THE YOUNG SCIENTIST AWARD FOR 1998 TO PETER C. BURNS

Mr. President, Ladies and Gentlemen,

This occasion represents the first time that the Mineralogical Association of Canada has presented its Young Scientist Award. The award is to be given to a young scientist who has made significant internationally recognized contributions to science in the fields supported by MAC. An important aspect of the criteria for the award is that the nominee has a sustained research record subsequent to the completion of his final degree and has the potential for a promising scientific career. The awards committee this year consisted of myself as chairman, Grant Henderson, Steve Kissin and Yuanming Pan. The committee were unanimous in their decision that the 1998 MAC Young Scientists Award be given to Peter Burns in recognition of his outstanding contributions to crystallography and mineralogy.

Peter Burns hails from New Brunswick and did his undergraduate work at UNB. Here he undertook an undergraduate thesis on borate minerals from Sussex County. Stemming from this work, he found and described a new borate mineral, which he named trembathite after his professor of mineralogy.

Subsequently, Peter did a M.Sc. on the ordering of gallium in synthetic gallium albite with Mike Fleet at the University of Western Ontario. This study involved determining crystal structures and using magic-angle spinning – nuclear magnetic resonance spectroscopy. It was during these studies that his abilities as a crystallographer were recognized, and he was encouraged to undertake a Ph.D. at the University of Manitoba under the nominal supervision of Frank Hawthorne.

His Ph.D. thesis at Manitoba involved structural studies of Cu^{2+} oxysalt minerals coupled with molecular mechanical calculations and was notable for the extraordinary amount of innovative experimental and theoretical work presented. In recognition of this, the thesis was awarded the Winthrop Spencer Gold Medal of the University.

On leaving Manitoba, Peter went to Cambridge on a post-doctoral fellowship. There he worked with Michael Carpenter on phase transitions in boracite-group minerals, developing skills in transmission electron microscopy and high-temperature infrared spectroscopy. His second PDF was spent at the University of New Mexico with Rod Ewing, where he focussed on developing a structural hierarchy for hexavalent U minerals and applying this work to problems in the disposal of spent nuclear fuel. This work is exceptionally good both from a scientific perspective and the viewpoint of developing a detailed understanding of the behavior of uranium in the environment. A paper stemming from this work was awarded the Hawley medal for the best paper published in *The Canadian Mineralogist* in 1997.

Peter went on to the University of Illinois for a year of teaching, and has now obtained a permanent position at the University of Notre Dame, where he has already established a laboratory and commenced a vigorous research program, primarily focussed on U-minerals, but also on borates and on solving the undetermined structures of diverse minerals. In these studies, Peter will continue to make significant advances, as his new CCD-equipped single-crystal diffractometer will allow him to solve the crystal structures of previously intractable fine-grained minerals and compounds of high atomic number and large cell dimension.

Peter Burns has been cited as the best student ever to attend the Department of Geological Sciences at the University of Manitoba. Not surprisingly, he has received many awards and scholarships. Of particular significance is an observation that when he won the MSA Research Award in Crystallography, it was noted that "nobody else was in the competition; he ranked 10 and all the others were below 5". He also held an ICDD Scholarship for two years, at that time only two of these per year were awarded throughout *all* areas of crystallography including chemistry, biochemistry and physics. Peter was the first mineralogist ever to hold this scholarship – a significant achievement indeed given the nature and strength of the competition.

Peter Burns is an exceptional scientist. He is extremely intelligent, works incredibly hard, and has scientific insight that is exceptional in one so young. He has accomplished an amazing amount of original work during the course of his Ph.D. and Post-Doctoral studies, producing about 56 papers since 1990. For most of these he is senior author. He has tremendous breadth and is involved with a whole range of geological topics ranging from fieldwork to *ab initio* molecular orbital calculations. Peter is the new type of mineralogist/petrologist. He has all the tools of the chemist and physicist, but is a geologist with the geologist's understanding of complex natural systems. As well as having technical expertise, Peter is imaginative and enjoys tackling difficult problems. He was a stimulating student for those who knew him at the University of Manitoba, and is now an incredibly stimulating colleague.

Peter Burns is a rising star; no other young person working in the field of crystallography and mineralogy comes close to him a scientist. Consequently, it gives me great pleasure to present to Peter Carman Burns the first-ever Young Scientist Award of the Mineralogical Association of Canada.

Roger H. Mitchell, Past President
Lakehead University

I am very honored to be chosen as the first recipient of the Young Scientist Award of the Mineralogical Association of Canada. This is especially true as I am well aware of many other young geoscientists that are deserving of this award.

I consider myself fortunate to have grown up in northern New Brunswick on the banks of the splendid Miramichi River. Every chance I could get I would head down to the river to cast for Atlantic salmon or try to outsmart elusive brook trout. This idle time was beneficial in more ways than gaining tall tales to tell other fisherman; it gave me the chance to develop my interests in nature and science, and to discover the value of time spent on quiet reflection.

When I finished high school, I was certain my interests lay in science, but my exposure had been limited to chemistry and physics, and it seemed unlikely that either would hold my interest for an entire career. I knew almost nothing about geology. Fortunately, I had been sent several brochures by university geology departments intent on selling young, impressionable students on careers in the geosciences. This served as my introduction to geology. I chose the University of New Brunswick, and tentatively identified geology as my major. Considerable thanks are due to the geology faculty at UNB, where my interest was nurtured and continued to grow.

While at the University of New Brunswick, I had the good fortune of coming under the tutelage of Lowell Trembath. After taking two courses from Lowell, I secured an NSERC undergraduate summer research assistantship and went to work with him on X-ray powder-diffraction studies of synthetic feldspars. This was my first experience in a research environment, and I learned a tremendous amount about doing science from Lowell and Jaan Vahtra, the X-ray laboratory manager. Lowell also had a keen interest in fly fishing for the elusive Atlantic salmon. We had an unspoken agreement: he showed me the ropes in mineralogy and crystallography, and I reciprocated by showing him many of the best fishing holes of the Miramichi. We thus developed a lasting friendship that is uncommon amongst a university student and a faculty member.

My undergraduate thesis at New Brunswick involved borate minerals from the Sussex area. Borate minerals captivated my interest because of their diverse and complex structures, and eventually led me down the research path of structural hierarchies and their relationships to mineral paragenesis. While doing my undergraduate research, I discovered a new borate mineral, which I eventually named trembathite after the scientist who initially developed and nurtured my interest in mineralogy.

After graduating from New Brunswick, I moved westward to the University of Western Ontario, where I continued to work on feldspars under the supervision of Mike Fleet. The feldspars were synthetic gallium analogues of albite, and provided a wonderful opportunity to study order–disorder in the crystals using Rietveld structure refinements. Upon completion of a Master's degree at UWO, I continued to move further westward, this time to the University of Manitoba, a school that is legendary amongst mineralogists both in Canada and abroad. I was privileged to work on a Ph.D. under Frank Hawthorne, and to get to know such people as Bob Ferguson and Petr Černý. Frank had a profound influence on my approach to science. He was the ideal Ph.D. supervisor for me, as he provided a perfect balance between supervision and flexibility; I could count on his support and wisdom to keep me sufficiently on track, while also permitting me to follow many tangents, as such diversions are part of what makes doing science so much fun. My thesis was on molecular orbital calculations applied to copper oxysalt minerals, but I also enjoyed continuing work on borates, as well as being introduced to other areas in mineralogy, such as phase transitions, crystal-structure determination, and mineral synthesis. The mineralogy labs at Manitoba are second to none in Canada for studying mineral structures, and I thoroughly enjoyed my time researching there.

Upon completion of my Ph.D., I was awarded an NSERC post-doctoral fellowship, which I decided to take to the University of Cambridge, an institution that mineralogists and most other people the world over revere. I went to Cambridge to learn about phase transitions in minerals, to gain experience with transmission electron microscopy, and to learn a bit about Landau theory, all of which were accomplished under the direction of Michael Carpenter. I was appointment a Research Fellow at Clare Hall, a college with a large number of visiting scholars from throughout the world. This provided the opportunity to interact with a wonderfully diverse group of scholars. Despite the temptations of Cambridge, after a year we decided to move back to North America, as I was keen to take a rather different direction with my mineralogical research.

The next move was probably the most dramatic. We left the rainy sea-level climate of England for the high

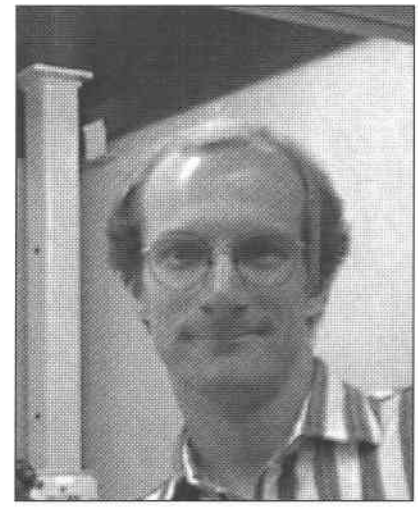
desert of New Mexico. There I joined Rodney Ewing's mineralogy group at the University of New Mexico as a post-doctoral fellow. Rod's group was studying several novel applications of mineralogy to problems of pressing environmental importance. It was there that one of my current fascinations began; the mineralogy and structures of uranium minerals. Soon after arriving in New Mexico, I began developing a structural hierarchy for uranyl minerals, and was amazed at the complexity of this mineral group. There continues to be a great deal to be discovered in this area, as these minerals are extremely challenging, even with the techniques which we can now bring to bear.

After a year at the University of New Mexico, I accepted a temporary faculty position at the University of Illinois in Urbana-Champaign. I decided to do this because I was keen to gain further experience teaching, as I correctly imagined that this would help me find a more permanent arrangement. This was somewhat of a baptism by fire, for it required teaching huge masses of students at one of the largest research universities in the United States. At Illinois, I developed courses somewhat removed from my usual interests: oceanography and planetary geology. Illinois had another benefit that was not immediately apparent to me upon my arrival. There was a CCD-based X-ray detector system in the School of Chemical Sciences. After Jim Kirkpatrick pointed the way to the X-ray system, I spent many long hours working on new and challenging structures. I was very fortunate to gain from Scott Wilson's accumulating expertise on the use and capabilities of this new instrument, which is revolutionizing the way we study mineral structures.

After spending only one year at the Illinois, I was given the opportunity to move to the University of Notre Dame to build a new Environmental Mineralogy laboratory, which includes a CCD-based single-crystal diffraction system. I now call Notre Dame home, and am enjoying the process of building a research group in mineralogy. My wife Tammy has made many sacrifices for the advancement of my career, as well as providing the best advice available; I am exceedingly grateful to her for all she has done.

I consider myself privileged to have been educated in the Canadian system, and to have worked with so many distinguished individuals and groups. It is gratifying to be rewarded for doing something that you love, and I thank you for this recognition.

Peter C. Burns
University of Notre Dame



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