elevated acid levels. No underdrawing is visible in white or ultraviolet wavelengths (375 nm and 405 nm) with either direct, oblique, or backlit illumination. With the exception of a tiny hole (only visible when backlit) at the very end of the street receding into the background, the painting is in a good state of conservation. Direct comparison with the colours in the published version of Hahn's image shows that little or no fading or alteration of colour values has occurred in the original. The back of the support is somewhat marked and scuffed.

The medium is watercolour, applied for the most part quite thinly. The streetscape (trees, buildings, sidewalks, roads) is in shades of off-white, grey, and black. Darker greys at times verging on black are used for windows, roofs, chimneys, porches, entryways, tree trunks, and parts of the canopy. Dirty ivory white is used for snow lumps in the street. After the streetscape was laid down, most of it was covered by a thin wash of a yellowish cast (horizontal brush strokes), to evoke the veiled nature of a night landscape (the wash was not applied to the top of the most prominent tree to the left of centre – from the viewer's perspective – and the tops of the canopy along the side street receding into the background).

A novel technical feature is Hahn's use of a sharp razor or a thin-profiled knife blade to incise the outlines of the top of the streetscape (roofs, chimneys, canopy). This feature is best seen under low-powered microscopic examination (6×+). His use of the knife shows great skill and delicacy, for while following the contours of the upper buildings and canopy closely, he did not once cut the paper fibres through to the back of the support. The artistic purpose of the technique appears to have been to create a subtle but definite demarcation between the streetscape and the celestial drama above, which it accomplishes quite successfully with a precise but very understated hint of a shadow.⁷

The background of the sky above the streetscape is gunmetal grey. The three meteor groups are in lemon yellow. The base of the heads along with the tails of each meteor appear to have

been constructed with an economic use of a few continuously drawn horizontal strokes. The paint has been applied to allow the inkiness of the night sky to show through in many places. The meteor heads have each been overlaid with a sub-circular daub of gouache of the same colour to give them more substance, to indicate a concentration of luminous matter (the second thickest application of paint in the image). The visual effect recalls pastels, but examination under magnification reveals telltale cracks in the heads indicative of gouache. The stars were created using a similar technique. The stars of Orion are white, except for Betelgeuse, which is rendered yellow-white (this pigment is lighter in effect than that used for the meteors, perhaps achieved by a combination of white and yellow layers). To form each star, Hahn first painted an irregularly rayed shape in semi-transparent white, and then applied on top a daub of much thicker white gouache, yellow-white in the case of Betelgeuse (the thickest application of paint in the image).

The painting is not signed, either on the back or front. The frame does bear a printed label in lieu of a signature, which reads in black on a gold ground: "METEORIC DISPLAY of February 9, 1913, as seen near High Park[.] Drawn by Gustave [sic] Hahn." From the slight fading around the margins of the painting, this may very well be the original frame (dimensions 43.4×27.9 cm). The wood of the utterly plain mouldings is dark-stained oak (it would have been a very cheap frame in

1913). The label is mounted on cardboard in a central position on the lower moulding with copper-alloy coloured dome-headed brads.

Hahn may have done a quick sketch as soon as the GMP had passed his line of sight, or made textual notes of what he saw. If so, these materials do not survive or have not thus far been located. He had no need to make an immediate sketch, however, for according to information from his family (private communication 2010 January 15), his visual memory was acute, and like many professional artists of the time, he could work up a finished drawing from memory without the intervening stage of a sketch (this ability had been possessed by several earlier astronomical artists; Warner 1983, 5, 111).

It is difficult to say, none the less, whether the image evokes what Hahn saw exactly, or whether it is in some particulars generalized. Given that the caption to the published version states: "The spaces between succeeding clusters were actually somewhat greater than shown here" (Chant 1913a, frontispiece), we know that at least one feature is not exactly as it was seen. This may also be the case for the streetscape itself. Much of the High Park area of Toronto retains its domestic and small commercial structures from the pre-WWI era, but some areas have seen subsequent development that has radically altered their appearance. An exhaustive examination of the

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area using Google Maps with Street View®, an examination of digitized period photographs from the City of Toronto Archives, combined with on-the-ground searches, have so far failed to locate an exact match for Hahn's streetscape, particularly the distinctive building with a flat roof at the junction of the two streets. Unless a likely match can be found, either with the present streetscape or in old photographs, it will be impossible to locate the exact spot from which the GMP was seen in Hahn's painting or even decide whether the streetscape is approximately or precisely rendered.

There is no record of Hahn's having been influenced by any prior meteoric image. The closest parallels are Thomas and Paul Sandby's images of the Great Meteor of 1783 August 18 (Olson & Pasachoff 1998, 69-74), and Matthew Cotes Wyatt's mezzotint of a bolide over London, seen 1850 February 11 (NMM Gabb Collection, PAJ3495) – but it is not known if he had ever set eyes on these, or similar images.

We do not know whether Hahn was so impressed by the GMP that he executed his painting for his own purposes, or whether Chant commissioned the painting upon learning that he was an eyewitness. We do know that he had such faith in both the evidential and evocative value of Hahn's image that he had it reproduced as the frontispiece to his major GMP article (Figure 2). He wanted this visual image to be transmitted as far as the *Journal* could travel in space and time. There are several remarkable aspects to this decision, and the production of Hahn's image.

For the first time in the *Journal's* history, the RASC decided to reproduce an image in relief half-tone print on tinted paper, with details apparently applied by hand to get the colours as close as possible to the original. In 1913, relief half-tone was nothing out of the ordinary and not a particularly costly process, but the order was made memorable by the use of special stock, hand work, and the striking effect created. Unfortunately, the council minutes extant for the period mention little in regard to the manufacture of this number of the *Journal*, nor have we succeeded thus far in locating references in surviving correspondence, or extant bills or receipts (*RASC Minute Book* 1913 April 29; October 7).

Several of the colours Chant and his colleagues desired in the reproduction were not best reproduced mechanically through the photo-chemical half-tone process. It was decided to execute the stars in white, white and gold, and the meteors in gold individually by hand to every single copy of the *Journal* as the penultimate stage in production prior to tipping-in to the binding. A careful examination of different copies of the print shows that while the general placement of the meteors and stars is quite close, as are their shapes, they are far from identical from print to print. This seems an extravagant way to mass-produce an image now, but it must be remembered

that features added by hand were part of the printing industry from the 15th to the early 20th century, chiefly in the matter of colour (*Grove Art*). The use of the technique for reproducing Hahn's GMP image occurred within the context of a venerable industrial practice.

There are clearly divergences between Hahn's original and its reproduction in the *Journal*. The two additional non-meteoritic bodies to the right of Orion are not in the original. For the date and time in question, the likeliest candidates are Aldebaran and Saturn, but their placement relative to Orion is wrong. Those features in the original done in lemon-yellow are rendered gold in the reproduction. The dull-yellow wash over the streetscape in the original is missing in the reproduction, as is the effect created by the skilful incision technique. The off-white snow lumps in the street of the original are omitted from the reproduction. It has to be admitted that the addition of other celestial bodies (Aldebaran and Saturn?) and their apparently inaccurate placement does not appear to add to the verisimilitude of the image as a precise record of the GMP. Replacing the original yellow of the meteors with gold in the reproduction, while it does agree with some of the original reports, is not the colour Hahn saw, to judge by his original rendering. It may have been chosen to make a more dramatic and spectacular image.

Gustav Hahn was 47 when he saw and painted the GMP, and he lived for nearly another half century. At Christmas of 1961, when he was 95, it was reported that he reminisced to the University of Toronto community about: "... the meteoric display of 1913 which he was able to paint. He was an amateur astronomer and a friend of the late Dr. Chant" (*The Monthly Letter*). He had witnessed the astronomical event of a lifetime, crafted its iconic image, and thereby fashioned the common visual memory of a spectacular meteoric phenomenon. The scientific record of this event was almost entirely a Canadian creation, and a chief engine of its propagation was the *Journal*.

Acknowledgements

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¹ RASC Archivist, 203-4920 Dundas St. W, Toronto ON M9A 1B7

² Kitchener-Waterloo Centre RASC, 133 Weber Street N, Suite 127, Waterloo ON N2J 3G9

³ Chant 1913a strongly implies that he immediately realized that the GMP was a "very exceptional occurrence" (145). The evidence of the newspapers indicates that the realization was far from immediate.

⁴ It may strike a modern reader as curious that no contact information more precise than "the University of Toronto" is provided by which prospective informants might reach Chant. It is possible that the papers were to act as intermediaries, or witnesses were expected

to contact the university for a more complete address, or perhaps "Prof. Chant, University of Toronto" was deemed sufficient.

⁵ Further witness reports were published in Chant 1913b, Denning 1915, Denning 1916, Pickering 1923b, Mebane 1956, O'Keefe 1961 & 1968. According to Heard & Fernie (1979, 128) the original reports were kept on display at the David Dunlap Observatory. They do not at present appear in the University of Toronto Archives and Record Management Services catalogue (they may, however, have been added to the existing fonds A1974-0027). Literary features of Chant 1913a seem to be modelled on Coffin 1868.

⁶ None of the Hahns has separate entries in the *Dictionary of Canadian Biography*, a very serious lacuna. Gustav's younger brothers Paul and Emmanuel merit entries in the *Encyclopedia of Music in Canada* and the *Canadian Encyclopedia* respectively. An interesting account of how the family became Canadian is Sauer 2007.

⁷ One of us (RR) originally thought the incisions indicated that Hahn had salvaged the streetscape from an earlier attempt at depicting the GMP, and pasted it on to a new support before painting the celestial portion, but in such a case the streetscape would be raised slightly above the level of the celestial scene, magnification would reveal traces of glue at the join, and it is very likely that, after a century, there would be signs of delamination in the composite support. The absence of these features disallows this explanation.



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