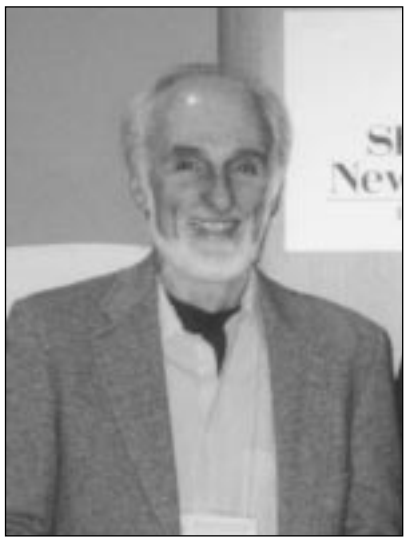
2001 Whiteman Prize



Thomas Hawkins

The Albert Leon Whiteman Prize was established in 1998 using funds donated by Mrs. Sally Whiteman, in memory of her husband, the late Albert Leon Whiteman. Mrs. Whiteman requested that the prize be established for notable exposition on the history of mathematics. The ideas expressed and the new understandings embodied in the exposition recognized by the Whiteman Prize should reflect exceptional mathematical scholarship. The $4,000 prize is awarded every four years.

The first Whiteman Prize was awarded at the Joint Mathematics Meetings in New Orleans in January 2001 to THOMAS HAWKINS.

The Whiteman Prize is awarded by the AMS Council acting through a selection committee whose members at the time of this award were Joseph W. Dauben, Jeremy J. Gray (chair), and Karen Hunger Parshall. The text that follows contains the committee's citation, a biographical sketch, and a response from Thomas Hawkins upon receiving the prize.

Citation

In awarding the first Albert Leon Whiteman Prize to Thomas Hawkins, professor of mathematics at Boston University, the American Mathematical Society recognizes an outstanding historian of mathematics whose current research and numerous publications display the highest standards of mathematical and historical sophistication.

Hawkins began his career in the history of mathematics with the publication of a groundbreaking book on *Lebesgue's Theory of Integration: Its Origins and Development* (Madison and London: University of Wisconsin Press, 1970). Now a recognized classic in the field, this work, like all of Hawkins's subsequent research, is characterized by its historical depth and mathematical perceptiveness.

After 1970, however, Hawkins gradually shifted his research from the history of nineteenth- and early twentieth-century analysis to the development of group representation theory and Lie groups. This new line of inquiry began with papers on the representation theory of finite groups, which culminated with the paper "New light on Frobenius' creation of the theory of group characters" (1974). By that time this work had led to research on the history of matrix theory, as can be seen from the first of his presentations to an International Congress of Mathematicians (ICM) in 1974. In Vancouver he discussed the theory of matrices in the nineteenth century and showed that more is owed to Weierstrass, and less to Cayley, than then-standard texts would have it. This insight led him, via his paper "Wilhelm Killing and the structure of Lie algebras" (1982), to investigate the tangled history of the theory of linear representations of semi-simple Lie groups, the subject of his second ICM address at Berkeley in 1986. Since then he has written extensively on the history of Lie groups. In particular, he has traced their origins to work in the 1870s on differential equations and contact transformations in which Lie applied both Poisson brackets and the Jacobi identity to study the integration of partial differential equations. In "Jacobi and the birth of Lie's theory of groups" (1991), Hawkins argued convincingly that the *idée fixe* guiding Lie's work was the development of a Galois theory of differential equations. Another paper, "Hesse's principle of transfer and the representation of Lie algebras" (1988), found the roots of Élie

Cartan's 1913 paper on the construction of all irreducible representations of a complex semi-simple Lie algebra in nineteenth-century algebra and geometry. Hawkins has also studied Killing's work in detail, debunking, in particular, the inflated claims as to the influence of Klein's Erlanger Program at the time of its appearance. In drawing his historical conclusions, Hawkins has relied not only on the published mathematical record but also on collections of letters and other archival sources. His reading of these varied sources has, moreover, been guided by a sure sense of the mathematical connections involved, even when, as has often been the case, these have been lost and forgotten as a result of the subsequent growth of the subject.

All of this work has culminated most fruitfully in the publication of his long-awaited book *The Emergence of the Theory of Lie Groups: An Essay in the History of Mathematics 1869–1926* (New York: Springer-Verlag, 2000). This study treats in great depth the work of Sophus Lie, Wilhelm Killing, Élie Cartan, and Hermann Weyl as it highlights the fascinating interaction of geometry, analysis, mathematical physics, algebra, and topology in the late nineteenth and early twentieth centuries. It displays to the full Hawkins's deeply held belief that mathematical understanding grows when the underlying motivations and the original, informal, intuitive conceptions are uncovered and illuminated. It also interweaves the critical human dimension into the story through extensive quotation of the mathematicians' private correspondence.

Hawkins's many contributions to the history of mathematics have already won him much deserved recognition. In addition to twice addressing the International Congress of Mathematicians, he received the Chauvenet Prize for mathematical exposition from the Mathematical Association of America in 1997. In presenting the first Albert Leon Whiteman Memorial Prize to Thomas Hawkins, we acknowledge a body of scholarship characterized by breadth and coherence, clarity and sensitivity to historical detail, and depth of insight. Hawkins's work has truly transformed our understanding of how modern mathematics has evolved.

Biographical Sketch

Thomas Hawkins received a Ph.D. degree with a joint concentration in mathematics and history of science from the University of Wisconsin-Madison in 1968. After passing the Ph.D. qualifying examinations of both departments, he wrote a dissertation on the origins of the theory of Lebesgue integration, which was published as a book in 1970. After a few years teaching at Swarthmore College, he accepted a position in the mathematics department at Boston University, where he has remained. Over the years his work on the history of mathematics has been supported by both historical and mathematical institutions. With the financial support of the American Council of Learned Societies, he spent 1969–70 as a guest of the Forschungsinstitut für Mathematik at the Eidgenössische Technische Hochschule (ETH) in Zürich. During 1980–81 he was a visiting scholar in the Department of History of Science at Harvard University, with financial support provided by the National Science Foundation program in history and philosophy of science. The School of Mathematics of the Institute for Advanced Study in Princeton provided him with support as a visiting member during 1988–89, and the Dibner Institute for History of Science and Technology at the Massachusetts Institute of Technology did the same during 1996–97, when most of his book on the history of Lie groups was written. In 1997 he was awarded the Chauvenet Prize of the Mathematical Association of America for his paper "The birth of Lie's theory of groups" (*Math. Intelligencer* **16** (1994), no. 2, 6–17).

Response

As one who has been researching the history of mathematics for more than thirty years, it is a great honor for me to become the first recipient of the Whiteman Prize. The creation of this prize is particularly meaningful to me as a further manifestation of the importance the AMS attaches to the historical study of mathematics.

Thirty-five years ago, however, when I committed myself to a career in history of mathematics, there was in this country no such recognition of historical work by professional mathematical societies. In deciding to pursue a career in this area, I realized I was facing the prospect of a lonely and not quite respectable existence within the community of mathematicians, the professional group to which I felt the closest affinity. I am happy to report that my dire expectations proved to be unfounded. After leaving Wisconsin I was encouraged by the growing interest a number of distinguished mathematics departments showed in my work through their unsolicited invitations to speak about it. Among the many such departments, I want to mention in particular those at the University of Chicago and Yale University, where I have been invited back many times to talk about my latest discoveries. In addition, over the years many first-rate mathematicians have respectfully encouraged me in my work or have assisted me by reading over preliminary drafts of papers and by sharing their expertise, thereby helping me to avoid countless pitfalls as well as to explore connections I would have otherwise missed. To all the mathematicians who in one or more of the above-mentioned ways have supported and assisted my work, I hereby extend my heartfelt thanks.