

Cambridge University Press 978-1-108-83693-7 — Understanding Evo-Devo Wallace Arthur Table of Contents More Information

## **Contents**

	Foreword	page xiii
	Preface	XV
	Acknowledgements	xix
1	What is Evo-Devo and Why is it Important?	1
	What is Evo-Devo?	1
	Origins of Evo-Devo: the Homeobox	6
	Origins of Evo-Devo: Other Factors	10
	Evo-Devo and Darwinism	12
	The Importance of Evo-Devo	15
2	Antecedents of Evo-Devo	19
	Quasi-Distinct Stretches of Time	19
	Nineteenth-Century Comparative Embryology	20
	From Haeckel to Homeobox	25
	Take-Home Messages From History	32
3	Evolutionary and Developmental Essentials	37
	Evolutionary Pattern	37
	Evolutionary Process	41
	Development in the Context of Life Cycles	46
	Model Organisms	49
	The Nature of the Developmental Process	51



Cambridge University Press 978-1-108-83693-7 — Understanding Evo-Devo Wallace Arthur Table of Contents More Information

## x CONTENTS

4	Evo-Devo Essentials	58
	Developmental Repatterning	58
	Developmental Constraint, Bias, or Channelling	60
	Modularity and Evolvability	63
	The Evo-Devo Hourglass	65
	Body Plans and Evolutionary Novelties	67
	Genes for Building Bodies	70
5	The Evolution of Variations on a Theme	74
	Levels of Evolutionary Change	74
	Developmental Variation	76
	Artificial Selection and Developmental Bias	83
	Phenotypic Plasticity and Developmental Bias	85
	Natural Selection and Genetic Drift	88
	Natural Selection and Developmental Bias	91
6	The Evolutionary Origins of Themes and Novelties	96
	Developmental Bias versus Macromutation	96
	Evolution of Reversed Asymmetry	98
	The Nature of Novelty	103
	Type I Novelty: the Turtle's Shell	105
	Type II Novelty: the Centipede's Venom Claws	108
	From Case Studies to Generalizations	111
7	The Evolutionary Origins of Body Plans	114
	The Pattern of Animal Relatedness	114
	The Timescale of Body-Plan Origins	11 <i>7</i>
	Mechanisms of Body-Plan Origins	121
	Genes and Body-Plan Origins	129
8	Body-Plan Features and Toolkit Genes	131
	Homologous versus Convergent Features	131
	Genes and Generality	134
	Segments, Notch Signalling, and Hox Genes	137
	Limbs, distal-less, and Dlx Genes	139
	Eyes, eyeless, and Pax Genes	141
	Gene Co-option in Evolution	144



Cambridge University Press 978-1-108-83693-7 — Understanding Evo-Devo Wallace Arthur Table of Contents More Information

		CONTENTS	Χİ
9	Bringing It All Together	14	9
	A Combined View of Development	14	19
	Towards a More Comprehensive Evolutionary Synthesis	15	0
	Variation and its Interaction with Selection	15	3
	Developmental Repatterning	15	6
	Developmental Bias and the Direction of Evolution	15	8
	The Origins of Novelties and Body Plans	16	0
	The Pattern of Occupation of Morphospace	16	3
	Concluding Remarks	16	6
	Summary of Common Misunderstandings	16	9
	References	17	73
	Figure Credits	18	32
	Index	18	3