



Arieh Zaritsky

Ben-Gurion University of the Negev, Israel

Instructive Simulation of the Prokaryotic Cell Cycle at <http://simon.bio.uva.nl/cellcycle/>

Discussing practical challenges encountered in Biochemical and Molecular Engineering requires deep knowledge of the Physiology of the host that is commonly exploited as the 'working horse' in these studies, *Escherichia coli*, which also serves as a model system for other prokaryotes. Coupling between bacterial DNA replication and cell division that includes *temporal* and *spatial* elements has globally been resolved, but details and action mechanisms are still obscure. The time sequence of the Bacterial Cell Division Cycle, termed "The Central Dogma in Bacterial Physiology" (BCD), defines 3 periods between 4 events: *B*, from birth to initiation of DNA replication, *C*, from initiation to termination, and *D*, from termination to the division, analogous respectively to Eukaryotic G_1 , S and G_2 . The values of *C* and *D* are relatively constant (40 & 20 min respectively) in doubling times $\tau < 70$ min at 37°C hence *B* disappears at $\tau < 60$ min. When $\tau < C$, re-initiation precedes termination. BCD's 4th relatively constant parameter is the ratio cell mass / number of chromosome origins (*oriC*) at initiation *M_i*. BCD explains changes in cell size and composition with τ and in mutants, as illustrated by the user-friendly program CCSim at <http://simon.bio.uva.nl/cellcycle/>. These 4 independent parameters (τ , *C*, *D*, *M_i*) are sufficient to describe cells growing under various conditions and during well-defined transitions. CCSim animates a replicating chromosome and growing bacterium. It serves as an educational tool and to compare experimental results with BCD and hence improve our understanding of regulatory mechanisms.

Biography

Arieh Zaritsky has completed his Ph.D. in Leicester University (UK, 1971) and postdoctoral studies in Copenhagen University-Institute of Microbiology (DK). He was the Chairman elect of Ben-Gurion University's Life Sciences Department (1989-91). During his 45-years career, AZ has published over 120 articles and reviewed many manuscripts in Peer-reviewed, reputed periodicals, visited the following Universities: Amsterdam (NL), Yale, Berkeley, Arizona, Florida, Harvard (USA), Wuhan (PRC) and Griffith (Australia), awarded numerous, highly competitive Research Grants and personal Fellowships (from e.g., Burrough- Wellcome, EMBO, UNESCO, WHO, US-AID, BSF), and supervised over 40 graduate students, post-doctoral fellows and established scientists.

ariehzar@gmail.com