

Contents

List of contributors page vii

Part I Introduction 1

Inauguration of the Study Week on Astrobiology 3
CARDINAL GIOVANNI LAJOLO

1 Astrobiology – A New Synthesis 5
JOHN BAROSS AND CHRIS IMPEY

Part II Origin of Planets and Life 23

2 Towards a Theory of Life 25
STEVEN BENNER AND PAUL DAVIES

3 Terran Metabolism: The First Billion Years 48
SHELLEY COPLEY AND ROGER SUMMONS

4 Planet Formation 73
SEAN N. RAYMOND AND WILLY BENZ

Part III History of Life on Earth 87

5 The Early Earth 89
FRANCES WESTALL

6 Evolution of a Habitable Planet 115
JAMES KASTING AND JOSEPH KIRSCHVINK

vi Contents

7 Our Evolving Planet: From Dark Ages to Evolutionary Renaissance 132
ERIC GAIDOS AND ANDREW KNOLL

Part IV Habitability of the Solar System 155

8 Early Mars – Cradle or Cauldron? 157
ARMANDO AZUA-BUSTOS, RAFAEL VICUÑA, AND RAYMOND PIERREHUMBERT

9 Large Habitable Moons: Titan and Europa 175
ATHENA COUSTENIS AND MICHEL BLANC

10 Small Habitable Worlds 201
JULIE CASTILLO-ROGEZ AND JONATHAN LUNINE

Part V Exoplanets and Life in the Galaxy 229

11 Searches for Habitable Exoplanets 231
SARA SEAGER

12 Review of Known Exoplanets 250
CHRISTOPHE LOVIS AND DANTE MINNITI

13 Characterizing Exoplanet Atmospheres 266
GIOVANNA TINETTI

14 If You Want to Talk to ET, You Must First Find ET 286
JILL TARTER AND CHRIS IMPEY

Index 306

See colour plate section between pp. 148 and 149.