## Contents

|    | ***11 | at Call De Dolle.                          |     |    |
|----|-------|--|-----|----|
|    | 1.    | The Extinction of Family Lines, 1          |     |    |
|    | 2.    | A Probabilistic Construction, 4            |     |    |
|    | 3.    | Asymptotic Behavior, 7                     |     |    |
|    | 4.    | Nonexistence of Consistent Estimators, 15  |     |    |
|    | 5.    | Consistently Estimable Functionals, 18     |     |    |
|    | 6.    | Other Sampling Schemes, 23                 |     |    |
|    | 7.    | Sources, 26                                |     |    |
|    |       | Exercises, 26                              | 4   |    |
|    |       |  |     |    |
| 2. | Esti  | imating the Offspring Mean                 |     | 30 |
|    | 1.    | An Example, 30                             |     |    |
|    | 2.    | Method of Moment Estimators, 33            |     |    |
|    | 3.    | Conditional Least Squares, 40              |     |    |
|    | 4.    | Maximum Likelihood Estimators, 41          |     |    |
|    | 5.    | Consistency, 48                            |     |    |
|    | 6.    | Asymptotic Distributions, 53               |     |    |
|    | 7.    | Efficiency and Exponential Families, 65    |     |    |
|    | 8.    | Extreme Point Models, 80                   |     |    |
|    | 9.    | Ancillarity, 84                            | 430 |    |
|    | 10.   | Asymptotic Testing, 90                     |     |    |
|    | 11.   | Randomly Sampled Family Sizes, 97          |     |    |
|    | 12.   | Inference Conditional upon Extinction, 100 |     |    |
|    | 13.   | Sources, 102                               |     |    |
|    |       | Exercises, 103                             |     |    |
|    |       |  |     |    |

| 3.  | Es   | timating Other Functionals                                      | 107 |
|-----|--|---|-----|
|     | 1.   | The Offspring Variance, 107                                     |     |
|     | 2.   | Estimating the Lattice, 113                                     |     |
|     | 3.   | The Offspring Distribution, 116                                 |     |
|     | 4.   | Maximum Likelihood Estimation of the Offspring<br>Variance, 121 |     |
|     | 5.   | The Age, 124  |     |
|     | 6.   | The Extinction Probability, 128                                 |     |
|     | 7.   | Sources, 136  |     |
|     |  | Exercises, 137  |     |
| 4.  | Ba   | yes Methods   | 140 |
|     | 1.   | Introduction, 140   |     |
|     | 2.   | Parametric Models, 144  |     |
|     | 3.   | Approximating the Posterior Density, 150                        |     |
|     | 4.   | A Nonparametric Model, 157                                      |     |
|     | 5.   | Sources, 161  |     |
|     |  | Exercises, 162  |     |
| 5.  | Some Variants on the BGW Branching Process |   |     |
|     | 1.   | A Branching Process with Immigration, 164                       |     |
|     | 2.   | Branching Processes with Varying Environment, 173               |     |
|     | 3.   | Branching Processes with Continuous State Space, 177            |     |
|     | 4.   | Multitype Processes, 181  |     |
|     | 5.   | Sources, 186  |     |
|     |  | Exercises, 187  |     |
| Ap  | Appendix. Some Data Sets                   |   |     |
| Ref | erer                                       | ices  | 195 |
| Aut | hor  | Index   | 205 |
| Sub | ject                                       | Index   | 209 |