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Sommario/riassunto	<p>Bacterial Physiology was inaugurated as a discipline by the seminal research of Maaløe, Schaechter and Kjeldgaard published in 1958. Their work clarified the relationship between cell composition and growth rate and led to unravel the temporal coupling between chromosome replication and the subsequent cell division by Helmstetter et al. a decade later. Now, after half a century this field has become a major research direction that attracts interest of many scientists from different disciplines. The outstanding question how the most basic cellular processes - mass growth, chromosome replication and cell division - are inter-coordinated in both space and time is still unresolved at the molecular level. Several particularly pertinent questions that are intensively studied follow: (a) what is the primary signal to place the Z-ring precisely between the two replicating and segregating nucleoids? (b) Is this coupling related to the structure and position of the nucleoid itself? (c) How does a bacterium determine and maintain its shape and dimensions? Possible answers include gene expression-based mechanisms, self-organization of protein assemblies and physical principles such as micro-phase separations by excluded volume interactions, diffusion ratchets and membrane stress or curvature. The relationships between biochemical reactions and physical forces are yet to be conceived and discovered. This e-book discusses the above mentioned and related questions. The book also serves as an important depository for state-of-the-art technologies,</p>

methods, theoretical simulations and innovative ideas and hypotheses for future testing. Integrating the information gained from various angles will likely help decipher how a relatively simple cell such as a bacterium incorporates its multitude of pathways and processes into a highly efficient self-organized system. The knowledge may be helpful in the ambition to artificially reconstruct a simple living system and to develop new antibacterial drugs.

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