

## CONTENTS

	<u>Page</u>	
PREFACE	i	
CONTENTS	iv	
LIST OF FIGURES	viii	
LIST OF TABLES	xii	
LIST OF PLATES	xiii	
CHAPTER I	INTRODUCTION	
1.1	Discovery and short survey of nuclear fission	1
1.2	Fission Mechanism	3
1.3	Secondary Emission	14
1.4	Induced fission in elements lighter than Thorium	17
1.5	Importance of the present study	19
	References	21
CHAPTER II	EXPERIMENTAL ARRANGEMENT AND TECHNIQUE OF MEASUREMENT	
2.1	The nuclear research emulsion	26
2.2	Emulsion stacks and their exposure	28
2.3	Processing of emulsions	29
2.4	Shrinkage factor and distortion of emulsion	34
2.5	Stopping power	35

	<u>Page</u>
2.6 Scanning of emulsion plates	36
2.7 Identification of charged particles	37
2.8 Mass estimation ...	44
2.9 Range measurement ...	48
2.10 Measurement of angles ...	49
2.11 Energy from multiple scattering method using cell of constant length	50
2.12 Energy from the observed range	53
2.13 Correction for loss of events	54
References ...	56
 CHAPTER III GENERAL CHARACTERISTICS OF STARS	
3.1 Introduction - formation of stars	58
3.2 Nuclear evaporation process	61
3.3 Experimental method and selection criteria ...	64
3.4 Results ...	66
3.5 Discussions ...	70
References ...	71
 CHAPTER IV RECOILS ASSOCIATED WITH DISINTEGRATION STARS	
4.1 Introduction ...	73
4.2 Experimental procedure and selection criteria ...	74
4.3 Results ...	75
4.3a Mass and charge distribution	76

	<u>Page</u>
4.3b Angular distribution of the residual recoils with respect to the direction of primary beam ...	77
4.3c The velocity distribution of recoils	79
4.3d Discussions ...	80
References ...	81
 CHAPTER V BINARY FISSION	
5.1 Introduction ...	82
5.2 Experimental procedure and selection criteria ...	84
5.3 Experimental results and discussions	85
5.3a Prong multiplicity of fission events	86
5.3b Charge distribution of fission fragments	88
5.3c Cross-section of fission events	90
5.3d Range distribution of fission fragments	94
5.3e The range velocity curve	95
5.3f Range ratio distribution of fission fragments ...	98
5.3g Angular distribution between the fission fragments (binary break up)	99
5.3h Angular distribution of the fission bisectors ...	101
5.3i Angular distribution of the individual fission fragments with respect to primary ...	102
5.3j Discussions ...	103

	<u>Page</u>
5.4 Possible examples of fission at initial stages ...	103
5.5 Summary ...	107
References ...	109
 CHAPTER VI RARE TYPES OF FISSION	
6.1 Introduction ...	111
6.1a Ternary fission ...	111
6.1b Probable explanation of Ternary fission ...	114
6.1c Quaternary fission ...	115
6.1d Mechanism of Quaternary fission	116
6.2 Experimental procedure and selection criteria ...	118
6.3 Results of analysis and discussions	119
6.4 Analysis of a few Ternary events	121
6.5 Quaternary fission ...	125
References ...	128
 CHAPTER VII FISSION AND SHORT RANGE OR SPALLATION HYPERFRAGMENTS	
7.1 Introduction ...	130
7.2 Experimental procedure and selection criteria ...	134
7.3 Results ...	136
7.4 Comparison of results and discussions	137
References ...	140
 CHAPTER VIII CONCLUDING REMARKS	 141