

Chapter 13.1. Heat shock response in bacteria with large genomes: lessons from rhizobia.

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Abstract

Among bacteria with the largest known genomes, rhizobia have been extensively investigated mainly due to their ability to establish nitrogen-fixing symbioses with legume plants. As free-living bacteria and as plant symbionts, rhizobia are often exposed to environmental stresses. This chapter overviews the current knowledge on rhizobia response to heat shock, particularly at the transcriptional level.

The few studies on rhizobia response to heat shock showed that all replicons are involved and that the expression of more than 30% of the protein-coding genes may be altered. In addition to the expected upregulation of genes already known to be involved in the heat shock response, these reports also showed particular aspects of stress response in these resourceful bacteria, namely the downregulation of a large number of genes. Furthermore, the heat shock response seems to include the overexpression of a large number of genes involved in transcription and carbohydrate transport and metabolism, such as ABC transporter genes. However, additional studies are needed in order to better understand the mechanisms involved in the heat stress response in rhizobia.

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