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**Vitaly Bergelson\*** ([vitaly@math.ohio-state.edu](mailto:vitaly@math.ohio-state.edu)), Department of Mathematics, Ohio State University, Columbus, OH 43210. *Ergodic Ramsey Theory: Dynamical Systems at the Service of Combinatorics and Number Theory.*

The lecture will be devoted to the presentation of some of the numerous and multifaceted connections which exist between Dynamics, Combinatorics and Number Theory. We will start with briefly reviewing the classical Poincaré's recurrence theorem which appeared as Theorem I in Poincaré's King Oscar Prize-winning memoir "Sur le probleme des trois corps et les equations de dynamique" (1890). We will move then to the discussion of classical theorems in combinatorics, such as van der Waerden's and Szemerédi's theorems on arithmetic progressions, and describe Furstenberg's dynamical approach to their proofs. Furstenberg's ideas have led to exciting developments and we will discuss some of them, including the polynomial Szemerédi theorem, multiple recurrence theorems for general groups and the role of dynamical systems on nil-manifolds in the study of multiple recurrence. Some of the recent results rely heavily on methods of topological algebra in the Stone-Cech compactifications and we will review some of these methods. We will also discuss the ergodic underpinnings of the spectacular theorem of Green and Tao on arithmetic progressions in primes and its recent polynomial extension by Tao and Ziegler. (Received February 07, 2011)