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KARST GEOMORPHOLOGY OF THE PUKETOI RANGE,
NORTHERN WAIRARAPA, NEW ZEALAND.

A thesis presented in partial fulfilment of the
requirements for the degree of Masters of Science
in Geography at Massey University.

Stuart Lorris Halliday
December 1987

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Frontpiece Puketoi Range looking south from Trig 15. The Waewaepa Range is to the right. Note the changes in drainage texture with respect to geology.

“To sit on rocks; to muse o'er flood and fell;
To slowly trace the forest's shady scene;
Where things that own not man's dominion dwell;
And mortal foot hath ne'er or rarely been;
To climb the trackless mountain all unseen;
With the wild flock that never needs a fold;
To lone o'er sleeps and foaming falls to leant;
This is not solitude; 'tis but to hold
Converse with Nature's charms; and view her stores unroll'd.”

Cofenzo 1884.

ABSTRACT

The research described in this thesis is the first investigation of the karst geomorphology of Pliocene and Pleistocene limestones in the southern Hawke's Bay - northern Wairarapa area. The study area is the Puketoi Range, which is situated 30 km southeast of Dannevirke.

The geology of the range is examined and a new geological map of the area has been completed. The Te Aute Group (Pliocene in age) forms much of the range. This consists of two limestone beds, the Te Onepu and Awapapa Limestone Formations interbedded between two mudstone beds. This is overlain by younger Pleistocene material, the Kumeroa Formation, the upper portion of which is limestone underlain by mudstone.

Solutional processes and erosion within the range is investigated. Three distinctive types of water are identified: allogenic water derived from non-karst areas, autogenic water derived from the limestone, and mixed allogenic-autogenic water. Each of these water types has specific characteristics. The solutional erosion rate for a limestone basin within the range is approximately $58.2 \text{ m}^3/\text{km}^2/\text{yr}$.

Selected karst and non-karst landforms and features developed on the Puketoi Range are examined. Two of these features, case-hardened limestone and bogaz, have not previously been described in detail in New Zealand. Many of the features are the result of, or have been modified by, past periglacial climatic conditions. Other landforms are developing under present climatic conditions.

The characteristics of three drainage basins developed on limestone, mudstone and greywacke respectively, are investigated. The drainage density on mudstone is the highest of the three basins examined, and densities on limestone and greywacke are similar.

Sediment is examined from two caves in the area. Within Ramsay's Neck Cave ancient sediment was probably deposited during the Otira Glaciation. This sediment consists of ancient cave stream sediment, forming basal gravels overlain by fine-grained sediment and, in places, speleothems. This sediment contains allophane, a volcanically derived material, which was possibly deposited after a heavy volcanic ash fall within the cave's

drainage basin.

The sediment examined within PT17 Cave is contemporary gravel fluctuating in response to present hydrological conditions within the cave. Surface features indicate that in the past, gravel has completely infilled the cave, re-establishing surface drainage until the gravel was flushed from the cave.

The development of the Puketoi Range cuesta and its subsequent modification is examined. The two limestone beds on which the range has developed strongly control the shape and form of the range.

ACKNOWLEDGMENTS

I would like to thank the following people for their help and assistance in the course of my research:

I am particularly grateful to Dr Mike Shepherd for his supervision, encouragement and assistance in the field, and for his constructive criticism in the preparation of this thesis. Thanks to Dr John McArthur and Mr Richard Heerdegen, and other staff of the Geography Department, for their help. Thanks also to Dr R.D.Reeves, Chemistry Department, for help with the use of equipment in the analysis of water samples; Dr R.B.Stewart, Ms Jo Thomkins and other staff of the Soil Science Department for their help in the analysis of cave sediment. I am grateful to Dr Ashley Cody, NZGS Rotorua, for examination of the moonmilk sample.

I thank Mr Russell Burn, Coonoor, for accommodation, vehicles and assistance during fieldwork; Mr Richard Brown and other farmers along the Puketoi Range for allowing unlimited access to their properties. Thanks to Peter Entwistle, Sue Cade, Jeff Archer, and other cavers for the many hours spent looking for caves and help in their survey; Manawatu Speleological Group for the use of their aerial mosaic photos of the Puketoi Range, and the New Zealand Speleological Society for the grant to help with research expenses.

I am indebted to Mr Brian Solomon and Mr David Feek for technical assistance; Mrs Anne Stoddart for help with figures and Mrs Karen Puklowski for help with cartography.

Much thanks also to my Mum. I dedicate this thesis to my late Dad for all his encouragement. Also much thanks to Jacqui Aimers for the many days spent in the field, for proof-reading this thesis, help with drawing figures, painting the geology maps, and for all her tolerance and encouragement during the writing of this thesis.

TABLE OF CONTENTS

	<u>Page</u>
FRONTPIECE	
VERSE	ii
ABSTRACT	iii
ACKNOWLEDGMENTS	v
TABLE OF CONTENTS	vi
LIST OF APPENDICES	ix
LIST OF FIGURES	x
LIST OF TABLES	xi
LIST OF PHOTOGRAPHS	xii
1 INTRODUCTION	1
1.1 Introduction	1
1.2 Aims and Approach	2
1.3 Study Area	2
1.4 Natural and Human History	3
1.5 Regional Climate	7
1.6 Soils	9
1.7 Periglacial Climate	9
2 GEOLOGY	12
2.1 Introduction	12
2.2 Previous Geological Work	12
2.3 Economic Geology	14
2.4 Structural and Tectonic Framework of the East Coast, North Island	17
2.5 Palaeogeography and Depositional History of the East Coast of the North Island	21
2.6 Tectonic and Depositional History of the Puketoi Range	26
2.7 Geology of the Puketoi Range	28
2.7.1 Structure	28
2.7.2 Lithology	29
2.7.3 Petrology of Te Aute Group Limestone, Puketoi Range	29
2.8 Geology Map of the Puketoi Range	30
2.8.1 Method of Geological Investigation	30
3 KARST SOLUTIONAL PROCESSES AND EROSION	34

3.1	Introduction	34
3.1.1	The Chemistry of Solution	35
3.2	Method of Investigation	37
3.2.1	Description of Water Sample Sites	38
3.2.2	Results	42
3.2.2.1	Allogenic Water	43
3.2.2.2	Autogenic Water	44
3.2.2.3	Mixed Allogenic-autogenic	45
3.3	Calculation of Solutional Erosion	46
3.3.1	Computational Techniques in the Estimation of Solutional Erosion	47
3.3.2	Description of the Towai Drainage Basin	49
3.3.3	Estimation of Solutional Erosion	49
3.3.4	Net Rate of Solutional Erosion	54
3.3.5	Comparison of Solutional Erosion Rate With Other Estimates in New Zealand and World-wide	55
3.4	Conclusions	56
4	KARST LANDFORMS AND CASE-HARDENING WITHIN THE PUKETOI RANGE	57
4.1	Introduction	57
4.2	Fluvial Karst Features of the Puketoi Range	57
4.2.1	Gorges	57
4.2.2	Blind Valleys	58
4.2.3	Steepheads and Pocket Valleys	59
4.2.4	Karst Windows	59
4.2.5	Dry Valleys	59
4.2.5.1	Dry Valley Formation	60
4.2.5.2	Asymmetrical Dry Valley Shape	61
4.3	Dolines	63
4.3.1	Dolines Within the Puketoi Range	65
4.4	Karren and Limestone Pavements	66
4.4.1	Karren	66
4.4.1.1	Karren Types in the Puketoi Range	68
4.4.2	Limestone Pavements	70
4.5	Bogaz	72
4.5.1	Terminology	74
4.5.2	Bogaz Within the Puketoi Range	76
4.5.2.1	Description of Bogaz at Oporae	81
4.5.2.2	Description of Bogaz at Waewaepa	82

4.5.2.3 Formation of Bogaz Within the Puketoi Range	82
4.6 Case-hardening of Limestone	84
4.6.1 Previous Studies	84
4.6.2 Case-hardening in the Puketoi Range	86
4.6.2.1 Method of Investigation	86
4.6.2.2 Results	86
4.6.2.3 Discussion	87
4.7 Conclusions	89
5 DRAINAGE CHARACTERISTICS	91
5.1 Introduction	91
5.1.1 Surface Drainage - a Generalized View	91
5.2 Drainage Basin Characteristics	92
5.2.1 Method	93
5.2.2 Results	97
5.2.3 Conclusion	98
6 CAVE SEDIMENT	100
6.1 Introduction	100
6.1.1 Description of Caves Investigated in the Puketoi Range	102
6.1.1.1 Ramsay's Neck Cave	102
6.1.1.2 PT17 Cave	104
6.2 Chemical Deposits	104
6.2.1 Speleothem Development	108
6.2.2 Uranium-series Dating of Speleothems	108
6.2.3 Speleothems Removed for Dating	109
6.2.3.1 Description of Samples	110
6.2.4 Dates of the Speleothem Samples Removed	112
6.3 Clastic Deposits	112
6.3.1 Description of Clastic Sediment From Ramsay's Neck Cave	112
6.3.1.1 Ancient Cave Stream Sediment	115
6.3.1.2 Fine-grained Sediment	116
6.3.1.3 Analysis of Fine-grained Sediment	117
6.3.1.4 Contemporary Cave and Surface Stream Sediment	118
6.3.1.5 Discussion of Sediment Size in Ramsay's Neck Cave	119
6.3.2 Gravel Fluctuations in PT17 Cave	120
6.3.2.1 Surface Evidence of Previous Gravel Levels	

within PT17 Cave	120
6.3.2.2 Contemporary Gravel Fluctuations within PT17 Cave	121
6.4 Organic Deposits	124
6.5 Sedimentation within Ramsay's Neck Cave	127
6.6 Conclusions	130
7 CUESTA DEVELOPMENT	132
7.1 Introduction	132
7.2 Development of the Puketoi Range Cuesta	133
7.3 Drainage Development	135
7.4 Mass Movement and Gravity-sliding on the Scarp Slope	137
7.5 The Significance of the Limestone Beds within the Puketoi Range	139
7.6 Conclusions	140
8 CONCLUSIONS	141
APPENDICES	146
REFERENCES	206

LIST OF APPENDICES

1 PLANTS OF THE ORIGINAL FOREST OF THE "FORTY MILE BUSH" AREA AND SUBFOSSIL BONES FROM CAVES WITHIN THE PUKETOI RANGE	146
2 LITHOSTRATIGRAPHY OF THE PUKETOI RANGE	150
3 STRATIGRAPHIC SECTIONS OF THE PLIOCENE TE AUTE GROUP IN THE PUKETOI RANGE	158
4 DATA COLLECTED FROM THE ANALYSIS OF WATER SAMPLES	167
5 GRAPHS OF VARIATION IN CARBONATE CONTENT OF WATER SAMPLES AT EACH SAMPLING SITE	176
6 STATISTICAL DATA AND CORRELATION MATRICES FOR WATER SAMPLING SITES	192
7 THORIUM/URANIUM DATING METHOD	198
8 PARTICLE SIZE ANALYSIS OF SEDIMENT FROM RAMSAY'S NECK CAVE AND THE STREAM FLOWING INTO THE CAVE	200
9 POLLEN EXTRACTION METHOD	204

LIST OF FIGURES

1.1 Location map of study area and towns mentioned in the text	4
1.2 Place names mentioned in the text	5
1.3 Graph of variation in rainfall distribution over the Puketoi Range	8
2.1 A map and block diagram illustrating a plate tectonic interpretation of the structure and landforms of Hawke's Bay	18
2.2 Palaeogeographic maps showing development of Hawke's Bay and Wairarapa	
a Pliocene	23
b Early Pleistocene	23
c Middle Pleistocene	24
d Late Pleistocene	24
3.1 Water sampling sites and rainfall collection points in the Puketoi Range	39
3.2 Towai drainage basin	50
3.3 3-D computer drawn image of Towai drainage basin	51
4.1 Map of asymmetrical dry valleys in the vicinity of Pori	62
4.2 Joint orientation of grikes and bogaz	73
4.3 Location map of bogaz and dolines at Oporae	77
4.4 Location map of bogaz and dolines at Waewaepa	78
4.5 Plan and cross-section of bogaz at Oporae	79
4.6 Plan and cross-section of bogaz at Waewaepa	80
4.7 Fault patterns in adjoining anticlines and synclines in southeast Algeria	83
4.8 Profile of R-values of case-hardened limestone at Oporae	88
5.1 Mudstone drainage basin on the eastern scarp slope of the Puketoi Range	95
5.2 Greywacke drainage basin on the eastern flanks of the Waewaepa Range	96
5.3 Limestone drainage basin to the north of Coonor, Puketoi Range.	96
6.1 Ramsay's Neck Cave	103

6.2 Geology and drainage of Ramsay's Neck Cave and surrounding area	105
6.3 PT17 Cave	106
6.4 Sketch of speleothem removed from Ramsay's Neck Cave for dating	111
6.5 Generalized sedimentary section from passage B, Ramsay's Neck Cave	113
6.6 Graph of particle size analysis for cave and surface sediment associated with Ramsay's Neck Cave	114
6.7 Relationship between velocities of erosion, transportation, and sedimentation according to Hjulström 1935	116
A.1 Isopach map (in metres) of the Te Aute Group in southern Hawke's Bay.	152
BACK POCKET Geology Map of the Puketoi Range	

LIST OF TABLES

2.1 Tabulation of stratigraphic nomenclature used by previous authors in the Hawke's Bay and northern Wairarapa.	15
2.2 Late Cenozoic chronostratigraphic divisions.	16
3.1 Type of water sampled at each site	43
3.2 Weather data used in the estimation of evaporation	53
5.1 Drainage density figures for three basins in the Puketoi Range	97
6.1 Sedimentary sequence in passage B, Ramsay's Neck Cave, with related cave environmental conditions	112
6.2 Folk-Ward statistics of mean and standard deviation of cave and surface stream sediments	115
6.3 Analysis of fine-grained sediment from Ramsay's Neck Cave	117

LIST OF PHOTOGRAPHS

FACING PAGE

FRONTPIECE Puketoi range from Trig 15 looking to the south.	i
4.1 Blind valley, Famous Five Cave	58
4.2 Karst window, Famous Five Cave system	58
4.3 Beheaded dry valley	61
4.4 Map of asymmetrical dry valleys in the vicinity of Pori	61
4.5 Large solutional doline at Coonoor	64
4.6 Subjacent doline	64
4.7 Solutional dolines coalsecing into one large doline	66
4.8 The same dolines as shown in photo 4.7, but during summer	66
4.9 Karren field on the western side of Oporae	68
4.10 Large rinnenkarren, rundkarren and meanderkarren	69
4.11 Rinnenkarren and rundkarren on nearly vertical rock outcrop	69
4.12 Kamenitzas or cup karren	69
4.13 Cave karren within PT17 Cave	69
4.14 Karrren developed on Mangatoro Mudstone	69
4.15 Limestone pavement	71
4.16 View of Oporae bogaz. Photo is looking to the north	81
4.17 Individual bogaz, southern end of Oporae bogaz area	81
4.18 Individual bogaz, Waewaepa Station	82
4.19 Case-hardened limestone at Oporae	87
4.20 Case-hardened isolated rock	87
5.1 Drainage basin developed on Mangatoro Mudstone Formation along the eastern scarp slope of the Puketoi Range.	94
6.1 Phreatic tube and vadose notch within Ramsay's Neck Cave	104
6.2 Longitudinal section of speleothem column removed from passage A, Ramsay's Neck Cave	110
6.3 Cross-section of spelethem removed from passage B, Ramsay's Neck Cave	110
6.4 Speleothem flowstone removed from Alans Ego Chamber, PT17 Cave	111
6.5 Sedimentary sequence examined within Ramsay's Neck Cave	113
6.6 Abandoned stream bed and terraces downstream of PT17 Cave	120
6.7 Gravel level within PT17 Cave before flooding	122

6.8	Gravel level within PT17 Cave after flooding	122
7.1	Aerial oblique view along the Puketoi Range, looking towards the south	135
7.2	Stream gap behind Makuri	136
7.3	Large scale mass movement on the southeastern side of Oporae	138
7.3	Gravity-sliding at the southern end of the Puketoi Range	138