

Editor's Note:

The accompanying article shows some of the many sides of Armand Borel, who died August 11, 2003. The eight authors write about him in the order Serre, Chandrasekharan, Bombieri, Hirzebruch, Springer, Tits, Arthur, Prasad.

Borel's research in algebra and topology was good enough to get him appointed professor at the Institute for Advanced Study at age thirty-four. Serre gives an overview of the mathematics, and Hirzebruch describes that mathematics in a different way, with emphasis on the topology. Springer and Tits write about Borel's work in algebraic groups, and Arthur writes about arithmetic groups and about how Borel's work in this area laid the foundations of the modern theory of automorphic forms.

An Institute colleague said that Borel believed strongly in the unity of mathematics and in the importance of the written record. The means for acting on these beliefs included roles as editor, author, educator, and conference organizer, and some of the present authors have elaborated on these activities. Borel put a sizable effort into contributions to the volumes by Bourbaki, detailing his experiences with that group in an article "Twenty-five Years with Nicolas Bourbaki, 1949–1973" in the *Notices* in March 1998 [CE 165]. He is widely regarded as having played a major role in the writing of the Bourbaki chapters on Lie groups and Lie algebras, which have been of particularly enduring value.

Borel was an editor of *Annals of Mathematics* for 1962–79 and of *Inventiones Mathematicae* for 1979–93, among other journals. For the interval 1998–2000 he served quietly as a kind of unofficial associate editor for the *Notices*, advising the editor on various matters, particularly memorial articles and the collaboration of the *Notices* with its counterparts in other countries. Borel played a large but anonymous role in planning the various articles about A. Weil and the memorial articles for J. Leray and A. Lichnerowicz.

Some of the authors of the present article describe some of the books that Borel authored or edited. The list of such books has seventeen entries, apart from his *Œuvres: Collected Papers* [CE], and appears in a sidebar with this article. A number of these books are outgrowths of seminars, sometimes joint with other people and sometimes not. No matter what form the seminars took, one can be confident that Borel was the choreographer of each. Of special note are the proceedings from two AMS summer institutes, in Boulder [3] in 1965 and in Corvallis [10] in 1977. Each proceedings contains significant expositions by Borel and contributions by many other experts; each has become a basic reference in its field.

In his last few years Borel kept up an annual schedule at the Institute in the winter, the Far East in the spring, and Switzerland in the summer. For each year 1999–2001 he was the organizer of a program on Lie theory at Hong Kong University from March to July. He had planned a summer school at Zhejiang University in Hangzhou, China, with Lizhen Ji and S.-T. Yau for August 2003, with continuations in 2004 and 2005 and plans for publishing the proceedings. The summer school for 2003 took place as planned, but Borel was unable to attend.

Borel was a counselor to mathematicians young and old. He had a fearsome reputation, and making a first approach to him was not for the faint-hearted. Yet many stories have come out since his death about how he helped individual mathematicians in large and small ways. All a person had to do was ask, and suddenly the effect of Borel's personality completely changed. Prasad writes how responsive Borel was to inquiries about mathematics from anyone anywhere in the world.

How did this man maintain his creative spirit, his energy, and his enthusiasm for so long? His older daughter, Dominique, said of him that he approached each new thing in his life, mathematical or otherwise, with the attitude of wonder and excitement of a small child. The citation for his AMS Steele Prize for Lifetime Achievement, which he was awarded in 1991, concluded with the following comments on Borel's activities beyond research: "In the course of amassing these astounding achievements, he placed the facilities of the Institute for Advanced Study at the service of mathematics and mathematicians, using them to foster talent, share his ideas, and facilitate access to recent developments through seminars and lectures. It is just simply not possible to cite a career more accomplished or fruitful or one more meaningful to the contemporary mathematical community."

Borel completed them in a series of papers ([CE 59, 61, 70, 74, 88, 99]), as well as in [2]. Several themes are intertwined:

- Compactification of quotients: that of Baily–Borel ([CE 63, 69]) in the complex analytic case; that of [CE 90, 98] in the real case, using manifolds with corners. In the two cases, it is the Tits building of the group that dictates what has to be added "at infinity".
- Generalization to S -arithmetic groups and to adelic groups ([CE 60, 91, 105]); here the use of

the Tits building must be completed by that of Bruhat–Tits buildings at nonarchimedean places.

- Infinite-dimensional representations, and the Langlands program: [8], [12], and [CE 103, 106, 112].
- Relations between the cohomology of arithmetic groups and that of symmetric spaces.

This last theme leads Borel to one of his most beautiful results: a stability theorem ([CE 93, 100, 118]) that gives the determination of the ranks of the K -theory groups of \mathbb{Z} (and, more generally, of