

Contents

List of Contributors	vii
Contributor Biographies	ix
Preface	xvii
Section I Introduction	1
1. Towards philosophical foundations of Systems Biology: introduction <i>F.C. Boogerd, F.J. Bruggeman, J.-H.S. Hofmeyr and H.V. Westerhoff</i>	3
Section II Research programs of Systems Biology	21
2. The methodologies of systems biology <i>H.V. Westerhoff and D.B. Kell</i>	23
3. Methodology is Philosophy <i>R.G. Shulman</i>	71
4. How can we understand metabolism? <i>D.A. Fell</i>	87
5. On building reliable pictures with unreliable data: An evolutionary and developmental coda for the new systems biology? <i>W.C. Wimsatt</i>	103
Section III Theory and models	121
6. Mechanism and mechanical explanation in systems biology <i>R.C. Richardson and A. Stephan</i>	123
7. Theories, models, and equations in systems biology <i>K.F. Schaffner</i>	145
8. All models are wrong . . . some more than others <i>O. Wolkenhauer and M. Ullah</i>	163
9. Data without models merging with models without data <i>U. Krohs and W. Callebaut</i>	181

Section IV Organization in biological systems	215
10. The biochemical factory that autonomously fabricates itself: A systems biological view of the living cell <i>J.-H.S. Hofmeyr</i>	217
11. A systemic approach to the origin of biological organization <i>A. Moreno</i>	243
12. Biological mechanisms: organized to maintain autonomy <i>W. Bechtel</i>	269
13. The disappearance of function from 'self-organizing systems' <i>E.F. Keller</i>	303
Section V Conclusion	319
14. Afterthoughts as foundations for systems biology <i>F.C. Boogerd, F.J. Bruggeman, J.-H.S. Hofmeyr and H.V. Westerhoff</i>	321
Subject Index	337