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Memorial of Gabrielle Donnay
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Gabrielle Donnay (née Hamburger) died peacefully at her home, on the flanks of Mont St. Hilaire, on April 4th, 1987. Gai was born in Landeshut, Silesia (in Germany at the time, now part of Poland). Her father was a textile manufacturer, and her mother had a career in music. She early developed lasting interests in sports, the great outdoors, and the violin. Although she had passed the examination for admission to the University of Oxford, she chose to emigrate to the United States. At the age of 17, she disembarked alone in Quebec, ready for the adventures of a very different life on a new continent, and headed to Los Angeles, where she was expected by friends of the family. Four years later, she graduated from UCLA with highest honors in chemistry. She had already begun her lifelong interest in the structure of crystals, with her first paper entitled "The crystal structure of diphenylselenium dibromide." There soon followed a second paper on the chlorine-bearing analogue. One senses right away that Gai was not a run-of-the-mill undergraduate student! Martin J. Buerger also came to this conclusion and encouraged Gai to apply her considerable talents to meaty research topics in the world of minerals. For her Ph.D. thesis, she tackled and solved the awesome noncentrosymmetric rhombohedral structure of tourmaline, using photographic techniques and nothing fancier than a desktop electrical calculator! She graduated from the Massachusetts Institute of Technology in 1949.

Tourmaline turned out to provide the challenges on which Gai thrived. What a fitting mineral group to start off an inquisitive, well-disciplined scientist on a career-long interest in the relationship between the physical properties of a mineral and its structure! Her third paper, simply entitled "The structure of tourmaline," had a dramatic impact. There followed no fewer than 13 major papers on tourmaline, including her description in 1966 of *buergerite,* named after her mentor, and a definitive statement in 1977 on the "Structural mechanism of pyroelectricity in tourmaline."

It is not my intention to review the impact of each of Gai's 134 papers, but the fourth paper deserves special mention. Entitled "The one-dimensional crystal. I. General," and published in 1949, it was co-authored by Gabrielle Hamburger and J.D.H. Donnay, then on the staff at the Johns Hopkins University. The symbiosis evidently "clicked" on all fronts, as Gai and Jose were married in July 1949. Thus began a most fruitful 37-year collaboration that gave the world a formidable team of crystallographers, she the expert in crystal chemistry and in structural crystallography, he more conversant in the topological and morphological aspects of the structures. Of her 134 papers, close to half also bear Jose's name. The Donnays became known internationally for their pioneering efforts to compile and systematize the findings of all crystallographers. A first edition of *Crystal Data* (1954) ran for 719 pages, and a second edition (1963) extended to 1302 pages, all meticulously prepared before the days of computer-based technology!

Although Gai never claimed to know much about geology, she made important and lasting contributions to our knowledge of just about all the major rock-forming minerals: quartz, alkali feldspar, plagioclase, nepheline, phyllosilicates, spinels, carbonates, sulfides, pumpellyite, staurolite, olivine, pyroxene, and diamond. She will be

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remembered for her great insight into mechanisms of solid solution, the phenomenology of phase transitions, the role of H^+ in ordering reactions and in subsolidus recrystallization, the nature of atomic bonding, bond-valence summations, the extent and implications of OH-for-O substitution, and the origin of intergrowths in crystals.

Gai spent twenty exciting years at the Geophysical Laboratory, Carnegie Institution of Washington. She learned a lot from the likes of Bowen, Schairer, Tuttle, Yoder, and Kullerud, and undoubtedly gave a lot in return. In 1970, after Jose's official retirement from Johns Hopkins, the Donnays elected to move on to new challenges in a new country. She left a group of experimentalists and became a member of a strongly field-oriented department at McGill University. She quickly came to grips with the question: how much crystallography should we teach geologists? Her paper on the subject (1978) and the *Laboratory Manual in Crystallography* both evolved from her courses at McGill. The manual is still marketed at nominal cost by the Mineralogical Association of Canada.

Gai had an irrepressible curiosity that led to important contributions in biocrystallography and material sciences. She viewed crystallography as a common ground where chemists, solid-state physicists, biochemists, mineralogists, engineers, and health scientists had an important stake. She would never shy away from a challenging problem involving crystals in any field. She saw to it that tourmaline would be among the very first minerals examined by high-resolution transmission electron microscopy. A prominent display at McGill illustrated the uncanny match between her early interpretations of this complex structure and the HRTEM results published nearly thirty years later. She clearly was very excited by the potential of this approach.

Another area began to hold Gai's interest. She was most concerned about the profile of women in the physical sciences. She found early on in her career that she definitely was treading in a man's world. She had compiled statistics that were not glowing concerning discriminatory practices in hiring and in remuneration, although she marveled at the treatment that she had experienced. She published *Women in the Geological Sciences in Canada* in order to correct perceived injustices in the system. In recognition of her efforts to promote the notion of equal chances of advancement for men and women of equal qualifications, and to signal Gai's retirement from academia, the American Crystallographic Association organized a symposium entitled "Women in Crystallography" at its 1986 meeting.

For a career of first-rate scientific accomplishments in the areas of mineralogy and crystallography, both in the U.S.A. and Canada, Gai was awarded the Past Presidents' Medal of the Mineralogical Association of Canada in 1983. She prized this gold medal a great deal. There were two other "awards" also: the species *gaidonnayite,* $Na_2ZrSi_3O_9 \cdot 2H_2O$, was dedicated to her, and *donnayite,* $NaCaSr_3Y(CO_3)_6 \cdot H_2O$, honors the world's dynamic duo of crystallography. Both species were discovered at Mont St. Hilaire, not far from the Donnay residence.

Gai could be counted on to liven up any session she attended at a professional meeting. There was little likelihood of an embarassing silence during a question period. In fact, Gai was liable to launch into a barrage of questions that left a speaker temporarily tongue-tied. As she stated in her acceptance of the Past Presidents' Medal, "I apologize sincerely to all the speakers who, over the years from 1937 to 1983, have had to answer my direct, non-premeditated questions after or even during their scientific presentations. I honestly cannot suppress this impulse to find things out on the spot. I never mean to be supercilious; it is just irrepressible curiosity. Thank you for putting up with it and even rewarding the guilty so generously."

Gai was very devoted to her immediate family, to Jose and to her two boys, Albert and Victor, whose accomplishments made her so proud. She was a fervent supporter of Albert's efforts on behalf of Nuclear Free America. Engraved on her tombstone in Pigeon Hill, in the Eastern Townships of Quebec, is the message: "Nationalism in the nuclear age may lead to the destruction of all life on the earth! Shun it and keep our planet alive." Victor's accomplishments in the area of topology and his decision to follow his parents in academia also provided a tremendous boost for Gai during her protracted battle with cancer. She was devoted also to her extended family and to her many scientific collaborators, perhaps because of the upheavals that she had experienced in her youth in pre-war Germany.

Gai was told in 1981 to expect to live eight months. She then set out to beat these odds in an ultimate challenge. She gave us all an eloquent message of courage in the face of adversity and showed us the only attitude to take in the face of a challenge, scientific or other. We have lost an esteemed colleague, a true superstar of the highest moral and scientific integrity.

A Memorial Fund has been set up to commemorate Gai Donnay; it is to support a Gabrielle Donnay Lectureship in the general area of Gai's interests at the Geophysical Laboratory. Donations should be made to the Carnegie Institution of Washington, Geophysical Laboratory and sent to the Director, Dr. Charles Prewitt, 2801 Upton Street N.W., Washington, D.C. 20008, U.S.A.

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[1] A copy of the complete bibliography of G.H. Donnay may be ordered as Document AM-89-402 from the Business Office, Mineralogical Society of America, 1625 I Street, N.W., Suite 414, Washington, D.C. 20006, U.S.A. Please remit $5.00 in advance for the microfiche.

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