

Society of Earth Scientists Series

K.S. Valdiya

The Making of India

Geodynamic Evolution

Second Edition



 Springer

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Series editor

Satish C. Tripathi, Lucknow, India

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Geodynamic Evolution

Second Edition

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*To My revered teacher
the late Shri Shiva Ballabh Bahuguna
who showed me the path
I have walked on.*

Preface from Series Editor

The Indian subcontinent is a coveted destination for geologists owing to its unique geological set-up involving some of the oldest cratonic blocks up to the youngest Quaternary sequences. The oldest cratons—Dharwar, Bastar, Singhbhum and Bundelkhand—represent cratonization process at ~3 Ga and their mosaic forms the Peninsular part of India. The intervening Proterozoic mobile belts and sedimentary basins add another dimension to the varied geology of India. Record of the earliest form of life has been extensively studied. The term “Gondwanaland” has its origin from India. After its break-up, Greater India moved northward rapidly as an island cut-off from rest of the globe supercontinent. The collision and subsequent subsidence of Indian subcontinent with Asia gave rise to the great Himalayan Mountain Ranges—the youngest fold–thrust belt. The vast tract of Indo-Gangetic alluvium as Himalayan foreland basin bears evidence to the voluminous extent of Quaternary fluvial sedimentation. As such, Indian subcontinent offers “food for thought” for geoscientists world over working in different domains.

The book *Making of India: Geodynamic Evolution* by veteran geoscientist and teacher Prof. Valdiya is a wonderful compilation of Indian geology, wherein he has included large number of references including those published but not noticed. The limited published copies of the first edition of the book were sold within a very short span of time, ran out of print and could not meet the demand. Sensing the great demand for the book Prof. Valdiya thoroughly revised and updated the content of the book. When approached, The Society of Earth Scientists immediately accepted to publish it under SES Series with Springer as an International edition for its worldwide circulation. I apologize for delay in bringing this voluminous book to print due to several parallel engagements but hope it will fulfil the need of the students and researchers.

Satish C. Tripathi

Preface to the Second Edition

Within two years of publication of the book *Making of India: Geodynamic Evolution* in 2010, all copies were sold out. Still there was a great demand for the book and I was receiving calls for availability of the book. I felt that my object of distilling substance from stupendous volume of literature published in 65 years after independence, and weaving through the maizes of conflicting contentions of field workers and researchers, and presenting commonly acceptable viewpoints had met with success. So I updated the book, citing additionally more than 350 new works, and corrected mistakes, some inadvertent some my own, related mostly to year of publication of research papers.

The publisher of the first edition of the book M/S Macmillan Publishers India Ltd. discontinued publication of all higher-education text books in science. It took me quite sometime to find a willing publisher—in *The Society of Earth Scientists*. Dynamic and extraordinarily dedicated that he is, Honorary Secretary and Series Editor Dr. Satish C. Tripathi presented me with amazing dispatch a thoroughly reprocessed and altogether reformulated the manuscript.

Hopefully this updated edition will be well received by readers, primarily students, teachers and researchers for whom I have written this book.

I am profoundly grateful to Dr. Satish C. Tripathi, to The Society of earth scientists and to Springer International Publishing Switzerland. But for the crucial and tremendous help of Dr. Kanchan Pande, Professor of Earth Science, Indian Institute of Technology, Mumbai, this edition would not have come out. Dr. Jaishri Sanwal also lent her great help.

K.S. Valdiya

Preface to the First Edition

The seed of the idea of writing a book on the geology and geodynamic evolution of the Indian continent was planted in my mind years ago when Mrs. D.N. Wadia asked me to revise that superb work of D.N. Wadia—*Geology of India*. I had to decline. I wrote back stating that the expansion of geological knowledge has been so vast, and so many advances in our understanding of the geodynamic processes involved in the evolution of the crust had taken place in last few decades that rewriting rather than revision of a book on the geology of India was called for. In 1996, the then President of the Geological Society of India Dr. B.P. Radhakrishna called me telephonically to suggest that I write a text book on the geological history of India. Being inextricably preoccupied with neotectonic study of the Mysore Plateau, I hummed and hawed but waited for a formal letter, which did not come. In early 2003, when the Indian National Science Academy offered, without my asking, the Golden Jubilee Research Professorship, I made up my mind to embark upon the venture of writing an account of the geological setting and tectonic history of the Indian continent. The focus was to be India, but the surrounding regions would have to be brought in the ambit to portray the whole picture of the evolution of the southern part of the Asian continent.

The wonderfully great works of D.N. Wadia, M.S. Krishnan and E.H. Pascoe amply bring out the contributions of pioneers and giants of the pre-Independence time. I have chosen to base my accounts on the works of mainly those who explored the land of India after 1947. Exception has been made in the case of the Himalaya province where comprehensive regional studies started quite late—a decade or a little earlier before India's independence. Endeavour has been made to bring out the works of those silent geologists whose contributions have gone and remain “unhonoured and unsung”.

Encompassing broad array of information related to structure and tectonics, stratigraphy and palaeontology, sedimentation and palaeogeography, petrology and geochemistry, geomorphology and geophysics, the book presents in a concise format a simplified and coherent story of the evolution of the Indian continent. Effort has been made to integrate what little I know, desisting, however, from dwelling

on arguments related to controversies (although calling attention to them), curtailing details of methodologies and descriptions, pack no more than is necessary for understanding and avoiding using jargons of stratigraphic nomenclature. Presented in a distilled form, the observations and deductions of workers on different facets of earth science, this book is intended to provide appreciation of the geological developments taken place in the making of India. A comprehensive though selective list of original works would provide lead to those who seek details and wish to go into the depth of problems. No more than an updated guide, this book is meant for readers who wish to enlarge their scientific perception.

Curtailing unnecessary details without making them shallow and updating without being unsympathetic to the past contributions, the diagrams are designed to depict settings and situations rather than precise delineation of geological features.

While writing this book, words of my mentors reverberated in my mind. My college-day teacher Shri Shiva Ballabh Bahuguna used to exhort me to see the world around with wide open eyes and try to know about as many things as possible. “The outcrop is the final court of appeal where all concepts or theories must be tested” wrote Prof. F.J. Pettijohn in 1974. And to have a close look at the outcrops, one must go “out among the rocks” was the message Prof. W.D. West gave me in 1991. Fortunately, I have lived and worked all my life among the rocks in different parts of India—the central sector of the Himalaya, the eastern extremity of the mountain arc, eastern Vindhya, northern Bundelkhand, the Mewar region of the Aravali, the Mysore Plateau and the central and southern Sahyadri. The voyages of studies enabled me to carry out “conversation with rocks”, which gave me insight and some understanding of the natural phenomena involved in the making of India. I wish to share that understanding with students and teachers of geology and non-specialist readers.

K.S. Valdiya

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I am deeply grateful to Prof. M.S. Valiathan, the then President of the Indian National Science Academy and to the members of his Council, for enabling me to write this book by offering the Golden Jubilee Research Professorship.

Words cannot express my feeling of gratitude to Jawaharlal Nehru Centre for Advanced Scientific Research for very generous support and immeasurable help to make me pursue the project the way I wanted.

A large number of friends have helped me to prepare the draft of the book, Dr. Anshu Kumar Sinha, then Director of Birbal Sahni Institute of Palaeobotany (Lucknow), Director Dr. V.P. Dimri, Librarian Shri B.M. Khanna, and Scientists Ravi Prakash Srivastava and Ashutosh Chamoli of National Geophysical Research Institute (Hyderabad), and Library Assistant Surendra Singh Bhandari at Wadia Institute of Himalayan Geology (Dehradun) greatly helped me in getting the relevant literature.

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K.S. Valdiya

Contents

1	Physiographic Layout of Indian Subcontinent	1
1.1	Physiographic Divisions	1
1.2	The Himalaya	2
1.2.1	Siwalik	3
1.2.2	Himachal or Lesser Himalaya	4
1.2.3	Himadri or Great Himalaya	5
1.2.4	Tethys Himalaya	5
1.2.5	Syntaxial Bends	6
1.2.6	Eastern Flank	6
1.2.7	Himalaya in Pakistan	7
1.3	The Indo-Gangetic Plains	8
1.3.1	Extent	8
1.3.2	Ganga Plain	8
1.3.3	Sindhu Plain	9
1.3.4	Thar Desert	10
1.4	Irrawaddy Basin	10
1.5	The Peninsular India	10
1.5.1	Bordering Mountain Ranges	11
1.5.2	Uplands and Plateaus	15
1.6	Coastal Plains	16
1.6.1	Makran Coast	16
1.6.2	West Coast	16
1.6.3	East Coast	18
	References	19
2	Geological Terranes of Indian Continent	21
2.1	Indian Shield with Archaean Cratons	21
2.2	Early Proterozoic Mobile Belts	22
2.3	Continent-Interior Later Proterozoic Sedimentary Basins	23
2.4	Gondwana Basins	24
2.5	Cretaceous Volcanic Provinces	24

2.6	Pericratonic Sedimentary Basins of Peninsular India	25
2.7	Himalaya Mobile Belt	26
2.8	Indo-Gangetic Plains and Quaternary Cover of Peninsular India	27
2.9	Andaman Island Arc and Central Myanmar Plain	28
3	Archaean Craton: Southern India	31
3.1	Indian Shield	31
3.2	Dharwar Craton: Crustal Structure	33
3.2.1	Faulted Terrane	34
3.2.2	Tectonic Boundaries	36
3.2.3	Intracratonic Shear Zone	36
3.2.4	Lithostratigraphy	39
3.3	Gorur Gneiss	39
3.4	Sargur Group	40
3.4.1	Composition	40
3.4.2	Metamorphism	42
3.4.3	Age	42
3.5	Peninsular Gneiss	43
3.5.1	Composition	43
3.5.2	Age	43
3.5.3	Deformation	43
3.6	Dharwar Supergroup	44
3.6.1	Basal Unconformity	44
3.6.2	Lithostratigraphy and Sedimentation	44
3.6.3	Temporal Span	47
3.7	Structural Architecture of Western Block	47
3.8	Schists Belts in Eastern Block	50
3.9	Closepet Granite	55
3.9.1	Composition	55
3.9.2	Genesis	55
3.9.3	Age	57
3.10	Dharwar Batholith	57
3.10.1	Composition	57
3.10.2	Origin	57
3.10.3	Age	58
3.10.4	Syenites	59
3.11	Granulite–Charnockite Domain	59
3.11.1	Occurrence	59
3.11.2	Genesis of Charnockites	60
3.11.3	Basic–Ultrabasic Intrusives	61
3.12	Tectonics of Evolution of Dharwar Craton	62
3.13	Life in the Archaean Time	63
3.14	Mineral Assets	64
	References	66

4	Archaean Cratons in Central, Eastern and Western India	75
4.1	Introduction	75
4.2	Bastar Craton	75
4.2.1	Continental Nucleus	75
4.2.2	Tectonic Boundaries	76
4.2.3	Deformation Pattern	79
4.2.4	Craton Nucleus: Markampara Gneiss	79
4.2.5	Sukma Group	79
4.2.6	Bengpal Group	81
4.2.7	Bailadila Group	82
4.2.8	Amgaon Gneiss	84
4.2.9	Bhopalpatnam Granulite	84
4.2.10	Mafic Dykes	85
4.3	Singhbhum Craton	85
4.3.1	Configuration and Characteristics	85
4.3.2	Tectonic Boundaries	86
4.3.3	Lithostratigraphic Layout	89
4.3.4	Champua Group (Older Metamorphic Group)	90
4.3.5	Saraikela Gneiss (Older Metamorphic Tonalite Gneiss)	90
4.3.6	Besoi Granite (Singhbhum Granite Type A)	91
4.3.7	Iron Ore Group	93
4.3.8	Singhbhum Granite (Type B)	96
4.3.9	Sukinda and Nuasahi Ultrabasic Bodies	97
4.3.10	Darjin Group and Tamparkola Granite	98
4.3.11	Geodynamic Evolution	98
4.3.12	Mineral Assets	99
4.4	Bundelkhand Craton	101
4.4.1	Collage of Complexes	101
4.4.2	Geophysical Conditions	103
4.4.3	Boundaries of Craton	103
4.4.4	Lithostratigraphy	106
4.4.5	Mawli Gneiss	106
4.4.6	Mangalwar Complex (Western Block)	107
4.4.7	Mehroni Group (Eastern Block)	107
4.4.8	Banded Gneissic Complex	109
4.4.9	Sandmata Complex	110
4.4.10	Hindoli Group	111
4.4.11	Dykes	112
4.4.12	Berach Granite	113
4.4.13	Bundelkhand Granite	113
4.4.14	Deformation Pattern	114
4.4.15	Evolution of the Craton	115
4.4.16	Mineralization	115
	References	116

5	Palaeoproterozoic Mobile Belts in Peninsular India	125
5.1	Tectonic Perspective	125
5.2	Aravali Domain	128
5.2.1	Configuration	128
5.2.2	Structural Architecture	128
5.2.3	Stratigraphy and Sedimentation	131
5.2.4	Basic Magmatic and Volcanic Activities	134
5.2.5	Synkinematic Nepheline Syenites	134
5.2.6	Regional Metamorphism	136
5.2.7	Emplacement of Granites	136
5.2.8	Mineral Deposits	137
5.3	Delhi Domain	139
5.3.1	Tectonics	139
5.3.2	Structural History	139
5.3.3	Stratigraphy and Sedimentation	141
5.3.4	Metamorphism	142
5.3.5	Mafic Volcanic Activities	143
5.3.6	Emplacement of Mafic–Ultramafic Bodies	143
5.3.7	Emplacement of Granites	144
5.3.8	Mineralization	145
5.4	Evolution of Aravali Orogenic Belt	147
5.5	Bijawar Basin	149
5.5.1	Intracratonic Setting	149
5.5.2	Structural Design and History	150
5.5.3	Stratigraphy and Sedimentation	152
5.5.4	Volcanic–Magmatic Activities	154
5.5.5	Emplacement of Granites	155
5.5.6	Mineralization	155
5.6	Singhbhum Domain	155
5.6.1	Tectonic Setting	155
5.6.2	Structural Architecture	158
5.6.3	Stratigraphy and Sedimentation	158
5.6.4	Volcanic Activities	159
5.6.5	Metamorphism	160
5.6.6	Emplacement of Granites	161
5.6.7	Dyke Swarms: Newer Dolerite	161
5.6.8	Evolution of the Singhbhum Mobile Belt	162
5.6.9	Mineralization and Mineral Assets	162
5.7	Chhotanagpur Gneiss Complex	164
5.7.1	Southern Tectonic Boundary	164
5.7.2	Ultrabasic Body	165
5.7.3	Meghalaya Gneiss Complex	165
5.8	Bhandara Triangle	166
5.8.1	Tectonic Setting	166

5.9	Sakoli Basin	167
5.9.1	Structural Architecture	167
5.9.2	Lithostratigraphy	169
5.9.3	Mineralization	169
5.10	Dongargarh Domain	170
5.10.1	Lithology	170
5.10.2	Bimodal Volcanism.	170
5.11	Sausar Basin	171
5.11.1	Structural Setup	171
5.11.2	Lithostratigraphy	172
5.11.3	Mineralization	173
5.12	Malanjkhanda Granite.	173
5.12.1	Geological Setting	173
5.12.2	Copper Deposit.	173
	References	174
6	Mesoproterozoic Eastern Ghat Mobile Belt	185
6.1	General Layout	185
6.2	Structural Architecture and Deformation History.	186
6.2.1	Configuration	186
6.2.2	Deformation Pattern	189
6.3	Lithological Assemblages and Subdivision.	190
6.3.1	Metamorphism: Thermobarometry and Petrogenesis . .	194
6.4	Multiphase Magmatic Complexes.	195
6.4.1	Ultrabasic Layered Complexes.	197
6.4.2	Alkaline Complexes	197
6.5	Evolution of Continental Crust	198
6.6	Mineral Deposits.	200
	References	201
7	Southern Granulite Terrane of Pan-African Rejuvenation.	205
7.1	Two Geological Domains	205
7.2	Geophysical Characteristics	206
7.3	Structural Framework	209
7.3.1	Moyar–Attur Shear Zone	209
7.3.2	Palghat–Cauvery Shear Zone.	211
7.3.3	Karur–Oddanchatram Shear Zone	213
7.3.4	Achankovil Shear Zone	214
7.4	Tectonics of Southern Granulite Terrane.	215
7.5	Metamorphism in Madurai Block.	216
7.5.1	Lithology	216
7.5.2	Metamorphic Mineral Assemblages.	216
7.6	Dynamothermal History of Trivandrum Block.	218
7.7	Age of Metamorphic Rejuvenation.	219
7.8	Felsic Magmatic Activity	220
7.9	Ultrabasic and Alkaline Rock Complexes.	221

7.10	Proterozoic Terranes of Sri Lanka	224
7.10.1	Lithotectonic Subdivision.	224
7.10.2	Lithostratigraphy and Petrogenesis	224
7.10.3	Tectonic Framework and Structural History	228
7.10.4	Metamorphism and Petrological Rejuvenation	229
7.10.5	Magmatic Activity	230
	References	230
8	Intracratonic Purana Basins in Peninsular India:	
	Mesoproterozoic History	237
8.1	Introduction	237
8.2	Twofold Subdivision of Purana Succession	239
8.3	Cuddapah Basin	240
8.3.1	Tectonics.	240
8.3.2	Structural Architecture	240
8.3.3	Stratigraphy and Sedimentation	242
8.3.4	Igneous Activity	244
8.3.5	Life in the Cuddapah Time.	245
8.3.6	Age of the Cuddapah	245
8.3.7	Mineral Assets	246
8.4	Kaladgi Basin	247
8.4.1	Structural Setting	247
8.4.2	Stratigraphy and Sedimentation	248
8.4.3	Bagalkot Stromatolites	249
8.5	Godavari Basin	249
8.5.1	Tectonics.	249
8.5.2	Structural Design	251
8.5.3	Stratigraphy and Sedimentation	252
8.5.4	Volcanic Activity	253
8.6	Vindhyan Basin: Semri Time	253
8.6.1	Tectonic Setting	254
8.6.2	Structural Architecture	255
8.6.3	Semri Sedimentation and Stratigraphy.	257
8.6.4	Volcanic Activity	260
8.6.5	Life in the Semri Time	261
8.6.6	Age of Lower Vindhyan Semri Group	261
	References	262
9	Neoproterozoic Intracratonic Basins in Peninsular India	269
9.1	Beginning of Neoproterozoic Era	269
9.2	Vindhyan Basin	269
9.2.1	Tectonic Setting	269
9.2.2	Stratigraphy and Sedimentation	270
9.2.3	Palaeocurrents	272
9.2.4	Igneous Activities	273

9.2.5	Life in the Bhander Time.	273
9.2.6	Age of Upper Vindhyan.	273
9.2.7	Mineral Resources.	275
9.3	Trans-Aravali Igneous Activities.	275
9.3.1	Emplacement of Erinpura Granite.	275
9.3.2	Malani Rhyolite.	277
9.3.3	Granites of Malani Suite.	278
9.3.4	Mineralization.	279
9.4	Greater Marwar Basin.	279
9.4.1	Nature of Basement.	279
9.4.2	Marwar Group.	280
9.5	Chhattisgarh Basin.	282
9.5.1	Structural Set-up.	282
9.5.2	Stratigraphy and Sedimentation.	282
9.5.3	Age of Chhattisgarh Succession.	284
9.6	Indravati Basin.	285
9.6.1	Configuration.	285
9.6.2	Stratigraphy and Sedimentation.	286
9.6.3	Igneous Activity.	286
9.6.4	Mineral Resources.	286
9.7	Sullavai Group.	287
9.8	Bhima Basin.	287
9.8.1	Stratigraphy and Sedimentation.	287
9.8.2	Mineral Resources.	289
9.9	Badami Group.	289
9.10	Kurnool Group.	290
9.10.1	Tectonics.	290
9.10.2	Stratigraphy and Sedimentation.	290
9.10.3	Mineral Resources.	290
9.11	Summing up.	292
	References.	292
10	Early Proterozoic in the Himalaya: Rocks, Metamorphism and Igneous Activities.	299
10.1	Tectonic Setting.	299
10.1.1	Triple Division of Early Proterozoic Succession.	300
10.2	Autochthonous Zone.	302
10.2.1	Tectonic Configuration.	302
10.2.2	Lithology and Depositional Environment.	304
10.2.3	Volcanic Activities.	307
10.2.4	Occurrence of Porphyritic Granite.	308
10.3	Nappe of Epimetamorphic Rocks.	309
10.3.1	Lithology.	309
10.3.2	Berinag Unit: Facies, Nappe and Volcanism.	311
10.3.3	Emplacement of Porphyritic Granites.	312

10.3.4	Origin of the Ramgarh Nappe.	313
10.3.5	Mineralization.	314
10.4	Nappe of Mesometamorphic Rocks	314
10.4.1	Lithology.	314
10.4.2	Structural Characteristics	316
10.4.3	Metamorphism	316
10.4.4	Mineralization.	317
10.5	Great Himalayan Vaikrita Group.	318
10.5.1	Tectonic Setting	318
10.5.2	Structural Characteristics	319
10.5.3	Lithology.	320
10.5.4	Metamorphism	322
10.6	Proterozoic Mogok Complex in Myanmar	323
10.6.1	Tectonic Setting and Structure	323
10.6.2	Lithology.	323
10.6.3	Mineralization.	325
	References	325
11	Later Proterozoic and Early Cambrian in the Himalaya	335
11.1	Tectonic Layout.	335
11.2	Carbonate Sedimentation: Autochthonous Zone.	338
11.2.1	Deoban Lithostratigraphy	338
11.2.2	Life in the Deoban Time	340
11.2.3	Depositional Environment	341
11.2.4	Vendian Time: Mandhali Sediments	341
11.2.5	Life During the Vendian Transition	343
11.2.6	Mandhali Environment of Deposition	343
11.3	Parautochthonous Krol Belt	344
11.3.1	Tectonic Setting	344
11.3.2	Lithostratigraphy.	345
11.3.3	Lithostratigraphical Comparison of Krol Belt and Autochthonous Zone	350
11.3.4	Life in the InfraKrol–Krol Time	350
11.3.5	Appearance of Shelly Fauna in Tal	351
11.3.6	Sudden Diversification	351
11.4	Transition in the Salt Range	351
11.4.1	Time of Desiccation	352
11.5	Proterozoic–Lower Cambrian Transition in Tethys Domain	353
11.6	Chaung Magyi Group	355
11.7	Pan-African Tectonism	355
11.7.1	Manifestation	355
11.7.2	Deformation	355
11.7.3	Volcanism	356
11.7.4	Granitic Activity	357
11.8	Mineralization	361
	References	363

12 Himalaya Province Between Pan-African and Hercynian Tectonic Upeavals	373
12.1 Disturbed Beginning of Palaeozoic Era	373
12.2 Cambrian Canvas of Biostratigraphy	374
12.2.1 Haitus	374
12.2.2 Situation in Eastern Myanmar	379
12.2.3 Cambrian Volcanism	379
12.3 Ordovician Period	380
12.3.1 Central Sector	380
12.3.2 Short-Lived Fluvial Regime	381
12.3.3 Eastern Myanmar	382
12.3.4 Volcanism	382
12.4 Silurian Scenario	384
12.4.1 Eastern Myanmar	384
12.4.2 Main Himalaya	384
12.4.3 Northern Pakistan	386
12.5 Devonian Development	387
12.5.1 Northern Pakistan and Kashmir	387
12.5.2 Eastern Myanmar	388
12.6 Carboniferous Time	388
12.6.1 Haitus in Eastern Myanmar	388
12.6.2 North-eastern Nepal	388
12.6.3 Kumaun and Spiti Basins	388
12.6.4 Northern Pakistan	389
12.7 Permian Panorama	389
12.7.1 New Cycle of Transgression	389
12.7.2 Magmatic Activity	390
12.7.3 Widespread Volcanism	390
12.7.4 Occurrence of Terrestrial Plants	391
12.7.5 Interruption in Sedimentation in Spiti Basin	391
12.7.6 Northern and North-eastern Nepal	393
12.7.7 “Gondwana Fringe” in Lesser Himalaya	393
12.7.8 Abor Volcanics	395
12.7.9 Eastern Myanmar	396
12.8 Palaeozoic Stratigraphy of Karakoram	398
12.9 Palaeozoic Stratigraphy of Tibet	398
12.10 Progression of Palaeozoic Life	399
12.10.1 Evolutionary Radiation	399
12.10.2 Development of Chitinous and Phosphatic Shells	399
12.10.3 Appearance of Fish	400
12.10.4 Colonization of Land by Plants	400
12.10.5 The Coming of Land-Living Amphibians	400
12.10.6 Amniote Eggs and Evolution of Reptiles	401
12.10.7 Decimation of Fauna	401

12.11	Disturbed End of the Palaeozoic Era	402
12.11.1	Rifting of Continental Margin	402
12.11.2	Widespread Volcanism	403
12.11.3	Separation of Tibetan Microcontinent	403
References		406
13	Gondwana Tectonics, Inland Sedimentation and Life	413
13.1	Hercynian Crustal Upheaval	413
13.2	Formation of Continent-Interior Basins	414
13.3	Land of Continental Glaciers	417
13.4	Drainage Pattern	419
13.5	Early Permian Marine Incursion	421
13.6	History of Sedimentation	421
13.6.1	General	421
13.6.2	Detritus from Glaciated Land	422
13.6.3	Fluvial–Alluvial Sedimentation	422
13.6.4	Prevalence of Dry Climate	425
13.6.5	Terminal Phase of Gondwana Sedimentation	427
13.7	Subsurface Gondwana Formations in Bangladesh	427
13.8	Igneous Activities in Grabens	430
13.9	Plant Life of the Gondwana Floodplains	430
13.9.1	Age of Seed-Bearing Gymnosperms	430
13.9.2	Advent of Flowering Angiosperms	432
13.10	Animal Communities	432
13.10.1	Predominance of Reptiles	432
13.10.2	Evolution of Mammals	434
13.10.3	Evolution of Birds	434
13.10.4	Dinosaurs, the Ruling Group	435
13.11	Mineral Deposits	436
References		436
14	Cretaceous Volcanism	441
14.1	Cretaceous Scenario	441
14.2	Eastern Theatre of Volcanism—Rajmahal Volcanic Province	443
14.2.1	Areal Extent	443
14.2.2	Lithostratigraphy	443
14.2.3	Genesis	443
14.3	Volcanism in South-west India: St. Mary's Island	445
14.4	Deccan Volcanic Province	447
14.4.1	Extent and Topographic Peculiarity	447
14.4.2	Nature of Deccan Lavas	447
14.4.3	Lithostratigraphy–Magnetostratigraphy	448
14.4.4	Structural Design	451
14.4.5	Petrochemistry and Petrogenesis	453
14.4.6	Origin of Acid and Alkaline Rocks	456

14.5	Geodynamics of Deccan Volcanism	456
14.6	Feeders of Deccan Lava Flows	457
14.7	Terminal Phase of Deccan Volcanism	459
14.8	Temporal Span of Deccan Volcanism	462
14.9	Testimony of Lacustrine Fossils	464
14.10	Environment and Life During the Deccan Time	466
14.10.1	Sedimentation in River Impoundments	466
14.10.2	Dinosaurs of the Lameta Time	467
14.10.3	Demise of Dinosaurs	468
14.10.4	Connection with Eurasian Landmass	469
	References	470
15	Pericratonic Basins: The Mesozoic Scenario	479
15.1	Crustal Extension in Continental Margins	479
15.2	North-eastern Continental Margin	480
15.2.1	Bengal Basin	480
15.2.2	Meghalaya Region	481
15.2.3	Ultrabasic–Alkaline–Carbonatite Complex	481
15.2.4	Mineral Deposits	483
15.3	South-eastern Continental Margin	483
15.3.1	Krishna–Godavari Basin	483
15.3.2	Hydrocarbon Deposits of Krishna–Godavari Basin	487
15.3.3	Kaveri–Palar Basin	488
15.4	North-western Continental Margin	491
15.4.1	Kachchh Basin	491
15.4.2	Jaisalmer Basin	496
15.5	Northern Continental Margin	499
15.6	An Arm of Sea Inside Central India	499
15.7	Mesozoic Panorama of Marine Life	501
15.7.1	Prolific and Diverse Life	501
15.7.2	Age of Ammonites	501
15.7.3	Reef Builders and Associated Invertebrates	502
15.7.4	Marine Vertebrates	502
	References	503
16	Northern and North-western Continental Margin: Mesozoic Stratigraphy	509
16.1	Tectonics	509
16.2	Biotic Communities: Profound Change	510
16.3	Stratigraphy and Sedimentation	514
16.3.1	Type Areas	514
16.3.2	The Triassic	516
16.3.3	The Jurassic	519
16.3.4	The Cretaceous	526
16.3.5	Transition to Palaeogene	531

16.4	Cycles of Marine Transgression and Regression	532
16.5	Influx of Plant Debris and Volcanic Clasts: Provenance Inland. . .	534
16.5.1	Plant Debris.	534
16.5.2	Volcaniclastics.	534
16.6	Volcanic Activity Along the Periphery	536
16.7	Active Tectonic Environment in Late Cretaceous.	538
16.7.1	Sinking Basin Floor	538
16.7.2	Submarine Slides	538
16.8	Mesozoic Stratigraphy of Karakoram	539
16.9	Mesozoic Stratigraphy of Tibet.	540
	References	540
17	Docking of India with Asia	547
17.1	India–Asia Convergence	547
17.2	Evolution of Volcanic Island Arc	547
17.2.1	Kohistan Island Complex	548
17.2.2	Dras Island Complex.	550
17.2.3	Shyok (Northern) Suture.	554
17.2.4	Shigatse Island Complex.	557
17.2.5	Timing of Docking	559
17.2.6	Formation of Land Bridge	561
17.2.7	Deformation and Metamorphism	562
17.3	Indus-Tsangpo Suture Zone	563
17.3.1	Structure and Lithology	563
17.3.2	Overthrusting of Obducted Units	565
17.4	Magmatic Arc North of Suture Zone	566
17.5	Oblique Convergence: Indo-Myanmar Border Ranges.	568
17.6	Ophiolite Bodies in Sulaiman–Kirthar Ranges	570
17.7	Karakoram Batholith.	571
	References	571
18	Emergence and Evolution of Himalaya.	579
18.1	Amalgamation of India with Eurasia	579
18.2	Bending and Bulging up of Leading Edge	579
18.2.1	Deformation	579
18.2.2	Metamorphism	581
18.3	Sagging of ITS Zone.	581
18.3.1	Sedimentation	581
18.3.2	Life and Time	582
18.4	Breaking of Himalayan Crust	583
18.4.1	Main Central Thrust	583
18.4.2	Trans-Himadri Detachment Fault	586
18.4.3	Timing of Detachment	592
18.5	Domal Structures in Tethys Terrane	592
18.6	Metamorphism in Himadri (Great Himalaya) Terrane	596

18.6.1	P-T Conditions	596
18.6.2	Inverted Metamorphism	596
18.6.3	Date of Metamorphism	598
18.7	Anatexis and Emplacement of Leucogranites	598
18.7.1	Mode of Occurrence	598
18.7.2	Causes of Anatexis	599
18.8	Development of Lesser Himalayan Terrane	600
18.8.1	Northern Duplex Zone	600
18.8.2	Far-Travelled Nappes	600
18.9	Evolution of Syntaxial Bends	605
18.9.1	Impact of Projecting Promontories	605
18.9.2	Nanga Parbat Syntaxial Bend	607
18.9.3	Hazara Syntaxis	607
18.9.4	Siang Syntaxis	608
18.10	Oblique Thrust Ramps	611
	References	613
19	Himalayan Foreland Basin	621
19.1	Origin and Development	621
19.2	Paleogene Sedimentation and Stratigraphy	622
19.2.1	North-western and Western Himalaya	622
19.2.2	Eastern India	627
19.3	Paleogene Sedimentation North of I-T Zone	628
19.4	Beginning of Fluvial Sedimentation	628
19.4.1	Drainage Reversal	628
19.4.2	North-western Himalaya	629
19.4.3	Sindh and Baluchistan	631
19.4.4	Nepal	631
19.4.5	Eastern India	631
19.4.6	Provenance of Sirmaur Sediments	633
19.4.7	Palaeoclimate Variation	633
19.5	Life in the Paleogene Period	634
19.5.1	Palaeocene–Eocene Vertebrates	634
19.5.2	Oligocene–Lower Miocene Fauna	634
19.6	Momentous Tectonic Events	636
19.6.1	Formation of Main Boundary Fault	636
19.6.2	Southward Relocation of Foreland Basin	637
19.6.3	Formation of Siwalik Basin	637
19.7	Siwalik Sedimentation	639
19.7.1	Lithology	639
19.7.2	Temporal Span	640
19.7.3	Environment of Deposition	641
19.7.4	Rates of Sediment Accumulation	642
19.7.5	Extensive Debris Flows	643
19.7.6	Episodes of Contemporary Volcanism and Tectonism	643
19.7.7	Provenance of Siwalik Sediments	644

19.8	The Siwalik Life	644
19.8.1	Favourable Conditions	644
19.8.2	Faunal Assemblages	646
19.8.3	Faunal Turnover	647
19.8.4	Immigration of Exotic Quadrupeds	648
19.9	Climate Change and Intensification of Monsoon	648
19.10	Structural Development in Siwalik Terrane	650
19.10.1	Reactivation of MBT	650
19.10.2	Structural Design in SW Nepal	651
19.10.3	South-western Uttarakhand	651
19.10.4	Salt Range–Potwar Plateau	654
19.10.5	Sulaiman Fold Belt	655
19.11	The Tertiary in Myanmar	656
19.11.1	Tectonics	657
19.11.2	Palaeocene–Eocene Time	657
19.11.3	Oligocene Epoch	659
19.11.4	Miocene Successions	659
19.12	Mineral Assets of Foreland Basins	660
	References	665
20	Tertiary Basins: Along Coasts and Offshore	675
20.1	Continental Margin	675
20.2	Dual-Facies Sedimentation	676
20.3	Link with Himalayan Foreland Basin	678
20.3.1	Kachchh Tertiary Succession	678
20.3.2	Rajasthan Tertiary Basin	680
20.4	Saurashtra Coast and Offshore	681
20.5	Sabarmati–Cambay Basin	683
20.5.1	Gravity Condition	683
20.5.2	Structure and Tectonics	683
20.5.3	Sedimentation and Stratigraphy	684
20.5.4	Life in the Sabarmati Domain	687
20.5.5	Climate Change	688
20.6	Bombay Offshore Basin	688
20.6.1	Basin Structure	688
20.6.2	Sedimentation History	689
20.6.3	Faunal Turnover	690
20.7	Kerala Basin	691
20.7.1	Outcrops Along Coast	691
20.7.2	Offshore Zone	692
20.8	Kaveri Basin	693
20.9	Krishna–Godavari Basin	694
20.10	Mahanadi Delta Domain	696
20.11	Bengal Basin	697

20.12	Evolution of Life During the Tertiary Time	697
20.12.1	Marine Invertebrates.	698
20.12.2	Terrestrial Mammals	698
20.13	Important Mineral Deposits	699
	References	703
21	Andaman Island Arc and Back-Arc Sea	707
21.1	Configuration.	707
21.2	Geophysical Characteristics	709
21.3	Structural Layout.	709
21.4	Stratigraphy and Sedimentation	713
21.4.1	Port Meadow Formation.	714
21.4.2	Baratang Group	714
21.4.3	Mithakhari Formation	715
21.4.4	Port Blair Formation	715
21.4.5	Archipelago Formation	716
21.4.6	Sawai Bay Formation	716
21.4.7	Neill Formation	717
21.5	Volcanics of Eastern Arc	717
21.6	Evolution of Andaman Mobile Belt	718
21.7	Mineral Asset	720
	References	720
22	Indo-Gangetic Plains: Evolution and Later Developments.	723
22.1	Formation of Foredeep	723
22.2	Floor of Indo-Gangetic Basin	724
22.2.1	Ganga Basin	724
22.2.2	Sindhu Basin	725
22.2.3	Brahmaputra Basin.	728
22.2.4	Bengal Basin	728
22.3	Sedimentation in Ganga Basin	730
22.4	Growth of Deltas.	731
22.4.1	Ganga–Brahmaputra Delta.	731
22.4.2	Sindhu Delta.	735
22.5	Physiographic Developments	735
22.5.1	Ganga Plain	735
22.5.2	Sindhu Plain	739
22.5.3	Brahmaputra–Ganga Plain	739
22.6	Drainage: Pattern and Changes.	742
22.7	Life in the Early Indo-Gangetic Time.	743
	References	743
23	Quaternary Cover and Tectonism: Peninsular India.	747
23.1	Drainage Disruption in Indo-Gangetic Plains	747
23.1.1	Shifting Courses	748
23.1.2	River Piracy.	750

23.2	Western Continental Margin	755
23.2.1	Tectonism.	755
23.2.2	Sedimentation	755
23.2.3	Fluctuation of Climate Condition	760
23.2.4	Lake Testimony	762
23.2.5	Drainage Deviation and Disruption.	762
23.3	Gujarat Coastal Belt.	764
23.3.1	Marine Transgression	764
23.3.2	WindSwept Coast	764
23.3.3	Neotectonic Development	764
23.3.4	The Rann	766
23.4	Narmada–Tapi Valleys, Central India.	766
23.4.1	Tectonic Setting.	766
23.4.2	Sedimentation	768
23.4.3	Episode of Volcanism	770
23.4.4	Hominid Presence	770
23.5	Konkan–Kanara Coastal Belt.	772
23.5.1	Structure and Geomorphology	772
23.5.2	Evolution of Western Ghat	773
23.5.3	Laterization of Pediplain	775
23.6	Malabar Coast	776
23.6.1	Structural Layout.	776
23.6.2	Sedimentary Cover	777
23.6.3	Gold-Bearing Laterite	777
23.7	Coromandal Coast	777
23.7.1	Kanyakumari–Rameswaram Tract	777
23.7.2	Evolution of Jaffna Peninsula	778
23.7.3	Growth of Kaveri Delta.	779
23.7.4	Human Remains	780
23.7.5	Development of Deltas of Godavari and Mahanadi	780
23.8	Mysore and Maharashtra Plateaus	782
23.8.1	Laterite Cap of Sahyadri	782
23.8.2	Multiple Planation Surfaces.	782
23.8.3	Tectonically Resurgent Mysore Plateau	783
23.8.4	Uplift of the Deccan Plateau	784
23.8.5	Volcanism and Life	786
23.9	Mineral Assets	787
	References	787
24	Quaternary Developments in Himalaya	795
24.1	Morphogenic Phase	795
24.1.1	Rapid Uplift.	795
24.1.2	Rugged Youthful Himadri	795

24.1.3	Milder, Mature Lesser Himalaya	796
24.1.4	Resurgent Siwalik	797
24.2	River Ponding and Lake Formation	798
24.2.1	Fault Reactivation	798
24.2.2	Palaeolakes in Tethys Terrane	798
24.2.3	River Ponding in Lesser Himalaya	801
24.2.4	Developments in Siwalik Domain	804
24.3	Climate Change and Advent of Ice Age	806
24.3.1	Cold Climate	806
24.3.2	Dry Desertic Climate	807
24.4	The Coming of Man	808
24.4.1	Human Settlements	808
24.4.2	Free Migration	809
24.4.3	Immigration	811
	References	811
25	Holocene Tectonic Movements and Earthquakes	817
25.1	Strain Build-up and Relaxation	817
25.1.1	Convergence of Continents	817
25.1.2	Uplift of Fault-Bound Blocks	818
25.1.3	Slip Along Himalayan Border	820
25.2	Extension and Uplift of Tibetan Plateau	821
25.3	Historical Earthquakes	822
25.4	Movements on Active Faults and Thrusts	823
25.5	Pattern of Seismicity in Himalaya	825
25.5.1	Narrow Zone of Earthquakes	825
25.5.2	Basal Plane of Detachment	827
25.5.3	Clustering of Epicentres	828
25.5.4	Great Earthquakes	831
25.5.5	Seismicity at North-western Terminal	832
25.6	Seismicity in the Eastern Flank	834
25.6.1	Segmented Plate Margin	834
25.6.2	Myanmar Belts	834
25.6.3	Andaman Island Arc and Back-Arc Sea	837
25.7	Stable Continental Seismicity: Northern Peninsular India	838
25.7.1	Reactivation of Ancient Faults	838
25.7.2	Delhi–Haridwar Ridge	838
25.7.3	Meghalaya Massif	840
25.7.4	Kachchh Domain	841
25.7.5	Narmada and Tapi Grabens	844
25.8	SCR Seismicity: Southern Indian Shield	845
25.8.1	Deccan Plateau	845
25.8.2	Mysore Plateau	846

25.8.3	Kerala Region	847
25.8.4	Tectonics of the Tail End	847
	References	849
26	Ocean Around Peninsular India	859
26.1	Seafloor Structure and Morphology	859
26.1.1	Origin.	859
26.1.2	Characteristic Features	859
26.1.3	Diffuse India–Australia Plate Boundary	862
26.2	Tectonics of the Bay of Bengal	864
26.2.1	Plate Movement.	864
26.2.2	Evolution of Ninety East Ridge.	864
26.2.3	Structure and Origin of Eighty Five East Ridge	865
26.3	Geodynamics of the Arabian Sea.	866
26.3.1	Origin of Carlsberg Ridge and Owen Fracture	866
26.3.2	Evolution of Laxmi Basin	868
26.4	Magmatic Rocks of the Indian Ocean	868
26.5	Deep-Sea Sedimentation: Faunal Record.	869
26.5.1	Western Part.	869
26.5.2	Eastern Part	870
26.6	Evolution of Mid-Oceanic Island Chains.	871
26.6.1	Maldivé Coral Islands	871
26.6.2	Lakshadweep Islands.	872
26.7	Submarine Sediment Fans	872
26.7.1	Bengal Fan.	872
26.7.2	Indus Fan	874
26.8	Structure of and Sedimentation on Continental Margin	875
26.8.1	Western Continental Margin	875
26.8.2	Eastern Continental Margin.	878
26.8.3	Sedimentation off Irrawaddy Delta	879
26.9	Sea-Level Change	880
26.10	Ongoing Movements and Seismicity	881
26.11	Mineral Assets	881
	References	882
27	The Evolving Indian Continent	889
27.1	India, a Collage of Many Terranes.	889
27.2	Formation of Continental Nuclei	889
27.2.1	Indian Shield	889
27.2.2	Developments in Dharwar Craton	890
27.2.3	Bastar Craton.	891
27.2.4	Singhbhum Craton.	891
27.2.5	Bundelkhand Craton	892