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Title: The Role of the Epigenome in Gene Expression Control and the Epimark Changes in Response to the Environment
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Source: CRITICAL REVIEWS IN PLANT SCIENCES **Volume:** 33 **Issue:** 1 **Pages:** 64-87 **DOI:** 10.1080/07352689.2014.852920 **Published:** 2014
Times Cited in Web of Science Core Collection: 7
Total Times Cited: 8
Usage Count (Last 180 days): 2
Usage Count (Since 2013): 55
Cited Reference Count: 278

Abstract: Our knowledge base involving the biochemical participants of epigenetic control has expanded greatly over the last decade. The role of epigenetic marks to DNA and histones controlled by non-coding RNAs is one of the most intensely studied areas of biology today. This review covers many of themechanisms that non-coding RNAs and other molecules use to control gene expression and eventually affect responses to the environment. In the first part of the review, we discuss the array of covalent modifications to the genome that constitute the epigenome, which consists of the histone variants, covalent modifications, and post-translational modifications that result in gene expression changes. How the histone variants and post-translationalmodifications including, acetylation, methylation, phosphorylation, ubiquitination and sumoylation help form the epigenome is also summarized. Our eventual understanding of how the environment controls these modifications will open incredible opportunities in agriculture, medicine and the development of practical tools for biology. In the second part of this review we discuss the growing list of environmentally-mediated epigenetic-modifications, and examples of transgenerational epigenetic inheritance events, that may begin to change our views of adaptive responses to the environment and evolution.

Accession Number: WOS:000336836600003
Language: English
Document Type: Review
Author Keywords: Abiotic stress; arabidopsis; environnment; epigenetic; epigenome epimarks
KeyWords Plus: DIRECTED DNA-METHYLATION; FLOWERING-LOCUS-C; RNA-POLYMERASE-IV; DOUBLE-STRANDED-RNA; CHROMATIN-REMODELING GENE; HISTONE H3 METHYLATION; ABIOTIC STRESS RESPONSES; POLYCOMB GROUP PROTEINS; ARABIDOPSIS-THALIANA; ABSCISIC-ACID

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Fac Sci, KAU, Biol Sci Dept	L-4228-2013	

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