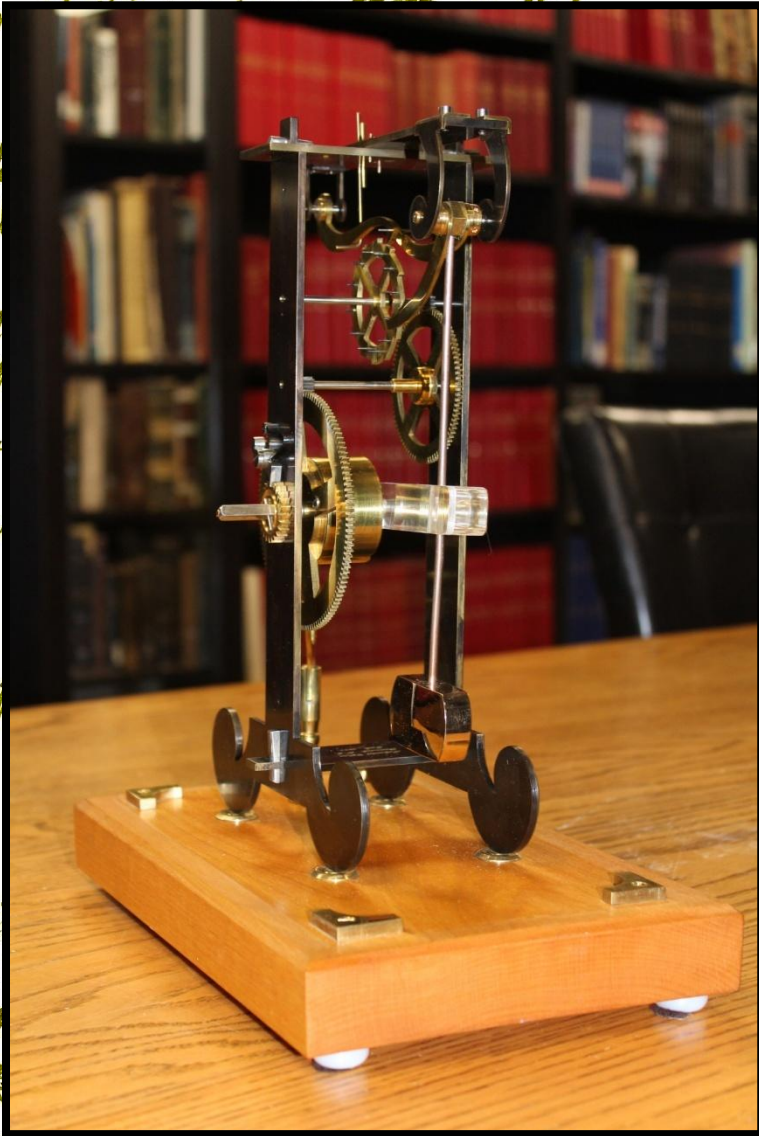


# RASC History Committee Report

2018 February 25 & April 8

et un giorno del 1641 quando io dimorava appresso  
 di un orologiaio che mi mostrò un pendolo che era caduto  
 in concetto chi si saria potuto adattare il pendolo a  
 gli orivoli su pendapassi e da molla con valer  
 sone in vece del sbilito tempo sperando che il  
 moto equalissimo e naturale d'esso pendolo avesse a  
 correggerli  
 orivoli  
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 fo incant  
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NC181-NC182

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image: the late Nat Cohen's reconstruction of Galileo's pendulum mechanism (1995), donated by Dr. Roy L. Bishop, FRASC (2018); ©RASC Archives

page background: retrospective copy (2018) of Vincenzo Viviani's letter (1659) describing the circumstances of Galileo's invention (1641) of a pendulum as a regulator for a clock, from an anonymous donor; ©RASC Archives

## Donations: a tale of two very inventive men



**I**n 1659 Galileo Galilei's last, and perhaps most devoted disciple, Vincenzo Viviani (1622-1703), participated in a priority dispute with Christiaan Huygens over the invention of the pendulum regulated clock to defend his late master's honour. His act of Galilean emulation did neither his, nor his master's reputation much good, but the surviving documents generated by the friction of the dispute have benefitted the curious by providing us with the circumstantial details of Galileo's concept of a clock regulated by a pendulum. In 1641, the blind philosopher of the Duke of Tuscany worked out the concept in discussions with his son Vincenzo and Viviani, but the device could not be built in his lifetime. As with his work in improving and applying the sector, and later the telescope, the motives in developing the time keeper were a mix of pure and not so pure—much money was potentially to be had from successfully finding the longitude, and marketing the means of the finding monopolistically (in the event Galileo's family were not to be as lucky as the Harrisons with their clocks). Vincenzo made some progress towards constructing the prototype, which survived incomplete till at least 1669, and, fortunately for us, Viviani captured it in an evocative and informative drawing which has survived.

Viviani's letter to the Cardinal Prince Leopoldo de' Medici is worth quoting:

*One day in 1641, while I was living with him [Galileo] at his villa on Arcetri, I remember that the idea occurred to him that the pendulum could be adapted to clocks with weights or springs, serving in place of the usual tempo [=verge and foliot], he hoping that the very even and natural motions of the pendulum would correct all the defects in the art of clocks. But because his being deprived of sight prevented his making drawings and models to the end of determining what device would be best fitted to the desired effect, and his son Vincenzo coming one day from Florence to Arcetri, Galileo told him his idea and several discussions followed. Finally they decided on the scheme shown in the accompanying drawing [<https://tinyurl.com/y6uxg6oh>], to be put in practice to learn the fact of those difficulties in machines which are usually not foreseen in simple theorizing (Le opere di Galileo Galilei, Edizione nazionale, ed. Antonio Favaro, vol. XIX [Florence: Tipografia Barbèra, 1907], pp. 648-659, at 655; the translation is adapted from Stillman Drake, Galileo at Work: His Scientific Biography [Chicago and London: The University of Chicago Press, 1978], p. 419).*

With the cultivation and growth of the cult of Galileo, his clock mechanism became iconic in its own right.

Since the late 19th century some of the most significant museums of the history of science, as well as some more general collections, have obtained their own reconstructions of the mechanism. Examples can be found today at the Smithsonian in Washington DC (<https://tinyurl.com/y7zj8w69>), at the Museo Galileo in Florence (<https://tinyurl.com/y8zhchqy>), at Museums Victoria in Melbourne (<https://tinyurl.com/y99e9p6r>), and at the Science Museum in London (<https://tinyurl.com/ycc7al6v>) to name a few. One of the luxury watch-making firms even issued their reconstruction of the Galileo pendulum provided with a clock face in 2014. Limited to a run of fifty, they retailed for a modest \$43,200 USD each(!) (<https://tinyurl.com/ya8tq4vn>).



Nathaniel ("Nat") Cohen (1926-1996) was one of the more memorable and remarkable RASC members. Originally from England, he was a long-time member of the Halifax Centre. Nat had received a thorough training as a machinist in the British Army. He was a mechanical engineering draughtsman, and technologist, who was accomplished at metallurgy and machining beyond the ordinary. One of his retirement activities was to repair clocks and watches, which he did to a fully professional standard. To Nat "*horology is a natural extension of astronomy...so combining the two hobbies makes both more enjoyable...Having recently acquired a new...compact lathe for my clock repair activities I thought it would be a very pleasant exercise to make this [Galilean] model*" (Cohen 1996, 4-5). So, in the year before his death at the age of 70, he made his own reconstruction of Galileo's pendulum mechanism. His main source of inspiration, and practical guide, appears to have been John Wilding, FBHI, *How to Make Galileo's Escapement* (Bordon, Hants: RiteTime Publishing Ltd., 1977), which he followed closely.

After presenting his work in a talk to the Halifax Centre, he gave his Galileo pendulum mechanism to Roy Bishop. Late last year Roy very generously offered Nat's work to the RASC Archives. We are very grateful for this major donation, a testament both to the technical innovations of a major figure in early-modern astronomy, and to the superb craftsmanship of a RASC member.

Roy Bishop and the Archivist are planning an extended study of the clock and its maker. For those interested in Galileo's pendulum mechanism, the standard account is Silvio A. Bedini, *The Pulse of Time: Galileo Galilei, the Determination of Longitude, and the Pendulum Clock*, Biblioteca di Nuncius (Florence: L.S. Olschki, 1991). Nat Cohen's own description of his project can be found in Nat Cohen, "A Clock Out of Time", *Royal Astronomical Society of Canada Bulletin* 6, 1 (1996, February), 4-5 ([www.rasc.ca/bulletin-1996-02](http://www.rasc.ca/bulletin-1996-02)), and an obituary for him is [David Turner,] "Nathaniel ("Nat") Cohen (1926-1996)", *JRASC* 91, 1 (1997 February), 48 (<https://tinyurl.com/yax2ccfg>).

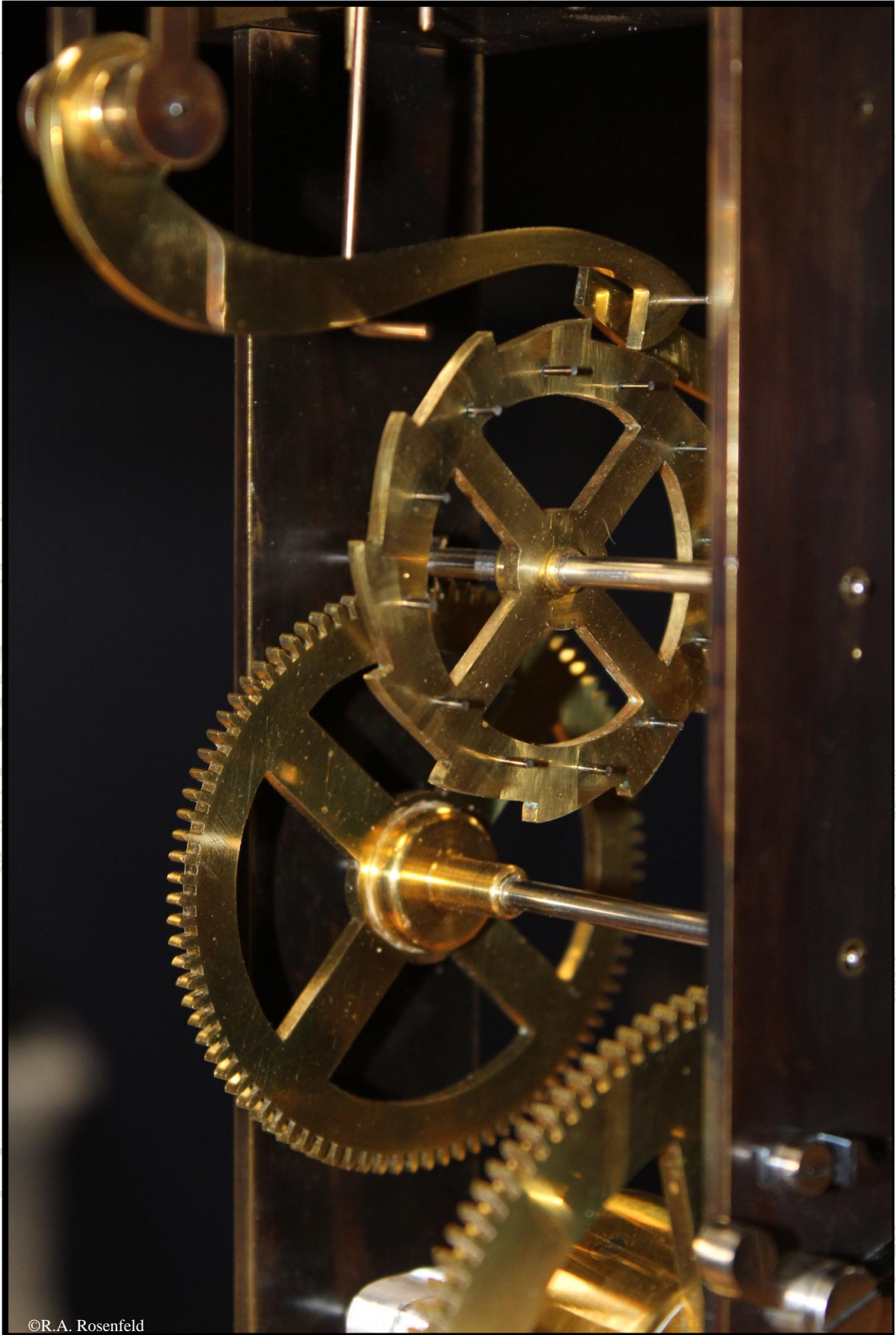


"front" of the mechanism



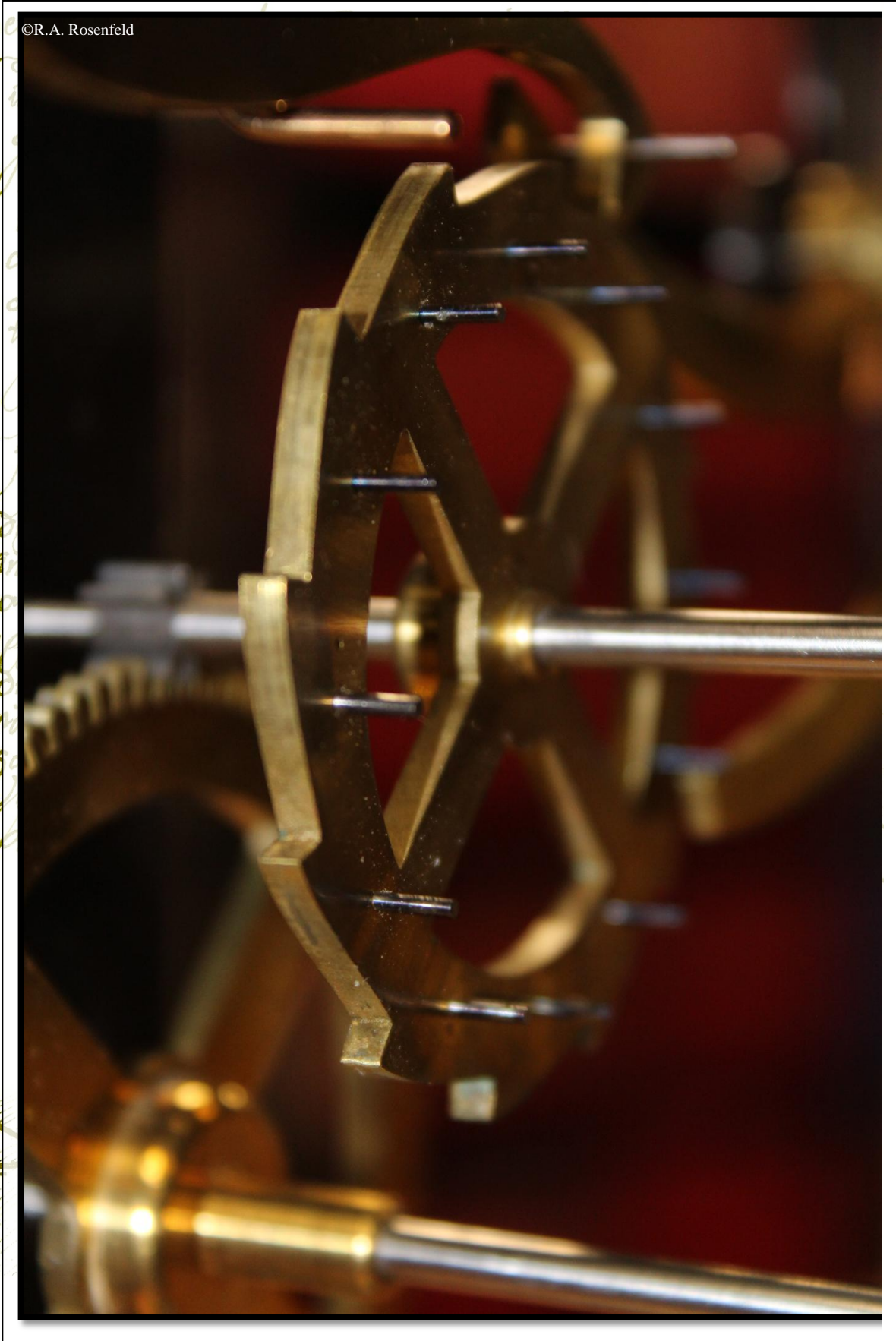
"back" of the mechanism

*going train*





*escapement wheel*



*pins, teeth, & pallets*





above: suspension bracket & arbor; below: name plate



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This major donation from Dr. Bishop inspired a lesser one. A member who wishes to remain anonymous has given the Archives a recreation of Vincenzo Viviani's letter (1659) describing the circumstances of Galileo's invention (1641); it is a manuscript facsimile (handmade) in the style of the mid seventeenth century, which will go on display with the pendulum mechanism (it is the watermark of the pages in this report—an unobscured version is on p. 14 *infra*).

### New Archives Space

The project to provide an expanded and renovated Archives space noted in the last History Committee Report NC173 (2017 December 17; <https://tinyurl.com/yd8ft9j6>) is nearing completion; the heavy lifting, as it were, will be complete by the time members read this account. This undertaking was approved by the Board of Directors as a RASC 150 project (but one not under the purview of the RASC 2018 Working Group—they are busy enough!). Beyond serving as a space for curation of and research into our material history and heritage, the room will function as a setting appropriate for a learned Society celebrating its sesquicentennial, providing a much needed meeting place, a venue for the delivery of programming *in situ* and remote, and as a fitting space for media interviews by the ED, as well as others.

The images below are of work in progress from several weeks back. Much help in realizing the project has been received from the Society Office staff, and Chris Kozak. An "opening event" is planned for the near future.



1147  
174  
1327  
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1200



## Citizen Science initiative

As will be recalled from the History Committee report for NC172 (2017 June 30; <https://tinyurl.com/y8wptjrn>), Eric Briggs, inspired by projects such as *Digital Access to a Sky Century @ Harvard* (DASCH) (<http://dasch.rc.fas.harvard.edu/project.php>), suggested that Society members could be encouraged to make potentially valuable scientific data accessible by helping to digitize the logbooks for the David Dunlap Observatory (DDO). The digitization of this material would be key in unlocking the data in the DDO plate archive. To further this, Eric has written:

I would like to call for some help in transcribing the Logbooks of the David Dunlap Observatory into Excel format. This is a project that was started by University of Toronto astronomy librarian Lee Robbins around 2011. I have discussed this project at several RASC meetings, at the Edmonton General Assembly in 2012, and at a Hamilton Centre meeting in January 2013.

These logbooks (<http://www.astro.utoronto.ca/AALibrary/ddologbooks.html>) are important for the sorting of the DDO plate library as it is periodically being digitally scanned ([http://www.aspbbooks.org/a/volumes/table\\_of\\_contents/?book\\_id=458](http://www.aspbbooks.org/a/volumes/table_of_contents/?book_id=458)).

The logbooks are also a partial technical history of the DDO operations for decades. They include notes about weather events, world historical events, observatory upgrades such as mirror silvering and aluminizing runs, the titanium oxide painting of the dome, replacement of the original clock drive, and visits by VIPs such as Enrico Fermi and the NFB 'Universe' film crew.

If you can form a mental picture of Helen Sawyer Hogg working at the top end of the telescope taking Newtonian plates of the globular clusters and lowering them down from the gondola in a handbag, would you like to look up when she did those observing runs, and the workflow necessary for converting the 74-inch telescope from Cassegrain mode?

Many members of the RASC across Canada received training at the DDO early in their careers and received DDO Observer Codes such as Bt, C3 and Ftd. But because the logbooks were always scratched out in longhand, aggregating them into a modern index that can be used to quickly search the digitized plates or recall other details requires human oversight. This project is identical in method to the Project Phaedra (Preserving Harvard's Early Data and Research in Astronomy) transcription projects now ongoing at the Smithsonian with the logbooks of Cecilia Payne-Gaposchkin and Annie Jump Cannon, but this is our own Canadian project ( <https://transcription.si.edu/browse?filter=owner:11> )

To learn more about this project please contact Lee Robbins at the University of Toronto: [robbins@astro.utoronto.ca](mailto:robbins@astro.utoronto.ca).

And if you are one of the alumni of David Dunlap Observatory, please share your experiences with the rest of us, or else we will have to use our imagination. The DDO's nomination process as a national heritage site by its new owner, the Town of Richmond Hill, is being started this year, and the RASC Toronto Centre is currently planning resumed DDO activities for later this year.

(<https://pub-richmondhill.escribemeetings.com/filestream.ashx?DocumentId=3914>). —Eric Briggs

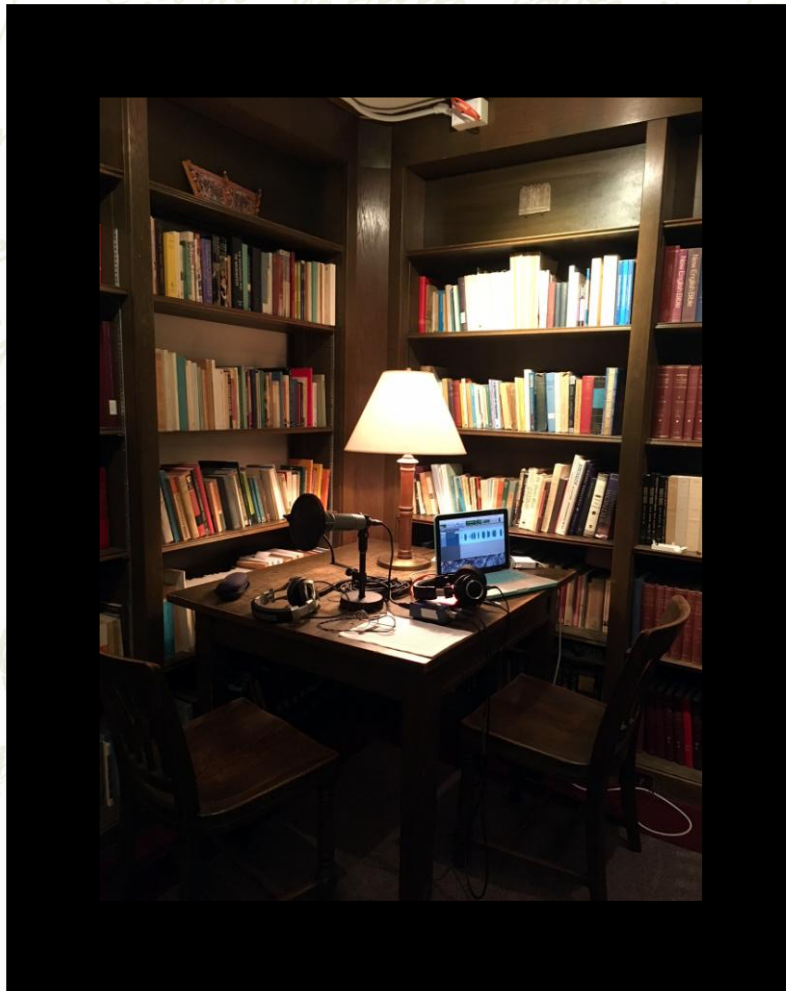


## Podcasting the history of Canadian astronomy

Several members of the Committee have been involved in podcasts on the history & heritage of Canadian astronomy.

Peter Broughton, whose much awaited monograph *Northern Star: J.S. Plaskett* (Toronto–Buffalo–London: University of Toronto Press, 2018) has finally appeared, has recorded a podcast on J.S. Plaskett for the Champlain Society, with the past-president of that institution, Patrice Dutil (<https://tinyurl.com/y8owxjvh>; he has also penned a guest author's blog for UTPress at: <https://tinyurl.com/yd9jlwjz>).

Additionally, three of the Society's sesquicentennial history podcasts have this far appeared. This series runs throughout 2018, and is one of the core programs of the RASC 150th celebrations. Each month sees the release of a new episode. The hosts are Heather Laird and the Archivist, the latter of whom also does the writing & research, Chelsea Body is the sound engineer & producer, theme music is by Eric Svilpis, and the series webmaster is Walter MacDonald. The web page for the series is <https://www.rasc.ca/rasc-2018-podcasts>, where the full schedule, programs released, and supplementary webpages can be found.



©Chelsea Body



## Publications

Heather Laird, "The RASC Podcast", *JRASC* 112, 2 (2018 April), 72

Andrew Oakes, "Review of Douglas A. Vakoch and Matthew F. Dowd, The Drake Equation: Estimating the Prevalence of Extraterrestrial Life through the Ages", *Spontaneous Generations: A Journal for the History and Philosophy of Science* 9, 1 (2018), 186-188 (<https://tinyurl.com/yawnhots>)

Andrew Oakes. "Review of Melinda Baldwin, Making Nature: The History of a Scientific Journal", *Spontaneous Generations: A Journal for the History and Philosophy of Science* 9, 1 (2018), 189-191 (<https://tinyurl.com/y8ubw7pz>)

R.A. Rosenfeld, "RASC 150: Unity in Diversity and Saving Your Centre's Past", *The Royal Astronomical Society of Canada National Newsletter* 2, 4 (2018 January–February), 1-2

R.A. Rosenfeld, "Dr. Sommer's Moon: Philology, Cartography, and Oblivion", *JRASC* 112, 1 (2018 February), 35-41

R.A. Rosenfeld & Heather Laird, "Beginnings—Documentary Traces & Tatters, or lessons from doing the first RASC 150 podcast", *JRASC* 112, 2 (2018 April), 72-73, 76-78

## Other activities

Several Committee members have been involved in diverse educational & public outreach (EPO) efforts, as part of the Society's 150 celebrations.

In the thus far most fully realized implementation of the sesquicentennial program *Cultural Connections* (<https://www.rasc.ca/cultural-connections-resources>), Clark Muir suggested that the Kitchener-Waterloo (K-W) Centre might contact a respected local gallery, the Homer Watson House & Gallery, dedicated to the heritage of the noted painter Homer Watson (1855-1936), to see if the gallery would be interested in a show illustrating the evolution of amateur representations of astronomical phenomena from 1868 to the present. The exhibit would celebrate both the achievements of the K-W Centre, and more broadly RASC 2018. The Gallery enthusiastically agreed to the K-W Centre's proposal, and the exhibit *Science and Art: 150 Years of Astronomical Imagery* was born.

The exhibition is built around images by local astronomers from the region executed during the period 1868-2018, with some early material drawn from the RASC's National Archives, the University of Toronto Archives and Records Management Service (UTARMS), and the Specula astronomica minima (the last is a private collection of astronomical artifacts). On loan from UTARMS will be a notable visual artifact of Canada's astronomical history & heritage, Gustav Hahn's painting of the Great Meteor Procession of 1913 February 9. This will be publicly displayed for the first time next to the version published in *JRASC* that year (for a treatment of both images, see <https://tinyurl.com/okxgrha>).

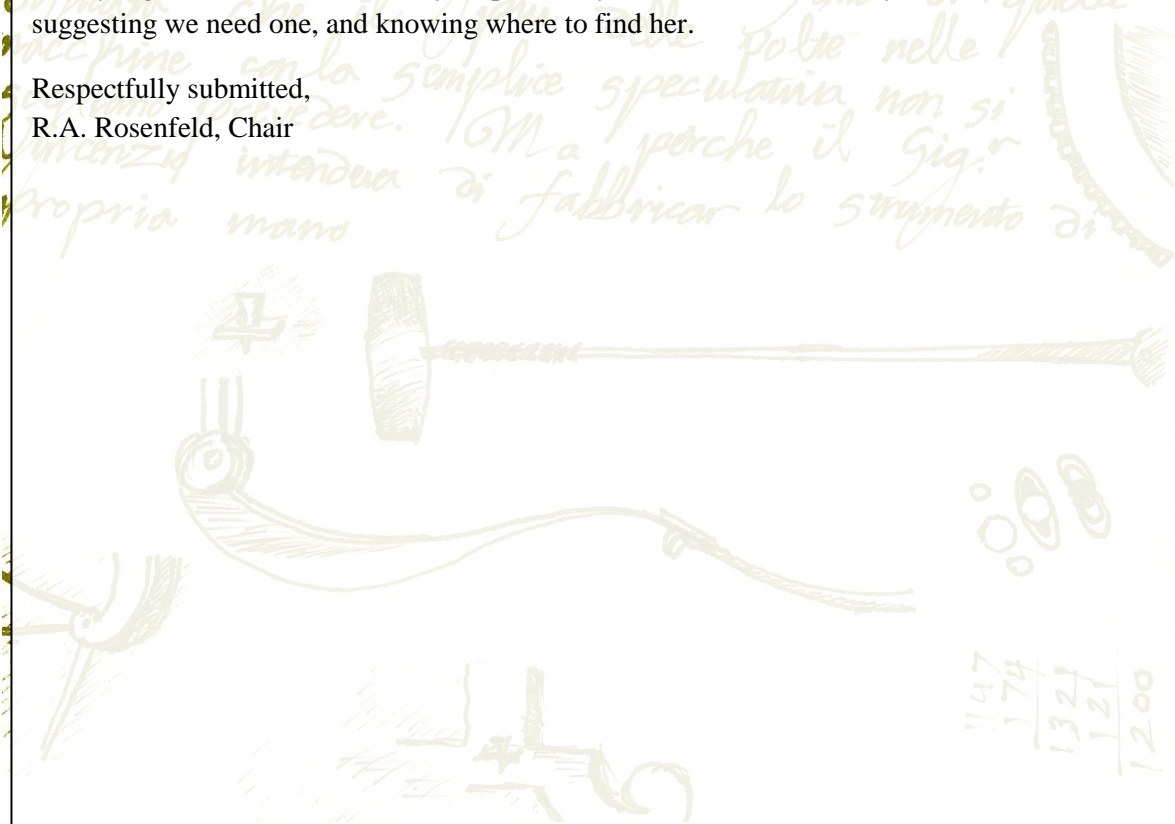
Originals of the sort of tools used by early RASC astrosketchers will also be on display. A particular feature of the modern part of the show will be the nightscapes of K-W Centre member Jeff Dawkins. The exhibit is scheduled to run from September 9 to October 21, 2018, and any RASC member from across the country who happens to be in the Kitchener-Waterloo area during the exhibition is invited to attend. The Homer Watson House & Gallery URL is [www.homerwatson.on.ca/](http://www.homerwatson.on.ca/).

The Archivist has been involved in organizing the first stage of the sesquicentennial project *A Shared Sky: the RASC 1868-2018* (<https://www.rasc.ca/rasc-2018-shared-sky-rasc-1868-2018>). This is a multi-contributor project, and commences with a symposium on the history of the RASC, to be held during the 2018 RASC General Assembly in Calgary (<https://rascga2018.ca/a-shared-sky-the-rasc-at-150/>). The local organizing committee of the GA has been most accommodating. More details will appear in subsequent reports.

### Acknowledgments

The Committee wishes to thank Julia Neeser, Office Manager, Renata Koziol, Accounting Manager, and Randy Attwood, FRASC, Executive Director, for support during the period covered by this report. We wish particularly to thank Chris Kozak for his furniture wrangling expertise, and good humour in the face of laconic Ikea instructions. Thanks are due to Walter MacDonald (RASC Webmaster) for valiantly continuing to digitize our archival heritage during cloudy nights, and to Chelsea Body, expert Foley artist, and to John Body (K-W Centre) for suggesting we need one, and knowing where to find her.

Respectfully submitted,  
R.A. Rosenfeld, Chair

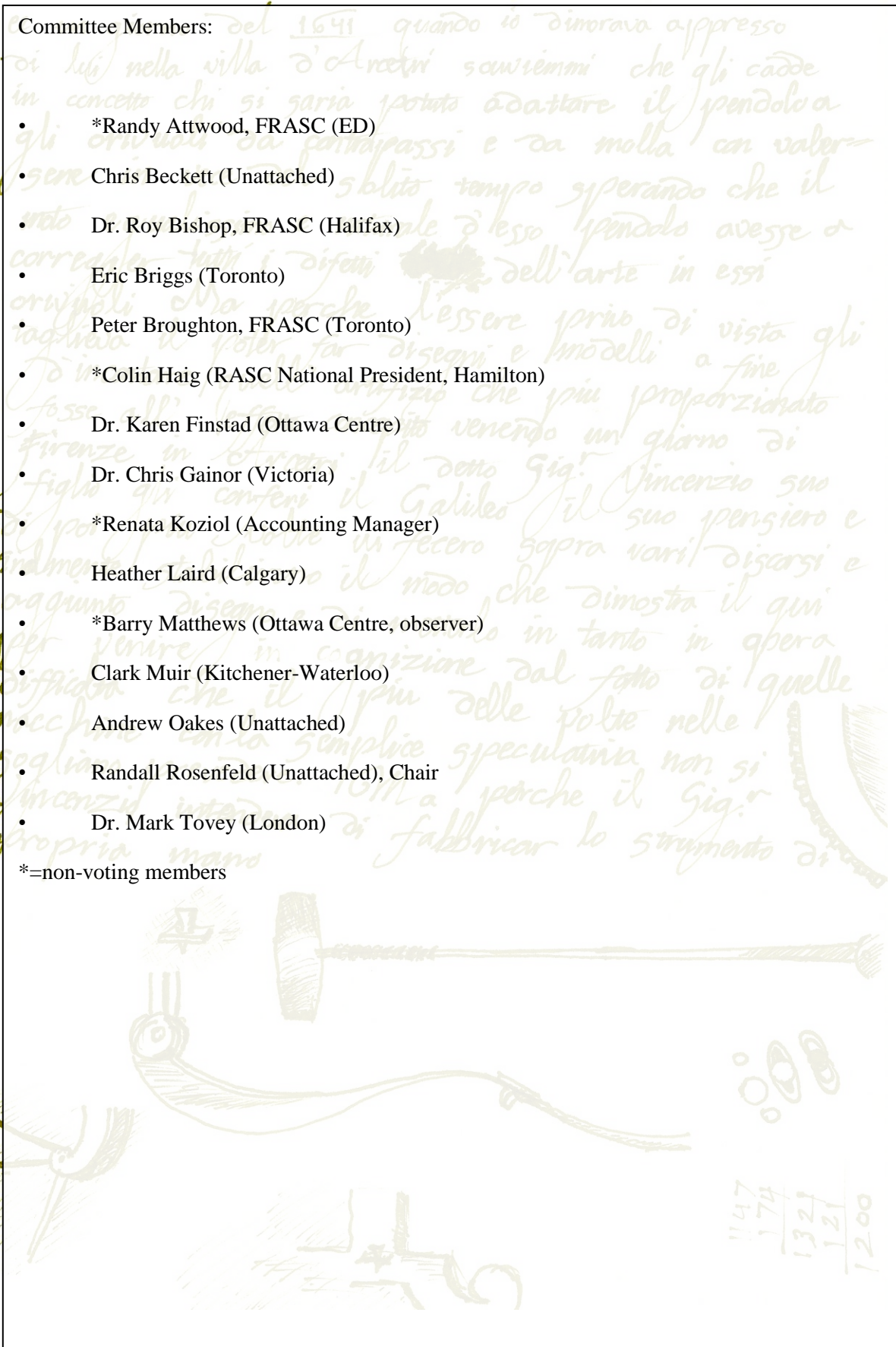




Committee Members:

- \*Randy Attwood, FRASC (ED)
- Chris Beckett (Unattached)
- Dr. Roy Bishop, FRASC (Halifax)
- Eric Briggs (Toronto)
- Peter Broughton, FRASC (Toronto)
- \*Colin Haig (RASC National President, Hamilton)
- Dr. Karen Finstad (Ottawa Centre)
- Dr. Chris Gainor (Victoria)
- \*Renata Koziol (Accounting Manager)
- Heather Laird (Calgary)
- \*Barry Matthews (Ottawa Centre, observer)
- Clark Muir (Kitchener-Waterloo)
- Andrew Oakes (Unattached)
- Randall Rosenfeld (Unattached), Chair
- Dr. Mark Tovey (London)

\*=non-voting members



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 orivoli. Ma perche l'essere privo di vista gli  
 tagliava il poter far disegni e modelli a fine  
 d'incantare quell'artificio che piu proporzionato  
 fosse all'effetto concepito venendo un giorno di  
 Firenze in Arcetri il dno Sig. Vincenzio suo  
 figlio gli conferi il Galileo il suo pensiero e  
 di poi piu volte vi fecero sopra vari discorsi e  
 finalmente stabilirono il modo che dimostra il qui  
 aggiunto disegno e di metterlo in tanto in opera  
 per venire in cognizione dal fatto di quelle  
 difficoltà che il piu delle volte nelle  
 macchine con la semplice speculativa non si  
 sogliono prevedere. Ma perche il Sig.  
 Vincenzio intendeva di fabbricar lo strumento di  
 propria mano

