1067-AC-1067 **Krishnaswami Alladi*** (alladik@ufl.edu), Department of Mathematics, Gainesville, FL 32611.
Euler's pentagonal numbers theorem, companions and variations.

Euler's celebrated Pentagonal Numbers Theorem is one of the most fundamental in the theory of partitions and q-hypergeometric series. From this Euler deduced an important recurrence relation for the partition function. This recurrence was what MacMahon used to construct a table of partitions in order to verify the famous Hardy-Ramanujan asymptotic formula for the partition function. And it was on seeing MacMahon's table of values that Ramanujan wrote down his spectacular congruences for the partition function. Another fundamental development was Jacobi's triple product identity for theta functions which may be viewed as a generalization of the pentagonal numbers theorem. After discussing these major developments emerging from the pentagonal numbers theorem, we will describe some new companions to, and variations of, the pentagonal numbers theorem. These include some elegant results discovered by Nathan Fine in the 1950s and some new partition theorems due to author that are deduced from partial theta identities of Ramanujan and Andrews. (Received September 17, 2010)