1. Record Nr. UNINA9910453737903321

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Titolo	Robustness and evolvability in living systems / / Andreas Wagner
Pubbl/distr/stampa	Princeton, New Jersey : , : Princeton University Press, , [2005] ©2005
ISBN	0-691-12240-7 1-4008-4938-1
Edizione	[Course Book]
Descrizione fisica	1 online resource (384 p.)
Collana	Princeton Studies in Complexity ; ; 24 Princeton studies in complexity
Classificazione	WH 2600
Disciplina	572.8/38
Soggetti	Molecular evolution Mutation (Biology) Biological systems - Stability Robust control Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references (pages [323]-358) and index.
Nota di contenuto	Introduction -- The genetic alphabet -- The genetic code -- RNA structure -- Proteins and point mutations -- Proteins and recombination -- Regulatory DNA regions and their reorganization in evolution -- Metabolic pathways -- Metabolic networks -- Drosophila segmentation and other gene regulatory networks -- Phenotypic traits, cryptic variation, and human diseases -- The many ways of building the same body -- Neutral spaces -- Evolvability and neutral mutations -- Redundancy of parts or distributed robustness? -- Robustness as an evolved adaptation to mutations -- Robustness as an evolved adapatation to environmental change and noise -- Robustness and fragility: advantages to variation and trade-offs -- Robustness in natural systems and self-organization -- Robustness in man-made systems.
Sommario/riassunto	All living things are remarkably complex, yet their DNA is unstable, undergoing countless random mutations over generations. Despite this instability, most animals do not grow two heads or die, plants continue

to thrive, and bacteria continue to divide. Robustness and Evolvability in Living Systems tackles this perplexing paradox. The book explores why genetic changes do not cause organisms to fail catastrophically and how evolution shapes organisms' robustness. Andreas Wagner looks at this problem from the ground up, starting with the alphabet of DNA, the genetic code, RNA, and protein molecules, moving on to genetic networks and embryonic development, and working his way up to whole organisms. He then develops an evolutionary explanation for robustness. Wagner shows how evolution by natural selection preferentially finds and favors robust solutions to the problems organisms face in surviving and reproducing. Such robustness, he argues, also enhances the potential for future evolutionary innovation. Wagner also argues that robustness has less to do with organisms having plenty of spare parts (the redundancy theory that has been popular) and more to do with the reality that mutations can change organisms in ways that do not substantively affect their fitness. Unparalleled in its field, this book offers the most detailed analysis available of all facets of robustness within organisms. It will appeal not only to biologists but also to engineers interested in the design of robust systems and to social scientists concerned with robustness in human communities and populations.