

# Contents

|                                                       |            |
|-------------------------------------------------------|------------|
| Preface                                               | vii        |
| Acknowledgements                                      | xiii       |
| Biography                                             | xv         |
| <br>                                                  |            |
| <b>1. Evolution</b>                                   | <b>1</b>   |
| <b>2. Natural Selection</b>                           | <b>9</b>   |
| <b>3. Adaptation</b>                                  | <b>23</b>  |
| <b>4. Competition</b>                                 | <b>31</b>  |
| <b>5. Genetics Basics &amp; Mutations</b>             | <b>39</b>  |
| Mutations                                             | 42         |
| Point Mutations                                       | 43         |
| Chromosomal Mutations                                 | 45         |
| Mutations from Transposable Elements                  | 48         |
| Epigenetics                                           | 49         |
| <b>6. Transposable Elements, Viruses, and Genomes</b> | <b>55</b>  |
| <b>7. Horizontal Gene Transfer</b>                    | <b>61</b>  |
| <b>8. Neutral Evolution</b>                           | <b>69</b>  |
| The Redundant Genetic Code                            | 70         |
| Neutral Nonsilent Mutations                           | 72         |
| Mutations in Introns                                  | 74         |
| Mutations in Other Noncoding DNA                      | 75         |
| Some Chromosomal Mutations Can Be Neutral             | 76         |
| <b>9. Genetic Drift</b>                               | <b>79</b>  |
| <b>10. Environment</b>                                | <b>85</b>  |
| <b>11. Development</b>                                | <b>93</b>  |
| <b>12. Symbiosis</b>                                  | <b>101</b> |
| <b>13. Speciation</b>                                 | <b>111</b> |
| Allopatric Speciation                                 | 112        |
| Sympatric Speciation                                  | 116        |
| Parapatric Speciation                                 | 118        |
| Speciation by Polyploidy                              | 119        |
| Speciation without Cladogenesis                       | 120        |

|                                               |     |
|-----------------------------------------------|-----|
| 14. Micro- and Macroevolution                 | 123 |
| 15. Homology                                  | 129 |
| 16. Imperfection                              | 137 |
| 17. The Fossil Record and the History of Life | 145 |
| 18. Contingency and Evolution                 | 151 |
| 19. Opportunity                               | 159 |
| 20. Phylogeny—The Tree of Life                | 165 |
| 21. Progress—Purpose?                         | 171 |

|            |     |
|------------|-----|
| References | 177 |
| Appendix 1 | 179 |
| Appendix 2 | 185 |
| Index      | 189 |