
CONTENTS

Preface to Second Edition v
Preface to First Edition vii

1. INTRODUCTION 1

 Scope of Sedimentology 1

 History of Development 1

 The Early History 1

 Developments Since Late 19th Century 3

 Recent Trends in Sedimentology 5

 Literature on Sedimentology 5

2. PROCESSES OF SEDIMENTATION 8

 Surface Processes and Rock Weathering 8

 Mineral Stability 10

 Source of Sediments 13

 Quartz and Feldspar as Provenance Indicators 14

 Heavy Minerals as Provenance Indicator 16

3. SEDIMENTARY PETROLOGY 17

 Rocks of Mechanical Origin 18

 Rudaceous Sedimentary Rocks (Conglomerates and Breccias) 18

 Arenaceous Sedimentary Rocks 19

 Classification of Sandstones 21

 Description of Sandstones 23

 Chemical Composition of Sandstones 28

 Lutaceous (Argillaceous) Sedimentary Rocks 30

 Rocks of Chemical and Biochemical Origin 33

 Carbonates 33

 Chemical Sediments Other than Carbonates 46

Volcaniclastic Rocks	52
Diagenesis	53
Diagenesis of Siliceous Sediments	54
Diagenesis of Carbonates	56
Appendix : Techniques of Sedimentary Petrography	59
4. SEDIMENTARY TEXTURE	61
Grain-Size	61
Concept of Particle Size	61
Grain-Size Measurement	62
Analysis and Interpretation of Grain-Size Data	67
Roundness and Shape	71
Roundness	72
Shape	76
Grain-to-Grain Relationship	79
Packing	79
Porosity	80
Permeability	81
Appendix : Techniques of Granulometric Analysis	82
5. HYDRAULICS, SEDIMENT TRANSPORTATION AND STRUCTURES OF MECHANICAL ORIGIN	88
Hydraulics of Open Channel Flows	88
Physical States of Flow	88
Structures of Turbulent Flow	90
Sediment Transportation	91
Sediment Transportation by Water and Wind	95
Bed Configuration During Sediment Transportation	99
Structures Related to Current Ripples	106
Structures Related to Wave Ripples	113
Structures Related to Flat Beds	117
Deformed Beddings	124
6. STRUCTURES OF CHEMICAL AND BIOLOGICAL ORIGIN	128
Structures of Chemical Origin	128
Concretions and Nodules	128
Products of Pressure Solution: Stylolites	130
Occurrence and Implications of Structures of Chemical Origin	131
Biogenic Sedimentary Structures	133
Stromatolites	133
Trace Fossils	140

7. SEDIMENTARY ENVIRONMENTS AND FACIES	147
Introduction: Facies Modelling	147
Marine Environments	147
Continental Shelf	147
Continental Slope	155
Continental Rise and Deep-sea Fans	155
Abyssal Plain Deposits	159
Marine Sediments in Stratigraphic Record	160
Non-Marin Environments	164
Glacial Environment	164
Eolian Environment	168
Lacustrine Environment	174
Fluvial Environment	178
Mixed Environments	190
Barrier Island and Beach Facies	190
Stratigraphic Sequences in Mixed Environments	194
Tidal Flat Facies	194
Siliciclastic Tidal Flat	195
Carbonate Tidal Flat	197
Stratigraphic Sequences in Carbonate Tidal Flats	198
Deltaic Environment	200
8. TECTONICS AND SEDIMENTATION	207
Sedimentary Basins	207
Geosynclinal Concept	207
Plate Tectonics Concept	213
Plate Movements and Basin Formation	215
Basins in Extensional Setting	215
Basins in Compressional Setting	218
Basins in Strike-slip and Transform Fault Zones	219
Tectonic Control of Sandstone Composition	219
Basin Classification and Description	223
Downwarp Basins	223
Rift Basins	227
Interior Basins	231
Foreland Basins	234
Subduction Basins	236
Pull-apart Basins	236
Delta Type Basins	239
Composite Basins with Multiple History	240

9. STRATIGRAPHY AND SEDIMENTATION	245
Classical Concepts in Stratigraphy	245
Estimation of Geologic Time	245
Dual Hierarchy in Stratigraphy	246
Relationship Between Sedimentary Units	248
Vertical and Lateral Relationships	248
Cyclicality	256
Correlation	259
Sequence Stratigraphy	267
History	267
Basic Concepts	269
Terminology	271
Depositional Sequences	271
Application of Sequence Stratigraphy	277
10. BASIN ANALYSIS: A SYNTHESIS	279
Introduction	279
Basin and its Lithic Fill	281
Mapping, Petrography & Sedimentary Structures	281
Palaeoslope and Palaeocurrent	282
Depositional Environment	291
Palaeohydraulic Interpretations in Fluvial Channels	294
Diagenesis and Maturation	297
Sediment Chemistry	298
Basin Evolution and Tectonics	298
Appendix : Techniques of Palaeocurrent Analysis	301
<i>References</i>	307
<i>Subject Index</i>	329