

MILTON K. MUNITZ

SPACE TIME AND  
CREATION

Philosophical Aspects

of Scientific Cosmology



**COLLIER BOOKS**  
**NEW YORK, N. Y.**

## Contents

|   |    |
|---|----|
| PREFACE   | 7  |
| I INTRODUCTION—WHAT IS COSMOLOGY?                       | 11 |
| II THE DEVELOPMENT OF COSMOLOGY<br>FROM MYTH TO SCIENCE | 13 |
| 1. Kinds and Stages of Progress in Cosmology            | 13 |
| 2. Cosmogonical Myths: <i>The Enuma Elish</i>           | 16 |
| 3. Proto-Scientific Cosmologies:<br>Anaximander         | 21 |
| 4. The Classical World-View: Aristotle                  | 22 |
| 5. The Universe of Stars in Modern Astronomy            | 26 |
| 6. Nebulae and Relativity                               | 35 |
| III SOME QUESTIONS OF LOGIC IN COSMOLOGY                | 37 |
| 1. Deduction of Extrapolation? Space and Time           | 38 |
| 2. Importance of Philosophical Analysis                 | 40 |
| IV THE NATURE OF SCIENTIFIC THEORY                      | 41 |
| 1. Functions of Theory                                  | 42 |
| 2. Types of Theoretical Concepts                        | 49 |
| 3. Types of Theoretical Statements                      | 52 |
| 4. Critique of the Classical Philosophy of Science      | 54 |
| V THE OBSERVABLE UNIVERSE AND COSMOLOGICAL MODELS       | 61 |
| 1. Meaning of "the Universe"                            | 61 |
| 2. Relativistic Cosmologies                             | 68 |

|      |   |     |
|------|---|-----|
| 10   | / Contents  |     |
| VI   | RATIONALISM   | 78  |
|      | 1. The Argument from the Uniqueness of the Universe | 80  |
|      | 2. Milne's Kinematic Relativity                     | 86  |
| VII  | WORLD GEOMETRY                                      | 92  |
|      | 1. Concepts of Physical Space                       | 93  |
|      | 2. The "Reality" of Space; Einstein's views         | 100 |
|      | 3. The Metrical Structure of Space                  | 104 |
|      | 4. The Metric of the Universe as a Whole            | 112 |
| VIII | THE AGE OF THE UNIVERSE                             | 117 |
|      | 1. Time and the Use of Clocks in Physics            | 120 |
|      | 2. "The Beginning" of the Universe                  | 125 |
| IX   | CONTINUOUS CREATION                                 | 134 |
|      | 1. A New Cosmology: Bondi-Gold, Hoyle               | 134 |
|      | 2. The "Physics" of Creation                        | 135 |
|      | 3. Creation and the Use of Scientific Method        | 137 |
|      | 4. The Meaningfulness of "Creation"                 | 140 |
|      | 5. The Perfect Cosmological Principle               | 143 |
| X    | SCEPTICISM  | 149 |
|      | 1. The Challenge of Operationalism                  | 149 |
|      | 2. Kantian Dialectic                                | 150 |
|      | 3. Conclusion                                       | 154 |
|      | INDEX   | 155 |