Abstract: Non-Hermitian systems which exhibit both parity (P) and time (T) symmetries (PT-symmetric) have been under serious investigation since the late 1990’s. Although the original intention was to describe a new, fundamental quantum theory, recent work has focused on applications to open systems. With this in view, I will briefly give an introduction to PT-symmetric theory and describe a class of non-Hermitian Hamiltonians which can still have real energy spectra. I will also outline several exciting, ongoing experiments which highlight the strange behavior of these systems. Finally, I will focus on a system of particular interest: the PT-dimer lattice. This system is a coupled chain of 2-state systems each having PT-balanced gain and loss. The dimer system undergoes a quantized transition, and I will focus on how this quantized (topological) transition and the PT-symmetry breaking transition interact, particularly in the presence of nonlinearity. I will also explain how our predictions can be experimentally tested in a loss only dimer lattice.