

STRESS AND ENVIRONMENTAL REGULATION OF GENE EXPRESSION AND ADAPTATION IN BACTERIA

VOLUME I

Bacteria in various habitats are subject to continuously changing environmental conditions, such as nutrient deprivation, heat and cold stress, UV radiation, oxidative stress, desiccation, acid stress, nitrosative stress, cell envelope stress, heavy metal exposure, osmotic stress, and others. In order to survive, they have to respond to these conditions by adapting their physiology through sometimes drastic changes in gene expression. In addition, they may adapt by changing their morphology, forming biofilms, fruiting bodies and spores, filaments, or viable but nonculturable (VBNC) cells, or moving away from stress compounds via chemotaxis. Changes in gene expression constitute the main component of the bacterial response to stress and environmental changes, and they involve a myriad of different mechanisms, including (alternative) sigma factors, bi- or tri-component regulatory systems, small noncoding RNAs, chaperones, CRISPR-Cas systems, DNA repair, toxin-antitoxin systems, the stringent response, efflux pumps, alarmones, and modulation of the cell envelope or membranes, to name a few. Many regulatory elements are conserved in different bacteria; however, there are endless variations on the theme, and novel elements of gene regulation in bacteria inhabiting particular environments are constantly being discovered. Especially in (pathogenic) bacteria colonizing the human body, a plethora of bacterial responses to innate stresses such as pH, reactive nitrogen and oxygen species, and antibiotic stress are being described. An attempt is made to not only cover model systems but also give a broad overview of the stress-responsive regulatory systems in a variety of bacteria, including medically important bacteria, where elucidation of certain aspects of these systems could lead to treatment strategies of the pathogens. Many of the regulatory systems being uncovered are specific, but there is also considerable "cross-talk" between different circuits.

Stress and Environmental Regulation of Gene Expression and Adaptation in Bacteria is a comprehensive two-volume work bringing together both review and original research articles on key topics in stress and environmental control of gene expression in bacteria.

Volume One contains overview chapters, as well as content on one-/two-/three-component regulatory systems and stress responses, sigma factors and stress responses, small noncoding RNAs and stress responses, toxin-antitoxin systems and stress responses, the stringent response to stress, responses to UV irradiation, SOS and double-stranded repair systems and stress adaptation to both oxidative and osmotic stress, and desiccation tolerance and drought stress.

Volume Two covers heat shock responses, chaperonins and stress, cold shock responses, adaptation to acid stress, nitrosative stress, and envelope stress, as well as iron homeostasis, metal resistance, quorum sensing, chemotaxis and biofilm formation, and VBNC cells.

- Includes numerous examples of different stress and environmental control mechanisms in a large variety of bacteria.
- Thoroughly compiles chapters dealing with the molecular genetics and "omics" of gene regulation systems in response to stress and varying environmental conditions, and is meant for medical and nonmedical researchers in the field, but also for students.
- Provides a detailed and broad overview of the field, and emphasizes differences and commonalities in different organisms.
- Consists of both reviews and original research chapters authored by leaders in the field.

Covering the full breadth of current stress and environmental control of gene expression studies and expanding it toward future advances in the field, these two volumes are a one-stop reference for (non) medical molecular geneticists interested in gene regulation under stress.

THE EDITOR

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