

## *Contents*

<i>Preface</i>	<i>page</i> xiii
<b>1 Introduction</b>	<b>1</b>
1.1 Phylogenetics and human origins	1
1.2 Origin of modern humans	7
1.3 Computer methods in phylogenetics	11
<b>Part I Simulating species</b>	<b>15</b>
<b>2 Overview</b>	<b>17</b>
2.1 Hominoids	20
2.2 Hominids	22
<b>3 Simulation design</b>	<b>26</b>
3.1 Phylogenetic reconstruction	29
3.2 Example simulation and reconstruction	33
3.3 Analysis and evaluation	38
<b>4 Running the simulation</b>	<b>42</b>
4.1 A simple example	42
4.2 Migration	46
4.3 Advanced features	52
<b>5 Simulating diversity</b>	<b>56</b>
5.1 Recent reduction in diversity profiles	57
5.2 Recent maximum of diversity profiles	69
5.3 Studying parameter sensitivity	74
<b>6 Simulating migration</b>	<b>84</b>
6.1 Species migration with an amphora profile	84
6.2 Simulating hominoid migrations	91

x	<i>Contents</i>	
	6.3 Restricted migrations and interbreeding	95
	6.4 Unrestricted migration with advantage	113
<b>7</b>	<b>Discussion</b>	<b>118</b>
	7.1 Single-continent summary	118
	7.2 Migration summary	122
	7.3 Implications	126
	7.4 Future work	128
	<b>Part II Simulating genealogies</b>	<b>131</b>
<b>8</b>	<b>Overview</b>	<b>133</b>
	8.1 Coalescent theory	134
	8.2 The historical human population	139
	8.3 Human mating patterns and fertility	141
	8.4 Coalescence and biological ancestry	143
<b>9</b>	<b>Simulation design</b>	<b>151</b>
	9.1 Parameters	152
	9.2 Simulating and analysing a genealogy	153
	9.3 Output data and visualisation	155
<b>10</b>	<b>Simulating a single population</b>	<b>162</b>
	10.1 Constant demographics	162
	10.2 Varying demographics	<b>174</b>
<b>11</b>	<b>Simulating multiple populations</b>	<b>186</b>
	11.1 Sample simulation with regular migrations	186
	11.2 Simulations with restricted migrations	191
<b>12</b>	<b>Adding genetics to the genealogy</b>	<b>201</b>
	12.1 Modelling genetics with coalescent theory	201
	12.2 Genetics models in the simulation	209
	12.3 Sex-specific migrations and selection	211
<b>13</b>	<b>Discussion</b>	<b>220</b>
	13.1 Single-population summary	220
	13.2 Migration summary	223

<i>Contents</i>	xi
13.3 Genetics summary	225
13.4 Implications for modern human origins	225
13.5 Future work	228
<i>References</i>	231
<i>Index</i>	239