

INTRODUCTION.....	1
I.1 Plant hormones.....	3
I.2 Gibberellins.....	3
I.3 Gibberellin metabolism.....	5
I.4 Gibberellin signalling.....	7
I.5 DELLA proteins.....	8
I.6 Gibberellin-induced DELLA degradation.....	10
I.7 Transcriptional regulation by DELLA proteins.....	12
I.8 Bibliography.....	15
 OBJECTIVES.....	 23
 CHAPTER 1: Transcriptional diversification and functional conservation between DELLA proteins in <i>Arabidopsis</i>.....	 25
1.1. Abstract	27
1.2. Introduction.....	28
1.3. Materials and Methods.....	30
1.4. Results and discussion.....	34
1.4.1. Phylogenetic relationships of DELLA proteins in Angiosperms.....	34
1.4.2. Expression of chimeric versions of DELLA genes.....	34
1.4.3. Functional substitution of RGA by RGL2.....	37
1.4.4. Functional substitution of RGL2 by RGA.....	38
1.4.5. Conservation of DELLA protein interactions.....	40
1.5. Bibliography.....	44
 2. CHAPTER 2: Transcriptional regulation by DELLA proteins during etiolated development in <i>Arabidopsis thaliana</i>	 49
2.1. Introduction.....	51
2.2. Results and discussion.....	52
2.2.1. Identification of genes rapidly regulated by GAI in etiolated seedlings.....	52
2.2.2. Comparison of DELLA-regulated genes in different developmental situations....	54

2.2.3. GAI regulates target genes in part through PIFs and HY5 transcription factors.....	54
2.2.4. Promoter analysis of GAI regulated targets suggests new transcription factors mediating DELLAactivity.....	57
2.2.5. Gene ontology analysis of GAI-regulated genes.....	59
2.2.6. Direct regulation of the GA pathway by DELLA proteins.....	60
2.2.7. DELLA proteins mediate direct cross-regulation with auxin and ethylene pathways	61
2.2.8. DELLAs impinge on transcriptional networks.....	63
2.3. Conclusions.....	64
2.4. Materials and Methods.....	65
2.5.Bibliography.....	67

3. CHAPTER 3: A hormonal regulatory module that provides flexibility to tropic responses.....

3.1. Abstract.....	73
3.2. Introduction.....	74
3.3. Results.....	75
3.3.1. Gibberellin deficiency enhances gravitropic reorientation.....	75
3.3.2. Expression of <i>IAA19/MSG2</i> is repressed by DELLA proteins.....	75
3.3.3. Physiological relevance of the regulation of gravitropism by gibberellins.....	80
3.4. Discussion.....	81
3.5. Materials and Methods.....	84
3.6. Bibliography.....	86

4. CHAPTER 4: Hierarchy of hormone action controlling apical hook

development in <i>Arabidopsis</i>.....	91
4.1. Abstract.....	93
4.2. Introduction.....	94
4.3. Results.....	95
4.3.1. Dynamics of GA-regulated apical hook development.....	95
4.3.2. GA control on hook development is dependent and independent upon ethylene activity.....	96

4.3.3. The expression of <i>ACS5/ETO2</i> , <i>ACS8</i> , and <i>HLS1</i> genes is regulated by the GA pathway.....	98
4.3.4. GA-regulation of <i>ACS5/ETO2</i> and <i>ACS8</i> gene expression depends on the phase of hook development	99
4.3.5. GAs support ethylene production in etiolated seedling.....	99
4.3.6. GAs regulate partly hook development by modulating PIF activity.....	101
4.3.7. <i>HLS1</i> activity mediates GA effect on hook development.....	102
4.3.8. GAs are needed to sustain differential auxin response during apical hook development.....	103
4.3.9. GAs participate in maintaining <i>PIN3</i> and <i>PIN7</i> expression in the apical hook.....	105
4.3.10. GA activity in the endodermis is required for apical hook development.....	107
4.4. Discussion.....	110
4.4.1. GAs regulate hook formation independently of ethylene activity.....	110
4.4.2. GAs prevent hook opening in cooperation with the ethylene pathway.....	111
4.4.3. GAs regulate hook development by transcriptional regulation of auxin and ethylene pathways.....	111
4.5. Experimental procedures.....	114
4.6. Bibliography.....	117
4.7. Supporting figures.....	122
GENERAL DISCUSSION.....	125
D.1. Contribution of gibberellins to plant plasticity resides partially on DELLA protein subfunctionalization.....	127
D.2. Regulation of transcriptional networks as a mechanism to improve plastic development.....	128
D.3. DELLA co-expressed as a source of new interactors.....	131
D.4. Gibberellin modulation of differential growth processes.....	133
D.5. Future perspectives.....	135
D.6. Bibliography	137
CONCLUSIONS.....	139

