

# 2001 Conant Prize



**Carl Pomerance**

The Levi L. Conant Prize recognizes the best expository paper published in either the *Notices of the AMS* or the *Bulletin of the AMS* in the preceding five years.

Levi L. Conant (1857–1916) was a mathematician at Worcester Polytechnic Institute. His will provided for funds to be donated to the AMS upon his wife's death. When she passed away in 1976, the AMS received \$9,500, which it used to establish the Levi L. Conant Fund. Income from the fund was used to supplement other AMS prizes. Because the fund has grown substantially over

the years, the Society has decided to use it to establish a new prize in Conant's honor. At its meeting in January 2000 the AMS Council approved the establishment of the prize. The current amount of the prize is \$1,000.

At the Joint Mathematics Meetings in New Orleans in January 2001, the 2001 Conant Prize was awarded to CARL POMERANCE.

The Conant Prize is awarded by the AMS Council, acting through a selection committee whose members at the time of this award were Brian J. Parshall, Anthony V. Phillips (chair), and Joseph H. Silverman. The text that follows contains the committee's citation, a brief biographical sketch, and

a response from Carl Pomerance upon receiving the prize.

## **Citation**

The Levi L. Conant Award in 2001 is granted to Carl Pomerance of Bell Laboratories for his paper "A Tale of Two Sieves", *Notices of the AMS* **43**, no. 12 (1996), 1473–1485. The paper gives an elegant and attractive introduction to factorization methods in modern number theory, starting from elementary examples and leading to the state-of-the-art method, the number field sieve, used at the time of writing to crack a 130-digit RSA challenge number.

This paper is remarkable among expository papers for the care with which Pomerance motivates and explains each step forward in his argument. He begins with a personal anecdote, describing a problem he faced in a high school competition. He missed the problem, but it sparked his interest in algorithms for factoring. This episode gives an engaging lead-in to what in less careful hands could be a very dry topic. He continues the human side of the story in describing the interplay between the "pure" teams working on the theory of factoring and the "applied" interests who were more motivated toward actual factorizations. The pace and explicitness of his explanations are also effective in keeping the nonexpert reader engaged and satisfied. He is never afraid to take a small numerical example: "Say we try this with  $p = 7$ " occurs in the thick of his description of the number field algorithm, well toward the end of the article.

Carl Pomerance's paper on "The Tale of Two Sieves", with its witty first sentence ("It is the best

of times for the game of factoring large numbers into their prime factors”), can be held up as a standard for good expository writing in mathematics. It has charm, it has substantial and important content, and every line is written with the nonexpert reader in mind.

### **Biographical Sketch**

Carl Pomerance was born in Joplin, Missouri, in 1944. He received his B.A. from Brown University in 1966 and his Ph.D. from Harvard University in 1972 under the direction of John Tate. During the period 1972–99 he was a professor at the University of Georgia, with visiting positions at the University of Illinois at Urbana-Champaign, the University of Limoges, Bell Communications Research, and the Institute for Advanced Study. Currently, he is a member of the technical staff at Bell Laboratories and a research professor emeritus at the University of Georgia.

A number theorist, Pomerance specializes in analytic, combinatorial, and computational number theory. He considers the late Paul Erdős as his greatest influence.

Pomerance was an invited speaker at the 1994 International Congress of Mathematicians, the Mathematical Association of America Pólya Lecturer in 1993–95, and the Hedrick Lecturer in 1999. He has been honored by the MAA with the Chauvenet Prize (1985) and the Haimo Award for Distinguished Teaching (1997).

### **Response**

I am thrilled and honored to be the first recipient of the Levi L. Conant Award. Writing does not always come easily to me, but “A Tale of Two Sieves” was a labor of love. The paper grew out of a talk I gave at Lehigh University in 1996, and I thank the Lehigh mathematics department for suggesting I write an expository article based on the lecture. The *Notices* editorial staff were very supportive. In particular, I thank Susan Landau for urging me to submit the article to the *Notices* and for her constructive critique, and Hugo Rossi for his likewise constructive critique and for his suggestion of the cover artwork theme. It is amusing to me, rereading the article now, that I predicted my book with Richard Crandall (which was suggested for further reading) would be published in 1997. It is just a little late; it will be published early this year, I promise.