

The Mathematics of Donald Gordon Higman

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1. Introduction

Donald Gordon Higman (born 20 September 1928 in Vancouver, B.C., Canada)—an architect of important theories in finite groups, representation theory, algebraic combinatorics, and geometry and a longtime faculty member at the University of Michigan (1960–1998)—died after a long illness on 13 February 2006.

Don left a significant legacy of mathematical work and personal impact on many mathematicians. A committee was formed in 2006 to work with the *Michigan Mathematical Journal* and create a memorial. The contributors have some mathematical closeness to Don. Several of Don’s fifteen doctoral students are included in this group. The breadth of topics and quality of the writing is impressive. For example, the article of Broué is especially direct in examining the impact of one of Higman’s basic results in representation theory (the “Higman criterion”).

Don Higman was a serious intellectual who had the manner of a kind uncle or concerned friend. He worked broadly in algebra and combinatorics. He thought deeply about the ideas in his mathematical sphere, and his style was to seek the essence of a theory. His work had great influence on future developments. This is exemplified by one of his theorems in permutation groups, as related by Peter Neumann: Don’s “fundamental observation that a permutation group is primitive if and only if all its nontrivial orbital graphs are connected changed the character of permutation group theory. It’s a simple thing, but it introduces a point of view that allowed lovely simplifications and extensions of the proofs of many classical theorems due to Jordan, Manning, and Wielandt.”

Len Scott relates Don’s reaction to a John Thompson lecture, around 1968, at a conference at the University of Illinois. This was not long after the discovery of the *Higman–Sims sporadic simple group*. Thompson expressed agreement with Jacques Tits’s “heliocentric view of the universe, with the general linear group as the sun, and these sporadic groups as just asteroids.” Len happened to be on the same elevator with Don, shortly after the lecture, when one of the participants asked Don what he thought of the heliocentric model. Don’s reply was, “Well, it hurts your eyes to look at the sun all the time.”

The elevator passengers had a good laugh, and it really was a marvelous line. But, reflecting further, not only can we see a part of Don’s personality and humor here, but also some of his identity as a mathematician and even some of his place in mathematical history.