

Contents

Preface and Acknowledgments	13
CHAPTER I. The Iconography of an Expectation	23
<hr/>	
A PROLOGUE IN PICTURES	23
THE LADDER AND THE CONE: ICONOGRAPHIES OF PROGRESS	27
REPLAYING LIFE'S TAPE: THE CRUCIAL EXPERIMENT	45
<i>Inset: The Meanings of Diversity and Disparity</i>	49
CHAPTER II. A Background for the Burgess Shale	53
<hr/>	
LIFE BEFORE THE BURGESS: THE CAMBRIAN EXPLOSION AND THE ORIGIN OF ANIMALS	53
LIFE AFTER THE BURGESS: SOFT-BODIED FAUNAS AS WINDOWS INTO THE PAST	60
THE SETTING OF THE BURGESS SHALE	64
WHERE	64
WHY: THE MEANS OF PRESERVATION	69
WHO, WHEN: THE HISTORY OF DISCOVERY	70

CHAPTER III. Reconstruction of the Burgess Shale: Toward a New View of Life	79
<hr/>	
A QUIET REVOLUTION	79
A METHODOLOGY OF RESEARCH	84
THE CHRONOLOGY OF A TRANSFORMATION	97
<i>Inset:</i> Taxonomy and the Status of Phyla	98
<i>Inset:</i> The Classification and Anatomy of Arthropods	102
<hr/>	
The Burgess Drama	107
Act 1. <i>Marrella</i> and <i>Yohoia</i> : The Dawning and Consolidation of Suspicion, 1971–1974	107
The Conceptual World That Whittington Faced	107
<i>Marrella</i> : First Doubts	113
<i>Yohoia</i> : A Suspicion Grows	121
Act 2. A New View Takes Hold: Homage to <i>Opabinia</i> , 1975	124
Act 3. The Revision Expands: The Success of a Research Team, 1975–1978	136
Setting a Strategy for a Generalization	136
Mentors and Students	139
Conway Morris’s Field Season in Walcott’s Cabinets: A Hint Becomes a Generality, and the Transformation Solidifies	141
Derek Briggs and Bivalved Arthropods: The Not-So-Flashy but Just-As-Necessary Final Piece	157
Act 4. Completion and Codification of an Argument: <i>Naraoia</i> and <i>Aysheaia</i> , 1977–1978	164
Act 5. The Maturation of a Research Program: Life after <i>Aysheaia</i> , 1979–Doomsday (There Are No Final Answers)	172
The Ongoing Saga of Burgess Arthropods	173
Orphans and Specialists	173
A Present from Santa Claws	185
Continuing the March of Weird Wonders	188
<i>Wiwaxia</i>	189
<i>Anomalocaris</i>	194
Coda	206

SUMMARY STATEMENT ON THE BESTIARY OF THE BURGESS SHALE	207
DISPARITY FOLLOWED BY DECIMATION: A GENERAL STATEMENT	207
ASSESSMENT OF GENEALOGICAL RELATIONSHIPS FOR BURGESS ORGANISMS	212
THE BURGESS SHALE AS A CAMBRIAN GENERALITY	218
PREDATORS AND PREY: THE FUNCTIONAL WORLD OF BURGESS ARTHROPODS	219
THE ECOLOGY OF THE BURGESS FAUNA	222
THE BURGESS AS AN EARLY WORLD-WIDE FAUNA	224
THE TWO GREAT PROBLEMS OF THE BURGESS SHALE	227
THE ORIGIN OF THE BURGESS FAUNA	228
THE DECIMATION OF THE BURGESS FAUNA	233
<hr/> CHAPTER IV. Walcott's Vision and the Nature of History	240
THE BASIS FOR WALCOTT'S ALLEGIANCE TO THE CONE OF DIVERSITY	240
A BIOGRAPHICAL NOTE	240
THE MUNDANE REASON FOR WALCOTT'S FAILURE	243
THE DEEPER RATIONALE FOR WALCOTT'S SHOEHORN	253
WALCOTT'S PERSONA	253
WALCOTT'S GENERAL VIEW OF LIFE'S HISTORY AND EVOLUTION	257
THE BURGESS SHOEHORN AND WALCOTT'S STRUGGLE WITH THE CAMBRIAN EXPLOSION	263
THE BURGESS SHALE AND THE NATURE OF HISTORY	277
<i>Inset:</i> A Plea for the High Status of Natural History	280
<hr/> CHAPTER V. Possible Worlds: The Power of "Just History"	292
A STORY OF ALTERNATIVES	292
GENERAL PATTERNS THAT ILLUSTRATE CONTINGENCY	299
THE BURGESS PATTERN OF MAXIMAL INITIAL PROLIFERATION	301
MASS EXTINCTION	305

SEVEN POSSIBLE WORLDS	309
EVOLUTION OF THE EUKARYOTIC CELL	309
THE FIRST FAUNA OF MULTICELLULAR ANIMALS	311
THE FIRST FAUNA OF THE CAMBRIAN EXPLOSION	314
THE SUBSEQUENT CAMBRIAN ORIGIN OF THE MODERN FAUNA	316
THE ORIGIN OF TERRESTRIAL VERTEBRATES	317
PASSING THE TORCH TO MAMMALS	318
THE ORIGIN OF <i>Homo sapiens</i>	319
AN EPILOGUE ON <i>PIK A I A</i>	321
Bibliography	325
Credits	333
Index	337