Our chemical cultural heritage

The University of Melbourne Chemistry Collection

PETRONELLA NEL

A University of Melbourne academic and objects conservator took up a fascinating opportunity when she assessed her alma mater's chemistry collection.

I did not even know that the School of Chemistry had a cultural heritage collection. So I was surprised when approached in November 2007 to conduct an audit of the Collection. Apparently it was being returned to the University of Melbourne, after a considerable stay at Scienceworks, which is now part of Museum Victoria. The audit involved 2 days of unpacking items from cardboard boxes and checking them against a spreadsheet inventory of the items. After delivering a report with various recommendations regarding the condition of the collection, I heard nothing more, until July 2008.

Returning the Chemistry Collection to its original home

Since its return to the University of Melbourne, the Chemistry Collection has been in the temporary care of the University of Melbourne Archives. It is intended that the collection will return to its original home, the School of Chemistry, where space is being prepared as part of major renovations that began in 2008. However, first the collection requires re-housing, conservation, detailed cataloguing and documentation. To begin this work, the Russell and Mab Grimwade Miegunyah Fund made a generous grant in 2009 to rehouse the most fragile items into archival-quality materials and boxes, thus ensuring their physical safety. It is most appropriate that a philanthropic trust founded by the bequests of an industrial chemist and his wife is providing funding to care for this historic collection.

This time I was approached by the School of Chemistry to undertake a 'Significance assessment'. This is a critical document, required by the University of Melbourne to determine whether the collection is of historical, scientific, aesthetic or social significance, and by the School of Chemistry in order to apply for funds and other support to preserve and develop the collection.

Significance assessment

History of the collection

In the 1970s, Dr Joan Radford, a member of the School of Chemistry from 1956 to 1980, developed an interest in the history of chemistry and the School of Chemistry in particular (McRae 2007). This resulted in a book *The Chemistry Department of the University of Melbourne: its contribution to Australian science 1854–1959*, published in 1978, which documented the school's history (Radford 1978). It was the knowledge Radford gained while researching the book that enabled her to recognise the cultural value of much of the redundant equipment in the chemistry store. She described the objects and their original uses and related them to the chemists who had worked in the department over the previous century. She then listed the collection in a card index and in 1980 organised for it to be placed on long-term loan with the Science Museum of Victoria, now part of Museum Victoria. In 2007, after 27 years of being located at Museum Victoria, the School of Chemistry Collection was returned to the university.

Description of the collection

The University of Melbourne's School of Chemistry Collection comprises more than 300 items, dating from the 1850s to the 1960s, which interpret the first century of teaching and research in chemistry at Melbourne. Items include bottles of chemicals, liquids and solutions; solids; balances; glassware; burners; apparatus associated with the measurement of heat, light, electricity and radiation, and the investigation of gases; paper-based materials; photographic film; slides; catalogues and lecture notes. Many of the items are of historical significance due to their association with key figures in the history of chemistry and science at the University of Melbourne, in Australia, and internationally.

Comparison with other university chemistry collections

So what is the significance of this chemistry collection? A survey of comparable collections undertaken as part of the significance assessment showed that chemistry exhibits are often found in physical science museums such as the Museum of Science in Boston and the Science Museum in London. Around the world, museums dedicated to chemistry can be found at the universities of Edinburgh, Dundee, St Andrews and Rome, at Kazan State University in Russia, and at the Hungarian Chemistry Museum. But this is not a large number; museums devoted to chemistry are relatively rare.

In Australia, numerous universities have a science and/or physics museum or collection. But of these, only two have a connection to the history of chemistry, and they are associated with universities that are younger than Melbourne: the Museum of the History of Science (established 1986) at the University of New South Wales (established 1949); and the Scientific Instrument Collection (established 1993) at Monash University (established 1958). Inquiries in 2008 by Professor Ian Rae (then RACI President) to various chemistry departments at the major universities in Australia revealed a tragic disintegration of chemistry collections and museums in Australian universities. There were tales of items being thrown out due to relocation into smaller buildings; items being given away to local fossickers or loaned to school teachers and alumni; remnants of formerly substantial collections being visible in a few display cases; and finally one science museum that was closed down completely. In light of this information, it would appear that Joan Radford had immense foresight when she decided to gather together and preserve the collection, and transfer it for safe-keeping to what is now Museum Victoria.

Film digitisation project

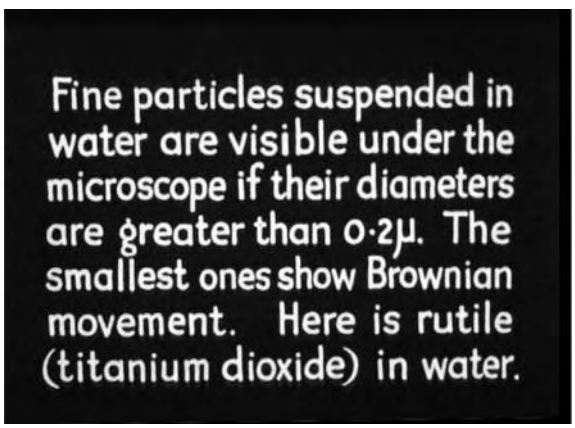
With the recent passing of Professor Ron Brown (foundation Professor of Chemistry at Monash University), Professor Ken Ghiggino (Masson Professor and Head of the School of Chemistry at the University of Melbourne) was approached by staff members at Monash University about the possibility of digitising cinematic film in the collection related to Professor Brown, and hence I was contacted. I found that the collection includes six complete reels of cinematic film and some incomplete reels and off-cuts. In November

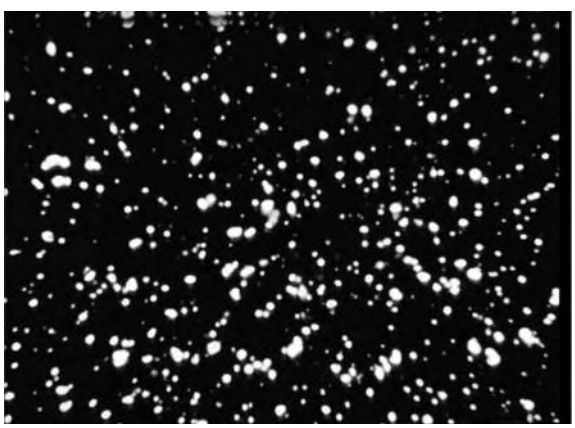
2008, this film was assessed for preservation and digitisation. There was some excitement when it was found that some of the film was based on cellulose nitrate, which poses many problems in collections. As the film deteriorates over time, it becomes difficult or impossible to view the image; the gases produced by the process of deterioration are corrosive and toxic to humans and can damage other collection items in the vicinity; and if the film does ignite it burns fiercely and is difficult to extinguish. An examination of the film reels at the National Film and Sound Archive determined which reels should be retained and which incomplete reels and off-cuts could be disposed of. The complete reels comprised two titles: 'Brownian motion', also called 'Colloids', made in 1934 by Ernst Hartung and Leonard William Weickhardt* (who became research director at ICI-ANZ and later Chancellor of the University of Melbourne 1972–8); and 'Semi-micro analysis' made in 1955 by Robert Craig, Thomas O'Donnell and Ron Brown during his time at Melbourne. The reels determined to be in the best condition were used for digital conversion. Thanks to the digitisation process, the content of these films can now be viewed and insight gained into the use of novel technologies by innovative lecturers such as Hartung to capture the imagination of the conference audience or the student. The 'Colloids' film (from which the uncaptioned negative images in this article are taken) was displayed on large plasma screens in the School of Chemistry on the evening of the ground-floor renovation celebrations in February.

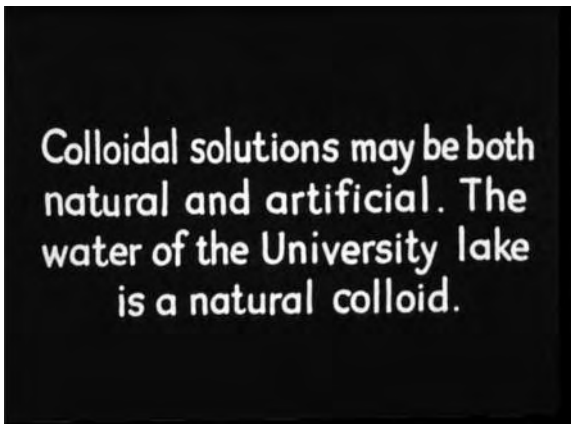
Michael Herrick examining a reel of film at the National Film and Sound Archive. Image credit: Petronella Nel.

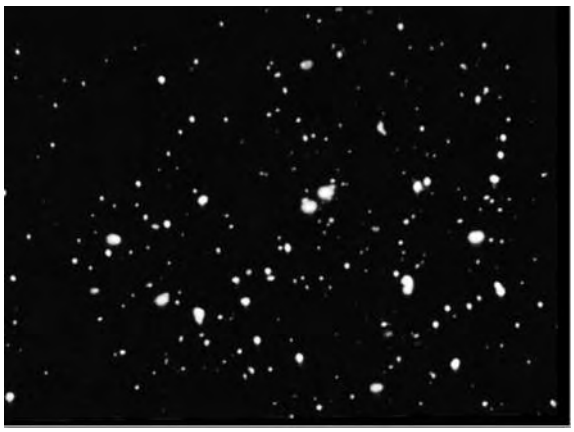
Inaugural exhibition

More recently, at the start of this year Professor Ghigino asked me to put together a small exhibit of items from the collection. As the timeframe was very tight, exhibits were selected on the basis of a list of key items already identified by Professor Ian Rae. Next the items had to be found, and their dimensions checked to ensure that they would fit into the display cases. Then an assessment was made of their condition to determine if they only needed minor conservation treatment to become fit for display. Thanks to some fantastic teamwork, especially from Dr Belinda Nemec and Mick Moylan, a small exhibition of the collection opened on









25 February 2009 as part of the School of Chemistry's celebrations on the completion of the ground-floor refurbishments. The exhibition featured photographs of and biographical information about the early professors of chemistry, and six key items from the first 100 years of chemistry research and teaching at the University of Melbourne. The exhibits can be viewed in the ground-floor foyer area of the main building. Aspects of the exhibition will be featured in future editions of *Chemistry in Australia*.

Reflection

Little did I know when I decided in 2004 to commence a 2-year full-time MA in Cultural Materials Conservation at the Centre for Cultural Materials Conservation at the University of Melbourne, that this knowledge would be required by the School of Chemistry for its very own Chemistry Collection. I have found the various projects associated with this collection absolutely fascinating. They have given me an insight into the cultural context of the School of Chemistry, which I most certainly did not have as an undergraduate and postgraduate student. I hope that this overview will provide the reader with a deeper appreciation of the historical roots of chemistry teaching and research in Australia.

Acknowledgments

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* Digitised by Digital Pictures, 22 December 2008 (School of Chemistry).

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Our chemical cultural heritage

Masson and Rivett (1858–1961)

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A new phase for chemistry at the University of Melbourne began in 1886, featuring David Masson and Albert Rivett, who also had instrumental roles in the birth of CSIRO.

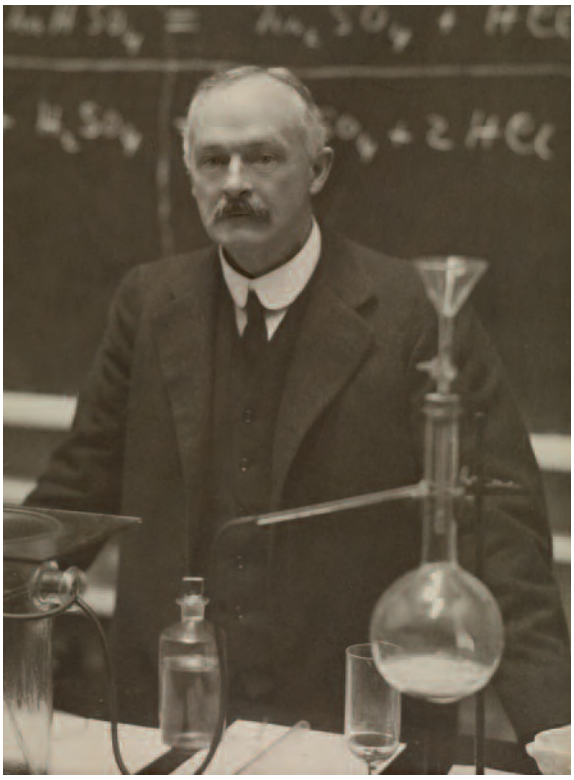

Figure 1. David Orme Masson. Photograph by Kricheldorff, c.1920s. UMA/I/1438, University of Melbourne Archives.

(Sir) David Orme Masson (1858–1937)

Masson was Professor of Chemistry at the University of Melbourne from 1886 to1923. As well as being a teacher and researcher, he contributed to Australian scientific and public life. He was instrumental in the establishment and governance of many important bodies including the Council for Scientific and Industrial Research (CSIR), which was to become the Commonwealth Scientific and Industrial Research Organisation (CSIRO). Masson supported Antarctic research for 25 years, beginning with Douglas Mawson's expedition of 1911.

Born and educated in England at the University of Edinburgh, he was a noted lecturer and researcher. After the death of Kirkland in 1885, chemistry became part of the science degree, along with the appointment of Masson as professor in 1886. His research work included the theory of solutions, and the periodic classification of the elements. Much of his research was done in collaboration with talented students such as David Rivett and his own son Irvine Masson. Masson was knighted in 1923. He is commemorated by the Masson Theatre and Masson Road at the University of Melbourne, a mountain range and island in Antarctica, a portrait painting by William McInnes in the foyer of the School of Chemistry, the Masson lectureship from the Australian National Research Council, and the Masson Memo-

Figure 2. Cleveite sample and helium in a discharge tube (presented by Sir William Ramsay). Cat. nos 155a & b, School of Chemistry Collection, University of Melbourne. Image credit: Petronella Nel.

rial Scholarship from the RACI (Radford 1978, Weickhardt 1986).

The cleveite sample and helium in a discharge tube (Figure 2) represent the enduring friendship and ongoing scientific collaboration and mentoring that developed between David Orme Masson and William Ramsay, one of England's leading chemists at the time. Masson's connection to William Ramsay started in 1880 when he was appointed as Ramsay's assistant at the University College of Bristol. In 1895, Masson was visiting England when Ramsay announced the isolation of helium, which he achieved using cleveite. Cleveite is a variety of uraninite, which contains at least 10% rare earth elements. Helium formed by the radioactive decay of uranium is trapped within the cleveite, but is released with the addition of acid. In 1904, Ramsay received the Nobel Prize for the discovery of the other noble gases. Masson's son Irvine Orme Masson later studied under Ramsay and was his last personal assistant.

(Sir) Albert Cherbury David Rivett (1885–1961)

Rivett was born in Tasmania and grew up in Victoria. A brilliant student, he won scholarships to Wesley College, the University of Melbourne and Queen's College. Masson became his friend and mentor, persuading him to switch from medicine to science. Rivett received the Victorian Rhodes Scholarship for 1907. At Oxford he earned a BA and BSc (research degree), both with first-class honours. He spent six months at the Nobel Institute, Stockholm, under Svante Arrhenius, a noted figure in physical chemistry. In 1911, Rivett returned to the University of Melbourne and took up a lectureship in chemistry. He married Stella Deakin, daughter of the former Prime Minister Alfred Deakin. Rivett was associate professor from 1920 to 1924 and succeeded Masson as professor of chemistry from 1924 to1927. Although an outstanding teacher, his major achievement was his involvement in building CSIR. Rivett was knighted in 1935. He is commemorated in the name of an ACT suburb, the David Rivett Medal, the CSIRO Officers Association and a portrait by Max Meldrum held at CSIRO in Canberra (Radford 1978, Schedvin 1988).

Figure 3. A.C. David Rivett (School of Chemistry).

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Ernst Johannes Hartung will feature in the next instalment of this series.

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Our chemical cultural heritage

North-western view of the new chemistry building during construction, c. 1938–40. Image credit: Colin Sachs. UMA/I/1133, University of Melbourne Archives.

Hartung (1893–1979)

PETRONELLA NEL

During the time of Ernst Johannes Hartung, the dream of a new purpose-built building for chemistry at the University of Melbourne was realised.

Ernst Johannes Hartung was a chemist and astronomer. Educated at the University of Melbourne (BSc 1913, DSc 1919), he became lecturer in 1919, associate professor in 1924, and succeeded Rivett as chair of chemistry in 1928, remaining in this position until 1953. Hartung was noted for his enthusiastic lecturing style. He employed the use of screen projections to demonstrate chemical phenomena to large undergraduate classes. In 1935, he recorded Brownian movement in colloidal solutions on 35 mm cinefilm, which was later copied onto 16 mm film for the Eastman Kodak Co. World Science Library. The recent digitisation of this cinematic film was discussed previously (November 2009 issue, pages 20–23). He undertook research on the photodecomposition of silver halides, and was awarded the David Syme Prize in 1926.

Hartung successfully petitioned the university for a new building (more details below) and became heavily involved with wartime research to produce optical-grade glass (see also below). Hartung served three terms as general President of the (Royal) Australian Chemical Institute, and was an ex-officio councillor of the Council for Scientific and Industrial Research and a Trustee of the Museum of Applied Science (now part of Museum Victoria) (Radford 1978, Weickhardt 1996).

A new building

When the chemistry teaching laboratories were filled to capacity in 1935, Hartung urgently petitioned the University Council for a new building, but little progress was made until the appointment of Raymond Priestley as salaried Vice-Chancellor.

Shocked by the state of the laboratories, Priestley commenced an immediate campaign, employing various means including Hartung's skill as a public lecturer to attract community support. The new School of Chemistry building commenced in 1938 and was completed in 1939, the year that World War II started.

Wartime research

During World War II, Hartung was approached by Professor Thomas Laby (chairman of the Optical Munitions Panel) to chair the advisory committee on optical materials, to produce high-quality optical glass in Australia. As a result, from 1940 the University of Melbourne became heavily involved in wartime research and specifically with the production of optical glass (for use in gun-sights, telescopes, binoculars and the like). Under wartime conditions, these could not be obtained from the traditional overseas suppliers. Manufacturing details were not available to Australian industry because European producers guarded their secrets closely, during peace time, for commercial reasons. Professor Thomas Laby of the School of Physics led the project. Hartung's team, which included Gustav Ampt (Fig. 1), found that early attempts undertaken in Sydney were inadequate due to impurities in the silica sands of the melts and the clay of the firing pots. Hartung and Ampt's chemical analysis and refinement of the raw materials overcame these problems. Numerous experimental batches were produced in the process of perfecting the glass. The collection includes four glass samples, three have irregular shapes that are roughly fist size and one sample is box shaped where layers of glass have been placed on top of each other (Fig. 2). These complement glass samples and instruments used in this project that are now part of the collection of the School of Physics Museum.

The analytical balance

The Sartorius balance (Fig. 3) belonged to Gustav Ampt (1886–1953), considered one of Australia's ablest analysts in his day. Ampt was a demonstrator, lecturer and senior lecturer in the Department of Chemistry from 1919 to 1951. He purchased the balance for £10 with funds that he won in one of his final awards. The balance has been an essential part of the chemist's equipment since the early 19th century, enabling the mass of a sample to be measured by comparison with standard masses. While many balances came equipped with standard masses, a good chemist would have his own calibrated set of analytical masses. Such sets were in use until about 1960, when the Melbourne department switched over to modern balances with in-built standard masses against which the unknown could be compared. A set of analytical masses in the collection, used by E.J. Hartung, ranges from 0.0 to 50 g. Hartung made corrections for each mass and scratched his initials on the lid of the wood box. Hartung stated that '... the balance is the most important instrument of the

Figure 1. Professor Hartung and Gustav Ampt examining one of the melts of glass in their work on optical glass during World War II. Reg. No. 158, School of Physics Museum, University of Melbourne.

Hartung stated that '... the balance is the most important instrument of the chemist and the basis of all quantitative chemical work ...'

Figure 2. Experimental samples from the development of optical glass, 1942. Cat. no. 11, School of Chemistry Collection, University of Melbourne. Image credit: Petronella Nel.

Figure 3. Balance made by F. Sartorius company, Gottingen, Germany (~1908). Catalogue no. 7, School of Chemistry Collection, University of Melbourne. Image credit: Petronella Nel.

chemist and the basis of all quantitative chemical work ...'

In conclusion

This is the final in a series of focus articles on key people associated with the Chemistry Collection at the University of Melbourne. It is hoped that this has provided readers with a brief glimpse into the early history of the School of Chemistry and its influence on Australian and international science. Surely it is interesting to observe how the past professors faced the same challenges with funding, buildings and equipment that we face today. With the current building renovations at Melbourne now well underway, it is suggested that it may be worthwhile to take a moment to stand in the Masson Theatre or to view the current exhibit of historical items and listen to echoes from the past.

Acknowledgments

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