33.3 Years at Dalhousie:
A Look Back and A Look Forward

by Mary Anne White

Introduction

This article is a written account of a public lecture I presented on the occasion of my retirement from Dalhousie University in December 2016. The end of December 2016 represented the end of 33⅓ years at Dalhousie, as I began as an assistant professor on September 1, 1983.[a]

For people of my age, or for present-day hipsters, 33⅓ is a familiar number, as the number of rpm (revolutions per minute) on a long-playing (vinyl) record. So I used this as the theme of my talk, as 33 ⅓ years is indeed a long time.

Before coming to Dalhousie as a professor, first I had to obtain credentials. Figure 1 illustrates my academic genealogy through my PhD back to the last "ancestor" who supervised PhD students. There are a few notables on the family tree, including Theodore Richards (Nobel Prize in Chemistry 1914), G. N. Lewis (of Lewis structures), and Robert McIntosh, whose father, Douglas McIntosh, was a very distinguished Professor of Chemistry at Dalhousie University.

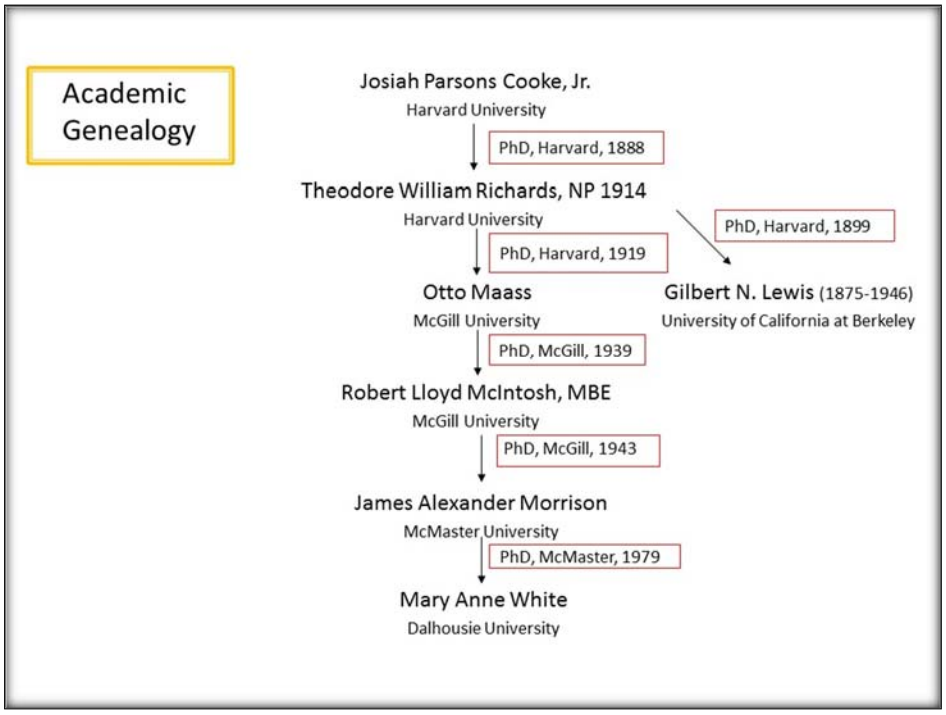


Figure 1. Academic family tree. The location under each person's name is where they spent the longest part of their academic career. The boxed information indicates where each person earned a PhD and the year.

[a] Note that "33.3" in the title is not quite accurate but easier to write than 33⅓.

How I Came to Dalhousie

After completion of my BSc at UWO (1975) and my PhD at McMaster University in 1979, I moved to the University of Oxford on an NSERC Postdoctoral Fellowship. I remained there until 1981. There were few academic positions in Canada at that time, but in 1980, NSERC began awarding University Research Fellowships (URFs), assistant professorships that carried both salary components and a guaranteed research grant, as a mechanism to keep people "in the system" until positions opened. I received one of these for the University of Waterloo and began there in September 1981. On arrival I found that three of us had been promised that we would bridge to the same retirement. In 1982 another URF came with the same promise. I saw the writing on the wall.

In the spring of 1983, I attended the national chemistry conference in Calgary and saw an opening for a short-term (I believe it was 9-month) position in physical chemistry at Dalhousie. I had actually applied to Dalhousie a few years earlier and knew it to be a Department with considerable expertise in solid state chemistry, a strong area of interest to me. (Rod Wasylishen was hired for that earlier position; I was not even interviewed for that opening.)

When I returned home after the 1983 Calgary conference, I applied for the short-term position, indicating that in two years at Waterloo I had received an NSERC Operating Grant, an NSERC Equipment Grant, two industrial contracts, and NSERC could continue to cover a portion of my salary until 1991. (I also had a baby in my first year at Waterloo; it was a busy time.) However, I had no intention of trading for just a short-term position. I had learned that the Dalhousie position was open because Professor Jan Kwak had taken leave for up to two years, while he started a position at Université de Sherbrooke. He would be teaching in French and wanted to leave the door open to return to Dalhousie (which he did). Professor Bill Jones was the Chair of Chemistry at Dalhousie when I applied in late June 1983, and he phoned me to say that they were interested in my application and wanted to know more about my requirements. I (wisely, I now realize) told him that I would phone him back the next day and took a trusted senior Waterloo colleague, Professor Art Carty, into my confidence and he helped me prepare a list of items to request (tenure track position being the top of the list). As I heard later, the list of Dalhousie applicants had been very thin (me and another who was not suitable) and the Department needed someone to teach advanced thermodynamics. Furthermore, Professor Ken Leffek, then Dean of Graduate Studies, had advised the Department that a good case could be made to extend a tenure-track offer to me since the Department had no women professors, and I even brought a large financial contribution to my salary. Professor Ossie Knop (apparently) spoke in my favour based on a long conversation we had had at my poster at the national chemistry conference in Vancouver in 1979.[b] So, on his last day as Chair, June 30, 1981, Professor Bill Jones (who, I am told, had previously said there would be no women professors in the Department as long as he was around), made me an offer, and

[b] I won first prize for this poster and realized much later that he probably was one of the judges. I have often told students that you never know when you are having a job interview.

I accepted. Professor Walter Aue was Chair when I visited later in the summer to make detailed arrangements for the move.

♫ ♪ *The Times, They Are a Changin'...* [c]

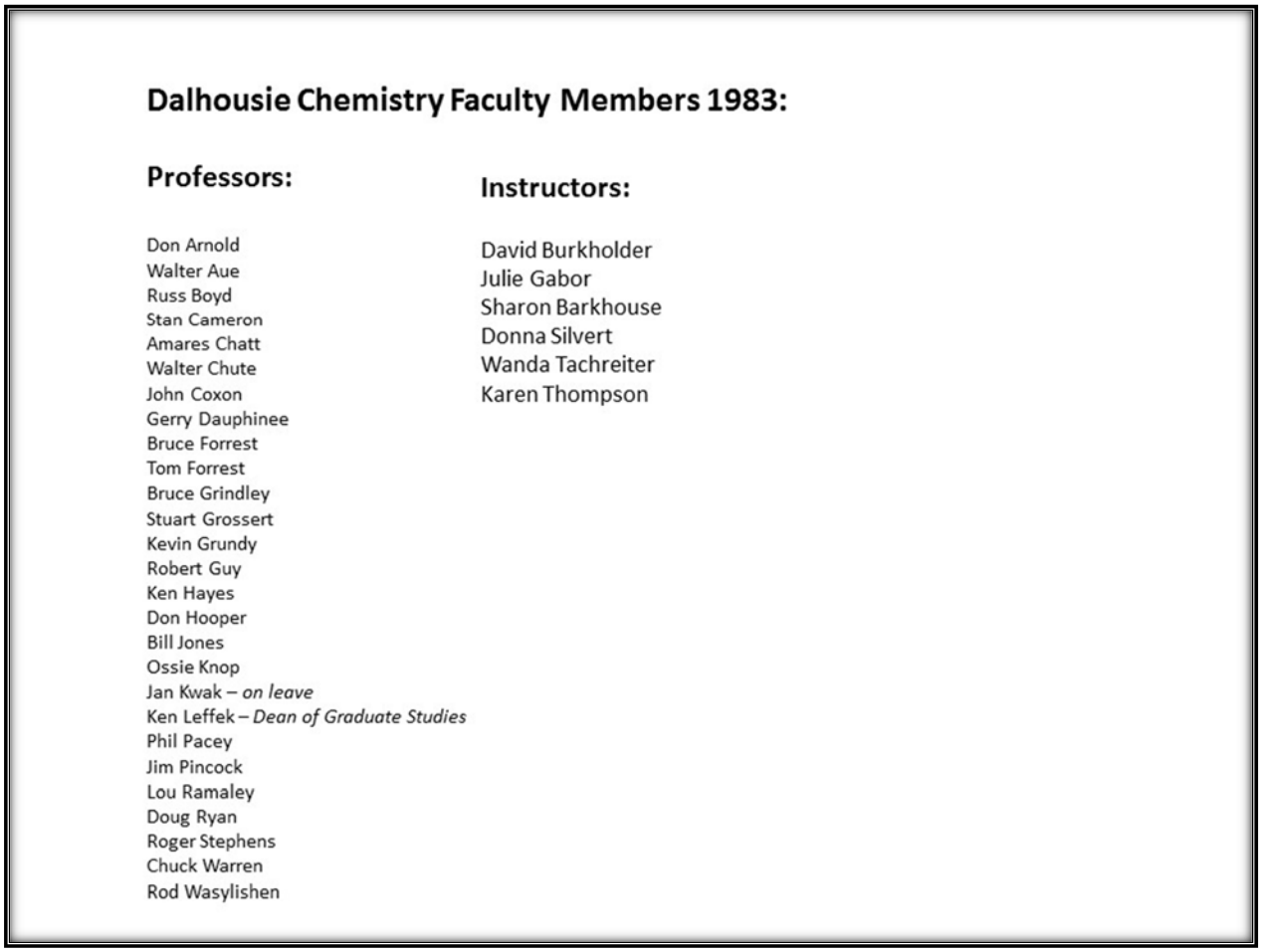
It is interesting now to reflect on the Department when I joined in 1983. The Department was spread over three sites: the Chemistry Building (see Figure 2), a location in the Life Sciences Centre where the analytical chemists had their offices and labs, and an old house on University Avenue where Jan Kwak had his office and lab, and held advanced physical chemistry labs. Jan had advised me to occupy that space myself, but I declined in favour of being in the main building, as I did not think being isolated would be a good thing at an early career stage.

Figure 2. The Chemistry Building in the 1980s. The large spruce tree was felled by Hurricane Juan in 2003, and replaced with a tree to commemorate Russ Boyd's term as Chair.

At the time of my arrival, there were, not including me, 25 active professors in the Department of Chemistry. In addition, there were two more: Professor Kwak on leave, and Professor Leffek as Dean of Graduate Studies. All were men. (By 2016, we had six women professors but only a total of 16 professors, down to 15 on January 1, 2017 after my retirement.) We had 10,000 students at Dalhousie in 1983, and 19,000 in 2016. The full list of 1983 Dalhousie Chemistry faculty members is given in Figure 3. Their names are given as we would call them today; in 1983 everyone was called "Dr. This" or "Professor That" even by other faculty members in public, and certainly by support staff and all students. In this respect, 1983 was a very long time ago!

[c] with apologies to Nobelist Bob Dylan

Figure 3. Dalhousie Chemistry faculty members in July 1983.



How did faculty members spend our time in 1983? When not teaching, we spent most of our time in our offices (see Figure 4) or the Library. In 1983, the Science Library was right next door in the Macdonald Building. Wednesday was the day the new journals appeared, and many professors and graduate students could be found in the Reading Room (now University Hall) on Wednesdays. Journals were on the shelf, and *Chemical Abstracts* was on paper. Reading was more "follow your nose" than today, which led to learning things off the intended path, which was very useful. However, it was *much* more difficult to know everything (or everything pertinent) about a topic in those days than it is now, so we are going in a good direction. In the late 1980s, the science library was integrated with the main Killam Library, but the pattern of reading journals in the library continued for some years. The former Science Reading Room of the Killam Library is now a student common area; see Figure 5. Personally, I rarely set foot in the Library now because the journals are available electronically.

Figure 4. In my office, *ca.* 1984, on the third floor of the Chemistry Building at Dalhousie University, opposite the men's washroom.

Figure 5. The area that was formerly the Science Reading Room (containing journals and Chemical Abstracts) in the Killam Library, now used as a student common area. Food is even allowed in here now!

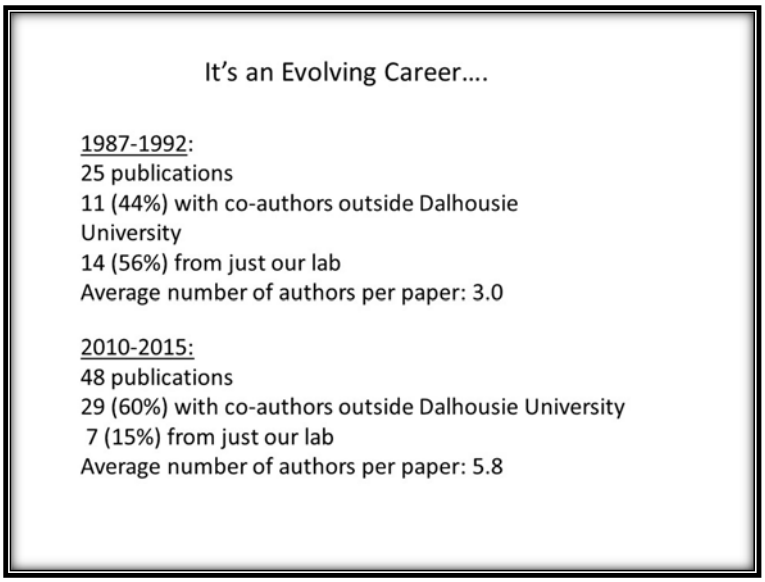
One thing we did not spend any time on in 1983 was email. I brought a "personal computer" with me from the University of Waterloo. It was an HP 83, used for data logging (see Figure 6). It cost $3,000, and had only floppy disks, no internal memory. Even programs had to be run from the floppy disks! (But it was easy to use: we had it out of the box and logging data in a day, which seemed something of a miracle for the day.) Shortly after I arrived at Dalhousie I purchased a personal computer for writing, for about $2,000. As I recall, I wrote in a program called WordStar, and Dan Wayner[d] taught me how to "word process."

[d] Dan Wayner was then a PhD student in the Department who I knew from my McMaster days when he had been a summer student in the same lab as me; he was destined to become a Vice President at the National Research Council.

Figure 6. HP 83 computer for data logging.

Times also have changed over my career in terms of research progress. I recently completed an analysis of my publications from early in my career, compared with later (see Figure 7). At the beginning, most were from just our lab, but more recently more than half include co-authors from outside Dalhousie, with very few just from our lab. While my publication rate had just about doubled over the time period, from an average of 5 per year, to nearly 10 per year, the number of authors had similarly almost doubled, showing that my productivity, as judged by number of publications per year adjusted by the number of co-authors, was just about the same!

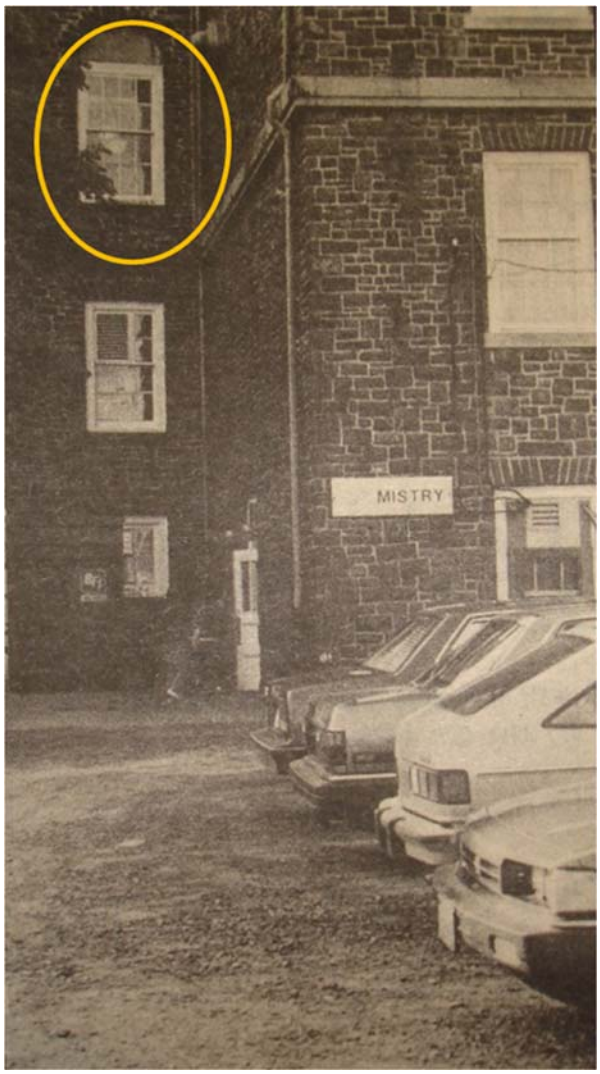
Figure 7. An analysis of my publications early in my career, compared with later in my career.



Maybe my research productivity is unchanged over the years, but the Chemistry Building certainly has changed. When I first arrived, the back (north) side of the building faced directly onto the parking lot. The latter was unpaved, and a great source of mud and dirty footwear nearly all days of the year. The lack of paving and concomitant lack of painted lines also meant that the cars were haphazardly parked, giving very inefficient packing. The building itself was something of a fire hazard, especially the overcrowded undergraduate labs with only one door. (See Figure 8.)

Figure 8. (a) The north-facing side of the Chemistry Building, opening onto the unpaved parking lot. These walls can be seen inside the Chemistry Building still today. The circled window has been my office since 1991. (b) An article from University News concerning the overcrowded undergraduate laboratories in Chemistry.

(a)



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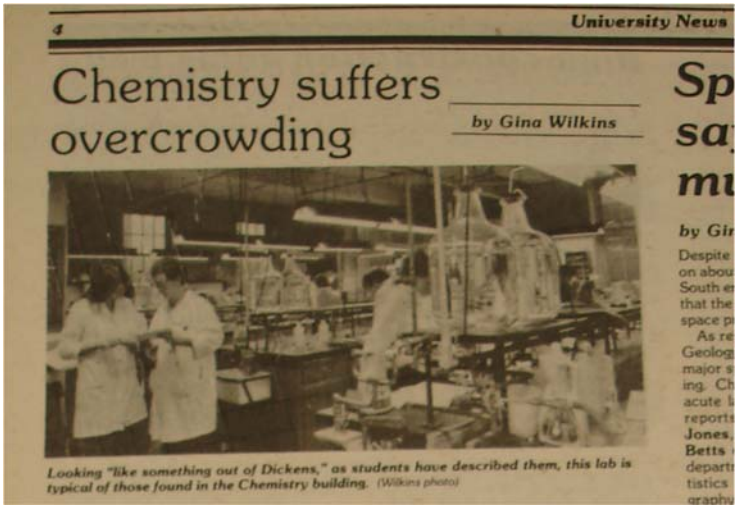

4 University News

Chemistry suffers overcrowding

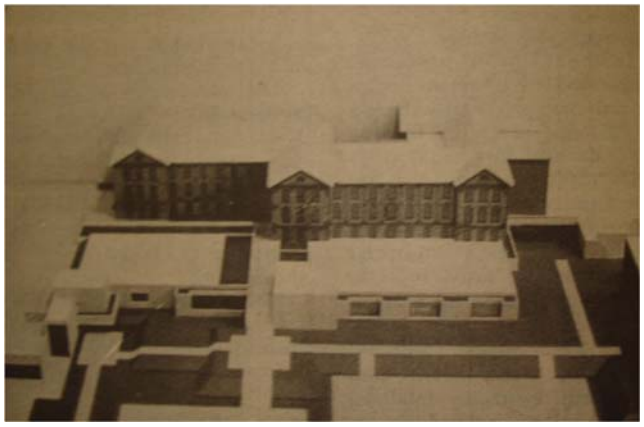
by Gina Wilkins

Looking "like something out of Dickens," as students have described them, this lab is typical of those found in the Chemistry building. (Wilkins photo)

It was with great excitement that the plans for the Podium (one-story addition) housing the undergraduate labs was unveiled (see Figure 9). The cost was $3.8 million, and it was overseen within the Department by Dr. Chuck Warren. This was the first phase of long-awaited series of renovations to Chemistry, first postponed because renovations to the Forrest Building for Nursing took priority because of their low morale, and then because a fire in the Weldon Building Library (July 1985) required immediate attention.

Figure 9. (a) The design for the new Podium to be added to the north side (back) of the Chemistry Building. (b) Some details from University News. (c) The rising pile from the excavation nearly obliterated the view of the Chemistry Building from the low angle of the camera.

(a)



(b)

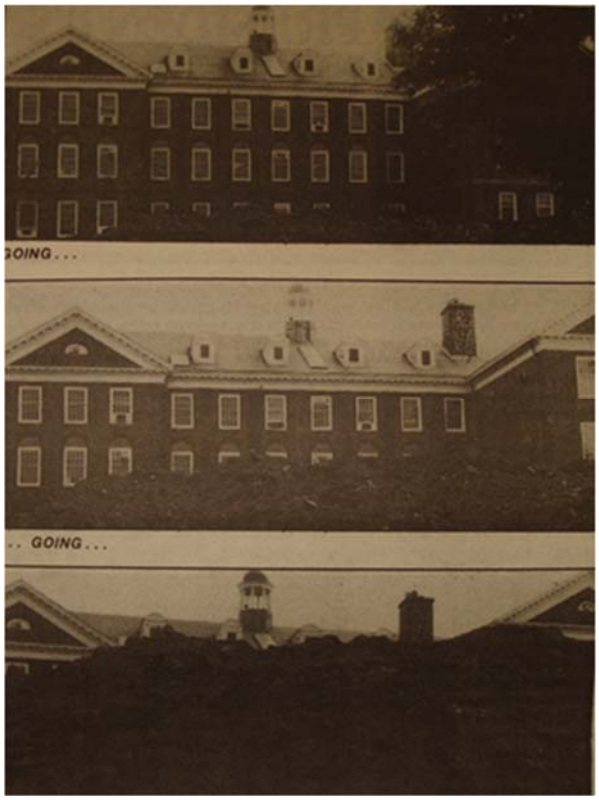
Chemistry construction to begin soon

Construction of a much-needed addition to Dalhousie's chemistry building is expected to begin early in 1986.

The first phase of the three-phase project is a $3.8 million, one-storey addition to the present building. The 31,000 square foot structure which will house five undergraduate teaching labs should be complete for 1987-88 academic term, says Jim Sykes, director of

Chemistry's cramped and antic facilities are affecting academi grams, says Charles Warren, cha of the chemistry building comm With an inadequate ventilation some chemicals cannot be used, means some experiments can conducted. The plumbing leaks are too few fume hoods and the are rotting. The new labs are

(c)

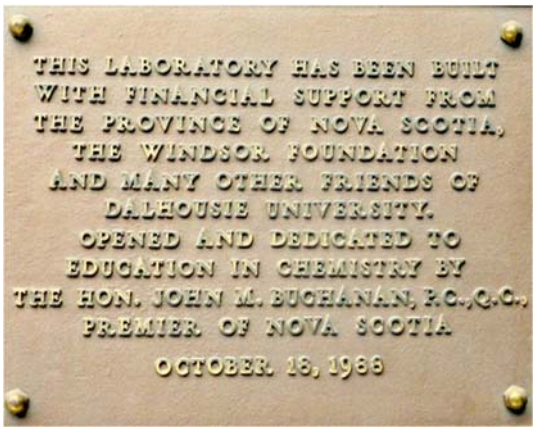


The opening of the Podium, on October 18, 1988, was an occasion for great celebration. See Figure 10. The full staff of the Department of Chemistry also was captured in photos to mark the event; see Figures 11 and 12.

Figure 10. (a) Opening of the Podium, an addition to the Chemistry Building to house new undergraduate laboratories. The support for the addition came from the Province of Nova Scotia and the Windsor Foundation. Premier John Buchanan (second from left) officially opened the extension. Also in attendance were Professor Jan Kwak (then Chair, at the lectern), President Howard C. Clark (to Jan Kwak's right), and Dean Don Betts (Dean of Science, to President Clark's right, just beyond the flowers). Two heads can be seen between Don Betts and Howard Clark's. The taller person, on the left in the photo, is Dean Ken Leffek, and the shorter one is Professor Ron Gillespie, from McMaster University, who received an honorary degree from Dalhousie University on this occasion. (b) The commemorative plaque, shown here, is on the wall outside the organic chemistry lab. (c) The labs in December 2016, still looking very good.

(a)

(b)



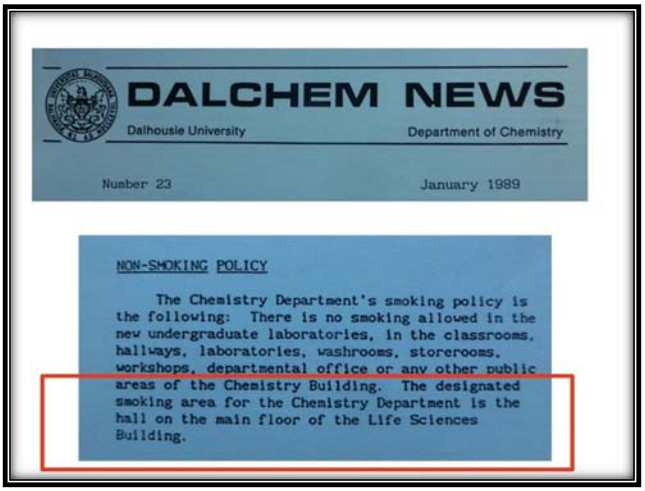
(c)

Figure 11. Dalhousie Chemistry Professors at the time of the Podium opening, October 1988. Standing in front to the bench (left to right): Walter Chute, Robert Guy, Chuck Warren, Jan Kwak, Mary Anne White, Ken Leffek (a bit behind), Don Hooper, Jim Pincock, Amares Chatt, Phil Pacey and Stuart Grossert. Sitting on the lab bench (left to right): Neil Burford, Russ Boyd, Doug Ryan, Stan Cameron, Lou Ramaley (face partially obscured by Don Hopper), John Coxon, Tom Forrest, Ossie Knop, Kevin Grundy, Don Arnold, Roger Stephens and Walter Aue. Missing: Rod Wasylishen, Gerry Dauphinee, Ken Hayes.

Figure 12. Dalhousie Chemistry Staff, Instructors, and Postdoctoral Fellows at the time of the Podium Opening, October 1988. Left to right: David Burkholder, Martin Nicholas, Annette Cossar, Donna Silvert, Wayne LeMoine, Gordon Owen, Colleen Shea, David Russell, Deanna Wentzell, Anthony Linden, Wanda Collings, Pradip Bakshi, Mary Warren, Glenn Penner, Julie Gabor, Jurgen Mueller, Raghu Rao, Felix Bermundo, Kathy Darvesh, Wanda Tachreiter, Przemslaw Pruszynski. Missing: Brian Millier, John Sutton, Barry Moore.

During the 1980s, the Department began a series of newsletters, DalChem News, which provide interesting insights. (These are no longer issued, and Russ Boyd recently gifted me of a complete set, along with Annual Reports [also no longer prepared] which I hope to have the Dalhousie Archives prepare in digital format.) Figure 13 shows an excerpt from one. My, how times have changed!

Figure 13. The Departmental smoking policy of 1989 is pretty amazing by 2017 standards. In the 1980s, people were quite used to smoking in hallways, offices, lecture rooms, exams, and even some labs!



DALCHEM NEWS

Dalhousie University — Department of Chemistry

Number 23 — January 1989

NON-SMOKING POLICY

The Chemistry Department's smoking policy is the following: There is no smoking allowed in the new undergraduate laboratories, in the classrooms, hallways, laboratories, washrooms, storerooms, workshops, departmental office or any other public areas of the Chemistry Building. The designated smoking area for the Chemistry Department is the hall on the main floor of the Life Sciences Building.

My own lab in the 1985s was pretty drab by today's standards. See Figure 14.

Figure 14. (a) My lab group in 1985, in the lab. Left to right: Dr. Guilda Neshvad (postdoctoral fellow), Philip Jessop (summer student), Brian Wagner (summer student), Mike Van Oort (PhD candidate in Chemistry). (b) In the lab in early 1985. Note the dial telephone and the plotter (on the shelf below my elbow) which we were so proud of for printing graphs and also making large titles for poster presentations (on continuous feed paper, using a program called Banner). (c) The same lab in late 2016, fully renovated and in use by Professor Mark Obrovac's group.

(a) (b) (c)

The renovations to the Chemistry Building continued after the Podium was completed in 1988. The old undergraduate labs in the building, now vacated, were renovated to be modern research labs and, as the old research labs moved out, they were each renovated too. The process took from 1986 until 1991 to complete, and resulted in modern facilities in an historic building. (See Figure 15.) A major change was the loss of the stairwell in the middle of the building as this was closed off to provide modern ductwork for ventilation. This stairwell had been the main walkway between floors, and its loss, putting people either on the main staircase or the back stairs, changed the personal dynamics in the building.

Figure 15. (a) An article from DalNews concerning the renovations within the Chemistry Building, completing the $10 million renovation. Prior to this upgrade, fumehoods vented directly out windows. A campus walking tour indicated "on the right you can smell the Chemistry Building". (b) The work to install the new elevator[e] began with installation of a new shaft, drilled down five floors into the bedrock. Unfortunately, this noisy work had to be re-done because the shaft was off by a few degrees. This stage was especially painful for those of us who were lecturing in Chemistry 125, beside the elevator.

(a) (b)

Renovations begin on section built in 1915

Work has begun on a three-year project to restore and renovate the older sections of the Chemistry Building, beginning with the area built in 1915.

The renovations will provide upgraded laboratories and improvements to the building's mechanical systems, particularly the ventilation system, says Dal architect Jim Sykes.

Between $9 million and $10 million is being spent on the project, which includes the new laboratory extension opened last year.

Sykes says the lion's share of the renovations will be done in the section of the building built in 1915. That is the section nearest the Killam library.

The centre section of the building (built in 1966) will have some work done on it, as will a small portion of the section that houses the Macdonald Science Library.

The building will still be in operation during the renovation process.

My new lab, Chem 312, was the last to be completed in that round of renovations. Before our plans were finalized, we visited the other new labs to see what people liked and did not like. One innovation that we made was having power outlets and cooling water lines come from the ceiling. Both meant that we had more freedom in placement of equipment, and no lines (power or water) running along the floor. We also had individual built-in desk spaces, each with a bulletin board and a set of drawers in which one could be locked. (When I was a student I always found it difficult to have a place to securely leave a purse.) The lab was completed in the summer of 1991, and even in 2016 its design had stood up well. (See Figure 16.)

Aside from lab-by-lab renovations in the intervening years, the other major change to the Chemistry Building was the addition of the long overdue 10,000 square foot Chemical Storage area, including Chem Stores, on the north end of the podium, approved at $6 million in 2007, spearheaded by Joe Zwanziger.

[e] The old elevator had an accordion door that had to be closed manually. If not closed properly, the elevator would stay on that floor until someone located it and closed the door.

Figure 16. (a) Our new lab (formerly a spectroscopy lab used by Professor Bill Jones) as it was renovated in 1991. (b) A mock-up of my group setting up the new lab (the torch was not used to make that seal!) Left to right: Vladimir Murashov (PhD student in Chemistry), Paul Bessonette (PhD student in Chemistry), Mary Anne White, Chris Smith (MSc student in Chemistry), and Shane Harnish (MSc student in Chemistry). (c) The lab in December 2016. It was a rare occasion in which no one was in the lab!

(a) (b) (c)

Take Me To Your Leader ♪♫

During my time at Dalhousie, there have been seven different Chairs of the Department. Including Bill Jones who hired me, makes eight. See Figure 17. Each had his own personality as Chair but what amused me the most in putting together these photos was to see that Neil Burford seems to have taken Jim Pincock's shirt and tie along with the job.

Figure 17. Chairs of the Department of Chemistry at Dalhousie University, 1983-2016. (a) Bill Jones, July 1, 1974 - June 30, 1983; (b) Walter Aue, July 1, 1983 – June 30, 1986; (c) Jan Kwak, July 1, 1986 – June 30, 1992; (d) Russ Boyd, July 1, 1992 – June 30, 2005; (e) Jim Pincock, July 1, 2005 – December 31, 2007; (f) Neil Burford, January 1, 2008 – June 30, 2011; (g) Joe Zwanziger, July 1, 2011 – June 30, 2014; (h) Norm Schepp, July 1, 2014 -.

(a) (b) (c) (d) (e) (f) (g) (h)

When I started at Dalhousie, we were a Faculty of Arts and Science and the Dean (then Don Betts) was Dean of the Faculty of Arts and Science. This was a bit unwieldy and changed a few years later to Faculty of Science, with a separate Faculty of Arts and Social Science. The Deans of Science, including Acting Deans, are pictured in Figure 18.

Figure 18. Dalhousie University Deans of Science, including Acting Deans, 1983-2016. (a) Donald Betts; (b) Warwick Kimmins; (c) Keith Taylor; (d) Marty Leonard (acting); (e) Pat Ryall (acting); (f) Ian Hill (acting); Chris Moore.

(a) (b) (c) (d) (e) (f) (g)

The number of Presidents at Dalhousie during my time on the payroll (Figure 19) is fewer than the number of Deans or Chairs, but not likely because the job is easier!

Figure 19. Dalhousie University Presidents, 1983-2016. (a) W. Andrew MacKay; (b) Howard Clark; (c) Tom Traves; (d) Richard Florizone.

(a) (b) (c) (d)

I will offer a few comments about the Presidents. I knew Howard Clark from my time as an undergraduate at UWO, when he was Head of Chemistry and he taught me in one course in my final year. I played a small role in his interview at Dalhousie: touring his wife, Dr. Joy Clark, without giving away her identity during the hush-hush interview. Howard Clark was a bit under sung for his accomplishments at Dalhousie, especially in

bringing fiscal management and a balanced budget. (However, personally, I did not understand his interest in closing the music and theatre programs; he announced to a full university meeting that they were "not being central to the university mission.") The tough relations between the administration and the Dalhousie Faculty Association (DFA) were ongoing from before my arrival. They continued into Tom Traves' term, and in about 2002, after we had had our third strike, I happened to meet (then past-President) Clark at UWO when I was giving a seminar and he was in London because Joy was in the UWO Hospital. I had lunch with him and when we were leaving I told him that because of all the labour unrest I was planning to try to leave Dalhousie. His parting words to me were: "Stay and make Dalhousie a better place." I took his words to heart and even "ran" for a position on the DFA executive expecting to be rejected at the polls, but put in by acclamation. In my three-year term I learned more about the DFA's positions and that the fault in the labour relations was not all on one side. And I believe that my contributions to Dalhousie in the years 2002-2016 did live up to Howard Clark's admonition. Part of this was the founding of the Institute for Research in Materials, in which President Tom Traves played a significant role. And, in my time of ending my official relationship with Dalhousie as my employer, I am very happy to see the energy and enthusiasm of our ubiquitous president, Richard Florizone.

♪♫ *The Numbers*

I do love numbers, and it has been interesting to put some of my activities at Dalhousie in numerical context.

In terms of teaching, I have taught about 2100 students over my 33 years. Many of my colleagues have taught many more students and courses than I have, as most of my career I have had some reduction in teaching, due to the NSERC University Research Fellowship, Killam Chair, Directorship of the Institute for Research in Materials, or Directorship of the DREAMS CREATE program. This number includes teaching first year Chemistry 15 terms, including several terms of a high-level first-year course with admission by entrance test, in a course that produced many outstanding scientists and other professionals. I also taught third year Chemistry (/Physics) 34 times. In fact, I taught third year every year I was at Dalhousie, and it has been a level I have really enjoyed teaching, as these are students who are serious about their subject, and just starting to get interested in research. In addition to a few second year and fourth year courses, I also have been involved with 36 graduate courses (sometimes as sole lecturer, other times as part of a team).

In the Department of Chemistry, for most of my career and continuing now except for the first-year courses and very large second year courses, professors marked all the tests and exams. I estimate that I have graded about 5,000 tests/exams, and that's enough for my lifetime.

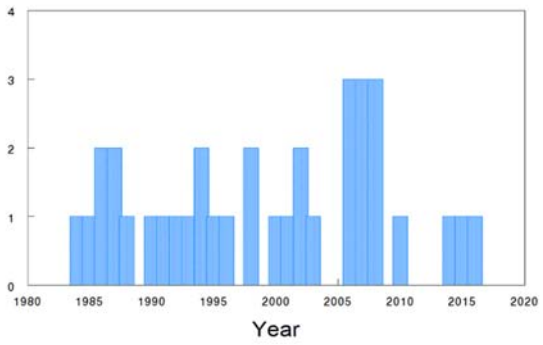
Also, I have been very interested in helping students learn to write well. To that end, almost every course I have ever taught, including first-year chemistry, has had a

written component such as a term paper that I marked myself. I estimate that this adds up to about 1,300 papers. And that's on top of marking many problem assignments, in virtually every course I ever taught.

I will not enumerate every aspect of my career, but it was interesting to consider how many times I served NSERC as a member of a committee.[f] This sums to 16 committees, or 35 committee years, starting shortly after I arrived at Dalhousie. See Figure 20. All of these committees met in Ottawa at least once, leading my daughter, Alice, to suggest that I had another family in Ottawa.

Figure 20. (a) Number of NSERC committees served in a given year, as a function of year. (b) A rare photo of an NSERC committee meeting *ca.* 1986, at a break, taken by one of the other committee members. To my right is Bob Kavanaugh (NSERC staff member) and to my left is Alain Caillé (physics professor, then at U. Sherbrooke).

(a) (b)



Just a few words about research numbers: In my lab, our work changed considerably in 2004, with the installation of the Physical Property Measurement System (PPMS), our first major piece of commercial instrumentation, funded by CFI.[g] This instrument meant that we could measure physical properties of very small samples, much faster than previously, and without the need to bring in liquid helium (meaning we no longer had to stay all night to do liquid helium runs).[h] To be more quantitative: to

[f] NSERC committee appointments, even to their governing Council, on which I sat from 2005 to 2008, are all unpaid volunteer positions.

[g] The approval from CFI actually came in June 2000, and we had to wait until 2003 to obtain the matching funds from the Atlantic Innovation Fund. Then it took another year to receive our PPMS.

[h] Until that time, low-temperature experiments meant staying in the lab until the liquid helium was done, and in the years leading up to the arrival of the PPMS, this meant over-night runs which I also stayed for, even when I had to lecture the next morning.

measure the heat capacity of a sample *circa* 1983 in our lab-built calorimeter took 120 g of sample, and 4 weeks (if all went well), to measure over the temperature range 25 K to 300 K, with a lot of manual intervention required. With the PPMS, in our expert hands given our previous experience with designing, building and trouble-shooting calorimeters, we could obtain the same level of accuracy with as little as 2 mg of sample, and one or two days to measure the heat capacity from 0.4 K to 400 K. That's a huge *in*crease in temperature range, a 60,000-fold *de*crease in sample size, and about 20-fold drop in the time required! See Figure 21. (The PPMS is also the heart-beat of the Department, with its helium liquefaction compressor resonating in the Chair's office, just below it.)

Figure 21. (a) Lab-built adiabatic calorimeter that I built at the University of Waterloo and brought with me to Dalhousie in 1983. (b) The PPMS with Mike Johnson running the instrument, and an inset of the heat capacity platform.

(a)

(b)

♫♪ *Let's Get Together*

During my 33 ⅓ years at Dalhousie, there were many opportunities to bring people together, and I will highlight a few.

One was the 16th IUPAC Conference on Chemical Thermodynamics, held August 6 to 11, 2000. This conference, held on campus, brought together about 500 participants from about 40 countries, to discuss various aspects of thermodynamics. Some of the other people involved in the organization of the Halifax conference included Peter Kusalik (secretary and web master), Susan Boyd (treasurer), Margaret Douma (administrator), Jan Kwak, and myself (chair). IUPAC is a hierarchical organization and many considered me to be young (or too young) to be chair (I was 46), but really it was a group effort. With the help of two students (my summer student, Jonathan Brake, and my son, David) we really did everything ourselves. In fact the poster boards that David (with help from Rob White) built, are still used on campus today! Many people in the Department volunteered their time to help with aspects of the conference, from making the computer room available to participants, to assisting with the tours on the afternoon off. The scariest thing about organizing this conference was that there was no financial cushion: if we lost money, we had to make it up ourselves. We proceeded very cautiously, and, due to careful management and a rising Canadian dollar,[i] we managed a profit of more than $100,000. As IUPAC had not planned to help if we ran a deficit, we were left to do with this as we wished. I checked and previous conferences had used excess revenue to pay the organizers. We decided to: pay a small bonus to our hard-working employees (but not to ourselves); make a small contribution to Mount St. Vincent University to thank them for Susan Boyd's time and efforts; have a memorial (see Figure 22); and use the remainder to start an endowment for materials-science seminar speakers at Dalhousie University. Although we were cautious with funding, in the intervening years many people have commented to me about the excellent conference on our beautiful campus, from being greeted by a kilted bagpiper at the opening morning, to the gala lobster dinner at the waterfront. And the science presented from all around the world also was first-rate.

[i] The revenue from registration was in US dollars but most expenses were in Canadian dollars.

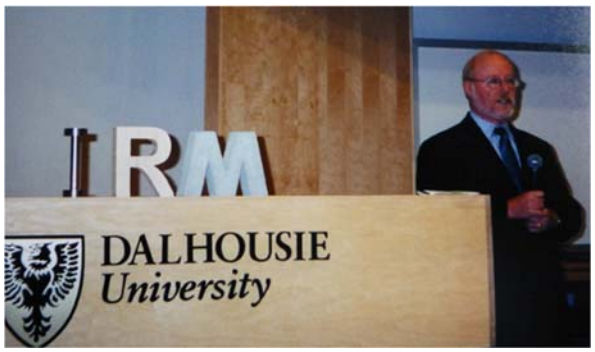
Figure 22. To commemorate the 16th IUPAC Conference on Chemical Thermodynamics at Dalhousie University in 2000, we had a bench constructed by the flagpole on the quad of the Studley campus. This bench, complete with commemorative plaque, replaced a previous one that was in severe disrepair, but this one often suffers from damage by the snow plows.

Another major effort that brought many people together was the founding of the Institute for Research in Materials (IRM) in 2002; see Figure 23. The IRM brought together materials researchers from science, engineering, dentistry, medicine and other areas, leading to significant grants (from CFI and many others), working towards this general theme. I believe that IRM also helped us attract a large number of amazing colleagues working in the area of materials. Most importantly, I think that our research and that of our graduate students rose to a higher level because of the existence of IRM, both in terms of the world-class equipment we were (finally) able to obtain, and the diverse research interactions among the faculty members. I chaired a large number of meetings associated with IRM faculty (as IRM director 2002-2008, and as director of the NSERC CREATE DREAMS[j] program 2010-2016) and it was always a pleasant challenge to get the faculty members to focus on the agenda, rather than discussing research with each other.

[j] Dalhousie Research in Energy, Advanced Materials and Sustainability

Figure 23. Opening of IRM in July 2002. (a) President Tom Traves, a strong supporter of IRM, spoke at the opening. (b) The five founding members of IRM, left to right: Farid Taheri (Civil Engineering), Jeff Dahn (Physics), Mary Anne White (Chemistry), Georges Kipouros (Materials Engineering), J. Michael Lee (Biomedical Engineering).[k] (c) Discussions at the exhibit/posters at the opening. The person on the left is W. Carl Breckenridge, then Vice President Research at Dalhousie, and another strong IRM supporter. The person in the middle, listening to Tom Traves, is Geoff Regan, MP for Halifax West. (d) Joe Zwanziger and Fran Cozens at the IRM opening. Joe was here at that time for his interview for a Canada Research Chair, which he took up in 2003.

(a)



(b)

(c)

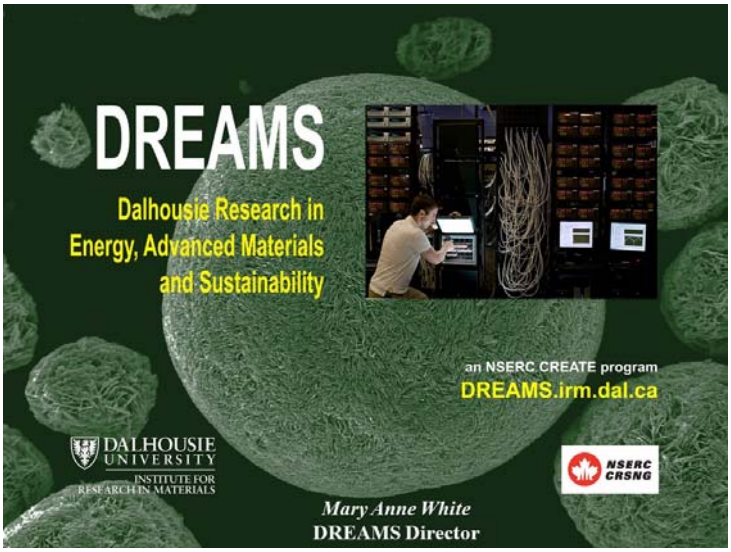
(d)

[k] Mike Lee once hosted an IRM seminar speaker, funded by the IUPAC endowment, who asked us a very insightful question: what is the best and worst thing about Dalhousie University? Mike and I put our heads together and decided the answer was the same: you can do what you like, but you have to do it yourself. Unlike some universities I know well, naysayers do not rule here. On the other hand, money does not usually flow like water. Both sides of this answer have made Dalhousie a good fit for me.

In the theme of bringing people together, IRM held many workshops and short courses over the years, on techniques related to the IRM Facilities for Materials Characterization, and other matters such as Energy and Sustainability.

One of the largest IRM projects was the NSERC CREATE program, DREAMS, which ran from 2010 to 2016. Janet MacDonald, the administrator for the DREAMS program, put together a tweet that summarized the DREAMS contributions (Figure 24).

Figure 24. A summary of the contributions of the NSERC CREATE DREAMS program, 2010-2016.



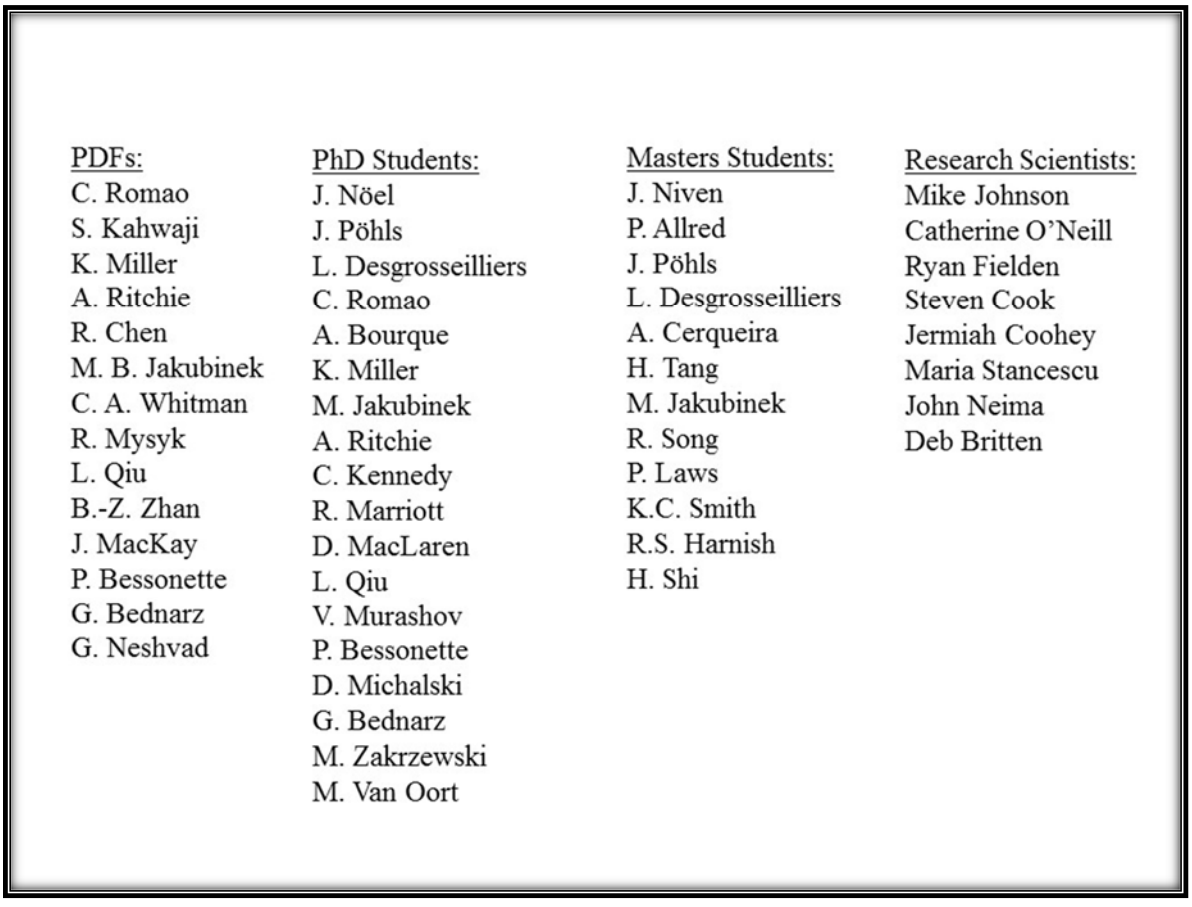
♪♫ *Greatest Hits* ♪♫

By far, the greatest aspect of Dalhousie University is the students. When I arrived in 1983, with recent experience from the University of Oxford and the University of Waterloo, I was amazed at the quality of the students in my first course at Dalhousie. I now know that was an extraordinary year, as sometimes happens. (Actually, we have had several such outstanding classes in my years at Dalhousie.) Like any university, Dalhousie attracts many spectacular students, but, in my observation, the next tier is not always as strong as it is at Dalhousie. In part, I think it is because our students generally work well together bringing the best out of many, and the interest in education -- both in the students and in Nova Scotia in general -- is high. Several times I have heard of great successes of our graduates who were not the top of their class at Dalhousie, again emphasizing the fine qualities of many of our students.

In my own research group, I have had the great pleasure of working with a large number of graduate students, postdoctoral fellows and research scientists (see Figure 25). I have enjoyed learning with them all. A quote from Hans Bethe on my lab door sums it up nicely: "For me, the real joy of teaching comes when the student knows more about the thesis problem than [the] professor." I especially liked having my office next to my lab[1] so I could easily interact with my research group.

My first graduate student, Mike Van Oort had a sign above his desk: "There are two ways to be happy in life: Get what you like, or like what you get." This saying has become my most-repeated advice, and my life's mantra.

Figure 25. Graduate students, postdoctoral fellows and research scientists in my lab, 1981-2016.



[1] After the renovation in 1991, I moved both my office and my lab to the north-west corner of the third floor of the Chemistry Building. Prior to that time, my office and lab were one floor apart.

Many undergraduate students also have had research experience in my lab (see Figure 26), either as honours project students (mostly in Chemistry but also some in Physics), summer students or co-op students. I especially enjoyed working with students who were having their first taste of research. For some it took very well (several are now distinguished researchers), and for others it was enough to show them that research was not the path for them. This apprentice-like approach to research has always appealed to me, and was one of my favourite educational activities.

Figure 26. Undergraduate students who carried out research in my lab, 1981-2016.

BSc Project Students:

S. Ellis
S. Juckes
J. Conrad
J. Niven
A. Bent
C. Bryan
P. Murray
P. Tremblay
D. James
A. Bourque
C. Samarasekera
B. Cowie
R.J. Matthews
K. Blagrave
A. Oliver
M. LeBlanc
D. Morrison
R. Perry
P. Bessonette
A. Perrott
S. Moore
B. Wagner
M. Van Oort
G. Kirkwood

Other Undergraduate Students:

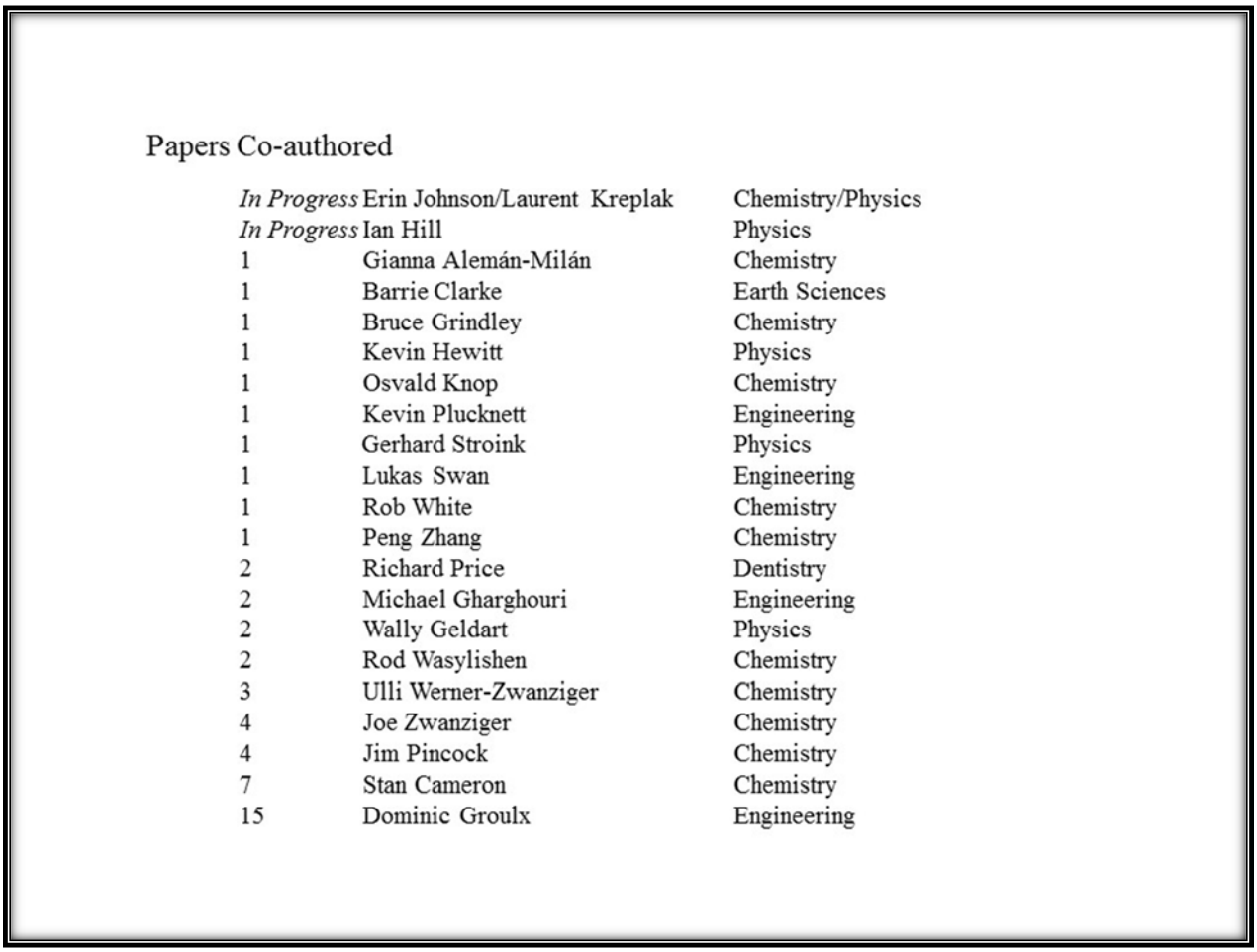
S. Ellis
S. Juckes
J. Conrad
J. Allott
Y. MacMillan
J. Conrad
A. de Pereira
H. Stubeda
A. Bent
J. Niven
E. Burns
L. Bilinsky
A. Safatli
J. Frison
K. Galpin
E. Neynens
P. Murray
Y. Abdalla
K. Harding
A. Reda
Y. Alattar

P. Tremblay
C. Bryan
S. Vinette
B. Weilens
A. Gandhi
A. Bourque
C. O'Neill
D. Switzer
R. Beck
S. Kember
G. Stewart
B. Thompson
M. Fawcett
P. Fancy
R. Doucet
J. Brake
S. Leslie
R. Donaldson
M. Safatli

A. McWilliams
R. Perry
S. Cronk
P. Bessonette
K. Wright
J.B. Burry
J. Leiper
A. Perrott
P. Jessop
B. Wagner
K. Nightingale
M. MacLean
A. Weaver
R. Clifton
E. Surtees
J. Hovey
M. Ratko

Another great joy has been having colleagues at Dalhousie with whom I have shared research interests. This was one reason I was attracted to come to Dalhousie University in the first place and many people hired after me[m] also have similar or complementary interests, especially in materials research. I have not published together with *all* my colleagues, but I have published (or have work in progress) with a great many. (See Figure 27.) I will especially highlight my relatively recent collaboration with Dominic Groulx in Mechanical Engineering, and our work on phase change materials for thermal energy storage, as work that I believe will lead to significant applications.

Figure 27. Dalhousie colleagues with whom I have published work.



Papers Co-authored

In Progress	Erin Johnson/Laurent Kreplak	Chemistry/Physics
In Progress	Ian Hill	Physics
1	Gianna Alemán-Milán	Chemistry
1	Barrie Clarke	Earth Sciences
1	Bruce Grindley	Chemistry
1	Kevin Hewitt	Physics
1	Osvald Knop	Chemistry
1	Kevin Plucknett	Engineering
1	Gerhard Stroink	Physics
1	Lukas Swan	Engineering
1	Rob White	Chemistry
1	Peng Zhang	Chemistry
2	Richard Price	Dentistry
2	Michael Gharghouri	Engineering
2	Wally Geldart	Physics
2	Rod Wasylishen	Chemistry
3	Ulli Werner-Zwanziger	Chemistry
4	Joe Zwanziger	Chemistry
4	Jim Pincock	Chemistry
7	Stan Cameron	Chemistry
15	Dominic Groulx	Engineering

[m] At the time of my retirement, all of the faculty members in Chemistry (professors and instructors) were hired after I was.

♫♪ *Lady Sings the Blues* ♪

I have not had a sunny view of everything that has happened during my career at Dalhousie University. In fact, I have been known to speak up, or write, or otherwise raise the matter when things are not "right". But, to keep this section short, I will just recount one matter that really made me furious. And, for this occasion, I purposefully chose a non-Dalhousie matter.

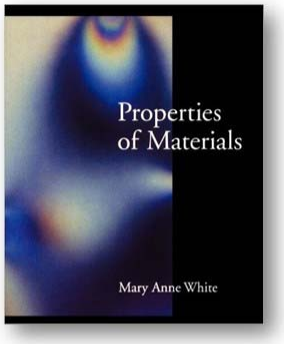
In 1999, I was really happy to see my first book, "Properties of Materials" published. The Department of Chemistry did a very nice book launch with speeches and the image of the book on a large cake.[n] The book got great reviews in *Physics Today* and in the *Journal of Chemical Education*, and was being used worldwide. However, I was not so happy when in 2005, my publisher, Oxford University Press, brought out another book with the exact same title, but with a different author. It was an excellent book, but the title did not even describe the content: its subtitle "Anisotropy, Symmetry, Structure" was a much more accurate description. When I checked with Oxford, I found that this new book also had my same editor, and he had suggested the title so the two books could be marketed together.[o] They followed through on this goal for a few months but then I noticed that only the other book was on display or even in the book list at conferences, and mine was all but forgotten.

The year 2005 was not good for me. I was diagnosed with cancer, now fortunately well past, and fighting with a publisher was not in the interests of my recovery. So I let it slide for a few years but, when Oxford was pushing me for a second edition, I finally decided that I should get help to fight for my rights as an author. I sought the advice of a friend whose textbook in materials engineering was already past its fifth edition. On his suggestion, I hired the top textbook lawyer in North America and he helped me get back the rights to my book. I then found a new publisher, and in 2012, the second edition with a slightly revised title, was published. (See Figure 28.) One of my retirement projects is to work on the third edition of this book.

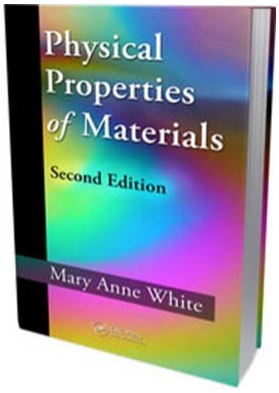
[n] The image on the cake was my idea, and not a great one as a lot of the icing was black, and left people with black mouths and teeth after eating it. At least it was memorable!

[o] My original editor, who had retired and been replaced by the one with whom I was aggrieved, had worked hard with me to come up with a title that was unique in "Books in Print", so it was especially hurtful that my own publisher and editor would bring out a duplicate title.

Figure 28. The first two editions of my materials textbook.



Published in 1999 by
Oxford University Press



Published in 2012 by
CRC Press

♪♫ *Satisfaction…*

Somewhere along the way, I found a mathematical description of success, and I posted it on the bulletin board outside my office. (See Figure 29.) The key ingredient is satisfaction, integrated over time. By this, or any other definition of success, I have really achieved the goal. A few of my most satisfying activities not already mentioned are illustrated in Figure 30.

Figure 29. A mathematical definition of success.

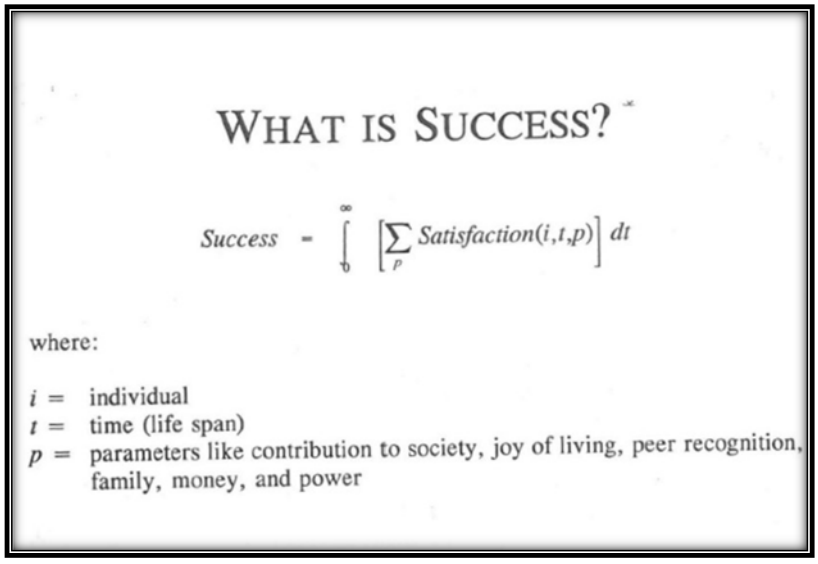
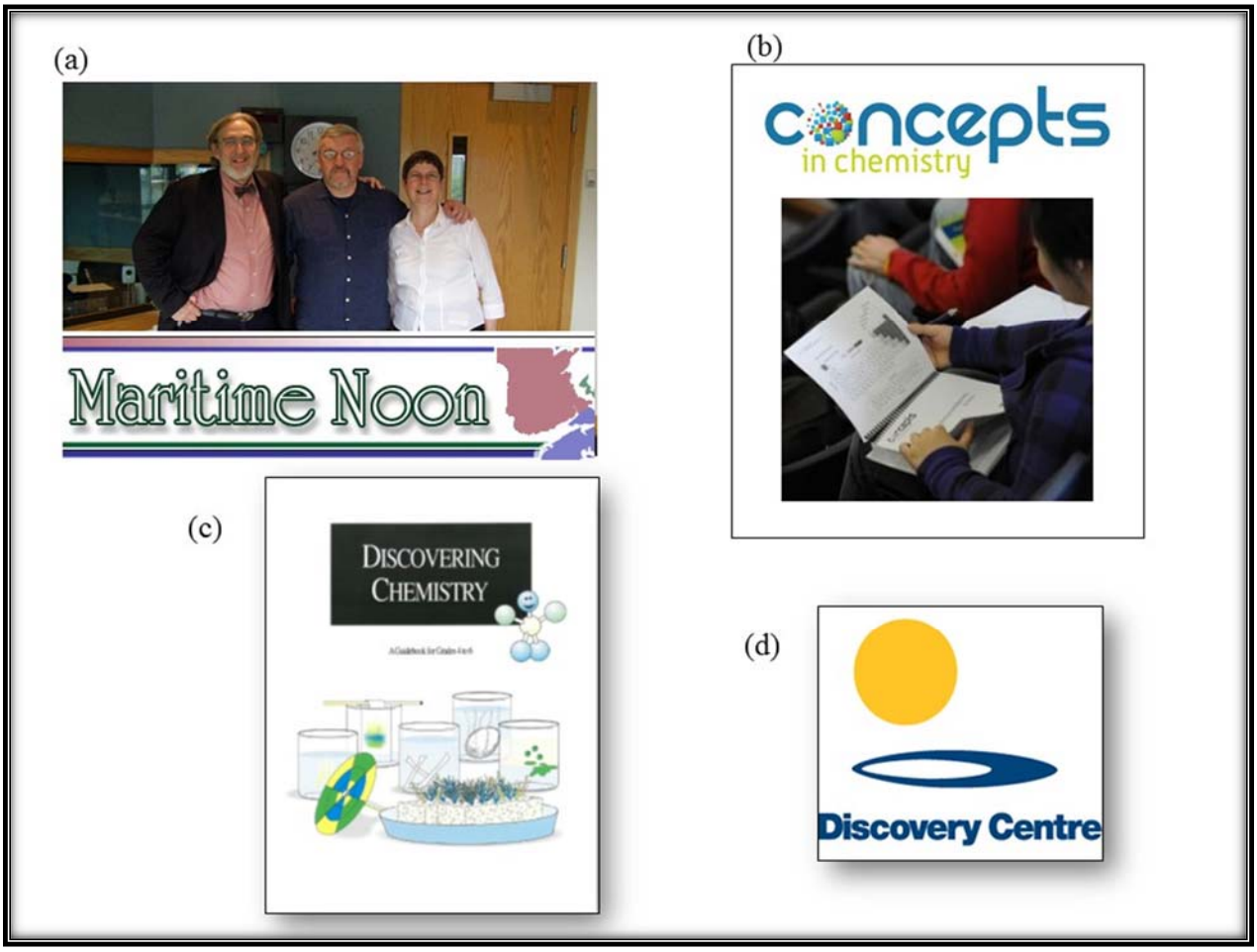


Figure 30. Other activities that have brought a great deal of satisfaction. (a) From 2001 to 2014 I was a "regular" on Maritime Noon on CBC Radio, answering science questions, live on air. Pictured here are Professor Richard Wassersug (Anatomy, Dalhousie) with whom I was one half of "White and Wassersug" on this show from 2001 to 2012, after which Richard moved to Vancouver and I was the sole "science guy". In the middle of this photo is Costas Halavrezos, 23-year host of Maritime Noon until his retirement in 2010. I really enjoyed working with Richard and Costas. (b) The Department of Chemistry led a full-department effort to produce a first-year chemistry textbook, used since about 2006, at Dalhousie and at some other universities. (c) In 1993 and 1994 I was a member of the Board of the Canadian Society for Chemistry and responsible for National Chemistry Week. Along with a summer student, Nada Haidar, I developed a booklet of chemistry-related activities for Grade 4 to 6 students. I knew that thousands of copies had been distributed across the country, but it was a very proud moment when I saw a tattered version of it in a classroom in Vancouver.[p] (d) In the late 1980s and early 1990s, I was very involved with the Discovery Centre in Halifax, including membership on the Board when it first opened (in Scotia Square) and chair of the exhibits advisory committee.



[p] This booklet, in English and French, and another for Grades 1 to 3, are available on my website at http://mawhite.chem.dal.ca/Outreach.htm

♫♪ *They Looked to the Future and What Did They See?* ♪♫

The future is very bright for this beautiful city of Halifax, growing into a new look, and for Dalhousie University, now a vibrant research-based university. I especially look forward to celebrating Dalhousie's 200th anniversary in 2018.[q] I am excited to see changes such as the new Wallace McCain Learning Commons with its active student areas for science students (Figure 31), and hope that some day Science will have a first-rate lecture theater like the room in the Marion McCain Arts and Social Science Building where my retirement lecture was held.

Figure 31. The Wallace McCain Learning Commons with its copper exterior, aging due to the formation of oxides and sulphides. Eventually it will be blue-green, like the roof of the Parliament Buildings. Inside, students study individually or in groups.

For my own future, I foresee more research, and some other activities, too. I am especially pleased to be invited to be a presider at Canadian citizenship ceremonies, and look forward to brushing up on my French to give the oath in both languages. And I have some other ideas for non-science activities. Stay tuned!

[q] The only university committee that I am remaining on post-retirement is the Faculty of Science 200th Anniversary Committee. I am remaining on a few graduate students' supervisory committees, and will continue to supervise my research group, including two PhD students.

Thanks, for the Memories… ♫♪♫

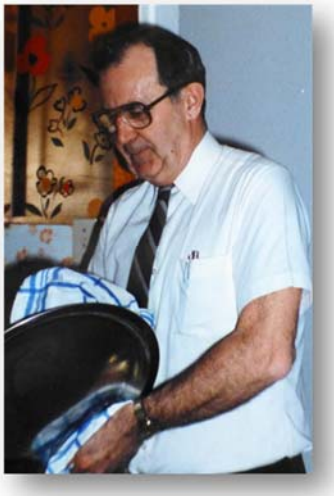
This lecture offers an opportunity for public thanks to many who have made my career at Dalhousie possible.

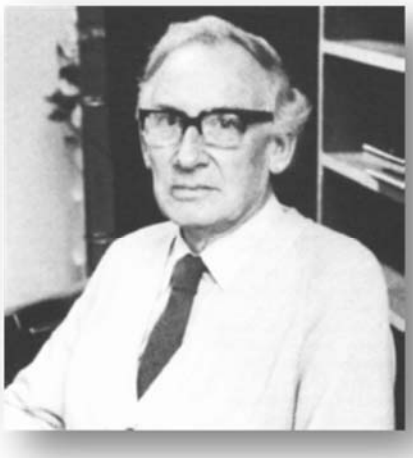
My first "thanks" go to my parents, the late Pat and Myron Millar. I especially thank my father for his insatiable appetite for knowledge, and my mother for her tenacity, both traits that have served me well in my career. I also thank them both for never questioning my interest in being a scientist or a professor.

On the academic front, I thank my mentors, Professor Patrick Jacobs at UWO, Professor Jim Morrison at McMaster University, and Dr. Lionel Staveley at the University of Oxford (Figure 32). Patrick Jacobs introduced me to thermodynamics and to solid state chemistry and his contributions to the former included a book published just weeks before his death at aged 89. Jim Morrison was my PhD advisor at McMaster University, and a gentleman and a scholar. I was Lionel Staveley's last research worker in his lab at Oxford and from him I learned good science and also how to close down a lab, a skill I will need, but not for a few years.

Figure 32. My mentors: (a) Patrick Jacobs; (b) Jim Morrison[r], and (c) Lionel Staveley.

(a) (b) (c)

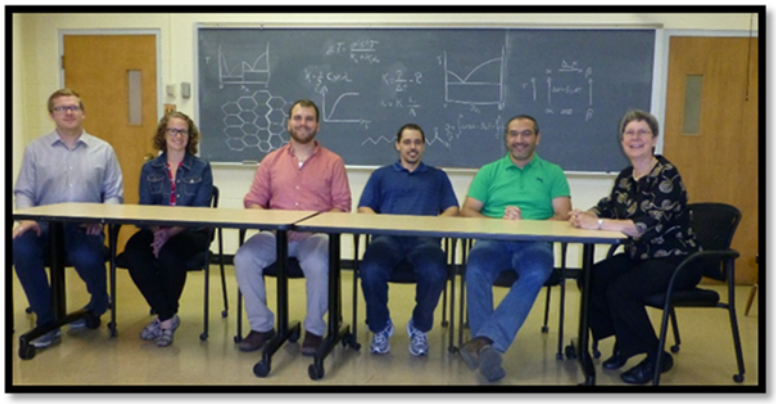




[r] Jim Morrison was well-known as a practical joker, so I think it's suitable to show a photo of him drying dishes at our house. This photo was taken during his last visit to Halifax, in February 1985, during which he gave a seminar on his recent research.

I have already mentioned my research group, but I would like to express explicit thanks to all members of my research group for their contributions to advancement of knowledge, and for being such interesting people to be with. Special thanks to my current research group (Figure 33).

Figure 33. My research group at the time of my retirement, December 2016. Left to right: Jan Pöhls (PhD candidate in Physics), Catherine O'Neill (research scientist), John Noël (PhD candidate in Chemistry), Mike Johnson (research scientist), Samer Kahwaji (research associate).



The staff at Dalhousie University have been very helpful over the years. I have worked with many very closely. In the Chemistry Office, this includes Cheryl Coolen, Cheryl Stanton, Giselle Andrews and especially Deanna Wentzell.[s] Technical staff members who helped in our research include Reg Myatt, Rick Conrad and Mike Boutilier in the Machine Shop, and Ryan MacKinnon and Brian Millier in Electronics/Computing. Brian was especially helpful in building equipment that could replicate the role of commercial instruments at a fraction of the cost, in both my research lab and in the undergraduate teaching lab. In other support, I thank Andy George (Physics), Pat Scallion (SEM), and Mike Johnson. Mike has been the IRM staff scientist in charge of physical property equipment for over 10 years, and my most common co-author (28 papers and counting…). At IRM, I always enjoyed working with Margaret Douma (a wonderful administrator when I was Director) and Janet MacDonald (outstanding manager of the DREAMS program).

Among my faculty colleagues at Dalhousie, I would like to single out a few for special mention. Gianna Alemán-Milán, a Senior Instructor in Chemistry who runs the labs for the Materials Science course, has been very fun to work with. Gianna has great ideas, and she also has very high standards, imposed on the students in the nicest possible way. I have already mentioned my interactions with Dominic Groulx in Engineering, but should add that he and I intend to keep collaborating as the

[s] Deanna has assisted on many projects over the years, including planning this retirement event, and providing many of the Departmental photos from her archives.

combination of chemical expertise and engineering is very useful. Mark Obrovac joined Dalhousie in 2010, so he is one of my more recent colleagues, but I have enjoyed our discussions on science and other far-reaching topics. Joe Zwanziger came to Dalhousie in 2003, but I have known him since the early 1990s from a Gordon Conference we both often attended. Joe and also Ulli Werner-Zwanziger have added considerably to the materials research profile at Dalhousie and are valued colleagues. Then there is Jeff Dahn. Jeff and I have never published together but we have worked together on a number of important projects, including the founding of IRM, major CFI applications, and the DREAMS application. (Jeff was the PI on that.) I admire his energy and enthusiasm, and his straightforward attitude. Each of the people mentioned above is also a good friend, and the importance of that fact cannot be overstated.

Most importantly, I would like to thank my family. My son, David, and daughter, Alice, had to be organized and self-sufficient as children to help make our lives work. Although I was not home to make them lunches as one in particular would have liked, I am so pleased to see that they have grown into fine, responsible adults, each with wonderful spouses, and one with an offspring who calls me Grandmaw. But most of all, I have to thank Rob. In the words of Norman Mailer, he "gives fire to my courage" and has stood behind my every undertaking.

Conclusion

It is clear that 33 ⅓ years is a very long time, in a person's life and in the life of a University. Much has changed, and things will continue to evolve. It's time for me to step aside.

Some months ago, I found a perfect quote to summarize how I feel:

Don't cry because it's over, smile because it happened.

This is attributed to Dr. Seuss. Ever the researcher, I sought the origin of the quote, and found that the Dr. Seuss attribution is disputed.

Oh well, it still fits!

Mary Anne White, OC, FRSC, is now Harry Shirreff Professor of Chemical Research (Emerita) at Dalhousie University, Halifax, Nova Scotia, Canada. For more details see http://mawhite.chem.dal.ca/