

Contents

	<i>Foreword by Jonathan Bard</i>	page xi
	<i>Preface</i>	xiii
Part I	Frogs	1
1	The Introspective Frog	3
	GP-1: Inductive signaling can enhance precision	4
	<i>GP-1 tangent: Bract induction</i>	5
	GP-2: Embryos tend to build anatomy by origami	10
	<i>GP-2 tangent: Imaginal discs</i>	13
2	Two-Headed Tadpoles	17
	GP-3: Cartesian axes are established sequentially	17
	<i>GP-3 tangent: The twisted maggot</i>	21
	GP-4: Organs adjust robustly if anatomy changes	23
	<i>GP-4 tangent: The three-eyed frog</i>	26
3	Extra-Legged Frogs	29
	GP-5: Cells obey local rules with no global blueprint	30
	<i>GP-5 tangent: Secondary mirror planes</i>	33
	GP-6: Organs assign cellular positions along axes	37
	<i>GP-6 tangent: Extra-legged flies</i>	40
Part II	Flies	51
4	The Double-Jointed Fly	53
	GP-7: The PCP pathway governs cell orientations	54
	<i>GP-7 tangent: The fly eye</i>	57
	GP-8: The Notch pathway defines regional boundaries	58
	<i>GP-8 tangent: The fly wing</i>	62

viii	Contents	
5	The Four-Winged Fly	65
	GP-9: Homologous organs diverge via a few key genes	66
	<i>GP-9 tangent: The fly foreleg</i>	69
	GP-10: Hox genes encode regional identities along axes	71
	<i>GP-10 tangent: The frog leg</i>	75
6	The Naked Fly	81
	GP-11: Body areas are specified by <i>cis</i> -enhancers	82
	<i>GP-11 tangent: The naked ape</i>	84
	GP-12: The Notch pathway enforces binary decisions	94
	<i>GP-12 tangent: The bristle</i>	97
Part III	Dogs	105
7	The Shar-Pei	107
	GP-13: Patterns can emerge from physical forces	109
	<i>GP-13 tangent: Fingerprints</i>	113
	GP-14: Uneven growth rates can foster shape changes	117
	<i>GP-14 tangent: The human brain</i>	120
8	The Bully Whippet	125
	GP-15: The Hippo pathway controls organ growth	129
	<i>GP-15 tangent: The mammalian liver</i>	129
	GP-16: The insulin pathway nurtures sexual frills	130
	<i>GP-16 tangent: Deer antlers</i>	131
9	The Great Pyrenees	133
	GP-17: Anatomy can be influenced by body size	136
	<i>GP-17 tangent: Fly bristle patterns</i>	137
	GP-18: The Hedgehog pathway controls digit number	139
	<i>GP-18 tangent: Mice with thirteen toes per foot</i>	140
Part IV	Cats	149
10	The Blotched Tabby	151
	GP-19: Mammal coat patterns use Turing-like devices	153
	<i>GP-19 tangent: The spotted zebra</i>	155
	GP-20: Turing-like devices have a fixed wavelength	155
	<i>GP-20 tangent: The angelfish</i>	163

11	The Siamese Cat	165
	GP-21: Temperature acts as a toggle in some species	167
	<i>GP-21 tangent: Turtle sex</i>	168
	GP-22: Other external factors can dictate embryo fate	168
	<i>GP-22 tangent: Killer tadpoles</i>	169
12	The Calico Cat	173
	GP-23: Cells sometimes “flip a coin” to chart their fate	174
	<i>GP-23 tangent: Other ways that cells gamble</i>	174
	GP-24: Gynandromorphs are a weird kind of mosaic	174
	<i>GP-24 tangent: Mosaic mapping methodology</i>	178
	<i>Epilogue</i>	185
	<i>References</i>	187
	<i>Index</i>	261

Color plates can be found between pages 138 and 139.