



## CONTENTS

<b>List of Tables</b>	iii
<b>List of Figures</b>	iv
<b>Acknowledgements</b>	vi
<b>CHAPTER 1 Introduction</b>	1-15
1.1 Proterozoic time on the Earth	3
1.2 The Proterozoic Basins of India	6
1.3 Aims of the present investigation	13
1.4 The structure of the Thesis	14
<b>CHAPTER 2 Geological Framework and Analytical Methods</b>	16-65
<b>2.1 Geological Framework</b>	16
2.1.1 General description of the Vindhyan Super group	16
2.1.2 Lithostratigraphy of the Vindhyan	20
2.1.2.1 Vindhyan of the Son Valley	20
2.1.2.2 Vindhyan of Rajasthan	24
2.1.3 Biostratigraphy of the Vindhyan	25
2.1.4 Geochronology in the Vindhyan	30
<b>2.2 Field Relationship and sampling</b>	33
2.2.1 Field relationships	33
2.2.2 Sampling strategy and sample details	41
<b>2.3 Experimental Methods</b>	52
2.3.1 Petrography	52
2.3.2 Major element analysis	53
2.3.3 Loss on Ignition (LOI) analysis	54
2.3.4 Analysis of Trace elements including Rare Earth Elements (REE)	57
2.3.5 Analysis of Radiogenic isotope ratios	61
2.3.6 Stable C and O isotopic ratio analysis	64
2.3.7 Detrital zircon geochronology	65

<b>CHAPTER</b>	<b>3</b>	<b>Results and Discussion</b>	<b>66-161</b>
<b>3.1</b>	<b>Results</b>	<b>66</b>	
3.1.1	Geochemical Data	66	
3.1.2	U-Pb analytical data for detrital zircons	68	
3.1.3	$\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ data from limestones	68	
3.1.4	$^{87}\text{Sr}/^{86}\text{Sr}$ data from limestones	69	
<b>3.2</b>	<b>Discussion</b>	<b>94</b>	
3.2.1	Pre-Vindhyan rocks	94	
3.2.1.1.	The Berach Granites	94	
3.2.1.2.	Mafic igneous rocks	96	
3.2.2	Vindhyan Sedimentary Sequences	101	
3.2.2.1	Petrography of sandstones	103	
3.2.2.2	Clues from Major elements	105	
3.2.2.3	Clues from Trace elements	111	
3.2.2.4	The Radiogenic isotope studies	129	
3.2.3	Geochronological Studies	143	
3.2.3.1	Detrital Zircon Geochronology of the Sawa Sandstone (Lower Vindhyan)	143	
3.2.3.2	Nd model ages ( $T_{\text{DM}}$ )	145	
3.2.3.3	Sr-isotope Stratigraphy (Upper Vindhyan)	145	
3.2.4	Provenance of the Vindhyan Sediments	147	
3.2.5	$\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ variations in limestones	153	
3.2.5.1	The Lakeri Limestone	154	
3.2.5.2	The Balwan Limestone	156	
3.2.6	Evolution of the Vindhyan Basin in Rajasthan	159	
<b>CHAPTER</b>	<b>4</b>	<b>Summary and Conclusions</b>	<b>162-165</b>
<b>References</b>			<b>166-178</b>