The dynamics of gene transcription.

Gene transcription is the biological process in which DNA is transcribed to RNA and is central to cellular and organismal biology. A great wealth of knowledge about how it works has been uncovered over the past half century yet much is still not fully understood. Here, I will review some recent theoretical and experimental advances that have allowed us to peer more closely into the detailed molecular mechanisms underlying this marvelously complex process. In particular, I will focus on steroid-regulated gene transcription, which is of great importance for development, growth, homeostasis, and diseases. I will show how a theoretical framework where group theory makes a surprising appearance can reconcile seemingly disparate observations from precise quantitative measurements in multi-cellular experiments and dynamical behavior observed in single-cell and single-molecule imaging experiments. (Received August 16, 2018)