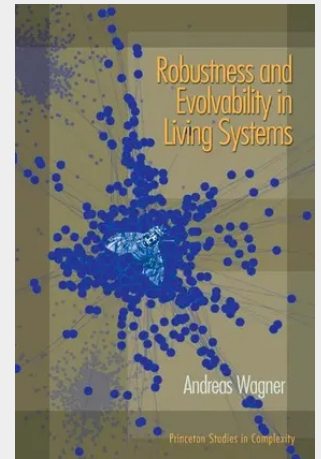


Robustness and Evolvability in Living Systems

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.

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.



62,30 €

62,30 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

Artikelnummer: 9780691134048

Medium: Buch

ISBN: 978-0-691-13404-8

Verlag: Princeton University Press

Erscheinungstermin: 22.07.2007

Sprache(n): Englisch

Auflage: Erscheinungsjahr 2007

Serie: Princeton Studies in Complexity

Produktform: Kartoniert

Gewicht: 582 g

Seiten: 384

Format (B x H): 156 x 234 mm

