Volume 2: Evolution and Selection of Quantitative Traits

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Volume 2 is now of sufficient length that it will be published as two separate works. pdf of draft for Chapter 2.

- Evolution and Selection of Quantitative Traits: I. Foundations. This is 95 percent done (roughly 1300 typeset pages), with a target publication date of late fall 2015.
- Evolution and Selection of Quantitative Traits: II. Advanced Topics in Breeding and Evolution.

Draft versions for essentially all of the chapters in Foundations, and many of the chapters in Advanced Topics are given below. The page numbers between chapters are rather random at the moment, and some are still a bit unpolished in terms of linking material across chapters together. *Preliminary* drafts are also posted for a few chapters. These are much rougher but give an idea of the basic topics to be covered.

With these caveats in mind, please feel free to use these for courses, etc. **We simply request your feedback. Please let us know of any errors, omissions, interesting/important papers we missed, etc. Contact us at** jbwalsh@u.arizona.edu **. Don't be bashful about your own work!** Once the book does indeed appear, these drafts will be removed from the website.

Note that the chapter numbers listed here reflect the current status of the book, and the actual chapter numbers used in the drafts may differ from these as they may predate some of these changes.

Finally, plesae note that these chapters are copyrighted.

Updates

- Currently updated to 30 December 2014

Evolution and Selection of Quantitative Traits: I. Foundations

Total lenght is around 1300 pages. NOTE: Chapters have been reordered several times, so the posted pdf version may have a different chapter number than that listed here.

0. Table of Contents

- pdf file of **Detailed Table of Contents** (version 30 December 2014). Still very rough for Chapter 27 (the remaining unwritten chapter). Also, page numbering between chapters is essentially random at this point.

I. Introduction

- 1. Changes in quantitative characters over time

II. Evolution At One And Two Loci

- 2. Neutral Evolution In One- And Two-Locus Systems

  pdf of draft for **Chapter 2**. Version: 19 May 2014. 46 pages.

- 3. The Genetic Effective Size Of A Population

  pdf of draft for **Chapter 3**. Version: 19 May 2014. 31 pages.

- 4. The Nonadaptive Forces Of Evolution

  pdf of draft for **Chapter 4**. Version: 30 May 2014. 48 pages.

- 5. The Population Genetics of Selection

pdf of draft for [Chapter 5](). **Version: 22 March 2014.** 35 pages.

- **6. Theorems of Natural Selection: Results of Price, Fisher, and Robertson**

  pdf of draft for [Chapter 6](). **Version: 9 March 2013.** 34 pages.

- **7. Interaction of Selection, Mutation, and Drift**

  pdf of draft for [Chapter 7](). **Version: 9 March 2013.** 45 pages.

- **8. Hitchhiking and Selective Sweeps**

  pdf of draft for [Chapter 8](). **Version: 10 April 2014.** 58 pages.

- **9. Using Molecular Data To Detect Selection: Signatures from Recent Single Events**

  pdf of draft for [Chapter 9](). **Version: 12 April 2014.** 75 pages.

- **10. Using Molecular Data To Detect Selection: Signatures from Multiple Historical Events**

  pdf of draft for [Chapter 10](). **Version: 11 April 2014.** 52 pages.

III. Drift and Quantitative Traits

- **11 Changes in Genetic Variance Induced by Random Genetic Drift**

  pdf of partial mdraft for [Chapter 11](). **Version: 12 September 2008.** 40 pages.

- **12. The Neutral Divergence of Quantitative Traits**

  pdf of partial draft for [Chapter 12](). **Version: 3 November 2011** 31 pages.

IV. Short-Term Response On A Single Character

- **13. Short-Term Changes In The Mean: 1. The Breeders' Equation**

pdf of draft for [Chapter 13](). Version: 29 May 2013. 26 pages.

- 14. Short-Term Changes In The Mean: 2. Truncation and Threshold Selection

  pdf of draft for [Chapter 14](). Version: 29 May 2013. 18 pages.

- 15. Short-Term Changes In The Mean: 3. Permanent Versus Transient Response

  pdf of draft for [Chapter 15](). Version: 12 June 2013. 26 pages.

- 16. Short-Term Changes In The Variance. 1. Changes in the Additive Variance

  pdf of draft for [Chapter 16](). Version: 12 June 2013. 26 pages.

- 17. Short-Term Changes In The Variance. 2. Changes in the Environmental Variance

  pdf of draft for [Chapter 17](). Version: 13 June 2013. 18 pages.

- 18. Least Squares Analysis Of Short-Term Selection Experiments

  pdf of draft for [Chapter 18](). Version: 20 June 2013. 44 pages.

- 19. Mixed-Model And Bayesian Analysis Of Selection Experiments

  pdf of draft for [Chapter 19](). Version: 24 June 2013. 43 pages.

- 20. Environmental Effects and the Response in Natural Populations

  pdf of draft for [Chapter 20](). Version: 27 June 2013. 46 pages.

V. Response in Structured Populations

- 21. Family-Based Selection

  pdf of draft for [Chapter 21](). Version: 11 May 2013. 50 pages.

- 22. Associative Effects, Competition, Group And Kin Selection

  pdf of draft for [Chapter 22](). Version: 7 Feb. 2011. 60 pages.

- 23 Selection Under Inbreeding

  pdf of draft for [Chapter 23](). Version: 26 May 2013. 36 pages.

VI. Population-Genetic Models of Trait Response

- 24. The Infinitesimal Model and its extensions

  pdf of draft for [Chapter 24](). Version: 30 April 2014, 36 pages.

- 25. Long-Term Response: Deterministic Aspects

  pdf of draft for [Chapter 25](). Version: 26 May 2014. 343 pages.

- 26. Long-Term Response: Finite Populations

  pdf of draft for [Chapter 26](). Version: 11 August 2014. 63 pages.

- 27. Maintenance Of Quantitative Genetic Variability

  pdf of partial draft for [Chapter 27](). Version: 30 December 2014. 67 pages.

VII. Measuring Selection

- 28. Individual Fitness And The Measurement Of Univariate Selection

  pdf of draft for [Chapter 28](). Version: 14 November 2008. 40 pages.

- 29. Measuring Multivariate Selection

  pdf of draft for [Chapter 29](). Version: 20 September 2010. 44 pages.

VIII. Appendices

- **A1. Diffusion Theory**

  pdf of draft for [Appendix 1](#). **Version: 18 March 2014.** 20 pages.

- **A2. Introduction To Bayesian Statistics**

  pdf of draft for [Appendix 2](#). **Version: 18 April 2014.** 21 pages.

- **A3. MCMC Methods And Bayesian Analysis**

  pdf of draft for [Appendix 3](#). **Version: 21 April 2014.** 24 pages.

- **A4. Multiple comparisons: Bonferroni Corrections and False Discovery Rates**

  pdf of draft for [Appendix 4](#). **Version: 26 March 2014.** 22 pages.

- **A5. The Geometry Of Vectors And Matrices: Eigenvalues And Eigenvectors**

  pdf of draft for [Appendix 5](#). **Version: 25 March 2014.** 19 pages.

Evolution and Selection of Quantitative Traits: II. Advanced Topics in Breeding and Evolution

0. Table of Contents

- pdf file of [Detailed Table of Contents](#) (version 5 April 2013, 8 pages). Still very rough for unfinished/not yet written chapters. Also, page numbering between chapters is essentially random.

IX. Short-Term Response On A Single Character: Advanced Topics

- 30. Selection And Development Of Pure Lines

  pdf of *Preliminary* draft for [Chapter 30](#). **Version: 27 May 2013.** 44 pages.

- 31. Selection And Crossbreeding I. Basic Concepts

  pdf of *Preliminary* draft for [Chapter 31](). **Version: 26 June 2014.** 42 pages.

- 32. Selection And Crossbreeding II. Advanced Topics

  pdf of *VERY rough preliminary* draft for [Chapter 32](). **Version: 26 June 2014.** 32 pages.

- 33. Selection In Age-Structured Populations

  pdf of *VERY rough preliminary* draft for [Chapter 33](). **Version: 26 June 2014.** 9 pages.

X. Selection On Multiple Characters : Theory

- 34. Multivariate Response: Changes In Means

  pdf of draft for [Chapter 34](). **Version: 26 June 2014.** 44 pages.

- 35. Multivariate Response: Changes In Covariances

  pdf of draft for [Chapter 35](). **Version: 26 June 2014.** 43 pages.

- 36. Comparisons of G and its Stability

  pdf of draft for [Chapter 36](). **Version: 26 June 2014.** 47 pages.

- 37. Theory Of Index Selection

  pdf of draft for [Chapter 37](). **Version: 26 June 2014.** 54 pages.

XI. Selection On Multiple Characters : Applications

- 38. Applications of Index Selection

  pdf of draft for [Chapter 38](). **Version: 26 June 2014.** 54 pages.

- 39. BLUP Selection

- ### 40. Marker-Assisted and Genomic Selection

- ### 41. Multiple-Trait Models of Maternal and Associate Effects

- ### 42. Phenotypic Evolution Models

XII. Selection and G x E

- ### 43. Selection and G x E: Introduction

  pdf of draft for [Chapter 43](). **Version: 26 June 2014.** 28 pages.

- ### 44. Selection and G x E: Advanced Topics

  pdf of draft for [Chapter 44](). **Version: 26 June 2014.** 58 pages.

XIII. Quantitative Genetics Of Continuous Functions

- ### 45. Random Regressions And Infinite-Dimensional Trait

XI. Appendices

- ### A6. Derivatives of Vectors and Vector-valued Functions

  pdf of draft for [Appendix 6](). **Version: 25 March 2014.** 10 pages.

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