Contents

I

Introduction

Part One Structure and Evolution of Hierarchical Systems				
п	On Emergent Structures, Truisms and Fallacies	7		
1 1.1 1.2 1.3	Structure and Complexity of Evolving Systems	7 7 10 24		
2	Basic Problems of the Evolution of Matter	25		
3 3.1 3.2 3.3 3.4 3.5 4 4.1 4.2 III	Holism Versus Reductionism	27 29 32 33 34 36 37 37 38 40		
1	Synthesis Versus Reduction of Theories	40		
2 2.1 2.2 2.3	Synthesis of Theories Through Parametrisationof LawsParametrisation of LawsSynthesis of TheoriesInformal Summary	42 42 43 44		
3 3.1	The Central Representation Theorem	45 51		

• •



1

.

4	State-Determined Hierarchical Systems	52
	Parameter Families of Systems	
4.1		52
4.2	Unified System Theories	54
4.3	State-Determined Hierarchies	55
4.4	Evolutionary Processes	56
4.5	Informal Summary and Discussion	58
5	Pointless Scientific Controversies	58
5.1	Cross-Level Similarity of Structures	59
5.2	Cultural Systems as "Emergent Wholes"	60
5.3	System Simulation	61
5.4	The Problem of Similarity in Comparative Ethology	63
5.5	Darwinism Versus Mendelism	63
Арр	endix: Examples	65
1	Interacting Biological Populations	65
1.1	Dynamical Systems	65
1.2	Interacting Populations as Coupled Systems	67
1.3	The Associate Parameter Family	68
1.4	State Determinacy and Hierarchical Evolution	69

Part Two The Evolution of Social Structure

IV	Perspectives on Non-Adaptive Evolution	73
1	Is Sociobiology Reductionist?	73
1.1	Complexities of Social Interaction	73
1.2	Sociobiology: Merits and Limits	74
1.3	The Quest for Alternatives	75
1.4	An Approach to Non-Adaptive Change	78
2	The Concepts of Structural and Evolutionary Instability .	78
2.1	The Meaning of Structural Instability	79
2.2	Structurally Stable and Unstable Games	80
2.3	Informal Summary and Discussion	82
v	Structural Instability in Evolutionary Population	
	Biology	84
1	Sociobiology and the Structural Instability of	
	Behaviour Patterns	84
1.1	Sources of Evolutionary Change	84
1.2	A Dynamical Approach to Biosocial Genetics	86
1.3	Asymptotically Stable Equilibria	89
1.4	Favourable Mutations	90

Contents

1.5 1.6 1.7 1.8	Application to Inclusive-Fitness TheoryApplications to Insect Social StructureEvolutionary Instability in Secular Time ScalesInformal Summary and Conclusion	93 95 97 101		
2 2.1 2.2 2.3 2.4 3	Structural Instability in Population Dynamics	102 104 108 114 116		
3.1 3.2 3.3 3.4 3.5	The Basic Equations	117 119 122 125 127 129		
VI	Applications to Human Social Structure	131		
1	The Anthropological Significance of Evolutionary Stability and Instability	131		
2 2.1 2.2 2.3 2.4 2.5	Political Power as an Evolutionary StructureEvolution of Hierarchical ComplexityStability of Social StructureBiobehavioural Bases of Influence and PowerPolitical PowerSummary and Discussion	133 135 137 140 143 146		
3 3.1 3.2 3.3 3.4	On the Evolution of Complex, Political Society	147 147 149 150 151		
VII	Concluding Remarks	152		
References				
List	List of Symbols			
Sub	Subject Index			

XI