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Soggetti	Evolution (Biology) Information theory in biology Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
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Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Contents; Preface; 1. PIONEERS OF EVOLUTIONARY THOUGHT; Aristotle; Averroes; The mystery of fossils; Condorcet; Linnaeus; Erasmus Darwin; Lamarck; The debates between Cuvier and Geoffroy St. Hilaire; Suggestions for further reading; 2. CHARLES DARWIN'S LIFE AND WORK; Family background and early life; Aboard the Beagle; Work in London and Down; The Origin of Species; The Descent of Man; The Expression of Emotions in Man and Animals ethology; Suggestions for further reading; 3. MOLECULAR BIOLOGY AND EVOLUTION; Classical genetics; The structure of DNA; Protein structure; RNA and ribosomes The genetic codeGenetic engineering; The Polymerase Chain Reaction; Theories of chemical evolution towards the origin of life; Molecular evidence establishing family trees in evolution; Symbiosis; Suggestions for further reading; 4. STATISTICAL MECHANICS AND INFORMATION; The second law of thermodynamics; Maxwell's demon; Statistical mechanics; Information theory Shannon's formula; Entropy expressed as missing information; Cybernetic information compared with thermodynamic information; The information content of Gibbs free energy; What is life?; Suggestions for further reading 5. INFORMATION FLOW IN BIOLOGYCybernetic (or semiotic) information

codes and languages; The language of molecular complementarity; The flow of information between and within cells; Nervous systems; Animal languages; Suggestions for further reading; 6. CULTURAL EVOLUTION AND INFORMATION; The coevolution of human language, culture, and intelligence; Y-chromosomal DNA and mitochondrial DNA; Mitochondrial Eve and Y-Chromosomal Adam; Exodus: Out of Africa; Acceleration of human cultural evolution; Early forms of writing; The invention of paper, ink, and printing; The information explosion Information-driven human cultural evolution as part of biological evolution Suggestions for further reading; 7. INFORMATION TECHNOLOGY; The first computers; Electronic digital computers; Cybernetics; Microelectronics; The history of the Internet and World Wide Web; Self-reinforcing information accumulation; Suggestions for further reading; 8. BIO- INFORMATION TECHNOLOGY; The merging of information technology and biotechnology; Self-assembly of supramolecular structures Nanoscience; Molecular switches; bacteriorhodopsin; Neural networks, biological and artificial; Genetic algorithms Artificial life Suggestions for further reading; 9. LOOKING TOWARDS THE FUTURE; Tensions created by the rapidity of technological change; Can information-driven society achieve stability?; Respect for natural evolution; Construction versus destruction; Suggestions for further reading; Appendix A ENTROPY AND INFORMATION; Appendix B BIOSEMIOTICS; Suggestions for further reading; Appendix C ENTROPY AND ECONOMICS; Human society as a superorganism, with the global economy as its digestive system; Frederick Soddy; Nicholas Georgescu-Roegen; Limits to Growth A steady-state economy Biological carrying capacity and economics

Sommario/riassunto

Information Theory and Evolution discusses the phenomenon of life, including its origin and evolution (and also human cultural evolution), against the background of thermodynamics, statistical mechanics, and information theory. Among the central themes is the seeming contradiction between the second law of thermodynamics and the high degree of order and complexity produced by living systems. This paradox has its resolution in the information content of the Gibbs free energy that enters the biosphere from outside sources, as the author will show. The role of information in human cultural evolution

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