

## EVOLUTION

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	<b>ISBN:</b>	9781605351155
	<b>Páginas:</b>	656
	<b>Año:</b>	2013
	<b>Edición:</b>	3
	<b>Idioma:</b>	Ingles
	<b>Disponible:</b>	De 7 a 10 Días
<b>Precio:</b>	<del>72.79</del> 69.15	Iva no incluido

### DESCRIPTION:

Published in March 2013, Evolution, Third Edition is a comprehensive treatment of contemporary evolutionary biology that is directed toward an undergraduate audience. It addresses major themes including the history of evolution, evolutionary processes, adaptation, and evolution as an explanatory framework at levels of biological organization ranging from genomes to ecological communities. Throughout, the text emphasizes the interplay between theory and empirical tests of hypotheses, thus acquainting students with the process of science. Teachers and students will find the list of important concepts and terms in each chapter a helpful guide, and will appreciate the dynamic figures and lively photographs. The content of all chapters has been updated.

### New in This Edition:

- Greatly revised treatment of methods of phylogenetic analysis
- Up-to-date coverage of human evolution, based on the fossil record and genomic variation
- Reorganized treatment of the history of changes in biological diversity, integrating information from paleontology and phylogenetics
- Coverage of important new developments in sexual selection and the evolutionary advantage of sex
- Updated and expanded coverage of reinforcement in speciation, and of speciation with gene flow
- Extensive updating of very recent advances in evolutionary genomics
- Roughly 25% of the figures are new
- The bibliography includes 460 new citations (of approximately 1,700)

### CONTENTS:

#### 1. Evolutionary Biology

Added example of hypothetico-deductive method (prediction and verification) in evolutionary biology

#### 2. The Tree of Life: Classification and Phylogeny

Revised, updated discussion of statistical methods of phylogenetic analysis

New box describing additional phylogenetic methods

Updated discussion of incomplete lineage sorting

New section on applications and extensions of phylogenetics

#### 3. Patterns of Evolution

New material on molecular convergence

Updated discussion of comparative genome sizes and numbers of genes in genome

#### 4. Evolution in the Fossil Record

Updated material on feathered dinosaurs and the origin of birds

Updated information about the Hominin fossil record, new genomic data, and human origins

#### 5. A History of Life on Earth

Updated references and information on (among other things):

The origin of life/earliest life

Laboratory evolution of RNA mixtures

The evolution of multicellularity

Comparative genetics of choanoflagellates and animals

Age of animal phyla

The evolution of angiosperms

Phylogeny of vertebrate groups

Early mammalian diversity

Causes of Pleistocene megafaunal extinction

#### 6. The Geography of Evolution

A description of new methods of historical biogeographic analysis

Updated discussion of historical biogeography in Hawaii and Southern hemisphere

New material on the spread of Homo sapiens beyond Africa (including admixture of Neanderthal and Denisovan genes)

#### 7. The Evolution of Biodiversity

Extensive reorganization and better integration of topics  
Improved integration of paleontological and phylogenetic approaches to estimating clade diversity through time  
Updated material on patterns of temporal change in clade diversity

Updated discussion of diversity-dependent diversification

New section on why some kinds of organisms are more diverse

Updated and expanded section on adaptive radiation

## **8. The Origin of Genetic Variation**

Updated discussion of effects of regulatory mutations

New material on molecular causes of pleiotropy

Updated material on fitness effects of mutation in noncoding regions of the genome, and on the frequency of neutral and nonneutral mutations

New description of epistatic mutations

## **9. Variation: The Foundation of Evolution**

New section on nongenetic inherited variation

Recast material on linkage disequilibrium

Updated references on patterns of human genetic variation, in relation to notions of "race"

## **10. Genetic Drift: Evolution at Random**

Expanded introduction to random processes in evolution

Updated material on reduced variation caused by population bottlenecks

McDonald-Kreitman test for selection moved to Chapter 12

New, updated section on molecular clocks

Rewritten and updated material on the origin of modern Homo sapiens, human effective population size, and genetic correlates of explosive population growth

## **11. Natural Selection and Adaptation**

Added discussion of selection sorting in both time and space

New material on effective environment depending on species

Expanded treatment of testing hypotheses of adaptation by experiments

Material on adaptive evolution moved to this chapter and expanded

New section on adaptation to global warming

## **12. The Genetic Theory of Natural Selection**

Updated examples of gene flow vs. selection, the effect of gene flow on local adaptation, and frequency-dependent selection

Updated treatment of a classic example: industrial melanism in the peppered moth

New material on detecting selection from geographic variation

Expanded treatment of tests and evidence for selection in DNA sequence data

Updated treatment of selection in the human genome

New section dealing with adaptation based on new vs. standing variation

## **13. Phenotypic Evolution**

Substantial rewriting and shortening of some sections

Updated material on QTL for human traits

New treatment of directional selection in contemporary human populations

New treatment of evolution of phenotypic plasticity

Updates on genetic constraints, modularity, and evolution of pleiotropy

New section on whether adaptation can rescue species from extinction

## **14. The Evolution of Life Histories**

Rewritten section on age schedules of reproduction

Section on "Life Histories and Mating Strategies" moved to this chapter from Chapter 15

## **15. Sex and Reproductive Success**

Updated material on the costs of sex, clonal interference, sex and parasites

Treatment of the newest models of the advantage of sex and recombination (separating advantageous alleles from disadvantageous alleles elsewhere in the genome)

Reorganized material on the evolution of mate choice

New sections on reversed and mutual sexual selection, and on the effects of sexual selection on adaptation

Updated treatment of sexual conflict

## **16. Conflict and Cooperation**

Reorganized discussion of social interactions and cooperation

Expanded material on the direct benefits of cooperation

New section on the evolution of spite

Updated and reorganized sections on social insects and on kin selection vs. group selection

Expanded treatment of evolutionary approaches to human behavior

## **17. Species**

Expanded treatment of phylogenetic species concepts

Updated discussion of ecological isolation, hybrid inviability, and the genetics of behavioral isolation

Expanded treatment of genetic incompatibility based on duplicate genes

Revised section on genetic divergence and exchange

## **18. Speciation**

Expanded section on evidence for allopatric speciation

Updated discussion of ecological speciation

Revised material on reinforcement of reproductive isolation

Expanded treatments of sexual selection and speciation and of peripatric speciation

Revised section on sympatric speciation new material on genomic studies of speciation with gene flow

## **19. The Evolution of Interactions among Species**

Revised section on aposematism and mimicry

Expanded and reorganized section on parasite-host interactions and infectious disease (includes updated treatment of the evolution of virulence, the molecular basis of host resistance, and evolution and epidemics)

Revised material on evolution of competitive interactions

New section on evolution and community structure

## **20. Evolution of Genes and Genomes**

Contributed by Scott V. Edwards

New section on diverse players and processes in genomes

New information on the fraction of the genome that is functional

Updated discussion of nonadaptive processes in genome evolution

Discussion of developmental processes and rates of protein evolution

Updated treatment of the role of noncoding regions in the evolution of humans

Discussion of what newly sequenced genomes reveal about major events in the history of life

Revised material on molecular convergence as evidence for natural selection

## **21. Evolution and Development**

Contributed by John R. True

Updated coverage of the evolutionary developmental biology of flower development

New material on the evolutionary developmental biology of flower symmetry

Updated section on genome-level and pathway perspectives of developmental evolution

Updated discussions of protein sequence changes in regulatory and morphological evolution

New perspectives on macroevolution and the role of developmental arrest in morphological evolution

New material on the integration of ecological developmental biology

## **22. Macroevolution: Evolution above the Species Level**

Updated treatment of stasis, gradualism and saltation, and the evolution of complex characteristics

New material on developmental biology and complexity

Revised section on evolvability

New section on predictability and contingency in evolution

## **23. Evolutionary Science, Creationism, and Society**

Updated discussion of evolution in relation to health and medicine

New material on evolutionary approaches to pest management

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