

## Editorial

# The Rise and Fall and Rise of the David Dunlap Observatory

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As I write this editorial, I am also preparing a presentation for a one-day symposium on June 13 marking the 80th anniversary of the founding of the David Dunlap Observatory (DDO; <http://theddo.ca>). Its story has many connections with and lessons for the AAVSO.

DDO was the dream of Professor Clarence Augustus Chant (1865–1956). Chant graduated from the University of Toronto in physics in 1890. In 1892, he rejoined the Department of Physics as a lecturer. Over the next four decades, he introduced courses in astrophysics (previously, only courses in mathematical and practical astronomy had been offered in the university), established a degree stream in physics and astronomy, and eventually a separate Department of Astronomy. He was also a guiding light for the mostly-amateur Royal Astronomical Society of Canada (RASC; <http://rasc.ca>) for half a century. It's not surprising that University of Toronto astronomers have enjoyed a respectful and productive partnership with amateur astronomers ever since, through the RASC, the AAVSO, and other organizations. Chant was also a prolific and successful communicator and popularizer of astronomy. His book *Our Wonderful Universe* (1928) was a best-seller in several languages.

Throughout his career, Chant dreamed of establishing a major observatory for the university and for the city. In 1921, after one of his many public lectures, lawyer and mining executive David Dunlap approached him and expressed an interest in astronomy and in the observatory project. Sadly, Dunlap died before any further discussions took place. In 1926, Chant got up the courage to approach his widow, Jessie Donalda Dunlap, and asked if she might consider donating an observatory to the university as a memorial to her late husband. She agreed and, on May 31, 1935, DDO opened, housing a 1.88-m (74-inch) reflector, the second-largest telescope in the world at the time. This story illustrates one of the many potential benefits of astronomy outreach and communication! More obvious reasons to do outreach are: to increase public awareness and understanding of astronomy; to increase public science literacy in general; to present a positive image of astronomy and astronomers; to justify public spending on astronomy; to attract young people (and amateurs) to astronomy; or simply because outreach is fun!

Initially, the DDO's research was in the area of stellar radial velocities, but the study of binary and variable stars soon became central to its work. Helen Sawyer Hogg (AAVSO president 1939–1941) was world-renowned for her research, catalogues, and bibliographies of variable stars in globular clusters, work

which has been continued by her former student Christine Clement. Smaller telescopes, equipped for photometry, were added. These, together with the 1.88-m spectroscopic “Great” telescope, led to long-term studies of Mira, RV Tauri, R CrB, RS CVn, Be and shell, peculiar A, and especially Population I and II Cepheid variables. Many of these studies were carried out as thesis projects by graduate students who subsequently became leaders in variable star research. Most have been “friends” of the AAVSO in one way or another. DDO director (1978–1988) Don Fernie was internationally known for his research on the Cepheid period-luminosity relation, now known as the Leavitt Law. Radio astronomer and DDO director (1988–1999) Ernie Seaquist studied radio emission from a variety of unusual variable and binary stars such as novae and symbiotic stars. Slavek Rucinski was the “father” of the MOST ([http://en.wikipedia.org/wiki/MOST\\_\(satellite\)](http://en.wikipedia.org/wiki/MOST_(satellite))) and BRITe (<http://brite-constellation.at>) variable star space telescopes. The most famous advance at DDO was Tom Bolton's identification of the optical counterpart of X-ray source Cyg-X1 as the first black hole binary.

DDO's success in these fields was due to its availability for sustained, systematic surveys and studies of individual stars, using both spectroscopic and photometric techniques. Long-term spectroscopic studies of variable stars are still rare. It helps to be a “local” observatory, with time allocation under the control of a single institution or organization. Of course, “sustained and systematic” is the key to the importance of the AAVSO's International Database of observations.

By the 1990s, however, stellar astronomy fell out of style, at least in North America—despite the importance of the sun and stars to all areas of science. Weather and light pollution made DDO a less-than-ideal site. University of Toronto astronomers and their students were observing from Hawaii, Chile, or from space. DDO was used less and less for research, though public programs continued, with the help of the RASC's Toronto Centre (<http://www.rascto.ca>). Its demise appeared to be imminent. Various groups, with different agendas, campaigned to save the observatory but, in 2008, with the agreement of the Dunlap family, the university sold the observatory to Metrus Development Inc.

If the story ended there, it would be a sad one. In 2009, however, the university invested the proceeds of the DDO sale—about \$60,000,000 Canadian—in a new Dunlap Institute (<http://www.dunlap.utoronto.ca>), which has carried forward the Dunlap name and bequest into the 21st century in a very effective way. Donor interest and recognition is a key element

of philanthropy, and we are delighted that the Dunlap family has maintained a strong interest in astronomy, and in the long-term impact of their bequest. The Dunlap Institute's mission is (1) to develop innovative instrumentation, including for the world's largest telescopes, (2) to help train the next generation of astronomers, and (3) to foster public interest and engagement in science. In partnership with the Department of Astronomy and Astrophysics, it is systematically building up a group of bright young faculty who, with Dunlap postdocs and graduate students, work at the frontiers of astronomy.

At the same time, the RASC Toronto Centre was successful in convincing Metrus to give it the use of the observatory to continue its public education and outreach programs. Every Saturday evening between May and October there are two public tours. They include a short non-technical talk by people such as me, followed by a tour of and look through the telescope, supplemented by exhibits and displays and state-of-the-art audiovisuals. Smaller telescopes are set up on the lawn.

There are programs for schools, for Scouts and Guides, family nights with a "Space Crafts" room, and programs for special events such as meteor showers, the 2012 Transit of Venus, and Astronomy Day. In 2015, the dozens of "DDO volunteers" received the RASC's national Qilak Award for excellence in astronomy outreach and communication ([http://www.rasc.ca/sites/default/files/2015\\_QilakDDO\\_volunteers.pdf](http://www.rasc.ca/sites/default/files/2015_QilakDDO_volunteers.pdf)). Also in 2015, Metrus officially donated the observatory to the RASC Toronto Centre—for better or worse!

There must be many "orphan" small-to-medium-sized telescopes in accessible locations across North America and beyond, and many astronomical organizations and clubs looking for a challenging outreach project (and maybe a telescope to do variable star research with). At the same time, there are millions of people, young and old, who could be inspired by looking through a telescope. The work of the RASC Toronto Centre is an excellent example of what can be done. I hope it inspires other astronomy groups to do likewise.