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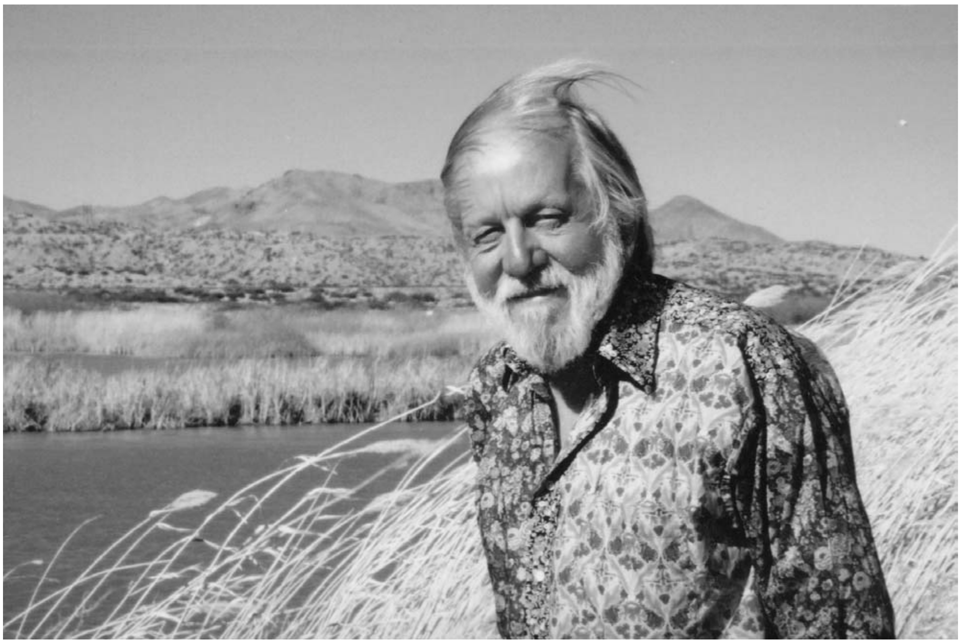
Obituary: Günter Bruns



Following a short illness, on December 23, 2002 Professor Günter Bruns died with his loving friend of 27 years, Monica Robinson, his daughter Susanne, and extended family Joh and Dickon at his side.

Günter Wilhelm Bruns was born on March 25, 1928 in Oldenburg, Germany. Soon after the end of the Second World War, Günter began studies in Berlin, receiving his Dr.Rer.Nat. from the Free University of Berlin in 1956. His thesis, "Einige Zerlegungssätze für Filter" [8], was supervised by F. W. Levi and Jürgen Schmidt. Günter took a position in Mainz in 1956, completing his Habilitationschrift "Darstellungen und Erweiterungen geordneter Mengen" in 1960 [11, 12]. He joined the faculty of McMaster University in Hamilton, Canada in 1961, and remained there until his retirement in 1993. Günter maintained nearly uninterrupted support of NSERC during this period. After his retirement, Günter devoted his time to mathematics, music, and his grandchildren Cody and Hanna.

Günter's early work was an investigation of several aspects of filters on a set. In a series of papers [1–6], several coauthored with J. Schmidt, Günter demonstrated a direct path to the well-known equivalence between the filter and Moore–Smith approaches to convergence, gave an equivalent form of the continuum hypothesis in terms of the generation of certain filters, obtained several results on the structure of the lattice of all filters on a set, and gave various results on the degree to which the isomorphism type of a filter can be characterized by certain cardinal invariants.

He then turned his attention to problems related to representations of partially ordered sets as subsets of a set via order isomorphisms taking specified collections of joins and meets to unions and intersections [9–13]. Among the important results he obtained were necessary and sufficient conditions for such a representation of a Boolean algebra as a field of sets, necessary and sufficient conditions for a lattice to be represented as the collection of closed sets of a topological space, and certain results on the universality of such representations. Although very much overlooked, many basic results about what would later be called sober spaces and spatial locales were first obtained in these papers.

After his arrival in Canada, Günter began a series of papers developing categorical notions for specific classes of ordered algebraic structures. These include his papers with Bernhard Banaschewski in the mid 1960's giving the now well-known categorical characterization of the MacNeille completion of a partially ordered set [17], and the result (also proved by R. Balbes) that the injectives in the category of distributive lattices are the complete Boolean algebras [18]. Another notable paper from this period is his 1970 paper with H. Lakser characterizing injective hulls of semi-lattices [19].

Günter spent the 1970 academic year on sabbatical at the University of Massachusetts, Amherst. This sabbatical would have a profound effect on his mathematical life. During this period there was growing interest in the area of orthomodular lattices (abbreviated: OMLs), and Amherst was one of the main centers of this activity. Gunter jumped into the subject with both feet and would devote the majority of his research efforts to this area for the next 30 years.

Günter made several important contributions to the study of sub-varieties of OMLs. His papers with Kalmbach [20, 21] develop much of the basic theory. Later, he considered sub-varieties of modular ortholattices [29], formulating what is now known as Bruns' Conjecture "any variety of modular ortholattices not contained in the variety generated by MO_ω contains an orthocomplemented projective plane".

Problems related to free OMLs garnered much of Günter's attention. In [22] Bruns and Kalmbach develop many of the basic facts about free OMLs. One of the techniques introduced in [22], the "one-point extension", would later lead to a proof that every OML can be embedded into an atomic OML. Günter then gave a solution, à la Whitman, to the free word problem for ortholattices [23]. Some of Günter's greatest contributions to the area may have come from his unsuccessful attempts to solve the free word problem for OMLs. His investigations into the finite embedding property for OMLs lead to the essential results about OMLs that have only finitely many maximal Boolean subalgebras (blocks) [24, 26]. These results were later extended by Bruns and Greechie [27, 28, 33] to provide much of what is known about block-finite and commutator-finite OMLs. The free word problem for OMLs that so captivated Günter remains an open problem.

Just prior to his retirement, Günter made an influential contribution to the completion problem for OMLs in a paper with Greechie, Harding and Roddy [34]. After his retirement Günter returned again to his early study of categorically motivated questions, this time in the setting of OMLs. Bruns and Roddy developed the theory of projectivity for OMLs in a series of papers [35–37]. Bruns and Harding examined the amalgamation property for OMLs [38] and the surjectivity of epimorphisms for varieties of OMLs [40]. Günter was working with Harding on questions related to completions shortly before his death.

Günter had eight Ph.D. students: J. Duskin, H. Doctor, J. Gerhard, K. B. Lee, E. Nelson, A. Day, M. Roddy, and J. Harding. He was proud of the fact that each of his students went on to successful academic careers, several very successful ones. Tragically, Evelyn Nelson and Alan Day died when just reaching their prime.

Günter was a fine mathematician and a wonderful person who will be deeply missed.

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