

Durham E-Theses

A dermatoglyphic investigation of selected skin disorders

David Blackwell

How to cite:

Blackwell, David (1994) A dermatoglyphic investigation of selected skin disorders. Doctoral thesis, Durham University.

Use policy

The full-text may be used and/or reproduced, and given to third parties in any format or medium, without prior permission or charge, for personal research or study, educational, or not-for-profit purposes provided that:

- a full bibliographic reference is made to the original source
- a <https://etheses.durham.ac.uk/id/eprint/5536/> is made to the metadata record in Durham E-Theses
- the full-text is not changed in any way

The full-text must not be sold in any format or medium without the formal permission of the copyright holders.

Please consult the [full Durham E-Theses policy](#) for further details.

A Dermatoglyphic Investigation of Selected Skin Disorders
in two volumes
Volume One.

David Blackwell

Thesis submitted for the degree of Doctor of Philosophy
Department of Anthropology
University of Durham

1994



12 SEP 1994

ABSTRACT

This investigation involved the study of qualitative and quantitative digital and palmar traits in patients with various selected skin disorders and normal control subjects. The collection of 3,030 sets of finger and palm prints was carried out. For each set of prints, 135 discrete variables were measured and recorded. The data obtained by this procedure was then subjected to computer aided statistical analysis.

The material is presented in the thesis in the following way:-

In Chapter One a brief introduction to the theory and history of dermatoglyphic studies is presented along with information concerning the nature of epidermal ridges and their mode of development.

A brief description of the skin disorders studied is given in Chapter Two. For each disorder the clinical presentation, aetiology, incidence, pathology and genetics are described. Chapter Three consists of a review of previous research into dermatoglyphics in skin disorders.

Chapter Four contains a description of the standardized method used for obtaining the digital and palmar prints. Information about the various sample groups of subjects which were printed is given here. Details of the method of examination of the prints and of the variables measured are also provided.

The various forms of statistical analysis applied to the data are described in Chapter Five. The variables computed from the original data, descriptive statistics, univariate and multivariate analytical procedures are explained in detail.

In the next two chapters the results obtained for the main sample of common skin disorders are presented. Chapter Six contains the results for variables on the fingers and Chapter Seven consists of the results for palmar variables. The results of the three smaller studies of rare skin disorders are presented in Chapter Eight.

In Chapter Nine the overall conclusions related to the original aims and objectives of the study are presented and discussed. Finally, a critical appraisal of the study is carried out and suggestions are made for improvements and further investigations.

CONTENTS

<u>ACKNOWLEDGEMENTS</u>	(i)
<u>PREFACE</u>	(iii)
<u>AIMS AND OBJECTIVES</u>	(iv)
<u>CHAPTER ONE - INTRODUCTION</u>	
1.1 Dermatoglyphics	1
1.2 History of the study of dermatoglyphics	1
1.3 Characteristics of Ridged Skin	3
1.4 Development of Dermal Ridges	3
1.5 Dermatoglyphics and medicine	6
1.6 Dermatoglyphics in Clinical Disorders	7
<u>CHAPTER TWO - SKIN DISORDERS</u>	
2.1 Introduction	10
2.2 Atopic Eczema	10
2.3 Psoriasis	12
2.4 Vitiligo	14
2.5 Alopecia Areata	15
2.6 Basal Cell Carcinoma	16
2.7 Actinic Keratosis	17
2.8 Dermatitis Herpetiformis	19
2.9 Darier's Disease	20
2.10 Incontinentia Pigmenti	21
2.11 Anhidrotic Ectodermal Dysplasia	23
2.12 Pemphigus	23
2.13 Ichthyosis	24
2.14 Discoid Lupus Erythematosus	26
2.15 Systemic Lupus Erythematosus	26
2.16 Glossary of dermatological terms	28
<u>CHAPTER THREE - RESEARCH REVIEW</u>	
3.1 Introduction	31
3.2 Dermatoglyphic studies of particular skin disorders	32
(a) Psoriasis	32
(b) Atopic Eczema	45
(c) Ichthyosis	50
(d) Alopecia areata	56
(e) Vitiligo	61
(f) Dermatitis herpetiformis	68
(g) Discoid Lupus Erythematosus	73
(h) Pemphigus	77
(i) Basal cell naevus syndrome	79
(j) Darier's Disease	80
(k) Incontinentia pigmenti	80
(l) Anhidrotic Ectodermal Dysplasia	81
3.3 Summary and Discussion	84
(A) Disease Approach	84
(B) Dermatoglyphic Approach	96

CHAPTER FOUR - MATERIALS AND METHODS

4.1	Standardized method for obtaining finger and palm prints	100
4.2	Postal Printing Kit	103
4.3	Subject Questionnaire	103
4.4	Confidentiality	105
4.5	The Subject Sample	106
	(a) The main sample	106
	(b) The control sample	107
	(c) DH and coeliac disease	110
	(d) Darier's Disease	111
	(e) IP and AED	111
	(f) Miscellaneous other disorders	111
4.6	Print Examination	112
4.7	Classification of Dermatoglyphics	113
	(A) Variables on Fingers	114
	(i) Finger Pattern types	114
	(ii) Finger Ridge Counts	117
	(iii) Finger Ridge Disturbances	118
	(B) Variables on Palms	120
	(i) Palmar Pattern Occurrence	120
	(ii) Palmar Ridge Counts	123
	(iii) Palmar Triradii	123
	(iv) Palmar Mainline Directions	129
	(v) Palmar Flexion Creases	131
	(vi) Palmar Ridge Disturbances	135
4.8	Recording of Data	137
4.9	Variables Measured	137

CHAPTER FIVE - ANALYSIS OF DATA

5.1	Introduction	144
5.2	Computed variables	144
	(A) Fingers	144
	(B) Palms	149
5.3	Descriptive Statistics	151
5.4	Comparison of samples: Mann-Whitney U Test	153
5.5	Discriminant Analysis	154
5.6	Factor Analysis	156

CHAPTER SIX - RESULTS PART ONE - MAIN SAMPLE - COMMON SKIN DISORDERS -

FINGERS

6.1	Introduction	159
6.2	Results for variables on fingers	160
	(a) Finger Patterns	160
	(i) Finger Pattern Type Occurrence	160
	(ii) Finger Loop Scores	203
	(iii) Finger Delta Scores	250
	(iv) Finger Pattern Intensity Indices	278
	(b) Finger Ridge Counts	282
	(i) Individual ulnar and radial ridge counts	282
	(ii) Unilateral Ridge Counts	323
	(iii) Absolute Ridge Counts	350

(iv) Summed Ulnar and Radial Counts	377
(v) Summed Radial and Ulnar Counts	406
(vi) Summed Unilateral Ridge Counts	416
(vii) Summed Unilateral Counts	425
(viii) Summed Absolute Ridge Counts	441
(ix) Summed Absolute Counts	461
(x) Results of Factor Analysis for Ridge Counts	477
(c) Finger Ridge Disturbances	503
(i) White lines	503
(ii) Hyperlinearity	528
(iii) Finger Ridge Atrophy	553

CHAPTER SEVEN - RESULTS: PART TWO - MAIN SAMPLE: VARIATION ON PALMS

7.1	Palmar Patterns	568
(a)	Palmar Pattern Occurrence	568
(b)	Interdigital Pattern Intensity Indices	600
(c)	Hypothenar Pattern Intensity Indices	614
7.2	Palmar Triradii	627
(a)	accessory triradii	627
(b)	axial triradii	627
(c)	axial triradial counts	636
(d)	Palmar Pattern Intensity Indices	636
(e)	Maximal atd angles	651
7.3	Palmar Ridge Counts	666
(a)	Individual Ridge Counts	666
(b)	Summed Palmar Ridge Counts	686
(d)	Factor Analysis - Palmar Ridge Counts	705
7.4	Palmar Mainline Directions	718
7.5	Palmar Flexion Creases	725
7.6	Palmar Ridge Disturbances	732

CHAPTER EIGHT - RESULTS: PART THREE - SMALLER STUDIES OF RARE

DISORDERS

8.1	Introduction	742
8.2	Dermatitis Herpetiformis and Coeliac Disease	742
(a)	Finger Patterns	742
(i)	Finger Pattern Types	742
(ii)	Ulnar and Radial Loop Scores	759
(iii)	Finger Delta Scores	776
(iv)	Finger Pattern Intensity Indices	791
(b)	Finger Ridge Counts	794
(i)	Individual Finger Ridge Counts	794
(ii)	Unilateral Finger Ridge Counts	808
(iii)	Absolute Ridge Counts	819
(iv)	Summed Ulnar and Radial Counts	833
(v)	Summed Radial and Ulnar Counts	844
(vi)	Summed Unilateral Ridge Counts	847
(vii)	Summed Absolute Ridge Counts	850
(c)	Finger Ridge Disturbances	862
(i)	White Lines	862
(ii)	Finger Ridge Hyperlinearity	866
(iii)	Discriminant Analysis	870
(iv)	Ridge Atrophy	881

(d) Palmar Patterns	884
(i) Palmar Pattern Occurrence	884
(ii) Hypothenar Pattern Intensity Indices	899
(iii) Interdigital Pattern Intensity Indices	902
(e) Palmar Triradii	905
(i) Accessory Triradii	905
(ii) Axial Triradii	908
(iii) Axial Triradial Counts	911
(iv) Palmar Pattern Intensity Indices	914
(v) Maximal atd angles	917
(f) Palmar Ridge Counts	920
(i) Individual and Summed Ridge Counts	920
(ii) Summed Total Palmar Ridge Counts	929
(iii) Factor Analysis	932
(g) Palmar Mainline Direction	937
(h) Palmar Flexion Creases	941
(i) Transverse Flexion Crease	941
(ii) Thenar Flexion Creases	944
(i) Palmar Ridge Disturbances	947
(i) Ridge Atrophy	947
(ii) Hyperlinearity	950
8.3 Incontinentia Pigmenti	952
8.4 Anhidrotic Ectodermal Dysplasia	960
8.5 Darier's Disease	961
(i) Introduction	961
(ii) Finger Ridge Counts	967
(iii) Finger Patterns	989
(iv) Finger Ridge Disturbances	1000
(v) Palmar Patterns	1015
(vi) Palmar Triradii	1023
(vii) Palmar Ridge Disturbances	1025
(viii) Pits and Plaques	1028

CHAPTER NINE: DISCUSSION AND CONCLUSIONS

9.1 Introduction	1029
9.2 Individual Skin Disorders	1029
(a) Psoriasis	1030
(b) Atopic Eczema	1032
(c) Alopecia areata	1034
(d) Vitiligo	1037
(e) BCC	1040
(f) Actinic keratosis	1042
(g) Dermatitis Herpetiformis	1044
9.3 Families of Skin Disorders	1046
(i) Finger Patterns	1046
(ii) Finger Ridge Counts	1047
(iii) Finger Ridge Disturbances	1049
(iv) Palmar Patterns	1049
(v) atd angles	1050
(vi) Palmar Ridge Counts	1050

9.4	Physical Effects of Skin Disorders on Epidermal Ridges	1050
(i)	Atopic Eczema	1050
(ii)	Dermatitis herpetiformis and coeliac disease	1052
(iii)	IP and AED	1053
(iv)	Darier's Disease	1053
(v)	Usefulness of physical changes of ridges in diagnosis	1054
9.5	Conclusions related to the original aims and objectives	1054
9.6	Critical Appraisal and Concluding Remarks	1056
	BIBLIOGRAPHY	1071
	ADDENDUM	1091
	APPENDIX 1 - Self Printing Kit	1092
	APPENDIX 2 - Computer data sheet and variable coding information	1098
	APPENDIX 3 - Subject data obtained from questionnaires	1107
	APPENDIX 4 - Assessment of epidermal ridge pitting in Darier's disease	1111
	APPENDIX 5 - Method for Sweat Pore Counting	1113

Volume One contains pages 1 - 567

Volume Two contains pages 568 - 1114

ACKNOWLEDGEMENTS

I wish to express my gratitude to the following people for their valuable assistance:

Dr. M.T. Smith of the University of Durham for acting as my supervisor and for providing help and encouragement.

Prof. S. Shuster of the University of Newcastle-upon-Tyne for help, encouragement, inspiration and acting as mentor. Also for kindly arranging financial assistance from N.E. Skin Research Fund.

Dr. W.R. Williams of the University of Durham for advice on dermatoglyphic methodology and on choosing appropriate computer programs for data analysis.

Dr. C. Moss for allowing me to print her I.P. patients and providing clinical details about them.

Dr. C. Munro for providing patients with Darier's disease along with details of their family backgrounds etc., plus much help and encouragement.

Dr. M. Hazell of Sunderland Royal Infirmary for allowing me to print patients in the Skin O.P. Dept.

Mrs. C. Forrester-Patton of the Coeliac Society for allowing me to attend meetings and print coeliac patients.

Mr. and Mrs. A. Przedborski for help in translation of research papers written in various Eastern European languages.

Mrs. M. Dotchin for word processing some of the tables of results.

Mrs. J. Carse and the staff of the data preparation service of Durham University Computer Centre for entering the data onto the computer.

Mrs. M. Blackwell for typing the thesis, correcting mistakes and for her endless patience over the years in which the research and presentation of the thesis has disrupted 'normal' family life.

All of the patients, doctors, nursing staff, students, office staff etc., who agreed to provide their prints and who also helped in a variety of other ways too numerous to mention.

D. Blackwell BA. M.Sc. M.Ed.

PREFACE

The purpose of the investigation was to study the quantitative and qualitative digital and palmar traits in patients with various skin disorders and compare them to normal controls. There have been similar studies of the subject in the past, but although promising findings have been noted, overall the results were inconclusive because very small sample sizes were used and the characteristics studied were rudimentary. This study was therefore designed to improve on previous investigations, firstly by using greater numbers of patients and comparable numbers of controls and secondly by studying a greater range of print characteristics some of which are not normally investigated in dermatoglyphic studies but are relevant to skin disorders.

The study involved an interdisciplinary approach since the methodology was that used in the Department of Anthropology at the University of Durham, the patients were drawn from the Royal Victoria Infirmary of Newcastle and Sunderland Royal Infirmary, the medical aspects of the study were carried out at the University of Newcastle and the data analysis was undertaken at the Computer Centre of Durham University. This diverse nature of approach to the study affected the presentation of the thesis in as much that details of dermatoglyphic theory and methodology are explained which would not normally be included in a thesis strictly within Biological and Anthropology and clinical details of various skin disorders are described which would not need to be explained to dermatologists. The rationale of including these parts is to make the study accessible to both physical anthropologists, medical personnel as well as others with different interests.

AIMS AND OBJECTIVES

- (i) To determine if groups of patients with six common skin disorders, and a group of normal control subjects, can be differentiated between using analysis of dermatoglyphic data.
- (ii) To determine affinities and differences between the six groups of patients with common skin disorders.
- (iii) To determine differences between the groups with skin disorders and normal control subjects.
- (iv) To determine which variables or set of variables best differentiate between the various groups described above.
- (v) To determine whether or not dermatoglyphic variables can be used to discriminate between groups of subjects with four rare skin disorders, their unaffected first degree relatives, relatives of proven carrier status and normal controls.
- (vi) To determine which variables or set of variables best differentiate between the groups described in (v) above.
- (vii) To determine the physical effects of the skin disorders on the epidermal ridges.
- (viii) To determine if the findings of other research workers can be supported using the findings of this study.
- (ix) To determine the usefulness of dermatoglyphic variables and/or physical changes to the epidermal ridges as aids to diagnosis of various skin disorders.

CHAPTER ONE - INTRODUCTION

1.1 - Dermatoglyphics

Dermatoglyphics is the study of epidermal ridges and the patterns formed by them. This definition was first used by Harold Cummins in 1926. The word 'dermatoglyphics' is also used as a collective term for the features of ridged skin, being derived from two Greek words, derma meaning 'skin' and glyphé meaning 'to carve'. A dermatoglyph is, therefore, literally a 'skin carving' or furrow in the skin. Both meanings of the term dermatoglyphics are now in common use among workers in this field.

1.2 - History of the Study of Dermatoglyphics

The first recorded scientific observations of dermal ridges were made in the seventeenth century by Nehemiah Grew who presented a report to the Royal Society in London which was published in the Philosophical Transactions for 1684. In this Grew described sweat pores, epidermal ridges and their arrangement. He included a drawing of the ridge configurations on one hand. G. Bidloo (1685) published a book on human anatomy in which was a drawing of a thumb accompanied by a detailed description of the arrangement of ridges on it. Marcello Malpighi (1686) produced a brief description of the ridge configurations on the palmar and finger surfaces. In the eighteenth century several anatomical works mentioning epidermal ridges and the patterns formed by them were published. Notable amongst these was that of J.C.A. Mayer (1788) who produced detailed drawings of finger patterns accompanied by brief explanatory notes. Mayer in this work made the first clear statement concerning the similarities and differences in the arrangement of epidermal ridges among individuals. In 1814 J.F. Schröter presented a discussion of the morphology of the palmar skin and illustrated the arrangement of ridges and pores. In 1823 Joannes Evangelista Purkinje submitted a thesis to the University of Breslau in which he described fingerprint patterns.

Purkinje was the first person to systematically classify the varieties of ridge patterns on the fingers. His classification distinguished nine basic pattern types. In his work he also mentioned the patterns found on the palms of humans and monkeys and on the prehensile tail of the spider monkey. Henry Foulds (1880) made the first publication relating to finger-print identification. The individuality of fingerprints and their use for identification purposes had been practised in India between 1858 and 1878 by William Herschel. The persistence of epidermal ridge characteristics throughout life was proved by Francis Galton. It was Galton who formulated the first scientific classification of the ridges of palms and fingers in his classic work on 'Fingerprints' in 1892. Edward Henry devised the standard numerical formula for classifying fingerprints in India which he published in 1900 as 'The Classification and Uses of Fingerprints'. This was to be the basis for the fingerprint identification system introduced into England in 1901. Harris Hawthorne Wilder studied comparative dermatoglyphics. His first paper was published in 1897 and in the following three decades he continued his studies into the inheritance of palmar and plantar dermatoglyphics. Inez Whipple (1904) produced a classic study of comparative dermatoglyphics. Kristine Bonnevie (1924) analyzed the inheritance of finger-print characteristics and the embryological processes leading to the expression of particular configurations. Heinrich Poll (1928) investigated racial differences and geographical variation of patterns within races. This scientific study of epidermal ridges and formulation of methods for the analysis of them which was begun by Francis Galton culminated with the publication in 1943 by Harold Cummins and Charles Midlo of 'Fingerprints, Palms and Soles'. This classic work is now regarded as the 'bible for workers in dermatoglyphics' (Gibbs, 1967). L.S. Penrose and S.B. Holt have carried out research into dermatoglyphics and human genetics at the Galton Laboratory, London. Many important contributions, including much of the fundamental work on quantitative genetics of dermatoglyphics in normal populations have been made by these two researchers in collaboration with others (Penrose (1963), Holt (1968)).

Classification procedures which develop the methodology of earlier workers have been produced by Penrose (1968), the traditional scheme, and Penrose and Loesch (1979), the topological scheme. These studies form the basis for the analysis carried out in this study.

1.3 - Characteristics of Ridged Skin

Ridged skin occurs on the palms and soles of all primates. It is also found on the naked distal part of the tail in some New World Monkeys, while the pads of a few mammals in other groups have patches of ridged skin wholly or partly covering the area.

The function of ridged skin is associated with the prehensile use of hands, feet and tails. Currugations of the skin help to prevent slipping, both in locomotion and in grasping. Ridged skin is sometimes referred to as 'friction skin' because of its function as an anti-slipping device. The ridges also help to improve the sense of touch, nerve endings and touch receptors being concentrated in the crests of the ridges. In humans the skin of the entire palmar surface of the hands and fingers and of the plantar surface of the feet and toes is ridged. The ridging continues along the margins of palms, soles, fingers and toes as well as over the tips of the digits. There are no hairs or sebaceous glands in these areas but sweat glands are abundant. The pores of the sweat glands are situated along the crests of the ridges, each ridge having a single row of pores spaced at fairly regular intervals on the summit. Between the epidermal ridges are narrow grooves called sulci. The parallel lines of ridges are curved rather than straight and in certain areas they are arranged in the form of patterns. The detailed structure of ridges is very variable and specific to the individual possessing them.

1.4 - Development of Dermal Ridges

The pattern of epidermal ridges characteristic of a given individual develops at the sites of the volar pads. These

mounds of mesenchymal tissue appear at the tips of the digits and at specific sites on palms and soles during the sixth and seventh week of foetal life. Epidermal ridge differentiation takes place during the third and fourth months of intra-uterine life at which time the pads become very prominent. After ridge formation the pads shrink so concentrating the patterns. This happens in the fifth month and the volar pads disappear completely in the sixth month leaving the ridges which have coalesced into specific patterns replacing them. The ridges are not elevated on the skin until at least the eighteenth week after conception. Five months before birth ridge differentiation is complete and from this time there is no change, either in ridge structure or in the patterns formed by them, during the subsequent period of intra-uterine growth (Holt 1968). It has been demonstrated by Okajima (1975) that ridge patterns could be detected as early as twelve weeks post-conception.

The configuration of ridge patterns is believed to be due to the presence of volar pads as well as their size and position (Bonnievie 1924). Small pads result in the development of simple patterns (arches), whereas more prominent pads lead to more complex ridge configurations (loops and whorls). Foetal pads positioned symmetrically give rise to patterns centred in the middle of the pattern area (whorl) and asymmetrically positioned pads to patterns acentrally oriented within the pattern area (ulnar or radial loops).

Several hypotheses have been postulated concerning the forces responsible for the development of specific ridge patterns. Cummins (1926) suggested that the patterns were a result of physical and topographic growth forces. Tensions and pressures in the skin during early embryogenesis were thought to be responsible for determining the directions of the epidermal ridges. Bonnievie (1929) postulated that fingerprint patterns depend on the underlying arrangement of peripheral nerves. Penrose (1969) suggested that the ridges followed lines of greatest convexity in the embryonic epidermis. Hirsch and Schweichel (1973) postulated that the folds which form the ridges are induced by vessel-nerve pairs. Ridge formation being influenced by any pressure or tension in the

epidermis either internal or due to environmental factors (e.g. embryonic finger movements). Mulvihill and Smith (1969) have provided evidence for the hypothesis that dermal ridge patterns are largely determined by the topography of the foetal hand while the ridges are forming. Their observations suggest that the parallel ridges develop transversely to the plane of growth forces. Since they develop on raised volar pads, curvilinear patterns result whose complexity reflects the height and form of the mounds at the time of ridge development. The initial stage of ridge formation begins when the hand is about 3.5mm in length and is completed when it is approximately 15.5mm long (Hale 1952). Ridges appear first on the balls of the fingers, later on the palms and finally the soles (Cummins and Midlo 1943). It seems that configurations on fingers are affected to a lesser extent by environmental factors than those on palms. This may be due to the precocity of ridge formation on fingers compared to palms. Palmar patterns are, thus, particularly sensitive indicators of developmental abnormalities.

From birth throughout life no developmental changes occur either in the detailed structure of the ridges or ridge patterns. The only changes are those in size, the growth of the ridges keeping pace with the growth of the hands and feet. Superficial injuries can cause temporary damage to the ridges and ridge patterns but on healing the details of the ridges appear exactly as before. Scars are formed if the skin is damaged to a depth of 1mm or more. This results in permanent distortion of the ridges which appear on prints as white lines.

Flexion creases are present at birth and indicate the places where the skin is more firmly attached to the underlying structures than elsewhere. They are recognizable in twelve week old embryos (Hale 1952) and it appears that they are formed at approximately the same time as the epidermal ridges. Strictly speaking the study of flexion creases is not part of dermatoglyphics but, since the two are very closely allied, they are usually studied together.

Past research (Galton 1892, Wilder 1902) has demonstrated

that epidermal patterns are under genetic influence. Holt (1968) carried out a comprehensive study of the genetics of dermal ridges and came to the conclusion that the heredity of many quantitative dermatoglyphic features conforms to a polygenic system with individual genes each contributing a small additive effect. It appears therefore that epidermal ridges have a genetic component controlling their formation, numbers and sites of appearance which is then modified by developmental and environmental effects in the uterus before birth.

1.5 - Dermatoglyphics and Medicine

If the growth of the limbs is disturbed in very early foetal life changes in the epidermal ridge configurations are likely. Such growth disturbances may result from environmental factors in utero, single gene mutations or chromosomal aberrations. Abnormal dermatoglyphics have been reported in many conditions (see below) resulting from the above factors. In many cases the dermatoglyphic findings are typically and specifically peculiar for particular disorders. Dermatoglyphic studies can, and have, been used in medicine as an additional diagnostic tool used to strengthen a diagnosis or diagnostic impression. The use of dermatoglyphics has the advantage of being rapid, inexpensive and the techniques used can be carried out at birth before other procedures are possible. Dermatoglyphics can be used as a screening technique for selecting patients suspected of genetic or chromosomal defects for further, more definitive studies. Detection of unusual dermatoglyphics in a particular patient may suggest a diagnosis when other manifestations of a condition are not apparent and may otherwise have been missed. Dermatoglyphic studies can also be used to verify paternity and zygosity.

Dermatoglyphic studies have been carried out on a variety of clinical disorders. Some of the studies are shown below in Section 1.6 with lists of the research workers concerned. The disorders are grouped under their causal factor, where known. Note that this list is by no means exhaustive, either in terms of

disorder or names of researchers. A selected few examples are given in each case with the purpose of providing an overview of the scope of dermatoglyphic research which has been carried out on medical disorders.

1.6 - Dermatoglyphic Studies in Clinical Disorders

(a) Congenital Malformation of Hands and Feet

- (i) Thalidomide embryopathy: Davies and Smallpeice (1962), Pfeiffer and Schultze zu Berge (1964)
- (ii) Absence or hypoplasia of thumbs: Guanti et.al. (1971), Holt (1968, 1972), Temtamy and McKusick (1969)
- (iii) Triphalangy of the thumbs: Aase and Smith (1969), Bellelli (1939a), Jones and Thompson (1973), Quazi and Smithwick (1970)
- (iv) Holt-Oram Syndrome: Chang (1967), Massumi and Nutter (1966), Rosner and Aberfeld (1970), Sanchez Cascos (1967)
- (v) Anonychia: Holt (1968), Penrose (1965)
- (vi) Distal Phalangeal Hypoplasia: Cantwell (1975), Jongbloet and Van Kempen (1968), Robinow and Johnson (1972)
- (vii) Brachydactyly: Battle et.al. (1973), Hoefnagel and Gerald (1966), Penrose and Holt (1966)
- (viii) Camptodactyly: Goodman et.al. (1972)
- (ix) Syndactyly: Bellelli (1939b), Cummins and Sicomo (1923), Dankmeijer and Waltman (1947), Koenner (1933)
- (x) Polydactyly: Cummins (1926)
- (xi) Ectrodactyly: Hall et.al. (1969), Jancar (1967), McKenzie and Penrose (1952)

(b) Autosomal Chromosome Trisomies

- (i) Down's Syndrome (Trisomy 21): Cummins (1939), Fang (1949, 1950), Holt (1951, 1968), Loesch and Smith (1975), Penrose (1954), Shiono et.al. (1969), Walker (1957, 1958)
- (ii) Trisomy 18: Alter and Schulenberg (1967), Penrose (1947), Walbaum et.al. (1966)
- (iii) Trisomy 13: Conen et.al. (1966), Lee et.al. (1966), Uchida et.al. (1962)

- (iv) Trisomy 8 Mosaicism: Atkins et.al. (1974), Penrose (1972), Schaumann et.al. (1974), Tuncbilek et.al. (1972)

(c) Aberrations of Sex Chromosomes

- (i) Turner's Syndrome (Monosomy of X chromosome): Cheah and Tan (1969), De Cabral et.al. (1967), Holt (1964, 1968), Holt and Lindsten (1964)
- (ii) Klinefelter's Syndrome (Polysomies of X and Y chromosomes): Alter et.al. (1966), Cushman and Soltan (1969), Forbes (1964), Penrose (1963), Shiono (1969)
- (iii) Polysomies of the Y Chromosome: Borgaonkar and Mules (1970), Hubell et.al. (1973), Penrose and Loesch (1967), Uchida et.al. (1964)
- (iv) Polysomies of X Chromosomes: Borgaonkar and Leger (1969), Penrose (1967), Sokolowski et.al. (1969)

(d) Triploidy: Book (1970), Penrose (1968)

(e) Structural Chromosomal Aberrations

- (i) Cri-du-Chat Syndrome (deletion of short arm of chromosome 5): Lejeune et.al. (1964), Schlegel et.al. (1967), Warburton and Miller (1967)
- (ii) Wolf-Hirschhorn Syndrome (deletion of short arm of chromosome 4): Miller et.al. (1970), Warburton (1969), Wolf et.al. (1965)
- (iii) Deletion of short arm of chromosome 18: Ayraud et.al. (1969), Laurent et.al. (1970), Malpeuch et.al. (1971), Reinwein et.al. (1968)
- (iv) Deletion of long arm of chromosome 18: de Grouchy et.al. (1964), Lejeune et.al. (1966), Parker et.al. (1972)
- (v) Ring Chromosome 18: Borgaonkar and Scott (1969), Cenani et.al. (1969), de Grouchy et.al. (1968), Ricci et.al. (1970)

(f) Single Gene Disorders

- (i) de Lange Syndrome: Broholm et.al. (1968), Grosse and

- Opitz (1971), Pfeiffer and Kumbhani (1967), Smith (1966)
- (ii) Rubinstein-Taybi Syndrome: Davison et.al. (1967), Giroux and Miller (1967), Hermann and Opitz (1969), Shiono et.al. (1971) Simpson and Brissenden (1973)
 - (iii) Smith-Lemli-Opitz Syndrome: Fried and Fraser (1972), Nevo et.al. (1972), Schumacher (1969), Smith et.al. (1964)
 - (iv) Cleft Lip and Palate: de Bie and Matton (1973), Dziuba (1972), Piatkowska and Sokolowski (1973), Silver (1968), Wittwer (1967)
 - (v) Cerebral Gigantism: Abraham and Snodgrass (1969), Hooft et.al. (1968), Schaumann and Alter (1973)
 - (vi) Phenylketonuria: Alter (1967), Hirsch (1965)
 - (vii) Huntington's Chorea: Barbeau et.al. (1966)
- (g) Exogenous Factors
- (i) Rubella embryopathy: Achs et.al. (1966), Alter and Schulenberg (1966), Hook et.al. (1971), Purvis-Smith and Menser (1968,1973)
 - (ii) Leukaemia: Aleksandrowicz et.al. (1966), Berka et.al. (1971), Colombo et.al. (1973), Menser and Purvis-Smith (1969,1973), Nora et.al. (1969), Rosner (1969,1970), Till et.al. (1978), Verbov (1969,1970), Wertelecki et.al. (1969,1973).

There have been several comprehensive reviews of the use of dermatoglyphic analysis in medical disorders. Notable among these are the reviews by David (1971), Schaumann and Alter (1976) and Verbov (1985). Readers interested in further details on this subject are referred to these reviews.

CHAPTER TWO - SKIN DISORDERS

2.1 - Introduction

In this chapter a brief description of each of the skin disorders studied is given. For each disorder the clinical presentation, aetiology, incidence, pathology and genetics are described along with any other relevant information. The disorders studied in this investigation are described i.e. atopic eczema, psoriasis, alopecia areata, vitiligo, BCC (including Gorlin's Syndrome), Actinic keratosis, Dermatitis herpetiformis (including Coeliac disease), Darriers disease, Incontinentia pigmenti and Anhidrotic ectodermal dysplasia. In addition those disorders which have been studied by other researchers using dermatoglyphic methods and the results of which are presented in Chapter Two are also described. These disorders are Discoid Lupus Erythematosus, Systemic Lupus Erythematosus, Ichthyosis (including Sjörgren-Larsson Syndrome) and Pemphigus. The purpose of this Chapter is to present some basic background information for readers with little or no knowledge of dermatology. Consequently dermatological terms used in the body of the chapter are explained when first used but there is also a glossary of technical terms with their definitions presented at the end of the chapter. Any readers requiring further information are referred to one of the standard dermatology texts e.g. Hunter, Savin and Dahl (1989), Rook et.al. (1986).

2.2 - Atopic Eczema (Atopic Dermatitis)

This is an inflammatory skin condition predominantly involving the epidermis. Pimples (macules and papules) and blisters (vesicles) exist on an erythematous (reddened) background. It is an irritating condition and excoriations along with secondary infections are common. Oedema, exudation, crusting and scaling occur in the acute stages with lichenification (dry leathery thickening with increased markings) when it becomes chronic.

The term atopy indicates a genetic predisposition to

form excessive amounts of IgE antibody and to develop one or more of a group of related conditions which include asthma, hay fever, urticaria, food and other allergies, and a particular form of eczema. Raised IgE levels have been found in 80% of atopics (Verbov 1979) and it has been estimated that 15% of the population are atopics (Hunter and Savin, 1983).

Atopic eczema usually presents between the age of three months and two years. It has been estimated that at least 3% of infants are affected (Walker and Warin, 1956). The initial involvement is the face and scalp where it tends to be vesicular and weeping. From here it spreads to the elbow and knee flexures, wrists and ankles, and the extensor aspects of the limbs. The lesions in these areas become progressively dry and excoriated. The cardinal feature of atopic eczema is itching, causing affected children to sleep poorly and become hyperactive. The condition, however remits spontaneously before the age of ten in at least two thirds of affected children (Hunter and Savin, 1983). It may reappear, however, at times of stress. Less commonly the disorder presents for the first time in adult life. The distribution is as in childhood with a marked tendency towards lichenification. There is also a more widespread but low grade involvement of trunk, face and hands.

The skin in atopic eczema is commonly dry and may be dry enough to constitute ichthyosis vulgaris. It is common for atopic eczema and ichthyosis to co-exist and about 50% of those with autosomal dominant ichthyosis have evidence of atopy (Verbov 1979). For more details on the co-existence of atopic eczema and ichthyosis see Chapter Three, Section 3.3.

Atopic eczema is genetically transmitted but, although 70% of patients have a family history of atopy (Rajka 1961), the transmission of the eczema is not a simple dominant or recessive trait. Champion and Parish (1972) assert that there is little doubt that inheritance of atopic eczema is polygenic. Fry et.al. (1981) although stating that the mode of inheritance is obscure, postulate that it is autosomal dominance with variable penetration.

In the atopic triad (eczema, asthma and allergic rhinitis)

serum levels of reaginic antibodies (IgE) are elevated and may be extremely high in atopic eczema. The degree of elevation of IgE appears to correlate with the severity of the atopic eczema (Butler and Hanifin, 1984).

Some doubts concerning the role of IgE in the pathogenesis of atopic eczema remain since atopic eczema can occur without raised IgE or with absent serum IgE. In addition the level of serum IgE remains high in atopic eczema patients even when remission occurs and elevated IgE occurs in a number of conditions which have no connection with atopic eczema. Shuster (1978) considers that IgE may have evolved as a defence against skin parasites which would have posed a great threat from secondary skin infection during early cave life. Atopic disorders can thus be viewed as a malfunction of this primary mechanism. There are two theories as to how the disorder of the mechanism can happen. Firstly, if there is a deficiency of mucosal IgA in the first few months of life allergens present in food may be allowed to be absorbed which would provoke the production of IgE. In normal infants intestinal IgA would neutralise these IgE provoking antigens.

The second theory is that in atopics there is a deficiency of T-lymphocytes. These T-cells are possibly T-suppressor cells which modulate IgE production and their deficiency would result in over production of IgE in response to allergens. Shuster (1978) postulates a link between IgE and T-cell function which bridges the aetiological components of the disease but does not agree that this is the primary cause.

2.3 - Psoriasis

This is a common chronic skin disorder which is enormously variable in duration and extent. It consists of well-defined, pink or dull red lesions covered by silvery scales. The disease occurs particularly frequently on extensor prominences. The lesions tend to become confluent and may persist indefinitely. Psoriasis may extend to cover the entire body surface leaving only small islands of uninvolved skin. The disease is unpredictable and capricious in

course with amomalous and atypical forms being common. There is a not infrequent association with arthritis. The prevalence of psoriasis in Western European adults has been estimated to be between 1.5 and 2.0% of the population (Baker and Wilkinson, 1972) and worldwide its frequency is thought to be approximately 1% (Anderson and Voorhees, 1984). The onset of psoriasis is generally between the ages of 10 and 30 years of age and can affect any racial group, although it is uncommon in negroes, occurring equally in both sexes.

Psoriasis appears to be a manifestation of an abnormal constitutional state of genetic origin. There appears to be a plethora of modes of onset and provoking causes. It is regarded as a constitutional or type reaction occurring in a predisposed person. Provoking factors which have been found are vaccination, streptococcal infection, asthma, dysentery, abrasions and numerous other skin infections. Endocrine factors are occasionally important as provoking factors. Psoriasis often clears or improves during pregnancy and may relapse or appear for the first time after parturition. Emotional factors may also play some part in the provocation of psoriasis.

There is much evidence to prove that there is a genetic basis for the aetiology of psoriasis. The evidence has been produced by population surveys, twin studies, pedigree analysis and HLA studies. This evidence points to the inheritance of psoriasis being by a simple dominant gene with incomplete penetration and variable manifestation or multifactorial polygenic inheritance pattern. Post-natal and environmental factors contribute to this. It has been suggested (Montagnani and Rossi, 1969) that psoriasis is not a single entity and that some cases are acquired entirely post-natally.

Epidemiological studies have found that more than one third of patients with psoriasis report psoriatic relatives (Anderson and Vorhees, 1984). The number of positive responses vary between 17% and 80%. They also report that there is a correlation between the degree of disease severity and strength of family history.

2.4 - Vitiligo

This is a common disorder of pigmentation consisting of sharply defined symmetrical patches of depigmentation. The word 'vitiligo' is derived from the Latin 'Vitellus' meaning 'veal' which describes the pale, pink hypochronic areas of the skin. The lesions may vary from a few millimetres to several centimetres in diameter. The main sites of predilection are the face, backs of the hands and wrists, the flexures particularly the axillae and groins, and the genitalia. The lesions are symptomless, the involved skin having a normal texture, apart from being sensitive to sunlight becoming painful and erythematous. The overlying hair may depigment becoming grey or white, or may remain normal with the melanocytes in the hair follicles being unaffected. The edges of the lesions tend to be hyperpigmented producing a contrasting border between affected and unaffected parts of the skin. The course of the disorder is unpredictable and lesions may remain localized and patchy or spread to involve much of the skin surface. Occasionally the lesions repigment from the hair follicles.

There is great variation in the age at which the visible signs of vitiligo appear. It occurs in all ages but its appearance is most common in the second and third decades. The incidence is said to be greater in females but the true sex incidence is difficult to establish because presentation at hospital depends on social factors which vary in different parts of the world. In Europe and North America the prevalence of vitiligo has been estimated at 1% (Shuster 1978) but it is higher in coloured races possibly because of easier recognition. A positive family history has been found in about 35% of cases (Lerner 1959). The existence of a hereditary component in vitiligo has long been believed (Gorl 1934, Gates 1948) and it is now thought that an autosomal dominant mechanism of variable penetrance is involved (Butterworth 1962). Majumder et.al. (1988) postulates that recessive alleles existing at a set of four unlinked diallelic loci are involved in the causation of the disorder.

It has been suggested that vitiligo is an autoimmune

disorder since it is associated with organ-specific autoimmune disorders such as hyperthyroidism, pernicious anaemia, late onset diabetes mellitus, alopecia areata and primary Addison's disease. There is no direct proof of this, however, and a specific HLA antigen frequency has not been found.

2.5 - Alopecia Areata

Alopecia means 'loss of hair', alopecia areata being a localized condition characterised by several well circumscribed areas of sudden hair loss. The lesions are oval or round usually with normal coloured skin, but occasionally it may be pink. The typical patch is uninflamed, with no scaling, but with readily visible empty hair follicles. On the periphery of the enlarging lesions 'exclamation mark' hairs may be seen. They are broken off about 5mm. from the scalp, being thicker at the distal part with the shaft tapering gradually towards the proximal end where they are less pigmented. If the lesion is active the hair surrounding the bald area is easily shed on traction. Patches are most common on the scalp and beard, but other areas, especially the eyelashes and brows can also be affected. A few patients show fine pitting and ridging of the nails which may become brittle. In a first attack spontaneous recovery and regrowth of hair usually occurs in a few months. New hairs appear in the centre of patches and at first these are fine and unpigmented. Gradually the hair regains its normal thickness and colour, although new hair may remain white in older patients. Subsequent episodes tend to have more patches and regrowth is slower. A minority of patients lose all of their hair.

Alopecia areata is a common disorder accounting for some 2% of all new cases seen at dermatology out-patients clinics (Hunter and Savin, 1984). Most cases are in children or young adults, presentation usually being in the third or fourth decade, both sexes can be affected. An immunological basis is suspected because of its association with thyroid disease, vitiligo and atopy. A few cases follow emotional trauma. There is a family history in about 20% of alopecia areata patients and it has been suggested that inheritance may be autosomal dominant (Muller and Winkelmann, 1963). Pathologically there is an increase in the percentage of telogen hairs at the

margins of the areas of hair loss. The shedding of these hairs is followed by the appearance of early anagen hairs that are restrained from further maturation. The hair bulbs are superficially located in the dermis and are enveloped by a connective tissue sheath infiltrated with lymphocytes.

2.6 - Basal Cell Carcinoma (BCC)

This is the most common type of skin cancer and the face of the middle-aged and elderly is the commonest site affected. Three quarters of patients with BCC are over 40 years of age (Sanderson1986). Cumulative exposure to sunlight is the most important factor in the aetiology of the disorder. The prevalence of BCC increases greatly with exposure length. The distribution of tumours, however, does not correlate with the areas receiving most sun. They occur most commonly on the eyelids, at the inner canthus and behind the ear, but seldom on the back of the hand or forearm. The palm, sole and vermilion of the lips are rarely, if ever, involved. Regional factors are obviously involved in the distribution of the tumour and these are most probably related to the density and type of pilosebaceous follicles present in particular areas of the skin. Photosensitizing pitch, tar and oils can act as co-carcinogens with ultra-violet radiation. In addition to the tumours being found on skin damaged by the sun, they may also be found in scars caused by x-rays, burns, vaccination or trauma. Previous treatment with arsenic salts, once present in many tonics, is a proven cause which may predispose the individual to BCCs, often after a lag of many years. The BCC tumour is found as a complication in approximately 20% of sebaceous naevi.

BCC is most prevalent in white-skinned people living near to the equator. Individuals with freckled skin and auburn or ginger hair are particularly prone to develop the tumours. It is extremely uncommon in dark skinned races and less common in Chinese, Japanese and other Mongoloids than in Caucasoids.

BCC is slightly more common in males than in females but on the lower leg the incidence in women is three times greater than in men. BCC appears to rise more frequently, and at a younger age, in patients who are immuno-suppressed. The tumour may on occasion

have a familial incidence, independent of the causes above, and it has been reported in identical twins.

The early BCC lesion is a small pearly pink papule, often with a few fine overlying telangiectases, running radially. At a later stage the epidermis breaks down to form an ulcer with a characteristic raised translucent edge which expands slowly, but relentlessly, hence the common term 'rodent ulcer'. If left untreated the ulcer may reach 1-2 cm. after 5 years. It is invasive locally and untreated lesions will slowly erode the underlying tissues, such as cartilage, bone, brain and blood vessels, but they hardly ever metastasize.

Tumour cells resemble those of the basal layer of the epidermis where the tumour develops. A group of cells grow and become surrounded by a well developed pallisade of tightly packed cells. The cells within the pallisade usually show little evidence of organization or differentiation and the tumour is dependent on the stroma which surrounds it. Occasionally hair follicles and sweat glands develop and there may also be cystic degeneration. Some associated pigmentation may also occur within the tumour. An uncommon variant is the morphoeic type in which strands of the tumour grow deeply and become invasive. Ulceration and crusting followed by fibrosis gives the lesion the appearance of an enlarging scar.

Gorlins Syndrome is a genetically determined disorder in which multiple skin tumours indistinguishable from basal cell carcinoma are found. These tumours may be associated with palmo-plantar pits and defects in other tissues such as cysts of the jaws, abnormalities of the ribs and vertebrae and a variety of less common changes. Genetic studies have shown that Gorlin's Syndrome is a hereditary dysplasia conditioned by an autosomal dominant gene. Chromosome studies suggest that the disorder may be mosaic. Sexes are equally affected with the majority of cases being white-skinned but some cases have been reported in Negroes and Asians.

2.7 - Actinic (Solar or Senile) Keratosis

Disorder of the skin characterised by overgrowth of the

horny layer, consists of discrete rough surfaced lesions which occur on sun-damaged skin. They are considered to be premalignant although only a few turn into squamous cell carcinoma. The cause is sun exposure which has a cumulative effect. Lesions occur mostly in people past middle-age most frequently with fair skin and red or blond hair. Melanin protects and actinic keratoses are not seen in black-skinned individuals. Albinos, conversely, are especially prone to develop the lesions.

The lesions are pink or grey areas of hyperkeratosis seldom exceeding 1 cm. in diameter. Their surface is rough and sometimes warty with scales which may be removed by minor trauma. In the UK they usually occur on the back of the hands, forehead or ear in elderly patients. In tropical countries people may become virtually covered with keratoses in later life. The lesions are hyperpigmented plaques and may become itchy and ulcerate. The maximum prevalence is to be found in Queensland, Australia where the majority of elderly people have at least one keratosis.

The histology shows dysplastic changes with loss of normal keratinocyte maturation and areas of parakeratosis. Alternating zones of hyper- and para-keratosis overlying a thickened or atrophic epidermis are present. The boundary between unaffected and affected epidermis is a sharp line which slopes upwards and inwards. The epidermal cells have paler cytoplasm and mature through an absent or diminished granular layer to form a parakeratotic scale of varying thickness. The affected zone tends to grow under the normal epidermis and around the ductal epithelium. The first evidence of a solar keratosis is usually a collection of telangiectatic capillaries 1 - 2 mm. in diameter. Later this changes to a dry rough adherent scale often yellow or dirty brown. The scale may become thick and horny with a sharp edge. In the majority of cases there are a number of lesions. The principal sites of predilection are the backs of the hands and forearms and the face. The cheeks, temples and forehead are more commonly affected than the lower face. The sides of the neck are involved in both sexes but the ears predominantly in men. The vermilion of the lower lip, but not often the upper, may also show keratosis, with a much higher incidence in men than women. The elastotic degeneration which is

almost always present produces a rather coarse, yellowish weather-beaten look to the exposed skin generally. Actinic keratoses are potentially malignant the latent period being probably at least 10 years. The squamous cell carcinoma which develops is almost always slow growing and has little tendency to metastasize. Malignant change occurs only in a minority of actinic keratoses. Sometimes the keratotic lesions will disappear spontaneously and in the early stages both actinic keratoses and elastotic degeneration may disappear if the patient goes to live in a less sunny environment.

2.8 - Dermatitis Herpetiformis (DH)

This is a rare, chronic blistering skin disorder characterized by symmetrical, intensely pruritic grouped vesicles or bullae arising on erythematous bases. Common sites of involvement include the extensor surfaces, the buttocks, the lower back and scapular areas. It occurs mainly between the ages of 25 and 55 with a mean age of onset of 40 years of age. It is estimated to be twice as common in males as in females. DH remits and relapses but usually persists indefinitely. It may be suppressed by dapsone and sulphapyridine.

Histopathologically DH is a subepidermal bullous disease with characteristic early lesions showing neutrophilic microabscesses at the tips of the dermal papillae with fibrin deposition. Specific immunopathologic findings have also been found in DH patients. HLA studies have shown that 85 - 90% are HLA B8- positive and there is an even stronger association with HLA DW3 and DRW3 (Dahl 1980). Granular immunoglobulin deposits are found in dermal papillary tips of lesional skin in DH patients. IgA has been found to be the most commonly detected immunoglobulin class. Ultrastructurally these deposits of IgA appear to be closely associated with the dermal microfibrillar bundles. The most conclusive test for DH is now regarded to be direct immunofluorescence which shows up the IgA deposits (Fry 1982).

There is an undoubted association between DH and gluten sensitivity. Usually DH patients have a patchy small bowel enteropathy with no obvious malabsorption. The small bowel abnormalities

are as characteristic of coeliac patients. Although some DH patients have severe coeliac disease, others have similar histological features of the upper small intestinal mucosa without clinical manifestation (Marks et.al. 1966). Some members of the families of DH patients have clinical coeliac disease and many more have subclinical evidence of it (Marks et.al. 1970). It has been estimated that two-thirds of patients with DH have enteropathy and in some cases there is malabsorption (Shuster and Marks. 1970). Fry et.al. (1973) estimate that 80% of patients with DH have coeliac disease but usually it is in a mild form. The relationship between the two disorders remains uncertain. Fry et.al. propose that a gluten-containing diet is itself causally related to DH or that gluten amplifies the rash as does dietary iodine.

2.9 - Darier's Disease (Follicular Keratosis)

This is a rare condition characterized by abnormal keratinization based mainly on the hair follicles and causing a greasy reddish-brown papular eruption. The disorder was first described independently by J. Darier and J.C. White in 1889.

The usual age of onset is between 8 and 16 years with generally the first signs appearing in the mid-teens. The characteristic lesions are initially firm, skin coloured which later become yellow or brown with a greasy crust. The crusts cover a concavity on top of the papules. The areas affected are the face, chest, trunk, sacral area and extremities. The scalp and flexures, especially the anogenital, are also frequently involved. The papules tend to coalesce into warty plaques with a 'seborrhoeic' distribution. On the palms and soles, minute papules or pits may appear. Haemorrhagic macules may also be seen on the hands and feet (Jones et.al. 1964). A distinctive nail dystrophy in which linear white or pinkish lines or ridges run longitudinally to the free edge of the nail where they end in triangular nicks (Zaias and Acherman 1973). Mucous membrane lesions although uncommon may be found in many members of some families. The oral lesions appear as pinpointed or flattened papules coalescing to give a pebbly cobblestone appearance (Gorlin and Chaudry, 1959).

The eruption of Darier's disease is aggravated by exposure to sunlight, especially of wavelength from 250 to 300 nm, (Heyl 1971). Other forms of trauma may also evoke exacerbations. The course of the disease is chronic. Affected individuals are usually of small stature and low intelligence.

Darier's disease is transmitted by autosomal dominant inheritance with incomplete penetrance. The disorder may also be caused by gene mutation (Fry 1982). The prevalence of Darier's disease has been assessed as 1 in 55,000 in England (Wilkinson 1986).

The pathology of the disease is one of abnormalities of keratinocytes in the lower layers of the epidermis. There is hyperkeratosis, acanthosis and papillomatosis. Lacunae are formed by acantholysis into which project villi (papillae) lined by a single layer of basal cells. In addition, a peculiar form of dyskeratosis results in the formation of corps ronds (prematurely keratinized cells) and distorted keratinocyte nuclei (grains). The corps ronds are found in the upper prickly layer and granular layer. In the dermis there is a mild, nonspecific inflammatory infiltrate.

Ultrastructurally, the lacunae and dyskeratoses appear to result from structural defects in the tonofilaments and desmosomes leading to splitting of the latter (Mann and Haye 1970).

2.10 - Incontinentia pigmenti (Bloch-Sulzberger Syndrome)

This is a comparatively rare disorder which was first described by Bloch (1926) and Sulzberger (1927). It is a complex hereditary syndrome which is inherited as an x-linked dominant trait which is usually lethal in males (Lenz 1961). 95 - 97% of recorded cases as females, the males probably being the result of spontaneous mutations. Chromosome studies have shown an increased frequency of aberrations and it has been suggested that I.P. is a chromosomal breakage syndrome (Kelly 1976). Incomplete forms of the syndrome are found in some female relatives of I.P. patients.

The clinical features of Incontinentia pigmenti are vesicular, verrucous and pigmented cutaneous lesions which are associated with development defects of the eye, skeletal system and

the central nervous system. The skin changes are often present at birth, having developed before the end of the first week, and rarely appear after the first 2 months. Soon after birth an erythematous and bullous eruption occurs in linear patterns on the limbs. The head and trunk may also be affected. The lesions may be persistent or recurrent over a period of several months and then are replaced by verrucous (warty) growths. In a few months these verrucous bands disappear leaving either mild atrophy or remnants of the papules. A whorled or 'splashed' macular pigmentation ranging from slate-grey to brown develops at this stage. Its bizarre patterning is a strong diagnostic pointer. Occasionally the pigmentary lesions are the only abnormality. The pigmentation gradually fades after many years and tends to be minimal by the second or third decade. On occasions the vesicular and warty stages occur in utero and there is also a variant in which pale rather than dark whorls and streaks are seen.

Associated abnormalities are common. These include poorly formed and missing teeth, mental retardation, epilepsy, microcephaly, spastic tetraplegia, strabismus, partial alopecia of the vertex, skull and palate abnormalities. It has been estimated that 25% of patients with I.P. have defects of the CNS (Carney 1976) and 30% have ocular defects (Jain and Willetts 1978).

The vesicles seen in the first stage of the disease are situated below the horny layer or within a spongiotic epidermis. Numerous eosinophils are present within and around the vesicles. Between the vesicles the epidermis contains large dyskeratotic cells. Macrophages laden with melanin are present in the upper dermis. In the warty lesions the hyperkeratosis is increased and within the irregularly acanthotic epidermis are hyaline bodies representing individual cell keratinization. The pigmented patches show diminished or absent pigment in the basal cells and large quantities of melanin in melanophages in the upper dermis. The epidermis may be normal or slightly acanthotic.

Ultrastructural studies show that many dyskeratotic cells are present in the epidermis particularly in the early stages. In the upper dermis, eosinophils, activated lymphocytes, basophils, mast cells and melanophages are abundant.

2.11 - Anhidrotic Ectodermal Dysplasia

This is a rare disorder with x-linked recessive mode of inheritance (Priest 1967). It is characterized by a diminished ability to sweat and by the non development or underdevelopment of certain ectodermal structures. There may be partial or complete absence of sweat glands on the papillary ridges. Hypotrichosis and hypodontia (abnormal teeth tending to be conical in shape) are notable features. Affected males may have characteristic facial features with prominent foreheads, depressed nasal bridges, protruding thick lips and large deformed ears (Lapierre and Dodinval 1967). The heterozygote carrier mothers of patients may show some manifestations such as hypodontia and hypohidrosis (Frias and Smith 1968). The carrier status cannot be recognized clinically. Nacata et.al. (1980) reported the occurrence of significantly smaller teeth in female carriers than in normal controls. Passarge and Fries (1973) report reduced sweat pore counts in carrier females.

The skin of AED patients is soft, dry and finely wrinkled, especially around the eyes, giving the appearance of premature aging. Milia like papules may appear on the face due to hyperplastic sebaceous glands. The scalp hair is characteristically sparse and fine. Occasionally there is total alopecia. Atopic eczema may be associated with this syndrome.

The epidermis is usually atrophic and the eccrine sweat glands are absent or few and poorly developed as are other appendages.

2.12 - Pemphigus

This is a bullous (blistering) disorder which affects adults. The commonest age of onset is in the fifties and sixties but may occur in younger and older age groups. There is a slightly higher incidence in females than in males. Pemphigus is considered to be an auto-immune disease with antibodies directed against the glycoprotein coat of epidermal cells which separate forming thin-roofed blisters. These break quickly and then persist as painful crusted erosions. The disease may present as red scaly patches, crusts, superficial erosions or blisters. Lesions may occur on any part of the body there being no particular site of predilection. In

some patients there may only be a few lesions whilst in others large areas of skin affected. Mouth lesions are an early and prominent feature of pemphigus. Fry (1983) estimates that a third of patients have mucous membrane of the mouth affected before the skin. In the mouth the lesions are painful erosions with red bases. Untreated pemphigus progresses remorselessly and may be fatal. Even with modern treatment, involving high doses of systemic steroids or azathioprine, morbidity is still severe.

2.13 - Ichthyosis

This is a very common inherited disorder of keratinization which is characterized by dryness, scaling and exfoliation of the epidermis. There are various forms of ichthyosis which have been classified using cellular kinetic and ultrastructural studies of the epidermis (Frost and Scott 1966, Kaloustian and Kurban 1979). Collectively the various types are known as the ichthyosiform dermatoses. There are, however, two commonly occurring forms; ichthyosis vulgaris and x-linked ichthyosis (the normokinetic ichthyoses).

(a) Ichthyosis vulgaris

This is the commonest and mildest form of ichthyosis and affects about 1 in 300 of the population (Hunter and Savin 1984). It is inherited as an autosomal dominant characteristic with male and females being affected in approximately equal numbers. The disorder is not present at birth and the peak age of onset is between 1 and 4 years of age. The scales are fine and flaky but may be larger over the legs. The extensor surfaces of the arms and legs are the most severely involved areas while the flexures are usually spared. The face may be affected in childhood but clears in later life. There is an accentuation of palmar and plantar markings (Kaloustian and Kurban 1979). It is more prevalent in dry and cold climates hence the eruption is worse in the winter months and improves when the weather becomes warmer. Manifestations of atopy may be present and it is sometimes associated with atopic eczema and keratosis pilaris. Follicular plugs are commonly seen on the thighs and upper arms (Wells and Kerr 1966). Characteristically

there is moderate hyperkeratosis with an attenuated or absent granular cell layer. Sebaceous glands are small or absent. The defect appears to be an increased adhesiveness of the scales rather than an over production of keratin. Transepidermal water loss is significantly increased and the skin surface pH is higher and alkali resistance is lower than in normal skin.

(b) x-linked ichthyosis

Only males are affected and the rate of incidence has been estimated as 1 in 6000 (Fry 1982) or 1 in 12000 (Hunter and Savin 1984). The onset of the disorder is in the first three months of life. It is more severe than I. vulgaris with larger brown scales. The involvement is generalized but it is most prominent over the trunk (especially the back), neck, face and extremities. In adults the most affected areas are the abdomen, lower legs and popliteal fossae. In heterozygote females (carriers) there may be scaliness of the legs. X-linked ichthyosis is persistent and may become severe in adult life.

Compact hyperkeratosis with a nearly normal granular cell layer has been observed. There is no follicular plugging kinetic and ultrastructural studies are similar to those of ichthyosis vulgaris. A deficiency of the enzyme aryl sulphatase has been reported (Fry 1982).

(c) Sjögren-Larsson Syndrome

First described in an isolated community in northern Sweden (Sjögren and Larsson 1957), this syndrome has since been reported in many countries. The syndrome consists of marked mental deficiency, cerebral spastic diplegia (of Little disease type) and ichthyosis.

The syndrome is determined by an autosomal recessive gene. Abnormality of lipid metabolism has been suspected but no consistent association with any metabolic defect has been established. Formes frustes (extremely mild and clinically insignificant expressions of abnormalities) exist in the relatives of patients with Sjögren-Larsson Syndrome. In such cases the only manifestations may be mental retardation with or without spasticity (Selmanowitz and Porter 1967).

2.14 - Discoid Lupus Erythematosus (DLE)

A relatively benign disorder of the skin with a characteristic age and sex pattern of aetiology. The disease affects twice as many females as males. It usually presents in adults, although any age can be affected, most present in their late thirties. DLE has been found to occur in all races. Its incidence is 4 in 1,000 new patients in the U.K., (Rowell 1984).

The disorder is located chiefly on the light exposed areas of the body. The face is most often involved, particularly the cheeks. The nose, ears, scalp, the backs of hands and fingers and the arms are also typical sites. The sides of the neck are the commonest sites on the trunk. Occasionally there are lesions in the mouth and vagina. The lesions may be single or multiple vary in size from 1 to 15 cm. Usually lesions occur as well-defined erythematous patches. There may be a brownish scale beneath which follicular plugging with keratin is a prominent feature. The lesions heal from the centre with atrophy, scarring and pigmentary changes being common. The centre becomes atrophied with telangiectasia and thin skin, usually it is hypopigmented but hyperpigmentation is also found, particularly in negroes. Depressed scars may be formed with permanent hair loss. The lesions may itch and sunlight may precipitate or exacerbate the disorder.

In about half of the patients with DLE there are haematological and serological changes. These changes, along with other evidence, suggest an autoimmune aetiology for the disorder. Skin biopsy shows immunoglobulin, C₃ and IgM deposits in affected skin. Haematological investigations have shown a raised ESR, anaemia and leukopenia in some patients, (Fry 1982).

2.15 - Systemic Lupus Erythematosus (SLE)

This is a chronic inflammatory disease of connective tissue. It may affect almost any organ or system of the body. SLE can occur at any age but is commonest between 25 and 50 years of age. Female sufferers outnumber males by a ratio of approximately 9 to 1 (Fry 1982). It occurs in all races but the highest incidence is

found in American negroes and West Indians in whom as many as 1 in 250 may be affected (Fry 1982).

Family studies suggest that SLE is an autoimmune disease to which there is a genetically determined predisposition. It has been suggested that, using mathematical analyses of age and sex distribution, SLE is determined by three dominant x-linked alleles and autosomal factors at one or more loci (Burch and Rowell 1965).

There has been much debate as to whether DLE and SLE are variants of the same disease or are separate entities with different genetic bases.

The evidence in favour of SLE and DLE being variants of the same diseases are that the cutaneous lesions of SLE and DLE may be clinically and histologically indistinguishable. Certain clinical features such as rash, joint pains, Raynaud's phenomenon, chilblains and poor peripheral circulation are found in both. Similar haematological, biochemical and immunological abnormalities can be demonstrated in both conditions although the incidence is lower in DLE. Patients with SLE may develop the typical lesions of DLE when the active phase has subsided. Furthermore, conditions such as lupus panniculitis, a recognizable clinical and pathological entity, occur in both discoid and systemic lupus erythematosus.

Although this seems to be formidable evidence there are various observations which require explanation since they contradict the above findings. The risk of a patient with DLE developing SLE is small (1.3 - 5%), (Cannon and Curtis 1958). Although 55% of patients with DLE show some haematological or serological abnormality the risk of conversion is only about 6.5% (Beck and Rowell 1966). Immunoglobulin and complement are present in uninvolved skin of SLE patients and are absent in patients with DLE. Most patients with DLE exposed to U-V radiation, stress or trauma do not develop SLE. In SLE patients there may be marked photosensitivity with the rash being confined to light exposed areas of the body and being precipitated and exacerbated by sunlight along with the other factors mentioned. The age and sex distribution of SLE is strikingly different from that of DLE.

It is now generally supposed that both SLE and DLE are initiated by the occurrence of somatic mutations in lymphocytic skin

cells of predisposed individuals and that they are genetically distinct entities (Rowell 1986).

2.16 - Glossary of dermatological terms

abscess	- localised collection of pus in a cavity more than 1 cm. in diameter
acantholysis	- dissolution of the intercellular cement leading to loss of cohesion between epidermal cells
acanthosis	- increase in the thickness of the basal, squamous and granular cell layers of the epidermis
actinic	- produced by the action of the sun's rays e.g. actinic keratosis
acute	- having rapid onset, a short course with pronounced symptoms
aetiology	- causation of disease
alopecia	- loss of hair, baldness
anagen	- growth phase of hair cycle
angioedema	- a diffuse swelling of oedema extending to subcutaneous tissue
anhidrosis	- deficiency in the secretion of sweat
aplasia	- absence of growth
atopy	- form of hypersensitivity characterised by asthma, hayfever and form of eczema.
atrophy	- thinning of skin due to diminution of epidermis, dermis or subcutaneous fat
benign	- non malignant with no tendency to invade the surrounding tissues
bullae	- fluid-filled cavity within or beneath the epidermis, over 5 mm. in diameter (blister)
chronic	- of long duration, opposite to acute
corps ronds	- peculiar type of dyskeratosis involving a central homogenous basophilic mass surrounded by a clear halo
crust	- scale composed of dried blood or tissue fluid
desquamation	- shedding of scales
dyskeratosis	- abnormal keratinization of individual keratinocytes

dysplasia	- abnormal development of tissue
enteropathy	- disease of the intestine
erosion	- an area of skin denuded by a partial or complete loss of the epidermis
erythema	- redness in the skin due to increased blood flow
excoriation	- superficial destruction of small pieces of skin produced by scratching
exfoliation	- shedding of scales from surface of skin
fibrosis	- excessive production of fibrous tissue
forme fruste	- extremely mild and clinically insignificant form of an abnormality
hyperkeratosis	- overgrowth of horny layer
hyperplasia	- abnormal increase in the number of cells in a tissue
hypertrichosis	- excessive growth of hair
hypochronic	- lack of pigmentation
hypohidrosis	- reduction in sweating
hypotrichosis	- deficiency of hair
keratinization	- development of keratin in horny layer of the skin
keratoderma	- a local or generalised thickening of the horny layer
keratosis	- disorder of skin characterized by the overgrowth of the horny layer
lacuna	- a narrow slit-like bulla
lesion	- a circumscribed change such as a wound or tumour
lichenification	- thickening and hardening of the skin with the formation of papules
macule	- a small flat area of altered colour or texture
metastasis	- transfer of disease from one part of the body to another not directly connected with it
milium	- minute glassy vesicles due to blockage of sweat ducts with keratin plugs
naevus	- developmental blemish of skin
nodule	- solid mass in the skin, greater than 0.5 cm. in diameter
papilloma	- a cone shaped mass projecting from the skin

papillomatosis	- irregularly undulated epidermis due to dermal papillae
papule	- small solid elevation of skin, less than 0.5 cm. in diameter (pimple)
parakeratosis	- incomplete or faulty keratinization characterised by retention of nuclei in horny layer
pathogenesis	- production of disease
petechiae	- pinhead sized macules of blood in the skin
plaque	- an elevated area of skin greater than 2 cm. in diameter but without substantial depth
pruritis	- itchiness
purpura	- large macule of blood in skin
purulent	- containing pus
pustule	- visible accumulation of pus in skin
scale	- flake arising from horny layer
scar	- result of healing where normal structure is replaced by fibrous tissue
seborrhoeic	- disturbance of skin caused by overaction of sebaceous glands
spongiotic	- sponge-like tissue with cells separated by fluid
stria	- streak-like; linear, atrophic, pink, purple or white lesion in the skin
telangiectasia	- dilated capillaries permanently visible on the skin surface
tumour	- abnormal mass of tissue more than 1 cm. in diameter
ulcer	- an area of skin from which the epidermis has been lost with an inflammatory base
urticaria	- eruption characterised by wheals similar to nettle rash
verrucous	- covered with warts, or rough undulating surface of papule
vesicle	- a fluid filled cavity within or beneath the epidermis up to 0.5 cm. in diameter
wheel	- elevated white compressible area produced by dermal oedema. Often surrounded by red flare, usually less than 2 cm. in diameter.

CHAPTER THREE-RESEARCH REVIEW

3.1 - Introduction

In comparison to other diseases relatively little research has been carried out into the relationship between dermatoglyphics and skin disorders. Few structural or functional characteristics of the skin are not dependent, at least in part, on the genotype of the individual. The colour and texture of the skin, its thickness and extensibility and the complex factors modifying the pattern of its response to physical and chemical trauma or to bacterial invasion are largely so determined. Many of these traits which display a continuous range of variation depend on multifactorial or polygenic inheritance. There is much evidence to show that many skin disorders are manifestations of abnormal constitutional states of genetic origin. Similarly dermatoglyphics are believed to have a genetic component in their formation which is then modified by environmental factors. Changes in dermatoglyphics have been noted in many disorders which have some degree of genetic causation. The relationship between dermatoglyphics and skin disorders would, therefore, appear to be worthy of investigation.

Of the research studies carried out many have used only very small sample sizes, often less than ten. There is no consistency in the dermatoglyphic parameters studied and only a handful considered most of the features which would be investigated in an anthropological survey. The results of investigations into a particular disorder often prove to be contradictory or certainly worthy of further study.

In this chapter I review the research carried out into ten major skin disorders. Each is discussed separately with the results of the investigations presented in chronological order of publication. Where syndromes involving a particular skin disorder have been studied, the results of these investigations are included under the heading of the main skin disorder (e.g. Sjörgren-Larsson Syndrome is under Ichthyosis).

After this is a summary of the findings of different researchers for individual dermatoglyphic parameters within a

particular disorder is presented. The purpose of this is to summarize and highlight any general trends. Finally the findings for a particular dermatoglyphic feature over all the disorders is presented. This is called "dermatoglyphic approach" (David 1971) as opposed to the "disease approach" whereby dermatoglyphic features in individual disorders are studied. An explanation of the technical dermatoglyphic terms used in this research review can be found in Section 4.4. Details of the skin disorders are given in Chapter 2.

3.2 - Dermatoglyphic studies of particular skin disorders

(a) Psoriasis

This has been, by far, the most extensively studied skin disorder using dermatoglyphic methods.

Gibbs and Warburton (1968) studied 135 patients with psoriasis, of whom 70 were men and 65 women. They also studied a control group, consisting of 63 men and 61 women, in an identical manner to the psoriatics. Both patients and controls were North American Caucasians of European extraction. The dermatoglyphic features they studied were finger patterns, presence of patterns in interdigital spaces and hypothenar eminences, maximal atd angle, location of axial triradius and presence of Simian crease. Their main findings were that the incidence of whorls was higher on all fingers in the members of the psoriatic group than in the controls. In reverse, the incidence of loops was found to be lower in the psoriatics than in the controls. The percentage differences were significant for all fingers except the right second finger. The incidence of arches remained the same in both groups. Gibbs and Warburton did not, however, separate the sexes before analysis although it has been shown that there are notable intersexual differences in dermatoglyphic features (Ohler and Cummins 1942; Cummins and Midlo, 1943). Table 3.1 shows Gibbs and Warburton's results for the incidence of whorls, loops and arches on different fingers.

In the study they found that the percentage frequency of patterns occurring in the palmar interdigital spaces and hypothenar eminences were essentially the same for both psoriatics and

Table 3.1 Incidence of digital patterns (Gibbs and Warburton 1968)

		PERCENTAGE FREQUENCIES					
		RIGHT HAND			LEFT HAND		
DIGIT	PATTERN	PSOR.	CONT.	PROB.X ²	PSOR.	CONT.	PROB.X ²
I	WHORL	60.7	44.4	< 0.02	54.1	39.5	< 0.05
	LOOP	34.8	52.4		43.7	54.8	
	ARCH	4.4	3.2		2.2	5.6	
II	WHORL	47.4	34.6	< 0.20	48.9	31.4	< 0.02
	LOOP	43.0	54.8		40.7	57.3	
	ARCH	9.6	10.4		10.3	11.3	
III	WHORL	28.1	12.9	< 0.01	31.8	14.5	< 0.02
	LOOP	64.4	79.0		59.2	80.6	
	ARCH	7.4	8.0		8.8	4.8	
IV	WHORL	66.6	45.9	< 0.01	51.8	33.9	< 0.01
	LOOP	30.4	51.6		41.4	62.9	
	ARCH	3.0	2.4		6.6	3.2	
V	WHORL	36.3	14.5	< 0.01	28.1	17.7	< 0.05
	LOOP	62.2	84.7		68.1	81.4	
	ARCH	1.5	0.8		3.7	0.8	

Table 3.2 Occurrence of patterns in Palmar areas
(Gibbs and Warburton 1968)

PATTERN AREA	HAND	PERCENTAGE FREQUENCY	
		PSORIATICS	CONTROLS
Thenar/I	RIGHT	8.9	5.6
	LEFT	11.2	10.5
II	RIGHT	8.3	8.0
	LEFT	1.5	0.9
III	RIGHT	51.1	55.4
	LEFT	31.1	26.8
IV	RIGHT	26.7	31.3
	LEFT	40.0	46.4
V	RIGHT	27.4	33.9
	LEFT	25.2	25.0

controls (Table 2.2). Negligible differences were found between the values for psoriatics and controls for atd angle (44.3° for psoriatics, 44.2° for controls), the location of the axial triradius (see Table 3.3) and the incidence of Simian crease (5% controls; 8% psoriatics).

Krieger (1934) studied 100 psoriatics and controls and reported that digital whorls increased in frequency of occurrence on thumbs and fourth fingers of psoriatics but the increases were found to be very small and not statistically significant. He also found patterns to occur more frequently in the fourth interdigital space on the left hand in psoriatics when compared to controls. Like Gibbs and Warburton, Krieger did not separate the sexes for analysis.

Table 3.3 Position of Axial Triradius (Gibbs and Warburton 1968)

HAND	AXIAL TRIRADIUS	PERCENTAGE FREQUENCY	
		PSORIATICS	CONTROLS
RIGHT	t	69.6	65.3
	t'	21.5	28.2
	t''	8.9	6.5
LEFT	t	67.4	62.9
	t'	24.4	32.3
	t''	8.1	4.8

Verbov (1968) studied 134 psoriatics (64 male and 70 female) and compared them with 158 normal controls (76 male, 82 female). He found an increase in digital whorls in both sexes on the fourth digit, more marked on the right hand, which was associated with a decrease in ulnar loops. He also reported a decrease in whorls in males in the first digit of the left hand associated with an increase in ulnar loops. (See Table 3.4) In both sexes there was an increase in patterns (viz. loops) on the right palm in the fourth interdigital area according to Verbov. Loops occurred in 48% psoriatics

compared with 31% of controls in males, and in 63% of psoriatic females compared with 53% of control females in the fourth interdigital area of the right palm. For both sexes together, the percentage frequency of loops on the fourth interdigital area of the right hand was psoriatics 56.1% and controls 40.7%.

Table 3.4 Percentage Frequencies of Digital Patterns (Verbov 1968)

PATTERN	DIGIT I		DIGIT IV							
	LEFT		LEFT				RIGHT			
	MALE		MALE		FEMALE		MALE		FFEMALE	
	PSOR.	CONT.	PS.	CO.	PS.	CO.	PS.	CO.	PS.	CO.
WHORL	20.3	31.6	37.5	35.5	39.1	32.9	52.4	43.2	47.1	37.8
ULNAR LOOP	75.0	65.8	62.5	64.5	59.4	67.1	44.4	56.8	51.4	58.5

Out of 125 patients examined by Verbov only two cases had Simian lines (1.6%), one male and one female and in each case the line was unilateral. In 158 controls no Simian lines were noted. Davies and Smallpiece (1963) found that Simian lines occurred naturally on one or both hands of 1.7% of 811 children. Verbov, therefore, concluded that Simian line incidence in psoriatics does not differ from that in the normal population. Bettmann (1932), however, had reported observation of Simian lines in 28% of psoriatics which he had examined.

Saha (1969) reported on dermatoglyphics in three cases of psoriasis. He examined finger patterns in two males which he reported as having no particular differences from normal but the one female examined had a predominance of whorls (9 whorls and one ulnar loop). Incidence of palmar patterns were also recorded but did not differ from the normal frequency except that in none of the three cases were there loops in the left third interdigital space.

Jilek (1972) studied 127 patients with psoriasis (56 men and 71 women) and compared them with a large control group. All subjects were Czechoslovakian, the controls coming from a large

Table 3.5 Frequency of Digital Patterns (Jilek 1972)

(a) Lefthand

PERCENTAGE FREQUENCIES

DIGIT	PATTERN	MALES			FEMALES		
		PSOR.	CONT.	T-test	PSOR.	CONT.	T-test
I	WHORLS	46.4	44.02	1.1	49.3	39.61	5.3
	ULN. LOOP	51.8	54.77		46.5	53.40	
	RAD. LOOP	0.0	0.13		0.0	0.95	
	ARCH	1.8	1.08		4.2	6.04	
II	WHORL	48.2	35.15	6.5	43.7	33.08	5.9
	ULN. LOOP	32.1	42.33		29.6	38.41	
	RAD. LOOP	12.5	15.60		21.1	17.09	
	ARCH	7.1	6.92		5.6	11.42	
III	WHORLS	25.0	26.20	0.6	18.3	21.52	2.08
	ULN. LOOP	64.3	68.85		71.8	64.33	
	RAD. LOOP	3.6	2.01		0.0	5.40	
	ARCH	7.1	2.94		9.9	8.76	
IV	WHORLS	53.6	40.27	6.4	49.3	36.31	7.2
	ULN. LOOP	46.4	58.17		47.9	53.59	
	RAD. LOOP	0.0	0.23		1.4	4.02	
	ARCH	0.0	1.33		1.4	6.08	
V	WHORLS	25.0	14.89	6.7	14.1	15.23	0.8
	ULN. LOOP	75.0	84.24		85.9	75.84	
	RAD. LOOP	0.0	0.12		0.0	2.29	
	ARCH	0.0	0.75		0.0	6.54	

(b) Righthand

I	WHORLS	53.6	54.70	0.5	54.9	43.14	6.3
	ULN. LOOP	46.4	44.15		43.6	52.90	
	RAD. LOOP	0.0	0.20		0.0	0.58	
	ARCH	0.0	0.95		1.4	3.38	
II	WHORLS	46.4	39.18	3.5	28.2	32.98	2.7
	ULN. LOOP	25.0	28.20		50.7	39.78	
	RAD. LOOP	17.9	21.14		8.4	12.64	
	ARCH	10.7	11.48		12.8	14.60	
III	WHORLS	30.3	26.16	2.2	18.3	19.67	0.94
	ULN. LOOP	67.8	65.34		74.6	71.74	
	RAD. LOOP	1.7	1.92		0.0	1.39	
	ARCH	0.0	6.58		7.0	7.20	
IV	WHORLS	66.0	49.86	7.6	57.7	43.54	7.6
	ULN. LOOP	32.1	47.70		42.3	52.26	
	RAD. LOOP	0.0	1.12		0.0	1.72	
	ARCH	1.9	1.32		0.0	2.49	
V	WHORLS	25.0	25.33	0.16	14.1	17.23	2.18
	ULN. LOOP	75.0	73.17		84.5	79.90	
	RAD. LOOP	0.0	0.24		0.0	0.99	
	ARCH	0.0	1.26		1.4	2.08	

dermatoglyphic survey of the population (Nemec 1968), 147,800 men and 32,500 women. The percentages of different digital patterns on different fingers were assessed and the Total Finger Ridge Counts were calculated.

The percentage frequency of whorls was found to be significantly higher in men and women with psoriasis, both when calculated for the sexes separately, or for the whole group when compared to controls. The percentage frequency of whorls in men was significantly higher on the index, third and fourth fingers of the right hand. In women psoriatics there were statistically significantly higher values on the thumb, second and fourth fingers of the right hand. There were also significantly higher numbers of loops on the third finger of the left hand and the second and fourth fingers of the right hand of women psoriatics compared with controls. On the fingers in which loops increased in frequency there was a statistically significant reduction in the incidence of whorls (see Table 3.5). Note that Jilek used a T-test in comparing the means of samples for each variant.

Jilek calculated the total ridge count for 55 men and 65 women. For both sexes the values obtained were significantly higher than controls. Total ridge count for male psoriatics was found to be 158 ± 50 and that for male controls was 145 ± 52 . The value for women psoriatics was 146 ± 50 whilst that for female controls was found to be 127 ± 52 .

Lal (1977) studied finger ridge patterns of psoriatics from the Benghazi area of Libya. 140 males and 70 female psoriatic patients were compared with a control group of 200 males and 100 females. Male psoriatics showed a statistically significant increase in percentage frequency of whorls on the right fourth finger and a statistically significant decrease in the frequency of whorls on the right thumb. Frequency of whorls on finger four of the left hand was also found to be higher but the difference was not statistically significant. In females the frequency of whorls was higher on right fingers three, four and five and fingers one, three and four of the left hand (see Table 3.6).

Table 3.6 Frequency of digital whorls (Lal 1977)

HAND	DIGIT	MALES			FEMALES		
		PSOR.	CONT.	χ^2	PSOR.	CONT.	χ^2
RIGHT	I	73	130	6.050	34	50	0.095
	II	58	98	1.692	23	38	0.416
	III	39	60	0.232	15	20	0.147
	IV	81	92	4.700	35	48	0.095
	V	29	58	2.989	18	20	0.548
LEFT	I	61	104	2.254	30	58	3.456
	II	56	80	0.000	32	33	2.525
	III	38	60	0.236	19	18	2.304
	IV	67	88	0.441	26	42	1.468
	V	26	48	1.775	10	18	0.700

n:-

Male psoriatics = 140

Controls = 200

Female psoriatics = 70

Controls = 100

Banach (1977) investigated 107 psoriatics (54 women and 53 men), 110 members of the families of psoriatics, who show no evidence of skin changes, and a control group of 200 (100 of each sex) all drawn from the same region of Poland. The frequencies of different digital patterns were determined and are shown in Table 3.7. Other features were also observed, these were; maximal atd angle, location of axial triradius, frequency of occurrence of patterns in interdigital areas and termination of mainline A.

Women psoriatics compared with controls had loops occurring less frequently but whorls and arches were more frequently found. These results are statistically significant and can be seen in Table 3.7. Male psoriatics in comparison to controls possessed loops less frequently although the differences were not statistically significant. There was however, a statistically significant increase in arches in male psoriatics when compared with male controls.

When female psoriatics were compared to family members without symptoms of psoriasis a statistically significant increase in the frequency of occurrence of arches was observed and decrease in the frequency of loops. When male psoriatics were compared to

Table 3.7 Frequency of digital patterns (Banach 1977)

GROUP	ULNAR LOOP	RADIAL LOOP	WHORL	ARCH
Female psoriatics	52.25	2.21	37.26	8.42
Male psoriatics	58.82	4.05	26.18	10.95
Female family*	61.7	4.9	32.2	1.2
Male family*	55.2	4.7	30.6	9.5
Female controls	62.1	4.3	28.4	5.2
Male controls	61.1	4.9	30.4	3.6

(*members of family of psoriatics but not showing any evidence of skin changes)

normal family members of the same sex a significant decrease in radial loops was observed.

The maximal atd angle, displacement of axial triradius, occurrence of patterns in interdigital palmar areas and termination of mainline A were also studied by Banach. Table 3.8 shows the results for atd angle. There were significant differences between the mean values for atd angles between psoriatics and unaffected family members. The mean angles were smaller in psoriatics than in the family members and this decrease was significant for both sexes. No other significant differences were found for atd angles.

Table 3.8 Maximal atd angle (Banach 1977)

GROUP	atd angle		
	RIGHT HAND	LEFT HAND	MEAN VALUE
Female psoriatics	42.0°	40.0°	41.0°
Male psoriatics	39.2°	40.6°	39.9°
Female family members*	47.7°	44.3°	46.0°
Male family members*	42.8°	43.3°	40.8°
Female controls	40.3°	41.3°	40.8°
Male controls	41.2°	42.4°	41.8°

(*unaffected)

The results for the position of the axial triradius are shown in Table 3.9. There were significant decreases in the occurrence of t' and t'' when female psoriatics were compared to both unaffected

family members and female controls. The greatest difference being between female psoriatics and controls. The same significant differences were also observed between male psoriatics and controls and between male psoriatics and unaffected male family members for occurrence of t' and t'' .

Table 3.9 Position of axial triradius (Banach 1977)

GROUP	% occurrence			
	t	t'	t''	t'''
Female psoriatics	78.0	18.5	2.4	0
Male psoriatics	86.6	12.2	3.3	0
Unaffected Female family	75.0	20.0	5.0	5.0
Unaffected Male family	75.0	25.0	16.7	0
Female controls	76.6	31.7	6.6	0
Male controls	82.0	21.1	6.5	0

Significant differences were found for occurrence of patterns in palmar interdigital areas for comparisons between psoriatics and controls in area II, III, IV, and Hypothenar (see Table 3.10). In all these cases the percentage occurrence was significantly lower in psoriatics of both sexes when compared with controls.

Table 3.10 Percentage frequency of occurrence of patterns in interdigital areas (Banach 1977)

GROUP	Interdigital Area				
	I/Th	II	III	IV	Hyp
Female psoriatics	5.0	0	41.2	48.7	10.0
Male psoriatics	6.8	1.1	50.0	42.0	8.0
Female controls	5.7	2.3	49.2	57.7	16.2
Male controls	8.0	5.0	53.2	57.5	16.5

No significant differences were found by Banach for termination of mainline A.

Sharma, Sarin and Prabhakar (1977) studied 25 patients with psoriasis (8 female and 17 males) and an equal number of controls (12 females and 13 males). Frequency of occurrence of

digital patterns were recorded and total finger ridge counts were determined. As can be seen from Table 3.11 there was an increase in whorls in females (23.75%) compared to control females (9.1%). In males the incidence of whorls was slightly less in male psoriatics (31.8%) than in male controls (35.4%). Loop pattern occurrence increased in both sexes as compared to controls. No particular finger was observed to be more prone to whorl patterns occurring but it was observed that in males the third finger had smaller incidence of whorls (5.6%) as compared to controls. All of the differences above were statistically significant.

Table 3.11 Percentage frequency of occurrence of digital patterns (Sharma et al 1977)

	LOOPS			WHORLS			ARCHES		
	F	M	T	F	M	T	F	M	T
CONTROL	68.4	56.9	62.4	9.1	35.4	22.8	9.1	3.84	6.4
PSORIASIS	75.0	64.1	67.6	23.75	31.8	29.2	1.25	4.1	3.2

For total finger ridge count a decrease was observed in psoriatic males which was statistically significant when compared to controls (see Table 3.12). In females the trend was opposite, i.e. the female psoriatics had an increased total finger ridge count, but the increase was not significant.

Table 3.12 Total finger ridge counts (Sharma et al 1977)

	FEMALE			MALE		
	RIGHT	LEFT	TOTAL	RIGHT	LEFT	TOTAL
CONTROL	60.41	54.69	115.1	75.4	77.4	152.8
PSORIASIS	73.25	72.12	145.37	66.41	67.29	133.7

Verma, Joshi and Jain (1980) studied finger ridge pattern occurrence and total finger ridge counts in 40 cases of psoriasis (32 males and 8 females) and 40 controls from the same region of India. In males there was found to be an incidence of loops (63.13%)

in psoriatics when compared to controls (54.5%). In females there was a decreased incidence of loops (56.25%) in psoriatics compared to controls (62%). Incidence of whorls in females was greater in psoriatics (37.5%) as compared to controls (34%) and in males there was a decreased incidence of whorls (30.9%) compared to controls (40.5%). On average whorls were most commonly found on the fourth finger in both sexes. An increased incidence of whorls in female psoriatics and a decreased incidence in psoriatic males was found overall.

Total ridge count was found to be 133.5 in female psoriatics compared to 123 in controls. In males the total ridge count was 133.9 for psoriatics and 142.3 for controls. There was, in other words, an increase in female psoriatics and a decrease in male psoriatics for total ridge count in comparison to controls.

Nagar, Laha and Sethi (1981) also carried out a dermatoglyphic study on Indian subjects. These were 24 female cases of psoriasis and 25 normal female controls matched for age. Total ridge counts and metric analysis of palms were carried out.

Mean values of ridge count showed significant differences ($p < 0.05$) for the right hand digit I and left hand digit IV; values on other digits were insignificant (see Table 3.13).

Table 3.13 Total ridge counts (Nagar et. al. (1981))

	RIGHT HAND						LEFT HAND					
	CONT.		PSOR.				CONT.		PSOR.			
DIGIT	MEAN	SD.	MEAN	SD.	t.	P.	MEAN	SD.	MEAN	SD.	t.	P.
I	14.6	6.10	18.04	4.67	2.13	<0.05*	14.0	4.70	16.57	4.07	1.97	>0.05
II	10.8	3.63	12.42	5.51	1.20	>0.05	10.96	4.34	12.04	5.49	0.75	>0.05
III	12.42	4.35	13.35	3.30	0.80	>0.05	12.12	4.13	13.85	4.05	1.43	>0.05
IV	13.08	5.0	15.71	4.01	1.90	>0.05	12.46	5.02	15.65	5.20	2.06	<0.05*
V	11.83	4.42	12.35	3.43	0.43	>0.05	11.11	4.49	12.95	4.22	1.42	>0.05

(* = significant)

Metric analysis of palms between psoriatics and controls showed a significant difference only for the mean value of vertical distance from a - d to the axial triradius on the left palm. The

values for the right palm were not significantly different nor were any other intervals (i.e. a - b, b - c, c - d and a - d metric intervals).

Kapur and Verma (1982) studied 25 male psoriasis patients and compared them to 25 male controls. All of the subjects were Indian Army personnel. The frequency of occurrence of digital patterns was recorded and also the total finger ridge count was determined. There was found to be a statistically significant increase in loops and decrease in whorl incidence in psoriatics when compared to controls (see Table 3.14). Whorls were found most often in psoriatics on first digit of right and fourth digits of both hands. Loops were more common on the third and fifth fingers of both hands and the first digit of the left hand. Arches were similar in psoriatics and controls.

Table 3.14 Percentage frequency of occurrence of digital patterns
(Kapur and Verma 1982)

	LOOPS			WHORLS			ARCHES		
	R.	L.	T.*	R.	L.	T.*	R.	L.	T.
CONTROLS	27.6	28.8	56.4	20.8	18.4	39.2	1.6	2.8	4.4
PSORIASIS	29.6	35.2	64.8	18.0	12.8	30.8	2.4	2.0	4.4

* $P < 0.05$

There was no significant difference found in the total finger ridge counts of psoriatics compared with controls.

Singh, Pandey and Singh (1983) studied 100 psoriatics (50 of each sex) and 100 controls. Again the subjects were Indian. They studied digital patterns, total ridge counts, presence of patterns in interdigital palmar areas, distal displacement of axial triradius, a - b counts and atd angles.

For digital patterns, male psoriatics showed an increase in the frequency of loops (Psor. males 53.4%: Control males 49%) and a decrease in the frequency of whorls (42%) in comparison to controls (46%). These differences in frequencies of digital patterns in male psoriatics were found to be statistically insignificant. An increase in the frequency of loops and a decrease in the frequency of whorls and arches was found to be statistically

highly significant ($P \leq 0.005$) on finger I. These changes were also observed in the fourth digits but were not statistically significant. Whorls were found to be increased in frequency on second, third and fourth digits although again these differences were statistically insignificant. (See Table 3.15).

Table 3.15 Percentage frequencies of digital patterns (Singh et.al. 1983)

(* = statistically highly significant)

		PERCENTAGE FREQUENCIES					
DIGITS	PATTERNS	MALE			FEMALE		
		PSOR.	CONT.	P.VAL.	PSOR.	CONT.	P.VAL.
I	LOOP	46	24	$P \leq 0.005$ *	44	63	$P \leq 0.005$ *
	WHORL	52	72		52	28	
	ARCH	2	4		4	9	
II	LOOP	49	46	$P > 0.5$	47	52	$P > 0.5$
	WHORL	41	40		37	32	
	ARCH	10	14		16	16	
III	LOOP	61	72	$P > 0.05$	65	65	$P > 0.1$
	WHORL	32	27		29	23	
	ARCH	7	1		6	12	
IV	LOOP	36	23	$P > 0.1$	40	45	$P > 0.05$
	WHORL	62	73		58	47	
	ARCH	2	4		2	8	
V	LOOP	75	80	$P > 0.5$	87	90	$P > 0.5$
	WHORL	23	18		13	10	
	ARCH	2	2		0	0	
TOTAL	LOOP	53.4	49	$P > 0.01$	56.6	63	$P \leq 0.005$ *
	WHORL	42.0	46		37.8	28	
	ARCH	4.6	5.		5.6	9	

Female psoriatics showed decreased frequency of loops (56.6%) and arches (5.6%) in comparison to controls (63% and 9% respectively). The frequency of whorls was found to be increased (37.8%) in contrast to controls (28%). These differences were statistically highly significant ($P \leq 0.005$). The changes for females above were observed on all fingers although statistically significant on first digits only.

Irrespective of sex there was found to be an increase in

frequency of whorls and a decrease in the frequencies of loops and arches in psoriatics compared with controls. These differences were found to be significant statistically, however (see Table 3.15).

A statistically significant ($P < 0.03$) increase in the total ridge count of male psoriatics (163.1 ± 49.1) as compared to controls (141.9 ± 47.4) was observed. There was also a marked increase in the total ridge counts in female psoriatics (143.7 ± 48.1) compared to controls (128.8 ± 48.0) but this was not found to be significant statistically ($P < 0.12$).

The frequency of true palmar patterns was found to be increased in male psoriatics (25%) compared to that of controls (22.6%). Increases in frequency were observed on third and hypothenar areas, whereas the frequency of patterns slightly reduced on fourth interdigital areas although the differences were insignificant statistically. Similarly the frequencies of true palmar patterns were observed to increase in female psoriatics (24%) compared with controls (21.8%). This statistically insignificant increase was observed on all palmar areas except thenar and hypothenar areas.

Singh et. al. found a statistically highly significant ($P < 0.005$) decrease in the frequency of distal displacement of axial triradii in female psoriatics (15%) in comparison to controls (35%). No difference was found in displacement of axial triradii in males.

Statistically insignificant decreases in mean values of a - b counts and atd angles were found in both male and female psoriatics when compared to controls.

(b) Atopic Eczema

Verbov (1972) studied 140 patients with atopic dermatitis (84 males and 56 females) and 180 normal controls (90 of each sex) all of whom were unrelated British caucasians. Features studied were ridge appearances, percentage occurrence of digital patterns, total finger ridge counts, configurations in interdigital palmar areas, a - b ridge count and maximal atd angles.

When the frequencies of pattern types on fingers were

analysed it was found that female atopics had a decreased frequency of whorls and an increased frequency of arches in comparison to controls. The differences were found to be significantly different from controls ($P < 0.001$) the main differences being between the proportion of whorls, 19.8% in atopics and 26.1% in controls, and of arches, 10.9% in atopics and 4.3% in controls (see Table 3.16).

Table 3.16 Percentage frequencies of digital pattern types (Verbov 1972)

GROUPS	% AGE FREQUENCY OF PATTERNS					
	WHORLS	ULN.LOOPS	RAD.LOOPS	ARCHES	χ^2	P.VALUE
ATOPIC MALES	33.1	56.9	5.6	4.4	5.30	> 0.1
CONTROL MALES	29.2	61.1	4.3	5.4		
ATOPIC FEMALES	19.8	65.3	4.0	10.9	27.97	< 0.001
CONTROL FEMALES	26.1	64.6	5.0	4.3		
ALL ATOPICS	27.7	60.3	4.9	7.1		
ALL CONTROLS	27.7	62.8	4.7	4.8		

When Verbov studied the distribution of patterns over individual fingers he found that 26 out of 55 female atopics (47.3%) had more than one whorl compared with 49 of the 90 controls (54.4%). Also 12 out of 55 atopics (21.8%) had more than one arch compared with 10 out of 90 controls (11.1%). Verbov regarded these differences as the only ones of diagnostic value.

When individual finger proportions were studied Verbov found that there was an increased proportion of arches on all fingers, and a decreased proportion of whorls on all fingers except right fourth finger, in female patients in comparison with controls.

The values for mean total finger ridge counts were not found to be significantly different at the 5% level. The same findings were observed for a - b ridge counts when atopics were compared to controls.

When Verbov examined the pattern frequency in palmar areas, no significant differences were found between atopics and controls of either sex for second, third and fourth interdigital areas. Compared with controls the observed pattern frequency was decreased in female atopics in the left I_3 and right I_4 areas, but was increased

in male atopsics in I_4 areas particularly on the left. For the hypothenar area the difference in pattern frequencies between atopic females and controls in the right hypothenar area was significant at the 5% level being significantly increased (46.9% v 37.7%).

The mean sum of the atd angles in female atopsics of 15 years and over was found to be significantly higher at the 5% level than controls (atopsics 93.7° : controls 85.9°). No other significant differences of atd angles were found.

No significant increase in the occurrence of Simian or Sydney creases were found in comparison to controls.

Verbov also reported that flattening of dermal ridges over palms and flexor aspects of fingers together with excess creases on these areas ('white lines') were a common finding among the atopsics studied.

Cusumano, Berman and Bershad (1983) studied fingerprint dermatoglyphics in 45 patients with atopic dermatitis. They were particularly interested in the occurrence of linear grooves (printing as 'white lines') as well as frequency of digital pattern types. The patient population was from New York and was 38% black, 41% Hispanic and 21% Caucasian consisting of almost equal numbers of male and females. A control group, consisting of 60 clinic patients without atopy, was also studied. Both control and atopic groups contained subgroups of 21 subjects with hand dermatitis.

The presence of linear grooves was detected more often among atopic dermatitis patients than among the control group ($P < 0.005$). This was true when comparing the percentage of displaying linear grooves or when comparing the total number of digits involved (see Table 3.17). Although the presence of linear grooves was also found to be associated with a variety of hand dermatitides within the control group, the number of digits displaying these grooves in atopic dermatitis patients with hand dermatitis was significantly greater ($P < 0.005$) than in any other patient subgroup. These findings suggest that linear grooves, although associated with hand dermatitis in general, are more commonly found in patients with atopic dermatitis (see Table 3.18).

When the frequency of digital pattern types on patients

with atopic dermatitis and control patients was analysed only female atopics had an increased frequency of whorls. This difference was significant ($P < 0.0025$) the female atopics having 38.5% occurrence of whorls compared to 26.1% in female controls. No significant differences were detected in pattern frequencies between groups of male patients (see Table 3.19).

Table 3.17 Presence of linear grooves (Cusumano et.al. 1983)

GROUP	n	% AGE AFFECTED	AVERAGE NO. OF DIGITS AFFECTED
<u>CONTROL</u>			
TOTAL	60	45.0	3.5
WITH HAND DERMATITIS	21	61.9	4.9
WITHOUT HAND DERMATITIS	29	38.8	2.7
<u>ATOPIC DERMATITIS</u>			
TOTAL	45	71.1	5.5
WITH HAND DERMATITIS	21	95.2	7.9
WITHOUT HAND DERMATITIS	24	50.0	3.5

Table 3.18 P.values determined from comparison of the average number of digits affected in patient groups (Cusumano et. al.)

GROUPS COMPARED	P.VALUE
Total controls V total atopics	<0.005
Total controls V atopics with hand dermatitis	<0.0005
Controls with hand derm. V atopics with hand derm.	<0.005
Controls without hand derm. V atopics with hand derm.	<0.0005
Atopics with hand derm. V atopics without hand derm.	<0.0005

Table 3.19 Frequency of digital pattern types (Cusumano et.al.)

	PATTERN TYPE (NO.OF DIGITS INVOLVED/TOTALNO.OF DIGITS)		
GROUP	WHORLS	LOOPS	ARCHES
<u>FEMALE</u>			
Atopic Derm.	82/213	95/213	36/213
Control	57/218 $P < 0.0025^*$	120/218 $P > 0.05$	41/218 $P > 0.05$
<u>MALE</u>			
Atopic Derm.	43/175	108/175	24/175
Control	60/220 $P > 0.05$	126/220 $P > 0.05$	34/220 $P > 0.05$

(* = statistically significant value)

When Cusumano et.al. separated all patients according to ethnic groups they found that a significant increase in whorls was detected only in Caucasian female atopic dermatitis patients when compared to sex- and race-matched controls ($P \leq 0.0005$).

Another feature which has been investigated in patients with atopic dermatitis is the increase in number of fine lines and markings on the palms. These 'hyperlinear palms' have been reported by Norvis (1971), Maize (1976), Blaylock (1976) and Verbov (1979) among others, as being characteristic of atopic dermatitis. Indeed Lobitz and Dobson (1956) and Hanifin and Lobitz (1977) consider hyperlinearity of palms to be one of the diagnostic criteria for atopic dermatitis. This, however, has been disputed by others (Leutgeb et.al. 1972 and Uehara and Hayashi, 1981) who propose that the hyperlinearity is a manifestation of concomitant ichthyosis vulgaris which is relatively common among atopic dermatitis patients.

Hirth et.al. (1971) studied the frequency of palmar hyperlinearity in a group of 150 subjects suffering from atopic dermatitis. 57% of the patients were found to have hyperlinear palms. In their control group of 300 subjects, however, only 1% showed hyperlinearity of palms.

Leutgeb, Bandmann and Breit (1972) studied 130 patients with atopic dermatitis. They found that hyperlinear palms were only observed in patients who simultaneously suffered from ichthyosis vulgaris.

The findings of Leutgeb et.al. were supported by Uehara and Hayashi (1981) who studied 178 patients with atopic dermatitis. Of these subjects 66 (37%) also suffered from ichthyosis vulgaris. Of the 66 patients with atopic dermatitis who also suffered from ichthyosis, 45 (68.2%) had hyperlinear palms. Only 4 (3.5%) of the 112 atopic dermatitis patients lacking ichthyotic skin changes showed increased palmar markings. This difference was found to be statistically significant ($P < 0.01$).

Hoyer, Agdal and Munkvad (1981) studied Danish patients with atopic dermatitis. Out of 140 subjects with atopic dermatitis, 15 (37%) showed hyperlinearity of the palms. In this

group 4 patients had ichthyosis vulgaris. The other 25 patients had normal palms and none suffered from ichthyosis. In a control group of 20 persons none had hyperlinear palms. Hoyer et.al. claim that palmar hyperlinearity is in fact a trait of atopic dermatitis itself and not a manifestation of concomitant ichthyosis vulgaris.

Smith (1984) examined 59 patients with atopic dermatitis. He looked for the additional presence, in these patients, of hyperlinear palms and/or ichthyosis vulgaris. The results are shown in Table 3.20.

Table 3.20 Distribution of hyperlinear palms and/or ichthyosis vulgaris in 59 patients with atopic dermatitis (Smith 1984)

	<u>ICHTHOSIS VULGARIS</u>	
	PRESENT	ABSENT
<u>HYPERLINEAR PALMS</u>		
PRESENT	7	17
ABSENT	3	32

Of the 24 atopic dermatitis patients (40%) with hyperlinear palms, 7 (29%) also had ichthyosis vulgaris and 17 (71%) had hyperlinear palms but no associated ichthyosis vulgaris. This difference was found to be statistically significant ($P < 0.05$). These results support the findings of Hoyer et.al. in that hyperlinear palms are frequently found in patients with atopic dermatitis independent of the presence of ichthyosis vulgaris.

(c) Ichthyosis

Omulecki and Banach (1975) studied 53 patients with ichthyosis vulgaris. 34 suffered from the form of the disease with dominant autosomal heredity and 19 had the sex-linked form. 100 normal subjects were also studied as controls. Both patients and controls were drawn from the same region of Poland. The frequency of occurrence of the different types of digital pattern was determined and is shown in Table 3.21.

Statistically significant increases in the frequency of

ulnar loops were found on the first finger of both hands when patients with autosomal dominant ichthyosis vulgaris were compared with controls.

Table 3.21 Percentage frequency of digital types (Omulecki and Banach 1975)

PATTERN TYPE	GROUP	LEFT HAND					RIGHT HAND				
		I	II	III	IV	V	I	II	III	IV	V
ULNAR LOOP	Ivd.	77.0*	30.8	46.2**	50.05	73.15	73.15	15.4	65.45	50.05	88.55
	Cont.	51.5	35.0	65.5	53.5	53.5	79.5	46.5*	71.5	50.15	84.5
	Ivx.	68.43	35.28	76.44	58.5	76.44	47.04	5.88	70.56	41.16	76.44
RADIAL	Ivd.	0	19.25	3.85	0	0	0	11.55	3.85	0	0
	Cont.	1.0	21.5	2.0	1.0	0	0	22.0	2.0	1.0	0
	Ivx.	0	0	0	0	0	0	23.52	5.88	0	0
WHORL	Ivd.	7.7	26.45	19.25	38.5	19.25	19.25	38.5	19.25	42.35	11.55
	Cont.	17.5	24.0	13.5	34.0	13.0	17.5	33.0	15.5	45.0	12.5
	Ivx.	23.52	41.16	17.64	29.4	23.52	47.04	29.4	11.76	47.04	17.64
DOUBLE LOOP	Ivd.	15.4	3.85	7.7	7.7	3.85	7.7	3.85	3.85	0	0
	Cont.	24.0	7.0	7.5	8.5	4.0	15.0	8.0	4.5	2.0	2.0
	Ivx.	41.76	11.76	0	5.88	0	5.85	17.64	5.88	5.88	5.88
ARCH	Ivd.	**	15.4	23.1	3.85	3.85	**	*	7.7	7.7	0
	Cont.	6.0	12.5	12.0	3.0	3.5	4.0	8.5	6.5	1.5	1.0
	TVX.	0	11.76	5.88	5.88	6.0	0	23.52	5.88	5.88	0

Ivd. = Autosomal dominant ichthyosis vulgaris

Ivx. X-linked ichthyosis vulgaris

Cont.= Control subjects

Statistically Significant:- * $P < 0.01$, ** $P < 0.05$

A corresponding significant decrease ($P < 0.05$) in arches was also found on the first fingers. This decrease in occurrence of arches on digit I of both hands was also observed when X-linked ichthyosis vulgaris patients were compared to controls. Significant increases in ulnar loop frequency was also found on the 3rd digit left hand of a.d. ichthyosis vulgaris patients in comparison to controls ($P < 0.05$). A significant decrease in ulnar loops on digit II right hand ($P < 0.01$) was also noted when X-linked ichthyosis vulgaris patients were compared to controls. The frequency of occurrence of double loops was observed to be significantly decreased on 3rd and 5th digits of the left hand in

Sharma et.al. also point out that Saha (1969) had reported a high proportion of loops in the 3rd interdigital area for Indian subjects. In their study 57% of patients had I3 loops.

Verma, Jain and Joshi (1981) studied 3 female and 15 male cases of autosomal dominant type ichthyosis and 2 cases of the sex-linked type of the disease. Percentage frequency of occurrence of digital pattern types and total ridge counts were studied.

In the three female cases of autosomal dominant type ichthyosis there was found to be a significant increase in the incidence of whorls (63.33%) compared to controls (34%). There was also a significant decrease in the incidence of loops in female autosomal dominant type ichthyosis. In the two cases of sex-linked ichthyosis there was a significant increase in the incidence of whorls (90%) in comparison to controls (45%). There were no significant differences between male patients and controls (see Table 3.24)

Table 3.24 Distribution of digital pattern types (Verma et.al. 1981)

GROUPS	LOOP			WHORL			ARCH			P. Value
	F	M	Tot.	F	M	Tot.	F	M	Tot	
CONTROLS	62	54.5	58.25	34	40.5	37.25	4.0	5.0	4.5	*
Ich.Vulg.Auto. Dom.	36.6	56.0	52.7	63.33	40.0	43.8	-	4.0	3.4	
Ich.Vulg.Sex-Linked	0	10	10	0	90	90	0	0	0	**

* female $P < 0.01$ significant; male $P > 0.05$ not significant

** male $P < 0.01$ significant

No significant differences were observed in total ridge counts when the ichthyosis patients were compared to controls.

Saha (1969) studied 19 cases of ichthyosis vulgaris and reported that in 13 cases of autosomal dominant ichthyosis vulgaris there were no significant differences for digital or palmar patterns. For the sex-linked recessive type a significant increase

comparison to controls, for X-linked ichthyosis vulgaris patients. Arches were significantly increased in patients on right hand second finger and ulnar loops were correspondingly decreased.

Sharma, Sarin and Prabhakar (1977) studied 25 patients with ichthyosis (5 female and 20 male) and compared them with 25 controls (12 female and 13 male). All the subjects were Punjabees and Sharma et.al. did not specify the type of ichthyosis studied. The percentage frequency of occurrence of digital pattern types was recorded and total ridge counts were made. There was found to be a statistically significant decrease in the occurrence of loops in both sexes of the patients when compared to the controls (see Table 3.22). Whorl pattern occurrence was higher in patients of both sexes than in controls although this difference was not statistically significant.

Table 3.22 Percentage occurrence of digital patterns (Sharma et.al. 1977)

	LOOPS			WHORLS			ARCHES		
	F	M	T	F	M	T	F	M	T
CONTROL	68.4	56.9	62.4	9.1	35.4	22.8	9.1	3.84	6.4
ICHTHYOSIS	62.0	44.5	48.0	36.0	39.0	38.4	6.0	11.0	8.8

In females total ridge counts were increased while in males they were decreased when compared to controls. These differences were not statistically significant (see Table 3.23).

Table 3.23 Total finger ridge counts (Sharma et.al. 1977)

	TOTAL RIDGE COUNT					
	FEMALE			MALE		
	R	L	TOTAL	R	L	TOTAL
CONTROL	60.41	54.69	115.1	75.4	77.4	152.8
ICHTHYOSIS	68.2	64.6	132.8	75.15	74.45	149.6

in the occurrence of loops in palmar interdigital area III was found for the four patients studied when they were compared to controls. No significant changes in digital or palmar patterns were found for two cases of autosomal recessive type of ichthyosis vulgaris in comparison to controls. There were no significant differences found for total ridge counts for any of the types of ichthyosis when patients were compared to control subjects.

Hyperlinear palms appears to be a common feature of patients with ichthyosis vulgaris (Hoyer, Agdal and Munkvad (1981) and Smith (1984)). The frequency of occurrence of hyperlinearity, however, varies according to different researches. Koukkanen (1969) reported that half of all patients with ichthyosis vulgaris, whom they studied, had palmar hyperlinearity. Leutgeb, Bandmann and Breit (1972) reported that 34% of 130 ichthyosis patients studied had hyperlinear palms. Uehara and Hayashi (1981) found 28% of 178 ichthyosis sufferers to have hyperlinearity of the palms. Nexmand (1948) put the figure at 6%, Wagner and Purschel (1962) reported 6 - 10% and Tillner (1956) reported hyperlinearity to be present in only 1% of ichthyosis vulgaris.

Sjorgren-Larsson Syndrome (SLS)- congenital ichthyosis with spastic paralysis and oligophrenia.

Gustavson and Jagell (1980) studied the dermatoglyphics of 35 Swedish patients with SLS (20 males and 15 females). They were compared to fingerprints from 200 normal controls, 128 of whom also provided palm prints.

The percentage distributions of fingerprint patterns were compared in normal and SLS individuals and are shown in Table 2.25. An increase in whorls on digits I, II and III and a decrease in radial loops on digit II was found in the SLS patients when compared with the distribution in normal controls.

Unfortunately the chi-square method of statistical analysis was not applied to these results as the control group was obtained from Beckman et.al. (1962) and they combined both right and left-hand fingerprint patterns, which are not independent features.

The frequencies of palmar patterns were analysed and there was found to be a lower frequency of patterns in the

interdigital areas III on the right hand and IV on both hands in the SLS patients in comparison to controls (See Table 3.26).

Table 3.25 Percentage distribution of digital patterns
(Gustavson and Jagell 1980)

DIGIT	GROUP	PATTERN TYPE				NO.OF DIGITS
		WHORL	RAD.LOOP	ULN.LOOP	ARCH	
I	SLS.	48.6	0.0	51.4	0.0	70
	CONT.	31.8	0.3	63.1	4.8	399
II	SLS.	37.1	10.0	31.4	21.4	70
	CONT.	25.5	24.2	35.3	15.0	400
III	SLS.	20.0	2.9	71.4	5.7	70
	CONT.	9.8	2.8	78.6	8.8	399
IV	SLS.	31.4	1.4	61.4	5.7	70
	CONT.	30.1	0.0	67.4	2.5	399
V	SLS.	11.6	0.0	85.5	3.0	69
	CONT.	9.5	0.5	87.4	2.6	398

Table 3.26 Percentage occurrence of patterns in palmar areas and palmar lines (Gustavson and Jagell 1980)

PATTERN AREAS AND PALMAR LINES	SLS PATIENTS		CONTROLS	
	R	L	R	L
HYPTOHEAR	37.1	42.9	35.2	32.1
THENAR + I	0.0	2.9	5.5	11.7
II	0.0	0.0	9.4	1.6
III	34.3**	17.1	60.2	20.3
IV	17.1*	22.9*	36.7	44.5
TRANSITIONAL TYPE I	14.3*	17.1***	2.4	0.8
TRANSITIONAL TYPE 2	0.0	0.0	3.2	0.8
TYPICAL FOUR-FINGER-line	2.9	5.7	0.0	1.6

R = Right hand

L = Left hand

* = almost significant $P < 0.05$

** = significant $P < 0.01$

*** = highly significant $P < 0.001$

There was found to be an increased frequency of transitional type I four-finger-line in SLS in comparison to controls. This difference was found to be statistically highly significant.

SLS patients were found to have a larger variation in

atd angles than the controls. There was no increase in the percentage of hands with an atd angle of 57° or wider in the SLS patients. Selmanowitz and Porter (1967) examined three patients with SLS and found a decrease in the percentage of whorls on the fingers and interdigital patterns, low ridge counts, an increased incidence of hypothenar patterns, more Simian lines, double axial triradii and distal displacement of axial triradii. Goor et.al. (1970) reported a four-finger-line on one hand of a patient with SLS. Richards et.al. (1975) found maximal atd angles in twin sisters with SLS.

The result of dermatoglyphic examinations of another 10 patients with SLS have been reported to be normal (Hooper et.al. 1967, Vissian et.al. 1971, Guilleminault et.al. 1973, Theile and Jensen 1973, Ruiz-Maldonado et.al. 1974 and Boér et.al. 1977).

(d) Alopecia areata

Verbov (1968b) studied 104 patients with alopecia areata (50 male and 54 female) and compared them with a group of normal controls consisting of 76 males and 82 females. The members of both groups were British whites. Verbov studied digital patterns, fourth interdigital area configuration and the presence or absence of Simian creases.

For digital patterns Verbov found a decreased incidence of ulnar loops in both sexes on the second digit, more marked on the left hand. This was associated with an increase of whorls in males and arches in females. A decreased incidence of ulnar loops was also observed in both sexes on the third digit, more marked on the right hand. This was associated with an increase in whorls in males and arches in females (see Table 3.27).

Verbov observed that, in the fourth interdigital area, there were more frequent patterns in alopecia males than in controls. A less frequent incidence of patterns was found for alopecia females when compared to controls. There was, however, an increase in vestiges without a tendency to loop formation in the group of female alopecia sufferers (see Table 3.28).

Selmanowitz, Victor, Warburton and Orentreich (1974)

investigated the incidence of fingerprint arches in 91 female and 87 male patients with alopecia areata and in 109 female and 74 male controls. All were North American whites. The investigation was carried out in response to a report by Verbov (1968a) that out of 104 patients with alopecia areata, five, all female, had six or more arches and only one control, a male, had six arches and one female control had seven arches.

Table 3.27 Percentage frequencies of digital patterns (Verbov 1968)

DIGIT	HAND	SEX	GROUP	WHORL	UL.LOOP	RAD.LOOP	ARCH
II	LEFT	MALE	A.A.	44.9	22.4	22.4	10.3
			CONT.	31.1	32.4	24.3	12.2
	RIGHT	FEMALE	A.A.	35.8	20.8	18.9	24.5
			CONT.	32.1	32.1	22.2	13.6
		MALE	A.A.	40.0	28.0	22.0	10.0
			CONT.	26.7	40.0	20.0	13.3
III	LEFT	FEMALE	A.A.	31.5	31.5	16.6	20.4
			CONT.				
		MALE	A.A.	26.0	66.0	0.0	8.0
			CONT.	17.1	69.7	1.4	11.8
	RIGHT	FEMALE	A.A.	18.9	62.3	1.8	17.0
			CONT.	14.4	80.8	0.0	4.8
		MALE	A.A.	28.0	66.0	0.0	6.0
			CONT.	14.5	75.0	2.6	7.9
		FEMALE	A.A.	20.4	66.6	0.0	13.0
			CONT.	13.4	82.9	0.0	3.7

Table 3.28 Percentage frequencies of fourth interdigital configurations (Verbov 1968)

I4 CONFIGURATIONS	MALES				FEMALES			
	LEFT		RIGHT		LEFT		RIGHT	
	A.A.	CONT	A.A.	CONT	A.A.	CONT	A.A.	CONT
LOOP	67	46	39	31	39	66	35	53
VESTIGE WITH DISTINCT TENDENCY TO LOOP FORMATION	0	10	0	0	4	0	0	5
VESTIGE WITHOUT DISTINCT TENDENCY TO LOOP FORMATION	11	19	17	23	35	16	22	8
OPEN FIELD	17	25	44	46	22	18	39	34
WHORL	5	0	0	0	0	0	4	0

A.A.=Alopecia areata CONT.=Controls.

Selmanowitz et.al. found that among the 91 female alopecia patients 7 had six or more arches each as compared with one subject, with eight arches, found among the 109 female controls. The difference in frequency between the two populations was found to be statistically significant ($P < 0.02$). A total of 87 arches was found in the 91 female alopecia patients compared to 60 arches in 109 female controls. The difference in the overall frequency of arches between the groups of females was found to be statistically significant ($\chi^2 = 11.980$, $P < 0.001$). This can be accounted for, however, by the seven patients having six or more arches each (see Table 3.29).

Table 3.29 Arches per individual (Selmanowitz et.al. 1974)

GROUPS	SIX OR MORE ARCHES PER INDIVIDUAL					
	NO. WITH ≥ SIX ARCHES	NO. WITH < SIX ARCHES	TOTAL SUBJECTS	≥ SIX ARCHES%	χ^2	P
FEMALE ALOPECIA AREATA	7	84	91	7.7	5.928	0.02
FEMALE CONTROLS	1	100	109	0.9		
MALE ALOPECIA AREATA	3	84	87	3.4	0.726	NS
MALE CONTROLS	1	73	74	1.4		

Three male patients out of 87 had six or more arches each compared with one out of 74 controls. The frequency difference, however, though in the same direction as in the females was found to be not statistically significant. The frequency difference in total arches versus total fingers between male alopecia areata and control groups was not statistically significant.

Sharma, Sarin and Prabhakar (1977) studied a group of patients with alopecia areata and compared them with a group of control subjects. Both groups consisted of 25 Punjabee individuals, in each case 12 were female and 13 male. Frequency of occurrence of finger pattern types and total ridge counts (TRC) were determined. In female patients there was found to be a decreased incidence of arches and loops and an increased incidence of whorls. These differences in comparison with the controls were found to be statistically significant (see Table 3.30). In male patients

loops were increased with decreases in arches and whorls but these differences were not significant when compared to control subjects.

Table 3.30 Percentage frequency of digital patterns (Sharma et.al 1977)

	LOOPS			WHORLS			ARCHES		
	F	M	T	F	M	T	F	M	T
CONTROL	68.4	56.9	62.4	9.1	35.4	22.8	9.1	3.84	6.4
ALOPECIA AREATA	62.5	60.77	61.6	31.61	34.61	33.2	4.1	3.0	3.67

The total ridge count was increased in both male and female alopecia areata sufferers when compared to controls but the deviations were not statistically significant (see Table 3.31)

Table 3.31 Total ridge count (Sharma et.al. 1977)

	FEMALE			MALE		
	R	L	T	R	L	T
CONTROL	60.41	54.69	115.1	75.4	77.4	152.8
ALOPECIA AREATA	65.0	65.83	130.83	78.3	80.7	159.0

Verma, Jain and Joshi (1981) studied 20 cases of alopecia areata (15 males and 5 females) and compared them to 40 controls. The subjects were all Indian as were the controls. The frequency of occurrence of digital pattern types and total ridge counts were measured.

Statistically significant differences were found in the percentage frequency of digital patterns in females A.A. when compared to normal female controls. There were no significant differences between male patients and controls (see Table 3.32).

In female patients there was a significant decrease in loops and a significant increase in arches. The decrease in loops were particularly notable on the 2nd digit.

For total ridge count there was a drop in average ridge count in the male patients in comparison to controls although not

statistically significant. The female total ridge count was slightly higher than the controls but again this difference was not statistically significant (see Table 3.33).

Table 3.32 Digital pattern types (Verma et.al. 1981)

GROUPS	PATTERN % AGE FREQ.			
	LOOP	WHORL	ARCH	P. VALUES
CONTROL FEMALES	62	34	4	FEMALE < 0.05 MALE > 0.05
CONTROL MALES	54.5	40.5	5	
TOTAL CONTROLS	58.25	37.25	4.5	
A.A. FEMALES	52	34	14	(A.A.=ALOPECIA AREATA)
A.A. MALES	54	40	6	
TOTAL AREATA	53.5	38.5	8	

Table 3.33 Total ridge counts (Verma et.al. 1981)

GROUPS	FEMALE			MALE		
	R	L	T	R	L	T
CONTROLS	63	60	123	70	72.25	142.25
ALOPECIA AREATA	65.4	62.6	128	66	62.9	128.9

Kapur and Verma (1982) studied dermatoglyphics of 25 male patients with alopecia areata and compared them to 25 male control subjects. All subjects were Indian army personnel. The percentage frequency of occurrence of the various types of digital pattern was determined for each group. Kapur and Verma found that whorls were increased in incidence and arches were decreased in sufferers. Both of these deviations, when compared to the normal controls, were statistically significant (see Table 3.34). Loops were decreased in occurrence in alopecia areata sufferers compared to controls but this difference was not significant. Kapur and Verma also measured total ridge counts for the fingers of each group but found no significant differences between the counts.

Table 3.34 Percentage frequency of digital patterns (Kapur and Verma 1982)

	LOOPS			WHORLS			ARCHES		
	R	L	T	R	L	T	R	L	T
CONTROLS	27.6	28.8	56.4	20.8	18.4	39.2	1.6	2.8	4.4
ALOPECIA AREATA	21.2	27.2	48.4	28.8	22.4	51.2	0.0	0.4	0.4
STATISTICAL EVALUATION	N/S			* $P < 0.01$			* $P < 0.01$		

(e) Vitiligo

There have been seven studies carried out on dermatoglyphics in vitiligo. Six of the studies, by Sahasrabuddhe, Singh and Agarwal (1975), Verma and Jain (1981), Kapur and Verma (1982), Singh, Panday and Singh (1983), Singh, Panday, Singh and Girgla (1983) and Iqbal, Premalatha and Zahra (1985), were on Indian subjects. The remaining study, by Oyhenart-Perera, Kolski and Salvat (1982), was carried out using Uruguayan subjects.

Sahasrabuddhe et.al. examined 50 vitiligo patients (25 of each sex) and compared them with a control group of 100 normal individuals (50 of each sex). They studied digital patterns, patterns on interdigital spaces, total ridge counts, a - b ridge counts and position of axial triradius. Some statistically significant differences were shown in digital patterns. Vitiligo females had arches in 8.8% of cases as compared to 1% in controls. No difference in the incidence of whorls or loops were observed. In vitiligo males there were significantly more radial loops (4.8%) in comparison to controls (1.8% [$P < 0.03$]) and whorls were significantly less (patients 28%; controls 39%; $P < 0.01$). When digital patterns on individual fingers were analysed, it was found that the third digit in female vitiligo patients had a significantly lower incidence of ulnar loops (66% patients; 82% controls; $P < 0.02$) than for controls. In males the third digital patterns in vitiligo patients showed increased incidence of arches in comparison to controls (12% patients; 1% controls; $P < 0.02$). Male vitiligo patients also showed significant increases in the frequency of; radial loops on second fingers (22% patients; 8% controls; $P < 0.04$)

and ulnar loops on fifth fingers (90% patients; 78% controls; $P < 0.01$). Whilst the incidence of whorls was significantly decreased on the fifth digit in comparison to controls (6% patients; 22% controls; $P < 0.01$).

Sahasrabuddhe et.al. also found that there was a significant reduction of patterns in the Thenar/First interdigital space on the left hand in vitiligo patients (4% female vitiligo patients; 18% controls; $P < 0.01$). No differences were observed for pattern frequency in any of the other palmar areas. This was also the case for total ridge counts, a - b ridge count, axial triradial position and atd angles where Sahasrabuddhe et.al. found no differences between vitiligo patients and normal controls.

Verma and Jain (1981) studied 40 patients with vitiligo (20 of each sex) and compared them to 40 normal controls (20 of each sex). The features studied were percentage occurrence of digital pattern types and total ridge count. In male vitiligo patients increased incidence of radial loops on second fingers and increased incidence of arches overall were observed. In females increased incidence of ulnar loops on the third digits was found. These differences were, however, statistically insignificant as was the case for total ridge count.

Kapur and Verma (1982) studied 25 male vitiligo patients and compared them with 25 male controls. The percentage frequency of occurrence of the various types of finger pattern were determined for each group. A decrease in loops and an increase in whorls were found but the differences were not statistically significant. Total ridge counts were also taken but again there was no statistically significant differences in the values for vitiligo patients when compared to controls.

Singh et.al. produced two papers published in 1983 on dermatoglyphics and vitiligo. The first reported findings on digital patterns and the second on palmar patterns. In both cases the subjects were Indian. For the study of digital patterns 100 vitiligo patients (50 of each sex) were compared with 90 first degree relatives (50 males and 40 females) and 50 normal controls (25 of each sex). For the palmar pattern study 200 vitiligo patients (100 of each sex) were compared with 100 normal controls

(50 of each sex).

In the study of digital patterns the data for the males and females was analysed separately but right and left hands and individual digits were not separated. Singh et.al. found that significant differences were observed in male vitiligo patients and their relatives regarding the frequency of occurrence of digital patterns ($P \leq 0.01$). Whorls were found to be of significantly lower incidence in patients and relatives. Arches were increased in patients and loops in relatives. In female patients and relatives the frequency of occurrence of loops and arches was decreased and the frequency of whorls was increased in comparison to controls. The differences were highly significant ($P \leq 0.005$) (see Table 3.35).

Table 3.35 Percentage total digital patterns (Singh et.al 1983)

DIGITAL PATTERN	MALE			FEMALE		
	CONTROL	PATIENTS	RELATIVES	CONTROL	PATIENTS	RELATIVES
WHORL	44.4	42.8	43.0	29.6	43.0	40.4
LOOP	49.6	45.6	51.3	60.4	51.0	55.2
ARCH	6.0	11.6	5.7	10.0	6.0	4.4

In the study of palmar patterns, Singh et.al. analysed the presence of patterns on the various palmar areas, total ridge counts, a-b ridge counts and maximal atd angles. In male patients a statistically significant ($P \leq 0.001$) increase in the frequency of true patterns was observed on palmar areas, when taken overall, in comparison to controls. Statistically significant differences were found on third, fourth and hypothenar areas with the patients having a greater frequency of patterns in each case (see Table 3.36). The findings for female patients in comparison to female controls was essentially the same as for males. Pattern frequency was also found to be increased in the second interdigital area for female sufferers but this increase was statistically insignificant (see Table 3.36). When distal displacement of axial triradii in male patients was compared with controls a highly significant ($P \leq 0.005$) increase in the frequency of distal displacement was

found (patients 35%; controls 18%). A significant increase ($P < 0.02$) for distal displacement of axial triradii was found in female patients (50%) in comparison to controls (35%).

Table 3.36 Percentage frequencies of patterns (Singh et.al. 1983)

AREA	MALES			FEMALES		
	CONTROLS	PATIENTS	P.VALUES	CONTROLS	PATIENTS	P.VALUES
THENAR	3.0	2.0	> 0.5	5.0	3.5	> 0.5
II	10.0	13.5	> 0.1	2.0	6.0	> 0.1
III	38.0	50.0	$< 0.05^*$	40.0	60.0	$< 0.005^*$
IV	52.0	65.0	< 0.05	47.0	69.0	$< 0.001^*$
HYPOTHENAR	10.0	31.5	$< 0.001^*$	15.0	30.0	$< 0.005^*$
TOTAL	22.6	32.4	$< 0.001^*$	21.8	33.7	$< 0.001^*$

* = statistically significant

The total ridge count of male patients were found to be markedly higher ($169^{\pm} 48.8$) than in controls ($141.9^{\pm} 47.4$). This increase was statistically highly significant ($P < 0.002$). A very highly significant statistically ($P < 0.0001$) increase in mean total ridge count was found for female patients ($158.0^{\pm} 48.6$) compared to controls ($128.8^{\pm} 48.0$). Female patients also showed a significant reduction ($P = 0.04$) in a-b count ($76.2^{\pm} 10.6$) in comparison to controls ($80.2^{\pm} 11.1$). The mean a-b count was also reduced in male patients ($77.8^{\pm} 9.2$) compared to controls ($80.7^{\pm} 12.6$) but the decrease was insignificant ($P > 0.14$). There was no significant differences for the mean atd angles in either male or female patients when compared to controls.

Iqbal et.al. (1985) studied 100 vitiligo sufferers (64 men and 36 women) and compared them to 100 controls (50 men and 50 women). Both the probands and controls were Southern Indians. The dermatoglyphic features studied were frequency of occurrence of digital pattern types, presence of patterns in palmar areas, presence of Simian crease and Sydney line, total finger ridge count, a-b ridge count, atd angle and position of axial triradius.

An increased incidence of whorls in male sufferers and an increased incidence of arches in female patients were found to be

statistically significant ($P < 0.01$ for whorls in males; $P < 0.025$ for arches in females) when compared to controls. An increased incidence of radial loops, especially on the second digit, was also observed in the study (see Table 3.37).

Table 3.37 Percentage frequency of digital pattern types
(Iqbal et.al. 1985)

DIGIT	SEX	MALE				FEMALE			
	HAND	LEFT		RIGHT		LEFT		RIGHT	
	PATTERN	VIT.	CONT.	VIT.	CONT.	VIT.	CONT.	VIT.	CONT.
I	U.LOOP	41	58	41	54	47	38	47	40
	WHORL	56	38	59	44	42	50	50	52
	R.LOOP	0	2	0	0	6	2	3	0
	ARCH	3	2	0	2	6	10	0	8
II	U.LOOP	42	38	36	36	33	44	44	40
	WHORL	41	42	45	46	42	44	36	46
	R.LOOP	8	16	9	12	8	6	8	6
	ARCH	9	4	9	6	17	6	11	8
III	U.LOOP	70	70	66	62	67	58	69	68
	WHORL	25	24	29	30	22	36	19	28
	R.LOOP	0	0	2	2	0	0	3	0
	ARCH	5	6	5	6	11	6	8	4
IV	U.LOOP	38	44	33	58	36	50	47	46
	WHORL	63	52	67	42	47	48	44	52
	R.LOOP	0	2	0	0	6	2	3	0
	ARCH	0	2	0	0	11	0	6	2
V	U.LOOP	86	90	77	80	75	84	81	78
	WHORL	13	10	23	20	19	14	17	20
	R.LOOP	2	0	0	0	3	0	0	0
	ARCH	0	0	0	0	3	2	3	2

Palmar patterns were found to occur most frequently in I_3 and I_4 areas of the palms. The minimum incidence of palmar patterns was found to be in I_2 areas. Overall the incidence of palmar patterns was found to be statistically significantly higher ($P < 0.05$) in cases of vitiligo when compared to controls (see Table 3.38).

The mean total finger ridge count (TRC) was reduced in both men and women vitiligo sufferers when compared to controls.

Table 3.38 Percentage frequencies of palmar patterns (Iqbal et.al.1985)

PALMAR	MALE				FEMALE			
	LEFT		RIGHT		LEFT		RIGHT	
AREAS	VIT.	CONT.	VIT.	CONT.	VIT.	CONT.	VIT.	CONT.
Th/ I1	13	2	6	2	6	0	3	0
I2	0	1	2	5	3	0	0	1
I3	13	12	16	20	14	14	22	20
I4	19	14	16	15	25	20	17	17
H.	13	8	18	2	6	16	3	15

The differences were found to be highly significant on statistical analysis. Total finger ridge count in male probands was 128 while that in male controls was 146.7 ($P < 0.005$). In female vitiligo sufferers the mean total finger ridge count was 110.7 and for controls it was found to be 141.8 ($P < 0.001$). A reduction in a-b ridge counts was also found to be highly statistically significant for both vitiligo men and women in comparison to controls ($P < 0.005$ and $P < 0.001$, respectively). The mean a-b ridge count was 35.0 and 34.1 in vitiligo men and women respectively, compared with counts of 36.9 for men controls and 38.6 for women controls. The values of atd angles and position of the axial triradius were not found to be statistically significantly different when compared to those of control subjects. Three male vitiligo sufferers and one woman sufferer showed Simian crease and Sydney line was present in one vitiligo male. Only one of the control subjects had a Simian crease. This was an interesting feature although not statistically significant.

Oyhenart-Perera, Kolski and Salvat (1982) carried out a dermatoglyphic investigation of 43 caucasoid Uruguayan vitiligo patients, 19 males and 34 females. These were compared to a control sample of the same number of individuals and in addition, for digital features, to a group of Uruguayans already studied for normal dermatoglyphics by Kolski and Scazzochio (1961) and Oyhenart-Perera (1977). The features investigated in the study were frequency of occurrence of digital patterns, total ridge count, frequency of incidence of patterns in palmar areas, and a-b ridge counts.

They found for incidence of digital patterns that there was an increase in the number of arches in males with vitiligo and a consequent reduction of whorl frequency when compared to controls. These differences were found to be statistically significant for right hand and for both hands together but the difference existent for the left hand did not achieve statistical significance (see Table 3.39). In women an increase in the frequency of whorls and a decrease in loops and arches was found in vitiligo females compared to controls. These differences were found by Oyhenart-Perera et.al. to be highly significant statistically. As far as the total ridge count was concerned there was found to be a tendency for a decrease of total ridge count in male vitiligo patients and an increase in vitiligo females compared to controls. These differences were not statistically significant, however. In vitiligo males total ridge count was 124.72 ± 63.98 and in control males it was 136.17 ± 49.58 . For female vitiligo patients total ridge count was found to be 153.29 ± 45.42 compared to 128.18 ± 47.38 for female controls.

Table 3.39 Percentage frequency of digital patterns (Oyhenart-Perera et.al. 1982)

SEX	HAND	GROUP	PATTERN			
			WHORL	U.LOOP	R.LOOP	ARCH
MALE	RIGHT	VITILIGO	28.9	55.5	3.3	12.2
		CONTROLS	37.5	52.3	5.3	4.9
	LEFT	VITILIGO	20.0	66.3	3.1	10.5
		CONTROLS	29.7	61.0	3.5	5.8
FEMALE	RIGHT	VITILIGO	24.3	61.1	3.2	11.3
		CONTROLS	33.6	56.7	4.4	5.3
	LEFT	VITILIGO	46.4	50.4	1.6	1.6
		CONTROLS	30.1	60.4	3.1	6.4
	RIGHT	VITILIGO	45.8	49.2	2.5	2.5
		CONTROLS	28.7	58.4	4.3	8.6
	LEFT	VITILIGO	46.1	49.8	2.0	2.0
		CONTROLS	29.4	59.4	3.7	7.5

Oyhenart-Perera found minimal differences between vitiligo patients and controls for a-b ridge counts. For the incidence of patterns in the palmar areas there was a tendency for

the frequency of patterns to decrease in females and increase in males, although the differences found did not reach statistical significance.

(f) Dermatitis herpetiformis (D.H.)

Verbov, Kumar and Marks (1971), investigated fingerprints in 37 patients with dermatitis herpetiformis (12 women and 25 men). Minor degrees of flattening with some white lines in prints was found to be common. These features did not, however, according to Verbov et.al., appear to be more frequent than in normal individuals matched for sex and age. Only 5 patients (3 women and 2 men) showed a marked degree of fingertip ridge flattening accompanied by an abundance of white lines. Verbov et.al attribute the ridge atrophy in these 5 cases to a combination of occupational and age factors.

David (1971) reported that he had found no evidence of ridge atrophy in dermatitis herpetiformis patients.

The reports by Verbov et.al and David were initiated in response to the findings of David, Adjukiewicz and Read (1970) that 63 out of 73 patients with coeliac disease showed changes in fingerprints varying from moderate epidermal ridge atrophy to actual loss of fingerprint patterns. Out of 485 controls, investigated by David et.al., only 3 had these abnormalities. The close association between coeliac disease and D.H. has been shown by Shuster and Marks (1970) who reported that two-thirds of patients with D.H. showed evidence of enteropathy (coeliac syndrome). Brow et.al (1971) using a multiple biopsy technique found enteropathy to be almost invariably present in dermatitis herpetiformis sufferers.

The findings of David et.al (1970) have been contradicted, however, by several researchers. McRae et.al (1970) investigated 33 children with coeliac disease and found that there was no correlation between changes in fingerprints and coeliac disease. Mylotte et.al. (1972) investigated fingerprints in 53 patients with coeliac disease, 82 of their relatives and 58 control subjects. Fingerprint pattern abnormalities were found to be no greater in coeliac disease sufferers than in controls. De Sousa and Duarte (1974) found no difference in fingerprint patterns between 13

Portugese children with coeliac disease and a sample of normal controls.

Roberts, Abdullah, Marks and Shuster (1978) carried out the only extensive investigation of dermatoglyphics in patients with dermatitis herpetiformis. 101 patients with D.H. (69 males and 32 females) were studied. These were compared to 214 of their first-degree relatives who did not have D.H. and three other random series of normal subjects from Northumbria, Cumbria and Southern England. The dermatoglyphic features observed were; occurrence of digital patterns; total ridge count; absolute ridge count; a-b, b-c, c-d and b-d ridge counts; atd angle; patterns in palmar areas and main-line terminations.

When comparison was made of the distribution of finger-tip patterns by sex in the D.H. patients with those in their non-affected relatives and two random control series several significant differences were observed. Pattern types over all digits showed that D.H. males differed significantly ($\chi^2=8.43$, $P<0.005$) from their normal relatives (male) and also ($\chi^2=13.64$, $P<0.01$) from the Cumbrian controls (see Table 3.40). The difference was due to an excess of ulnar loops and a deficit of whorls in the patients.

Table 3.40 Digital pattern types (Roberts et.al. 1978)

SAMPLE	ARCHES	RAD.LOOPS	ULN.LOOPS	WHORLS
MALES				
D.H. PATIENTS	40	31	465	154
NORMAL RELATIVES	45	50	519	236
NORMAL CUMBIANS	173	241	2536	1120
NORMAL NORTHUMBRIANS	78	78	715	219
SOUTHERN ENGLISH	284	241	3279	1196
FEMALES				
D.H. PATIENTS	23	18	213	66
NORMAL RELATIVES	100	51	865	274
NORMAL CUMBIANS	415	285	3716	1534
NORMAL NORTHUMBRIANS	78	56	776	250
SOUTHERN ENGLISH	214	295	3075	1416

Differences between the male D.H. patients and Northumbrian and Southern controls were not significant but were in the same

direction. In female patients highly significant difference ($\chi^2=13.18$, $P<0.01$) were found when compared to Southern and Cumbrian samples. The differences were in the same direction as for the males. No differences were found between the D.H. females and their 'normal' relatives and Northumbrians for overall digital pattern types.

Individual finger comparisons for occurrence of digital pattern types showed a significant difference between male D.H. patients and their 'normal' male relatives in the distribution of pattern types on the index finger ($\chi^2=7.90$, $P<0.05$) and between male patients and normal Cumbrian males ($\chi^2=9.34$, $P<0.05$). Trends in the same direction again occurred on the other digits.

D.H. patients thus showed a relative excess of ulnar loops and a deficiency of whorls compared with the controls. This was the consistent difference shown in all of the significant comparisons and the trend occurred in all of the non-significant comparisons also, both for fingers overall and individually. The analysis carried out by Roberts et.al., therefore, suggested a pattern difference in D.H. with the index finger making the major but not sole contribution to it.

Ridge counts were taken for each of the ten digits and from these the total and absolute ridge counts were calculated.

D.H. males showed lower mean ridge counts on every digit than did their normal relatives and Cumbrian controls. The mean total ridge counts were significantly lower in D.H. males than those in Cumbrian controls ($F=7.45$, $P<0.001$). No significant differences were found between D.H. males and 'normal' relatives and North-umbrian controls for mean total ridge counts although again the trend was in the same direction. D.H. females also showed a lower unilateral mean ridge count on each digit than did the Cumbrian controls but no significant difference was found. Non-affected female relatives did, however, differ significantly from the Cumbrian controls ($F=1.57$, $P<0.01$)(see Table 3.41).

Quantitative analysis of palmar interdigital characters showed that the mean a-b ridge count for each hand, and for both hands combined in the D.H. patients was significantly lower than in relatives ($P<0.01$) and in Cumbrian controls ($P<0.001$) and is

also lower in Northumbrian controls, although not significantly.

Table 3.41 Digital ridge counts (Roberts et.al. 1978)

DIGIT	HAND	D.H.PATIENTS		UNAFFECTED RELATIVES		CUMBRIAN CONTROLS		NORTHUMBRIAN CONTROLS	
		MEAN±	S.D.	MEAN±	S.D.	MEAN±	S.D.	MEAN±	S.D.
MALES		n=69		n=85		n=407		n=109	
1	R	17.42±	7.54	17.72±	5.87	19.71±	5.94	16.74±	7.04
	L	15.06±	6.44	15.49±	6.91	16.77±	6.22	14.17±	6.36
2	R	9.87±	7.10	11.49±	7.18	11.60±	7.04	10.02±	7.71
	L	9.06±	6.71	10.60±	7.20	11.08±	6.84	9.51±	6.88
3	R	10.91±	6.05	11.82±	6.25	12.31±	6.00	10.44±	6.02
	L	11.35±	6.25	11.45±	6.94	12.40±	6.12	11.61±	6.09
4	R	14.90±	6.28	15.29±	7.56	16.27±	6.07	14.89±	5.54
	L	14.94±	6.07	15.35±	8.04	16.26±	6.03	14.37±	5.53
5	R	12.64±	5.49	13.19±	5.64	14.35±	5.16	12.02±	5.39
	L	12.10±	5.37	13.16±	5.96	13.92±	5.07	12.56±	4.84
FEMALES		n=32		n=129		n=595		n=116	
1	R	15.78±	5.75	14.77±	6.50	17.38±	6.77	15.41±	6.54
	L	14.59±	6.17	12.78±	5.71	14.69±	6.37	13.58±	6.42
2	R	9.66±	7.61	9.74±	7.17	11.15±	7.41	11.24±	7.07
	L	8.03±	7.78	8.68±	6.55	10.52±	7.14	10.31±	7.21
3	R	9.06±	6.03	9.84±	5.78	11.39±	6.15	11.78±	5.76
	L	9.53±	7.07	8.84±	6.60	11.24±	6.76	10.68±	5.96
4	R	13.09±	7.25	13.32±	6.92	15.53±	6.62	14.93±	5.49
	L	13.59±	6.89	13.19±	7.16	15.14±	6.87	14.20±	5.83
5	R	10.88±	6.03	11.11±	5.87	13.09±	5.43	11.99±	5.14
	L	11.69±	5.28	11.12±	5.84	12.76±	5.28	12.12±	5.50
TOT. RIDGE COUNT									
MALES		128.25±	49.18	135.58±	53.50	144.67±	45.71	126.32±	45.18
FEMALES		115.91±	52.80	113.38±	50.36	132.90±	50.88	126.24±	48.01
ABSOLUTE RID.COUNT									
MALES		155.65±	78.40	171.08±	88.23	179.89±	79.95	150.66±	70.35
FEMALES		140.25±	85.20	138.55±	80.08	165.27±	83.30	153.20±	76.72

The same trends were found to occur in both sexes. The mean b-c ridge count in patients was found to be significantly lower on the right hand compared to their relatives ($P < 0.005$), on both sides than in the Cumbrian controls ($P < 0.01$) and on the left side than the Northumbrian controls ($P < 0.05$). The mean c-d ridge count in the D.H. patients was found to be significantly lower than in

the normal Cumbrians on each hand ($P < 0.001$) and in both hands combined ($P < 0.001$) and in the normal relatives on the left hand ($P < 0.05$) and on both hands combined ($P < 0.05$). They were also found to be lower, but not significantly so, than in the Northumbrian controls (see Table 3.42). For b-d counts, it was found that the means for patients on both hands combined were significantly lower than those in relatives ($P < 0.01$). They were also found to be lower (significantly) in the left hand alone by comparison with the Cumbrian ($P < 0.01$) and Northumbrian controls ($P < 0.001$). The numbers in which b-d ridge count was measured was very small, however, (2 D.H. females, 3 female relatives, 42 Cumbrian and 4 Northumbrian controls).

Table 3.42 Palmar quantitative features (R + L combined)
(Roberts et.al 1978)

PALMAR VARIABLE	D.H. PATIENTS		D.H. NORMAL RELATIVES		CUMBRIAN CONTROLS		NORTHUMBRIAN CONTROLS	
<u>MALES</u>								
a-b	79.48±	11.14	85.39±	12.24	84.37±	10.74	81.29±	10.09
b-c	53.06±	9.18	55.62±	11.67	55.80±	10.85	55.89±	9.91
c-d	71.77±	11.81	75.92±	12.61	77.69±	10.68	72.71±	11.67
b-d	-	-	-	-	94.44±	25.04	81.00±	0.0
atd angle	80.43±	7.32	85.41±	13.43	79.85±	7.05	79.85±	6.52
MAINLINE INDEX	27.60±	3.72	26.84±	3.75	-	-	27.36±	4.01
<u>FEMALES</u>								
a-b	79.23±	10.23	84.05±	11.98	84.03±	9.84	80.60±	8.60
b-c	52.31±	9.07	55.54±	13.40	55.59±	9.96	55.85±	9.73
c-d	71.76±	13.13	73.72±	11.77	77.52±	10.86	74.92±	8.68
b-d	80.00±	8.49	107.00±	22.07	98.54±	15.71	104.00±	6.56
atd angle	79.96±	6.61	85.70±	12.45	79.58±	6.91	80.85±	7.11
MAINLINE INDEX	27.46±	3.11	26.06±	3.86	-	-	28.02±	3.55

No significant differences were found between patients and controls for atd angles or mainline index.

In the Th/I_1 areas, patterns in both hands combined in patients of both sexes were found to be significantly fewer than in Cumbrian, but no other controls (5.5% D.H. patients; 10.01% in Cumbrian controls; $X_2 = 4.13$, $P < 0.05$). There were significantly fewer loops on both hands combined for D.H. males compared to normal relatives in I_2 ($P < 0.05$) and in I_4 significantly fewer

patterns in female patients when compared to relatives ($X_2 = 4.13$ and 4.11) for each hand. Hypothenar patterns were found to be significantly fewer on the right hand of male patients and their normal relatives ($P < 0.01$) and so were those on the left hand of female patients ($P < 0.05$). When compared with controls the right hand of male D.H. patients showed a significantly lower frequency of hypothenar patterns than Cumbrian male controls ($P < 0.05$).

The distribution of mainline termination showed little difference between patients and controls, only mainline C on the right hand of male patients show significantly fewer suppressed and aborted forms than Cumbrian controls ($P < 0.05$) and the left hand of the male patients showed significantly fewer by comparison with Northumbrian controls ($P < 0.05$).

(g) Discoid lupus erythematosus (D.L.E.)

Singh, Panday and Singh (1984) studied dermatoglyphic features in 50 patients (20 males and 30 females) suffering from discoid lupus erythematosus and compared them with 50 normal controls (25 of each sex). Both patients and controls were from the same region of India. The features studied were digital patterns, presence of true patterns on palmar areas, distal displacement of axial triradii, total ridge counts, a-b counts and maximal atd angles.

Male patients showed a statistically significant increase in the frequency of loops (64%) and a decrease in whorls (34.5%) and arches (1.5%) when compared to controls (loops 49.6%, whorls 44.4% and arches 6.0%). These changes were found to be statistically significant for first and fourth digits (see Table 3.43). Arches were found in male controls on all digits although most frequently on second fingers. In the case of male D.L.E. patients, however, arch patterns were found exclusively on second fingers. Female patients showed a statistically highly significant increase in the percentage of whorls (37.3%) and a decrease in arches (1.7%) in comparison with controls (whorls 29.6%, arches 10.0%). These differences were statistically significant for first, third and fourth digits. Arches were found exclusively on second digits in patients but occurred on all fingers of controls. Irrespective of

sex, there was found to be an increase in loops (62.5%) and a decrease in whorls (35.9%) and arches (1.6%) in D.L.E. patients when compared to controls (loops 55%, whorls 36.8% and arches 8.0%).

Table 3.43 Percentage frequencies of digital patterns (Singh et.al. 1984)

DIGITS	PATTERNS	MALES			FEMALES		
		Pt.	CONT.	P.Values	Pt.	CONT.	P.Values
I	WHORL	42.5	68.0	<0.01*	43.3	32.0	>0.05*
	LOOP	57.5	26.0		56.7	58.0	
	ARCH	0.0	6.0		0.0	10.0	
II	WHORL	42.5	40.0	>0.5	46.7	34.0	>0.2
	LOOP	50.0	46.0		45.0	50.0	
	ARCH	7.5	14.0		8.3	16.0	
III	WHORL	37.5	26.0	>0.3	25.0	24.0	>0.02*
	LOOP	62.5	72.0		75.0	62.0	
	ARCH	0.0	2.0		0.0	14.0	
IV	WHORL	42.5	72.0	<0.01*	63.3	48.0	<0.05*
	LOOP	57.5	24.0		36.7	44.0	
	ARCH	0.0	4.0		0.0	8.0	
V	WHORL	7.5	16.0	>0.1	8.3	10.0	>0.5
	LOOP	92.5	80.0		91.7	88.0	
	ARCH	0.0	4.0		0.0	2.0	
TOTAL	WHORL	34.5	44.0	<0.01*	37.3	29.6	<0.001*
	LOOP	64.0	49.6		61.0	60.4	
	ARCH	1.5	6.0		1.7	10.0	

*= statistically significant value

Pt.= D.L.E. patients

CONT.= controls

In the normal controls whorls were found to be more frequent in males (44.4%) than in females (29.6%) while it was the reverse in the case of the D.L.E patients (males 34.5% and females 37.3%). This was also the case for loops (see Table 2.43). There was a significant decrease in whorls in males and an increase of whorls in females. The arch patterns were observed only on second digits in both sexes. The digital findings were statistically significant for first and fourth digits in both sexes.

The total ridge counts were significantly increased ($P < 0.01$) in male patients (170.5 ± 28.2) in comparison to controls (137.1 ± 45.2). There was an insignificant increase in total ridge count in females (patients 138.8 ± 46.7 , controls 129.3 ± 50.0 , $P > 0.47$).

Singh et.al. found that there was an overall increase in the true patterns in palmar areas in male patients (29.0%) in comparison to male controls. These changes were statistically significant for thenar and hypothenar areas (see Table 3.44). For female patients there was an overall increase in true patterns on all palmar areas (25.0%) in comparison to controls (21.6%). The fourth interdigital and hypothenar areas had significantly increased true patterns while there was a significant reduction of true patterns on the third interdigital area (see Table 3.44).

Table 3.44 Percentage frequencies of dermatoglyphic features on palms (Singh et.al.1984)

(* = statistically significant)

PALMAR AREAS	MALES			FEMALES		
	CONTROLS	PATIENTS	P.VALUES	CONTROLS	PATIENT	P.VALUES
THENAR	2.0	20.0	$< 0.01^*$	4.0	0.0	> 0.05
I ₂	8.0	5.0	> 0.5	0.0	0.0	1.0
I ₃	42.0	42.5	> 0.9	40.0	20.0	$< 0.05^*$
I ₄	50.0	37.5	> 0.2	48.0	71.7	$< 0.02^*$
HYPOTHENAR	20.0	40.0	$< 0.05^*$	16.0	33.3	$< 0.05^*$
TOTAL	24.4	29.0	> 0.2	21.6	25.0	> 0.3

The distal displacement of axial triradii was reduced significantly in female patients (11.7%) in comparison to controls (34.0% [$P < 0.01$]) but in males there was no difference in distal displacement of axial triradii (D.D.A.) between patients and controls. The mean value of atd angles was significantly reduced in female D.L.E patients ($40.8^\circ \pm 5$) in comparison to controls ($43.7^\circ \pm 7.7$ [$p < 0.03$]). For male patients the atd angles were insignificantly increased ($43.8^\circ \pm 9.8$ for D.L.E. patients, $41.5^\circ \pm 6.9$ for controls [$p > 0.21$]).

Systemic lupus erythematosus (S.L.E.)

This is a systemic disorder which may have some relationship to D.L.E. The connection between S.L.E. and D.L.E. is,

however, a subject of much controversy and has not been conclusively proven (see Chapter 2).

There have been four main studies carried out on the relationship between dermatoglyphics and S.L.E. All the researchers found statistically significant differences between S.L.E. patients and matched control populations.

Dukes and Rupe (1973) investigated caucasian subjects and found there to be a significant difference in the ulnar displacement of the axial triradius on the right hand. Fraga et.al. (1974) studied Mexican subjects and found differences which were statistically significant. They found a decrease in the occurrence of radial loops and arches on the digits of S.L.E. patients in comparison to controls. A significant increase in the occurrence of palmar patterns in the Thenar/1st interdigital area of S.L.E. patients along with an increase in axial triradius displacement was also reported by Fraga et.al. Dubois, Weiner and Dubois (1976) studied Mexicans and caucasians along with their matched controls. Dubois et.al. studied 85 measurements and 23 indices and from the data 11 parameters were found to be statistically significant. Four separated the Mexican-American S.L.E. group from their controls and seven separated the caucasian S.L.E from their controls (P values <0.002 to <0.05). The four parameters which were statistically significant between the Mexican S.L.E. sufferers and controls were as follows:- the radial measurement of the axial triradius in the right hand of the Mexican S.L.E. group was decreased when compared to controls ($P<0.0027$). The composite measurement of the right axial triradius also showed a significant difference. Both of these results indicate a radial shift of the axial triradius in S.L.E. patients. There was found to be a significant increase in the frequency of occurrence of patterns in the hypothenar area of the left hand in the S.L.E. group ($P<0.036$). A significant increase in the occurrence of whorls and a significant decrease in loops was observed in S.L.E. patients on the left thumb in comparison to controls ($P<0.002$).

Seven significant parameters were observed by Dubois et.al. in the caucasian S.L.E. group when compared to controls. In the left hand of the S.L.E. patients both ulnar displacement of the

axial triradius ($P < 0.0026$) and the composite measurement of the axial triradius ($P < 0.011$) showed significant differences. This indicated an ulnar shift of the triradius in the S.L.E. group in comparison to controls. For the right hand significant decreases in atd. angle ($P < 0.042$) and proximal displacement of the axial triradius ($P < 0.05$) were observed. A significant increase in hypothenar patterns ($P < 0.036$) was also found for the right hand in S.L.E. patients. A statistically significant decrease in the log of a-b ridge count was observed by Dubois et.al. in both hands of caucasian S.L.E. patients when compared to controls.

Vormittag et.al. (1981) studied female Austrian S.L.E. patients and a group of matched controls. A significantly higher frequency of low endings of line A on both hands of S.L.E. patients was found. On the left hand there were significantly more patterns in the I_4 and significantly fewer patterns in the I_3 interdigital areas of the palms of S.L.E. patients when compared to controls.

(h) Pemphigus

Only one study has been carried out on dermatoglyphics in pemphigus and this was by Singh, Pandey and Singh (1984) on Indian subjects. They studied forty patients suffering from pemphigus (20 males and 20 females) and compared them with fifty control subjects (25 of each sex). In the study, digital pattern frequency, occurrence of palmar patterns, distal displacement of axial triradii, total finger ridge counts, a-b counts and atd. angles were recorded.

The results for the frequency of occurrence of digital pattern types showed statistically significant increases ($P < 0.001$) for loops in male patients (74%) when compared with male controls (49.6%). There was also a decrease in whorls in the male patients 26% compared to 44.4% in male controls. No male patients had arch patterns in contrast to 6% of controls. These results were observed on all digits but were statistically significant ($P < 0.05$) for digits I, II and IV only (see Table 3.45).

In females the patients showed statistically highly significant ($P < 0.001$) increase in the frequency of whorls (56%) and decrease in loops (43%) and arches (1%) in comparison to

controls (whorls 29.6%, loops 60.4%, arches 10%). The changes were found on all fingers and were statistically significant (apart from loops on digit III) (see Table 3.45).

Table 3.45 Percentage frequencies of digital patterns
(Singh et.al. 1984)

		FINGER NO:-											
		I		II		III		IV		V		TOTAL	
SEX	PATT	CONT	PT.	CONT	PT.	CONT	PT.	CONT	PT.	CONT	PT.	CONT	PT.
MALE	LOOP	26.0	75.0	46.0	67.5	72.0	82.5	24.0	57.5	80.0	87.5	49.6	74.0
	WHRL	68.0	25.0	40.0	32.5	26.0	26.0	72.0	42.5	16.0	12.5	44.4	26.0
	ARCH	6.0	0.0	14.0	0.0	2.0	2.0	4.0	0.0	4.0	0.0	6.0	0.0
	P.VAL	*0.001		* <0.05		>0.1		* <0.005		>0.1		* <0.001	
FE- MALE	LOOP	58.0	37.0	50.0	32.5	62.0	62.5	44.0	12.5	88.0	70.0	60.4	43.0
	WHRL	32.0	62.0	34.0	62.5	24.0	37.5	48.0	87.5	10.0	30.0	29.6	56.0
	ARCH	10.0	0.0	16.0	5.0	14.0	0.0	8.0	0.0	2.0	0.0	10.0	1.0
	P.VAL	* <0.01		* <0.02		* <0.05		* <0.001		* <0.05		* <0.001	

The frequency of occurrence of patterns was increased in female patients in all palmar areas except Thenar/ I_1 where it was reduced. The differences were all statistically significant for all areas except thenar and I_3 (see Table 3.46). In males patients the results were exactly opposite from those in females. The frequency of patterns was reduced significantly ($P<0.01$) in all areas except thenar/ I_1 where it was increased significantly ($P<0.05$).

Table 3.46 Percentage frequencies of palmar patterns
(Singh et.al. 1984)

		THENAR	I_2	I_3	I_4	HYPOTH.	TOTAL	D.D.A.
MALES	CONTROLS	2.0	8.0	42.0	50.0	20.0	24.4	20.0
	PATIENTS	15.0	0.0	30.0	35.0	0.0	16.0	10.0
	P.VALUES	$<0.05^*$	>0.05	>0.1	>0.1	$<0.01^*$	$<0.05^*$	>0.1
FEMALES	CONTROLS	4.0	0.0	40.0	48.0	16.0	21.6	34.0
	PATIENTS	0.0	30.0	55.0	70.0	45.0	40.0	80.0
	P.VALUES	>0.1	$<0.001^*$	>0.1	$<0.05^*$	$<0.01^*$	$<0.001^*$	$<0.001^*$

The distal displacement of axial triradius (see Table 3.46) was reduced in male patients and significantly increased in female patients. The mean value for total ridge count was significantly higher in both male and female pemphigus patients when compared with those of controls (see Table 3.47).

Table 3.47 Quantitative parameters on palms (Singh et.al. 1984)

GROUPS		MEAN $\pm$ S.D.		
		a-b	TRC.	atd.
MALES	CONTROLS	77.9 $\pm$ 11.2	137.1 $\pm$ 45.2	41.5 $\pm$ 6.9
	PATIENTS	81.3 $\pm$ 6.4	165.5 $\pm$ 34.8	39.8 $\pm$ 5.0
P.VALUES		> 0.2	< 0.02*	> 0.18
FEMALES	CONTROLS	80.6 $\pm$ 12.6	129.3 $\pm$ 50.0	43.7 $\pm$ 7.8
	PATIENTS	80.3 $\pm$ 10.5	180.5 $\pm$ 32.0	44.8 $\pm$ 9.8
P.VALUES		> 0.92	< 0.0001*	> 0.56

*=statistically significant

(i) Basal cell naevus syndrome (Gorlin-Goltz Syndrome)

The dermatoglyphics of 10 patients with Gorlin-Goltz Syndrome were studied by Linss et.al. (1983). A comparison was made with eleven unaffected descendant family members of these patients. The findings were also compared with those from a group of normal subjects. A significant decrease in the incidence of whorls and an increase in loops was found in both affected and unaffected subjects when compared to the normal controls (see Table 3.28). The number of arches on the finger prints of patients was found to be significantly higher than those in family members. A low total ridge count and delta index was also found in both patients and family members but maximal atd angle and D-line type did not differ in comparison to the values found for control subjects (see Table 3.49).

Table 3.48 Percentage digital pattern frequency (Linss et.al. 1983)

PATTERN	CONTROLS	PATIENTS	RELATIVES
WHORLS	28.36	9.0	12.7
LOOPS	65.74	75.0	80.0
ARCHES	5.9	16.0	6.4
RADIAL LOOPS	4.7	9.0	5.4

Table 3.49 TRC., delta index and atd angle (Linss et.al. 1983)

GROUP	n	TRC.	DELTA-INDEX*	ATD.
PATIENTS	10	78.3	0.93	44.2
RELATIVES	11	92.8	1.06	48.2
CONTROLS	200	136.36	1.21	45.0

*Delta index (Loeffler 1969) = $\frac{\text{Whorl \%} - \text{Arch \%}}{100} + 1$

(j) Dariers Disease

Verbov (1970) reported that a common characteristic of the hands of patients suffering from Dariers disease is that the epidermal ridges are broken in continuity and 'pitted' areas occur. Gibbs (1967) had previously described the blurring or destruction of epidermal ridge patterns in Dariers disease which could, he reported, return to normal with remission. Sarojini et.al. (1977) reported similar findings to Gibbs. Szilvassy et.al. (1974) studied hand and finger prints of ten patients with Dariers disease (5 male and 5 female). They reported the frequency of occurrence of finger and palmar patterns, total ridge counts and maximal atd angles. No significant differences were found between their findings for Dariers patients and the normal population. Szilvassy et.al. did, however, describe the occurrence of white lines and the nature of the pits and plaques which were found to be similar to other researchers.

(k) Incontinentia pigmenti

Rott (1984) studied the dermatoglyphics of eight female patients with incontinentia pigmenti. In all cases the dermatoglyphic pattern composition was found to be within the variation of normal subjects. In five out of the eight patients, however, ridge

dissociation and partial or complete lack of sweat gland pores was observed. The areas involved were found to be irregularly patchy and occurred mostly on the palms with only minor affection of the fingers. Two patients were found to have normal ridges and pores whilst the prints taken from the remaining subject were of a quality insufficient for the evaluation of ridge detail.

(1) Anhidrotic (Hypohydrotic) ectodermal dysplasia (A.E.D. or H.E.D.)

Lapiere and Dodinval (1967) studied four male subjects with anhidrotic ectodermal dysplasia, three brothers and their cousin, and compared their dermatoglyphics with other family members. All subjects were drawn from the same French family. Lapiere and Dodinval noted that the atd angle was higher in 2 affected males and on one hand of one of their mothers and in a sister of one of the affected boys (see Table 3.50). They suggested that a high atd angle might be an indication of affected or carrier status. Lapiere and Dodinval also found hypothenar patterns to be common within the family they studied (see Table 3.50). The individuals presented in the table are the only ones which Lapiere and Dodinval report in detail, the rest are reported not to possess any notable dermatoglyphic characteristics. Flattening of ridges and distortion of the ridge patterns were reported in the affected males, sister and mother.

Table 3.50 Atd angles and hypothenar patterns in A.E.D family members (Lapiere and Dodinval 1967)

SUBJECT	atd.angle		Hypothenar patterns	
	L	R	L	R
(1) AFFECTED MALE	63	68	NONE	U.LOOP
(2) AFFECTED MALE COUSIN	80	70	NONE	WHORL
(3) MOTHER OF (1)	-	38	NONE	U.LOOP
(4) MOTHER OF (2)	-	63	NONE	WHORL
(5) A SISTER OF (1)	-	50	U.LOOP	U.LOOP

Priest (1967) reported a study carried out on two families with A.E.D. She found that in both families striking ridge disruption occurred in all areas of the palms. Patterns tended to be vestigial, particularly in I_3 and I_4 , apart from in

the hypothenar area where Priest reported very complex patterns. The axial triradius tended to be distal and triradii c and d were often absent or displaced.

Verbov (1970) carried out a study of 20 members belonging to 5 unrelated families with hypohidrotic (anhidrotic) ectodermal dysplasia. Finger pattern occurrence, frequency of occurrence of interdigital and hypothenar patterns, and a-b ridge counts were found to show no important variation from normal. Verbov reported that a high maximal atd angle was a common finding in affected individuals and in their mothers (see Table 3.51).

Table 3.51 Maximal atd angles in members of five families with AED (Verbov 1970)

		Maximal atd angle	
FAMILY	MEMBER	L	R
A	Affected male	65	58
	Mother	76	66
	Sister	44	44
	Father	43	40
B	Affected male	unclear	100
	Mother	80	80
	Sister	80	45
	Father	36	36
C	Affected male	69	61
	Mother	60	41
	Sister	41	40
D	Affected male	49	48
	Mother	42	60
	Sister 1	40	40
	Sister 2	42	58
	Brother	48	45
E	Affected male	60	60
	Mother	40	41
	Sister	43	45
	Father	39	40

The mean sum of atd angles in the members of the families studied were also compared to controls (Table 3.52) and were found to be higher in affected males and their mothers than in control subjects.

Ridge flattening was reported to be a common finding in affected individuals and in their mothers and sisters. Verbov states that dermatoglyphic analysis was often made difficult because of the distortion of the ridges.

Table 3.52 Sum of atd angles in families with AED and in controls
(Verbov 1970)

SEX	AED FAMILIES		CONTROLS (PENROSE 1954)		
	NO. SUBJECTS	MEAN SUM $\hat{atd}$	NO.	AGE	MEAN SUM $\hat{atd}$
MALE	4 Affected	117.5	28	0 - 4	92.5
	3 Fathers	78.0	510	15+	85.0
FEMALE	6 Daughters	93.7	32	0 - 4	97.5
	5 Mothers	117.2	507	15+	85.9

Rodewald and Zahn-Messow (1982) studied dermatoglyphics in a male patient with HED and in his mother and grandmother (both carriers). A comparison was made with a control group of 282 males and 270 females, all subjects were from Southern Germany. The difficulty of dermatoglyphic analysis produced by the ridge flattening and distortion due to the ectodermal defect was emphasized by Rodewald and Zahn-Messow. The male HED sufferer and carrier mother differed from controls in having more t" triradii and hypothenar patterns along with a high maximal atd angle. The carrier grandmother had none of the above but possessed 4 arches on the fingertips. Lapiere and Dodinval (1967) reported that one male patient in their study had arches on 7 out of 10 fingers.

O'Leary et.al. (1986) studied dermatoglyphics in 15 members of a family with hypohidrotic ectodermal dysplasia. Three affected members, three obligate carriers, five possible carriers and five unaffected males were studied and compared with prints of controls, matched for sex and age. One obligate and one possible carrier were reported to have a missing c triradius and one affected member had bilateral high axial triradius. Among the obligate carriers one had a hypothenar whorl and among five possible carriers one had a hypothenar ulnar loop and two had thenar patterns.

O'Leary et.al. found that the mean sweat pore count per centimetre of dermal ridge was 20.7 compared to 39.6 in controls matched for sex and age. Frias and Smith (1968), Verbov (1970), Passarge and Fries (1973) and Rodewald and Zahn-Messow (1982) all report significant decreases in mean sweat pore counts in subjects and carriers when compared with controls. The methods of obtaining and calculating the values were different, however, for various researchers.

3.3 - Summary and Discussion

A. Disease Approach (i.e. dermatoglyphic parameters in different disorders)

1. Psoriasis

(i) Digital Pattern Frequency

This is the dermatoglyphic feature most commonly studied. Changes in the frequency of occurrence of digital pattern types have been observed by various researchers although there is no unanimity in their findings. The pattern types most commonly involved were whorls and loops.

Krieger (1934) observed an increase in the frequency of occurrence of whorls on the first and fourth fingers of psoriatics when compared to controls. The increase was, however, very small and not statistically significant. Krieger did not separate the sexes before analysis. Verbov (1968) found a statistically significant increase in whorls in psoriatics of both sexes on the fourth digit which was more marked on the right hand. Lal (1977) also found a statistically significant increase in whorls on the right hand fourth finger of male psoriatics along with a decrease in the frequency of whorls on the right thumb. For female psoriatics the frequency of whorls was increased in comparison to controls particularly on fingers 3, 4 and 5 of the right hand and fingers 1, 3 and 4 of the left hand.

Gibbs and Warburton (1968), found a statistically significant increase of whorls on all fingers of psoriatics except for the right index finger. Saha (1969) also found increases in whorl patterns but only analysed a small sample of psoriatics. Jilek (1972) found an increase in whorl pattern occurrence in

psoriatics compared to controls. Statistically significantly higher values were found on fingers 2, 3 and 4 of the right hand in males and fingers 2 and 4 of the right hand in females. Jilek also observed a slight increase in the occurrence of loops on these fingers. All of the other researchers above had reported a decrease in loops corresponding to the increase in whorls. Sharma et.al. (1977) found a statistically significant increased incidence of whorl patterns in females on all fingers as well as an increase in loops in both sexes of psoriatics. Male patients were observed to have a slight decrease in whorls in comparison to controls.

Banach (1977) found a statistically significant increase in arches in both sexes of psoriatics in comparison to controls. An increase in whorls in female psoriatics and a decrease in the occurrence of loops in both sexes was also observed. Verma et.al. (1980) also found an increased incidence of whorls in female psoriatics coupled with a corresponding decrease in loops. For males, however, the results were reversed with a decrease in whorls and an increase in loop incidence. In both sexes whorls occurred most commonly on the fourth finger. Kapur and Verma (1982) reported a statistically significant increase in loops and decrease in whorls in male psoriatics compared to controls. Singh et.al. (1983) found exactly the same trends as did Verma but their findings did not reach statistically significant values apart from an increase in whorls on the first finger of female psoriatics and an increase in loops on finger 1 of male psoriatics in comparison to controls.

(ii) Total Ridge Counts

Jilek (1972) found that the values for T.R.C. were significantly higher for both sexes of psoriatics in comparison to controls. Singh et.al. (1983) reported a statistically significant increase in T.R.C. for male psoriatics and a marked increase, although not statistically significant, for female psoriatics when compared to normal controls. Verma et.al. (1980) found a statistically significant increase in T.R.C. in female psoriatics but for male psoriatics the T.R.C. was significantly decreased in comparison to controls. Sharma et.al. (1977) reported the same findings as Verma et.al. but only the males were statistically significant.

(iii) Palmar Patterns

An increased frequency of occurrence of patterns in the fourth interdigital area was reported to be statistically significant for the left hand by Krieger (1934) and for the right hand by Verbov (1968). Singh et.al. (1983) found true patterns to be significantly increased in the third and hypothenar interdigital areas. Banach (1977) reported significant differences in the occurrence of patterns in areas I_2 , I_3 , I_4 and the hypothenar area. The frequency of patterns was significantly lower in both sexes in comparison to controls. Gibbs and Warburton (1968) observed that the frequency of occurrence of patterns in the interdigital areas of the palms were essentially the same.

(iv) Mean atd angle

Banach (1977) reported that the mean atd angle was statistically significantly smaller in psoriatics of both sexes in comparison to controls. The same findings were reported by Singh et.al. (1983). Gibbs and Warburton (1968) reported negligible differences between psoriatics and controls for atd angle.

(v) Displacement of axial triradius

Singh et.al. (1983) found a statistically highly significant decrease in displacement of the axial triradius in female psoriatics but no difference in males in comparison to controls. Banach (1977) also found significant decreases in the occurrence of axial triradius displacement both for female and male psoriatics. Gibbs and Warburton (1968) found no difference between psoriatics and controls for displacement of axial triradius.

(vi) Occurrence of Simian Line

Bettmann (1932) reported Simian lines in 28% of psoriatics examined which is well above the normal value. Gibbs and Warburton (1968) and Verbov (1968), however, found no differences in the frequency of occurrence of Simian lines in psoriatics in comparison to normal controls.

2. Atopic Eczema

(i) Digital Pattern Frequency

Verbov (1972) found a statistically significant decrease in whorls on all fingers except the right fourth finger and a statistically significant increase in arches on all fingers for female atopics in comparison to controls. Both Verbov and Cusumano et.al. (1983) reported there to be no significant differences in digital pattern frequency for male atopics in comparison to controls. Cusumano et.al. did, however, find a statistically significant increase in the occurrence of whorls in female atopics when compared to controls which directly contradicts Verbov's findings.

(ii) Palmar Patterns

Verbov (1972) reported no significant differences for either sex for palmar areas I_2 , I_3 and I_4 . He did, however, observe a significant increase in occurrence of patterns in the hypothenar area in female atopics compared to controls.

(iii) Miscellaneous dermatoglyphic features

Verbov (1972) reported that there were no significant differences between atopics and controls for total ridge counts, a - b ridge counts and the occurrence of Simian and Sydney lines.

(iv) Linear grooves and hyperlinearity

The occurrence of excess creases ("White lines" or "linear grooves") over fingers and palms has been reported to occur significantly more frequently in atopic eczema sufferers than in normal controls (Verbov (1972) and Cusumano et.al.(1983)). Hyperlinear palms have been reported to be a common feature of atopic eczema, occurring significantly more frequently in atopics than in controls (Smith 1984; Hoyer et.al. 1981; Hirth et.al. 1971; Hanifen and Lobitz, 1977; Blaylock, 1976 and Maize, 1976). Uehara and Hayashi (1981) and Leutgeb et.al. (1972) also report the common occurrence of hyperlinear palms in atopic patients but argue it is due to concomittant ichthyosis. This theory has

been directly contradicted by Smith (1984) and Hoyer et.al. (1981) who investigated atopics without ichthyosis and found hyperlinear palms to be common.

3. Ichthyosis

(i) Digital Pattern Frequency

For the autosomal dominant variety of ichthyosis Omulecki and Banach (1975) report a statistically significant increase in ulnar loops on both hands particularly on the third digit of the left hand. They also observed a significant decrease in arches on finger 1 of both hands. Verma et.al. (1981) found a significant increase in whorls and decrease in loops but only examined three female cases. Saha (1969) reported that there were no significant differences in digital pattern frequency of occurrence for autosomal dominant type ichthyosis sufferers in comparison with controls. Omulecki and Banach (1975) observed a statistically significant decrease in the occurrence of ulnar loops on the second digit right hand and of double loops on the third and fifth fingers of the left hand of sufferers of x - linked ichthyosis when compared to controls. Arch patterns were also found to be significantly increased on the second finger of the right hand. Sharma et.al. (1977) reported a statistically significant decrease in loops in both sexes of patients compared to controls. Gustavson and Jagell (1980) found an increase in whorls on digits I, II and III and a decrease in radial loops on digit II of sufferers of Sjögren-Larssen Syndrome (SLS) in comparison to controls. Selmanowitz and Porter (1967) report a decrease in whorls in SLS patients which is in direct contradiction to the findings of Gustavson and Jagell.

(ii) Total finger ridge counts

Selmanowitz and Porter (1967) report a significant decrease in TRC for SLS patients in comparison to controls. No significant differences were found for TRC by Verma et.al. (1981) and Saha (1969) for autosomal dominant ichthyosis and x - linked ichthyosis patients in comparison to controls.

(iii) Palmar patterns

Saha (1969) reported no significant differences in the frequency of occurrence of patterns in the various palmar areas for autosomal dominant ichthyosis sufferers. There was, however, a significant increase in patterns in I_3 for x - linked ichthyosis sufferers according to Saha although only 4 patients were studied. For SLS Gustavson and Jagell (1980) reported a lower frequency of patterns in I_3 of the right hand and I_4 of both hands in patients in comparison to controls. Selmanowitz and Porter (1967) found an increase in occurrence of patterns in the hypothenar areas and a decrease in patterns in the other interdigital areas.

(iv) Hyperlinear palms

Hyperlinearity of palms in sufferers from ichthyosis have been reported to be significantly more frequent in sufferers than in normal controls (Hoyer et.al. 1981; Koukkanen, 1969; Leutgeb et.al. 1972; Uehara and Hayashi, 1981 and Tillner, 1956).

(v) Miscellaneous dermatoglyphic features

No significant differences for any other dermatoglyphic features have been reported by any of the researchers with the exception of Selmanowitz and Porter who observed increases in the occurrence of distal displacement of the axial triradius and Simian lines for SLS sufferers in comparison to controls.

4. Alopecia Areata

(i) Digital pattern frequency

Verbov (1968) found significant increases in the occurrence of whorls in male alopecia patients and arches in female patients when compared to controls. In both sexes there was found to be a statistically significant decrease of ulnar loops on the second digit. This decrease was also significant for females on the third fingers. Verma et.al. (1981) also found a significant decrease in loops for female alopecia patients which was particularly noticeable on the second digit. A significant increase in arches was also found for female alopeciaks by

Verma et.al. and by Selmanowitz et.al. (1974).

The same trend was found for male alopeciacs but did not reach the level of statistical significance. Sharma et.al. (1977) found a statistically significant decrease in arches and loops in female alopecia sufferers with a corresponding increase in whorls. Kapur and Verma (1982) reported a statistically significant increase in whorls and decrease in arches in male patients.

(ii) Total ridge counts

A drop in the TRC in male patients and a rise in female patients was observed by Verma et.al. (1981) but the values did not reach the level of statistical significance when compared to control subjects.

(iii) Palmar patterns

A less frequent incidence of patterns in the interdigital areas in females and an increase in the frequency of incidence of patterns in area I_4 in males was reported by Verbov (1968) when alopeciacs were compared to controls.

(v) Simian lines

The incidence of Simian lines did not differ from that in controls (Verbov 1968).

5. Vitiligo

(i) Digital pattern frequency

For female vitiligo patients compared to controls a statistically significant increase in arches was found by Sahasrabuddhe et.al. (1975) and Iqbal et.al. (1985). Singh et.al. (1983) and Oyhenart-Perera et.al. (1982) found a significant increase in whorls with a corresponding decrease in loops and arches for female patients. Verma and Jain (1981) observed only an increased incidence in ulnar loops on the third digits of female patients but the difference was statistically significant.

A statistically significant reduction in the incidence of whorls in male vitiligo patients was found by Singh et.al. (1983),

Oyhenart-Perera et.al. (1982) and Sahasrabuddhe et.al. (1975). A significant increase in arches was reported by Singh, Verma and Jain and Oyhenart-Perera. Sahasrabuddhe observed a significant increase in radial loops a finding which was also reported by Verma and Jain but they found it only significant for the second digit. Iqbal et.al. also found an increase in radial loops particularly on the second digit for both sexes of patients in comparison to controls. Iqbal also reported a statistically significant increase in the frequency of occurrence of whorls in male patients which directly conflicts with the findings of Singh, Sahasrabuddhe and Oyhenart-Perera above.

(ii) Palmar patterns

Iqbal et.al. (1985) and Singh et.al. (1983) found statistically significant increases in the frequency of occurrences of palmar patterns in vitiligo sufferers of both sexes. These increases were particularly noticeable in areas I_3 , I_4 and the hypothenar area. Sahasrabuddhe et.al. (1975) reported a significant reduction in occurrence of patterns in the Thenar/I, area on the left hands of vitiligo females in comparison to controls. Oyhenart-Perera et.al. (1982) observed a tendency for patterns to increase in male patients and decrease in female patients but the differences were not statistically significant.

(iii) Total ridge count

Singh et.al. observed a statistically significant increase in TRC in both sexes of vitiligo patients. Iqbal et.al. reported a significant reduction in TRC for both sexes of patients. Oyhenart-Perera also found a decrease in TRC for both sexes but this was not statistically significant. No significant differences for TRC were found by Sahasrabuddhe et.al. or by Verma and Jain.

(iv) a - b ridge count

Iqbal et.al. (1985) observed a reduction of a-b ridge counts in both sexes of vitiligo patients which was statistically significant in comparison to the values for controls. Singh et.al. (1983) also found reductions in both sexes of vitiligo sufferers

for a-b ridge counts but this was only statistically significant in females. Sahasrabuddhe et.al. (1975) found no difference between vitiligo sufferers and controls for a-b ridge counts neither did Oyhenart-Perera (1982).

(v) Miscellaneous dermatoglyphic parameters

No significant differences were found between vitiligo patients and controls for atd angle, occurrence of Simian or Sydney lines or distal displacement of axial triradius by any of the researchers with exception of Singh et.al. (1983) who found a significant increase in the frequency of distal displacement of the axial triradius in both sexes of vitiligo sufferers.

6. Dermatitis Herpetiformis

(i) Digital pattern frequency

Roberts et.al. (1978) found that D.H. patients showed a significant increase in ulnar loops and a decrease in whorls compared to controls. The changes in pattern frequency were most pronounced on the index fingers.

(ii) Total ridge count

Roberts et.al. found a significant decrease in the TRC for male D.H. patients in comparison to controls. A non-significant decrease was found for D.H. females in comparison to controls.

(iii) a-b ridge count

The mean a-b ridge count was found to be significantly lower in D.H. patients than in controls by Roberts et.al.

(iv) Other ridge counts

The mean values for b-c, c-d and b-d ridge counts were found to be significantly lower in D.H. patients than normal controls by Roberts et.al.

(v) Ridge atrophy

Flattening of epidermal ridges and occurrence of white lines

have been observed to be significantly common in D.H. and coeliac disease patients by David et.al. (1970). Verbov et.al. (1971), M^CRae et.al. (1970), Mylotte et.al. (1972) and DeSousa and Duarte (1974) disagree with David et.al. since none observed any significant change in the ridge patterns compared to normal controls.

7. Discoid lupus erythematosus

(1) Digital pattern frequency

Singh et.al. (1984) reported a statistically significant increase in the frequency of occurrence of loops and a decrease in whorls and arches in both sexes of D.L.E. patients compared to controls. Dubois et.al. (1976) observed similar findings for S.L.E. patients which were statistically significant on the left thumb. Fraga et.al. (1974) noted a significant decrease in radial loops and arches in S.L.E. patients when compared to controls.

(ii) Total ridge count

Singh et.al. found a significant increase in the T.R.C. in male D.L.E. patients compared to controls. A similar, though insignificant increase was observed in female patients.

(iii) Palmar patterns

An overall increase in both sexes of D.L.E. patients for the frequency of occurrence of palmar patterns was observed by Singh et.al. This was statistically significant for males in the thenar/I, and hypothenar areas and for females there were significant increases in the I₄ and hypothenar areas and significant reductions in the I₃ area.

For S.L.E. patients significant increases were noted by Fraga et.al. in the thenar/I, area, by Dubois et.al. in the hypothenar area and by Vormitagg et.al. for the I₄ area. A decrease was also observed by Vormitagg for patterns in the I₃ area.

(iv) atd angle

Singh et.al. reported a significant reduction in females

and a significant increase in males for the mean atd angle when D.L.E. patients were compared to controls. Dubois et.al. reported a significant decrease in the atd angle for caucasian S.L.E. patients when compared to controls. This decrease was for the left hand.

(v) Displacement of axial triradius

Singh et.al. found a significant reduction in the occurrence of distal displacement of the axial triradius in female D.L.E. patients in comparison to controls. A significant increase in axial displacement was found by Fraga et.al. for S.L.E. patients. Dubes and Rupe (1973) and Dubois et.al. (1976) found significant increases in ulnar displacement for S.L.E. patients.

8. Pemphigus

(i) Digital pattern frequency

Singh et.al. (1984) found a significant increase in loop occurrence in male pemphigus sufferers compared to controls. A decrease in whorls was also reported. In female patients a statistically significant increase in whorls and decrease in loops and arches was found when compared to controls.

(ii) Palmar patterns

In female patients a significant increase in palmar patterns in all areas except T/1, where it was reduced, was found. Exactly the opposite findings were found for male patients.

(iii) Total ridge counts

The mean value for T.R.C. was found to be significantly higher in both male and female pemphigus patients in comparison to controls.

(iv) Distal displacement of axial triradius

There was found to be a significant reduction in the displacement in male patients and a significant increase in female patients when compared to controls.

9. Basal Cell Naevus Syndrome

(i) Digital pattern frequency

Linss et.al. (1983) reported a significant increase in loops and decrease in whorls in patients compared to controls. The frequency of occurrence of arches was significantly higher than those in unaffected descendant family members.

(ii) Total ridge count

Linss found a lower T.R.C. in patients and family members than for controls.

10. Darriers Disease

Verbov (1979), Gibbs (1967), Szilvassy et.al. (1974) and Sarojini et.al. (1977) all reported characteristic breaking of the epidermal ridges and pitted areas in patients with Darier's disease.

11. Incontinentia Pigmenti

Rott (1984) reported ridge dissociation with sweat pore loss mainly on the palms.

12. Anhidrotic Ectodermal Dysplasia

(i) Ridge disturbances

Ridge flattening and distortion were reported by Verbov (1970), Lapiere and Dodinval (1967), Priest (1967) and Rodewald and Zahn-Messow (1982).

(ii) Palmar patterns

An increase in the occurrence of arches was reported by Lapiere and Dodinval (1967) and by Zahn-Messow (1982).

(iii) atd angle

An increase in atd angle was reported by Lapiere and Dodinval (1967), Priest (1967), Verbov (1970), Rodewald and Zahn-Messow (1982) and O'Leary et.al. (1986).

(iv) Axial triradius displacement

All researchers reported an increase in t'' in probands and carriers in comparison with controls.

(v) Palmar patterns

All researchers reported an increase in hypothenar pattern occurrence and O'Leary et.al. (1986) report an increase in thenar patterns in patients and carriers in comparison with control subjects.

B. Dermatoglyphic Approach (i.e. single dermatoglyphic parameters compared over all disorders)

1. Digital Pattern Frequency

Changes in the frequency of occurrence of various patterns in comparison to controls have been reported for psoriasis, atopic eczema, ichthyosis, alopecia areata, vitiligo, dermatitis herpetiformis and discoid lupus erythematosus.

Increases in the occurrence of whorls have been reported for; psoriasis (Krieger, 1934; Verbov, 1968; Gibbs and Warburton, 1968; Saha, 1969; Jilek, 1972; Lal, 1977; Sharma et.al., 1977 and Verma, 1980) along with a corresponding decrease in loops; for male vitiligo patients (Singh et.al. 1983; Verma and Jain, 1981 and Oyhenart-Perera et.al., 1982) and female vitiligo patients (Singh et.al. 1983 and Oyhenart-Perera et.al., 1982) and female pemphigus patients (Singh et.al. 1983) again with a decrease in loops; for alopecia areata males by Verbov (1968) with a decrease in loops; and for ichthyosis (Verma et.al. 1981) and female atopics (Cusumano 1973).

Increases in arches have been observed for; female atopic eczema patients (Verbov 1972); for female alopeciads (Verma et.al., 1981, Selmanowitz et.al., 1974 and Verbov, 1968); for female vitiligo patients (Sahasrabuddhe et.al. 1975 and Iqbal et.al. 1983) and for male vitiligo patients (Singh et.al. 1983, Verma and Jain 1981 and Oyhenart-Perera et.al. 1982)

Increases in loops have been reported for dermatitis herpetiformis (Roberts et.al. 1978), D.L.E. (Singh et.al. 1984), basal cell naevus syndrome (Linss et.al. 1983), ichthyosis (Omulecki and Banach 1975) and male pemphigus patients (Singh 1983),

all with decreases in whorls. Sharma et.al. (1977) reported decreases in loops and increase in whorls for both sexes with ichthyosis.

2. Total Ridge Count

Significant increase in T.R.C. have been reported for both sexes of psoriatics (Jilek, 1972 and Singh et.al. 1983) and for female psoriatics (Verma et.al. 1980). The same findings (i.e. significant increases) have also been found for D.L.E. patients (Singh et.al. 1984), pemphigus (Singh et.al. 1983) and vitiligo (Singh et.al. 1983). The findings of Singh are contradicted by Iqbal et.al.(1983) who found significant decreases in T.R.C. Roberts et.al.(1978) found significant decreases in T.R.C. for D.H. patients of both sexes compared to controls.

3. Palmar Patterns

Increases in the frequency of occurrence of palmar patterns have been observed in psoriasis in left I_4 (Krieger 1934) and right I_4 (Verbov 1968). Singh et.al.(1983) reported increases in both hands for I_3 and hypothenar areas. Increases have also been observed in the hypothenar area of female atopic eczema patients (Verbov 1972), in area I_3 of ichthyosis patients (Saha 1969) in I_4 of male alopeciacs (Verbov 1968), in Thenar/I, and hypothenar areas of male D.L.E sufferers and I_4 and hypothenar of female D.L.E patients (Singh et.al. 1984), overall in both sexes of vitiligo patients (Iqbal et.al. 1985) and in I_3 , I_4 and hypothenar areas of both sexes of vitiligo sufferers (Singh et.al. 1983).

Significant decreases have been found in I_2 and I_3 areas of both sexes of psoriatics (Banach 1977) and an overall decrease in female alopeciacs (Verbov 1968). Sahasrabuddhe et.al.(1975) found significant reductions in Thenar/I, area for female vitiligo sufferers and Singh et.al.(1984) observed a reduction in patterns in I_3 in D.L.E. patients. Increases in hypothenar pattern occurrence have been reported in H.E.D. by Verbov (1970), Lapiere and Dodinval (1967), Rodewald and Zahn-Messow (1982).

4. Mean atd angle

Banach (1977) and Singh et.al. (1983) found the mean atd angle to be smaller in psoriatics of both sexes. For female D.L.E. patients (Singh et.al. 1984) found a significant reduction in mean atd angle and a significant increase in males. An increase in the atd angle was reported by Priest (1967), Lapiere and Dodinval (1967), Verbov (1970), Rodewald and Zahn-Messow and O'Leary et.al. in H.E.D. patients.

5. a-b ridge count

Ibqal et.al. (1985) reported a significant reduction of a-b counts in both sexes of vitiligo patients and Singh et.al.(1983) found significant reductions in female vitiligo patients. Roberts et.al. (1978) reported a significant reduction in a-b ridge counts for male D.H. patients.

6. Displacement of axial triradius

Singh et.al. (1984) found a significant reduction in the frequency of occurrence of distal displacement of the axial triradius in female D.L.E. patients. Both Banach (1977) and Singh et.al. (1983) found significant reduction in displacement of axial triradii. Banach for both sexes and Singh for female psoriatics.

Selmanowitz and Porter (1967) reported an increase in the displacement of axial triradius for S.L.S. patients and Fraga et.al. (1974), Dubes and Rupe (1973) and Dubois et.al. (1976) found significant increases for S.L.E. patients.

An increase in t displacement has been reported in H.E.D. (Verbov 1970, Lapiere and Dodinval 1967, Rodewald and Zahn-Messow 1982).

7. Ridge Atrophy

The loss of epidermal ridges has been reported in dermatitis herpetiformis (David et.al. 1979), in incontinentia pigmenti (Rott 1984), Darier's disease (Verbov, 1970; Gibbs, 1967, Szilvassy et.al. 1974 and Sarojini et.al. 1977), and H.E.D. (Verbov 1970, Lapiere and Dodinval 1967, O'Leary et.al. 1986)

8. Hyperlinearity

The occurrence of an abundance of white lines has been reported in atopic eczema (Smith, 1984; Hoyer et.al. 1981; Verbov 1972 and Cusumano et.al. 1983), ichthyosis (Koukannen 1969, Leutgeb et.al. 1972, Uehara and Hayashi 1981 and Smith 1984), dermatitis herpetiformis (David et.al. 1970), H.E.D. (Lapiere and Dodinval 1967).

CHAPTER FOUR - MATERIALS AND METHODS

4.1 - Standardized method for obtaining finger and palm prints

The method employed for taking prints from subjects involved the use of 'Durester Printake' inked sheets and standard print forms produced by myself (Figure 4.1). The right palm of the subject was placed on an inked sheet and light pressure was applied to the back of the hand to produce a thin even coating of printing ink over the entire palmar surface. The palm was checked to ensure that all of it was covered with ink before it was transferred to the centre of the print form. Pressure was again applied to the back of the hand, particularly to the regions over the bases of the fingers, the central palmar area, the ulnar border of the hypothenar eminence and to the base of the wrist. Care was taken to ensure that the whole of the palmar surface was printed, longitudinally from wrist creases to proximal finger creases and transversely from ulnar to radial borders of the palm. Any areas not printed satisfactorily, due to the concave nature of certain regions of the palm, were reprinted or printed separately. Touch impressions of the fingers were also produced during this process and served for reference purposes. The printing procedure was then repeated for the left palm using another Printake sheet and print form.

The rolled impressions of the terminal phalanges of the fingers of each hand were then obtained. The digits of each hand were printed in turn from thumb to little finger in the spaces provided around the edges of the print form. The procedure used was to roll the terminal phalange of the extended finger on the Printake sheet. The finger was rolled from the radial edge of the finger nail to the nail edge on the ulnar side. Once inked the digit was then rolled in the space on the print form to produce the impression. Care was taken, both in the inking and printing stages, to ensure the finger was only rolled once, to avoid smudging and blurring of the print, and to include all of the finger pad including any triradii which were present. A sample of a completed print form is shown in Figure 4.2.

Figure 4.1 - Print Form ($\frac{3}{4}$ size)

UNIVERSITY OF NEWCASTLE UPON TYNE Department of Dermatology	PRINT SHEET	UNIVERSITY OF DURHAM Department of Anthropology
Palm Print		
		Little Finger
		Ring Finger
		Middle Finger
		Fore Finger
		Thumb



Figure 4.2 - Completed Print Sheet ($\frac{3}{4}$ size)

SPECIMEN	
Palm Print	
	Little Finger
	Ring Finger
	Middle Finger
	Fore Finger
	Thumb

4.2 - Postal Printing Kit

To increase the number of subjects in certain of the groups a postal kit was developed to enable self-printing to be carried out by selected patients. The kit consisted of an introductory letter, an instruction sheet containing detailed printing instructions conforming to the standardized technique described in Section 4.1, a questionnaire, two print forms, a sample of a completed print form, two Durester Printake sheets, two paper towels and a stamped addressed envelope for the return of the completed prints (a kit is included for reference purposes in Appendix 1). The percentage return of completed prints proved to be surprisingly good and much better than anticipated. Overall there was a 76.5% return rate of prints. The highest return rates being in the younger subjects (under - 21s) and the older age group (over - 60s) being 81% and 84% respectively. Of the prints returned 82.5% were found to be of sufficiently good quality for use in the study. The postal method, therefore, proved to be a very successful means of increasing numbers.

4.3 - Subject Questionnaire

At the time of printing each subject was asked a series of questions, the answers to which were recorded on a questionnaire form (Figure 4.3). Postal subjects were also sent a questionnaire for completion (Appendix 1). The questions on the form were designed to provide background information concerning personal, familial and genealogical details. In addition questions were posed relating to the occurrence of the various manifestations of atopy and also to determine the subject's skin type.

With reference to the questionnaire (Figure 4.3) the rationale behind the questions was as follows:-

Q1 - Subject's hospital identification number - this was supplied from the RVI'S records dept. and initially was the only way in which subjects could be identified. A case number was later assigned to each subject and was used on hand print sheets, computer data entry sheets etc. (see Section 4.4 on confidentiality) as the sole means of identification.

FIGURE 4.3 - QUESTIONNAIRE

Please answer the following questions:

(All answers will be treated in the strictest confidence)

Q1. Hospital No.

Q2. Age in years

Q3. Sex (please tick) Male

Female

Q4. Birthplace (Town or City)

Q5. Mother's Birthplace (Town or City)

Q6. Father's Birthplace (Town or City)

Q7. Do you suffer from any of the following?

(please tick, you may tick more than one box)

Hay Fever

Asthma

Eczema

Arthritis

Q8. Do you have any allergies?

Yes

No

if yes please give details

.....

.....

Q9. Skin Type

In summer when you get your first good exposure to the sun

which of the following would you say best describes your skin?

(please tick one box only)

Always burn never tan

Always burn sometimes tan

Sometimes burn always tan

Never burn always tan

Q10. Does any other member(s) of your family suffer from any form of skin disorder:

Yes

No

if Yes state who (e.g. brother, sister) and the skin disorder if known

- Q2 and 3 - Age and Sex- self-explanatory.
- Q4 to 6 - Place of birth of the subject and his/her parents. This information was used to determine whether or not the subject could be regarded as a 'North-Eastern' subject and hence be included in the study (see Section 4.5 for criteria used for selection of subject sample).
- Q7 and 8 - Information about atopy. Subjects were asked to specify any of the manifestations of atopy from which they might suffer. This was particularly of relevance to subjects with atopic eczema and related disorders.
- Q9 - Skin Type. A rough evaluation of the skin type of the patient using a 1 - 4 scale was carried out by using questions related to the effect of the sun. This procedure was a modification of the standard questions used for skin type assessment before PUVA treatment of psoriatics.
- Q10 - Family history - Any history of skin disorders in the subjects family was asked for. The relationship of the sufferer to the subject and the disorders concerned were also requested.

4.4 - Confidentiality

Before commencing the study approval was obtained from the hospital departments concerned and from the ethical committee of the Newcastle Health Authority. The plan which was submitted and approved, in addition to detailing the purpose and methods of study, included details of measures to be taken to ensure the confidentiality and security of patients' information collected.

No names were included in the information recorded and the strictest confidentiality was observed throughout. A case number was assigned to each subject and this was the only means of identification of the patient's details. The questionnaires, hand print sheets, computer data sheets and lists of hospital identification numbers and diagnoses were always kept in separate locations coded in such a way that no matching of the various components of information for each particular subject could take

place. The storage of information on computer was secured by codes and passwords for each file and again no names or addresses were included. All information was stored in a coded form and the coding information was not stored.

Subjects were advised of the methods to be used for ensuring the strictest confidentiality and permission was sought from each individual patient or control subject before the questionnaire was completed and the prints taken. In the case of the postal self-printing kits an introductory letter addressing the issue of confidentiality was included. Throughout all of the study close liaison was maintained between the medical staff and myself with regards to confidentiality and security.

4.5 - The Subject Sample

In total 3,040 sets of prints were obtained which were of the clarity required for measuring. The subjects were obtained from patients with a variety of selected skin disorders and from a group of normal controls. The bulk of the printing was carried out using patients at the Skin Outpatients clinic of the Royal Victoria Infirmary, Newcastle-upon-Tyne and the remainder from Sunderland Royal Infirmary. Control subjects were printed at both hospitals; being patients' spouses or friends, or medical, nursing or secretarial staff, at Monkwearmouth College, Sunderland; being students, or staff and at various other locations in the North-East region of England.

The total subject sample can be divided into various subjects as follows:-

(a) The main sample: subjects with common skin disorders

In this group are a total of 1,162 males and 1,201 females with selected common skin disorders. The patients were selected for printing according to a set of criteria:-

- (i) the subjects had been clinically diagnosed as suffering from one of six common skin disorders. Four of the disorders; psoriasis, atopic eczema, vitiligo and alopecia areata; are known to have a genetic component to their aetiology. The other two have no known genetic causation

and are; basal cell carcinoma and actinic keratosis. Full details of the disorders chosen are given in Chapter 2.

- (ii) the subjects were diagnosed as suffering from only one skin disorder, the one chosen. There were no other complicating effects of other disorders.
- (iii) the subjects were of North-Eastern England origin. The criteria for this was that for each subject two out of three of subjects', mother's and fathers birthplace were in the North-East area. This area was deemed to comprise of the old counties of Durham and Northumberland as they existed before the boundary changes of 1974 (see Figure 4.4) or the new counties of Durham, Northumberland, Tyne and Wear, and part of Cleveland (North of the River Tees) after 1974 boundary changes (Figure 4.5). The rationale behind this choice of subjects from a limited geographical region was to attempt to reduce inter-regional variation in dermatoglyphics which has been reported by various researchers e.g. Roberts and Coope (1972).
- (iv) subjects with other known ethnic or racial origins were excluded from the survey with the object of reducing variation in dermatoglyphics encountered in different races. Good summaries on this subject have been written by Heet and Keita (1979) and Pollitzer and Plato (1979).
- (v) family members were excluded since this would lead to bias in the sample. It has been shown that certain dermatoglyphic characteristics occur more frequently among family members than within the general population (Cummins and Midlo (1943), Holt (1968)).

The target number set for each of the six disorders chosen was 200 subjects of each sex for each disorder. The skin disorders and the numbers in each group are shown in Table 4.1. It can be seen that the target numbers were reached for all groups except for Actinic Keratosis.

(b) The control sample: a group of normal control subjects, the members of which had no known history of skin disorders. The target number for the control group was 400, i.e. 200 for each sex. The

Figure 4.5 - County Boundaries since 1974



criteria re regional, ethnic and racial origins as for the skin disorders (criteria iii, iv and v) were again applied. The age range and structure of the control sample was matched as closely as possible to that of the sample of skin disorders. By printing friends and spouses it was also hoped to match controls and patients as closely as possible. The numbers of subjects in the control sample are shown in Table 4.1.

Table 4.1 Numbers of subjects in subgroups: main disorders and controls

DISORDER	NUMBERS OF SUBJECTS	
	MALE	FEMALE
Psoriasis	202	205
Atopic eczema	203	203
Alopecia areata	210	206
Vitiligo	201	205
Basal cell carcinoma	211	202
Actinic keratosis	129	174
Controls	206	203

(c) Dermatitis herpetiformis and coeliac disease

In addition to the numbers shown in Table 4.1 a smaller group of patients suffering from Dermatitis herpetiformis was printed. All of the patients who were registered at the R.V.I. as having DH were printed. In addition a number of subjects with coeliac disease and their unaffected relatives were printed. This sample was obtained from a meeting of the Northern branch of the Coeliac Society. The relationship between DH and Coeliac disease is discussed in Chapter 2 (Section 2.8) and previous investigations on DH in Northern patients have been carried out by Roberts et.al. (1978) as described in Chapter 3. The numbers of the subjects are shown in Table 4.2.

Table 4.2 Numbers of subjects in subgroups: DH and Coeliacs

DISORDER	NUMBERS OF SUBJECTS	
	MALES	FEMALES
Dermatitis herpetiformis	48	28
Coeliac disease	10	26
Coeliac unaffected relatives	7	4

(d) Darier's disease

A family study was carried out on patients with Darier's disease (see Chapter 2 - Section 2.9) and also unaffected first degree relatives. Full details of the family trees and relationships of subjects to one another along with diagnoses etc., are provided in Chapter 8. The numbers of subjects in the various subcategories of the Darier's disease sample is shown in Table 4.3.

Table 4.3 Numbers of subjects: Darier's disease sample

DISORDER	NUMBERS IN GROUPS	
	MALES	FEMALES
Darier's patients	32	38
Darier's unaffected relatives	18	13
Darier's children	11	8
Darier's spouses	7	3

(e) Incontinentia pigmenti and Anhidrotic ectodermal dysplasia

A small sample of patients was printed with the rare disorders Incontinentia pigmenti along with unaffected relatives and a patient with I.P. achromians (see Chapter 2 - Section 2.10 for details). Full details of the clinical features of the patients and their relationships are given in Chapter 8. Three patients with Anhidrotic ectodermal dysplasia, another disorder in which a loss of sweat pores has been recorded, were also printed. The numbers of patients printed with I.P. and A.E.D. are shown in Table 4.4.

Table 4.4 Numbers of subjects: I.P. and A.E.D.

DISORDER	NUMBERS OF SUBJECTS	
	MALES	FEMALES
I.P.	0	10
I.P. relatives	0	2
I.P. achromians	1	0
A.E.D.	2	1

(f) Miscellaneous other disorders

In addition to the subjects printed for the various groups listed above 14 other patients were printed. These subjects either

had rare disorders or suffered from disorders which were related to the main ones listed above. Although they do not constitute viable groups in themselves they were considered to be of interest and were therefore printed. The disorders are described and the patients results reported at the appropriate points in Chapters 6 to 8 . The miscellaneous disorders are: Gorlins Syndrome, Squamous Cell Carcinoma, Paget's disease of the Scrotum, Reynaud's disease, Albinism, Punctate Keratodermata and Lichen nitidus.

4.6 - Print Examination

The prints were examined using the low power objective of a binocular microscope. A sharpened mounted needle was used for assisting in accurate ridge counting, drawing in connecting lines between digital and palmar landmarks and for tracing mainline directions. A plastic protractor was used for making measurements of angles and a ruler was used for measuring distances for the calculation of indices and as a straight edge. The results for each subject were recorded in a coded form on the computer data sheet (Figure 4.6). The coded information from the subject's questionnaire (Figure 4.3) was also recorded on the data sheet.

4.7 - Classification of Dermatoglyphics

The method for classifying the dermatoglyphics in this study is that formulated by Dennis (1977). It draws upon two main sources; the 'traditional scheme' of Cummins and Midlo (1943) and Penrose (1968), and the 'topological scheme' of Penrose (1965) and Penrose and Loesch (1979). The complete method, directions and instructions are given in Dennis (1977) which should be consulted for more complete documentation. Here only brief details of the dermatoglyphic parameters used are given. The purpose being to provide information for dermatologists not familiar with the method of dermatoglyphic analysis. The method of Dennis has been modified and extended to include several other parameters not described by him e.g. flexion crease variants (Alter, 1975), main-line configuration (Holt 1968). Where these are included references to sources are given.

Figure 4.6 - Computer Data Sheet

CASE NO				CARD	AGE	SX	LOC	DIS	ST	FH	SAP	FBP							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
				1															
MBP				AY	LW				LH				RW						
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
RH																			
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

CASE NO				CARD	LFU1	LFRI	LFU2	LFRI2	LFU3	LFRI3	LFU4								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
				2															
LFR4				LFUS	LFRI5	LFRI1	LFU1	LFRI2	LFU2	LFRI3	LFU3	LFRI4							
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
RFU4				RFRI5	RFU5	LP1	LP2	LP3	LP4	LP5	RP1	RP2							
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
RP3				RP4	RP5	LA	FNL	RA	FNR										
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

CASE NO				CARD	PT	RT	P2	C2	P3	C3	P4	C4	U4	PH	CH	RH	UHT	PAR	HRA
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
				3															
AK	AU	BR	BU	CR	CU	DR	DU	X2	X3	X4	LP1I	T	T1	T11	TBL	AB			
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
BC				CD	BD	AC	ATD	FC	HYP	ATR	TCV	TCT							
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

CASE NO				CARD	PT	RT	P2	C2	P3	C3	P4	C4	U4	PH	CH	RH	UHT	PAR	HRA
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
				4															
AK	AU	BR	BU	CR	CU	DR	DU	X2	X3	X4	RF1I	T	T1	T11	TBR	AB			
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
BC				CD	BD	AC	ATD	FC	HYP	ATR	TCV	TCT							
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

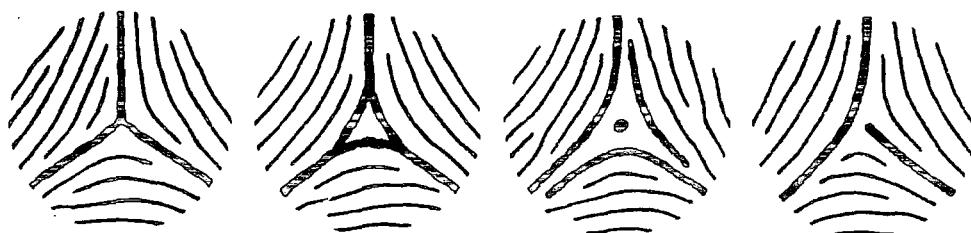
The variables measured are listed below and a brief description is given for each.

(A) Variables on Fingers

(i) Finger Pattern Types

Pattern formulation depends on the discontinuity in the parallel arrangement of ridges, the development of triradial points and the alignment of the ridges. A triradius is the centre of the delta-shaped junction of three ridge systems. Some variants are shown in Figure 4.7,

Figure 4.7 - Variants of triradii



The patterns on the fingers were classified into eleven different types, a record being made for each digit. The classes are:-

- (a) True Arches: have no triradius and the ridge system which are open or show marked curvative run across the digit roughly at right angles to its long axis (see Figure 4.8a).
- (b) Tented Arches: possess a single triradius but a distal radiant terminates in the loop core forming the pattern centre with no tendency to loop backward in either an ulnar or radial direction (see Figure 4.8b).
- (c) Ulnar loops: have one triradius with a number of ridges bending around themselves to terminate at the same side of the digit from which they started. The opening of the loop is directed towards the ulnar side of the hand (see Figure 4.8c).
- (d) Radial loops: these have the same configuration as the previous pattern except that the triradius is on the ulnar side of the digit with the loop opening on the radial side of the hand.

Figure 4.8 - Finger Pattern Types



(a) True Arch



(b) Tented Arch



(c) Loop

In cases where 2 triradial points are present six main pattern types can be distinguished:-

- (e) True Whorls: in this pattern the ridge system forms concentric rings or a spiral within the limits of their corresponding triradii. Counting the ridge system on both radial and ulnar side of the pattern (triradius to core) gives two values. If the smaller of these two is greater than half the larger count then a true whorl is recorded.
- (f) Ulnar Central Pocket Loop: if the ridges are counted as in the previous pattern but the ulnar count is less than or equal to half the radial count then the pattern is an Ulnar C.P. Loop.
- (g) Radial Central Pocket Loop: should the radial count be less than or equal to half the ulnar count, a radial C.P. loop is recorded.
- (h) Double Loop or Twinned Loop: these possess two triradii but the cores of the ridge systems do not form a circle or spiral but rather two separate clearly distinguishable loops their courses lying side by side. The cores of a double loop open on opposite sides of the digit.
- (i) Ulnar Lateral Pocket Loop: this is a double loop in which both loop cores open on the ulnar side of the hand.
- (j) Radial Lateral Pocket Loop: as for the previous pattern but both loops open on the radial side of the digit.
- (k) Accidentals: these are complex features being a combination of two or more other specified patterns usually with three triradial points e.g. whorl and loop, tented arch and loop etc., (see Figure 4.9).

Figure 4.9 Finger Pattern Types with two triradii



(ii) Finger Ridge Counts

A straight line was drawn from the central point of a triradius to the centre or core of the pattern. The number of ridges intersecting or touching the line were then counted, not included are the triradius and the central ridge of a pattern (see Figure 4.10).

Figure 4.10 - Method of ridge counting for loop



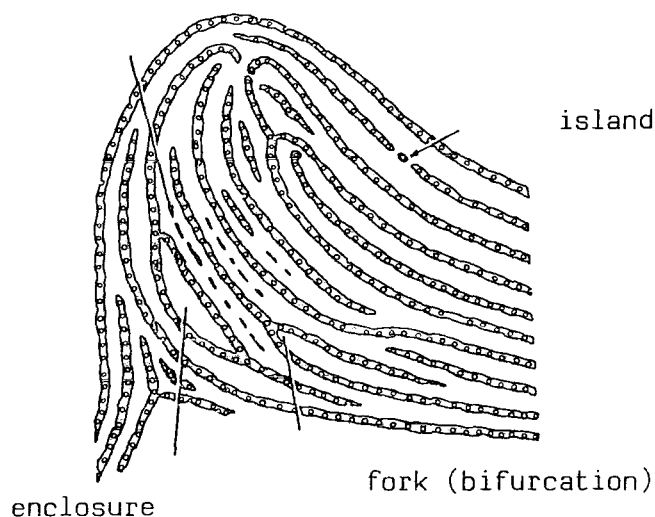
Line from triradius to core. Ridge count = 14

Two ridges resulting from a bifurcation which cross the straight line are both counted but interstitial lines are not counted (see Figure 4.11). Arches and Tented Arches are zero ridge counts. In rare instances so do loops which, however, generally have one positive count. In whorls and double loops two counts were taken

(ulnar and radial) when a patient has two triradii on the same side of the digit as in the case of Ulnar and Radial Lateral Pocket Loops or certain accidentals only the higher of the two counts is recorded (see Figure 4.12).

Figure 4.11 - Ridge detail (minutiae)

rudimentary (interstitial) ridge



(after Penrose 1968)

(iii) Finger Ridge Disturbances

These features are not included by Dennis (1977) but have been reported in various studies of dermatoglyphics in skin disorder e.g. Verbov (1968), David (1971). They, therefore, appeared to be useful variants to record in this study. The definitions are derived for Schauman and Alter (1976).

(a) White Lines

These are shallow linear grooves of different length, width and direction crossing the epidermal pattern areas of the fingertips. The grooves appear as white lines in the prints (see Figure 4.13). The white lines are recorded for each finger using a 0-3 scale of severity for each finger where 0 = absent, 1 = slight, 2 = moderate and 3 = severe.

Figure 4.12 - Finger pattern types with more than one ridge count



(a) Symmetrical Whorl



(b) Double Loop



(c) Spiral Whorl

a, b and c have two triradii
and two ridge counts

d has three triradii and
three ridge counts



(d) Accidental consisting of three loop patterns

Figure 4.13 - White Lines



(b) Hyperlinearity

This is the occurrence of fine lines and marking over the fingertips. These lines are easily distinguished from white lines since they are not as deep and straight and run all over the fingertips in a network fashion. As for the last variable hyperlinearity is recorded for each finger using a 0-3 scale of severity.

(c) Ridge Atrophy

This is the reduction in height of the epidermal ridges giving a 'worn-off' appearance. The degree of atrophy was again assessed using a 0-3 scale of severity of occurrence.

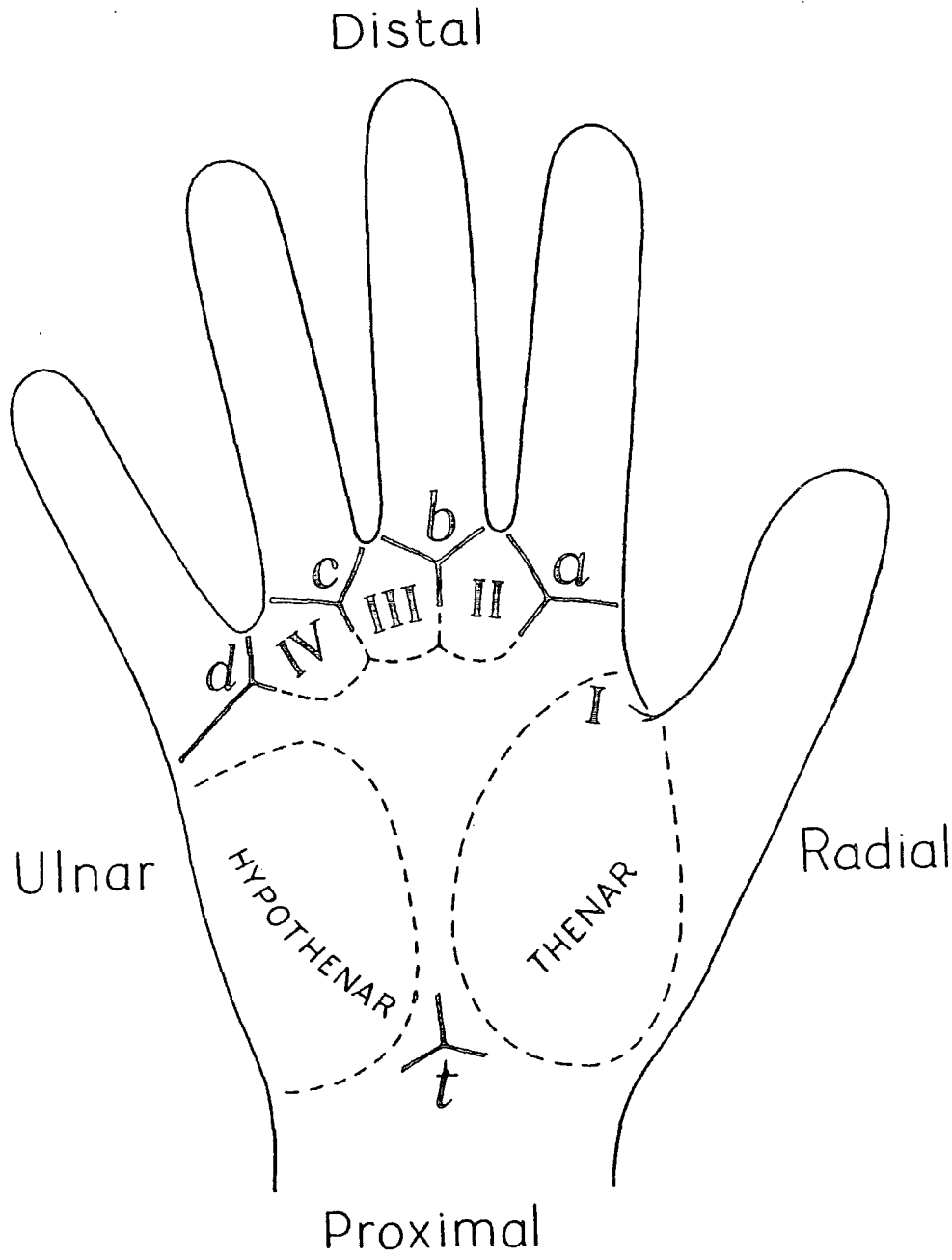
(B) Variables on Palms

(i) Palmar Pattern Occurrence

There are six configurational areas on the palm denoted as Thenar/I, II, III, IV, Hypothenar and Parathenar. These areas are shown in Figure 4.14 and are the standard ones used in all dermatoglyphic studies.

The occurrence of patterns was recorded for each area with all loops being described. Whorls always consist of two loops for description purposes. No account was taken of vestigeal patterns in this study. Each loop was, therefore, specified according to the configurational area in which it occurs and also according to the direction of its core. The directions are either peripheral or central for loops in areas II and III; peripheral or radial for the Thenar/I area; and peripheral, central or radial for the hypothenar area.

Figure 4.14 - Configurational areas of the palm



(after Holt 1968)

The parathenar area infrequently has peripheral loops (see Figure 4.15).

Figure 4.15 - Directions of loop cores in palmar configurational areas



I - peripheral loop on area I
 İ - central loop on area I

I' - radial (peripheral) loop on area I
 II - peripheral loop on interdigital area II
 Iİ - central loop on interdigital area II
 III - peripheral loop on interdigital area III
 IIİ - central loop on interdigital area III

IV - peripheral loop on interdigital area IV
 IV̇ - central loop on interdigital area IV
 IVu - ulnar (peripheral) loop on interdigital area IV
 H - peripheral loop on hypothenar area
 Ḣ - central loop on hypothenar area
 H' - radial (central) loop on hypothenar area

Tu - tented loop on hypothenar area with its core pointing towards the ulnar side of palm

(ii) Palmar Ridge Counts

Counts were made of the number of ridges intersecting or touching straight lines drawn to join the distal palmar triradii a, b, c and d. The palmar ridge counts carried out were the traditional ones: a-b, b-c and c-d. The same general rules as for finger ridge counts were applied e.g. the triradial points were not included in the counts (see Figure 4.16a. In some cases the c triradius was missing and in these cases b-d counts were taken. Similarly when the b triradius was absent, an a-c count was carried out. When an accessory triradius was present in an interdigital area then the more radially triradius is chosen for use in the count (see Figure 4.16b)

(iii) Palmar Triradii

All of the triradii on each hand were enumerated and the important ones were specified (see Figure 4.17).

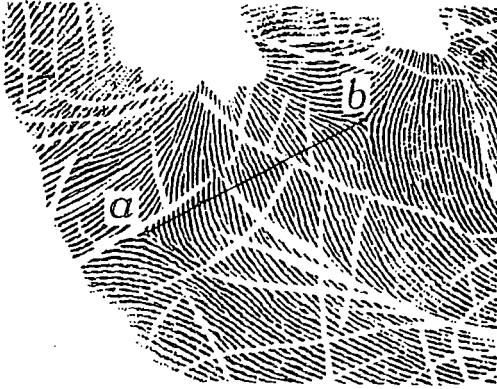
(a) Axial triradii were designated as t, t' and t'' based on the method devised by Penrose (1968). The designation of the axial triradius is based on the percentile fraction of the distance from the axial triradius to the distal wrist crease divided by the axial length. The axial length is the distance between the most distal wrist crease and the most proximal crease on digit 4. The most distal and most proximal feather-edges of the distal wrist crease and proximal finger crease are used respectively. The measurement taken are shown in Figure 4.18.

The relative axial triradius distance is calculated using the equation:-

$$\frac{\text{Distance from axial triradius to distal wrist crease}}{\text{Distance from proximal finger (4) crease to distal wrist crease}} \times 100$$

Where the value obtained was equal to or less than 14% then the axial triradius was designated as t. If greater than 14% and equal to or less than 40% the axial triradius = t'. If the value obtained was in excess of 40% then the axial triradius = t''. The critical values of 14% and 40% are entirely arbitrary and were specified by Penrose (1968). Border triradii, or extra-limital

Figure 4.16 - Method for palmar ridge counting (after Holt 1968)



(a) Palmar a-b ridge count where only one triradius a is present



(b) a-b count when two triradii a are present. The most distal is chosen for the count. Note the presence of a peripheral loop in I_2 .

Figure 4.17 - Palmar Irradii

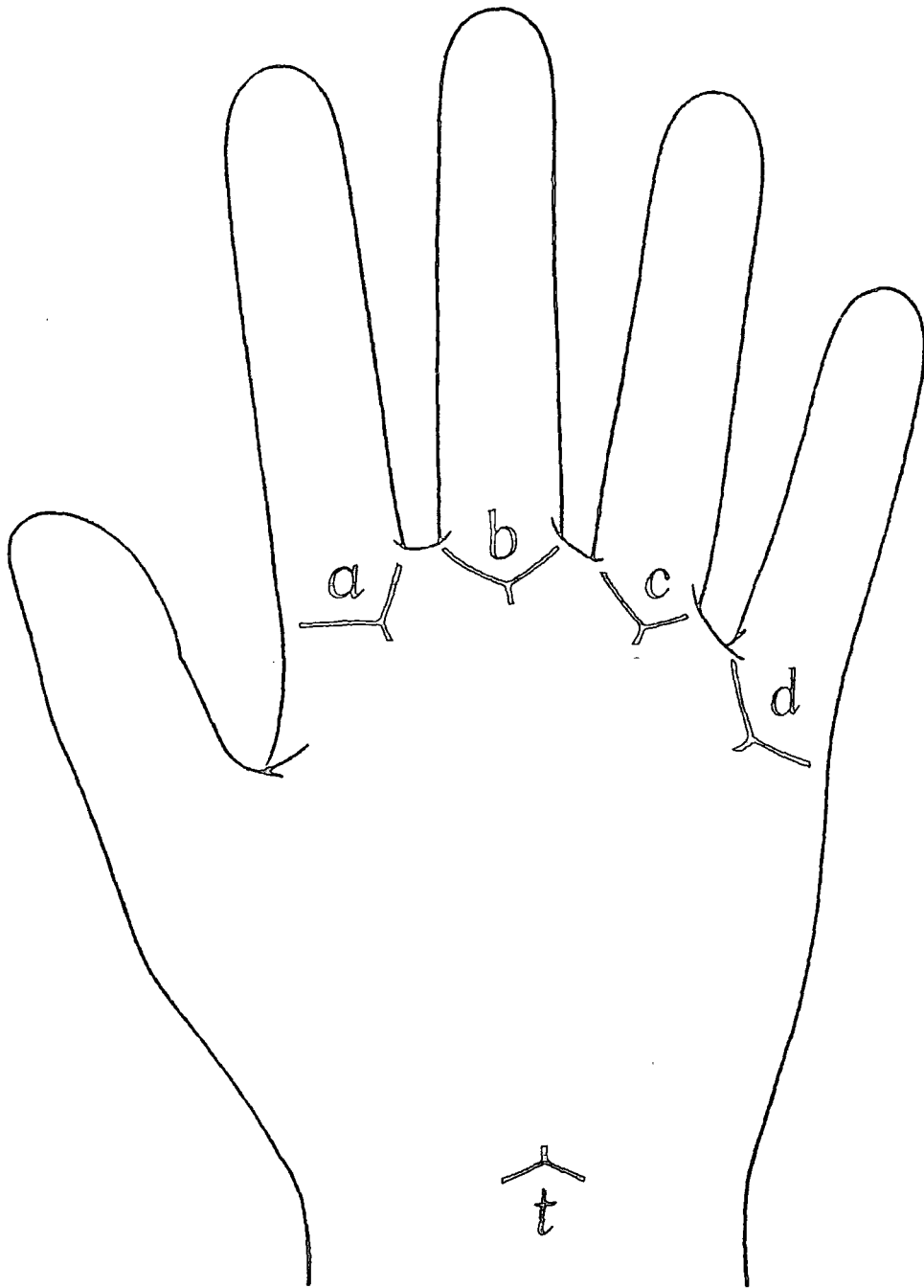
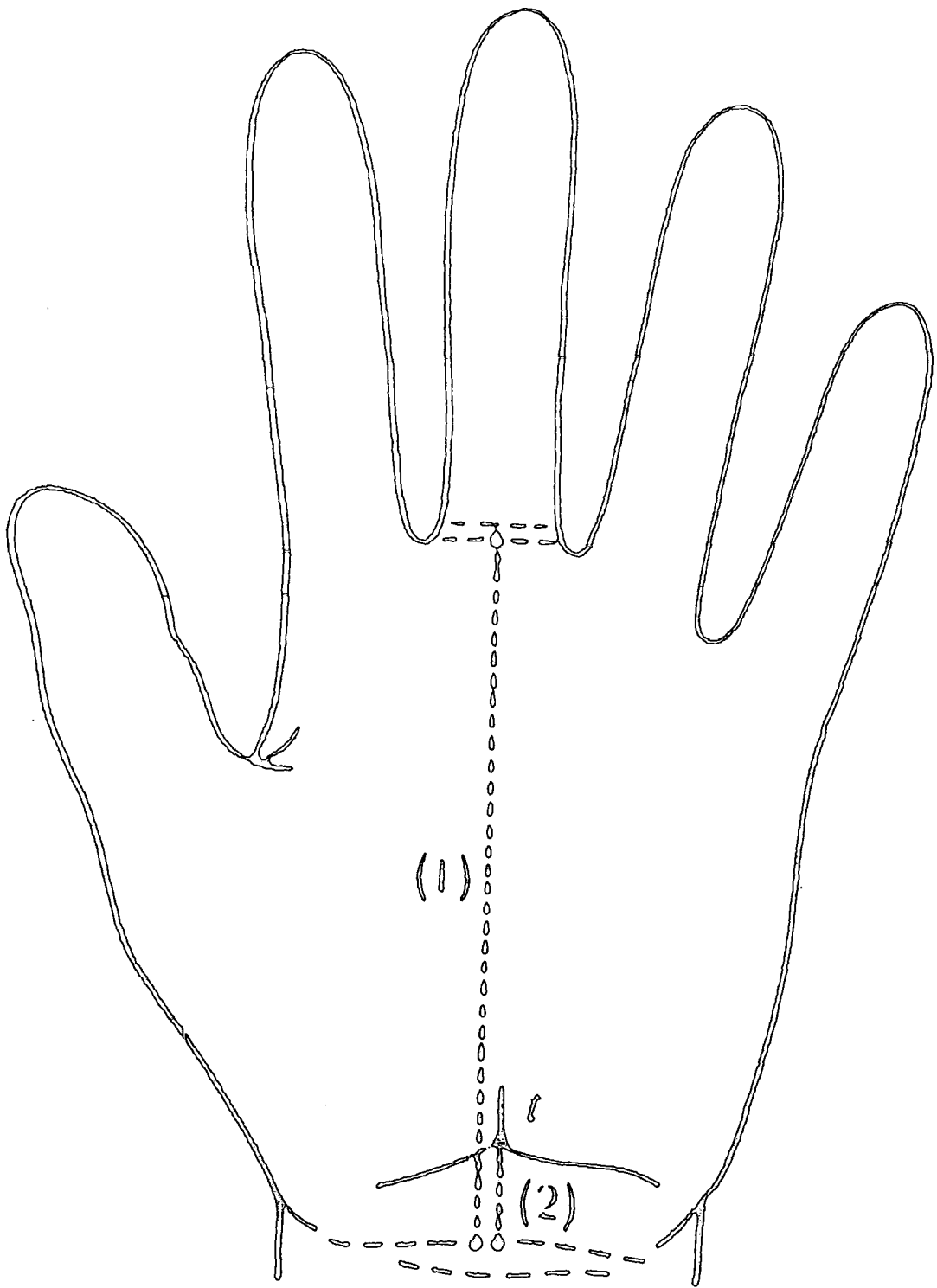
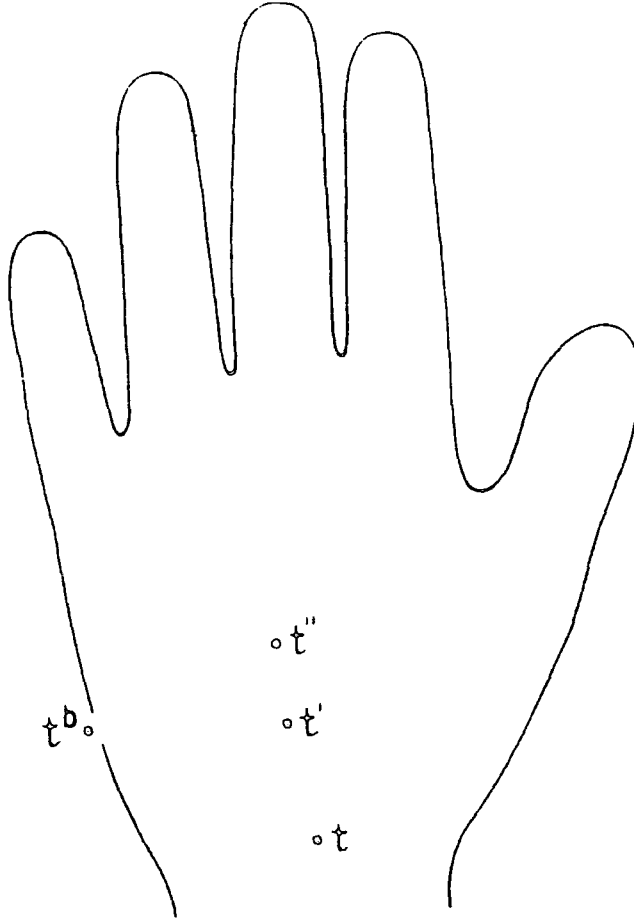


Figure 4.18 - Method for determining position of axial triradius



triradii, were recorded as t^b . The possible positions of the axial triradii are shown in Figure 4.19.

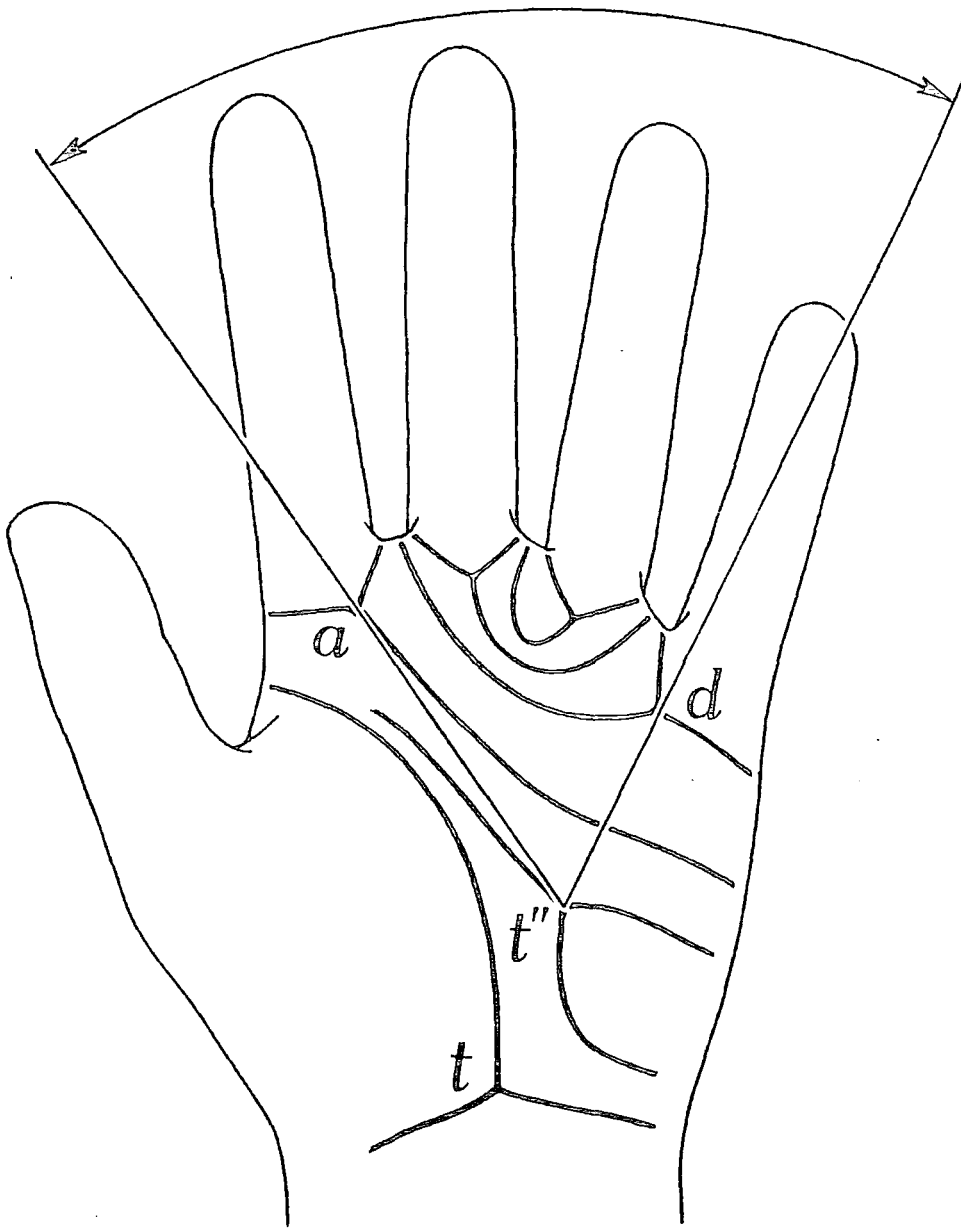
Figure 4.19 - Possible positions of axial triradii



(b) The number of triradii present in the various areas of the hand were recorded and added together to produce the Palmar Pattern Intensity Index for each hand. Any accessory triradii present in the interdigital palmar areas II, III and IV were also recorded and were included in the calculation of the Index. Note that there are always four more triradial points on the palm than there are loops.

(c) The maximal atd angle was measured. This angle is that subtended by the most distal axial triradius with the interdigital triradii a and d and is shown in Figure 4.20.

Figure 4.20 - Method of measuring maximal atd angle



(after Penrose 1965)

(iv) Palmar Mainline Directions

The direction in which each of the mainlines A, B, C and D turn, i.e. ulnarly or radially, as they leave their corresponding triradii, a, b, c and d respectively, was recorded. Figure 4.21 shows the designation of the palmar mainlines. Figure 4.22 shows possible variants for the mainline directions. Where two possible radiants were available for tracing the more radially located was chosen. The mainlines were not traced to their terminations as some researchers have done (e.g. Cummins and Midlo 1943) but simply the direction of turning was recorded.

Figure 4.21 - Palmar Mainlines

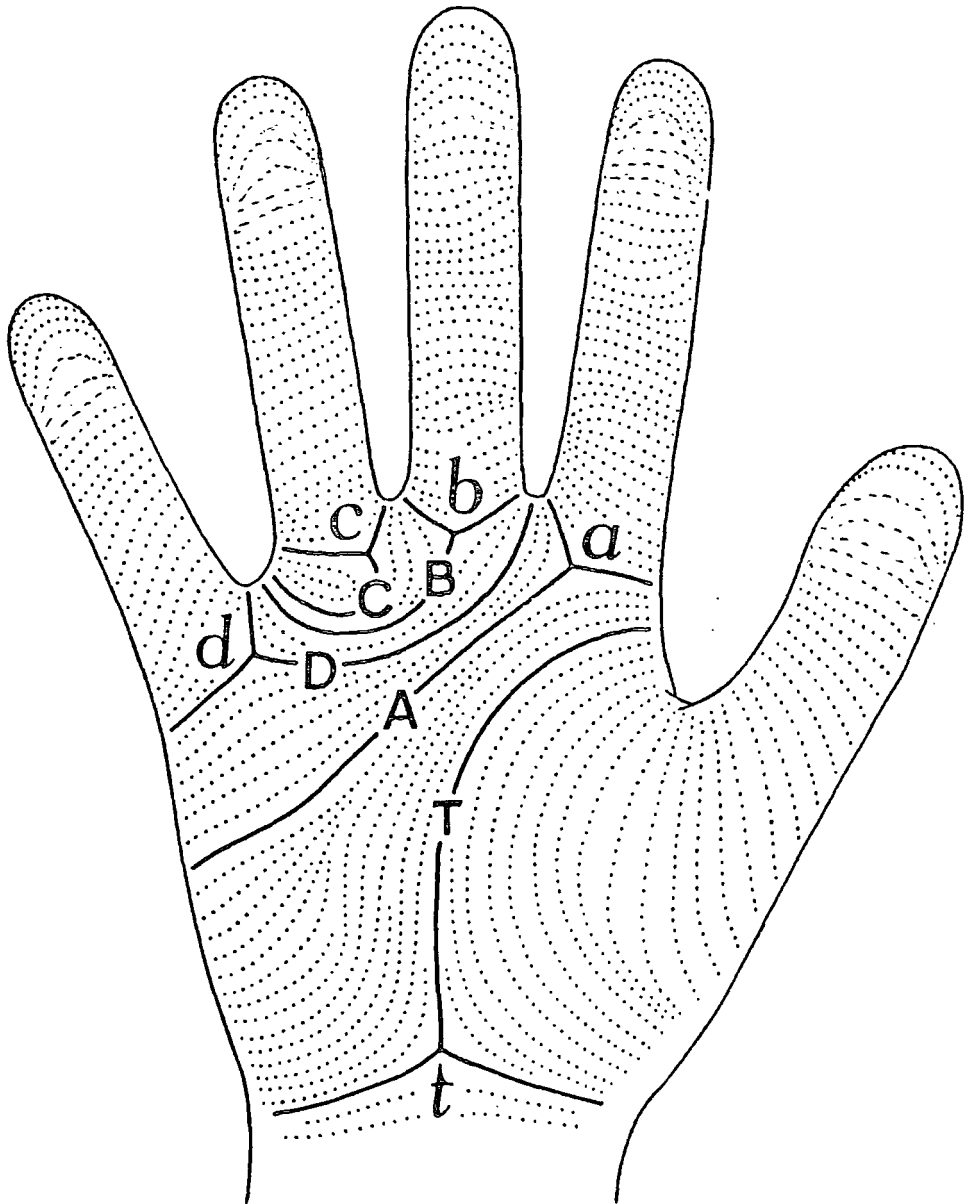
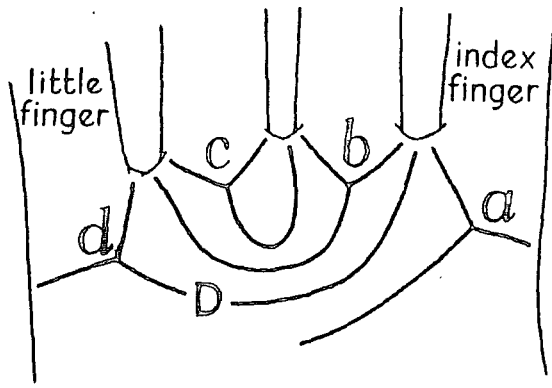


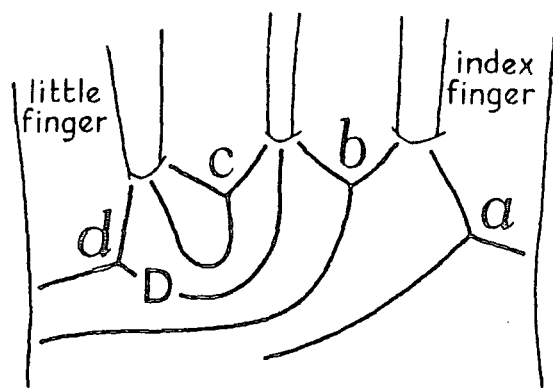
Figure 4.22 - Mainline directions

(a)



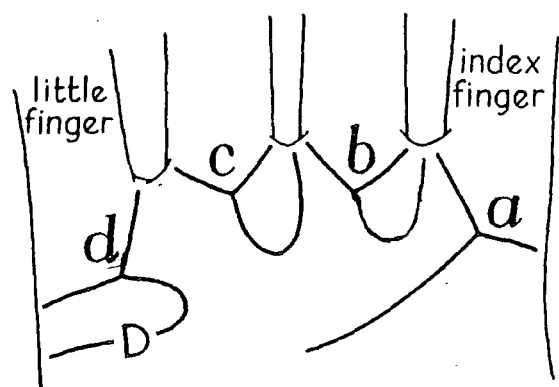
- A turning ulnarly
- B turning ulnarly
- C turning radially
- D turning radially

(b)



- A turning ulnarly
- B turning ulnarly
- C turning ulnarly
- D turning radially

(c)



- A turning ulnarly
- B turning radially
- C turning radially
- D turning ulnarly

(after Holt 1968)

(v) Palmar Flexion Creases

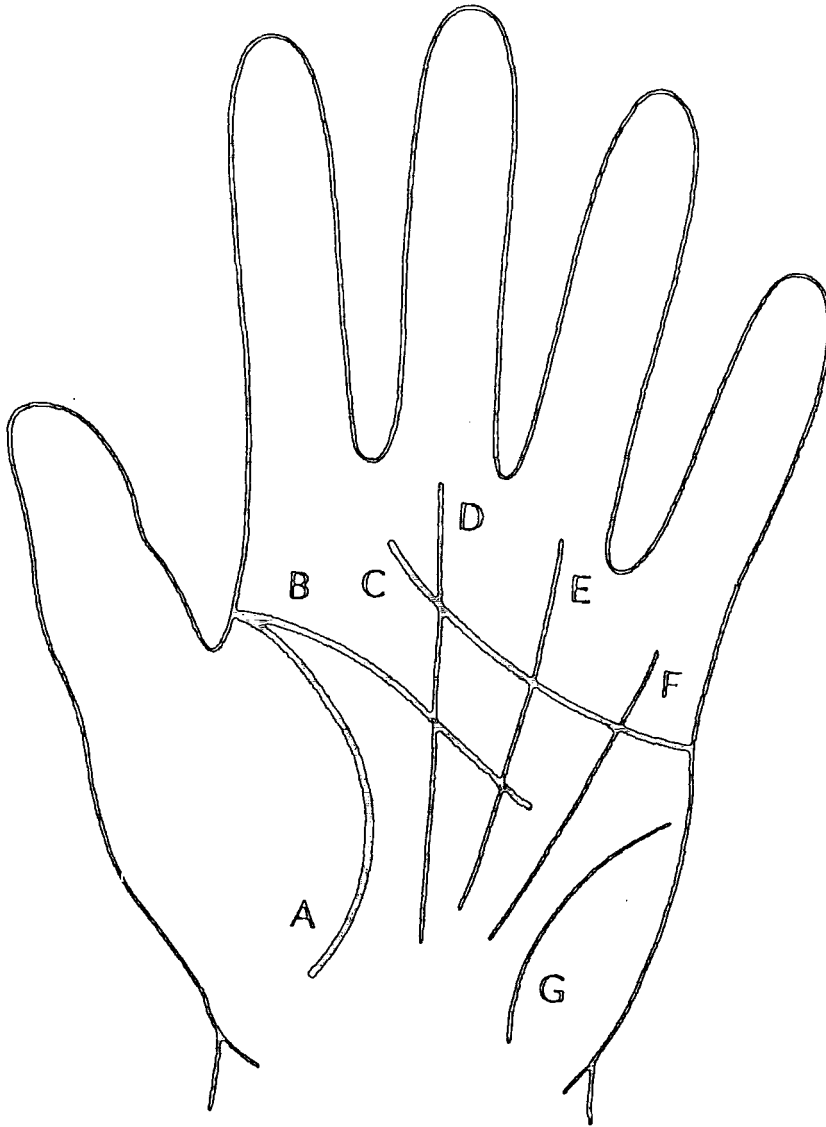
Although not always recorded in dermatoglyphic studies variations in the configurations of the various flexion creases on the hand have been extensively studied. In this study variations in the transverse flexion crease and the thenar crease were recorded. The method of classification used was that detailed by Alter (1970) and expanded by Schaumann and Alter (1976). The position of the transverse and thenar creases are shown in Figure 4.23 along with the other main flexion creases on the palm.

(a) Transverse flexion creases

The particular variant of transverse flexion creases found on each palm was identified and recorded using the following definitions of type (see Figure 4.24).

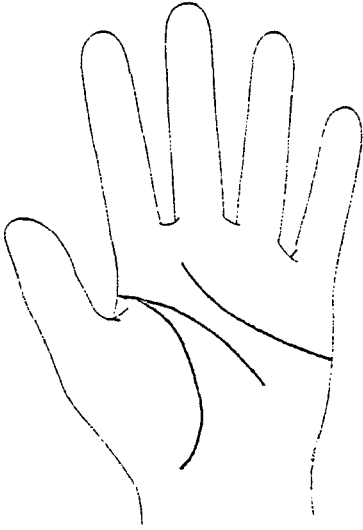
1. Normal creases - in which there is a distal and proximal crease neither of which extends across the entire palm. The distal crease starts at the ulnar border and extends in a gentle bow, concave distally, about $\frac{2}{3}$ rds of the distance to the radial border of the palm. The proximal transverse crease starts at the radial border and extends in a gentle bow, concave proximally, about $\frac{2}{3}$ rds of the distance to the ulnar border (see Figure 4.24a).
2. Close lines - normally almost a centimetre separates the distal and proximal transverse flexion creases at their nearest point. Occasionally, however, they run so close that they appear to be fused but in fact they do not actually touch (see Figure 4.24b).
3. Simian line- this is when true fusion between the distal and proximal creases occurs and only one line traverses the palm from ulnar to radial border (see Figure 4.24c).
4. Sydney line - this is when the proximal crease extends across the entire palm and the distal crease appears normal (see Figure 4.24d). The name 'Sydney' line was first used by Purvis-Smith (1968) who observed this type of transverse flexion crease in patients in Sydney, Australia.
5. Cascade configuration - this consists of several short, partially overlapping transverse crease (see Figure 4.24e).

Figure 4.23 - Palmar Flexion Creases

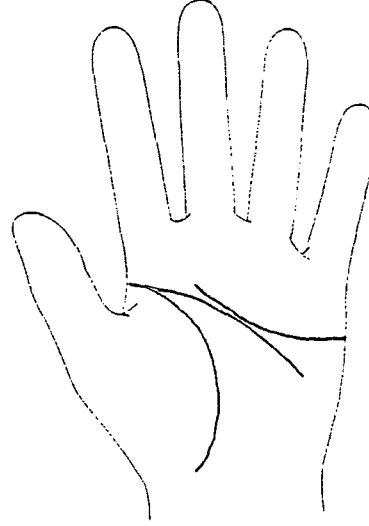


- A = thenar crease
- B = proximal transverse crease
- C = distal transverse crease
- D = middle finger crease
- E = ring finger crease
- F = little finger crease
- G = hypothenar crease

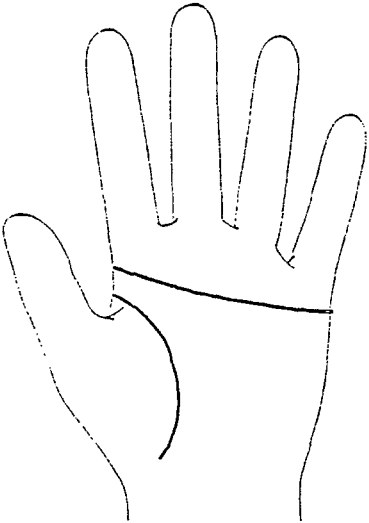
Figure 4.24 - Variants of Transverse Flexion Crease



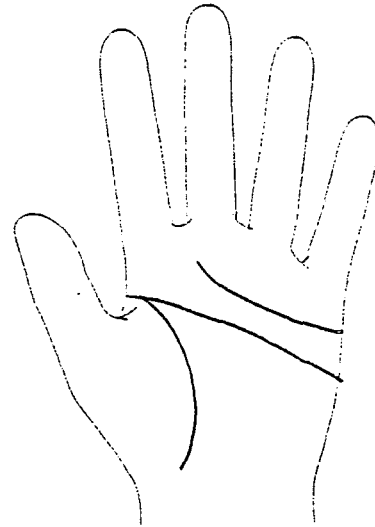
(a) normal



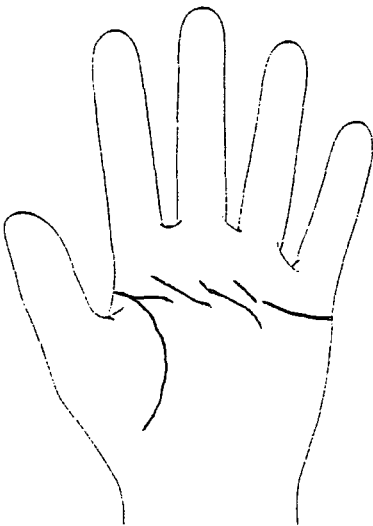
(b) close



(c) Simian

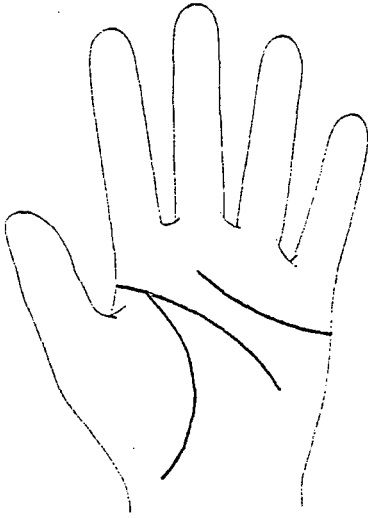


(d) Sydney

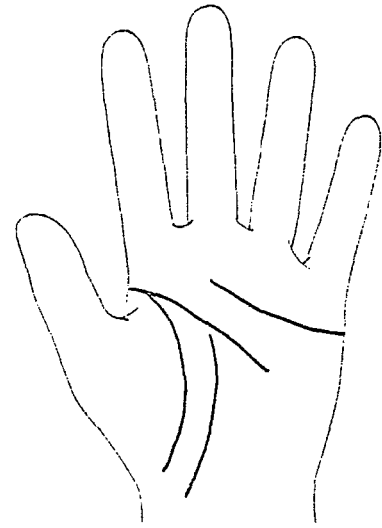


(e) Cascade

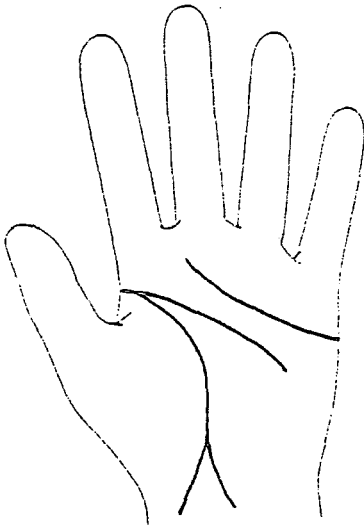
Figure 4.25 - Thenar Crease Variants



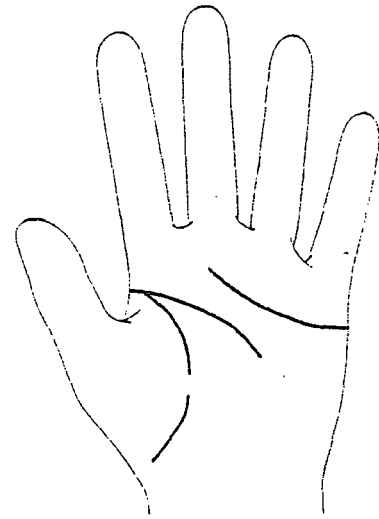
(a) normal



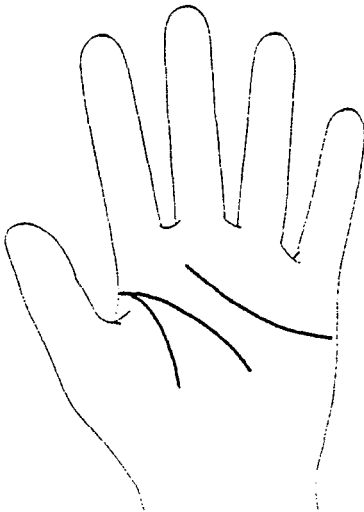
(b) double



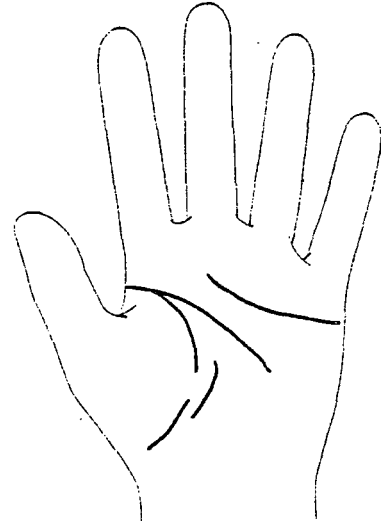
(c) forked



(d) broken



(e) short



(f) Cascade

(b) Thenar Crease

Two variables were recorded for the thenar crease on each hand. The first was the specific variant of the crease present and the second was the location of the terminus of the crease. The specifications for the categories of each variable are shown below:-

(A) Thenar Crease Variant

1. Normal: the thenar crease curves unbroken, forming a single bow, from the proximal transverse crease around the ulnar side of the thenar eminence to the radial side of the hand at the base of the thumb (see Figure 4.25a).
2. Double: two thenar creases, running approximately parallel to each other, are present (see Figure 4.25b).
3. Forked: the thenar crease towards its proximal end forks producing two branches (see Figure 4.25c).
4. Broken: the crease is discontinuous with one or more breaks in it (see Figure 4.25d).
5. Short: the crease runs less than half way from the proximal transverse crease to the base of the thumb (see Figure 4.25e).
6. Cascade: a series of cascading lines are present (see Figure 4.25f).

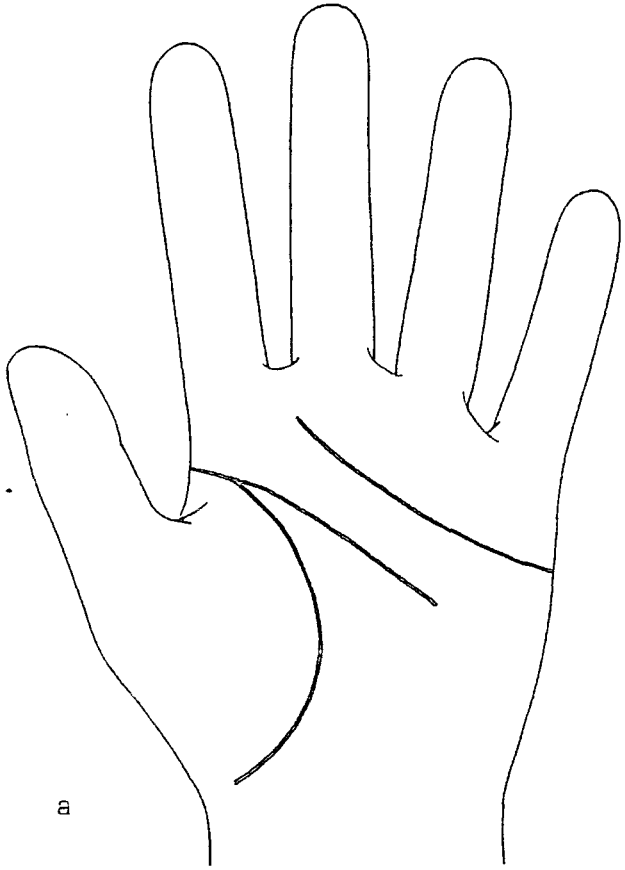
(B) Thenar Crease Terminus

1. Proximal Crease Terminus: the thenar crease normally joins the proximal transverse crease near to radial border of the palm (see Figure 4.26a).
2. Distinct Radial Terminus: the thenar crease has a separate and distinct terminus on the radial side of the hand and does not join the proximal transverse crease (see Figure 4.26b).

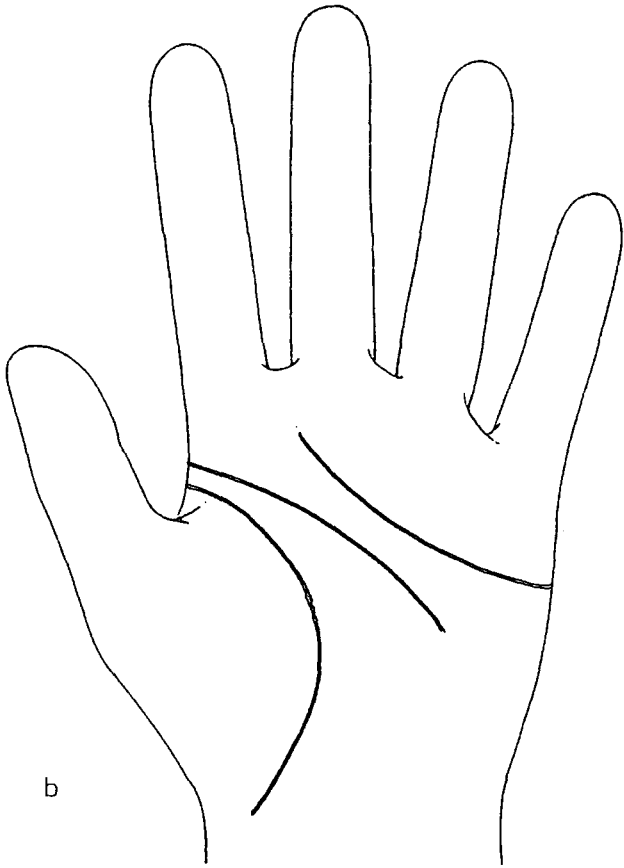
(vi) Palmar Ridge Disturbances(a) Ridge Atrophy

This is the reduction in height of the epidermal ridges producing a 'worn off' appearance. The degree of atrophy was assessed for each palm using a 0-3 scale of severity where 0 = no atrophy, 1 = slight, 2 = moderate and 3 = severe.

Figure 4.26 - Thenar Crease Terminus Variants



(a) proximal crease terminus



(b) distinct radial terminus

(b) Hyperlinearity

This is the occurrence of fine lines and markings over the palms producing a network running in all directions. The degree of hyperlinearity was assessed and recorded using a 0-3 scale of severity as for atrophy.

4.8 - Recording of Data

The information obtained from the detailed examination of the prints was recorded in coded form on the Computer Data Entry Sheet (Figure 4.6). Full details of all of the variables recorded and the codings used are provided in Appendix 2. The data from the Computer Entry Sheets was then entered into a data file on the NUMAC Computer at the University of Durham Computer Centre by the Data Preparation Service. All information was in numerical coded form and no names and addresses or information about coding was provided. The data was protected by passwords to the system and to the individual files and by the Data Protection Act (see Section 4.4.- Confidentiality).

4.9 - Variables Measured

The variables which were measured directly from the prints have already been reported in Section 4.7. They can be grouped into nine separate categories - three concerning the fingers and six on the palms. Throughout the results and analysis sections the variables are most often referred to in an abbreviated form. Table 4.5 contains a list of the variables which are measured directly from the prints and are to be found on the Data Entry Sheets along with their abbreviated titles. The variables in the table are grouped as follows:-

1. Fingers: (a) finger patterns, (b) finger ridge counts, (c) finger ridge disturbances
2. Palms: (d) palmar patterns, (e) palmar ridge counts, (f) palmar triradii, (g) palmar mainlines, (h) palmar flexion creases, (i) palmar ridge disturbances.

It is in this format that the results will be later presented.

Table 4.5 - List of Variables and Abbreviations

(a) Finger Patterns

ABBREVIATION	VARIABLE
LP1	Left hand, finger 1, pattern type
LP2	Left hand, finger 2, pattern type
LP3	Left hand, finger 3, pattern type
LP4	Left hand, finger 4, pattern type
LP5	Left hand, finger 5, pattern type
RP1	Right hand, finger 1, pattern type
RP2	Right hand, finger 2, pattern type
RP3	Right hand, finger 3, pattern type
RP4	Right hand, finger 4, pattern type
RP5	Right hand, finger 5, pattern type

(b) Finger Ridge Counts

ABBREVIATION	VARIABLE NAME
LFU1	Left hand, finger 1, ulnar ridge count
LFR1	Left hand, finger 1, radial ridge count
LFU2	Left hand, finger 2, ulnar ridge count
LFR2	Left hand, finger 2, radial ridge count
LFU3	Left hand, finger 3, ulnar ridge count
LFR3	Left hand, finger 3, radial ridge count
LFU4	Left hand, finger 4, ulnar ridge count
LFR4	Left hand, finger 4, radial ridge count
LFU5	Left hand, finger 5, ulnar ridge count
LFR5	Left hand, finger 5, radial ridge count
RFU1	Right hand, finger 1, ulnar ridge count
RFR1	Right hand, finger 1, radial ridge count
RFU2	Right hand, finger 2, ulnar ridge count
RFR2	Right hand, finger 2, radial ridge count
RFU3	Right hand, finger 3, ulnar ridge count
RFR3	Right hand, finger 3, radial ridge count
RFU4	Right hand, finger 4, ulnar ridge count
RFR4	Right hand, finger 4, radial ridge count
RFU5	Right hand, finger 5, ulnar ridge count
RFR5	Right hand, finger 5, radial ridge count

(c) Finger Ridge Disturbances

ABBREVIATION	VARIABLE NAME
LW1	White lines, left hand, finger 1
LW2	White lines, left hand, finger 2
LW3	White lines, left hand, finger 3
LW4	White lines, left hand, finger 4
LW5	White lines, left hand, finger 5
RW1	White lines, right hand, finger 1
RW2	White lines, right hand, finger 2
RW3	White lines, right hand, finger 3
RW4	White lines, right hand, finger 4
RW5	White lines, right hand, finger 5
LH1	Hyperlinearity, left hand, finger 1
LH2	Hyperlinearity, left hand, finger 2
LH3	Hyperlinearity, left hand, finger 3
LH4	Hyperlinearity, left hand, finger 4
LH5	Hyperlinearity, left hand, finger 5
RH1	Hyperlinearity, right hand, finger 1
RH2	Hyperlinearity, right hand, finger 2
RH3	Hyperlinearity, right hand, finger 3
RH4	Hyperlinearity, right hand, finger 4
RH5	Hyperlinearity, right hand, finger 5
LA	Finger ridge atrophy, left hand
RA	Finger ridge atrophy, right hand

(d) Palmar Pattern Occurrence

ABBREVIATION	VARIABLE NAME
PTL	Left hand, thenar, peripheral loop
RTL	Left hand, thenar radial loop
PTR	Right hand, thenar peripheral loop
RTR	Right hand, thenar radial loop
P2L	Left hand, I2, peripheral loop
C2L	Left hand, I2, central loop
P2R	Right hand, I2, peripheral loop
C2R	Right hand, I2, central loop
P3L	Left hand, I3, peripheral loop
C3L	Left hand, I3, central loop
P3R	Right hand, I3, peripheral loop
C3R	Right hand, I3, central loop
P4L	Left hand, I4, peripheral loop
C4L	Left hand, I4, central loop
U4L	Left hand, I4, ulnar loop
P4R	Right hand, I4, peripheral loop
C4R	Right hand, I4, central loop
U4R	Right hand, I4, ulnar loop
PHL	Left hand, hypothenar peripheral loop
CHL	Left hand, hypothenar central loop
RHL	Left hand, hypothenar radial loop
UHTL	Left hand, hypothenar ulnar tented arch
HARL	Left hand, hypothenar radial arch
PHR	Right hand, hypothenar peripheral loop
CHR	Right hand, hypothenar central loop;
RHR	Right hand, hypothenar radial loop
UHTR	Right hand, hypothenar ulnar tented arch
HARR	Right hand, hypothenar radial arch
PARL	Left hand, parathenar loop
PARR	Right hand, parathenar loop

(e) Palmar Ridge Count

ABBREVIATION	VARIABLE NAME
LAB	Left hand, a-b ridge count
LBC	Left hand, b-c ridge count
LCD	Left hand, c-d ridge count
LBD	Left hand, b-d ridge count
LAC	Left hand, a-c ridge count
RAB	Right hand, a-b ridge count
RBC	Right hand, b-c ridge count
RCD	Right hand, c-d ridge count
RBD	Right hand, b-d ridge count
RAC	Right hand, a-c ridge count

(f) Palmar Triradii

ABBREVIATION	VARIABLE NAME
LX2	Accessory triradii, I2, left hand
LX3	Accessory triradii, I3, left hand
LX4	Accessory triradii, I4, left hand
RX2	Accessory triradii, I2, right hand
RX3	Accessory triradii, I3, right hand
RX4	Accessory triradii, I4, right hand
LT0	Axial triradius t, left hand
LT1	Axial triradius t', left hand
L11	Axial triradius t'', left hand
TBL	Border triradius, left hand
RT	Axial triradius, right hand
RT1	Axial triradius, right hand
RT11	Axial triradius, right hand
TBR	Border triradius, right hand
LPPII	Left palmar pattern, intensity index
RPPII	Right palmar pattern, intensity index
LATD	Maximal atd angle, left hand
RATD	Maximal atd angle, right hand

(g) Palmar Mainlines

ABBREVIATION	VARIABLE NAME
ARL	Mainline A turning radially, left hand
AUL	Mainline A turning ulnarly, left hand
BRL	Mainline B turning radially, left hand
BUL	Mainline B turning ulnarly, left hand
CRL	Mainline C turning radially, left hand
CUL	Mainline C turning ulnarly, left hand
DRL	Mainline D turning radially, left hand
DUL	Mainline D turning ulnarly, left hand
ARR	Mainline A turning radially, right hand
AUR	Mainline A turning ulnarly, right hand
BRR	Mainline B turning radially, right hand
BUR	Mainline B turning ulnarly, right hand
CRR	Mainline C turning radially, right hand
CUR	Mainline C turning ulnarly, right hand
DRR	Mainline D turning radially, right hand
DUR	Mainline D turning ulnarly, right hand

(h) Palmar Flexion Creases

ABBREVIATION	VARIABLE NAME
FCL	Transverse flexion crease variant, left hand
FCR	Transverse flexion crease variant, right hand
TCVL	Thenar crease variant, left hand
TCVR	Thenar crease variant, right hand
TCTL	Thenar crease terminus, left hand
TCTR	Thenar crease terminus, right hand

(i) Palmar Ridge Disturbances

ABBREVIATION	VARIABLE NAME
ATRL	Ridge atrophy, left hand
HYLP	Hyperlinearity, left hand
ATRR	Ridge atrophy, right hand
HYRP	Hyperlinearity, right hand

CHAPTER FIVE - ANALYSIS OF DATA

5.1 - Introduction

After the data had been entered into the data file on the computer at the University of Durham, a series of analytical procedures was then carried out on this data set. All of the procedures were implemented using the computer program 'Statistical Package for the Social Sciences' (SPSS-X Release 3).

Five different types of procedure were used to analyse the data:-

- (i) computation of new variables
- (ii) descriptive statistics
- (iii) comparison of samples
- (iv) discriminant analysis
- (v) factor analysis

5.2 - Computed Variables

A series of new variables was computed using the data in the data file. Most of the computed variables were those specified by Dennis (1977) although some were created for this study by myself. A description of each of the computed variables along with the method used for their computation is given in this section. The computed variables are classified using the same method as for the original directly measured variables (See Section 4.9).

(A) Fingers

(i) Finger Patterns

The detailed pattern types were aggregated into various categories depending upon the number and direction of the loops present and also the number of triradii recorded.

(a) - Computation of Ulnar and Radial Loop Scores

(Variables RPR1 to LPU5)

Each of the variables RP1 and LP5 (Finger Pattern types) was divided into two new variables referring to the presence of ulnar and radial loops on each digit. Each of the new variables (RPR1 to LPU5) was given a score of 0-2 depending upon the number of

loops opening out in the direction specified by the variable term.

Table 5.1 shows the computed variables and their names.

Table 5.1 Ulnar and Radial Loop Scores

ABBREVIATION	VARIABLE NAME
RPR1	Right hand, finger 1, radial loop score
RPUI	Right hand, finger 1, ulnar loop score
RPR2	Right hand, finger 2, radial loop score
RPUI	Right hand, finger 2, ulnar loop score
RPR3	Right hand, finger 3, radial loop score
RPUI	Right hand, finger 3, ulnar loop score
RPR4	Right hand, finger 4, radial loop score
RPUI	Right hand, finger 4, ulnar loop score
RPR5	Right hand, finger 5, radial loop score
RPUI	Right hand, finger 5, ulnar loop score
LPR1	Left hand, finger 1, radial loop score
LPUI	Left hand, finger 1, ulnar loop score
LPR2	Left hand, finger 2, radial loop score
LPUI	Left hand, finger 2, ulnar loop score
LPR3	Left hand, finger 3, radial loop score
LPUI	Left hand, finger 3, ulnar loop score
LPR4	Left hand, finger 4, radial loop score
LPUI	Left hand, finger 4, ulnar loop score
LPR5	Left hand, finger 5, radial loop score
LPUI	Left hand, finger 5, ulnar loop score

Examples of radial and ulnar scores would be as follows:-

arch: radial loop score = 0, ulnar loop score = 0

radial loop: radial loop score = 1, ulnar loop score = 0

ulnar loop: radial loop score = 0, ulnar loop score = 1

whorl: radial loop score = 1, ulnar loop score = 1

(b) - Finger Delta Scores (Variables RD1 to LD5)

The number of triradii in each pattern type is recorded for each finger i.e. ulnar loop, radial loop, tented arch = 1, whorls and double loops = 2, accidentals with three triradii = 3 (see Table 5.2)

(c) - Finger Pattern Intensity Indices (Variables RFPII, LFPII and TFPII)

The finger pattern intensity index for each hand was computed by summing the delta scores for the digits of each hand in turn:-

Right hand finger pattern intensity index: $RFPII = RD1 + RD2 + RD3 + RD4 + RD5$.

Left hand finger pattern intensity index: $LFPII = LD1 + LD2 + LD3 + LD4 + LD5$.

The total finger pattern intensity index (TFPII) is computed by summing the intensity indices for left and right hands, i.e.,
 $TFPII = RFPII + LFPII$

Table 5.2 shows finger pattern intensity indices and abbreviated forms of variable names.

Table 5.2 Finger Delta Scores and Finger Pattern Intensity Indices

ABBREVIATION	VARIABLE NAME
RD1	Right hand, finger 1, delta score
RD2	Right hand, finger 2, delta score
RD3	Right hand, finger 3, delta score
RD4	Right hand, finger 4, delta score
RD5	Right hand, finger 5, delta score
LD1	Left hand, finger 1, delta score
LD2	Left hand, finger 2, delta score
LD3	Left hand, finger 3, delta score
LD4	Left hand, finger 4, delta score
LD5	Left hand, finger 5, delta score
RFPII	Right hand, finger pattern intensity index
LFPII	Left hand, finger pattern intensity index
TFPII	Total finger pattern intensity index

(ii) Finger Ridge Counts

A count for both the ulnar and radial side of each digit was taken and recorded on the data sheets. Using these scores various totals were computed for each finger and combinations of fingers.

(a) - Unilateral Count for each finger (Variables RF1 to LF5)

The higher of the ulnar and radial counts for each finger is chosen .

(b) - Summed Total Count for the Ulnar and Radial side of each finger (Variables RFA1 to LFA5)

The 'A' in the variable name indicates that these are absolute counts as defined by Holt (1968) instead of 'U' or 'R'.

$$RFA1 = RFR1 + RFU1$$

$$RFA2 = RFR2 + RFU2 \text{ etc.}$$

Table 5.3 shows variables RF1 to LF5 and RFA1 to LFA5.

Table 5.3 Computed Variables: Finger Ridge Counts (Single Hand)

ABBREVIATION	VARIABLE NAME
RF1	Unilateral ridge count, right hand, finger 1
RF2	Unilateral ridge count, right hand, finger 2
RF3	Unilateral ridge count, right hand, finger 3
RF4	Unilateral ridge count, right hand, finger 4
RF5	Unilateral ridge count, right hand, finger 5
LF1	Unilateral ridge count, left hand, finger 1
LF2	Unilateral ridge count, left hand, finger 2
LF3	Unilateral ridge count, left hand, finger 3
LF4	Unilateral ridge count, left hand, finger 4
LF5	Unilateral ridge count, left hand, finger 5
RFA1	Absolute ridge count, right hand, finger 1
RFA2	Absolute ridge count, right hand, finger 2
RFA3	Absolute ridge count, right hand, finger 3
RFA4	Absolute ridge count, right hand, finger 4
RFA5	Absolute ridge count, right hand, finger 5
LFA1	Absolute ridge count, left hand, finger 1
LFA2	Absolute ridge count, left hand, finger 2
LFA3	Absolute ridge count, left hand, finger 3
LFA3	Absolute ridge count, left hand, finger 4
LFA5	Absolute ridge count, left hand, finger 5

(c) - Summed Counts for one side of each finger (Variables R1 to U5)

The summed counts for one side of each digit for the homologous digits on both hands:-

$$R1 = RFR1 + LFR1$$

$$R2 = RFR2 + LFR2$$

(d) - Summed Unilateral Counts (Variables F1 to F5)

The summed unilateral counts for the homologous digits on both hands:-

$$F1 = RF1 + LF1$$

$$F2 = RF2 + LF2 \text{ etc.}$$

(e) - Summed Total Counts for homologous digits (Variables AF1 to AF5)

The summed total count for the homologous digits on both hands:-

$$AF1 = RFA1 + LFA1$$

$$AF2 = RFA2 + LFA2 \text{ etc.}$$

Variables R1 to AF5 are shown in Table 5.4

(f) - Summed Unilateral Counts (Variables RFRC, LFRC, TFRC)

The summed unilateral counts for the fingers of the right hand, the left hand and both together:-

$$RFRC = RF1 + RF2 + RF3 + RF4 + RF5$$

$$\text{LFRC} = \text{LF1} + \text{LF2} + \text{LF3} + \text{LF4} + \text{LF5}$$

$$\text{TFRC} = \text{RFRC} + \text{LFRC}$$

Table 5.4 Computed Variables: Finger Ridge Counts (Both Hands)

ABBREVIATION	VARIABLE NAME
R1	Summed radial count, finger 1
R2	Summed radial count, finger 2
R3	Summed radial count, finger 3
R4	Summed radial count, finger 4
R5	Summed radial count, finger 5
U1	Summed ulnar count, finger 1
U2	Summed ulnar count, finger 2
U3	Summed ulnar count, finger 3
U4	Summed ulnar count, finger 4
U5	Summed ulnar count, finger 5
F1	Summed unilateral count, finger 1
F2	Summed unilateral count, finger 2
F3	Summed unilateral count, finger 3
F4	Summed unilateral count, finger 4
F5	Summed unilateral count, finger 5
AF1	Summed absolute count, finger 1
AF2	Summed absolute count, finger 2
AF3	Summed absolute count, finger 3
AF4	Summed absolute count, finger 4
AF5	Summed absolute count, finger 5

(g) - Summed Total Counts (Variables RFAC, LFAC, TFAC)

The summed total counts for the fingers on the right hand, the left hand and both hands together:-

$$\text{RFAC} = \text{RFA1} + \text{RFA2} + \text{RFA3} + \text{RFA4} + \text{RFA5}$$

$$\text{LFAC} = \text{LFA1} + \text{LFA2} + \text{LFA3} + \text{LFA4} + \text{LFA5}$$

$$\text{TFAC} = \text{RFAC} + \text{LFAC}$$

(h) - Summed Counts (Variables RFR, LFR, TFR)

The summed counts for one side of each digit for the fingers on the right hand, left hand and both hands together.

Radial counts are given first and then ulnar counts:-

$$\text{RFR} = \text{RFR1} + \text{RFR2} + \text{RFR3} + \text{RFR4} + \text{RFR5}$$

$$\text{LFR} = \text{LFR1} + \text{LFR2} + \text{LFR3} + \text{LFR4} + \text{LFR5}$$

$$\text{TFR} = \text{RFR} + \text{LFR}$$

$$\text{RFU} = \text{RFU1} + \text{RFU2} + \text{RFU3} + \text{RFU4} + \text{RFU5}$$

$$\text{LFU} = \text{LFU1} + \text{LFU2} + \text{LFU3} + \text{LFU4} + \text{LFU5}$$

$$\text{TFU} = \text{RFU} + \text{LFU}$$

Variables RFRC to TFU are shown in Table 5.5.

Table 5.5 Computed Variables: Finger Ridge Counts

ABBREVIATION	VARIABLE NAME
RFRC	Summed unilateral count, right hand
LFRC	Summed unilateral count, left hand
TFRC	Summed unilateral count, both hands
RFAC	Summed absolute count, right hand
LFAC	Summed absolute count, left hand
TFAC	Summed absolute count, both hands
RFR	Summed radial count, right hand
LFR	Summed radial count, left hand
TFR	Summed radial count, both hands
RFU	Summed ulnar count, right hand
LFU	Summed ulnar count, left hand
TFU	Summed ulnar count, both hands

$$\text{LFAC} = \text{LFA1} + \text{LFA2} + \text{LFA3} + \text{LFA4} + \text{LFA5}$$

$$\text{TFAC} = \text{RFAC} + \text{LFAC}$$

(B) Palms

(i) Palmar Patterns

(a) Palmar Intensity Indices for the hypothenar area on each palm (HYPOR, HYPOL) and for both palms together (HYPBH).

$$\text{HYPOR} = \text{PHR} + \text{CHR} + \text{RHR} + \text{UHTR}$$

$$\text{HYPOL} = \text{PHL} + \text{CHL} + \text{RHL} + \text{UHTL}$$

$$\text{HYPBH} = \text{HYPOR} + \text{HYPOL}$$

(b) Pattern Intensity Indices for the interdigital areas on each palm (INTOR, INTOL) and for both palms together (INTBT).

$$\text{INTOR} = \text{PTR} + \text{RTR} + \text{P2R} + \text{C2R} + \text{P3R} + \text{C3R} + \text{P4R} + \text{C4R} + \text{U4R}$$

$$\text{INTOL} = \text{PTL} + \text{RTL} + \text{P2L} + \text{C2L} + \text{P3L} + \text{C3L} + \text{P4L} + \text{C4L} + \text{U4L}$$

$$\text{INTBT} = \text{INTOR} + \text{INTOL}$$

(ii) Palmar Triradii

(a) Axial Triradii Counts for right hand (AXR), left hand (AXL) and both hands together (TTAX).

$$\text{AXR} = \text{RT} + \text{RT1} + \text{RT11} + \text{TBR}$$

$$\text{AXL} = \text{LTO} + \text{LT1} + \text{LT11} + \text{TBL}$$

$$\text{TTAX} = \text{AXR} + \text{AXL}$$

(b) Total Pattern Intensity Index (TPPII) total number of triradii on both hands.

$$\text{TPPII} = \text{RPII} + \text{LPII}$$

(c) Summed Maximal Atd Angle for both hands together (SATD)

$$\text{SATD} = \text{RATD} + \text{LATD}$$

Variables HYPOR to SATD are shown in Table 5.6

Table 5.6 Palmar Patterns and Triradii

ABBREVIATION	VARIABLE NAME
HYPOR	Hypothenar pattern intensity index, right hand
HYPOL	Hypothenar pattern intensity index, left hand
HYPBH	Hypothenar pattern intensity index, both hands
INTOR	Interdigital pattern intensity index, right hand
INTOL	Interdigital pattern intensity index, left hand
INTBT	Interdigital pattern intensity index, both hands
AXR	Axial triradii count, right hand
AXL	Axial triradii count, left hand
TTAX	Total axial triradii count, both hands
TPPII	Total palmar pattern intensity index
SATD	Summed maximal atd angle, both hands

(ii) Palmar Ridge Counts

(a) Summed Counts for both hands (Variables TAB, TBC, TCD)

$$\text{Total a-b count (TAB)} = \text{RAB} + \text{LAB}$$

$$\text{Total b-c count (TBC)} = \text{RBC} + \text{LBC}$$

$$\text{Total c-d count (TCD)} = \text{RCD} + \text{LCD}$$

(b) Summed Total Counts for each hand and for both hands together.
(Variables RPRC, LPRC, TPRC).

$$\text{RPRC} = \text{RAB} + \text{RBC} + \text{RCD} + \text{RBD}$$

$$\text{LPRC} = \text{LAB} + \text{LBC} + \text{LCD} + \text{LBD}$$

$$\text{TPRC} = \text{LPRC} + \text{RPRC}$$

Variables TAB to TPRC are shown in Table 5.7

Table 5.7 Palmar Ridge Counts

ABBREVIATION	VARIABLE NAME
TAB	Summed a-b ridge count, both hands
TBC	Summed b-c ridge count, both hands
TCD	Summed c-d ridge count, both hands
RPRC	Summed palmar ridge count, right hand
LPRC	Summed palmar ridge count, left hand
TPRC	Total palmar ridge count, both hands

Table 5.8 shows a combined list of all of the variables used in this study both from direct measurement (see Chapter 4) and Computed Variables (Section 5.2).

Table 5.8 Summary Table of all Variables used in study

(* = Computed Variables)

VARIABLE TYPE	VARIABLE NAME	CODES
FINGER PATTERNS	Finger pattern types	LP1 to RP5
	Ulnar and radial loop scores	RPR1 to LPU5*
	Finger delta scores	RD1 to LD5*
	Fing. patt. intensity indices	RFPII, LFPII, TFPII*
FINGER RIDGE COUNTS	Individ.fing.ridge counts	LFU1 to RFR5
	Unilateral ridge counts	RF1 to LF5*
	Absolute ridge counts	RFA1 to LFA5*
	Summed ulnar + radial counts	R1 to U5*
	Summed radial counts	RFR, LFR, TFR*
	Summed ulnar counts	RFU, LFU, TFR*
	Summed unilateral ridge counts	F1 to F5*
	Summed absolute ridge counts	AF1 to AF5*
	Summed unilateral counts	RFRC, LFRC, TFRC*
	Summed absolute counts	RFAC, LFAC, TFAC*
FINGER RIDGE DISTURBANCES	White lines	LW1 to RW5
	Hyperlinearity	LH1 to RH5
	Ridge atrophy	LA, RA
PALMAR PATTERNS	Palmar pattern occurrence	PTL to PARR
	Hypothenar patt.intens.indices	HYPOR, HYPOL, HYPBH*
	Interdigital patt.intens.indic	INTUR, INTOL, INTBT*
PALMAR TRIRADII	Accessory triradii	LX2 to RX4
	Axial triradii	LTO to TBR
	Axial triradial counts	AXR, AXL, TTAX*
	Palmar patt.intens.indices	LPPII, RPPII, TPPII*
	Atd angle	LATD, RATD
	Summed atd angle	SATD*
PALMAR RIDGE COUNTS	Ridge counts	LAB to RAC
	Summed counts	TAB to TCD*
	Summed total counts	RPRC, LPRC, TPRC*
PALMAR MAINLINES	Mainline direction	ARL to DUR
PALMAR FLEXION CREASES	Transverse flexion crease	FCL, FCR
	Thenar flexion crease	TCVL to TCTR
PALMAR RIDGE DISTURBANCES	Ridge atrophy	ATRL, ATRR
	Hyperlinearity	HYLP, HYRP

5.3 - Descriptive Statistics

The basic distributional characteristics of each of the variables were first determined for each of the subsets of the population sample. Information on the distribution, variability and central tendencies of the variables was obtained using the

subprogram 'Frequencies' of SPSS-X Release 3. The following summary statistics were produced:-

- (i) Number of cases (n) - the number of subjects in a particular group.
- (ii) Minimum and Maximum - the smallest and largest value of a variable found among the cases.
- (iii) Range - obtained by subtracting the minimum from the maximum.
- (iv) Mean ($\bar{x}$) - the sum of the individual values for each of the cases divided by the number of cases. This is the most common measure of central tendency and can be calculated using the formula:-

$$\bar{x} = \frac{\sum x}{n}$$

where x = score for each case

n = number of cases

- (v) Standard Deviation (σ) - a measure of the degree of dispersion around the mean. It is calculated by adding the square of the deviations of the individual values from the mean of the distribution, dividing this sum by the number of items in the distribution and then finding the square root of the quotient:-

$$\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$$

- (vi) Standard Error ($\sigma_{\bar{x}}$) - this is calculated by dividing the standard deviation by the square root of the number of cases:-

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

The standard error helps to determine the potential degree of discrepancy between the sample mean and the unknown population mean.

- (vii) Skewness - this statistic measures deviations from symmetry and so determines the degree to which a distribution of cases approximates a normal curve. Skewness has a value of zero when the distribution is a completely symmetrical bell-shaped curve. A positive value indicates a clustering of cases to the

left of the mean. A negative value indicates clustering to the right. The larger the value the greater the degree of skew:-

$$\text{skewness} = \frac{\sum_{i=1}^n [(x_i - \bar{x}) / s]^3}{n}$$

- (viii) Kurtosis - is a measure of the relative peakedness or flatness of the curve defined by the distribution of the cases. A normal distribution will have a Kurtosis of zero. If the Kurtosis is positive then the distribution is more peaked (narrow) than would be true for a normal distribution. A negative value indicates that the curve is flatter:-

$$\text{Kurtosis} = \frac{\sum_{i=1}^n [(x_i - \bar{x}) / s]^4}{n} - 3$$

- (ix) Frequency Distributions - this method was used for variables which were discontinuous values. The percentage of the total number of cases occurring in each of the categories was computed. For these discontinuous variables the median and the mode were also computed.
- (x) Median - this is the numerical value of the middle case once all of the cases have been rank ordered from highest to lowest. The Median is, therefore, the value which will divide the sample into two halves.
- (xi) Mode - this is the value of the variable which occurs most often. If two or more values tie in having the 'most' cases, then the lowest numerical value is reported as the mode.

5.4 - Comparison of Samples : the Mann-Whitney U Test

After determining the basic distributional characteristics described above the next stage of analysis was to determine whether or not samples taken for different populations were significantly different from one another for each of the variables measured. A nonparametric test was chosen for comparison of the samples since it makes no assumptions about the distribution of cases on the variables (i.e. nonparametric = distribution free).

The test chosen for comparison of samples was the Mann-Whitney U Test which is used to determine whether or not two

independent groups have been drawn from the same population. The test used is one of the most powerful of the nonparametric tests.

The method used in the Mann-Whitney U Test is to combine the two groups and then rank the cases in order of increasing value. The statistic U is then computed as the number of times a score from group A precedes a score from group B. The rationale is that if the samples are from the same population, the distribution of the scores from the two groups in the ranked list will be random, a non-random pattern will be indicated by an extreme value for U.

For small samples (less than 30 cases) the exact significance level of U is computed using the algorithm of Dineen and Blakesley (1973). For larger samples U is transformed into a normally distributed statistic, Z (corrected for ties) and its two-tailed probability is given.

5.5 - Discriminant Analysis

The object of discriminant analysis is to determine which variables cause two or more populations to differ. This procedure is, therefore, used to 'discriminate' between the groups in the sense of being able to tell them apart. To distinguish between the groups the discriminating variables are weighted and linearly combined so that the groups are forced to be statistically as distinct as possible. This is done in a stepwise method removing variables and replacing them in turn, so selecting the 'best' set of discriminating variables causing the groups to be as distinct as possible. The method used for controlling the stepwise selection was the minimum Mahalanobis distance between groups.

Whereas the methods used up to now (see Sections 5.3 and 5.4) are univariate methods of data analysis (i.e. use one variable at a time), the procedure here, Discriminant Analysis, is a method of multivariate data analysis.

The method used in Discriminant Function Analysis is best initially explained in terms of two separate groups, the object of which is to allow an individual to be placed in one or other of the groups on the basis of a set of 'K' variables. This amounts to finding a linear equation which will maximise some pre-determined requisite taken to be indicative of between-group separation.

The linear function between two groups is defined by Blackith and Reyment (1971) as:-

$$Y = (\bar{x}_1 - \bar{x}_2)S^{-1}x$$

where $\bar{x}_1$ and $\bar{x}_2$ are the mean vectors of sample size N_1 , N_2 . S^{-1} is the reciprocal of the pooled sample dispersion matrix (variance/co-variance matrix) and x is the vector of variables.

The coefficients of the linear discriminant functions are defined as:-

$$a = S^{-1}(\bar{x}_1 - \bar{x}_2)$$

These functions are related to the Mahalanobis generalised distance by the relationship:-

$$D^2 = (\bar{x}_1 - \bar{x}_2)^1 S^{-1}(\bar{x}_1 - \bar{x}_2) = d^1 a$$

where d is the difference between two sample mean vectors. This formula can be extended to cover any number of intergroup relationships.

The particular program used for discriminant analysis in this investigation is that produced by the SPSS statistical package system and termed Discriminant (Nie et.al. 1979). For reference to the D^2 statistic see Mahalanobis (1936) and Rao (1952).

One of the outputs from the program Discriminant is an F matrix together with the associated degrees of freedom. A classification array is obtained which shows the percentage of cases in each known group which would be correctly placed in that group on the basis of the discriminant functions alone. The relative importance of each function in the discriminating process can be examined by considering the eigen values or the canonical correlations (c.c.), the program deriving the functions in decreasing order of importance as judged by the amount of explained variance contained within each function. The maximum number of functions is always one less than the number of groups, but with several groups a few functions (2 or 3) should classify the individual cases into their correct groups.

5.6 - Factor Analysis

This is a method of data-reduction performed on the data in the computer file. Factor analysis enables us to see whether some underlying pattern of relationship exists such that the data may be arranged or 'reduced' to a smaller set of 'factors' that may be taken as source variables accounting for the observed interrelations in the data. There are three main steps to factor analysis:- first the preparation of the correlation matrix, second, the extraction of the initial factors - the exploration of possible data reduction, and third, the rotation to a terminal solution - the search for sample and interpretable factors.

Factor analysis, or principal component/co-ordinate analysis, therefore, attempts to find a reduced number of factors or components (R) which will explain the variance contained within the correlation matrix between the original N variables ($R < N$).

The program used for the factor analysis in this study is part of the SPSS package and is program Factor.

As stated above the first step in factor analysis involves the calculation of appropriate measures for a set of relevant variables. The variety of factor analysis carried out is known as R - factor analysis since it is based on correlation between variables rather than on units (objects, individuals, communities etc.) which would be termed Q - factor analysis. The user has first to define the relevant universe of analysis since the nature and scope of the variables included in the analysis have crucial implications for the factor results and their possible interpretation.

The second step in factor analysis is to explore the data reduction possibilities by constructing a new set of variables on the basis of the interrelations exhibited in the data. In doing so, the new variables may be defined as exact mathematical transformations of the original data, a method known as principal-component analysis. The initial factors are extracted in such a way that one factor is independent from the other, i.e. the factors are orthogonal.

Principal-component analysis is a relatively straightforward method of transforming a given set of variables into a new set of composite variables or principal components that are orthogonal

to each other. The 'best' linear combination is chosen. 'Best' in the sense that the particular combination of variables would account for more of the variance in the data as a whole than any other linear combination of variables. The first principle component, therefore, may be defined as the single best summary of linear relationships exhibited in the data. The second component is defined as the second best linear combination of variables. Since it is a condition that the second component is orthogonal to the first, then, the second one must account for the proportion of variance not accounted for by the first component. Thus, the second component is the linear combination of variables which accounts for the most residual variance after the effect of the first component is removed from the data. Subsequent components are defined similarly until all the variance in the data is exhausted. The principal component model may be expressed as:-

$$Z_j = a_{j1} F_1 + a_{j2} F_2 + \dots + a_{jn} F_n$$

where each of the n observed variables is described linearly in terms of n new uncorrelated components $F_1, F_2, \dots, F_n$ each of which is in turn defined as a linear combination of the n original variables.

Since each component is defined as the best linear summary of variance left in the data after the previous components are taken care of, the first components may explain most of the data. For factor-analytical purposes, therefore, only the first few components are retained for further rotation.

The final step in factor analysis is the rotation of the factors into terminal factors. Rotation is desirable because it simplifies the factor structure. Two major options are available, an orthogonal rotational method or an oblique rotational method. The orthogonal factors are uncorrelated, while oblique factors may be correlated. The orthogonal factors are mathematically simpler to handle and this was the option chosen in the program by using sub-program option Varimax. Also selected was the method of factoring in sub-program Factor. The one chosen was that of Principal Factoring with Iteration (PA2) which replaces the main diagonal elements of the correlation matrix with communality estimates, the R^2 estimates. PA2 is the most widely accepted

factoring method. An output of the factor matrix and communalities was given along with communalities, eigen values and proportion of total and common variance as statistics. In addition a plot of the rotated factors was produced using the first 3 factors only.

CHAPTER SIX - RESULTS: PART ONE - MAIN SAMPLE: COMMON SKIN DISORDERS

- FINGERS

6.1 - Introduction

In this chapter and the next the results for each of the six main groups of skin disorders, along with those for the control sample, are presented. For each of the sample groups the results for male and female subjects are shown separately. Results for variables on the fingers are presented first in this chapter followed by those for palmar variables in Chapter Seven. The variables, within the subsections for fingers and palms, are grouped according to type e.g. ridge counts, pattern type frequency. The order of presentation of results for the groups of variables is the same as shown in the variable list (Table 5.8).

For each group of variables, descriptive statistics are presented first. These statistics consist of either, means and standard deviations, or percentage frequency distributions, depending upon whether the variables are continuous or discontinuous (categorizable) respectively. Next the results of comparisons between groups, i.e. Mann-Whitney U Test scores and probabilities, are shown, followed by the results of discriminant analysis for each particular group of variable. Factor analysis results are presented for the continuous variables within the appropriate sections.

The groups of skin disorders were also regrouped to form two larger sets. The criterion used for determining which set a particular disorder was a member of depended on the aetiology of the disorder. Those which were known to have a genetic component in their aetiology, i.e. psoriasis, atopic eczema, vitiligo and alopecia areata, were grouped together to form one set under the title 'genodermatoses' (denoted by the code GD). The second set consisted of disorders with no known genetic factor in their aetiology. These disorders were BCC and actinic keratosis and were grouped under the code ND (dermatoses with no genetic causal factors). The results for these larger groupings are presented, along with those for the control sample, after the individual disorders for each group of variables.

6.2 - Results for variables on fingers

(a) Finger patterns

(i) Finger pattern type occurrence (variables LP1 to RPS)

The percentage frequency of occurrence of the various pattern types on each of the fingers is shown in Tables 6.1 and 6.2 for males and females respectively. In both tables the different pattern types are coded in the following way:-

- 0 = arch
- 1 = tented arch
- 2 = ulnar loop
- 3 = radial loop
- 4 = whorl
- 5 = double loop
- 6 = ulnar double loop
- 7 = radial double loop
- 8 = central pocket loop ulnar
- 9 = central pocket loop radial

More details of the classification can be found in Section 4.7Ai.

Tables 6.3 and 6.4 show the results of intergroup comparisons carried out using the Mann-Whitney U Test, for males and females respectively.

For finger I (thumb) only five of the pattern types were present for both male and female subjects. The most commonly occurring pattern in all groups was the ulnar loop followed by double loops, whorls, arches and finally ulnar central pocket loops in order of decreasing frequency.

Among male subjects vitiligo patients had the greatest frequency of occurrence of ulnar loops on digit I of both hands when compared to the other groups. They also had the smallest percentage frequency of occurrence of double loops on both hands in comparison to all of the other groups. These differences are shown to be statistically significant at the 5% level for the left hand

Table 6.1(a) Percentage frequencies of finger pattern types : Male left hand

Sex = Male

Group	Cases	LP1									
		0	1	2	3	4	5	6	7	8	9
Controls	206	1.9	0.0	59.2	0.0	21.8	16.0	0.0	0.0	1.0	0.0
Psoriasis	202	0.0	0.0	56.4	0.0	24.8	18.8	0.0	0.0	0.0	0.0
Atop.Ecz.	203	0.0	0.0	61.6	0.0	15.3	23.2	0.0	0.0	0.0	0.0
Vitiligo	201	0.5	0.0	66.7	0.0	17.9	14.4	0.0	0.0	0.5	0.0
Alop.Are.	210	1.4	0.0	58.1	0.0	15.2	25.2	0.0	0.0	0.0	0.0
B.C.C.	211	1.4	0.0	59.7	0.0	16.1	21.8	0.0	0.0	0.9	0.0
Act.Ker.	129	0.0	0.0	64.3	0.0	13.2	22.5	0.0	0.0	0.0	0.0

Group	Cases	LP2									
		0	1	2	3	4	5	6	7	8	9
Controls	206	3.9	1.5	44.7	19.4	22.8	3.9	0.0	0.0	1.9	1.9
Psoriasis	202	2.5	0.0	37.1	27.7	28.2	1.5	0.0	0.0	1.5	1.5
Atop.Ecz.	203	5.4	1.0	32.5	29.6	27.6	0.0	0.0	0.5	1.0	2.5
Vitiligo	201	5.0	0.5	35.8	23.4	29.9	3.0	0.0	0.0	1.5	1.0
Alop.Are.	210	3.3	0.5	36.2	30.0	27.6	0.5	0.0	0.0	0.5	1.4
B.C.C.	211	0.5	0.0	45.0	22.3	26.5	3.3	0.0	0.5	0.5	1.4
Act.Ker.	129	0.8	0.0	38.8	21.7	34.9	2.3	0.0	0.0	1.6	0.0

Table 6.1(a) continued

Group	Cases	LP3									
		0	1	2	3	4	5	6	7	8	9
Controls	206	2.9	1.0	79.6	1.5	12.1	1.9	0.0	0.0	0.5	0.5
Psoriasis	201	3.0	0.0	80.6	1.0	13.4	1.0	0.0	0.0	1.0	0.0
Atop.Ecz.	203	3.9	0.5	82.3	0.5	11.3	1.5	0.0	0.0	0.0	0.0
Vitiligo	201	5.0	0.0	82.6	1.5	9.5	1.0	0.0	0.0	0.5	0.0
Alop.Are.	210	3.3	0.0	79.0	4.3	11.9	0.5	0.0	0.0	1.0	0.0
B.C.C.	211	1.4	0.5	75.8	0.9	16.6	3.3	0.0	0.0	1.4	0.0
Act.Ker.	129	0.0	0.0	82.9	0.8	13.2	2.3	0.0	0.0	0.8	0.0

Group	Cases	LP4									
		0	1	2	3	4	5	6	7	8	9
Controls	206	2.4	0.0	56.3	0.5	26.7	1.5	0.0	0.5	11.7	0.5
Psoriasis	201	0.5	0.0	55.9	0.5	35.1	0.5	0.0	0.0	7.4	0.0
Atop.Ecz.	203	0.0	0.0	52.7	0.0	30.0	2.0	0.0	0.0	15.3	0.0
Vitiligo	201	0.0	0.0	63.2	0.0	26.4	0.0	0.0	0.0	1.0	9.5
Alop.Are.	210	2.4	0.0	61.0	0.0	29.0	1.0	0.0	0.0	6.7	0.0
B.C.C.	211	0.5	0.0	57.8	0.5	32.7	1.9	0.0	0.0	6.6	0.0
Act.Ker.	129	0.0	0.0	54.3	0.0	36.4	0.8	0.0	0.0	8.5	0.0

Group	Cases	LP5									
		0	1	2	3	4	5	6	7	8	9
Controls	206	1.0	0.0	83.0	0.5	8.7	1.0	0.0	0.0	5.8	0.0
Psoriasis	202	0.0	0.0	87.6	0.0	8.4	0.0	0.0	0.0	4.0	0.0
Atop.Ecz.	203	0.5	0.0	85.7	0.0	9.9	0.5	0.0	0.0	3.4	0.0
Vitiligo	201	0.0	0.0	92.5	0.0	5.5	0.0	0.0	0.0	2.0	0.0
Alop.Are.	210	0.5	0.0	88.1	0.0	10.0	0.5	0.0	0.0	1.0	0.0
B.C.C.	211	0.0	0.0	92.4	0.0	4.3	1.4	0.0	0.0	1.9	0.0
Act.Ker.	129	0.0	0.0	93.8	0.0	3.1	0.0	0.0	0.0	3.1	0.0

Table 6.1(b) Percentage frequencies of finger pattern types. Male - Right hand.

Sex = Male

Group	Cases	RP1									
		0	1	2	3	4	5	6	7	8	9
Controls	206	0.5	0.0	52.9	0.0	27.2	18.4	0.0	0.0	1.0	0.0
Psoriasis	202	0.0	0.0	55.0	0.0	24.8	20.3	0.0	0.0	0.0	0.0
Atop.Ecz.	203	0.0	0.0	52.2	0.0	27.1	20.7	0.0	0.0	0.0	0.0
Vitiligo	201	0.5	0.0	62.7	0.0	19.9	16.9	0.0	0.0	0.0	0.0
Alop.Are.	210	1.0	0.0	60.5	0.0	16.7	21.9	0.0	0.0	0.0	0.0
B.C.C.	211	0.9	0.0	52.6	0.0	21.8	24.2	0.0	0.0	0.5	0.0
Act.Ker.	129	0.0	0.0	56.6	0.0	19.4	24.0	0.0	0.0	0.0	0.0

Group	Cases	RP2									
		0	1	2	3	4	5	6	7	8	9
Controls	206	4.4	1.5	38.8	18.4	26.7	3.4	0.0	0.0	1.0	5.8
Psoriasis	202	4.0	1.0	39.1	25.2	26.2	0.5	0.0	0.0	1.5	2.5
Atop.Ecz.	203	4.9	1.5	20.7	30.5	31.0	1.5	0.0	0.5	5.9	3.4
Vitiligo	201	7.0	0.0	35.8	24.9	29.9	1.0	0.0	0.5	0.5	0.5
Alop.Are.	210	3.8	0.0	35.2	27.1	29.0	1.4	0.0	0.5	1.4	1.4
B.C.C.	211	0.9	0.9	40.8	27.5	25.6	1.9	0.0	0.0	0.5	1.9
Act.Ker.	129	1.6	0.8	35.7	27.9	31.8	0.0	0.0	0.0	0.0	2.3

Table 6.1(b) continued

Group	Cases	RP3									
		0	1	2	3	4	5	6	7	8	9
Controls	206	2.4	1.0	75.7	1.5	15.5	1.5	0.0	0.0	2.4	0.0
Psoriasis	202	1.5	0.5	83.2	2.0	11.4	0.5	0.0	0.0	1.0	0.0
Atop.Ecz.	203	3.0	0.0	83.3	2.5	14.3	0.5	0.0	0.0	1.5	0.0
Vitiligo	201	2.5	0.5	82.1	0.5	11.9	2.0	0.0	0.0	0.5	0.0
Alop.Are.	210	3.8	0.0	78.1	1.4	16.2	0.0	0.0	0.0	0.5	0.0
B.C.C.	211	1.9	0.0	76.8	0.9	16.6	2.4	0.0	0.0	1.4	0.0
Act.Ker.	129	0.8	0.0	79.8	3.1	14.0	2.3	0.0	0.0	0.0	0.0

Group	Cases	RP4									
		0	1	2	3	4	5	6	7	8	9
Controls	206	0.5	0.0	51.5	0.5	37.4	1.5	0.0	0.0	8.3	0.5
Psoriasis	202	0.0	0.0	49.5	0.0	37.6	0.0	0.0	0.0	12.4	0.0
Atop.Ecz.	203	1.5	0.0	46.3	0.0	39.9	0.0	0.0	0.0	11.8	0.5
Vitiligo	201	0.5	0.0	59.2	0.5	28.9	1.0	0.0	0.0	10.0	0.0
Alop.Are.	210	0.5	0.0	56.7	0.0	33.3	1.0	0.0	0.0	8.1	0.5
B.C.C.	211	0.5	0.0	46.9	0.0	39.8	1.9	0.0	0.0	10.4	0.5
Act.Ker.	129	0.0	0.0	49.6	0.0	41.1	0.0	0.0	0.0	9.3	0.0

Group	Cases	RP5									
		0	1	2	3	4	5	6	7	8	9
Controls	206	1.0	0.0	77.7	0.0	10.7	0.5	0.0	0.0	10.2	0.0
Psoriasis	202	0.0	0.0	83.7	0.0	10.9	0.0	0.0	0.0	5.0	0.0
Atop.Ecz.	203	0.0	0.0	80.8	0.0	10.8	0.5	0.0	0.0	7.4	0.0
Vitiligo	201	0.5	0.0	87.1	0.0	7.0	0.0	0.0	0.0	5.5	0.0
Alop.Are.	210	0.5	0.0	85.7	0.0	10.0	0.0	0.0	0.0	3.8	0.0
B.C.C.	211	0.0	0.0	87.7	0.0	6.2	0.5	0.0	0.0	5.7	0.0
Act.Ker.	129	0.0	0.0	89.9	0.0	3.9	0.0	0.0	0.0	6.2	0.0

when vitiligo males were compared to psoriatic males. The highest value for ulnar loop occurrence was found for vitiligo males (66.7%) and the lowest value for psoriasis males (56.4%). Conversely both whorls and double loops were found to occur more frequently in psoriatics (24.8% and 18%) than in vitiligo probands (17.9% and 14%).

On the right hand statistically significant differences were found for vitiligo males when compared with atopic eczema patients and with BCC sufferers. Vitiligo had the highest value for ulnar loop occurrence (62.7%) compared with 52.2% for atopic eczema and 52.6% for BCC. The values for whorls and double loops were smaller in vitiligo patients (19.9% and 16.9% respectively) when compared to atopic eczema (27.1% and 20.7%) and to BCC (21.8% and 24.2%).

For female subjects statistically significant differences were found for comparisons between BCC and controls for patterns on the left thumb. The control group had a higher frequency of occurrence of ulnar loops (65%) compared to 60.4% in BCC patients. Lower frequencies for whorls and double loops (14.3% and 13.3% respectively) were found in controls than in BCC sufferers (16.8% and 20.8%). Psoriatic females were found to have statistically significantly higher values for ulnar loop occurrence (72.2%) compared with those for vitiligo (67.8%) and BCC (60.4%). The values for whorls and double loops were higher in BCC females (16.8% and 20.8% respectively) than in psoriatics (8.8% and 15.1%). The differences between BCC and psoriasis females was found to be statistically highly significant. Vitiligo patients had statistically significantly higher values for whorl occurrence (18.8%) than in psoriasis females (8.8%).

On digit II (the index finger) there was found to be a much greater variety of pattern types. All of the nine pattern types were found to be present. Ulnar loop was again the most commonly occurring pattern type, followed by whorl and radial loop in order of decreasing frequency.

Statistically highly significant differences were found on right finger II between atopic eczema males when compared with

Table 6.2(a) Percentage frequencies of finger pattern types. Female left hand.

Sex = Female

Group	Cases	LP1									
		0	1	2	3	4	5	6	7	8	9
Controls	203	4.9	0.0	65.0	0.0	14.3	13.3	0.0	0.0	2.5	0.0
Psoriasis	205	3.4	0.0	72.2	0.0	8.8	15.1	0.0	0.0	0.5	0.0
Atop.Ecz.	203	3.0	0.0	67.5	0.0	13.3	16.3	0.0	0.0	0.0	0.0
Vitiligo	205	0.0	0.0	67.8	0.0	18.0	13.7	0.0	0.0	0.5	0.0
Alop.Are.	206	1.9	0.0	68.4	0.0	9.7	19.9	0.0	0.0	0.0	0.0
B.C.C.	202	1.5	0.0	60.4	0.0	16.8	20.8	0.0	0.0	0.5	0.0
Act.Ker.	174	1.1	0.0	65.5	0.0	21.3	12.1	0.0	0.0	0.0	0.0

Group	Cases	LP2									
		0	1	2	3	4	5	6	7	8	9
Controls	203	8.4	0.0	48.8	19.2	15.3	3.0	0.0	0.0	3.0	2.5
Psoriasis	205	9.3	1.0	41.0	22.0	16.6	5.4	0.0	0.0	2.0	2.9
Atop.Ecz.	203	4.4	0.5	36.9	29.6	23.2	2.5	0.5	0.0	0.5	2.0
Vitiligo	205	4.9	0.5	35.6	19.0	34.6	2.0	0.0	0.0	2.0	1.5
Alop.Are.	206	6.8	0.0	45.6	26.7	18.0	0.5	0.0	0.0	1.0	1.5
B.C.C.	202	6.4	0.5	50.0	11.9	28.2	1.0	0.0	0.0	1.0	1.0
Act.Ker.	174	2.9	0.0	35.6	19.5	35.1	1.1	0.0	0.0	3.4	2.3

Table 6.2(a) continued

Group	Cases	LP3									
		0	1	2	3	4	5	6	7	8	9
Controls	203	3.9	0.5	84.7	1.0	8.9	0.5	0.0	0.0	0.5	0.0
Psoriasis	205	7.8	0.5	75.6	0.5	12.2	2.0	0.0	0.0	1.5	0.0
Atop.Ecz.	203	7.4	0.5	72.4	2.0	14.3	2.0	0.0	0.0	0.5	1.0
Vitiligo	205	2.4	0.0	77.6	1.5	16.6	1.0	0.0	0.0	1.0	0.0
Alop.Are.	206	6.8	0.0	81.6	0.0	11.2	0.5	0.0	0.0	0.0	0.0
B.C.C.	202	4.0	0.5	79.7	1.5	10.9	2.5	0.0	0.0	1.0	0.0
Act.Ker.	174	2.9	0.0	74.1	0.6	19.5	1.1	0.0	0.0	1.7	0.0

Group	Cases	LP4									
		0	1	2	3	4	5	6	7	8	9
Controls	203	2.0	0.0	68.5	0.5	17.2	1.5	0.0	0.0	10.3	0.0
Psoriasis	205	2.9	0.0	57.6	1.0	28.3	2.0	0.0	0.0	8.3	0.0
Atop.Ecz.	203	2.0	0.5	62.6	0.0	28.6	2.0	0.0	0.0	4.4	0.0
Vitiligo	205	1.5	0.0	57.4	0.0	33.8	2.0	0.0	0.0	5.4	0.0
Alop.Are.	206	1.0	0.5	69.4	0.0	22.3	1.5	0.0	0.0	5.3	0.0
B.C.C.	202	0.0	0.5	59.4	1.0	31.7	1.5	0.0	0.0	5.9	0.0
Act.Ker.	174	1.1	0.0	59.8	0.6	31.6	0.6	0.0	0.0	6.3	0.0

Group	Cases	LP5									
		0	1	2	3	4	5	6	7	8	9
Controls	203	1.5	0.0	89.7	0.0	5.4	2.0	0.0	0.0	1.5	0.0
Psoriasis	205	1.0	0.0	90.7	0.0	5.9	0.5	0.0	0.0	2.0	0.0
Atop.Ecz.	203	2.0	0.0	88.7	0.0	6.9	0.5	0.0	0.0	2.0	0.0
Vitiligo	205	0.0	0.0	91.7	0.0	5.9	0.5	0.0	0.0	2.0	0.0
Alop.Are.	206	0.5	0.0	89.8	0.0	4.4	0.0	0.0	0.0	5.3	0.0
B.C.C.	202	0.0	0.0	89.1	0.5	4.0	1.5	0.0	0.0	5.0	0.0
Act.Ker.	174	0.6	0.0	89.7	0.0	8.6	0.0	0.0	0.0	1.1	0.0

Table 6.2(b) Percentage frequencies of finger pattern types. Female right hand

Sex = Female

Group	Cases	RP1									
		0	1	2	3	4	5	6	7	8	9
Controls	203	3.0	0.0	65.5	0.0	12.8	14.8	0.0	0.0	3.9	0.0
Psoriasis	205	1.5	0.0	68.3	0.0	15.1	14.6	0.0	0.0	0.5	0.0
Atop.Ecz.	203	2.0	0.0	66.0	0.0	18.2	12.8	0.0	0.0	1.0	0.0
Vitiligo	205	0.0	0.0	60.5	0.0	20.5	18.5	0.0	0.0	0.5	0.0
Alop.Are.	206	1.9	0.0	68.0	0.0	12.1	18.0	0.0	0.0	0.0	0.0
B.C.C.	202	0.5	0.0	53.0	0.5	22.8	21.3	0.0	0.0	2.0	0.0
Act.Ker.	174	0.6	0.0	68.4	0.0	17.8	13.2	0.0	0.0	0.0	0.0

Group	Cases	RP2									
		0	1	2	3	4	5	6	7	8	9
Controls	203	4.4	2.0	48.8	16.3	17.7	3.0	0.0	0.0	4.9	1.0
Psoriasis	205	9.3	1.5	31.7	28.3	21.0	2.9	0.0	0.0	2.0	3.4
Atop.Ecz.	203	6.4	2.5	34.0	30.0	21.7	2.0	0.0	0.0	1.0	2.5
Vitiligo	205	1.5	0.5	36.6	22.5	33.7	2.4	0.0	0.0	1.5	1.5
Alop.Are.	206	6.3	1.0	36.9	27.7	22.8	1.5	0.0	0.0	1.5	2.4
B.C.C.	202	3.5	0.0	39.1	27.2	24.3	2.0	0.0	0.0	2.0	2.0
Act.Ker.	174	2.9	0.0	29.3	21.8	35.6	1.7	0.0	0.0	4.6	4.0

Table 6.2(b) continued

Group	Cases	RP3									
		0	1	2	3	4	5	6	7	8	9
Controls	203	5.9	0.0	84.2	0.5	7.4	1.0	0.0	0.0	0.5	0.0
Psoriasis	205	3.9	0.0	82.4	0.5	9.8	2.4	0.0	0.0	1.0	0.0
Atop.Ecz.	203	6.9	0.0	79.3	0.5	9.9	1.0	0.0	0.0	2.5	0.0
Vitiligo	205	2.4	0.0	77.1	0.0	17.6	0.5	0.0	0.0	0.5	0.5
Alop.Are.	206	7.3	1.0	79.1	1.9	7.8	1.0	0.0	0.0	1.9	0.0
B.C.C.	202	4.0	0.0	78.7	1.5	12.9	1.5	0.0	0.0	1.0	0.5
Act.Ker.	174	2.3	0.0	70.1	0.6	24.7	0.6	0.0	0.0	1.7	0.0

Group	Cases	RP4									
		0	1	2	3	4	5	6	7	8	9
Controls	203	3.0	0.5	65.0	0.5	22.2	1.0	0.5	0.0	6.4	0.0
Psoriasis	205	2.9	0.0	57.1	0.0	30.7	2.4	0.0	0.0	6.8	0.0
Atop.Ecz.	203	2.0	0.0	54.2	0.0	35.0	1.0	0.0	0.0	7.4	0.5
Vitiligo	205	0.5	0.0	54.6	0.0	35.6	0.5	0.0	0.0	8.8	0.0
Alop.Are.	206	1.5	0.0	63.1	0.0	25.2	0.0	0.0	0.0	10.2	0.0
B.C.C.	202	0.5	0.0	55.4	0.5	32.2	1.5	0.0	0.0	9.4	0.5
Act.Ker.	174	1.1	0.0	55.2	0.0	31.6	1.7	0.0	0.0	10.3	0.0

Group	Cases	RP5									
		0	1	2	3	4	5	6	7	8	9
Controls	203	3.9	0.0	85.2	0.0	4.4	0.5	0.0	0.0	5.4	0.0
Psoriasis	205	0.5	0.0	93.2	0.0	2.4	0.0	0.0	0.0	3.9	0.0
Atop.Ecz.	203	0.5	0.0	89.7	0.0	3.0	0.5	0.0	0.0	6.4	0.0
Vitiligo	205	0.0	0.0	89.8	0.0	4.4	0.0	0.0	0.0	5.9	0.0
Alop.Are.	206	0.5	0.5	84.5	0.0	5.8	0.0	0.0	0.0	8.7	0.0
B.C.C.	202	0.0	0.0	86.6	0.0	6.9	1.5	0.0	0.0	5.0	0.0
Act.Ker.	174	0.0	0.0	88.4	0.0	6.9	0.0	0.0	0.0	4.6	0.0

psoriasis, vitiligo and BCC. Significant differences were found between atopic eczema compared with actinic keratosis and with alopecia areata males. The values for percentage frequency of occurrence for ulnar loops was found to be lowest and that for radial loops, whorls and both ulnar and radial central pocket loops was highest in atopic eczema males in comparison to the groups mentioned above (see Table 6.1b). On the left hand digit II atopic eczema males again showed the smallest frequency of occurrence of ulnar loops and the highest for radial central pocket loops and arches when compared to the other groups. These differences were not, however, significant statistically.

In females finger II of the left hand proved to be the one in which the greatest number of statistically significant differences were found as a result of Mann-Whitney U Test inter-group comparisons (see Table 6.6). The highest frequencies of occurrence of arches were found in psoriatics (9.3%) and controls (8.4%) and the smallest value was shown by actinic keratosis patients (2.9%) (see Table 6.2a). Ulnar loop occurrence was highest in BCC patients and lowest in actinic keratosis and vitiligo subjects (35.6%). The highest frequency of occurrence of radial loops was found in atopic eczema (29.6%) and lowest in BCC (11.9%). Actinic keratosis females exhibited the highest frequency of occurrence of whorls (35.1%) followed by vitiligo females (34.6%). The lowest frequency of whorls was shown by controls (15.3%). Female psoriatic patients showed the highest frequency of double loops (5.4%) and alopecia areata probands exhibited the smallest frequency (0.5%). Actinic keratosis and control subjects had the highest frequency of occurrence of ulnar central pocket loops (3.4% and 3.0% respectively) with atopic eczema females (0.5%) having the least. For radial central pocket loops, psoriasis and control females had the greatest frequencies of occurrence (2.9% and 2.5% respectively) with BCC (1%) having the smallest value.

Highly significant differences were shown for females for left hand digit II (see Table 6.4) between actinic keratosis patients when compared to BCC, alopecia areata, psoriasis and controls. Female vitiligo patients showed highly significant

Table 6.3 Mann-Whitney U Test Results

Pattern Types : Males (Variables LP1 - RP5)

		Probability (* = significant P<0.05 ** = Highly significant P<0.01)				
Group 1	Group 2	LP1	LP2	LP3	LP4	LP5
Controls	Psoriasis	0.2752	0.1418	0.8868	0.9062	0.4072
Controls	Atop Ecz	0.5457	0.2780	0.3554	0.1261	0.5690
Controls	Vitiligo	0.3259	0.2174	0.1983	0.4679	0.0169*
Controls	Alop Are	0.3589	0.3229	0.8255	0.8607	0.1790
Controls	BCC	0.6138	0.3169	0.0700	0.5587	0.0188*
Controls	Act Ker	0.9257	0.0687	0.3836	0.5587	0.0198*
Psoriasis	Atop Ecz	0.6522	0.7389	0.2794	0.1284	0.7898
Psoriasis	Vitiligo	0.0340*	0.9254	0.1473	0.3492	0.0965
Psoriasis	Alop Are	0.9193	0.5902	0.9390	0.1376	0.6071
Psoriasis	BCC	0.5891	0.5848	0.0900	0.7592	0.1083
Psoriasis	Act Ker	0.4001	0.5320	0.4546	0.5991	0.0746
Atop Ecz	Vitiligo	0.1185	0.8016	0.7096	0.0198*	0.0583
Atop Ecz	Alop Are	0.7638	0.8480	0.2423	0.0038**	0.4340
Atop Ecz	BCC	0.9239	0.8580	0.0060**	0.0673	0.0663
Atop Ecz	Act Ker	0.6703	0.3514	0.0779	0.3949	0.0512
Vitiligo	Alop Are	0.0648	0.6586	0.1221	0.5815	0.2467
Vitiligo	BCC	0.1483	0.7103	0.0020**	0.5258	0.9423
Vitiligo	Act Ker	0.3530	0.4971	0.0360*	0.1823	0.6587
Alop Are	BCC	0.6953	0.6862	0.0987	0.2318	0.2784
Alop Are	Act Ker	0.5010	0.2574	0.5075	0.0687	0.1758
B.C.C.	Act Ker	0.7379	0.2879	0.4141	0.4254	0.6485

Table 6.3 continued

		Probability (* = significant $P < 0.05$ ** = Highly significant $P < 0.01$)				
Group 1	Group 2	RP1	RP2	RP3	RP4	RP5
Controls	Psoriasis	0.8816	0.4482	0.1723	0.5191	0.1829
Controls	Atop Ecz	0.7587	0.0300*	0.5994	0.4268	0.5948
Controls	Vitiligo	0.0715	0.3394	0.1445	0.1539	0.0170*
Controls	Alop Are	0.2576	0.9728	0.3174	0.2821	0.0308*
Controls	BCC	0.7100	0.6386	0.7048	0.2892	0.0299*
Controls	Act Ker	0.9484	0.9275	0.9077	0.8025	0.0139*
Psoriasis	Atop Ecz	0.6507	0.0014**	0.3876	0.8786	0.4083
Psoriasis	Vitiligo	0.1001	0.8994	0.8824	0.0423*	0.2435
Psoriasis	Alop Are	0.3268	0.4038	0.7059	0.0891	0.3881
Psoriasis	BCC	0.6078	0.7547	0.0685	0.6941	0.3608
Psoriasis	Act Ker	0.9488	0.3804	0.2228	0.7418	0.1368
Atop Ecz	Vitiligo	0.0354*	0.0008**	0.3342	0.0316*	0.0512
Atop Ecz	Alop Are	0.1559	0.0118*	0.6384	0.0669	0.0924
Atop Ecz	BCC	0.9335	0.0021**	0.3514	0.8136	0.0858
Atop Ecz	Act Ker	0.7508	0.0330*	0.7071	0.6382	0.0327*
Vitiligo	Alop Are	0.5446	0.3415	0.6330	0.7037	0.7458
Vitiligo	BCC	0.0366*	0.6769	0.0570	0.0150*	0.7818
Vitiligo	Act Ker	0.1420	0.3412	0.1948	0.1263	0.6432
Alop Are	BCC	0.1509	0.5621	0.1542	0.0335*	0.9597
Alop Are	Act Ker	0.3676	0.9103	0.4177	0.2247	0.4486
B.C.C.	Act Ker	0.7131	0.5171	0.6326	0.4830	0.4729

Table 6.4 Mann-Whitney U Test Results

Finger Pattern Types : Females (Variables LP1 to RP5)

		Probability (* = significant P<0.05 ** = Highly significant P<0.01)				
Group 1	Group 2	LP1	LP2	LP3	LP4	LP5
Controls	Psoriasis	0.4200	0.4092	0.6417	0.1357	0.9604
Controls	Atop Ecz	0.8785	0.0140*	0.1785	0.5706	0.9906
Controls	Vitiligo	0.2974	0.0009**	0.0047**	0.0585	0.6546
Controls	Alop are	0.6011	0.6977	0.7341	0.8594	0.4986
Controls	BCC	0.0432*	0.6610	0.1955	0.0731	0.2431
Controls	Act Ker	0.4471	0.0001**	0.0015**	0.1424	0.6344
Psoriasis	Atop Ecz	0.3194	0.1429	0.4425	0.3203	0.9682
Psoriasis	Vitiligo	0.0479*	0.0163*	0.0440*	0.7371	0.6074
Psoriasis	Alop Are	0.1699	0.5745	0.4572	0.772	0.4663
Psoriasis	BCC	0.0037**	0.6925	0.4907	0.8577	0.2160
Psoriasis	Act Ker	0.0981	0.0031**	0.0193*	0.9390	0.5808
Atop Ecz	Vitiligo	0.3660	0.2104	0.2523	0.1693	0.6565
Atop Ecz	Alop Are	0.6965	0.0221*	0.1181	0.4205	0.5084
Atop Ecz	BCC	0.0522	0.0609	0.8745	0.2200	0.2529
Atop Ecz	Act Ker	0.5360	0.0623	0.1253	0.3616	0.6330
Vitiligo	Alop Are	0.6096	0.0008**	0.0029**	0.0282*	0.8135
Vitiligo	BCC	0.2461	0.0043**	0.1504	0.8581	0.4482
Vitiligo	Act Ker	0.8133	0.5278	0.6053	0.6656	0.9379
Alop.Are	BCC	0.1240	0.8312	0.1225	0.0380*	0.6285
Alop Are	Act Ker	0.8166	0.0001**	0.0010**	0.0850	0.8776
B.C.C.	Act Ker	0.1702	0.0006**	0.0660	0.7942	0.5161

Table 6.4 continued

		Probability (* = significant P<0.05 ** = Highly significant P<0.01)				
Group 1	Group 2	RP1	RP2	RP3	RP4	RP5
Controls	Psoriasis	0.7338	0.3375	0.1419	0.1123	0.6914
Controls	Atop Ecz	0.8601	0.4033	0.4520	0.0171*	0.5023
Controls	Vitiligo	0.1173	0.0041**	0.0007**	0.0030**	0.2361
Controls	Alop are	0.8756	0.3667	0.8885	0.2185	0.0751
Controls	BCC	0.0049**	0.1032	0.0254*	0.0058**	0.1008
Controls	Act Ker	0.8392	0.0001**	0.0000**	0.0106*	0.2606
Psoriasis	Atop Ecz	0.8651	0.8239	0.5395	0.4386	0.2049
Psoriasis	Vitiligo	0.0411*	0.0571	0.0489*	0.1784	0.0596
Psoriasis	Alop Are	0.8416	0.8613	0.2224	0.7119	0.0128*
Psoriasis	BCC	0.0008**	0.6235	0.4130	0.2474	0.0150*
Psoriasis	Act Ker	0.8960	0.0014**	0.0012**	0.2951	0.0636
Atop Ecz	Vitiligo	0.0608	0.0251	0.0145*	0.5723	0.5590
Atop Ecz	Alop Are	0.9684	0.9586	0.5696	0.2415	0.2034
Atop Ecz	BCC	0.0014**	0.4515	0.1748	0.7075	0.2664
Atop Ecz	Act Ker	0.9686	0.0004**	0.0003**	0.7596	0.5726
Vitiligo	Alop Are	0.0761	0.0292*	0.0024**	0.0802	0.4639
Vitiligo	BCC	0.1584	0.1363	0.2628	0.8487	0.5802
Vitiligo	Act Ker	0.0593	0.1237	0.1498	0.8131	0.9938
Alop.Are	BCC	0.0022**	0.4814	0.0515	0.1233	0.8164
Alop Are	Act Ker	0.9425	0.0004**	0.0000**	0.1633	0.4726
B.C.C.	Act Ker	0.0014**	0.0036**	0.0144*	0.9533	0.5884

differences when compared to BCC, alopecia areata and control subjects. Vitiligo females also showed significant differences in comparison to psoriatics. Control subjects were found to show statistically highly significant differences in comparison to vitiligo and to actinic keratosis patients. They also showed significant differences (at the 5% level) when compared to atopic eczema females. Statistically significant differences were also found between atopic eczema and alopecia areata females.

On the right hand finger II psoriasis females again showed the greatest frequency of arches (9.3%) and actinic keratosis females (2.9%) the lowest. The highest frequency of ulnar loops (48.8%) was found in control females and the highest value for ulnar loops was found in female atopic eczema patients (30%). In both these categories the lowest frequencies of occurrence (29.3% and 21.8% respectively) was exhibited by patients with actinic keratosis. Conversely actinic keratosis sufferers showed the greatest frequency of occurrence of whorls (35.6%). Control females showed the smallest frequency of whorls (17.7%) but the subjects in comparison to actinic keratosis patients. Statistically significantly higher frequencies of arches, double loops, ulnar loops and radial loops were found in psoriatics when compared to vitiligo and to actinic keratosis patients.

For finger three of the right hand in female subjects, highly significant statistical differences were found between actinic keratosis patients and each of the following groups; controls, psoriasis, atopic eczema and alopecia areata. Significant differences were also found between actinic keratosis and BCC. Actinic keratosis patients showed higher frequencies of occurrence of whorls along with significantly smaller frequencies of arches and radial loops in comparison to the other groups. Vitiligo patients exhibited the same pattern of frequency differences when compared to alopecia areata, psoriasis, atopic eczema and control groups. The differences shown were highly significant for the comparisons between vitiligo and controls and for vitiligo and alopecia areata. The comparisons between vitiligo and the other two groups showed statistically significant differences (5% level). Significant differences were also found between controls and BCC. Controls

having higher values for arches and ulnar loops along with lower values for frequencies of radial loops, whorls, double loops and both ulnar and radial central pocket loops in comparison to BCC (see Table 6.2).

Male atopic eczema patients showed highly significant differences in comparison to alopecia areata and significant differences to vitiligo sufferers when finger pattern occurrence on finger IV of the left hand was investigated. The atopic eczema group showed higher frequencies of whorls, double loops and ulnar central pocket loops in comparison to the two groups mentioned. Vitiligo patients had a highly significantly higher frequency of radial central pocket loops and of radial loops in comparison to atopic eczema patients. Alopecia areata patients were found to have higher frequencies but also had the highest frequency of double loops (3.0%). Actinic keratosis patients showed the smallest frequency of occurrence of double loops (1.7%).

From Tables 6.4 and 6.6 it can be seen that highly significant differences in frequency of pattern occurrence for females on right hand finger two were found when actinic keratosis patients were compared to each of psoriasis, controls, atopic eczema, alopecia areata and BCC subjects. Statistically highly significant differences were also found when vitiligo and controls were compared and statistically significant differences were exhibited between vitiligo and alopecia areata patients.

When male subgroups were compared for frequency of occurrence of pattern types for finger three (middle finger) of the left hand statistically highly significant differences were found between BCC and atopic eczema and between BCC and vitiligo patients. BCC showed higher frequencies for whorls and double loops and lower values for arches and ulnar loops (see Table 6.1a). Vitiligo patients showed significantly higher frequencies of arches and radial loops along with significantly lower occurrences of whorls and double loops. No significant differences were found for inter-group comparison of finger pattern frequencies on the middle finger of the right hand in male subjects.

For female subjects frequency of occurrence of pattern type on digit III of the left hand highly significant differences were found between control subjects and vitiligo patients and between controls and actinic keratosis probands. In both cases higher frequencies of ulnar loops and lower frequencies of whorls, double loops and ulnar central pocket loops were found in controls than in the two groups of patients. Statistically highly significantly higher frequencies of arches and ulnar loops and lower frequencies of radial loops, whorls, double loops and ulnar central pocket loops existed in alopecia areata of arches and radial loops than atopic eczema subjects.

On the right hand finger four of males statistically significantly higher frequencies of ulnar loops and significantly lower frequencies of whorls were found for vitiligo patients when compared to each of atopic eczema, psoriasis and BCC groups of subjects. BCC subjects showed the same trends of differences, i.e. higher frequencies of loops and lower frequencies of whorls, along with lower frequencies of double loops and ulnar central pocket loops, when compared to alopecia areata patients.

For female subjects, alopecia areata patients showed statistically significantly higher values for ulnar loops and significantly lower frequencies for whorl pattern occurrence when compared with vitiligo and with BCC probands for finger four left hand. On the right hand finger four of female subjects, controls showed higher frequencies for arches, tented arches, ulnar loops and ulnar double loops. They also showed smaller frequencies for whorls and ulnar central pocket loops. The differences were found to be statistically significant for controls in comparison to atopic eczema and to actinic keratosis and to be highly significant statistically for controls compared to BCC and to vitiligo.

On finger five of the left hand of males control subjects showed significantly higher frequencies of arches, whorls, and ulnar central pocket loops and significantly lower frequencies of ulnar loops when compared to each of BCC, vitiligo and actinic keratosis patient groups. On the right hand little finger significantly higher frequencies of arches and ulnar central pocket

loops and significantly lower values for ulnar loops were found when male control subjects were compared to vitiligo, and to BCC and to actinic keratosis. A significant difference was also found between atopic eczema and actinic keratosis.

Tables 6.5 and 6.6 are summary tables showing which of the various inter-group comparisons, carried out using the Mann-Whitney U Test, showed statistically significant differences.

Table 6.5 - Summary Table of Statistically Significant differences from Mann-Whitney U Test Comparisons

DIGIT	LEFT HAND		RIGHT HAND	
	SIG.	H.SIG.	SIG	H.SIG.
I	Psor. : Vit		Vit. : A.Ecz Vit. : BCC	
II			A.Ecz: A.KER A.Ecz: Alop. A.Ecz: Cont.	A.Ecz : Bor A.Ecz : Vit A.Ecz : BCC
III	Vit. : A.Ker	BCC : A.Ecz BCC : Vit.		
IV	A.Ecz : Vit	A.ECZ : Alop.	Vit. : Psor. Vit. : A.Ecz. Vit. : BCC BCC : Alop.	
V	Cont. :Vit. Cont. : BCC Cont. :A.Ker		Cont. : Vit. Cont. : Alop Cont. : BCC Cont. : A.Ker. A.Ecz : A.Ker.	

The numbers of significant differences found, for each of the twenty one comparisons made, summed for the ten variables, are shown in Table 6.7. For male subjects (Table 6.7a) it can be seen that atopic eczema and vitiligo patients have the greatest number of significant differences, twelve each. Table 6.7b shows that many more significant differences are found for comparisons between the various groups of female subjects.

Table 6.6 - Summary Table of Statistically Significant differences
from Mann-Whitney U Test comparisons. Finger Pattern Type occurrence
- Females

DIGIT	LEFT HAND		RIGHT HAND	
	SIG.	H.SIG.	SIG.	H.SIG.
I	Cont. : BCC Psor. : Vit.	Psor. : BCC	Psor. : Vit.	Cont. : BCC Psor. : BCC A.Ecz.: BCC Alop. : BCC BCC : A.Ker
II	Cont. : A.Ecz. Psor. : Vit. A.Ecz.: Alop.	Cont. : Vit. Cont. : A.Ker. Bor. : A.Ker Vit. : Alop. Vit. : BCC Alop. : A.Ker BCC. : A.Ker	Vit.:Alop. BCC :A.Ker	Cont. : Vit. Cont. : A.Ker Psor. : A.Ker A.Ecz.: A.Ker Alop. : A.Ker
III	Psor. : Vit. Psor. : A.Ker.	Cont. : Vit. Cont. : A.Ker. Vit. : Alop. Alop. : A.Ker.	Cont. : BCC Psor. : Vit. A.Ecz.: Vit. BCC : A.Ker	Cont. : Vit. Cont. : A.Ker Psor. : A.Ker A.Ecz.: A.Ker Vit. : Alop. Alop. : A.Ker
IV	Vit. : Alop. Alop. : BCC		Cont. : A.Ecz Cont. : A.Ker	Cont. : Vit. Cont. : BCC
V			Psor. : Alop. Psor. : BCC	

Table 6.7 - Summary Table of Numbers of Statistically Significant Intergroup comparisons from Mann-Whitney U Test Results

VARIABLES LPI to RP5

(a) Males

Alop.	0				
Psor.	2	0			
A.Ecz.	4	2	1		
A.Ker.	1	0	0	2	
BCC	3	1	0	2	0
Cont.	2	1	0	1	2

Vit.
Alop.
Psor.
A.Ecz.
A.Ker.
BCC

(b) Females

Alop.	5				
Psor.	5	1			
A.Ecz.	1	1	0		
A.Ker.	3	3	4	2	
BCC	1	2	3	1	4
Cont.	4	0	0	2	4

Vit.
Alop.
Psor.
A.Ecz.
A.Ker.
BCC

Female patients with vitiligo (19), actinic keratosis (18), BCC (15) and control subjects (14) showed the greatest numbers of differences. In all 210 comparisons were made for each sex finger pattern types. Males showed 26 significant differences and females 50 out of the 210. By chance alone 5% (10.5) differences would have been expected to occur. The χ^2 test showed that the number of differences found in both male and females are too great to have occurred by chance alone and the differences are statistically significant.

Discriminant analysis was carried out for the variables LP1 to RP5. The results are shown in Table 6.8 to 6.12 and in Figures 6.1 and 6.2 for male subjects and in Table 6.13 to 6.17 and Figures 6.3 and 6.4 for females.

From Table 6.8 it can be seen that the variables in Function 1 account for 62.19% of the variation and those in Function 2 for a further 17.92%. These two functions account for 80.12% of the total variation. The Functions 1 and 2 are used in the territorial map and scatter plot (Figure 6.1 and 6.2). The variables and their relative sizes within the functions can be seen in Table 6.9. Note that LP3 (Left hand finger 3) is the highest

Table 6.8 - CANONICAL DISCRIMINANT FUNCTION - MALES LP1 TO RP5

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.03291	62.19	62.19	0.1784977
2*	0.00948	17.92	80.12	0.0969300
3*	0.00609	11.51	91.63	0.0778121
4*	0.00315	5.95	97.58	0.0560076
5*	0.00123	2.42	100.00	0.0357883

Table 6.9 - MALES LP1 to RP5

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS
BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5
LP3	-0.36984	0.80628*	0.19435	-0.22366	0.35054
RP4	0.16754	0.67534*	-0.07102	0.56782	-0.43403
RP2	0.59494	0.62977*	-0.04622	-0.32005	-0.38061
RP3	0.22749	0.54568*	0.01381	-0.03630	-0.22287
RP5	0.28549	0.47629*	0.07346	0.13247	-0.29131
LP2	0.16049	0.40894*	0.11923	-0.11490	0.09051
RP1	0.10641	0.27190*	0.04311	0.04675	0.08663
LP1	0.06560	0.24367*	0.10204	0.00065	0.09126
LP5	0.36682	0.21716	0.87644*	0.13606	0.17784
LP4	0.49242	0.35791	-0.21522	0.35616	0.67546*

(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

Table 6.10 MALES - LP1 to RP5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5
LP3	-0.66646	0.67093	0.09607	-0.33234	0.33618
LP4	0.51721	0.08685	-0.43770	0.27868	0.77099
LP5	0.29316	-0.08085	0.99983	0.17649	0.05464
RP2	0.72875	0.28380	-0.18573	-0.81399	-0.31162
RP4	-0.25229	0.39504	-0.03103	0.95140	-0.53695

followed by four variables from the right hand, RP4, RP2, PR3, and RP5 in that order. Table 6.10 shows the standardized canonical discriminant function coefficients. The variables shown LP3, LP4, LP5, RP2 and RP4 are those which contribute most the the discriminant functions. Table 6.11 shows F statistics and significance between pairs of groups. The smaller the F statistic the closer the groups are together. Conversely larger F statistics indicate groups which are further apart. In Table 6.11 and also in Table 6.12 the codes for the groups are as follows:-

<u>Code</u>		<u>Group</u>
0	=	Controls
1	=	Psoriasis
2	=	Atopic eczema
3	=	BCC
5	=	Alopecia areata
6	=	Actinic keratosis
7	=	Vitiligo

Using these codes it can be seen that atopic eczema and BCC are the furthest removed groups ($F = 7.2058$) followed, in order of descending magnitude, by atopic eczema and alopecia areata ($F = 4.8448$); atopic eczema and vitiligo ($F = 4.3982$); atopic eczema and psoriasis ($F = 3.9569$); controls and BCC ($F = 3.8647$) and by atopic eczema and actinic keratosis ($F = 3.338$). All these differences are statistically highly significant at 1% level. The territorial map (Figure 6.1) shows the separation of the main groups using Functions 1 and 2. The coding for the territorial map and scatterplot (Figure 6.2) is as follows:-

<u>Code</u>		<u>Group</u>
1	=	Controls
2	=	Psoriasis
3	=	Atopic eczema
4	=	BCC
6	=	Alopecia areata
7	=	Actinic keratosis
8	=	Vitiligo

Table 6.11 - VARIABLES LP1 to RP5 - MALES

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

GROUP	0	1	2	3	5	6
1	1.1867 0.3134					
2	2.0317 0.0716	3.9569 0.0014				
3	3.8647 0.0018	1.5180 0.1311	7.2058 0.0000			
5	1.8905 0.0931	1.0126 0.4087	4.8448 0.0002	1.6583 0.1417		
6	1.6382 0.1468	0.77737 0.5660	3.3333 0.0054	0.59577 0.7032	0.63344 0.6743	
7	2.3540 0.0387	1.1231 0.3460	4.3982 0.0006	2.8532 0.0143	0.80159 0.5485	0.89550 0.4832

Figure 6.1 - Territorial Map - Males LP1 to RP5

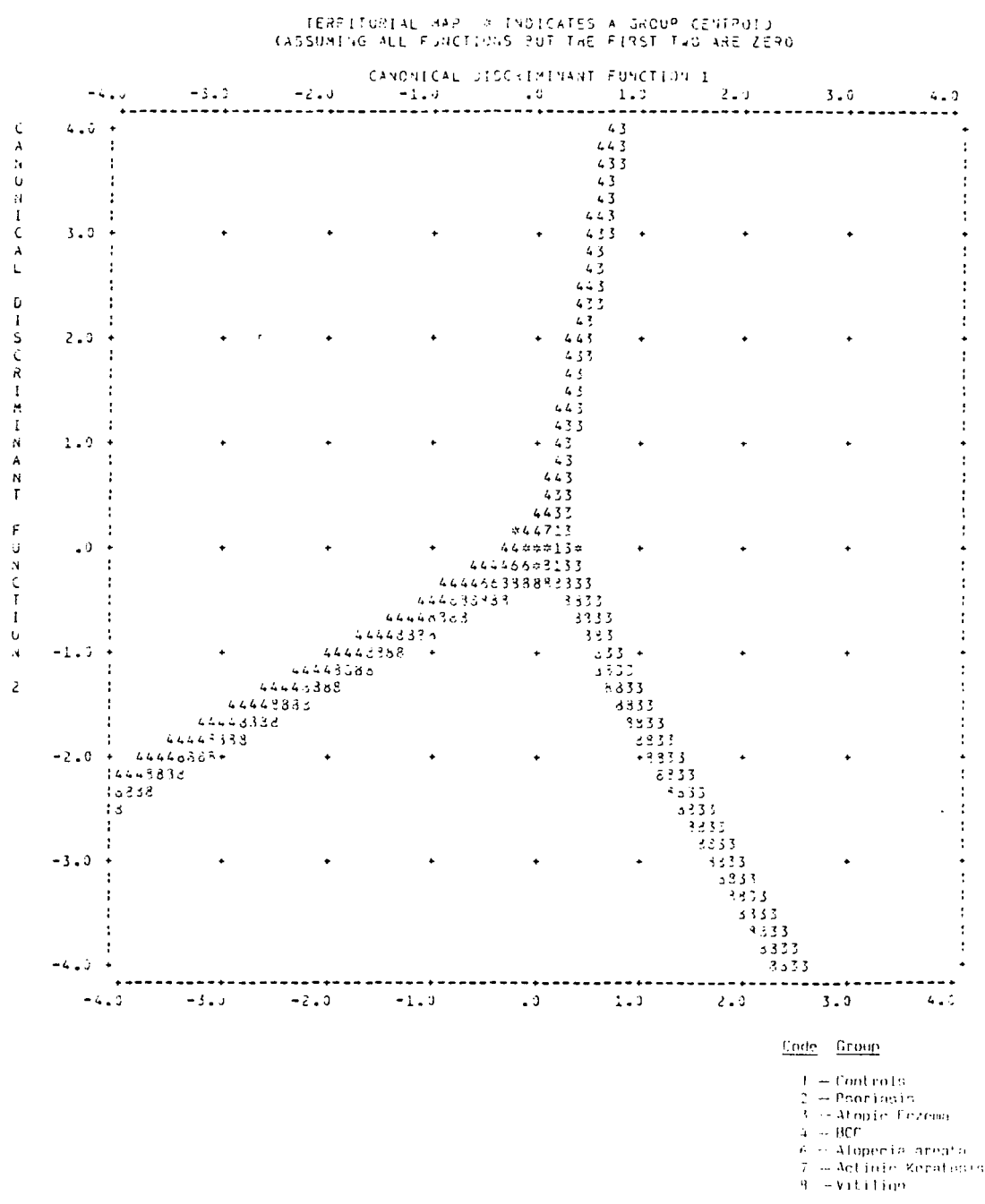
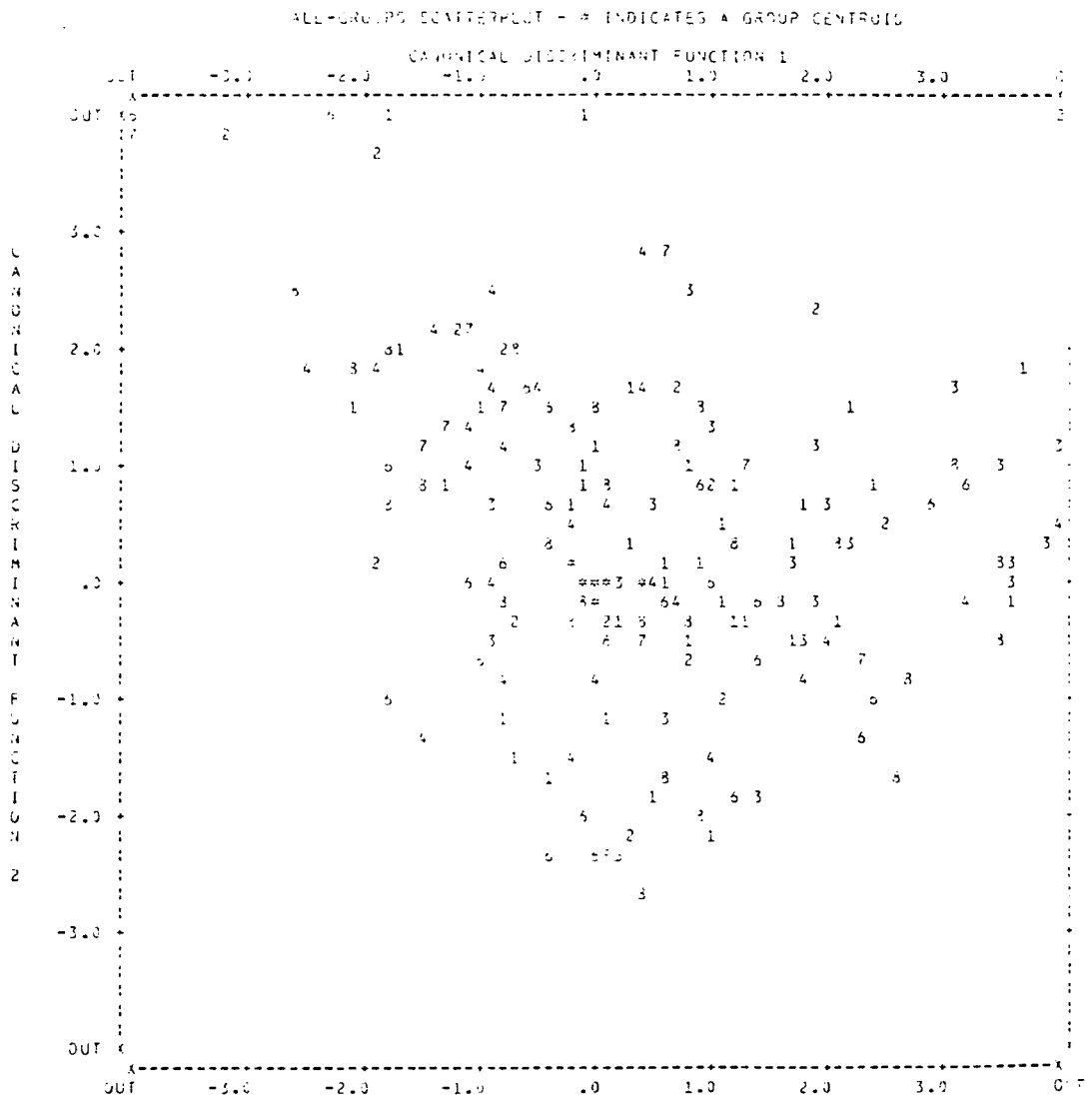


Figure 6.2 - Scatterplot - Males: LP1 to RP5



- Code Group
- 1 - Controls
 - 2 - Psoriasis
 - 3 - Atopic Dermatitis
 - 4 - RCC
 - 6 - Alopecia areata
 - 7 - Actinic Keratosis
 - 8 - Vitiligo

Figure 6.3 - Group Centroids

	4				
		6	7	2	1
					3
				8	

Table 6.12 - CLASSIFICATION RESULTS MALES - VARIABLES LP1 to RP5

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
		0	1	2	3	5	6	7
0	200	26 13.0%	3 1.5%	54 27.0%	21 10.5%	82 41.0%	1 0.5%	13 6.5%
1	201	22 10.9%	8 4.0%	42 20.9%	31 15.4%	76 37.8%	0 0.0%	22 10.9%
2	203	24 11.8%	3 1.5%	64 31.5%	19 9.4%	73 36.0%	0 0.0%	20 9.9%
3	211	10 4.7%	9 4.3%	36 17.1%	53 25.1%	89 42.2%	1 0.5%	13 6.2%
5	210	22 10.5%	7 3.3%	39 18.6%	29 13.8%	99 47.1%	0 0.0%	14 6.7%
6	129	8 6.2%	6 4.7%	30 23.3%	24 18.6%	54 41.9%	0 0.0%	7 5.4%
7	201	12 6.0%	6 3.0%	44 21.9%	25 12.4%	91 45.3%	1 0.5%	22 10.9%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 20.07%

From the territorial map it can be seen that atopic eczema (3), BCC (4) and vitiligo (8) are the groups furthest apart. The scatterplot shows that controls are the most widely dispersed group (Group 1). The other groups do show some greater degree of clustering around their centroids. Figure 6.3 shows the relationship of centroids to one another.

Table 6.12 shows the classification results for males using variables LP1 and RP5. These variables proved to be best at correctly classifying members of groups, alopecia areata (47.1% correct). This group was followed, by group 2, atopic eczema, in which there was 31.5% correct classification. Group 3 (BCC) was next with 25.1% of cases classified correctly. Overall, however, these variables only correctly classified 20.07% of the cases.

The results of discriminant analysis for females using variables LP1 to RP5 are shown in Tables 6.13 to 6.17 and Figures 6.4 and 6.5. From Table 6.13 it can be seen that the variables making up Function 1 take out 51.4% of the total variations. Function 2 takes out 26.91% so that Functions 1 and 2 account for 78.32% of the total variation. From Table 6.13 it would appear that patterns on the thumbs of both hands are the most important variables followed by right digits 5 and 3 and then by the second fingers of both hands. Again the right hand appears to be the most important for discriminating with 4 out of the first 6 variables coming from here. Table 6.14 shows that LP2, LP4, LP5, RP1, RP2, RP3, and RP5 contribute most to the discriminating functions. In Table 6.15 the F statistics and significances between pairs of groups are shown. The largest differences between groups was shown by groups 6 and 3, actinic keratosis and BCC ($F = 4.7576$), followed by groups 6 and 5, actinic keratosis and alopecia areata ($F = 4.1570$), then groups 7 and 5, vitiligo and alopecia areata ($F = 3.4749$) and atopic eczema and BCC ($F = 2.6598$). All of these show statistically highly significant differences (at 1% level). Functions 1 and 2 were used to plot the territorial map (Figure 6.4) and scatterplot (Figure 6.5).

Figure 6.4 shows that the most widely separated groups are 7, 8, 4 and 6 (i.e. actinic keratosis, vitiligo, BCC and alopecia areata). The all-groups scatterplot (Figure 6.5) again

Table 6.13 - FEMALES VARIABLES LP1 to RP5

CANONICAL DISCRIMINANT FUNCTIONS

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.03165	51.40	51.40	0.1751538
2*	0.01657	26.91	78.32	0.1276744
3*	0.00663	10.86	89.17	0.0914334
4*	0.00439	7.13	96.30	0.0561009 :
5*	0.00171	2.79	99.08	0.0413758 :
6*	0.00056	0.92	100.00	0.0237475 :

Table 6.14 - FEMALES:VARIABLES LP1 to RP5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
LP2	-0.81662	-0.28010	0.27422	0.08179	-0.50776	-0.03748
LP4	-0.06704	0.55542	-0.44439	-0.05005	0.58208	0.75672
LP5	0.70466	-0.18429	0.11192	-0.05964	0.74904	-0.87398
RP1	0.43365	0.78129	0.27595	-0.06143	-0.52036	0.00972
RP2	-0.02189	0.38830	0.27532	1.05904	0.34208	-0.54463
RP3	-0.61733	0.06679	0.21169	-1.20345	0.19061	0.01212
RP5	0.45466	-0.62843	0.46866	0.45349	-0.34736	0.90414

Table 6.15 - Females: Variables LP1 to RP5

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

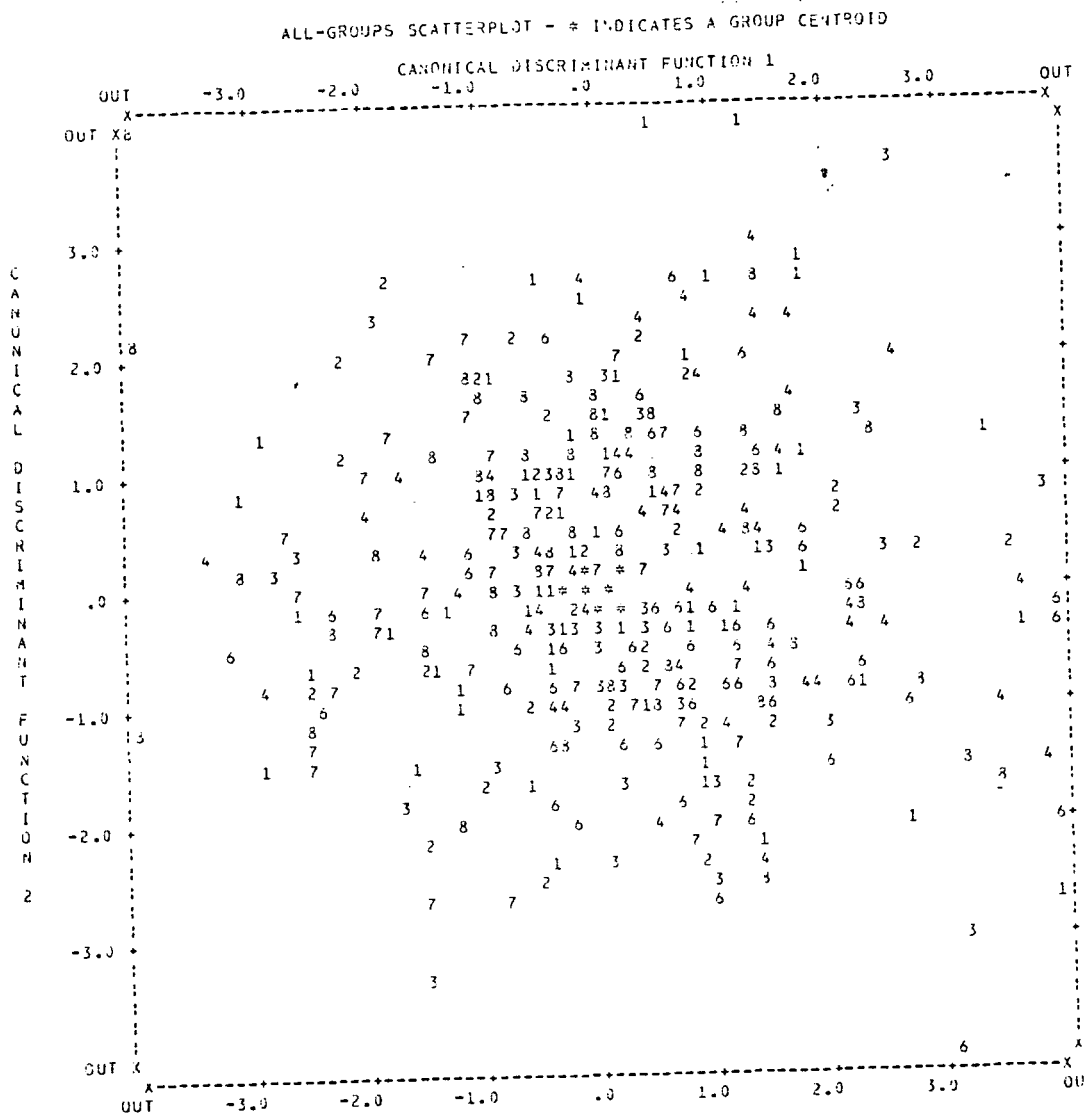
	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
RP1	0.32721	0.63666*	0.52593	-0.24421	-0.32565	0.05820
LP1	0.07600	0.48344*	0.23396	-0.04078	0.01483	0.10955
RP5	0.19158	-0.23772	0.78474*	0.06722	0.21970	0.48804
RP3	-0.26312	0.13715	0.78068*	-0.32640	0.37769	0.07238
LP2	-0.46003	-0.05185	0.58343*	-0.13057	0.04845	0.14912
RP2	-0.31484	0.30661	0.57440*	0.51876	0.36968	-0.11028
LP5	0.30920	-0.13711	0.56056*	-0.32150	0.51404	-0.06144
LP3	-0.07162	0.00032	0.54578*	-0.35627	0.25588	0.21037
RP4	-0.16757	0.18164	0.49737*	0.14426	0.32246	0.18114
LP4	-0.12116	0.33341	0.13285	-0.07637	0.59780*	0.59352

Table 6.16 - FEMALES VARIABLES LP1 to RP5

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

GROUP	0	1	2	3	5	6
1	1.0340 0.4051					
2	1.0636 0.3847	0.66982 0.6978				
3	1.4781 0.1708	2.3091 0.0242	2.6598 0.0098			
5	1.9386 0.0602	2.6142 0.0110	1.5035 0.1618	2.5326 0.0137		
6	2.4097 0.0188	1.3871 0.2066	1.2948 0.2421	4.7576 0.0000	4.1570 0.0002	
7	1.3455 0.2249	1.3005 0.2463	1.4398 0.1852	2.4656 0.0163	3.4749 0.0011	0.85501 0.5417

Figure 6.5 - Scatterplot - Females: Variables LP1 to RP5



- Code Group
- 1 - Controls
 - 2 - Psoriasis
 - 3 - Atopic Eczema
 - 4 - BCC
 - 5 - Alopecia areata
 - 6 - Actinic Keratosis
 - 7 - Vitiligo
 - 8 - Vitiligo

Figure 6.6 - Group Centroids

		8		4		
7	2	1				
		3		6		

Table 6.17 - CLASSIFICATION RESULTS - FEMALE VARIABLES LP1 TO RP5

		NO. OF ACTUAL GROUP CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	202	13 6.4%	24 11.9%	51 25.2%	43 21.3%	29 14.4%	33 16.3%	9 4.5%
GROUP	1	205	11 5.4%	22 10.7%	34 16.6%	36 17.6%	39 19.0%	40 19.5%	23 11.2%
GROUP	2	203	12 5.9%	17 8.4%	33 16.3%	35 17.2%	37 18.2%	49 24.1%	20 9.9%
GROUP	3	202	6 3.0%	13 6.4%	38 18.8%	66 32.7%	36 17.8%	30 14.9%	13 6.4%
GROUP	5	206	12 5.8%	11 5.3%	45 21.8%	40 19.4%	49 23.8%	39 18.9%	10 4.9%
GROUP	6	171	9 5.3%	5 2.9%	37 21.6%	24 14.0%	29 17.0%	42 24.6%	25 14.6%
GROUP	7	204	3 1.5%	15 7.4%	38 18.6%	45 22.1%	26 12.7%	50 24.5%	27 13.2%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED : 18.09%

shows controls to be the most widely dispersed with other groups more widely dispersed than for males. Figure 6.6 shows centroid positions. Table 6.17 shows the classification results for females using variables LP1 to RP5. Only 18.09% of cases were correctly classified using these variables. The best correct classification was for group 3, BCC (32.7% correct), followed by group 6, actinic keratosis (24.6% correct).

The cases were regrouped according to aetiology of disorder and descriptive statistics for these new groups are shown in Tables 6.18 and 6.19 for left and right hand respectively. The results of Mann-Whitney U Test intergroup comparisons are shown in Table 6.20. For male subjects the only statistically significant differences were shown in fingers 3 and 5. On finger 3 of both hands a significant difference was shown between male subjects with genodermatoses (GD) compared with those suffering from disorders having no genetic causation (ND). The difference was highly significant on the left hand (1% level) and significant on the right hand (5% level). The GD subjects had higher values for arches, ulnar and radial loops and lower values for tented arches, whorls, double loops and ulnar central pocket loops than the ND subjects on the left hand finger 3. On the right hand GD subjects again had higher values for the frequency of occurrence of arches, ulnar loops and also for tented arches, and lower values for radial loops, whorls and double loops in comparison to ND males.

On finger 5 of both hands highly significant differences were found for male controls in comparison to ND subjects. Significant differences were found for GD compared to ND on left finger 5 and for controls compared to GD on right finger 5. Controls had higher frequencies of occurrence of arches on both hands in comparison to ND. On the right hand controls had higher values for whorls, double loops and ulnar central pocket loops than ND and a lower value for ulnar loops. On the left hand finger 5, controls had higher values, in addition to those for arches, for radial loops, whorls and ulnar central pocket loops and a lower value for ulnar loops than occurred in ND males.

On right finger 5 male controls had higher values for arches, whorls, double loops and ulnar central pocket loops compared

Table 6.18 Percentage frequencies of finger pattern types – subjects grouped by disorder type – left hand

			LP1									
Gp	Sex	No	0	1	2	3	4	5	6	7	8	9
Cont	M	206	1.9	0.0	59.2	0.0	21.8	16.0	0.0	0.0	1.0	0.0
GD	M	816	0.5	0.0	60.7	0.0	18.3	20.5	0.0	0.0	0.1	0.0
ND	M	340	0.9	0.0	61.5	0.0	15.0	22.1	0.0	0.0	0.6	0.0
Cont	F	203	4.9	0.0	65.0	0.0	14.3	13.3	0.0	0.0	2.5	0.0
GD	F	819	2.1	0.0	68.9	0.0	12.5	16.2	0.0	0.0	0.1	0.1
ND	F	374	1.1	0.0	62.8	0.0	19.0	16.8	0.0	0.0	0.3	0.0

			LP2									
Gp	Sex	No	0	1	2	3	4	5	6	7	8	9
Cont	M	206	3.9	1.5	44.7	19.4	22.8	3.9	0.0	0.0	1.9	1.9
GD	M	816	4.0	0.5	35.4	27.7	28.3	1.2	0.0	0.1	1.1	1.6
ND	M	340	0.6	0.0	42.6	22.1	29.7	2.9	0.0	0.3	0.9	0.9
Cont	F	203	8.4	0.0	48.8	19.2	15.3	3.0	0.0	0.0	3.0	2.5
GD	F	819	6.3	0.5	39.8	24.3	23.1	2.6	0.1	0.0	1.3	2.0
ND	F	374	4.8	0.3	43.3	15.2	31.6	1.1	0.0	0.0	2.1	1.6

			LP3									
Gp	Sex	No	0	1	2	3	4	5	6	7	8	9
Cont	M	206	2.9	1.0	79.6	1.5	12.1	1.9	0.0	0.0	0.5	0.5
GD	M	816	3.8	0.1	81.1	1.8	11.5	1.0	0.0	0.0	0.6	0.0
ND	M	340	0.9	0.3	78.5	0.9	15.3	2.9	0.0	0.0	1.2	0.0
Cont	F	203	3.9	0.5	84.7	1.0	8.9	0.5	0.0	0.0	0.5	0.0
GD	F	819	6.1	0.2	76.8	1.0	13.5	1.3	0.0	0.0	0.7	0.2
ND	F	374	3.5	0.3	77.0	1.1	15.0	1.9	0.0	0.0	1.3	0.0

Table 6.18 continued

			LP4									
Gp	Sex	No	0	1	2	3	4	5	6	7	8	9
Cont	M	206	2.4	0.0	56.3	0.5	26.7	1.5	0.0	0.5	11.7	0.5
GD	M	816	0.7	0.0	58.2	0.1	30.1	1.1	0.0	0.0	9.7	0.0
ND	M	340	0.3	0.0	56.5	0.3	34.1	1.5	0.0	0.0	7.4	0.0
Cont	F	203	2.0	0.0	68.5	0.5	17.2	1.5	0.0	0.0	10.3	0.0
GD	F	819	1.8	0.2	61.7	0.2	28.2	1.8	0.0	0.0	5.9	0.0
ND	F	374	0.5	0.3	59.6	0.8	31.6	1.1	0.0	0.0	6.1	0.0

			LP5									
Gp	Sex	No	0	1	2	3	4	5	6	7	8	9
Cont	M	206	1.0	0.0	83.0	0.5	8.7	1.0	0.0	0.0	5.8	0.0
GD	M	816	0.2	0.0	88.5	0.0	8.5	0.2	0.0	0.0	2.6	0.0
ND	M	340	0.0	0.0	92.9	0.0	3.8	0.9	0.0	0.0	2.4	0.0
Cont	F	203	1.5	0.0	89.7	0.0	5.4	2.0	0.0	0.0	1.5	0.0
GD	F	819	0.9	0.0	90.2	0.0	5.7	0.4	0.0	0.0	2.8	0.0
ND	F	374	0.3	0.0	89.3	0.3	6.1	0.8	0.0	0.0	3.2	0.0

Table 6.19 - Percentage frequencies of finger pattern types - subjects grouped by disorder type - right hand

RP1												
Gp	Sex	No	0	1	2	3	4	5	6	7	8	9
Cont	M	206	0.5	0.0	52.9	0.0	27.2	18.4	0.0	0.0	1.0	0.0
GD	M	816	0.4	0.0	57.6	0.0	22.1	20.0	0.0	0.0	0.0	0.0
ND	M	340	0.6	0.0	54.1	0.0	20.9	24.1	0.0	0.0	0.3	0.0
Cont	F	203	3.0	0.0	65.5	0.0	12.8	14.8	0.0	0.0	3.9	0.0
GD	F	819	1.3	0.0	65.7	0.0	16.5	16.0	0.0	0.0	0.5	0.0
ND	F	374	0.5	0.0	60.2	0.3	20.6	17.4	0.0	0.0	1.1	0.0

RP2												
Gp	Sex	No	0	1	2	3	4	5	6	7	8	9
Cont	M	206	4.4	1.5	38.8	18.4	26.7	3.4	0.0	0.0	1.0	5.8
GD	M	816	4.9	0.6	32.8	27.0	28.9	1.1	0.0	0.4	2.3	2.0
ND	M	340	1.2	0.9	38.8	27.6	27.9	1.2	0.0	0.0	0.3	2.1
Cont	F	203	4.4	2.0	48.8	16.3	17.7	3.0	0.0	0.0	4.9	1.0
GD	F	819	5.9	1.3	34.8	27.1	24.8	2.2	0.0	0.0	1.3	2.5
ND	F	374	3.2	0.0	34.5	24.6	29.7	1.9	0.0	0.0	3.3	2.9

RP3												
Gp	Sex	No	0	1	2	3	4	5	6	7	8	9
Cont	M	206	2.4	1.0	75.7	1.5	15.5	0.0	0.0	0.0	2.4	0.0
GD	M	816	2.7	0.2	80.4	1.6	13.5	0.7	0.0	0.0	0.9	0.0
ND	M	340	1.5	0.0	77.9	1.8	15.6	2.4	0.0	0.0	0.9	0.0
Cont	F	203	5.9	0.0	84.2	0.5	7.4	1.0	0.0	0.0	0.5	0.0
GD	F	819	5.1	0.2	79.5	1.1	11.2	1.2	0.0	0.0	1.5	0.1
ND	F	374	3.2	0.0	74.6	1.1	18.4	1.1	0.0	0.0	1.3	0.3

Table 6.19 continued

			RP4									
Gp	Sex	No	0	1	2	3	4	5	6	7	8	9
Cont	M	206	0.5	0.0	51.5	0.5	37.4	1.5	0.0	0.0	8.3	0.5
GD	M	816	0.6	0.0	52.9	0.1	34.9	0.5	0.0	0.0	10.5	0.2
ND	M	340	0.3	0.0	47.9	0.0	40.3	1.2	0.0	0.0	10.0	0.3
Cont	F	203	3.0	0.5	65.0	0.5	22.2	1.0	0.5	0.0	6.4	0.0
GD	F	819	1.7	0.0	57.2	0.0	31.6	1.0	0.0	0.0	8.3	0.1
ND	F	374	0.8	0.0	55.6	0.3	31.8	1.6	0.0	0.0	9.6	0.3

			RP5									
Gp	Sex	No	0	1	2	3	4	5	6	7	8	9
Cont	M	206	1.0	0.0	77.7	0.0	10.7	0.5	0.0	0.0	10.2	0.0
GD	M	816	0.2	0.0	84.4	0.0	9.8	0.1	0.0	0.0	5.4	0.0
ND	M	340	0.0	0.0	88.5	0.0	5.3	0.3	0.0	0.0	5.9	0.0
Cont	F	203	3.8	0.0	85.2	0.0	4.4	0.5	0.0	0.0	5.4	0.0
GD	F	819	0.4	0.1	89.2	0.0	3.9	0.1	0.0	0.0	6.2	0.0
ND	F	374	0.0	0.0	87.4	0.0	7.0	0.8	0.0	0.0	4.8	0.0

Table 6.20 Mann-Whitney U Test Results : Finger Pattern types - Grouped subjects

Variables and Probabilities (** = highly significant * = significant)												
Sex	Gp1	Gp2	LP1	LP2	LP3	LP4	LP5	RP1	RP2	RP3	RP4	RP5
M	Cont	GD	0.5142	0.1949	0.6704	0.7653	0.0991	0.3410	0.8286	0.1198	0.6109	0.0496*
M	Cont	ND	0.6201	0.1653	0.0751	0.9880	0.0038**	0.8792	0.5415	0.9524	0.4921	0.0073**
M	GD	ND	0.9278	0.7651	0.0021**	0.6975	0.0499*	0.1876	0.4623	0.0396*	0.1223	0.1681
F	Cont	GD	0.6813	0.0317*	0.1923	0.2489	0.7485	0.6868	0.0906	0.0773	0.0120*	0.2706
F	Cont	ND	0.0651	0.0177*	0.0126*	0.0661	0.3277	0.0845	0.0016**	0.0001**	0.0031**	0.0991
F	GD	ND	0.0286*	0.4318	0.1021	0.2793	0.3209	0.0417*	0.0162*	0.0018**	0.3261	0.2691

to GD males who had higher values for ulnar loops.

On left finger 5 ND males had higher values for ulnar loops and double loops than did GD males. GD males, however, had higher values for loops, ulnar central pocket loops and arches in comparison to ND males.

In females when grouped by disorder aetiology type, statistically significant differences were found between controls and ND for fingers 2 and 3 of both hands and finger 4 of the right hand. The differences on the right hand were statistically highly significant and those on the left hand were significant statistically. Controls compared to GD showed statistically significant differences on left digit 2 and right digit 4. GD compared to ND showed significant differences in pattern occurrence on finger 1 of both hands and for fingers 2 and 3 of the right hand. The difference on RP3 being statistically highly significant.

Control females were found to have a higher frequency of occurrence of arches, ulnar loops, double loops and ulnar central pocket loops compared with ND females for finger 2 on both hands. Controls also had smaller values than ND for whorls on finger 2 of both hands. On finger 3 controls had higher values for ulnar loops and lower values for whorls, double loops and ulnar central pocket loops.

For finger 4 of the right hand female controls had higher values for arches, ulnar loops and lower values for whorls, double loops and ulnar central pocket loops when compared to ND females.

On the second finger of the left hand controls had higher values for arches, ulnar loops, double loops and ulnar central pocket loops, along with lower values for radial loops and whorls in comparison to GD females. On right finger 4, controls had higher frequencies of occurrence of arches, ulnar loops, radial loops along with lower values for whorls and ulnar central pocket loops in comparison to GD females.

When GD was compared to ND, the subjects with genodermatoses were found to have higher values for arches and ulnar loops on finger 1 of both hands and lower values for whorls, double loops and ulnar central pocket loops. On the right hand finger 2, GD had higher

values than ND for arches, radial loops and double loops and lower values for whorls and ulnar pocket loops. For finger 3 right hand GD had higher values for arches and ulnar loops and lower values for whorls in comparison to ND females.

(ii) Ulnar and Radial Loop Scores (Variables RPR1 to LPU5)

Table 6.21 and 6.22 show percentage frequencies of finger loop scores for males and females respectively. Tables 6.23 and 6.24 show Mann-Whitney U Test results for males and females. In all of these, tables (a) refer to right hands and tables (b) to left hands.

For male subjects right hand finger 1 statistically significant differences were found between vitiligo subjects compared to each of BCC, atopic eczema and controls for radial loop occurrence. Vitiligo had a greater occurrence of 0 radial loops and a smaller occurrence of 1 radial loop than the other groups mentioned. For ulnar loop scores on RI significant differences were found between atopic eczema and BCC subjects and between vitiligo and actinic keratosis patients. BCC had a greater occurrence of 1 ulnar loop (99.1%) compared to atopic eczema (95.1%) and a correspondingly smaller occurrence of 0 ulnar loops (BCC 0.9%, atopic eczema 4.9%). Vitiligo had significantly greater occurrence of no ulnar loops (7.5%) compared to actinic keratosis (1.6%) and a correspondingly smaller occurrence of 1 loop (92.5% compared to 98.4%). A statistically highly significant difference in finger loop scores was found when vitiligo and BCC subjects were compared. BCC had a higher occurrence of 1 ulnar loop (99.1%) compared to vitiligo (92.5%). Vitiligo had 7.5% occurrence of zero loops compared to 0.9% occurrence in BCC patients.

On right hand finger II statistically significant differences were found for radial loop occurrence when atopic eczema subjects were compared with alopecia areata and with actinic keratosis patients. Highly significant differences were found for atopic eczema compared with controls, psoriasis, vitiligo and BCC groups of subjects.

Atopic eczema males had greatest occurrence of 1 radial loop and smallest occurrence of 0 radial loops compared to all of

Table (a) Percentage Frequencies : Finger Loop Scores - Males : Right Hands

6.21

Sex = Male

Group	Cases	RPR1			RPU1			RPR2			RPU2		
		0	1	2	0	1	2	0	1	2	0	1	2
Controls	206	53.4	46.6	0.0	4.4	95.6	0.0	44.4	55.6	0.0	20.9	79.1	0.0
Psoriasis	202	55.0	45.0	0.0	4.0	96.0	0.0	43.8	56.2	0.0	27.5	72.5	0.0
Atop Ecz	203	52.2	47.8	0.0	4.9	95.1	0.0	27.2	72.3	0.5	34.4	65.6	0.0
Vitiligo	201	63.2	38.6	0.0	7.5	92.5	0.0	42.8	56.7	0.5	27.3	72.7	0.0
Alop Are	210	61.4	38.6	0.0	4.3	95.7	0.0	39.0	60.5	0.5	28.7	71.3	0.0
BCC	211	53.6	46.4	0.0	0.9	99.1	0.0	42.2	57.8	0.0	29.4	70.6	0.0
Act Ker	129	56.6	43.4	0.0	1.6	98.4	0.0	38.0	62.0	0.0	29.1	70.9	0.0

Group	Cases	RPR3			RPU3		
		0	1	2	0	1	2
Controls	206	79.0	21.0	0.0	4.9	95.1	0.0
Psoriasis	202	85.4	14.4	0.0	4.0	96.0	0.0
Atop Ecz	203	81.2	18.8	0.0	5.4	94.6	0.0
Vitiligo	201	85.1	14.9	0.0	3.5	96.5	0.0
Alop Are	210	81.9	18.1	0.0	5.2	94.8	0.0
BCC	211	78.2	21.8	0.0	2.8	97.2	0.0
Act Ker	129	80.6	19.4	0.0	3.9	96.1	0.0

Table 6.21(a) continued

Group	Cases	RPR4			RPU4			RPR5			RPU5		
		0	1	2	0	1	2	0	1	2	0	1	2
Controls	205	51.7	48.3	0.0	1.0	99.0	0.0	78.5	21.5	0.0	1.0	99.0	0.0
Psoriasis	201	49.8	50.2	0.0	0.0	100.0	0.0	84.1	15.9	0.0	0.0	100.0	0.0
Atop Ecz	202	48.0	52.0	0.0	1.5	98.5	0.0	81.2	18.8	0.0	0.0	100.0	0.0
Vitiligo	201	59.7	40.3	0.0	1.0	99.0	0.0	87.6	12.4	0.0	0.5	99.5	0.0
Alop Are	210	57.1	42.9	0.0	0.5	99.5	0.0	86.2	13.8	0.0	0.5	99.5	0.0
BCC	211	46.9	53.1	0.0	0.5	99.5	0.0	87.2	12.8	0.0	0.0	100.0	0.0
Act Ker	129	49.6	50.4	0.0	0.0	100.0	0.0	89.9	10.1	0.0	0.0	100.0	0.0

Table (b) Percentage Frequencies : Finger Loop Scores Males : Left Hands

6.21

Sex = Male

Group	Cases	LPR1			LPU1			LPR2			LPU2		
		0	1	2	0	1	2	0	1	2	0	1	2
Controls	206	61.2	38.8	0.0	1.9	98.1	0.0	50.0	50.0	0.0	24.8	75.2	0.0
Psoriasis	202	56.4	43.6	0.0	0.0	100.0	0.0	39.6	60.4	0.0	30.2	69.8	0.0
Atop Ecz	203	61.6	38.4	0.0	0.0	100.0	0.0	38.9	60.6	0.6	36.5	63.5	0.0
Vitiligo	201	67.2	32.8	0.0	0.5	99.5	0.0	41.3	58.7	0.0	28.9	71.1	0.0
Alop Are	210	59.5	40.5	0.0	1.4	98.6	0.0	40.0	60.0	0.0	33.8	66.2	0.0
BCC	211	61.1	38.9	0.0	1.4	98.6	0.0	45.5	54.5	0.0	22.7	77.3	0.0
Act Ker	129	64.3	35.7	0.0	0.0	100.0	0.0	39.5	60.5	0.0	22.5	77.5	0.0

Group	Cases	LPR3			LPU3		
		0	1	2	0	1	2
Controls	206	83.5	16.5	0.0	5.3	94.7	0.0
Psoriasis	202	83.6	16.4	0.0	4.0	96.0	0.0
Atop Ecz	203	86.7	13.3	0.0	4.9	95.1	0.0
Vitiligo	201	87.6	12.4	0.0	6.5	93.5	0.0
Alop Are	210	82.4	17.6	0.0	7.6	92.4	0.0
BCC	211	77.7	22.3	0.0	2.8	97.2	0.0
Act Ker	129	82.9	17.1	0.0	0.8	99.2	0.0

Table 6.21 (b) continued

Group	Cases	LPR4			LPU4			LPR5			LPU5		
		0	1	2	0	1	2	0	1	2	0	1	2
Controls	206	58.7	40.8	0.5	3.4	96.6	0.0	84.0	16.0	0.0	1.5	98.5	0.0
Psoriasis	202	56.4	43.6	0.0	1.0	99.0	0.0	87.6	12.4	0.0	0.0	100.0	0.0
Atop Ecz	203	52.7	47.3	0.0	0.0	100.0	0.0	86.2	13.8	0.0	0.5	99.5	0.0
Vitiligo	201	63.2	36.8	0.0	0.0	100.0	0.0	92.5	7.5	0.0	0.0	100.0	0.0
Alop Are	210	63.3	36.7	0.0	2.4	97.6	0.0	88.6	11.4	0.0	0.5	99.5	0.0
BCC	211	58.3	41.7	0.0	0.9	99.1	0.0	92.4	7.6	0.0	0.0	100.0	0.0
Act Ker	129	54.3	45.7	0.0	0.0	100.0	0.0	93.8	6.2	0.0	0.0	100.0	0.0

Table (a) Percentage Frequencies : Fingr Loop Scores Females : Right hands

6.22

Sex = Female

Group	Cases	RPR1			RPU1			RPR2			RPU2		
		0	1	2	0	1	2	0	1	2	0	1	2
Controls	203	68.5	31.5	0.0	6.4	93.6	0.0	55.7	43.8	0.5	19.3	80.2	0.5
Psoriasis	205	69.8	30.2	0.0	1.5	98.5	0.0	42.4	57.6	0.0	39.0	61.0	0.0
Atop Ecz	203	68.0	32.0	0.0	7.4	92.6	0.0	42.9	57.1	0.0	34.7	65.3	0.0
Vitiligo	205	60.5	39.5	0.0	1.5	98.5	0.0	38.9	61.1	0.0	23.0	77.0	0.0
Alop Are	206	69.8	30.2	0.0	7.8	92.2	0.0	44.2	55.8	0.0	30.6	69.4	0.0
BCC	202	53.5	46.5	0.0	4.5	95.4	0.0	42.6	57.4	0.0	28.2	71.8	0.0
Act Ker	174	69.0	31.0	0.0	3.4	96.6	0.0	32.2	67.8	0.0	22.5	77.5	0.0

Group	Cases	RPR3			RPU3		
		0	1	2	0	1	2
Controls	203	90.6	9.4	0.0	6.4	93.6	0.0
Psoriasis	205	86.3	13.7	0.0	4.4	95.6	0.0
Atop Ecz	203	86.2	13.8	0.0	7.4	92.6	0.0
Vitiligo	205	79.8	20.2	0.0	3.9	96.1	0.0
Alop Are	206	87.8	12.2	0.0	10.2	89.8	0.0
BCC	202	82.7	17.3	0.0	5.4	94.6	0.0
Act Ker	174	72.4	27.6	0.0	2.9	97.1	0.0

Table 6.22(a) continued

Group	Cases	RPR4			RPU4			RPR5			RPU5		
		0	1	2	0	1	2	0	1	2	0	1	2
Controls	203	69.7	30.3	0.0	4.0	95.5	0.5	89.6	10.4	0.0	4.0	96.0	0.0
Psoriasis	205	60.0	40.0	0.0	2.9	97.1	0.0	93.7	6.3	0.0	0.5	99.5	0.0
Atop Ecz	203	56.2	43.8	0.0	2.0	98.0	0.0	90.1	9.9	0.0	0.5	99.5	0.0
Vitiligo	205	55.2	44.8	0.0	0.5	99.5	0.0	89.7	10.3	0.0	0.0	100.0	0.0
Alop Are	206	64.4	35.6	0.0	1.5	98.5	0.0	85.9	14.1	0.0	1.0	99.0	0.0
BCC	202	55.9	44.1	0.0	1.0	99.0	0.0	86.6	13.4	0.0	0.0	100.0	0.0
Act Ker	174	56.3	43.7	0.0	1.1	98.9	0.0	88.4	11.6	0.0	0.0	100.0	0.0

Table (b) Percentage Frequencies : Finger Loop Scores. Females : Left hands

6.22

Sex = Female

Group	Cases	LPR1			LPU1			LPR2			LPU2		
		0	1	2	0	1	2	0	1	2	0	1	2
Controls	203	70.0	30.0	0.0	4.9	95.1	0.0	57.1	42.9	0.0	27.6	72.4	0.0
Psoriasis	205	75.6	24.4	0.0	3.4	96.6	0.0	51.2	48.8	0.0	32.2	67.8	0.0
Atop Ecz	203	70.4	29.6	0.0	3.0	97.0	0.0	42.4	57.6	0.0	34.5	65.0	0.5
Vitiligo	205	67.6	32.4	0.0	0.0	100.0	0.0	41.2	58.8	0.0	24.0	76.0	0.0
Alop Are	206	70.4	29.6	0.0	1.9	98.1	0.0	52.7	47.3	0.0	33.7	66.3	0.0
BCC	202	61.9	38.1	0.0	1.5	98.5	0.0	56.9	43.1	0.0	18.8	82.1	0.0
Act Ker	174	66.7	33.3	0.0	1.1	98.9	0.0	38.5	61.5	0.0	22.4	77.6	0.0

Group	Cases	LPR3			LPU3		
		0	1	2	0	1	2
Controls	203	89.2	10.8	0.0	5.4	94.6	0.0
Psoriasis	205	83.9	16.1	0.0	8.8	91.2	0.0
Atop Ecz	203	80.3	19.7	0.0	9.9	90.1	0.0
Vitiligo	205	79.9	20.1	0.0	3.9	96.9	0.0
Alop Are	206	88.8	11.2	0.0	6.8	93.2	0.0
BCC	202	84.2	15.8	0.0	5.9	94.1	0.0
Act Ker	174	77.0	23.0	0.0	3.4	96.6	0.0

Table 6.22(b) continued

Group	Cases	LPR4			LPU4			LPR5			LPU5		
		0	1	2	0	1	2	0	1	2	0	1	2
Controls	203	70.4	29.6	0.0	2.5	97.5	0.0	84.0	16.0	0.0	1.5	98.5	0.0
Psoriasis	205	60.5	39.4	0.0	3.9	96.1	0.0	87.6	12.4	0.0	0.0	100.0	0.0
Atop Ecz	203	65.0	35.0	0.0	2.5	97.5	0.0	86.2	13.8	0.0	0.5	99.5	0.0
Vitiligo	205	59.1	40.9	0.0	1.5	98.5	0.0	92.5	7.5	0.0	0.0	100.0	0.0
Alop Are	206	70.7	29.3	0.0	1.5	98.5	0.0	88.6	11.4	0.0	0.5	99.5	0.0
BCC	202	59.9	40.1	0.0	1.5	98.5	0.0	92.4	7.6	0.0	0.0	100.0	0.0
Act Ker	174	60.9	39.1	0.0	1.7	98.3	0.0	93.8	6.2	0.0	0.0	100.0	0.0

Table 6.23(a)

Mann Whitney U Test Results: Finger Loop Scores

Males : Right hands (variables RPR1 to RPU5)

		Probability (* = significant $p < 0.05$. ** = highly significant $p < 0.01$)				
Group 1	Group 2	RPR1	RPU1	RPR2	RPU2	RPR3
Controls	Psoriasis	0.7533	0.8366	0.9018	0.1323	0.0846
Controls	Atop Ecz	0.8111	0.7892	0.0003**	0.0031**	0.5851
Controls	Vitiligo	0.0456*	0.1858	0.7032	0.1462	0.1129
Controls	Alop Are	0.0981	0.9668	0.2481	0.0725	0.4597
Controls	BCC	0.9745	0.0722	0.6800	0.0662	0.9102
Controls	Act Ker	0.5687	0.1596	0.2487	0.0925	0.7248
Psoriasis	Atop Ecz	0.5817	0.6377	0.0004**	0.1427	0.2378
Psoriasis	Vitiligo	0.0932	0.1302	0.7970	0.9672	0.8881
Psoriasis	Alop Are	0.1831	0.8683	0.3048	0.7823	0.3149
Psoriasis	BCC	0.7762	0.1097	0.7747	0.7583	0.0652
Psoriasis	Act Ker	0.7702	0.2123	0.2978	0.7451	0.2361
Atop Ecz	Vitiligo	0.0259*	0.2906	0.0012**	0.1351	0.2982
Atop Ecz	Alop Are	0.0591	0.7564	0.0117*	0.2270	0.8515
Atop Ecz	BCC	0.7854	0.0412*	0.0011**	0.2349	0.5085
Atop Ecz	Act Ker	0.4366	0.1088	0.0353*	0.3278	0.8980
Vitiligo	Alop Are	0.7139	0.1703	0.4468	0.7523	0.3879
Vitiligo	BCC	0.0478*	0.0027**	0.9807	0.7287	0.0883
Vitiligo	Act Ker	0.2323	0.0179*	0.4196	0.7190	0.2901
Alop Are	BCC	0.1027	0.0778	0.4531	0.9763	0.3916
Alop Are	Act Ker	0.3787	0.1682	0.8883	0.9347	0.7682
B.C.C.	Act Ker	0.5860	0.9240	0.4244	0.9551	0.6514

Table 6.23(a) continued

Probability (* = significant $p < 0.05$. ** = highly significant $p < 0.01$)						
Group 1	Group 2	RPU3	RPR4	RPU4	RPR5	RPU5
Controls	Psoriasis	0.6607	0.6938	0.1609	0.1528	0.1609
Controls	Atop Ecz	0.7961	0.4575	0.6412	0.5054	0.1599
Controls	Vitiligo	0.4833	0.1054	0.9842	0.0156*	0.5743
Controls	Alop Are	0.8673	0.2669	0.5487	0.0409*	0.5487
Controls	BCC	0.2856	0.3530	0.5487	0.0136*	0.1518
Controls	Act Ker	0.6673	0.7097	0.2612	0.0072**	0.2612
Psoriasis	Atop Ecz	0.4882	0.7284	0.0833	0.4442	1.0000
Psoriasis	Vitiligo	0.7927	0.0453*	0.1508	0.3175	0.3173
Psoriasis	Alop Are	0.5442	0.1336	0.3279	0.5479	0.3279
Psoriasis	BCC	0.5309	0.5973	0.3279	0.3035	1.0000
Psoriasis	Act Ker	0.9622	0.9804	1.0000	0.1318	1.0000
Atop Ecz	Vitiligo	0.3408	0.0188*	0.6571	0.0785	0.3161
Atop Ecz	Alop Are	0.9255	0.0641	0.2970	0.1695	0.3267
Atop Ecz	BCC	0.1872	0.8588	0.2970	0.0720	1.0000
Atop Ecz	Act Ker	0.5168	0.7777	0.1650	0.0321*	1.0000
Vitiligo	Alop Are	0.3852	0.5993	0.5373	0.6811	0.9753
Vitiligo	BCC	0.7176	0.0108*	0.5373	0.9861	0.3067
Vitiligo	Act Ker	0.8524	0.0722	0.2565	0.5128	0.4231
Alop Are	BCC	0.2163	0.0405*	1.0000	0.6647	0.3173
Alop Are	Act Ker	0.5664	0.1772	0.4332	0.3120	0.4332
BCC	Act Ker	0.6078	0.6591	0.4332	0.5193	1.0000

Table 6.23(b)

(b) Mann Whitney U Test Results: Finger Loop Scores

Males : Left hands (variables LPR1 to LPU5)

		Probability (* = significant $p < 0.05$. ** = highly significant $p < 0.01$)				
Group 1	Group 2	LPR1	LPU1	LPR2	LPU2	LPR3
Controls	Psoriasis	0.3324	0.0468*	0.0350*	0.2188	0.9812
Controls	Atop Ecz	0.9320	0.0463*	0.0251*	0.0103*	0.3636
Controls	Vitiligo	0.2077	0.1866	0.0783	0.3511	0.2445
Controls	Alop Are	0.7326	0.6845	0.0406*	0.0428*	0.7629
Controls	BCC	0.9954	0.6798	0.3339	0.7140	0.1369
Controls	Act Ker	0.5598	0.1119	0.0618	0.6349	0.8958
Psoriasis	Atop Ecz	0.2935	1.0000	0.8396	0.1824	0.3789
Psoriasis	Vitiligo	0.0269*	0.3161	0.7300	0.7680	0.2567
Psoriasis	Alop Are	0.5260	0.0886	0.9346	0.4328	0.7464
Psoriasis	BCC	0.3323	0.0894	0.2507	0.1094	0.1335
Psoriasis	Act Ker	0.1536	1.0000	0.9900	0.1244	0.8799
Atop Ecz	Vitiligo	0.2416	0.3149	0.5857	0.1040	0.7960
Atop Ecz	Alop Are	0.6700	0.0878	0.7750	0.5741	0.2259
Atop Ecz	BCC	0.9270	0.0886	0.1787	0.0033**	0.0173*
Atop Ecz	Act Ker	0.6123	1.0000	0.8681	0.0074**	0.3480
Vitiligo	Alop Are	0.1087	0.3371	0.7898	0.2799	0.1428
Vitiligo	BCC	0.2030	0.3395	0.4229	0.1930	0.0087**
Vitiligo	Act Ker	0.5977	0.4231	0.7513	0.2003	0.2424
Alop Are	BCC	0.7354	0.9953	0.2810	0.0163*	0.2326
Alop Are	Act Ker	0.3772	0.1733	0.9324	0.0266*	0.8942
B.C.C.	Act Ker	0.5547	0.1744	0.3069	0.8747	0.2462

Table 6.23(b) continued

		Probability (* = significant $p < 0.05$. ** = highly significant $p < 0.01$)				
Group 1	Group 2	LPU3	LPR4	LPU4	LPR5	LPU5
Controls	Psoriasis	0.5161	0.6699	0.0982	0.2927	0.0855
Controls	Atop Ecz	0.8499	0.2388	0.0081**	0.5279	0.3227
Controls	Vitiligo	0.6296	0.3400	0.0085**	0.0075**	0.0863
Controls	Alop Are	0.3460	0.3191	0.5360	0.1739	0.3063
Controls	BCC	0.1980	0.9602	0.0855	0.0076**	0.0789
Controls	Act Ker	0.0289*	0.4454	0.0346*	0.0077	0.1692
Psoriasis	Atop Ecz	0.6454	0.4520	0.1558	0.6729	0.3185
Psoriasis	Vitiligo	0.2630	0.1676	0.1578	0.0995	1.0000
Psoriasis	Alop Are	0.1162	0.1537	0.2754	0.7667	0.3267
Psoriasis	BCC	0.5250	0.7030	0.9651	0.1039	1.0000
Psoriasis	Act Ker	0.0816	0.6985	0.2577	0.0679	1.0000
Atop Ecz	Vitiligo	0.5043	0.0332*	1.0000	0.0394*	0.3197
Atop Ecz	Alop Are	0.2605	0.0289*	0.0272*	0.4695	0.9809
Atop Ecz	BCC	0.2724	0.2536	0.1649	0.0406*	0.3080
Atop Ecz	Act Ker	0.0397*	0.7824	1.0000	0.0304*	0.4254
Vitiligo	Alop Are	0.6490	0.9750	0.0279*	0.1708	0.3279
Vitiligo	BCC	0.0799	0.3103	0.1670	0.9632	1.0000
Vitiligo	Act Ker	0.0124*	0.1075	1.0000	0.6611	1.0000
Alop.Are	BCC	0.0279*	0.2901	0.2508	0.1790	0.3162
Alop Are	Act Ker	0.0051**	0.0986	0.0779	0.1105	0.4332
B.C.C.	Act Ker	0.1931	0.4673	0.2681	0.6299	1.0000

Table 6.24(a)

(a) Mann Whitney U Test Results: Finger Loop Scores

Females : Right hands (variables RPR1 to RPU5)

		Probability (* = significant $p < 0.05$. ** = highly significant $p < 0.01$)				
Group 1	Group 2	RPR1	RPU1	RPR2	RPU2	RPR3
Controls	Psoriasis	0.7794	0.2149	0.0090**	0.0022**	0.1801
Controls	Atop Ecz	0.9152	0.6956	0.0117*	0.0005**	0.1686
Controls	Vitiligo	0.0924	0.0102*	0.0009**	0.3199	0.0023**
Controls	Alop Are	0.7794	0.5917	0.0233*	0.0085**	0.3653
Controls	BCC	0.0020**	0.3876	0.0100*	0.0324*	0.0195*
Controls	Act Ker	0.9182	0.1915	0.0000**	0.4010	0.0000**
Psoriasis	Atop Ecz	0.6989	0.3939	0.9320	0.6911	0.9685
Psoriasis	Vitiligo	0.0492*	0.0003**	0.4695	0.0319*	0.0785
Psoriasis	Alop Are	1.0000	0.4762	0.7229	0.6419	0.6592
Psoriasis	BCC	0.0007**	0.0379*	0.9780	0.3310	0.3069
Psoriasis	Act Ker	0.8680	0.0156*	0.0404*	0.0307*	0.0008**
Atop Ecz	Vitiligo	0.1149	0.0036**	0.4199	0.0105*	0.0862
Atop Ecz	Alop Are	0.6989	0.8854	0.7884	0.3852	0.6316
Atop Ecz	BCC	0.0028**	0.2118	0.9542	0.1681	0.3272
Atop Ecz	Act Ker	0.8376	0.0967	0.0335*	0.0107*	0.0009**
Vitiligo	Alop Are	0.0492*	0.0024**	0.2812	0.0904	0.0284*
Vitiligo	BCC	0.1530	0.0748	0.4543	0.2364	0.4600
Vitiligo	Act Ker	0.0863	0.2066	0.1747	0.9066	0.0926
Alop Are	BCC	0.0007**	0.1637	0.7446	0.6096	0.1448
Alop Are	Act Ker	0.8680	0.0728	0.0169*	0.0836	0.0002**
B.C.C.	Act Ker	0.0022**	0.6193	0.0385*	0.2127	0.0169

Table 6.24(a) continued

		Probability (* = significant $p < 0.05$. ** = highly significant $p < 0.01$)				
Group 1	Group 2	RPU3	PPR4	RPU4	RPR5	RPU5
Controls	Psoriasis	0.3621	0.0420*	0.7610	0.1399	0.0174*
Controls	Atop Ecz	0.7056	0.0051**	0.3867	0.8562	0.0181*
Controls	Vitiligo	0.2582	0.0027**	0.0532	0.9865	0.0042**
Controls	Alop Are	0.1656	0.2602	0.2286	0.2497	0.0521
Controls	BCC	0.6742	0.0045**	0.1244	0.3568	0.0043**
Controls	Act Ker	0.1072	0.0076**	0.1813	0.7190	0.0082**
Psoriasis	Atop Ecz	0.1986	0.4322	0.5327	0.1940	0.9945
Psoriasis	Vitiligo	0.8206	0.3244	0.0586	0.1440	0.3197
Psoriasis	Alop Are	0.0230*	0.3599	0.3125	0.0092**	0.5627
Psoriasis	BCC	0.6228	0.4074	0.1599	0.0174*	0.3209
Psoriasis	Act Ker	0.4359	0.4698	0.2309	0.0737	0.3583
Atop Ecz	Vitiligo	0.1334	0.8418	0.1776	0.8693	0.3173
Atop Ecz	Alop Are	0.3100	0.0897	0.6937	0.1827	0.5685
Atop Ecz	BCC	0.4255	0.9649	0.4148	0.2702	0.3185
Atop Ecz	Act Ker	0.0515	0.9745	0.5260	0.5928	0.3554
Vitiligo	Alop Are	0.0133*	0.0579	0.3203	0.2423	0.1588
Vitiligo	BCC	0.4745	0.8765	0.5598	0.3475	1.0000
Vitiligo	Act Ker	0.5718	0.8230	0.4749	0.7065	1.0000
Alop Are	BCC	0.0725	0.0820	0.6651	0.8196	0.1599
Alop Are	Act Ker	0.0047**	0.1095	0.7898	0.4565	0.1933
B.C.C.	Act Ker	0.2186	0.9409	0.8808	0.5991	1.0000

Table 6.24(b)

(b) Mann Whitney U Test Results : Finger Loop Scores

Females: Left Hands (variables LPR1 to LPU5)

		Probability (* = significant $p < 0.05$. ** = highly significant $p < 0.01$)				
Group 1	Group 2	LPR1	LPU1	LPR2	LPU2	LPR3
Controls	Psoriasis	0.1996	0.4455	0.2305	0.3099	0.1203
Controls	Atop Ecz	0.9137`	0.3082	0.0029**	0.1560	0.0131*
Controls	Vitiligo	0.0164*	0.0013**	0.0013**	0.4115	0.0099**
Controls	Alop Are	0.9230	0.0974	0.3659	0.1839	0.9021
Controls	BCC	0.0871	0.0498*	0.9656	0.0367	0.1390
Controls	Act Ker	0.4946	0.0376*	0.0003**	0.2495	0.0015**
Psoriasis	Atop Ecz	0.2402	0.7921	0.0734	0.6767	0.3425
Psoriasis	Vitiligo	0.0744	0.0078**	0.0419*	0.0663	0.2939
Psoriasis	Alop Are	0.2338	0.3555	0.7671	0.7529	0.1509
Psoriasis	BCC	0.0028**	0.2093	0.2483	0.0020*	0.9439
Psoriasis	Act Ker	0.0549	0.1495	0.0134*	0.0342*	0.0905
Atop Ecz	Vitiligo	0.5423	0.0135*	0.8082	0.0259*	0.9209
Atop Ecz	Alop Are	0.9903	0.5073	0.0371*	0.9159	0.0179*
Atop Ecz	BCC	0.0690	0.3161	0.0034**	0.0005**	0.3099
Atop Ecz	Act Ker	0.4311	0.2257	0.4475	0.0130*	0.4375
Vitiligo	Alop Are	0.5489	0.0458*	0.0199*	0.0317*	0.0136*
Vitiligo	BCC	0.2245	0.0810	0.0015**	0.2016	0.2647
Vitiligo	Act Ker	0.8399	0.1252	0.5977	0.7131	0.4954
Alop.Are	BCC	0.0697	0.7228	0.3890	0.0007**	0.1732
Alop Are	Act Ker	0.4364	0.5376	0.0059**	0.0158*	0.0022**
B.C.C.	Act Ker	0.3354	0.7772	0.0004**	0.3888	0.0795

Table 6.24(b) continued

		Probability (* = significant $p < 0.05$. ** = highly significant $p < 0.01$)				
Group 1	Group 2	LPU3	LPR4	LPU4	LPR5	LPU5
Controls	Psoriasis	0.1869	0.0347*	0.4084	0.8361	0.6452
Controls	Atop Ecz	0.0930	0.2435	1.0000	0.8633	0.7034
Controls	Vitiligo	0.4746	0.0170*	0.4757	0.8598	0.0825
Controls	Alop Are	0.5350	0.9491	0.4671	0.8879	0.3108
Controls	BCC	0.8207	0.0261*	0.4800	0.4954	0.3179
Controls	Act Ker	0.3587	0.0519	0.6202	0.7638	0.3942
Psoriasis	Atop Ecz	0.7099	0.3439	0.4084	0.7044	0.4045
Psoriasis	Vitiligo	0.0443*	0.7773	0.1310	0.9762	0.1588
Psoriasis	Alop Are	0.4620	0.0292*	0.1269	0.7274	0.5627
Psoriasis	BCC	0.2735	0.9038	0.1332	0.3738	0.5714
Psoriasis	Act Ker	0.0339*	0.9318	0.2087	0.6164	0.6612
Atop Ecz	Vitiligo	0.0182*	0.2202	0.4757	0.7273	0.0447*
Atop Ecz	Alop Are	0.2699	0.2176	0.4671	0.9747	0.1740
Atop Ecz	BCC	0.1450*	0.2876	0.4800	0.6099	0.1793
Atop Ecz	Act Ker	0.0146*	0.4108	0.6202	0.8926	0.2382
Vitiligo	Alop Are	0.1930	0.0140*	0.9904	0.7506	0.3197
Vitiligo	BCC	0.3479	0.8719	0.9951	0.3912	0.3161
Vitiligo	Act Ker	0.8084	0.7216	0.8491	0.6376	0.2801
Alop Are	BCC	0.7143	0.0218*	0.9855	0.5870	0.9917
Alop Are	Act Ker	0.1429	0.0444*	0.8396	0.8683	0.9073
B.C.C.	Act Ker	0.2597	0.8406	0.8539	0.7226	0.9158

the other groups. Atopic eczema subjects also showed highly significantly smaller occurrence of 1 ulnar loop and larger occurrence of 0 loops (65.6% and 34.4% respectively) when compared to control subjects (79.1% and 20.9% respectively), see Table 6.21(a).

No statistically significant differences were found for loop scores on right hand finger III.

On right hand finger IV higher occurrence of 0 loops and lower occurrence of 1 loop was found when vitiligo patients were compared to psoriasis, atopic eczema and BCC. Alopecia areata showed significantly higher occurrence of 0 loops and smaller occurrence of 1 loop compared to BCC patients. No significant differences were found for ulnar loop counts on right hand finger IV for male subjects.

When control male subjects were compared to those of vitiligo, alopecia areata, BCC and actinic keratosis for frequency of occurrence of radial loops on finger RV statistically higher occurrence of 1 loop and lower frequency of occurrence of 0 loops was found in control subjects than in the groups mentioned (highly significant for comparison with actinic keratosis). Atopic eczema patients were also found to have statistically significantly higher occurrence of 1 radial loop on RV compared to actinic keratosis. No significant difference were found for ulnar loops on RV (see Table 6.25).

On the left hand finger I significantly higher occurrence on 1 radial loop in psoriasis patients (43.6%) compared to vitiligo (32.8%) were found. Vitiligo patients had significantly higher occurrence of 0 radial loops (67.2%) compared to psoriatics (56.4%). For ulnar loop scores controls showed significantly smaller occurrence of 1 loop and significantly higher occurrence of 0 loops compared to both psoriasis and atopic eczema probands.

For male subjects on finger II of the left hand, control subjects showed significantly higher frequency of occurrence of 0 radial loops and lower occurrence of 1 loop in comparison to psoriasis, atopic eczema and alopecia areata. Statistically significant occurrence of ulnar loops were found in alopecia areata compared to BCC, actinic keratosis and controls, alopeciatics having higher occurrence of 0 loops and lower frequency of 1 loop occurrence.

Table 6.25 - Summary table of significant differences in Mann-Whitney U Test comparisons between groups - Male subjects: ulnar and radial loop scores

DIGIT	RADIAL LOOPS		ULNAR LOOPS	
	SIG	H.SIG.	SIG.	H.SIG.
RI	Cont. : Vit A.Ecz.: Vit. BCC : Vit.		A.Ecz. : BCC Vit. : A.Ker	Vit. : BCC
RII	A.Ecz.: Alop. A.Ecz.: A.Ker.	Cont. : A.Ecz Psor. : A.Ecz A.Ecz.: Vit. A.Ecz.: BCC		Cont. : A.Ecz
RIII				
RIV	Psor. : Vit. A.Ecz. : Vit. Vit. : BCC Alop. : BCC			
RV	Cont. : Vit. Cont. : Alop. Cont. : BCC A.Ecz.: A.Ker.	Cont. : A.Ker		
LI	Psor. : Vit.		Cont. : Psor. Cont. : A.Ecz.	
LII	Cont. : Psor. Cont. : A.Ecz. Cont. : Alop.		Cont. : A.Ecz. Cont. : Alop. Alop. : BCC Alop. : A.Ker.	A.Ecz.: BCC A.Ecz.: A.Ker
LIII	A.Ecz.: BCC	Vit. : BCC	Cont. : A.Ker. A.Ecz.: A.Ker. Vit. : A.Ker. Alop. : BCC	Alop. : A.Ker
LIV	A.Ecz. : Vit. A.Ecz. : Alop.		Cont. : A.Ker. A.Ecz.: Alop. Vit. : Alop.	Cont.: A.Ecz. Cont.: Vit.
LV	A.Ecz. : Vit. A.Ecz. : BCC A.Ecz. : A.Ker.	Cont. : Vit. Cont. : BCC		

A statistically significant difference was found for controls compared to atopic eczema with controls having higher frequency of 1 loop and lower occurrence for 0 loops. Highly significantly greater occurrence of 0 loops and lower occurrence of 1 loop was found when atopic eczema subjects were compared to BCC and actinic keratosis subjects.

For left hand finger III statistically significant differences were found between BCC and atopic eczema and highly significant differences between BCC and vitiligo for radial loop occurrence. In both cases BCC had higher occurrence of 1 loop and lower occurrence of 0 loops. For ulnar loop frequency on LIII statistically significant higher values for 1 loop and lower values for 0 loops were found in actinic keratosis compared to controls, atopic eczema, vitiligo and actinic keratosis (highly significant). A significant difference was found for BCC compared to alopecia areata subjects for ulnar loop scores. BCC having lower 0 loop frequency and higher 1 loop frequency.

For radial loop score occurrence on LIV, significantly higher 1 loop scores and lower 0 loop scores were found for atopic eczema patients when compared to those with vitiligo and to alopecia areata sufferers. For ulnar loop scores, control subjects showed highly significant larger occurrence for 0 loops and lower occurrence of 1 loop in comparison to atopic eczema, vitiligo and actinic keratosis (significant). Significant differences were also found for ulnar loop scores on LIV for alopecia areata subjects, when compared to atopic eczema and to vitiligo subjects. Alopeciatics having lower 1 loop occurrence and higher 0 loop occurrence.

For male subjects on left hand finger V significantly higher values were found in atopic eczema subjects for 1 radial loop occurrence when compared to BCC, vitiligo and actinic keratosis patients and significantly smaller values for 0 radial loop occurrence. Highly significant differences were found between control subjects and both vitiligo and BCC patients for radial loop scores on LV. Controls having higher occurrence of 1 loop and lower occurrence of 0 loops. No statistically significant differences were found for ulnar loop scores on left finger V

(see Table 6.26).

Table 6.26 - Summary Table of significant difference from results of Mann-Whitney U Test intergroup comparisons - Female subjects:
Ulnar and radial loop scores

DIGIT	RADIAL LOOPS		ULNAR LOOPS	
	SIG.	H.SIG.	SIG.	H.SIG.
RI	Psor. : Vit. Vit. : Alop.	Cont. : BCC Psor. : BCC A.Ecz.: BCC Alop. : BCC A.Ker.: BCC	Cont. : Vit. Psor. : BCC Psor. : A.Ker.	Psor. : Vit. A.Ecz.: Vit. Alop. : Vit.
RII	Cont. : A.Ecz Cont. : Alop. Cont. : BCC Psor. : A.Ker A.Ecz.: A.Ker	Cont. : Psor. Cont. : Vit. Cont. : A.Ker.	Cont. : BCC Psor. : Vit. Psor. : A.Ker. A.Ker.: Vit. A.Ecz.: A.Ker.	Cont. : Psor Cont. : A.Ecz Cont. : Alop.
RIII	Cont. : BCC Vit. : Alop	Cont.: Vit. Cont. : A.Ker. Psor. : A.Ker. A.Ecz.: A.Ker. Alop. : A.Ker.	Psor. : Alop. Vit. : Alop.	Alop. : A.Ker
RIV	Cont. : Psor.	Cont. : A.Ecz. Cont. : Vit. Cont. : BCC Cont. : A.Ker.		
RV	Psor. : BCC	Psor. : Alop.	Cont. : Psor. Cont. : A.Ecz.	Cont. : Vit. Cont. : BCC Cont. : A.Ker
LI	Cont. : Vit.	Psor. : BCC	Cont. : BCC Cont. : A.Ker. A.Ecz.: Vit. Vit. : Alop.	Cont. : Vit. Psor. : Vit.
LII	Psor. : Vit. Psor. : A.Ker A.Ecz.: Alop. Vit. : Alop.	Cont. : A.Ecz. Cont. : Vit. Cont. : A.Ker. A.Ecz.: BCC Vit. : BCC Alop. : A.Ker. BCC : A.Ker.	Psor. : BCC Psor. : A.Ker. A.Ecz.: Vit. A.Ecz.:A.Ker. Alop. : A.Ker. Vit. : Alop.	A.Ecz.: BCC Alop. : BCC

Table 6.26 continued

DIGIT	RADIAL LOOP		ULNAR LOOP	
	SIG.	H.SIG.	SIG.	H.SIG.
LIII	Cont. : A.Ecz A.Ecz.:Alop. Vit. : Alop.	Cont. : Vit. Cont. : A.Ker Alop. : A.Ker	Psor. : Vit. Psor. : A.Ker A.Ecz.: Vit. A.Ecz.: BCC A.Ecz.: A.Ker	
LIV	Cont. : Psor. Cont. : Vit. Cont. : BCC Psor. : Alop. Vit. : Alop.			
LV			A.Ecz. : Vit.	

For female subjects on right hand finger I highly significantly greater frequency of occurrence of 1 radial loop, and lower occurrence of 0 radial loops, was found in BCC subjects when compared to controls, psoriasis, atopic eczema, alopecia areata and actinic keratosis. Statistically significant differences were found for radial loop scores in vitiligo patients compared to psoriasis and alopecia areata. Vitiligo patients having higher frequency of occurrence of 1 loop and lower value for 0 loops. Highly significant statistical differences were found for ulnar loop scores on RI in vitiligo patients when compared to psoriasis, alopecia areata, atopic eczema and controls (significant). Vitiligo patients showed higher occurrence of 1 ulnar loop than in the groups mentioned. Significantly higher values for 1 ulnar loop were found for psoriatics compared to BCC and to actinic keratosis on finger RI.

For radial loop scores on finger RII highly significant differences were found when controls were compared to psoriasis, vitiligo and actinic keratosis, and significant differences were found between controls and atopic eczema, alopecia areata and BCC. Controls showed higher values for 0 radial loops and lower values for 1 loop scores compared with the groups mentioned. Actinic keratosis patients showed significantly higher values for 1 radial loop in comparison to psoriasis and atopic eczema. Highly significant differences were found when controls were compared to

psoriasis, atopic eczema, alopecia areata and BCC (significant) subjects for ulnar loop scores on RII. Psoriatic females showed significantly higher values for 0 ulnar loop scores compared with vitiligo and with actinic keratosis patients on RII. Atopic eczema showed statistically significantly higher values for 0 ulnar loop scores than those for vitiligo and actinic keratosis.

On the right hand finger III highly significantly greater values for 1 radial loop were found in actinic keratosis patients when compared to controls, psoriasis, atopic eczema and alopecia areata. Vitiligo patients showed a highly significantly higher radial loop score for 1 loop when compared to controls and to alopecia areata where the difference was significant statistically. Control females were found to have a statistically higher value for 0 radial loops on RIII. For ulnar loop scores on the same finger alopecia areata patients were found to have statistically significantly higher loop scores for 0 loops compared to psoriasis and vitiligo and also when compared to actinic keratosis where the difference was found to be statistically highly significant (see Table 6.22b).

Female control subjects were found to have a statistically highly significantly greater value for frequency of occurrence of 0 radial loops on RIV in comparison to vitiligo, atopic eczema, BCC, actinic keratosis and psoriasis (significant in this case). There were no statistically significant differences for ulnar loop scores on RIV. On the right hand finger V higher values were found for 0 radial loops which were statistically highly significantly different for psoriatics when compared to alopeciads and significantly different to BCC patients. For ulnar loop scores on RV a highly significantly greater frequency of occurrence of 0 loops was found in control subjects compared to vitiligo, BCC and actinic keratosis. A significant difference was also found between controls compared to psoriasis and to atopic eczema.

For female subjects on left hand finger I , BCC patients showed a higher percentage frequency of occurrence of 1 radial loop score in comparison to psoriatics which was statistically highly significant. Vitiligo patients were also found to have a significantly higher value for 1 radial loop score in comparison to female control subjects. When ulnar loop scores were considered for

the same finger, vitiligo patients were found to have a higher score for 1 loop which was highly significantly different to scores for controls and psoriatics and significantly different for atopic eczema and alopecia areata patients. Control subjects were found to have a significantly higher value for 0 ulnar loops in comparison to BCC and actinic keratosis patients. On finger II highly significantly greater values for 0 radial loop occurrence was found for control females when compared to atopic eczema, vitiligo and actinic keratosis patients. Similar results were found for BCC in comparison to vitiligo, atopic eczema and actinic keratosis. Actinic keratosis showed highly significantly greater values for 1 radial loop occurrence in comparison to BCC, alopecia areata and controls. Significantly higher values for 0 radial loop occurrence was found in alopecia areata female patients compared to both atopic eczema and to vitiligo sufferers. Psoriatic females showed significantly higher values for 0 radial loop occurrence when compared to vitiligo and to actinic keratosis patients. For ulnar loop occurrence on LII BCC patients showed highly significantly greater values for 1 ulnar loop occurrence in comparison with atopic eczema, alopecia areata and psoriasis (significant), female patients. A significantly higher value for 1 ulnar loop occurrence was found for actinic keratosis females when compared with alopecia areata, atopic eczema and psoriasis patients. Significant differences were also found between vitiligo and alopecia, and between vitiligo and atopic eczema patients. In both cases vitiligo showed a significantly higher value for frequency of occurrence of 1 ulnar loop.

For finger III of the left hand in female subjects control subjects showed highly significantly greater values for 0 radial loop frequency than found for vitiligo, actinic keratosis and atopic eczema (significant in last case). Alopecia areata showed a highly significantly value for 0 loop occurrence compared to actinic keratosis and a significantly higher value when compared to vitiligo and to atopic eczema. Significantly higher values for 0 ulnar loop occurrence was found for atopic eczema patients compared to vitiligo, BCC and actinic keratosis on LIII. Psoriatic females showed significantly higher values for 0 ulnar loop occurrence

compared to vitiligo and to actinic keratosis.

Control female subjects were found to have a statistically higher value for occurrence of 0 radial loops on left hand finger IV in comparison to psoriasis, vitiligo and BCC patients. Alopecia areata subjects were found to have a significantly higher value for 0 radial loops on LIV in comparison to psoriasis and vitiligo patients. No statistically significant differences were found for ulnar loop scores on LIV or for radial loops on LV. Vitiligo patients had a higher 0 ulnar loop value compared to atopic eczema patients on LV which was found to be statistically significant.

Table 6.27 shows a summary of the significant results for the intergroup Mann-Whitney U Test comparisons. For males there were 52 significant differences shown and for females 105 out of a possible total of 420. Both were found statistically significant using the χ^2 test not to have happened by chance alone of the 5% level of significance.

Table 6.27 - Table showing numbers of significant differences found for Mann-Whitney U Test intergroup comparisons

(a) <u>Males</u>							(b) <u>Females</u>						
AA	1						AA	9					
Psor	2	0					Psor	6	3				
A.Ecz	5	3	1				A.Ecz	6	2	0			
A.Ker	2	2	0	4			A.Ker	0	5	7	5		
BCC	4	3	0	5	0		BCC	1	2	5	4	2	
Cont	4	3	2	6	3	2	Cont	10	2	5	6	7	8
	Vit	AA	Psor	A.Ecz	A.Ker	BCC		Vit	AA	Psor	A.Ecz	A.Ker	BCC

From Table 6.27(a) it can be seen that the greatest number of significant differences were shown by atopic eczema males (24 differences), controls (20) and vitiligo (18). In Table 6.27(b) vitiligo females showed 32 differences, controls (38), psoriasis (26), alopecia (33) and BCC (22).

Tables 6.28 to 6.32 and Figures 6.7 and 6.8 show the results of discriminant analysis of male subjects for the variables RPR1 to LPU5. The canonical discriminant functions are set out in Table 6.28 and show that Function 1 takes out 43.24% of the total variance. Functions 1 to 3 combined take out 43.24% of the variance. Tables 6.29 and 6.30 show the variables and the contribution they make to each of the functions. Loop scores on fingers II, IV and V of both hands are the most prominent variables in Functions 1 and 2 using which the territorial map (Figure 6.7) and scatterplot (Figure 6.8) are plotted. Table 6.31 shows the F statistics and significances between the various pairs of groups. Those groups shown to be highly significantly furthest apart are controls and vitiligo ($F = 3.7398$) followed by atopic eczema and BCC ($F = 3.4719$). The next sequence of groups furthest apart and showing high statistical significance are all of the remaining disorder groups compared to controls. The territorial map (Figure 6.5) shows the distribution of groups most distinct from one another. These are controls (Group 1), atopic eczema (3), vitiligo (8) and BCC (4). Figure 6.7 shows a scatterplot for all of the groups. The cases in this scatterplot appear to be more spread out than for the last set of variables. The group controls are also more dispersed. It can be seen that controls have their centroid removed from the other groups centroids which are more clustered in the centre. There is, however, much overlap between the groups even though there are significant differences between those mentioned above. Figure 6.9 shows the centroids from the scatterplot and their relationship to one another. The Figures 6.7 to 6.9 show that this set of variables, along with female subjects, spread out the centroids, so that they are further apart than, in the other plots carried out up to this point.

The classification results for males (variables RPR1 to LPU5) are shown in Table 6.32. The groups with the greatest percentages of correctly classified cases are BCC (29.8% correct) and atopic eczema (29.7% correct). Overall the percentages of grouped cases correctly classified are only 20.17%.

The results of discriminant analysis for females are shown in Tables 6.33 to 6.37 and in Figures 6.10 to 6.11. Canonical discriminant functions are shown in Table 6.33 and it can be seen

Table 6.28 - Males: Variables RFR1 to LPU5CANONICAL DISCRIMINANT FUNCTIONS

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.05218	43.24	43.24	0.2226337
2*	0.03133	25.97	69.20	0.1742991
3*	0.01809	14.99	84.20	0.1333126
4*	0.00965	8.00	92.20	0.0977357
5*	0.00751	6.22	98.42	0.0863237
6*	0.00190	1.58	100.00	0.0435892

Table 6.29 - Males: Variables RPR1 to LPRU5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
RPU1	-0.37006	-0.23066	0.12645	0.21180	0.13448	0.26956
RPR2	-0.85064	0.65292	0.13711	-0.02731	-0.77516	0.16753
RPU2	-0.72973	0.18807	-0.35375	0.14760	-0.33297	0.17777
RPU3	0.18515	0.19911	-0.35063	0.09909	-0.00118	-0.63656
RPR4	0.06724	-0.19155	0.60687	-0.24520	0.34832	-0.53125
LPU1	0.27236	0.31272	0.10339	0.08811	0.38095	0.14866
LPR2	0.79522	0.23528	-0.31070	0.55710	0.51702	0.52057
LPU2	0.73535	-0.21020	-0.17823	0.75028	-0.14434	0.16265
LPR3	0.24354	-0.47126	0.15165	-0.64944	-0.29162	0.27286
LPU3	-0.08694	-0.39083	0.53283	0.34001	0.02485	0.16248
LPU4	0.23916	0.43339	0.26209	0.07919	-0.24544	-0.27878
LPR5	-0.59685	0.00868	-0.15794	-0.03021	0.48801	-0.33977
LPU5	0.32050	-0.03181	-0.13880	-0.30926	0.26695	-0.02462

Table 6.30 - Males: Variable RPR1 to LPU5

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
LPR5	-0.45166*	-0.05496	-0.03072	-0.06164	0.41239	-0.23157
LPU5	0.34711*	0.16729	0.07581	-0.10136	0.20324	-0.09780
RPR5	-0.29271*	-0.09909	0.12439	-0.08646	0.20340	-0.18893
RPU4	0.13586*	0.08445	0.07915	0.07483	0.12175	-0.05842
RPR2	-0.22133	0.56479*	0.43430	-0.05600	-0.25820	0.16966
LPR2	0.08268	0.40962*	0.01547	-0.06356	0.36437	0.38489
LPU4	0.32525	0.40047*	0.31497	0.05527	-0.10525	-0.26884
RPU2	-0.08352	-0.34534*	-0.33381	0.28076	0.05325	-0.08913
RPR4	-0.02587	-0.12129	0.53642*	-0.05165	0.20607	-0.27940
RPR3	-0.05378	-0.14599	0.25657*	-0.18150	0.00394	0.16904
LPR4	-0.08850	-0.09344	0.23990*	0.04871	0.08852	-0.11053
RPR1	-0.06803	-0.05897	0.16465*	0.00841	0.02851	-0.00231
LPR1	-0.04887	-0.03649	0.08078*	0.02821	0.03235	0.00099
LPU3	-0.00408	-0.19178	0.48316	0.53708*	0.04109	-0.10066
LPR3	0.12021	-0.29368	0.09147	-0.48336*	-0.09594	0.15917
LPU2	0.13207	-0.42981	0.04171	0.48069*	-0.34458	-0.19242
LPU1	0.11497	0.25161	0.24811	0.14988	0.41360*	0.16485
RPU1	-0.11091	-0.03660	0.21296	0.22241	0.29583*	0.22980
RPU5	0.18220	0.12886	0.10504	-0.03400	0.21440*	-0.03067
RPU3	0.15696	0.09449	-0.21710	0.24931	-0.00579	-0.62895*

Table 6.31 - Males: Variables RPR1 to LPU5

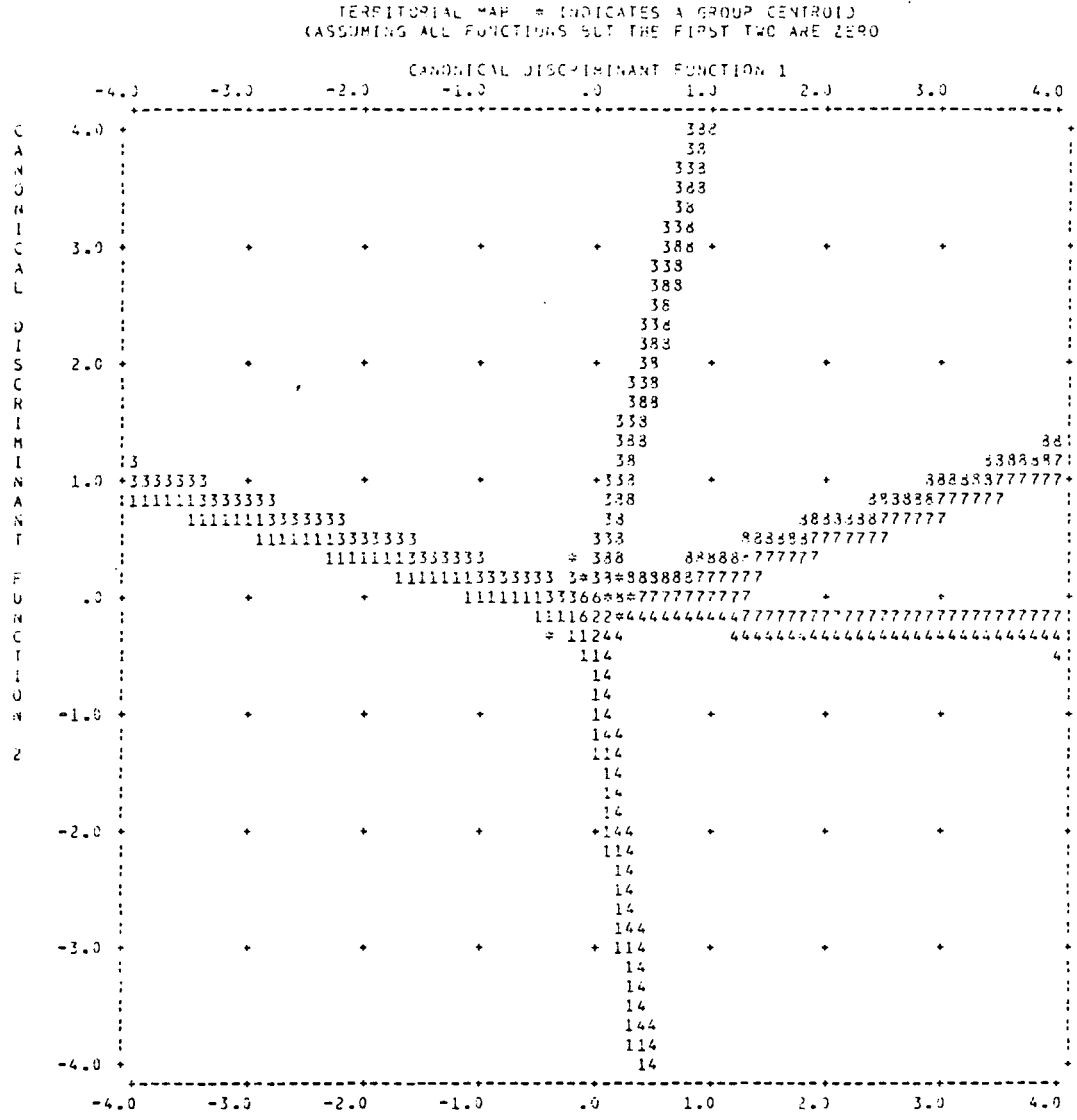
F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

GROUP	GROUP	0	1	2	3	5	6
1		2.3255 0.0047					
2		2.6497 0.0011	2.0591 0.0141				
3		3.4305 0.0000	1.0912 0.3621	3.4719 0.0000			
5		2.0700 0.0135	1.0040 0.4446	1.5822 0.0836	1.9291 0.0235		
6		2.8975 0.0004	0.81526 0.6443	2.1792 0.0087	0.62235 0.8370	1.7341 0.0489	
7		3.7398 0.0000	1.1633 0.3012	2.4876 0.0023	1.8761 0.0288	1.0810 0.3713	0.97389 0.4750

Code Group

- 0 -- Controls
- 1 -- Psoriasis
- 2 -- Atopic Eczema
- 3 -- BCC
- 5 -- Alopecia areata
- 6 -- Actinic Keratosis
- 7 -- Vitiligo

Figure 6.7 - Territorial Map - Males: Variables RPR1 to LPU5



Code Group

- 1 - Controls
- 2 - Psoriasis
- 3 - Atopic Eczema
- 4 - BCC
- 6 - Alopecia areata
- 7 - Actinic Keratosis
- 8 - Vitiligo

Table 6.32 - Males: Variables RPR1 to LPU5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	191	41 21.5%	10 5.2%	32 16.8%	21 11.0%	2 1.0%	16 8.4%	69 36.1%
GROUP	1	192	16 8.3%	16 8.3%	48 25.0%	37 19.3%	4 2.1%	21 10.9%	50 26.0%
GROUP	2	192	27 14.1%	12 6.2%	57 29.7%	25 13.0%	3 1.6%	20 10.4%	48 25.0%
GROUP	3	208	14 6.7%	17 8.2%	34 16.3%	62 29.8%	4 1.9%	23 11.1%	54 26.0%
GROUP	5	202	25 12.4%	13 6.4%	50 24.8%	24 11.9%	9 4.5%	19 9.4%	62 30.7%
GROUP	6	127	3 2.4%	9 7.1%	26 20.5%	36 28.3%	1 0.8%	12 9.4%	40 31.5%
GROUP	7	187	16 8.6%	14 7.5%	36 19.3%	27 14.4%	8 4.3%	21 11.2%	65 34.8%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 20.17%

Table 6.33 - Males: RPR1 to LPU5CANONICAL DISCRIMINANT FUNCTIONS

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.05601	33.49	33.49	0.2303011
2*	0.04513	27.02	60.51	0.2079173
3*	0.02998	17.93	78.43	0.1706132
4*	0.02106	12.59	91.03	0.1436298
5*	0.00920	5.50	96.53	0.0954312
6*	0.00581	3.47	100.00	0.0759334

Table 6.34 - Females: Variables RPR1 to LPU5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
RPR1	0.01510	-0.56341	0.43438	-0.51267	-0.12180	0.56282
RPR2	0.09947	0.49514	0.23904	0.10998	0.61001	-0.16520
RPU2	-0.25570	0.86814	0.11691	-0.03310	0.09682	0.45186
RPR3	0.34075	0.53703	0.27071	0.00233	0.13789	-0.29999
RPU3	0.15990	0.24636	-0.23595	-0.38501	0.15836	-0.19008
RPR4	0.19924	-0.47901	-0.19150	0.25312	-0.31094	0.01961
RPU4	0.11593	-0.12782	0.33071	0.28946	-0.22200	0.31415
RPR5	-0.41073	0.04108	0.27560	0.53019	-0.07772	-0.10000
RPU5	0.38394	-0.16234	0.15082	0.30678	0.27542	0.01423
LPR1	-0.16611	0.21242	0.02967	0.48471	-0.27152	-0.53849
LPU1	0.30973	0.00184	0.22684	0.14528	0.01098	0.38534
LPR2	0.43427	0.15188	-0.34134	0.12425	-0.66286	0.35507
LPU2	0.35525	-0.07479	0.35257	-0.27256	-0.52271	-0.33593
LPR3	0.19289	-0.12905	-0.45278	0.03917	-0.29578	-0.06528
LPU3	-0.23749	0.26219	0.14804	0.15597	0.35454	0.31195
LPR4	-0.01192	-0.32517	0.01060	-0.69974	0.62211	0.05223
LPU4	-0.33003	-0.12811	-0.33140	0.00707	0.21988	-0.15424

that Function 1 accounts for only 33.49% of the total variance. The two functions used in the scatterplot (Function 1 and 2) only contribute to 60.51% of the variance. Table 6.35 shows that Function 1 has seven variables contributing to it, those being the radial scores for finger II, III and IV on both hands along with the ulnar score for finger V on the right hand. Function 2 relies upon the ulnar loop score for right hand finger II.

The F statistics and significances between pairs of groups are shown in Table 6.36. Eleven out of twenty one of the comparisons shown highly significant differences at the 1% level. The groups furthest apart are controls and actinic keratosis ($F = 3.4556$), controls and atopic eczema ($F = 3.2367$), BCC and actinic keratosis ($F = 3.1423$) and controls and BCC ($F = 3.0036$). Figure 6.10 shows the most widely separated groups are controls, atopic eczema and actinic keratosis. The all groups scatterplot (Figure 6.11) shows that there is great overlap between the groups and Figure 6.12 shows the position of the group centroids relative to one another. Classification results are shown in Table 6.37 and overall 23.54% of cases were correctly classified. The greatest number of correctly classified cases were in actinic keratosis (38.3% correct) followed by BCC (33.8% correct).

When the groups were reclassified into larger groups by aetiology type the results are shown in Tables 6.38 and 6.39.

For male subjects a highly significant statistical difference exists between genodermatoses (GD) and non-genetic dermatoses (ND) for ulnar loop scores on the first finger of the right hand (RI). The GD group shows a higher incidence of 0 ulnar loop scores and lower incidence of 1 ulnar loop score when compared to ND. On the left hand finger I a significant difference is shown for ulnar loop scores between control subjects and the GD group with control males having a higher incidence of 0 loops and lower incidence of 1 loop. On finger II of the right hand statistically significant differences are found between controls and GD and between controls and ND. In both cases controls have a higher incidence for 1 loop and lower incidence for 0 loops. On the left finger II controls again show a significant difference in ulnar loop scores between controls and GD with controls having a higher incidence of

Table 6.35 - Females: Variables RPR1 to LPU5

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
RPR2	0.49510*	0.05427	0.05507	0.22202	0.36147	-0.22733
LPR2	0.49434*	0.17560	-0.37133	0.21105	-0.14530	0.34225
RPR3	0.49022*	0.31607	0.26483	0.04097	-0.08800	-0.23642
LPR3	0.44239*	0.09455	-0.13621	-0.00622	-0.27740	-0.18879
RPR4	0.38920*	-0.17748	0.04313	0.02656	-0.10761	0.01302
RPU5	0.38794*	-0.19680	0.14460	0.30001	0.31652	0.06729
LPR4	0.36225*	-0.07361	0.09253	-0.28231	0.12857	0.04384
RPU2	-0.14133	0.46633*	0.18520	-0.28573	-0.34427	0.31237
LPU2	0.09972	0.13614	0.55494*	-0.37465	-0.21355	-0.31054
RPR1	0.11360	-0.22127	0.50303*	-0.21805	-0.29927	0.17816
RPR5	-0.10718	0.02423	0.28444	0.35619*	-0.11794	-0.12569
RPU3	0.10845	0.18226	-0.07574	-0.26993*	0.14245	0.08194
LPR5	0.08895	0.09047	0.12438	0.13489*	-0.13403	-0.12169
LPR1	0.06479	0.01065	0.34433	0.05718	-0.37271*	-0.16355
LPU3	-0.03604	0.23375	0.22169	0.01495	0.36033*	0.27849
LPU4	-0.12272	-0.06539	-0.06974	0.20541	0.22051*	0.11783
LPU1	0.26295	0.00978	0.20556	0.16300	0.07538	0.41597*
RPU4	0.06155	-0.08495	0.20286	0.28287	0.05443	0.30042*
RPU1	0.19354	0.05796	0.12003	0.03532	0.06041	0.20095*
LPU5	-0.00889	0.02013	0.02396	0.03588	0.07916	0.07983*

Table 6.36 - Females: Variables RPR1 to LPU5

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

GROUP	GROUP	0	1	2	3	5	6
1		2.6159 0.0003					
2		3.2367 0.0000	1.0162 0.4369				
3		3.0036 0.0000	1.7347 0.0316	2.1349 0.0046			
5		1.7448 0.0302	1.9877 0.0096	1.7785 0.0259	1.6893 0.0387		
6		3.4556 0.0000	2.3691 0.0013	2.8482 0.0001	3.1423 0.0000	2.6930 0.0002	
7		2.7252 0.0002	0.99699 0.4587	1.4158 0.1198	1.3635 0.1458	1.8011 0.0234	1.1671 0.2843
<u>Code</u>	<u>Group</u>						

0 - Controls
1 - Psoriasis
2 - Atopic Eczema
3 - SCC
5 - Alopecia areata
6 - Actinic Keratosis
7 - Vitiligo

Figure 6.10 - Territorial Map - Females: Variables RPR1 to LPU5

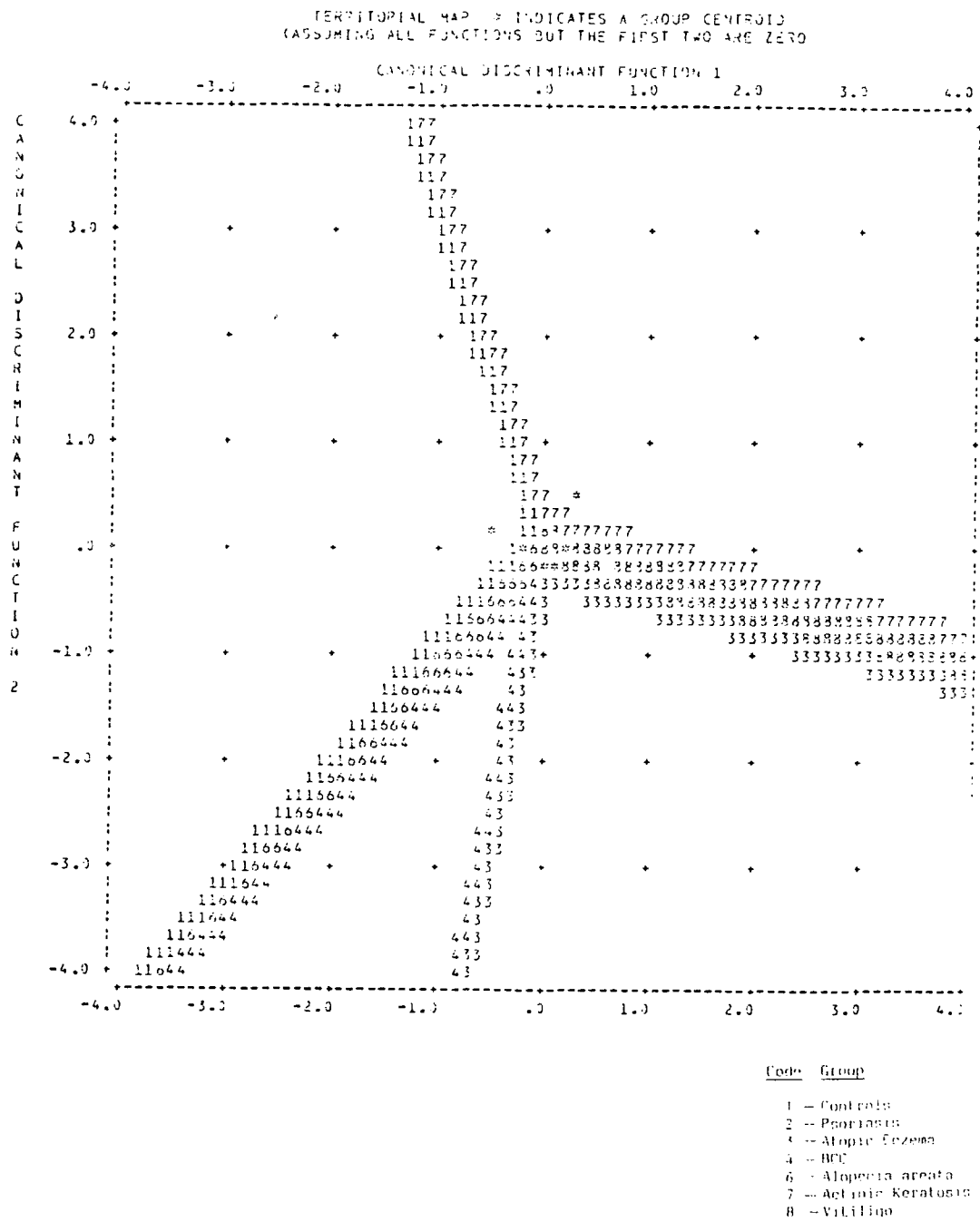


Figure 6.11 - Scatterplot - Females: Variables RPR1 to LPU5

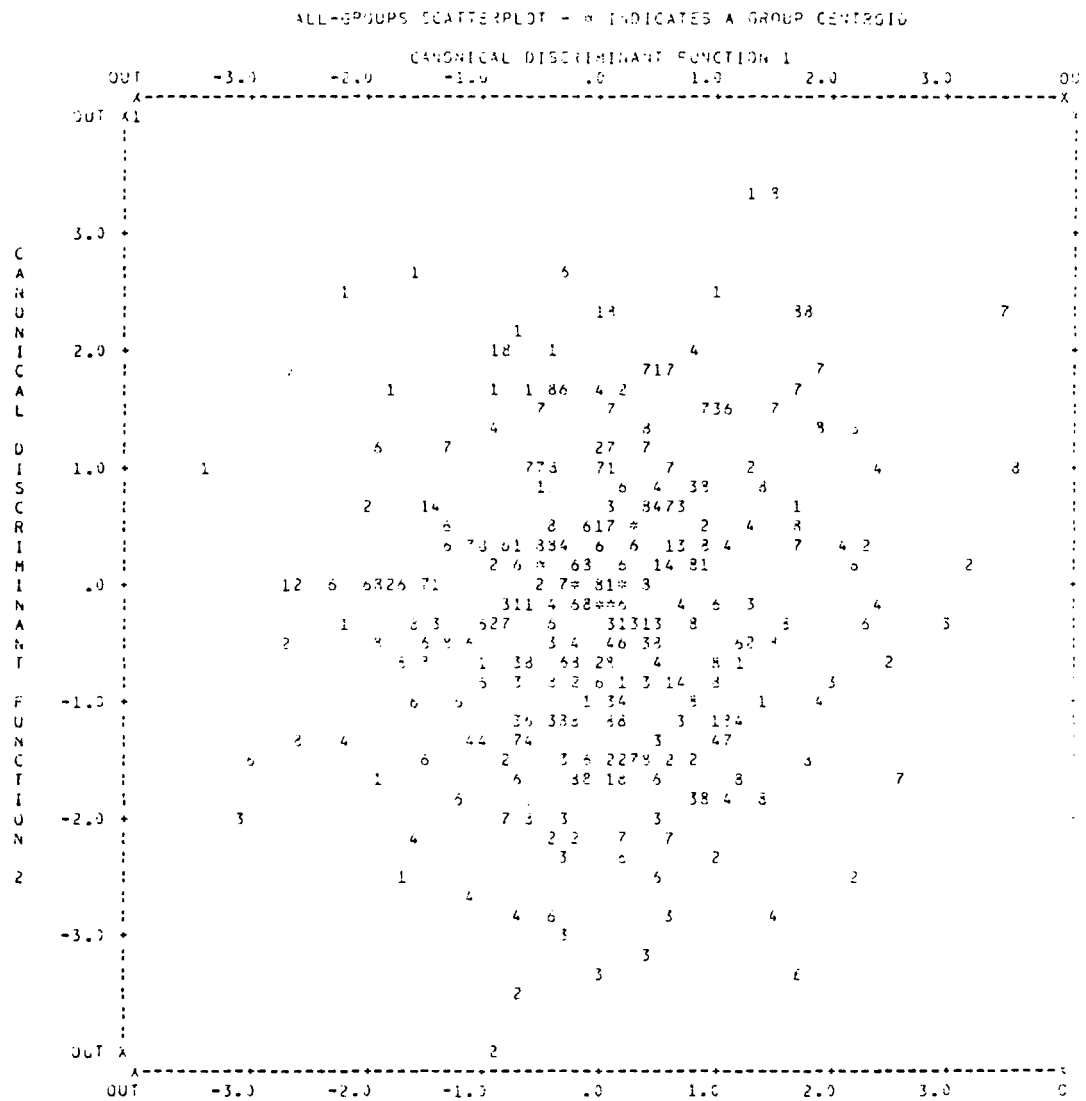


Figure 6.12 - Group Centroids

[illegible]

<u>Code</u>	<u>Group</u>

- 1 - Controls
2 - Psoriasis
3 - Atopic Eczema
4 - BCC
6 - Alopecia areata
7 - Actinic Keratosis
8 - Vitiligo

Table 6.37 - Females: Variables RPR1 to LPU5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	191	53 27.7%	14 7.3%	26 13.6%	37 19.4%	24 12.6%	26 13.6%	11 5.8%
GROUP	1	186	33 17.7%	33 17.7%	23 12.4%	34 18.3%	21 11.3%	33 17.7%	9 4.8%
GROUP	2	190	21 11.1%	18 9.5%	41 21.6%	37 19.5%	32 16.8%	35 18.4%	6 3.2%
GROUP	3	195	29 14.9%	13 6.7%	23 11.8%	66 33.8%	21 10.8%	33 16.9%	10 5.1%
GROUP	5	193	41 21.2%	18 9.3%	21 10.9%	42 21.8%	41 21.2%	25 13.0%	5 2.6%
GROUP	6	167	39 23.4%	7 4.2%	14 8.4%	22 13.2%	16 9.6%	64 38.3%	5 3.0%
GROUP	7	199	35 17.6%	24 12.1%	19 9.5%	35 17.6%	30 15.1%	43 21.6%	13 6.5%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 23.54%

Table 6.38 Frequencies : Finger Loop Scores – Subjects Grouped by Disorder Type

(a)

Right Hand			RPR1			RPU1			RPR2			RPU2			RPR3		
Group	Sex	No.	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2
Cont	M	206	53.4	46.6	0.0	4.4	95.6	0.0	44.4	55.6	0.0	20.9	79.1	0.0	79.0	21.0	0.0
GD	M	816	58.0	42.0	0.0	5.1	94.9	0.0	38.2	61.4	0.4	29.5	70.5	0.0	83.4	16.6	0.0
ND	M	340	54.7	45.3	0.0	1.5	98.5	0.0	40.7	59.3	0.0	29.0	71.0	0.0	79.4	20.6	0.0
Cont	F	203	68.5	31.5	0.0	6.4	93.6	0.0	55.7	43.8	0.5	19.3	80.2	0.5	90.6	9.4	0.0
GD	F	819	67.0	33.0	0.0	6.6	93.4	0.0	42.1	57.9	0.0	30.2	69.8	0.0	85.0	15.0	0.0
ND	F	374	60.7	39.3	0.0	4.0	96.0	0.0	37.7	62.3	0.0	25.4	74.6	0.0	77.8	22.2	0.0

Right Hand			RPU3			RPR4			RPU4			RPR5			RPU5		
Group	Sex	No.	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2
Cont	M	206	4.9	95.1	0.0	51.7	48.3	0.0	1.0	99.0	0.0	78.5	21.5	0.0	1.0	99.0	0.0
GD	M	816	4.5	95.5	0.0	53.7	46.3	0.0	0.7	99.3	0.0	84.8	15.2	0.0	0.2	99.8	0.0
ND	M	340	3.2	96.8	0.0	48.1	51.9	0.0	0.3	99.7	0.0	88.5	11.5	0.0	0.0	100.0	0.0
Cont	F	203	6.4	93.6	0.0	69.7	30.3	0.0	4.0	95.5	0.5	89.6	10.4	0.0	4.0	96.0	0.0
GD	F	819	6.5	93.5	0.0	58.9	41.1	0.0	1.7	98.3	0.0	89.8	10.2	0.0	0.5	99.5	0.0
ND	F	374	4.3	95.7	0.0	56.4	43.6	0.0	1.1	98.9	0.0	87.4	12.6	0.0	0.0	100.0	0.0

Table 6.38 continued

(b)

Left Hand			LPR1			LPU1			LPR2			LPU2			LPR3		
Group	Sex	No.	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2
Cont	M	206	61.2	38.8	0.0	1.9	98.1	0.0	50.0	50.0	0.0	24.8	75.2	0.0	83.5	16.5	0.0
GD	M	816	61.2	38.8	0.0	0.5	99.5	0.0	40.0	59.9	0.1	32.4	67.6	0.0	85.0	15.0	0.0
ND	M	340	62.4	37.6	0.0	0.9	99.1	0.0	43.2	56.5	0.3	22.9	77.1	0.0	79.7	20.3	0.0
Cont	F	203	70.0	30.0	0.0	4.9	95.1	0.0	57.1	42.9	0.0	27.6	72.4	0.0	89.2	10.8	0.0
GD	F	819	71.0	29.0	0.0	2.1	97.9	0.0	46.9	53.1	0.0	31.1	68.8	0.1	83.2	16.8	0.0
ND	F	374	63.9	36.1	0.0	1.1	98.9	0.0	48.4	51.6	0.0	20.3	79.7	0.0	80.7	19.3	0.0

Left Hand			LPU3			LPR4			LPU4			LPR5			LPU5		
Group	Sex	No.	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2
Cont	M	206	5.3	94.7	0.0	58.7	40.8	0.5	3.4	96.6	0.0	84.0	16.0	0.0	1.5	98.5	0.0
GD	M	816	5.8	94.2	0.0	58.9	41.1	0.0	0.9	99.1	0.0	88.7	11.3	0.0	0.2	99.8	0.0
ND	M	340	2.1	97.9	0.0	56.8	43.2	0.0	0.6	99.4	0.0	92.9	7.1	0.0	0.0	100.0	0.0
Cont	F	203	5.4	94.6	0.0	70.4	29.6	0.0	2.5	97.5	0.0	91.1	8.9	0.0	1.5	98.5	0.0
GD	F	819	7.3	92.7	0.0	63.8	36.2	0.0	2.3	97.7	0.0	91.2	8.8	0.0	0.9	99.1	0.0
ND	F	374	4.8	95.2	0.0	60.4	39.6	0.0	1.6	98.4	0.0	89.6	10.4	0.0	0.5	99.5	0.0

Table 6.39 – Mann-Whitney U Test Results: Finger Loop Scores

Subjects grouped by disorder type

			Variables & Probabilities (**=highly significant *=significant)				
Sex	Gp1	GP2	RPR1	RPU1	RPR2	RPU2	RPR3
M	Cont	GD	0.2039	0.5017	0.1776	0.0187*	0.0953
M	Cont	ND	0.7011	0.0643	0.5692	0.0442*	0.7922
M	GD	ND	0.3079	0.0039**	0.3893	0.8661	0.1002
F	Cont	GD	0.6216	0.9354	0.0008**	0.0021**	0.0434*
F	Cont	ND	0.0537	0.1970	0.0001**	0.0902	0.0001**
F	GD	ND	0.0345*	0.0764	0.1512	0.0991	0.0021**

			Variables & Probabilities (**=highly significant *=significant)				
Sex	Gp1	GP2	RPRPU3	RPR4	RPU4	RPR5	RPU5
M	Cont	GD	0.7732	0.4578	0.7020	0.0450*	0.1259
M	Cont	ND	0.3038	0.5500	0.2861	0.0027**	0.0647
M	GD	ND	0.3140	0.0829	0.3788	0.0979	0.3612
F	Cont	GD	0.9887	0.0061**	0.1268	0.9079	0.0000**
F	Cont	ND	0.2530	0.0022**	0.0619	0.4469	0.0001**
F	GD	ND	0.1289	0.4119	0.3967	0.2132	0.1758

Table 6.39 continued

			Variables & Probabilities (**=highly significant *=significant)				
Sex	Gp1	GP2	LPR1	LPU1	LPR2	LPU2	LPR3
M	Cont	GD	0.9279	0.0305*	0.0136*	0.0312*	0.7159
M	Cont	ND	0.2438	0.2680	0.1493	0.6803	0.2170
M	GD	ND	0.7023	0.4338	0.3176	0.0014**	0.0265*
F	Cont	GD	0.8381	0.0228*	0.0105*	0.3653	0.0394*
F	Cont	ND	0.1221	0.0039**	0.0507	0.0439*	0.0096**
F	GD	ND	0.0138*	0.2195	0.6267	0.0001**	0.2960

			Variables & Probabilities (**=highly significant *=significant)				
Sex	Gp1	GP2	LPU3	LPR4	LPU4	LPR5	LPU5
M	Cont	GD	0.4322	0.7671	0.0041**	0.0674	0.0231
M	Cont	ND	0.1065	0.8175	0.0108*	0.0010**	0.0237*
M	GD	ND	0.0065**	0.4933	0.6348	0.0298*	0.3611
F	Cont	GD	0.3429	0.0852	0.9021	0.9688	0.4185
F	Cont	ND	0.7406	0.0187*	0.4665	0.5611	0.2411
F	GD	ND	0.1014	0.2574	0.4189	0.3772	0.5505

1 loop and lower incidence of 0 loops. A significantly lower incidence of 1 loop and higher incidence of 0 loops is found between controls and GD subjects for radial loop scores on LII. A highly significant difference was found between GD and ND males for ulnar loop scores on LII with ND subjects having a higher incidence of 1 loop and a lower incidence of 0 loops as compared with GD males. No significant differences exist for any comparison for radial loop scores on RIII but a significant difference for radial loop scores and a highly significant difference for ulnar loop scores was shown for the comparison between GD and ND males. In both cases, GD showed higher scores for 0 loops and lower scores for 1 loop than shown by ND males.

On RIV no significant differences are shown and none are shown either for radial loop scores on LIV in male subjects. When ulnar loop scores were compared, however, a highly significant difference was found between controls and GD and a significant difference between controls and ND patients. In both cases the control males showed a higher incidence of 0 loops and a lower incidence of 1 loop. For finger RV a highly significantly greater incidence of 0 loops and lower incidence of 1 loop was found between controls and ND and the same pattern of differences was found between controls and GD subjects at the 5% level. No significant differences were found for RV ulnar loop scores. On the left hand finger V of males a highly significant greater incidence of 0 loops and a lower incidence of 1 loop was found for radial loops and a significantly higher incidence of 1 loop for ulnar loop scores was also shown. GD males showed a significantly higher occurrence of 0 radial loop scores and smaller occurrence of 1 radial loop scores.

For female subjects GD showed a significantly higher incidence of 0 loops and significantly lower occurrence of 1 loop when compared to ND for finger I of both right and left hands. On the left hand control females showed a highly significantly greater incidence of 0 loops when compared to ND and a significant difference compared to GD. On RII highly significant differences were found between controls when compared to each of GD and ND for radial loop scores and for ulnar loop scores between controls and GD. Controls had a higher frequency of occurrence of 0 radial loops and

lower occurrence of 1 radial loop compared to the other two groups and a higher occurrence of 1 ulnar loop and lower occurrence of 0 ulnar loops compared to GD. On LII controls showed a significantly higher value for 0 loops and significantly lower value for 1 loop compared to GD for radial loop scores. When control females were compared to ND females for ulnar loop scores on LII a significantly higher incidence of 1 loops was found. ND female subjects showed a highly significantly greater incidence of 1 loop and lower incidence of 0 loops compared with GD for this variable. On finger III of the right hand for radial loop scores, control females showed a higher incidence of 1 loop and lower incidence of 0 loops which was significantly different in comparison to GD and highly significantly different when compared to ND. ND females showed a highly significantly greater incidence of 1 loop and lower incidence of 0 loops in comparison to GD. The same differences are shown on LIII for radial loop scores, apart from the comparison between GD and ND. No significant differences were found for ulnar scores on either hand for finger III.

Control females were found to have a highly significantly greater frequency of occurrence of 0 loops when compared to both GD and to ND females for radial loop scores on RIV. On LIV controls again showed a significantly higher occurrence of 0 radial loops compared to ND females. No significant differences were found for ulnar loop scores on finger V of either hand nor for ulnar loop scores on LV. On R5, however, highly significantly greater occurrence of 0 loops was found in control females than in either of GD or ND females.

The number of significant differences between the groups when subjects were compared after regrouping are shown in Table 6.40.

Table 6.40 - Number of significant differences from Mann-Whitney U Test Results

Variables RPR1 to LPU5

(a) Males			(b) Females		
GROUPS	GD	ND	GROUPS	GD	ND
Cont.	5	5	Cont.	10	8
ND	5		ND	4	

As can be seen female subjects showed the greater number of significant differences (22/60) than for males (26/60). Both were found to be greater than would have happened by chance alone using the χ^2 test.

(iii) Finger Delta Scores (Variables RD1 to LD5)

The results for finger delta scores, i.e. the number of triradii present on each finger, are shown in Table 6.41. The Mann-Whitney U Test probabilities are shown in Table 6.42 and a summary of the statistically significant differences found is given in Table 6.43.

For male subjects a greater number of statistically significant intergroup differences was found on the right hand (17 differences) compared to 9 found on the left. On finger I vitiligo male subjects showed a statistically significantly smaller number of deltas compared to atopic eczema and to BCC for the right hand. On the left hand vitiligo patients again were found to have a statistically significant decrease in mean delta score compared to psoriasis patients. For finger I on both hands the smallest delta scores were found in vitiligo patients in comparison to all other groups.

On finger II of the right hand atopic eczema males had a significantly higher mean delta score when compared with controls, alopecia areata and actinic keratosis subjects. This difference in score was found to be statistically highly significant when atopic eczema was compared with psoriasis, vitiligo and BCC for finger RII. No significant differences in delta scores were found for fingers LII or RIII. On LIII actinic keratosis patients were found to have a significantly greater mean delta score in comparison to vitiligo patients. BCC male subjects were found to have significantly greater mean value for delta score on LIII in comparison to both vitiligo and atopic eczema.

Vitiligo male patients on finger RIV had a significantly smaller mean delta score when compared to psoriasis, atopic eczema and to BCC. The BCC males also had a significantly greater mean value for delta scores when compared to alopecia areata males. On LIV eczema patients had a significantly higher mean delta score when

Table (a) Means and Standard Deviations - Finger Delta Scores (RD1 to LD5). Males.

6.41

		Variables				
		RD1	RD2	RD3	RD4	RD5
Group	Cases	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.
Control	206	3.146 +/- 1.346	3.272 +/- 2.220	2.544 +/- 1.743	3.403 +/- 2.118	2.908 +/- 2.225
Psoriasis	202	3.104 +/- 1.267	3.054 +/- 1.942	2.465 +/- 2.809	3.584 +/- 2.254	2.609 +/- 1.911
Atop Ecz	203	3.163 +/- 1.266	3.655 +/- 3.200	2.443 +/- 1.644	3.690 +/- 3.232	2.867 +/- 3.151
Vitiligo	201	2.896 +/- 1.243	2.826 +/- 1.298	2.279 +/- 0.934	3.199 +/- 1.852	2.458 +/- 1.439
Alop Are	210	2.971 +/- 1.319	3.029 +/- 1.414	2.290 +/- 0.952	3.205 +/- 1.775	2.419 +/- 1.274
BCC	211	3.171 +/- 1.376	3.062 +/- 1.743	2.545 +/- 1.651	3.588 +/- 2.192	2.569 +/- 1.934
Act Ker	129	3.109 +/- 1.312	3.039 +/- 1.301	2.364 +/- 0.838	3.380 +/- 1.764	2.450 +/- 1.484

		Variables				
		LD1	LD2	LD3	LD4	LD5
Group	Cases	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.
Control	206	2.937 +/- 1.369	2.927 +/- 1.558	2.311 +/- 1.059	3.291 +/- 2.051	2.539 +/- 1.516
Psoriasis	202	3.059 +/- 1.252	3.030 +/- 1.360	2.308 +/- 1.012	3.158 +/- 1.679	2.406 +/- 1.267
Atop Ecz	203	3.000 +/- 1.305	2.985 +/- 1.533	2.129 +/- 0.849	3.576 +/- 2.101	2.409 +/- 1.241
Vitiligo	201	2.811 +/- 1.251	2.975 +/- 1.409	2.164 +/- 0.915	3.124 +/- 1.816	2.229 +/- 0.942
Alop Are	210	3.033 +/- 1.269	2.924 +/- 1.269	2.286 +/- 0.980	2.962 +/- 1.683	2.262 +/- 0.860
BCC	211	3.005 +/- 1.416	2.995 +/- 1.267	2.493 +/- 1.144	3.104 +/- 1.638	2.242 +/- 0.963
Act Ker	129	2.938 +/- 1.298	3.062 +/- 1.137	2.388 +/- 0.938	3.264 +/- 1.739	2.248 +/- 1.090

Table (B) Means and Standard Deviations - Finger Delta Scores (RD1 to LD5). Females.
6.41

		Variables				
		RD1	RD2	RD3	RD4	RD5
Group	Cases	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.
Control	203	2.877 +/- 1.620	3.320 +/- 4.083	2.182 +/- 1.542	2.995 +/- 2.391	2.438 +/- 1.937
Psoriasis	205	2.741 +/- 1.271	2.946 +/- 1.807	2.254 +/- 1.031	3.039 +/- 1.720	2.273 +/- 1.206
Atop Ecz	203	2.768 +/- 1.317	2.872 +/- 1.562	2.241 +/- 1.265	3.167 +/- 1.766	2.448 +/- 1.516
Vitiligo	205	2.995 +/- 1.297	3.659 +/- 6.479	2.659 +/- 3.081	3.507 +/- 3.322	2.615 +/- 2.256
Alop Are	206	2.830 +/- 1.755	2.898 +/- 1.582	2.340 +/- 2.887	3.175 +/- 2.226	2.801 +/- 3.130
BCC	202	3.208 +/- 1.455	3.005 +/- 1.498	2.332 +/- 1.148	3.282 +/- 1.857	2.480 +/- 1.404
Act Ker	174	2.741 +/- 1.176	3.483 +/- 1.833	2.575 +/- 1.199	3.282 +/- 1.889	2.416 +/- 1.334

		Variables				
		LD1	LD2	LD3	LD4	LD5
Group	Cases	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.
Control	203	2.734 +/- 1.525	2.768 +/- 1.761	2.148 +/- 0.855	2.975 +/- 1.923	2.227 +/- 0.969
Psoriasis	205	2.590 +/- 1.298	2.839 +/- 1.787	2.234 +/- 1.210	3.073 +/- 1.812	2.229 +/- 0.986
Atop Ecz	203	2.693 +/- 1.280	2.926 +/- 1.414	2.310 +/- 1.281	2.852 +/- 1.512	2.232 +/- 1.030
Vitiligo	205	2.893 +/- 1.729	3.190 +/- 2.409	2.473 +/- 1.607	3.206 +/- 3.030	2.338 +/- 1.572
Alop Are	206	2.752 +/- 1.304	2.840 +/- 2.948	2.277 +/- 2.777	2.874 +/- 1.954	2.573 +/- 2.970
BCC	202	2.960 +/- 1.367	2.708 +/- 1.396	2.282 +/- 1.058	3.040 +/- 1.577	2.426 +/- 1.381
Act Ker	174	2.764 +/- 1.186	3.241 +/- 1.630	2.477 +/- 1.186	3.011 +/- 1.623	2.230 +/- 0.856

Table (a) Mann-Whitney U Test Results – Finger Delta Scores.

6.42(a)

Males.

		Probability (* = significant p<0.05. ** = highly significant p<0.01)				
Group 1	Group 2	RD1	RD2	RD3	RD4	RD5
Controls	Psoriasis	0.8816	0.4482	0.1723	0.5191	0.1829
Controls	Atop Ecz	0.7587	0.0300*	0.5994	0.4269	0.5948
Controls	Vitiligo	0.0715	0.3394	0.1445	0.1539	0.0170*
Controls	Alop Are	0.2576	0.9728	0.3174	0.2821	0.0308*
Controls	BCC	0.7100	0.6386	0.7048	0.2892	0.0299*
Controls	Act Ker	0.9484	0.9275	0.9077	0.8025	0.0139*
Psoriasis	Atop Ecz	0.6507	0.0014**	0.3876	0.8786	0.4083
Psoriasis	Vitiligo	0.1001	0.8994	0.8824	0.0423*	0.2435
Psoriasis	Alop Are	0.3268	0.4038	0.7059	0.0891	0.3881
Psoriasis	BCC	0.6078	0.7547	0.0685	0.6941	0.3608
Psoriasis	Act Ker	0.9488	0.3804	0.2228	0.7418	0.1368
Atop Ecz	Vitiligo	0.0354*	0.0008**	0.3342	0.0316*	0.0512
Atop Ecz	Alop Are	0.1559	0.0118*	0.6384	0.0669	0.0924
Atop Ecz	BCC	0.9335	0.0021**	0.3514	0.8136	0.0858
Atop Ecz	Act Ker	0.7508	0.0330*	0.7071	0.6382	0.0327*
Vitiligo	Alop Are	0.5446	0.3415	0.6330	0.7037	0.7458
Vitiligo	BCC	0.0366*	0.6769	0.0570	0.0150*	0.7818
Vitiligo	Act Ker	0.1420	0.3412	0.1948	0.1263	0.6432
Alop Are	BCC	0.1509	0.5621	0.1542	0.0338*	0.9597
Alop Are	Act Ker	0.3676	0.9103	0.4177	0.2247	0.4486
B.C.C.	Act Ker	0.7131	0.5171	0.6326	0.4830	0.4729

Table 6.42(a) continued

		Probability (* = significant $p < 0.05$. ** = highly significant $p < 0.01$)				
Group 1	Group 2	LD1	LD2	LD3	LD4	LD5
Controls	Psoriasis	0.2752	0.1418	0.8868	0.9062	0.4072
Controls	Atop Ecz	0.5457	0.2780	0.3554	0.1261	0.5690
Controls	Vitiligo	0.3259	0.2174	0.1983	0.4679	0.0169*
Controls	Alop Are	0.3589	0.3229	0.8255	0.2029	0.1790
Controls	BCC	0.6138	0.3169	0.0700	0.8607	0.0188*
Controls	Act Ker	0.9257	0.0687	0.3836	0.5587	0.0198*
Psoriasis	Atop Ecz	0.6522	0.7389	0.2794	0.1284	0.7890
Psoriasis	Vitiligo	0.0340*	0.9254	0.1473	0.3492	0.0965
Psoriasis	Alop Are	0.9193	0.5902	0.9390	0.1376	0.6071
Psoriasis	BCC	0.5891	0.5848	0.0900	0.7592	0.1083
Psoriasis	Act Ker	0.4001	0.5320	0.4546	0.5991	0.0746
Atop Ecz	Vitiligo	0.1185	0.8016	0.7096	0.0198*	0.0583
Atop Ecz	Alop Are	0.7638	0.8480	0.2423	0.0038**	0.4340
Atop Ecz	BCC	0.9239	0.8580	0.0060**	0.0673	0.0663
Atop Ecz	Act Ker	0.6703	0.3514	0.0779	0.3949	0.0512
Vitiligo	Alop Are	0.0648	0.6586	0.1221	0.5815	0.2467
Vitiligo	BCC	0.1483	0.7103	0.0020**	0.5258	0.9423
Vitiligo	Act Ker	0.6703	0.4971	0.0360*	0.1823	0.6887
Alop Are	BCC	0.6953	0.9862	0.0987	0.2318	0.2784
Alop Are	Act Ker	0.5010	0.2574	0.5075	0.0687	0.1758
B.C.C.	Act Ker	0.7379	0.2879	0.4141	0.4254	0.6485

Table (b) Mann-Whitney U Test Results – Finger Delta Scores.

6.42

Females.

		Probability (* = significant $p < 0.05$. ** = highly significant $p < 0.01$)				
Group 1	Group 2	RD1	RD2	RD3	RD4	RD5
Controls	Psoriasis	0.7338	0.3375	0.1419	0.1123	0.6914
Controls	Atop Ecz	0.8601	0.4033	0.4520	0.0171*	0.5023
Controls	Vitiligo	0.1173	0.0041**	0.0007*	0.0030**	0.2361
Controls	Alop Are	0.8756	0.3667	0.8885	0.2185	0.0751
Controls	BCC	0.0049**	0.1032	0.0254*	0.0058**	0.1008
Controls	Act Ker	0.8392	0.0001**	0.0000**	0.0106*	0.2606
Psoriasis	Atop Ecz	0.8651	0.8239	0.5398	0.4386	0.2049
Psoriasis	Vitiligo	0.0411*	0.0571	0.0489*	0.1784	0.0596
Psoriasis	Alop Are	0.8416	0.8613	0.2224	0.7119	0.0128*
Psoriasis	BCC	0.0008**	0.6235	0.4130	0.2474	0.0150*
Psoriasis	Act Ker	0.8960	0.0014**	0.0012**	0.2951	0.0636
Atop Ecz	Vitiligo	0.0608	0.0251*	0.0145*	0.5723	0.5590
Atop Ecz	Alop Are	0.9684	0.9586	0.5696	0.2415	0.2034
Atop Ecz	BCC	0.0014**	0.4515	0.1748	0.7075	0.2664
Atop Ecz	Act Ker	0.9686	0.0004**	0.0003**	0.7596	0.5726
Vitiligo	Alop Are	0.0761	0.0292*	0.0024**	0.0802	0.4639
Vitiligo	BCC	0.1584	0.1363	0.2628	0.8487	0.5802
Vitiligo	Act Ker	0.0593	0.1237	0.1498	0.8131	0.9938
Alop Are	BCC	0.0022**	0.4814	0.0515	0.1233	0.8164
Alop Are	Act Ker	0.9425	0.0004**	0.0000*	0.1633	0.4726
B.C.C.	Act Ker	0.0014**	0.0036**	0.0144*	0.9533	0.5884

Table 6.42(b) continued

		Probability (* = significant $p < 0.05$. ** = highly significant $p < 0.01$)				
Group 1	Group 2	LD1	LD2	LD3	LD4	LD5
Controls	Psoriasis	0.4200	0.4092	0.6417	0.1357	0.9604
Controls	Atop Ecz	0.8785	0.0140*	0.1785	0.5706	0.9906
Controls	Vitiligo	0.2964	0.0009**	0.0047**	0.0585	0.6546
Controls	Alop Are	0.6011	0.6977	0.7341	0.8594	0.4986
Controls	BCC	0.0432*	0.6610	0.1955	0.0731	0.2431
Controls	Act Ker	0.4471	0.0001**	0.0015**	0.1424	0.6344
Psoriasis	Atop Ecz	0.3194	0.1429	0.4425	0.3203	0.9682
Psoriasis	Vitiligo	0.0479*	0.0163*	0.0440*	0.7371	0.6074
Psoriasis	Alop Are	0.1699	0.5745	0.4572	0.0772	0.4663
Psoriasis	BCC	0.0037**	0.6925	0.4907	0.8577	0.2160
Psoriasis	Act Ker	0.0981	0.0031**	0.0193*	0.9390	0.5808
Atop Ecz	Vitiligo	0.3660	0.2104	0.2523	0.1693	0.6565
Atop Ecz	Alop Are	0.6965	0.0221*	0.1181	0.4205	0.5084
Atop Ecz	0.0522	0.0522	0.0609	0.8745	0.2200	0.2529
Atop Ecz	Act Ker	0.5360	0.0623	0.1253	0.3616	0.6330
Vitiligo	Alop Are	0.6096	0.0008**	0.0029**	0.0282*	0.8135
Vitiligo	BCC	0.2461	0.0043**	0.1504	0.8581	0.4482
Vitiligo	Act Ker	0.8133	0.5278	0.6053	0.6686	0.9379
Alop Are	BCC	0.1240	0.8312	0.1225	0.0380*	0.6285
Alop Are	Act Ker	0.8166	0.0001**	0.0010**	0.0850	0.8776
B.C.C.	Act Ker	0.1702	0.0006**	0.0660	0.7942	0.5161

compared to vitiligo males and in comparison to alopecia areata patients the difference was statistically highly significant.

Table 6.43(a) - Finger Delta Scores: Males

DIGIT	RIGHT HAND		LEFT HAND	
	SIG.	H.SIG.	SIG.	H.SIG.
I	A.Ecz.: Vit. BCC : vit.		Psor. : Vit.	
II	Cont. : A.Ecz A.Ecz.: Alop. A.Ecz.: A.Ker	Psor. : A.Ecz A.Ecz.: Vit. A.Ecz.: BCC		
III			Vit. : A.Ker	A.Ecz.: BCC Vit. : BCC
IV	Psor. : Vit. A.Ecz.: Vit. BCC. : Vit. BCC : Alop.		A.Ecz.: Vit.	A.Ecz.: Alop.
V	Cont. : Vit. Cont. : Alop. Cont. : BCC Cont. : A.Ker A.Ecz.: A.Ker		Cont. : Vit. Cont. : BCC Cont. : A.Ker	

On finger V control males had a statistically significantly larger mean delta score when compared to vitiligo, BCC and actinic keratosis patients on both hands. A significant difference was also found between controls and alopecia areata on RV with controls having a higher mean delta score. Actinic keratosis males were also found to have a statistically significantly higher value for mean finger score when compared to atopic eczema patients.

For female subjects there were more significant differences shown in the intergroup comparisons using the Mann-Whitney U Test than for males. A summary of these significant results is shown in Table 6.43(b). Once more there were a greater number of significant differences on the right hand (30) when compared to those on the left hand (20).

On the right hand finger I BCC female patients showed a statistically highly significantly greater mean value for finger

Table 6.43(b) - Delta Scores: Females

DIGIT	RIGHT HAND		LEFT HAND	
	SIG.	H.SIG.	SIG.	H.SIG.
I	Psor. : Vit.	Cont. : BCC Psor. : BCC A.Ecz.: BCC Alop. : BCC BCC : A.Ker.	Cont. : BCC Psor. : Vit.	Psor. : BCC
II	A.Ecz.: Vit. Vit. : Alop.	Cont. : Vit. Cont. : A.Ker. Psor. : A.Ker. A.Ecz.: A.Ker. Alop. : A.Ker. BCC : A.Ker.	Cont. : A.Ecz. Psor. : Vit. A.Ecz.: Alop.	Cont. : Vit. Cont. : A.Ker. Psor. : A.Ker. Vit. : Alop. Vit. : BCC Alop. : A.Ker. BCC : A.Ker.
III	Cont. : Vit. Cont. : BCC Psor. : Vit. A.Ecz.: Vit. Alop. : A.Ker. BCC : A.Ker.	Cont. : A.Ker. Psor. : A.Ker. A.Ecz.: A.Ker. Vit. : Alop.	Psor. : Vit.	Cont. : Vit. Cont. : A.Ker. Vit. : Alop. Alop. : A.Ker.
IV	Cont. : A.Ecz. Cont. : A.Ker.	Cont. : Vit. Cont. : BCC	Vit. : Alop. Alop. : BCC	
V	Psor. : Alop. Psor. : BCC			

delta score in comparison to controls, psoriasis, atopic eczema, alopecia areata and actinic keratosis, and also when compared to vitiligo patients but the latter difference is only statistically significant. Also on finger RI vitiligo had a significantly larger mean delta score when compared to psoriasis patients. BCC females showed a higher mean value for delta score on finger LI which was significant when compared to controls and highly significant compared to psoriasis. Vitiligo patients also were found to have a higher mean value when compared to psoriasis.

Actinic keratosis females were found to have a higher mean delta score for right hand finger II which was shown to be highly significantly different from the scores found in controls, psoriasis, atopic eczema, alopecia areata and BCC female subjects. Vitiligo patients were found to have significantly higher mean values

for delta scores on RII when compared to atopic eczema and alopecia areata. The female vitiligo patients also showed a highly significantly greater value when compared to controls for RII. On the left hand finger II actinic keratosis females again proved to have a highly significantly greater mean delta score when compared to BCC, alopecia areata, psoriasis and controls. Vitiligo females had highly significantly larger mean values compared to controls, alopecia areata and BCC and significantly larger when compared to psoriasis. Atopic eczema female patients also showed a significantly higher mean delta score when compared to controls and to alopecia areata sufferers on LII.

On finger III actinic keratosis female patients showed a highly significantly greater mean value when compared to psoriasis, atopic eczema and control subjects and a significantly greater value compared to alopecia areata and BCC. Vitiligo patients showed higher values which were significant when compared to controls, psoriasis and atopic eczema and highly significant when vitiligo females were compared to alopecia areata probands. BCC females also showed significantly higher mean delta scores compared to controls for RIII. On the left hand finger III actinic keratosis showed a highly significantly larger mean delta score when compared to alopecia areata and controls. Vitiligo females were found to have highly significantly larger mean delta scores than those in alopecia areata and controls and a significantly larger value in comparison to psoriatic females.

On finger IV right hand control female subjects exhibited a lower mean delta score which was shown to be highly significantly different to the scores for vitiligo and BCC and significantly lower than those found in atopic eczema and actinic keratosis. On LIV alopecia areata females were found to have a significantly lower score compared to vitiligo and BCC. Finally on RV psoriasis females were found to have a significantly lower mean delta score in comparison to alopecia areata and BCC subjects. No significant differences were found on left hand finger V for delta scores.

Table 6.44 shows that female subjects had more statistical differences (51/210) compared to males (26/210) when Mann-Whitney U Test intergroup comparisons were carried out for finger delta scores. In males, vitiligo (13) and atopic eczema (12) showed the most

differences whilst in females vitiligo (18) and actinic keratosis (18) showed the greatest number of differences.

Table 6.44 - Summary Table of statistical differences from Mann-Whitney U Tests

(a) Males

Alop. 0
 Psor. 2 0
 A.Ecz. 5 1 1
 A.Ker. 1 0 0 2
 BCC 3 1 0 2 0
 Cont. 2 1 0 1 2 2

V.
 Alop.
 Psor.
 A.Ecz.
 A.Ker.
 BCC

(b) Females

Alop. 5
 Psor. 5 1
 A.Ecz. 2 1 0
 A.Ker. 0 4 3 2
 BCC 1 2 3 1 4
 Cont. 5 0 1 2 5 4

Vit.
 Alop.
 Psor.
 A.Ecz.
 A.Ker.
 BCC

The results of discriminant analysis using the variables RD1 to LD5 are shown in Table 6.45 to 6.54 and Figures 6.13 to 6.18. From Table 6.45 it can be seen that for male subjects Function 1 is responsible for 62.19% of the variance with Function 2 accounting for a further 17.92%. Combined Functions 1 and 2 account for 90.12% of the variance. The contribution made, to each of the function, by the individual variables is shown in Tables 6.46 and 6.47. Eight out of the ten variables appear to be important. Using Function 1 and 2 a territorial map and scatterplot were produced (Figures 6.13 and 6.14). Although there was again much overlap groups 4 (BCC), 3 (atopic eczema) and 8 (vitiligo) can be seen to be those most separated by these function as shown in the territorial map. Figure 6.15 shows the relative postitions of the group centroids. It confirms that BCC, atopic eczema and vitiligo are the most widely separated with groups 6 (alopecia areata), 7 (actinic keratosis), 2 (psoriasis) and 1 (controls) being closer together.

From Table 6.48 there are six pairs of groups which show high F statistics and also high significances of separation. These pairs of groups are, in descending order of F statistics, 2 and 3

Table 6.45 - Males: Finger Delta Scores

CANONICAL DISCRIMINANT FUNCTIONS

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.03291	62.19	62.19	0.1784977
2*	0.00943	17.92	80.12	0.0969300
3*	0.00609	11.51	91.63	0.0778121
4*	0.00315	5.95	97.58	0.0560076
5*	0.00128	2.42	100.00	0.0357838

Table 6.46 - Males: Finger Delta Scores

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5
RD2	0.72875	0.28380	-0.18573	-0.81399	-0.31162
RD4	-0.25229	0.39504	-0.03103	0.95140	-0.53695
LD3	-0.66646	0.67093	0.09607	-0.33234	0.33618
LD4	0.51721	0.08685	-0.43770	0.27868	0.77099
LD5	0.29316	-0.08085	0.99983	0.17649	0.05464

Table 6.47 - Males: Finger Delta Scores

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5
LD3	-0.36984	0.80628*	0.19485	-0.22866	0.35054
RD4	0.16754	0.67534*	-0.07102	0.56782	-0.43403
RD2	0.59494	0.62977*	-0.04622	-0.32005	-0.38061
RD3	0.22749	0.54568*	0.01381	-0.03630	-0.22287
RD5	0.28549	0.47629*	0.07846	0.13247	-0.29131
LD2	0.16049	0.40894*	0.11923	-0.11490	0.09051
RD1	0.10641	0.27190*	0.04311	0.04675	0.08663
LD1	0.06560	0.24367*	0.10204	0.00065	0.09126
LD5	0.36682	0.21716	0.87644*	0.13606	0.17784
LD4	0.49242	0.35791	-0.21522	0.35616	0.67546*

Table 6.48 - Males: Variables RD1 to LD5

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

GROUP	0	1	2	3	5	6
1	1.1867 0.3134					
2	2.0317 0.0716	3.9569 0.0014				
3	3.8647 0.0018	1.5180 0.1311	7.2058 0.0000			
5	1.8905 0.0931	1.0126 0.4087	4.8448 0.0002	1.6583 0.1417		
6	1.6382 0.1468	0.77737 0.5660	3.3338 0.0054	0.59577 0.7032	0.63344 0.6743	
7	2.3540 0.0387	1.1231 0.3460	4.3982 0.0006	2.8552 0.0143	0.80159 0.5485	0.89550 0.4832

Code Group

- 0 - Controls
- 1 - Psoriasis
- 2 - Atopic Eczema
- 3 - BCC
- 5 - Alopecia areata
- 6 - Actinic Keratosis
- 7 - Vitiligo

Figure 6.13 - Territorial Map - Males: Variables RD1 to LD5

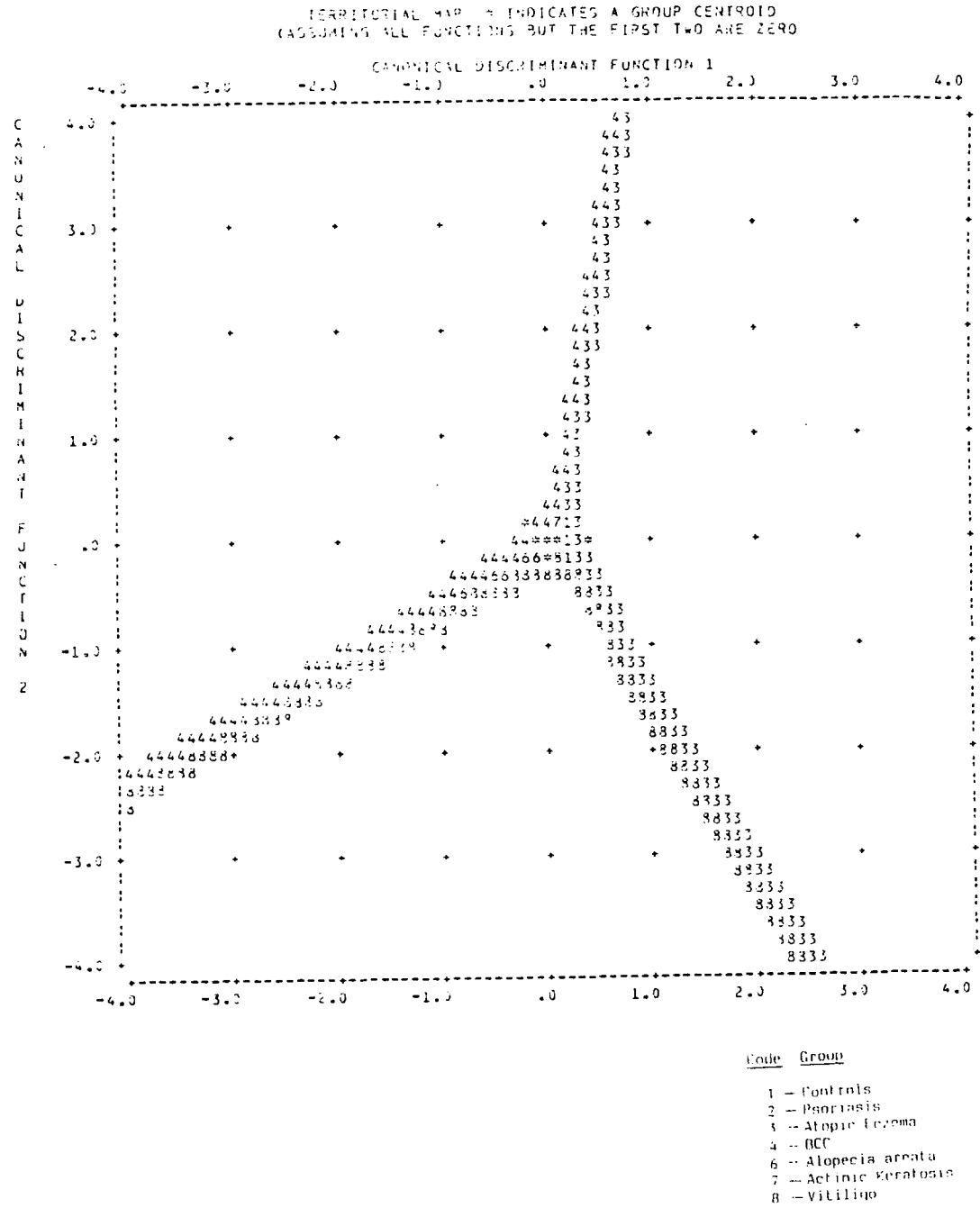
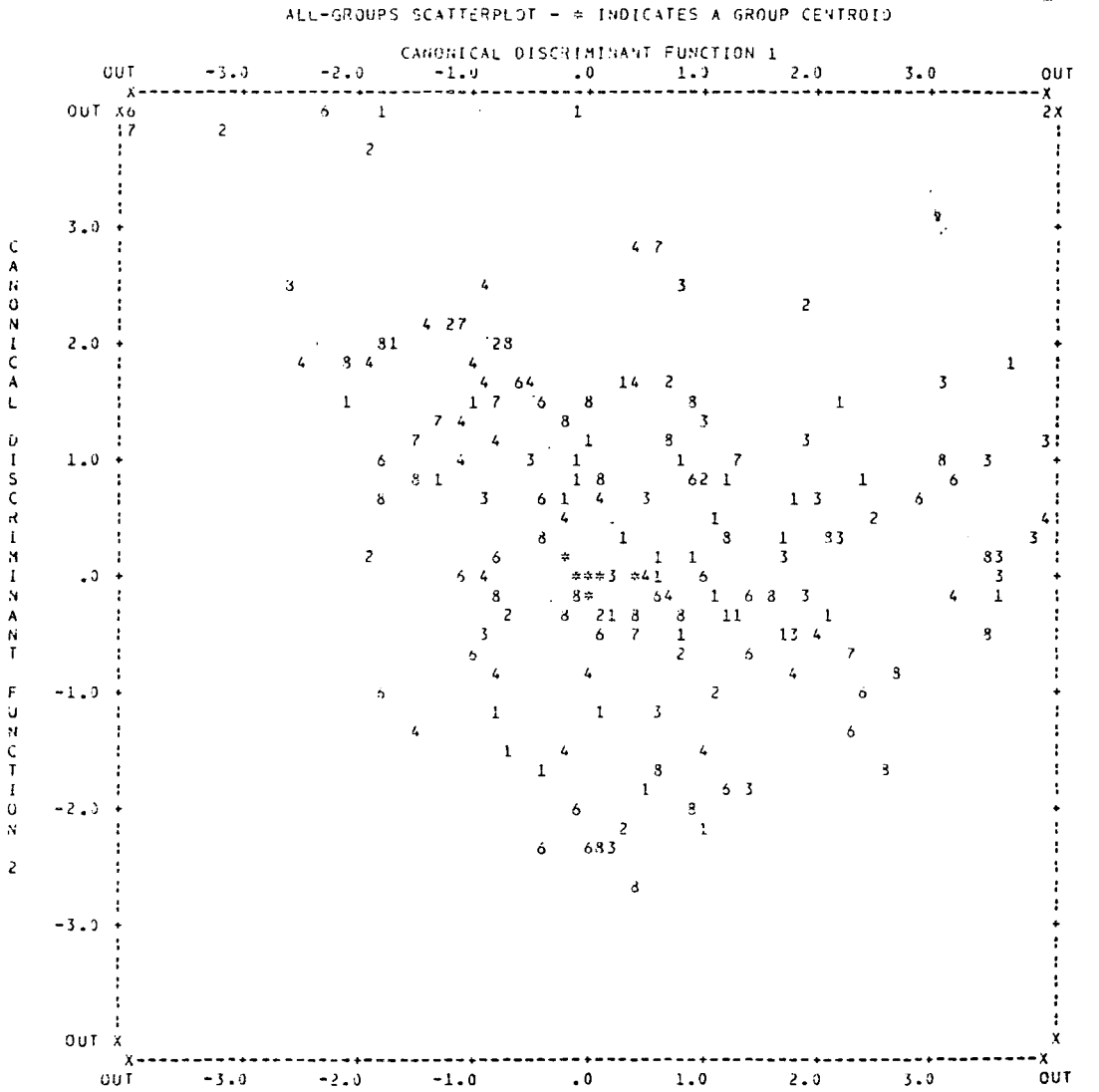


Figure 6.14 - Scatterplot - Males: Variables RD1 to LD5



- Code Group
- 1 - Controls
 - 2 - Psoriasis
 - 3 - Atopic Eczema
 - 4 - BCC
 - 6 - Alopecia areata
 - 7 - Actinic Keratosis
 - 8 - Vitiligo

Figure 6.15 - Group Centroids

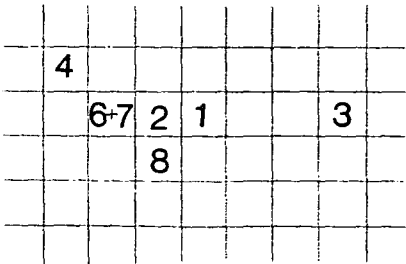


Table 6.49 - Males: Variables RD1 to LD5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	200	26 13.0%	3 1.5%	54 27.0%	21 10.5%	82 41.0%	1 0.5%	13 6.5%
GROUP	1	201	22 10.9%	8 4.0%	42 20.9%	31 15.4%	76 37.8%	0 0.0%	22 10.9%
GROUP	2	203	24 11.8%	3 1.5%	64 31.5%	19 9.4%	73 36.0%	0 0.0%	20 9.9%
GROUP	3	211	10 4.7%	9 4.3%	36 17.1%	53 25.1%	89 42.2%	1 0.5%	13 6.2%
GROUP	5	210	22 10.5%	7 3.3%	39 18.6%	29 13.8%	99 47.1%	0 0.0%	14 6.7%
GROUP	6	129	8 6.2%	6 4.7%	30 23.3%	24 18.6%	54 41.9%	0 0.0%	7 5.4%
GROUP	7	201	12 6.0%	6 3.0%	44 21.9%	25 12.4%	91 45.3%	1 0.5%	22 10.9%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 20.07%

(atopic eczema and BCC: $F = 7.2058$), 2 and 5 (atopic eczema and alopecia areata: $F = 4.8448$), 2 and 7 (atopic eczema and vitiligo: $F = 4.3982$), 1 and 2 (atopic eczema and psoriasis: $F = 3.9569$), 0 and 3 (controls and BCC: $F = 3.8647$) and 2 and 6 (atopic eczema and actinic keratosis: $F = 3.3338$). Atopic eczema seems to be showing the most separation. Classification results are shown in Table 6.49 and overall only 20.07% of cases can be grouped into their correct groups using variables RD1 to LD5. Alopecia areata (group 5) with 47.1% correct classification is the group with most correct cases followed by group 3 (BCC) with 25.1% correct.

Discriminant function results for females using finger delta scores as variables are shown in Tables 6.50 to 6.54. Canonical discriminant function 5 are shown in Table 6.50 with Functions 1 and 2 accounting for 78.32% of the variance. Function 1 removes 51.40% of the variance. Tables 6.51 and 6.52 show the contributions made by each of the variables to the various functions. Finger I delta scores appear to be the most important on both hands. Functions 1 and 2 were used to plot the territorial map Figure 6.16 and the scatterplot Figure 6.17. From the territorial map it can be seen that groups 4, 6, 7 and 8 are the most widely separated. These groups are BCC, alopecia areata, actinic keratosis and vitiligo respectively.

Figure 6.18 shows the relative position of the group centroids to one another. As can be seen they are all closely clustered together. Table 6.53 sets out the F statistics and significances for females. The largest F statistics are found between actinic keratosis and BCC ($F = 4.7576$) and between actinic keratosis and alopecia areata ($F = 4.1570$).

When the classification procedure was carried out it was found that only 18.09% of cases were correctly grouped using variables RD1 to LD5. The most correctly classified cases were found in BCC where 32.7% were correctly classified followed by 24.6% correct grouping of cases in actinic keratosis.

When the subjects were reclassified by aetiology of disorder types on the right hand for males a significantly higher mean value was found on finger III for ND males compared to GD males. On right hand finger V controls showed a higher mean value for delta scores

Table 6.50 - Females: Variables RD1 to LD5

CANONICAL DISCRIMINANT FUNCTIONS				
FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.03165	51.40	51.40	0.1751588
2*	0.01657	26.91	78.32	0.1276744
3*	0.00668	10.86	89.17	0.0814884
4*	0.00439	7.13	96.30	0.0661009
5*	0.00171	2.79	99.08	0.0413758
6*	0.00056	0.92	100.00	0.0237475

Table 6.51 - Females: RD1 to LD5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
RD1	0.43365	0.78129	0.27595	-0.06143	-0.52036	0.00972
RD2	-0.02189	0.38830	0.27532	1.05904	0.34208	-0.54463
RD3	-0.61733	0.06679	0.21169	-1.20345	0.19061	0.01212
RD5	0.45466	-0.62843	0.46866	0.45349	-0.34736	0.90414
LD2	-0.81662	-0.28010	0.27422	0.08179	-0.50776	-0.03748
LD4	-0.06704	0.55542	-0.44439	-0.05005	0.58208	0.75672
LD5	0.70466	-0.18429	0.11192	-0.05964	0.74904	-0.87398

Table 6.52 - Females: RD1 to LD5

STRUCTURE MATRIX:

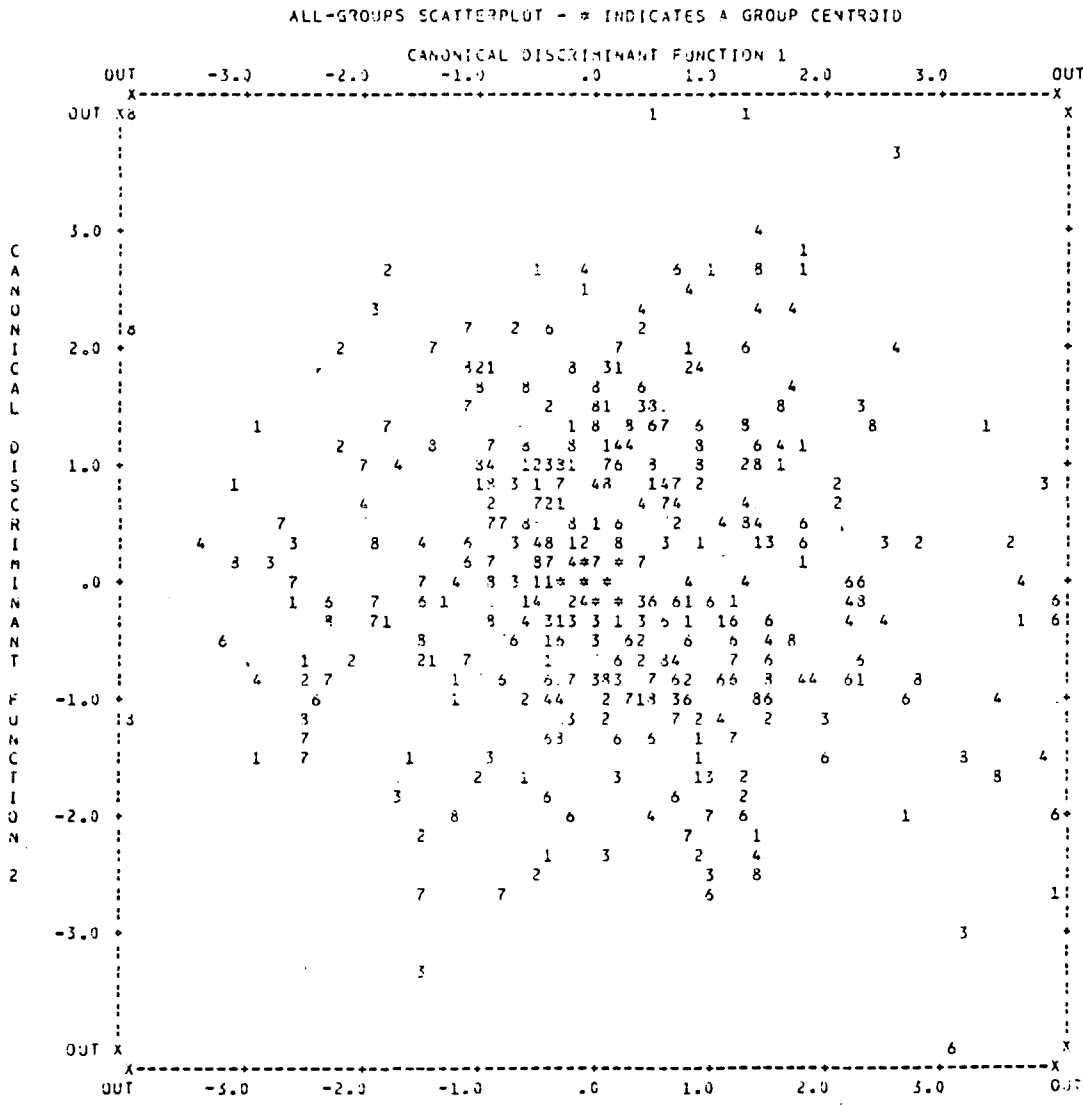
POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
RD1	0.32721	0.63666*	0.52593	-0.24421	-0.32565	0.05820
LD1	0.07600	0.48344*	0.23396	-0.04078	0.01483	0.10955
RD5	0.19158	-0.23772	0.78474*	0.06722	0.21970	0.48804
RD3	-0.26312	0.13715	0.78068*	-0.32640	0.37769	0.07238
LD2	-0.46003	-0.05135	0.58343*	-0.13057	0.04845	0.14912
RD2	-0.31484	0.30661	0.57440*	0.51876	0.36968	-0.11028
LD5	0.30920	-0.13711	0.56056*	-0.32150	0.51404	-0.06144
LD3	-0.07162	0.00032	0.54578*	-0.35627	0.25588	0.21037
RD4	-0.16757	0.13164	0.49737*	0.14426	0.32246	0.18114
LD4	-0.12116	0.33341	0.13285	-0.07637	0.59780*	0.59352

Table 6.53 - Females: Variables RD1 to LD5

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS						
GROUP	GROUP					
	0	1	2	3	5	6
1	1.0340 0.4051					
2	1.0636 0.3847	0.66982 0.6978				
3	1.4781 0.1703	2.3091 0.0242	2.6598 0.0093			
5	1.9386 0.9602	2.6142 0.0110	1.5035 0.1618	2.5326 0.0137		
6	2.4097 0.0138	1.5871 0.2066	1.2948 0.2491	4.7576 0.0000	4.1570 0.0002	
7	1.3455 0.2249	1.3005 0.2465	1.4398 0.1852	2.4656 0.0163	3.4749 0.0011	0.85501 0.5417
Code	Group					
0	Controls					
1	Psoriasis					
2	Atopic Eczema					
3	HIC					
5	Sloperia Greata					
6	Actinic Keratosis					
7	Vitiligo					

Figure 6.17 - Scatterplot - Females: RD1 to LD5



- Code Group
- 1 - Controls
 - 2 - Psoriasis
 - 3 - Atopic Eczema
 - 4 - BCC
 - 6 - Alopecia areata
 - 7 - Actinic Keratosis
 - 8 - Vitiligo

Figure 6.18 - Group Centroids

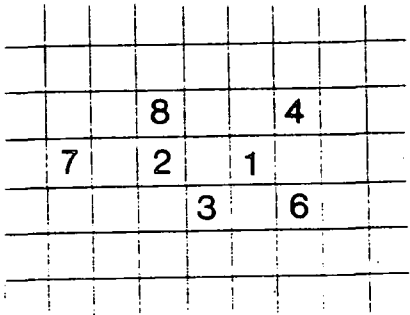


Table 6.54 - Females: Variables RD1 to LD5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	202	13 6.4%	24 11.9%	51 25.2%	43 21.3%	29 14.4%	33 16.3%	9 4.5%
GROUP	1	205	11 5.4%	22 10.7%	34 16.6%	36 17.6%	39 19.0%	40 19.5%	23 11.2%
GROUP	2	203	12 5.9%	17 8.4%	33 16.3%	35 17.2%	37 18.2%	49 24.1%	20 9.9%
GROUP	3	202	6 3.0%	13 6.4%	38 18.8%	66 32.7%	36 17.8%	30 14.9%	13 6.4%
GROUP	5	206	12 5.8%	11 5.3%	45 21.8%	40 19.4%	49 23.8%	39 18.9%	10 4.9%
GROUP	6	171	9 5.3%	5 2.9%	37 21.6%	24 14.0%	29 17.0%	42 24.6%	25 14.6%
GROUP	7	204	3 1.5%	15 7.4%	38 18.6%	45 22.1%	26 12.7%	50 24.5%	27 13.2%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 18.09%

Table Means and Standard Deviations – Finger Delta Scores.

6.55

Subjects grouped by Disorder Type.

Group	Sex	No	RD1		RD2		RD3		RD4		RD5	
			Means	Std.	Means	Std.	Means	Std.	Means	Std.	Means	Std.
Cont	M	206	3.146 +/-	1.346	3.272 +/-	2.220	2.544 +/-	1.743	3.403 +/-	2.118	2.908 +/-	2.225
GD	M	816	3.033 +/-	1.277	3.141 +/-	2.119	2.369 +/-	1.752	3.418 +/-	2.354	2.587 +/-	2.078
ND	M	340	3.147 +/-	1.351	3.053 +/-	1.588	2.476 +/-	1.400	3.509 +/-	2.040	2.524 +/-	1.776
Cont	F	203	2.877 +/-	1.620	3.320 +/-	4.083	2.182 +/-	1.542	2.995 +/-	2.391	2.438 +/-	1.937
GD	F	819	2.834 +/-	1.425	3.094 +/-	3.552	2.374 +/-	2.268	3.222 +/-	2.352	2.535 +/-	2.167
ND	F	374	2.989 +/-	1.350	3.230 +/-	1.680	2.447 +/-	1.179	3.267 +/-	1.858	2.453 +/-	1.374

Group	Sex	No	LD1		LD2		LD3		LD4		LD5	
			Means	Std.	Means	Std.	Means	Std.	Means	Std.	Means	Std.
Cont	M	206	2.937 +/-	1.369	2.927 +/-	1.558	2.311 +/-	1.059	3.291 +/-	2.051	2.539 +/-	1.516
GD	M	816	2.977 +/-	1.298	2.978 +/-	1.393	2.238 +/-	0.942	3.203 +/-	1.338	2.326 +/-	1.092
ND	M	340	2.979 +/-	1.371	3.021 +/-	1.218	2.453 +/-	1.070	3.165 +/-	1.676	2.244 +/-	1.011
Cont	F	203	2.734 +/-	1.525	2.768 +/-	1.761	2.148 +/-	0.855	2.975 +/-	1.923	2.227 +/-	0.969
GD	F	819	2.733 +/-	1.417	2.949 +/-	2.222	2.324 +/-	1.832	3.001 +/-	2.155	2.344 +/-	1.831
ND	F	374	2.880 +/-	1.283	2.957 +/-	1.534	2.374 +/-	1.124	3.027 +/-	1.599	2.337 +/-	1.173

Table . Mann-Whitney U Test Results – Finger Delta Scores

6.56

Subjects grouped by disorder type.

			Variables & Probabilities (** = highly significant, * = significant)				
Sex	Gp1	Gp2	RD1	RD2	RD3	RD4	RD5
M	Cont	GD	0.3410	0.8286	0.1198	0.6109	0.0496*
M	Cont	ND	0.8792	0.5415	0.9524	0.4921	0.0073**
M	GD	ND	0.1876	0.4628	0.0396*	0.1223	0.1681
F	Cont	GD	0.6868	0.0906	0.0773	0.0120*	0.2706
F	Cont	ND	0.0845	0.0016**	0.0001**	0.0031**	0.0991
F	GD	ND	0.0417*	0.0162*	0.0018**	0.3261	0.2691

			Variables & Probabilities (** = highly significant, * = significant)				
Sex	Gp1	Gp2	LD1	LD2	LD3	LD4	LD5
M	Cont	GD	0.5142	0.1949	0.6704	0.7653	0.0991
M	Cont	ND	0.6201	0.1653	0.0751	0.9880	0.0038**
M	GD	ND	0.9278	0.7651	0.0021**	0.6975	0.0499*
F	Cont	GD	0.6813	0.0317*	0.1923	0.2489	0.7485
F	Cont	ND	0.0651	0.0177*	0.0126*	0.0661	0.3277
F	GD	ND	0.0236*	0.4318	0.1021	0.2793	0.3209

which was significantly greater when compared to GD and highly significantly greater than in ND males. This highly significant difference also existed on the left hand finger V between controls and ND males along with a significantly higher mean delta score in GD males compared to ND males. A highly significantly lower mean value was found in GD when compared to ND on LIII, the same as found for RIII.

On finger I a significant difference existed on both hands when GD and ND females were compared. In both cases ND had a higher mean score. When controls were compared to ND for finger II on both hands a significant difference occurred. On the right hand controls had a higher mean score and on the left hand ND females had a higher mean score. The right hand finger II difference was found to be highly significant. Also on RII GD was found to have a significantly lower mean score than ND and on LII GD was to have a significantly higher value than controls.

On the right hand finger III highly significant differences were found between controls and ND and between GD and ND. ND was found to have a higher mean value than the other two groups. This was also the case on LIII where ND females were found to have significantly greater delta score than controls. RIV showed significant differences when controls were compared to both GD and to ND. In both cases the controls had a lower mean delta score. The difference was significant for the comparison with GD and highly significant when ND were compared. No significant differences were found on LIV or on finger V of either hand.

Table 6.57 shows a summary of the total numbers of statistically significant differences found from the Mann-Whitney U Test results for variables RD1 to LD5. females showed more statistically significant differences (11/30) compared to 6/30 for males.

Table 6.57 - Summary Table of significant differences from Mann-Whitney U Tests

Variables RD1 to LD5

(a) Males			(b) Females		
GROUPS	ND	GD	GROUPS	ND	GD
Cont.	2	1	Cont.	5	2
GD	3		GD	4	

(iv) Finger Pattern Intensity Indices (RFPII, LFPII and TFPII)

The results for Finger Pattern Intensity Indices are shown in Tables 6.58 and 6.59. For males a significantly lower mean value was found on the right hand for vitiligo patients in comparison to controls, psoriasis, atopic eczema and BCC. The last two comparisons were found to be statistically highly significant. On the left hand vitiligo patients again had a significantly lower value than atopic eczema patients. When the values for both hands were combined, vitiligo males again had significantly lower mean values than controls, psoriasis, BCC and atopic eczema. The comparison with atopic eczema was found to show a highly significant difference. Atopic eczema had a significantly higher TFPII mean value than that found in alopecia areata probands.

When female groups were compared with one another for FPII's more statistically significant results were shown (19/63) compared to 10/63 in males. Control females showed a significantly lower mean value when compared to vitiligo, BCC and to actinic keratosis. For controls compared to vitiligo the difference was highly significant on the right hand and significant for both hands combined. When controls were compared to BCC the differences were significant for RFPII and TFPII. For controls against actinic keratosis the mean values for all three of the indices showed significant differences. Psoriasis females were found to have significantly lower means for RFPII when compared to vitiligo, BCC and to actinic keratosis which also showed a significant difference in TFPII. When alopecia areata was compared to vitiligo significantly lower values were found for all three indices in alopeciads. Significant differences were found for RFPII and TFPII when alopecia areata was compared to BCC and actinic keratosis. The alopeciads again showed significantly lower values compared to the other two groups. A significantly lower value was also found between alopeciad females and actinic keratosis for LFPII. When groups were reclassified according to disorder type the only significant differences for Finger Pattern Intensity Indices were found when control females were compared to ND and when GD were compared to ND. In both cases the significant results were found for RFPII and TFPII with ND females showing significantly higher values. The difference between values for the ND compared to

Table Means and Standard Deviations. Finger pattern Intensity Indices
6.58

(a) Sex = Males

		Variables		
		RFPII	LFPII	TFPII
Group	Cases	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.
Control	206	15.272 +/- 7.022	14.005 +/- 4.686	29.277 +/- 10.127
Psoriasis	202	14.817 +/- 7.558	13.990 +/- 4.207	28.796 +/- 9.874
Atop Ecz	203	15.818 +/- 10.479	14.163 +/- 9.384	29.980 +/- 12.617
Vitiligo	201	13.657 +/- 4.639	13.303 +/- 3.905	26.960 +/- 7.791
Alop Are	210	13.914 +/- 4.247	13.467 +/- 3.692	27.381 +/- 7.392
BCC	211	14.934 +/- 6.378	13.839 +/- 4.034	28.438 +/- 7.307
Act Ker	129	14.341 +/- 4.236	13.899 +/- 3.720	28.240 +/- 7.031

(b) Sex = Females

		Variables		
		RFPII	LFPII	TFPII
Group	Cases	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.
Control	203	13.813 +/- 8.670	12.852 +/- 4.254	26.665 +/- 11.148
Psoriasis	205	13.254 +/- 4.332	12.966 +/- 4.414	26.220 +/- 7.975
Atop Ecz	203	13.498 +/- 4.581	13.015 +/- 4.248	26.512 +/- 8.029
Vitiligo	205	15.434 +/- 14.337	14.093 +/- 9.193	29.510 +/- 20.217
Alop Are	206	14.044 +/- 8.973	13.316 +/- 9.795	27.359 +/- 18.370
BCC	202	14.307 +/- 4.530	13.416 +/- 4.500	27.723 +/- 8.065
Act Ker	174	14.532 +/- 4.838	13.724 +/- 4.149	28.277 +/- 8.272

Table Mann-Whitney U Test Results.
6.59(a)
Finger Pattern Intensity Indices.

Males

Group 1	Group 2	Probability		
		RFPII	LFPII	TFPII
Control	Psoriasis	0.7363	0.7209	0.9143
Control	Atop Ecz	0.3388	0.3281	0.3013
Control	Vitiligo	0.0239*	0.2229	0.0428*
Control	Alop Are	0.1974	0.7039	0.2305
Control	BCC	0.8802	0.9562	0.9580
Control	Act Ker	0.7132	0.6188	0.8736
Psoriasis	Atop Ecz	0.1617	0.4856	0.2160
Psoriasis	Vitiligo	0.0277*	0.1166	0.0412*
Psoriasis	Alop Are	0.3049	0.4961	0.2816
Psoriasis	BCC	0.5290	0.7389	0.8424
Psoriasis	Act Ker	0.9773	0.8604	0.9835
Atop Ecz	Vitiligo	0.0006**	0.0244*	0.0014**
Atop Ecz	Alop Are	0.0141*	0.1416	0.0194*
Atop Ecz	BCC	0.3749	0.3194	0.2722
Atop Ecz	Act Ker	0.1800	0.6575	0.2457
Vitiligo	Alop Are	0.2289	0.4140	0.3197
Vitiligo	BCC	0.0049**	0.1691	0.0209*
Vitiligo	Act Ker	0.0454*	0.0854	0.0677
Alop Are	BCC	0.1036	0.6716	0.1673
Alop Are	Act Ker	0.3942	0.4382	0.3268
BCC	Act Ker	0.4994	0.5945	0.7970

Table Mann-Whitney U Test Results.
 6.59(b)
 Finger Pattern Intensity Indices.

Females

Group 1	Group 2	Probability		
		RFPII	LFPII	TFPII
Control	Psoriasis	0.7692	0.6136	0.6985
Control	Atop Ecz	0.3635	0.3657	0.4413
Control	Vitiligo	0.0044**	0.0844	0.0281*
Control	Alop Are	0.6129	0.8074	0.9859
Control	BCC	0.0105*	0.3440	0.0486*
Control	Act Ker	0.0130*	0.0413*	0.0150*
Psoriasis	Atop Ecz	0.5219	0.7235	0.7172
Psoriasis	Vitiligo	0.0111*	0.2371	0.0649
Psoriasis	Alop Are	0.8325	0.4075	0.6661
Psoriasis	BCC	0.0216*	0.6970	0.1176
Psoriasis	Act Ker	0.0221*	0.1203	0.0409*
Atop Ecz	Vitiligo	0.0759	0.3620	0.1597
Atop Ecz	Alop Are	0.6486	0.2345	0.4267
Atop Ecz	BCC	0.1041	0.9106	0.2234
Atop Ecz	Act Ker	0.0815	0.2373	0.0684
Vitiligo	Alop Are	0.0198*	0.0351*	0.0266*
Vitiligo	BCC	0.8102	0.4020	0.8388
Vitiligo	Act Ker	0.8640	0.6635	0.6160
Alop Are	BCC	0.0394*	0.2278	0.0425*
Alop Are	Act Ker	0.0426*	0.0196*	0.0151*
BCC	Act Ker	0.7712	0.2459	0.5122

controls for RFPII was found to be highly significant. The results are shown in Tables 6.60 and 6.61.

(b) Finger Ridge Counts

(i) Individual ulnar and radial ridge counts (variables LFUI to RFR5)

Tables 6.62 and 6.63 show the means and standard deviations for individual ulnar and radial finger ridge counts for males and females respectively. In Tables 6.64 and 6.65 the results of Mann-Whitney U Test comparisons are set out. For males on the left hand finger I a highly significant increase in radial ridge count is found in atopic eczema patients compared to psoriasis, vitiligo, alopecia areata and to BCC. A significant increase in radial count was found in atopic eczema subjects compared to actinic keratosis sufferers and a significant decrease was found when vitiligo patients were compared to psoriasis and to actinic keratosis patients. A statistically significant increase in ulnar ridge count was found in psoriasis patients in comparison to vitiligo sufferers. On the right hand finger I, male atopic eczema patients again showed a highly significant increase in radial ridge count when compared to vitiligo, alopecia areata and BCC sufferers and a significant increase when compared to controls and psoriasis subjects. Atopic eczema males also showed a statistically significant increase in ulnar ridge count on RI in comparison to vitiligo males.

On the left hand finger II, a highly significantly greater mean value for radial ridge count was found in actinic keratosis males when they were compared to alopecia areata and psoriasis. Actinic keratosis also showed a significant increase in radial count when compared to atopic eczema and to BCC male patients. A significant increase in radial count was found for vitiligo in comparison to alopecia areata for radial count and for atopic eczema compared to controls on LII. On the right hand finger II no significant differences were found for radial counts but a highly significant increase was found for ulnar count in atopic eczema males compared to values for controls, psoriasis and BCC. A significant increase was found for ulnar count in atopic eczema patients in comparison to vitiligo.

Table 6 .60

Means and S.D.s Finger Pattern Intensity Indices: Subjects grouped by disorder type.

Gp	Sex	No	RFPII		LFPII		TFPII	
			Mean	Std.D.	Mean	Std.D.	Mean	Std.D.
Cont	M	206	15.272 +/- 7.022		14.005 +/- 4.686		29.277 +/- 10.127	
GD	M	216	14.548 +/- 7.206		13.729 +/- 4.061		28.274 +/- 9.686	
ND	M	340	14.709 +/- 5.662		13.862 +/- 3.912		28.363 +/- 7.194	
Cont	F	203	13.813 +/- 8.670		12.852 +/- 4.254		26.665 +/- 11.148	
GD	F	819	14.059 +/- 9.056		13.347 +/- 7.389		27.400 +/- 14.823	
ND	F	374	14.402 +/- 4.680		13.575 +/- 4.343		27.987 +/- 8.176	

Table 6 .61

Mann Whitney U Test Results : Finger Pattern

Intensity Indices : subjects grouped by disorder types.

Sex	Gp1	Gp2	Variables and Probabilities		
			RFPII	LFPII	TFPII
M	Cont	GD	0.2913	0.8910	0.4035
M	Cont	ND	0.8432	0.8212	0.8776
M	GD	ND	0.2176	0.6318	0.3519
F	Cont	GD	0.1472	0.3514	0.2841
F	Cont	ND	0.0038**	0.0777	0.0109*
F	GD	ND	0.0182*	0.1898	0.0223*

Table 6..62(a)

Means and Standard Deviations
Finger Ridge Counts : Males, Left Hand.

Sex = Male

		Variables				
		LFU1	LFR1	LFU2	LFR2	LFU3
Group	Cases	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.
Control	206	6.350 +/- 8.554	17.927 +/- 5.410	6.519 +/- 8.264	10.335 +/- 7.370	2.296 +/- 5.793
Psoriasis	202	7.723 +/- 9.084	18.683 +/- 4.355	7.475 +/- 7.387	9.574 +/- 7.560	2.547 +/- 6.096
Atop Ecz	203	6.547 +/- 8.654	19.724 +/- 4.179	8.448 +/- 9.767	9.852 +/- 8.289	2.438 +/- 6.498
Vitiligo	201	5.189 +/- 7.900	17.806 +/- 4.340	7.896 +/- 7.887	10.716 +/- 7.781	1.760 +/- 5.052
Alop Are	210	6.705 +/- 8.345	18.143 +/- 4.415	7.724 +/- 7.623	9.210 +/- 7.547	2.533 +/- 6.199
BCC	211	6.128 +/- 8.085	18.185 +/- 4.720	7.000 +/- 7.713	10.479 +/- 6.961	3.118 +/- 6.309
Act Ker	129	6.023 +/- 8.302	19.016 +/- 3.507	7.891 +/- 7.480	11.884 +/- 7.608	2.667 +/- 6.109

		Variables				
		LFR3	LFU4	LFR4	LFU5	LFR5
Group	Cases	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.
Control	206	13.587 +/- 6.179	5.320 +/- 7.497	15.922 +/- 6.597	1.505 +/- 4.073	13.825 +/- 5.047
Psoriasis	202	14.507 +/- 5.125	5.653 +/- 7.328	16.054 +/- 4.423	1.272 +/- 3.802	13.010 +/- 3.584
Atop Ecz	203	14.842 +/- 5.466	5.640 +/- 7.284	17.227 +/- 4.330	1.660 +/- 4.563	13.690 +/- 3.721
Vitiligo	201	13.886 +/- 5.814	4.721 +/- 7.094	16.622 +/- 4.691	0.826 +/- 3.261	13.731 +/- 4.037
Alop Are	210	14.014 +/- 5.890	4.929 +/- 7.313	15.738 +/- 5.294	1.362 +/- 4.082	12.876 +/- 4.042
BCC	211	13.654 +/- 5.137	5.635 +/- 7.305	16.161 +/- 4.394	0.844 +/- 3.478	13.147 +/- 3.700
Act Ker	129	15.876 +/- 4.163	6.318 +/- 7.693	17.667 +/- 3.171	0.605 +/- 2.933	13.667 +/- 2.774

Table 6. 62(b)

Finger Ridge Counts : Males, Right Hand

Sex = Male

		Variables				
		RFR1	RFU1	RFR2	RFU2	RFR3
Group	Cases	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.
Control	206	19.796 +/- 5.101	7.393 +/- 8.676	9.767 +/- 7.417	7.568 +/- 8.365	13.277 +/- 5.780
Psoriasis	202	19.822 +/- 4.571	7.921 +/- 9.019	10.505 +/- 7.978	6.985 +/- 7.573	14.193 +/- 5.283
Atop Ecz	203	21.025 +/- 4.075	8.039 +/- 9.024	9.788 +/- 8.475	9.547 +/- 7.752	14.956 +/- 5.340
Vitiligo	201	19.418 +/- 4.703	6.328 +/- 8.604	10.323 +/- 8.193	7.975 +/- 7.980	14.756 +/- 5.039
Alop Are	210	19.733 +/- 4.527	6.605 +/- 8.548	10.052 +/- 7.933	8.362 +/- 7.859	14.433 +/- 5.651
BCC	211	19.616 +/- 4.086	7.910 +/- 8.759	10.028 +/- 7.687	7.175 +/- 7.450	14.289 +/- 5.074
Act Ker	129	20.457 +/- 3.333	7.566 +/- 8.926	11.147 +/- 8.014	8.124 +/- 7.714	15.403 +/- 5.266

		Variables				
		RFU3	RFR4	RFU4	RFR5	RFU5
Group	Cases	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.
Control	206	3.199 +/- 6.708	15.942 +/- 6.056	6.864 +/- 8.264	14.058 +/- 5.018	1.825 +/- 4.336
Psoriasis	202	2.064 +/- 5.491	16.426 +/- 4.679	6.163 +/- 7.381	13.396 +/- 3.696	1.693 +/- 4.494
Atop Ecz	203	2.882 +/- 6.470	17.276 +/- 5.243	6.887 +/- 7.749	14.020 +/- 4.018	2.064 +/- 4.929
Vitiligo	201	2.348 +/- 5.929	16.975 +/- 5.191	5.557 +/- 7.682	14.552 +/- 4.332	1.279 +/- 4.088
Alop Are	210	3.048 +/- 6.787	16.490 +/- 5.268	5.857 +/- 7.747	13.624 +/- 4.164	1.562 +/- 4.292
BCC	211	3.123 +/- 6.368	15.924 +/- 4.528	6.777 +/- 7.499	13.294 +/- 3.371	1.109 +/- 3.527
Act Ker	129	2.953 +/- 6.503	17.426 +/- 3.779	7.264 +/- 8.232	14.395 +/- 2.824	0.876 +/- 3.448

Table 6. Means and Standard Deviations. Finger Ridge Counts : Females, Left Hand.
6.63(a)

Sex = Female

		Variables				
		LFU1	LFR1	LFU2	LFR2	LFU3
Group	Cases	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.
Control	206	4.300 +/- 7.211	15.616 +/- 5.663	4.719 +/- 6.936	8.813 +/- 6.561	1.493 +/- 4.558
Psoriasis	202	3.688 +/- 6.840	15.371 +/- 5.895	5.732 +/- 7.344	7.854 +/- 6.701	2.332 +/- 5.653
Atop Ecz	203	4.724 +/- 7.665	16.325 +/- 5.296	6.862 +/- 7.463	8.502 +/- 7.398	2.857 +/- 6.312
Vitiligo	201	5.078 +/- 7.602	17.366 +/- 4.321	7.985 +/- 7.768	11.059 +/- 7.334	3.083 +/- 6.595
Alop Are	206	4.481 +/- 7.073	19.466 +/- 4.265	5.393 +/- 6.639	8.883 +/- 7.053	1.854 +/- 5.351
BCC	211	5.614 +/- 7.429	16.297 +/- 4.555	5.673 +/- 7.483	10.396 +/- 6.663	2.173 +/- 5.180
Act Ker	129	5.414 +/- 7.840	17.511 +/- 3.887	8.121 +/- 7.560	11.040 +/- 6.945	3.368 +/- 6.408

		Variables				
		LFR3	LFU4	LFR4	LFU5	LFR5
Group	Cases	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.
Control	206	11.591 +/- 5.405	3.300 +/- 6.224	14.567 +/- 5.339	0.818 +/- 2.940	12.182 +/- 4.438
Psoriasis	202	11.839 +/- 5.744	4.346 +/- 6.405	14.107 +/- 5.423	0.971 +/- 3.453	11.171 +/- 3.982
Atop Ecz	203	12.335 +/- 6.259	4.823 +/- 7.228	14.778 +/- 5.370	1.025 +/- 3.688	11.842 +/- 4.366
Vitiligo	201	13.893 +/- 5.315	5.995 +/- 7.872	16.498 +/- 6.444	0.951 +/- 3.458	12.805 +/- 4.309
Alop Are	210	13.646 +/- 5.429	3.772 +/- 6.456	14.951 +/- 4.868	0.757 +/- 2.856	11.864 +/- 3.855
BCC	211	12.480 +/- 5.024	4.762 +/- 6.442	13.975 +/- 4.623	0.950 +/- 3.121	11.347 +/- 3.700
Act Ker	129	14.920 +/- 4.948	5.069 +/- 7.092	15.621 +/- 4.402	1.184 +/- 3.788	12.511 +/- 3.101

Table 6. Means and Standard Deviations. Finger Ridge Counts : Females, Right Hand

6.63(b)

Sex = Female

		Variables				
		RFR1	RFU1	RFR2	RFU2	RFR3
Group	Cases	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.
Control	203	16.877 +/- 5.425	4.409 +/- 7.123	9.690 +/- 6.965	4.631 +/- 6.411	11.315 +/- 5.538
Psoriasis	205	17.522 +/- 5.624	4.844 +/- 7.627	7.576 +/- 7.369	6.605 +/- 7.285	12.180 +/- 5.163
Atop Ecz	203	18.182 +/- 4.992	5.419 +/- 8.154	8.429 +/- 7.960	7.458 +/- 7.907	12.626 +/- 5.722
Vitiligo	205	19.015 +/- 4.572	6.268 +/- 8.090	11.546 +/- 7.948	8.737 +/- 9.779	14.706 +/- 5.207
Alop Are	206	17.971 +/- 4.541	4.917 +/- 7.607	9.447 +/- 7.768	6.825 +/- 8.503	13.447 +/- 6.330
BCC	202	17.614 +/- 4.543	6.995 +/- 8.051	9.272 +/- 7.483	9.272 +/- 7.483	13.079 +/- 5.317
Act Ker	174	18.736 +/- 4.201	5.040 +/- 7.835	11.517 +/- 7.622	9.017 +/- 7.587	15.402 +/- 5.045

		Variables				
		RFU3	RFR4	RFU4	RFR5	RFU5
Group	Cases	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.	Mean Std. Dev.
Control	203	1.227 +/- 4.068	14.650 +/- 5.760	3.660 +/- 6.336	12.532 +/- 4.475	0.714 +/- 2.505
Psoriasis	205	1.878 +/- 4.935	14.239 +/- 5.463	4.937 +/- 6.729	11.093 +/- 4.049	0.405 +/- 1.987
Atop Ecz	203	2.064 +/- 5.512	14.675 +/- 5.371	5.847 +/- 7.583	12.448 +/- 4.285	0.665 +/- 2.420
Vitiligo	205	3.190 +/- 6.632	17.005 +/- 5.356	6.102 +/- 7.760	13.449 +/- 4.414	0.844 +/- 3.137
Alop Are	206	1.917 +/- 6.367	14.757 +/- 4.998	4.413 +/- 8.451	12.617 +/- 4.005	1.286 +/- 5.627
BCC	202	2.594 +/- 6.237	14.371 +/- 4.731	5.337 +/- 7.066	12.139 +/- 3.653	1.233 +/- 3.580
Act Ker	174	4.339 +/- 7.550	15.477 +/- 4.561	5.523 +/- 7.291	12.925 +/- 3.417	1.046 +/- 3.329

Table 6. 64(a)

Mann-Whitney U Test Results

Finger Ridge Counts – Males, Left Hand

		Probability (* = Significant $p < 0.05$, ** = highly significant $p < 0.01$)				
Gp 1	Gp 2	LFU1	LFR1	LFU2	LFR2	LFU3
Control	Psoriasis	0.0994	0.3809	0.1382	0.2883	0.9449
Control	Atop Ecz	0.8070	0.0004**	0.0275*	0.5437	0.5074
Control	Vitiligo	0.1716	0.2297	0.1054	0.4725	0.2006
Control	Alop Are	0.6831	0.9165	0.0931	0.1026	0.8130
Control	B.C.C.	0.8242	0.9493	0.5380	0.9129	0.1854
Control	Act Ker	0.7633	0.2365	0.0929	0.0673	0.8347
Psoriasis	Atop Ecz	0.1693	0.0076**	0.4815	0.7051	0.4836
Psoriasis	Vitiligo	0.0036**	0.0391*	0.8015	0.0869	0.1888
Psoriasis	Alop Are	0.1539	0.2962	0.8809	0.6133	0.8637
Psoriasis	B.C.C.	0.0513	0.3255	0.4334	0.3034	0.2287
Psoriasis	Act Ker	0.0783	0.6650	0.7159	0.0086**	0.8956
A.Ecz	Vitiligo	0.1271	0.0000**	0.6993	0.2386	0.5576
A.Ecz	Alop Are	0.9162	0.0001**	0.6519	0.3661	0.3754
A.Ecz	B.C.C.	0.6471	0.0004**	0.1301	0.6563	0.0597
A.Ecz	Act Ker	0.5972	0.0275*	0.8484	0.0381*	0.4566
Vitiligo	Alop Are	0.0705	0.2659	0.8975	0.0258*	0.1317
Vitiligo	B.C.C.	0.2393	0.3193	0.3174	0.3529	0.0102*
Vitiligo	Act Ker	0.3948	0.0138*	0.9243	0.3092	0.1777
Alop. Are	B.C.C.	0.4777	0.9830	0.3487	0.1217	0.2879
Alop. Are	Act Ker	0.5470	0.1565	0.8562	0.0021**	0.9951
B.C.C.	Act Ker	0.9090	0.1703	0.2843	0.0451*	0.3763

		Probability (* = Significant $p < 0.05$, ** = highly significant $p < 0.01$)				
Gp 1	Gp 2	LFR3	LFU4	LFR4	LFU5	LFR5
Control	Psoriasis	0.2999	0.7160	0.4299	0.4484	0.0852
Control	Atop Ecz	0.0377*	0.4341	0.2203	0.8373	0.8332
Control	Vitiligo	0.6152	0.3714	0.7291	0.0182*	0.9407
Control	Alop Are	0.5048	0.4140	0.3611	0.2797	0.0786
Control	B.C.C.	0.6832	0.7687	0.4743	0.0077**	0.1507
Control	Act Ker	0.0031**	0.3210	0.1050	0.0141*	0.7141
Psoriasis	Atop Ecz	0.2359	0.7751	0.0145*	0.5840	0.0816
Psoriasis	Vitiligo	0.6270	0.2123	0.1980	0.1067	0.0355*
Psoriasis	Alop Are	0.7150	0.2363	0.9276	0.7343	0.9659
Psoriasis	B.C.C.	0.0978	0.9010	0.9865	0.0558	0.7593
Psoriasis	Act Ker	0.0278*	0.4713	0.0023**	0.0667	0.1397
A.Ecz	Vitiligo	0.1050	0.1004	0.2789	0.0353	0.6388
A.Ecz	Alop Are	0.1552	0.1220	0.0193*	0.3729	0.0994
A.Ecz	B.C.C.	0.0058**	0.7387	0.0123*	0.0178*	0.1474
A.Ecz	Act Ker	0.3011	0.6337	0.4206	0.0264*	0.8118
Vitiligo	Alop Are	0.8713	0.9537	0.1918	0.2123	0.0413*
Vitiligo	B.C.C.	0.2946	0.2634	0.2010	0.7709	0.0767
Vitiligo	Act Ker	0.0116*	0.0713	0.0800	0.6527	0.5006
Alop. Are	B.C.C.	0.2453	0.3001	0.9334	0.1244	0.7365
Alop. Are	Act Ker	0.0158*	0.0848	0.0041**	0.1279	0.1926
B.C.C.	Act Ker	0.0002**	0.3890	0.0021**	0.8352	0.2706

Table 6 .64(b)

Mann-Whitney UR Test Results

Finger Ridge Counts : Male Right Hand

		Probability (* = Significant $p < 0.05$, ** = highly significant $p < 0.01$)				
Gp 1	Gp 2	RFR1	RFU1	RFR2	RFU2	RFR3
Control	Psoriasis	0.9135	0.7082	0.2742	0.6608	0.0970
Control	Atop Ecz	0.0270*	0.5832	0.9725	0.0093**	0.0036**
Control	Vitiligo	0.2772	0.1254	0.3467	0.7450	0.0084**
Control	Alop Are	0.7237	0.1988	0.7226	0.3792	0.0203*
Control	B.C.C.	0.2728	0.8304	0.7541	0.7547	0.1335
Control	Act Ker	0.6447	0.8824	0.0693	0.4962	0.0008**
Psoriasis	Atop Ecz	0.0128*	0.8919	0.3459	0.0011**	0.2000
Psoriasis	Vitiligo	0.2985	0.0639	0.9664	0.3598	0.2701
Psoriasis	Alop Are	0.7950	0.0979	0.4411	0.1475	0.4429
Psoriasis	B.C.C.	0.2513	0.7391	0.3876	0.8432	0.8091
Psoriasis	Act Ker	0.6368	0.6231	0.4480	0.2273	0.0380*
Atop Ecz	Vitiligo	0.0005**	0.0476*	0.3846	0.0308*	0.7967
Atop Ecz	Alop Are	0.0046**	0.0769	0.8535	0.1028	0.6898
Atop Ecz	B.C.C.	0.0003**	0.7287	0.8775	0.0019**	0.1069
Atop Ecz	Act Ker	0.0745	0.5759	0.1236	0.0890	0.3683
Vitiligo	Alop Are	0.4263	0.7901	0.4830	0.5965	0.8215
Vitiligo	B.C.C.	0.9732	0.0894	0.4411	0.4570	0.1694
Vitiligo	Act Ker	0.1195	0.2458	0.4374	0.7654	0.2485
Alop. Are	B.C.C.	0.3861	0.1575	0.9090	0.1758	0.3234
Alop. Are	Act Ker	0.4383	0.3160	0.1148	0.7913	0.1852
B.C.C.	Act Ker	0.0871	0.8207	0.1117	0.3137	0.0230*

Probability (* = Significant $p < 0.05$, ** = highly significant $p < 0.01$)						
Gp 1	Gp 2	RFU3	RFR4	RFU4	RFR5	RFU5
Control	Psoriasis	0.0929	0.7004	0.4691	0.0890	0.2209
Control	Atop Ecz	0.7409	0.0498*	0.8185	0.8443	0.8463
Control	Vitiligo	0.1534	0.1008	0.0910	0.3756	0.0247*
Control	Alop Are	0.6268	0.5812	0.1891	0.2865	0.0954
Control	B.C.C.	0.9443	0.4385	0.9650	0.0227*	0.0299*
Control	Act Ker	0.8182	0.1414	0.7222	0.8079	0.0080**
Psoriasis	Atop Ecz	0.1777	0.0487*	0.3690	0.0740	0.3081
Psoriasis	Vitiligo	0.8282	0.1246	0.2725	0.0029**	0.3318
Psoriasis	Alop Are	0.2409	0.8203	0.5371	0.4371	0.6563
Psoriasis	B.C.C.	0.0727	0.1371	0.4126	0.3721	0.3880
Psoriasis	Act Ker	0.2056	0.2536	0.3001	0.0324*	0.1221
Atop.Ecz	Vitiligo	0.2634	0.7143	0.0515	0.2211	0.0486*
Atop.Ecz	Alop Are	0.8670	0.1073	0.1280	0.3028	0.1452
Atop.Ecz	B.C.C.	0.6793	0.0009**	0.9224	0.0070**	0.0589
Atop.Ecz	Act Ker	0.9613	0.5432	0.7930	0.6884	0.0174*
Vitiligo	Alop Are	0.3405	0.2484	0.6725	0.0280*	0.5802
Vitiligo	B.C.C.	0.1198	0.0047**	0.0583	0.0001**	0.8706
Vitiligo	Act Ker	0.2911	0.8469	0.0607	0.3963	0.4841
Alop. Are	B.C.C.	0.5822	0.1325	0.1553	0.1083	0.6610
Alop. Are	Act Ker	0.8440	0.2920	0.1300	0.1753	0.2293
B.C.C.	Act Ker	0.7684	0.0141*	0.7042	0.0013**	0.3835

Table 6.65(a)

Mann-Whitney U Test Results

Finger Ridge Counts – Females, Left Hand

		Probability (* = Significant $p < 0.05$, ** = highly significant $p < 0.01$)				
Gp 1	Gp 2	LFU1	LFR1	LFU2	LFR2	LFU3
Control	Psoriasis	0.2543	0.5442	0.2135	0.2528	0.0862
Control	Atop Ecz	0.8339	0.1845	0.0019**	0.8682	0.0111*
Control	Vitiligo	0.4491	0.0044**	0.0001**	0.0001**	0.0069**
Control	Alop Are	0.9342	0.3199	0.3232	0.7244	0.8209
Control	B.C.C.	0.0832	0.4273	0.4881	0.0150*	0.0997
Control	Act Ker	0.2783	0.0012**	0.0000**	0.0001**	0.0010**
Psoriasis	Atop Ecz	0.1938	0.0698	0.0674	0.4378	0.3851
Psoriasis	Vitiligo	0.0630	0.0007**	0.0049**	0.0000**	0.2956
Psoriasis	Alop Are	0.2457	0.0807	0.6982	0.2013	0.1455
Psoriasis	B.C.C.	0.0056**	0.1438	0.6054	0.0004**	0.9086
Psoriasis	Act Ker	0.0338*	0.0002**	0.0033**	0.0000**	0.1028
Atop.Ecz	Vitiligo	0.5972	0.1307	0.2679	0.0006**	0.8759
Atop.Ecz	Alop Are	0.8204	0.6786	0.0244*	0.7675	0.0224*
Atop.Ecz	B.C.C.	0.1838	0.5842	0.0266*	0.0172*	0.3333
Atop.Ecz	Act Ker	0.3927	0.0650	0.1935	0.0008**	0.4253
Vitiligo	Alop Are	0.4022	0.0511	0.0006**	0.0006**	0.0143*
Vitiligo	B.C.C.	0.4707	0.0310*	0.0013**	0.1259	0.2479
Vitiligo	Act Ker	0.7087	0.6977	0.9341	0.9206	0.5712
Alop. Are	B.C.C.	0.0859	0.8104	0.9164	0.0541	0.1779
Alop. Are	Act Ker	0.2217	0.0105*	0.0005**	0.0007**	0.0029**
B.C.C.	Act Ker	0.8149	0.0099**	0.0011**	0.1361	0.0645

		Probability (* = Significant $p < 0.05$, ** = highly significant $p < 0.01$)				
Gp 1	Gp 2	LFR3	LFU4	LFR4	LFU5	LFR5
Control	Psoriasis	0.5812	0.0417*	0.4192	0.9721	0.0075**
Control	Atop Ecz	0.0976	0.1070	0.7932	0.9330	0.3515
Control	Vitiligo	0.0000**	0.0013**	0.0012**	0.9782	0.2479
Control	Alop Are	0.0000**	0.7357	0.4334	0.9337	0.2258
Control	B.C.C.	0.1159	0.0173*	0.0728	0.4127	0.0072**
Control	Act Ker	0.0000**	0.0248*	0.0517	0.6642	0.8259
Psoriasis	Atop Ecz	0.2640	0.9197	0.3234	0.9496	0.0918
Psoriasis	Vitiligo	0.0002**	0.1029	0.0001**	0.9986	0.0001**
Psoriasis	Alop Are	0.0008**	0.1285	0.1170	0.9440	0.0991
Psoriasis	B.C.C.	0.3567	0.6770	0.3358	0.4396	0.9828
Psoriasis	Act Ker	0.0000**	0.5523	0.0056**	0.7205	0.0008**
Atop.Ecz	Vitiligo	0.0146*	0.0876	0.0028**	0.9496	0.0340*
Atop.Ecz	Alop Are	0.0453*	0.2275	0.6979	0.9692	0.8905
Atop.Ecz	B.C.C.	0.7352	0.7185	0.0359*	0.4774	0.1021
Atop.Ecz	Act Ker	0.0000**	0.5242	0.0910	0.7826	0.1686
Vitiligo	Alop Are	0.6114	0.0040**	0.0138*	0.9373	0.0198*
Vitiligo	B.C.C.	0.0018**	0.1613	0.0000	0.4301	0.0001**
Vitiligo	Act Ker	0.0466*	0.2967	0.1201	0.7212	0.2901
Alop. Are	B.C.C.	0.0066**	0.0713	0.0154*	0.4761	0.1013
Alop. Are	Act Ker	0.0096**	0.0647	0.3077	0.7650	0.1286
B.C.C.	Act Ker	0.0000**	0.7350	0.0001**	0.7194	0.0004**

Table 6 . 65(b)

Mann-Whitney U Test Results

Finger Counts - Female, Right Hand

		Probability (* = Significant $p < 0.05$, ** = highly significant $p < 0.01$)				
Gp 1	Gp 2	RFR1	RFU1	RFR2	RFU2	RFR3
Control	Psoriasis	0.3646	0.8848	0.0033**	0.0025**	0.1904
Control	Atop Ecz	0.0177*	0.3966	0.0743	0.0004**	0.0180*
Control	Vitiligo	0.0004**	0.0334*	0.0024**	0.0000**	0.0000**
Control	Alop Are	0.0694	0.8323	0.9527	0.0042**	0.0000**
Control	B.C.C.	0.3338	0.0013**	0.5645	0.0022**	0.0012**
Control	Act Ker	0.0019**	0.7478	0.0847	0.0000**	0.0000**
Psoriasis	Atop Ecz	0.1891	0.4466	0.3548	0.4692	0.2283
Psoriasis	Vitiligo	0.0151*	0.0664	0.0000**	0.0377*	0.0000**
Psoriasis	Alop Are	0.4189	0.9898	0.0150*	0.9334	0.0016**
Psoriasis	B.C.C.	0.9929	0.0046**	0.0278*	0.9134	0.0402*
Psoriasis	Act Ker	0.0386*	0.8234	0.0000**	0.0042**	0.0000**
Atop.Ecz	Vitiligo	0.2688	0.3373	0.0000**	0.2223	0.0000**
Atop.Ecz	Alop Are	0.5384	0.4295	0.1679	0.4102	0.0564
Atop.Ecz	B.C.C.	0.1486	0.0486*	0.2571	0.5422	0.4560
Atop.Ecz	Act Ker	0.4418	0.6316	0.0001**	0.0520	0.0000**
Vitiligo	Alop Are	0.0708	0.0643	0.0030**	0.0317*	0.0166*
Vitiligo	B.C.C.	0.0073**	0.3283	0.0009**	0.0543	0.0002**
Vitiligo	Act Ker	0.7568	0.1327	0.7091	0.5026	0.2264
Alop. Are	B.C.C.	0.3560	0.0049**	0.6659	0.8314	0.2028
Alop. Are	Act Ker	0.1571	0.8549	0.0100*	0.0039**	0.0006**
B.C.C.	Act Ker	0.0215*	0.0125*	0.0016**	0.0073**	0.0000**

		Probability (* = Significant p<0.05, ** = highly significant p<0.01)				
Gp 1	Gp 2	RFU3	RFR4	RFU4	RFR5	RFU5
Control	Psoriasis	0.1697	0.3671	0.0300*	0.0002**	0.1360
Control	Atop Ecz	0.1100	0.8277	0.0018**	0.4710	0.8785
Control	Vitiligo	0.0008**	0.0001**	0.0005**	0.0744	0.9994
Control	Alop Are	0.2658	0.7884	0.3440	0.9484	0.2409
Control	B.C.C.	0.0192*	0.2277	0.0072**	0.1237	0.2349
Control	Act Ker	0.0000**	0.2236	0.0045**	0.2349	0.5453
Psoriasis	Atop Ecz	0.7843	0.5001	0.2625	0.2543	0.1843
Psoriasis	Vitiligo	0.0370*	0.0000**	0.1265	0.0023**	0.1406
Psoriasis	Alop Are	0.7924	0.4913	0.2444	0.0000**	0.0087**
Psoriasis	B.C.C.	0.3028	0.8429	0.5508	0.0001**	0.0091**
Psoriasis	Act Ker	0.0003**	0.0315*	0.3812	0.0107*	0.0442*
Atop.Ecz	Vitiligo	0.0782	0.0000**	0.6990	0.4329	0.8715
Atop.Ecz	Alop Are	0.6090	0.9662	0.0297*	0.0156*	0.1855
Atop.Ecz	B.C.C.	0.4381	0.3392	0.5916	0.5171	0.1810
Atop.Ecz	Act Ker	0.0010**	0.1259	0.8441	0.5067	0.4491
Vitiligo	Alop Are	0.0234*	0.0000**	0.0113*	0.0429*	0.2452
Vitiligo	B.C.C.	0.3407	0.0000**	0.3296	0.0009**	0.2454
Vitiligo	Act Ker	0.0985	0.0040**	0.5452	0.1492	0.5543
Alop. Are	B.C.C.	0.2037	0.3595	0.0909	0.1127	0.9750
Alop. Are	Act Ker	0.0001**	0.1113	0.0573	0.6242	0.6046
B.C.C.	Act Ker	0.0114*	0.0109*	0.7483	0.0306*	0.5869

For finger III of the left hand a significant increase in radial ridge count was found in actinic keratosis males in comparison to psoriasis, vitiligo and alopecia areata. This increase was highly significant when actinic keratosis males were compared to controls and to BCC patients. Atopic eczema males showed a significant increase in radial count compared to controls and a highly significant increase in comparison to BCC males for LIII. BCC males showed a significant increase in ulnar ridge count in comparison to vitiligo male patients for the same finger. On the right hand finger III a highly significant decrease in mean radial count was found for control males compared to atopic eczema, vitiligo and to actinic keratosis. A significant decrease was found in controls compared to alopecia areata. Actinic keratosis males were found to have a statistically significantly higher mean radial count on RIII in comparison to BCC and to male psoriasis patients.

On finger LIV a highly significant increase in radial ridge count was found in actinic keratosis patients in comparison to psoriasis, alopecia areata and BCC subjects. A statistically significant increase was found in male atopic eczema patients for radial count when compared to BCC, psoriasis and to alopecia areata patients. A highly significant decrease in radial count on RIV was found in BCC males when compared to vitiligo and atopic eczema and a significant decrease when BCC were compared to male actinic keratosis probands. A significant increase in mean radial count was shown in atopic eczema males in comparison to psoriasis and controls on RIV.

On finger V of the left hand male controls showed an increase in ulnar ridge count which was significant in comparison to vitiligo and to actinic keratosis and statistically highly significant when compared to BCC. Atopic eczema male patients showed a statistically significant increase in ulnar count compared to BCC and to actinic keratosis. For radial ridge count on finger LV, vitiligo males were found to have a significantly greater mean value when compared to psoriasis and to alopecia areata. On the right hand finger V, control males showed a decrease in mean ulnar ridge count which was highly significant compared to actinic keratosis and significant compared to vitiligo. Controls showed a significantly greater value for ulnar count compared to BCC. Atopic

eczema males showed a significantly lower mean ulnar count than either vitiligo or actinic keratosis. For radial counts on finger RV, BCC males were found to have a lower mean which was highly significantly smaller when compared to atopic eczema, vitiligo and actinic keratosis and significantly smaller compared to controls. Vitiligo males had an increased radial count on RV which was significantly greater than that for alopecia areata and highly significantly greater than the mean found for psoriasis. Actinic keratosis males were found to have a statistically significant increase in radial count on RV when compared to psoriasis male patients.

For female subjects on the left hand finger I psoriatics were found to have a lower mean ulnar ridge count which was significantly different when compared to actinic keratosis patients and highly significantly smaller compared to BCC. For radial counts on LI actinic keratosis had a highly significantly greater count than that for BCC, psoriasis and controls. Alopecia areata had a significantly higher radial count than actinic keratosis. Vitiligo males were found to have a highly significantly greater mean radial count in comparison to controls and to psoriatics.

On finger I of the right hand BCC female patients were found to have an increased ulnar count that was significantly greater than found in atopic eczema and BCC, and highly significantly greater than in controls, psoriasis and alopecia areata. Vitiligo males had a statistically significant increase in ulnar count compared to controls. For radial count on finger RI vitiligo patients were found to have a higher count which was significantly greater than that in psoriasis and highly significantly greater than found in controls and BCC patients. Controls had highly significantly decreased radial count in comparison to vitiligo and actinic keratosis and significantly lower count than atopic eczema. Actinic keratosis females proved to have a significantly higher mean radial count when compared to both psoriasis and BCC.

Finger LII showed a highly significantly larger ulnar count in vitiligo patients than in alopecia areata, BCC, psoriasis and controls. Actinic keratosis females showed a highly significant increase in ulnar count compared to BCC, alopecia areata, psoriasis and controls. Atopic eczema males showed a significantly higher

mean ulnar count compared to alopecia areata and BCC, and a highly significantly greater count compared to controls. For radial counts on finger LII, vitiligo again showed a highly significantly greater mean count when compared to alopecia areata, atopic eczema, psoriasis and controls. Actinic keratosis females were found to have a highly significantly larger mean radial count in comparison to alopecia areata, atopic eczema, psoriasis and controls. BCC males were found to have a significantly higher value than in controls and atopic eczema and a highly significantly greater value when compared to psoriatic females.

On finger RII controls were found to have a highly significantly lower count when compared to all of the other groups of females. Actinic keratosis females had a highly significantly larger mean ulnar count when compared to BCC, alopecia areata, psoriasis and to controls. Vitiligo was found to have a significantly higher radial count than that of psoriasis or alopecia areata. For radial counts on RII vitiligo females were found to have a highly significantly greater mean count than BCC, alopecia areata, atopic eczema, psoriasis and controls. Actinic keratosis patients had a highly significantly higher value than BCC, atopic eczema, psoriasis and a significantly higher value than alopecia areata. Psoriasis had a significantly lower mean radial count than alopecia areata and BCC and a highly significantly lower count than controls.

Finger III on the left hand showed actinic keratosis to have a highly significantly higher radial count than all groups apart from vitiligo where the difference was only significant. Controls had a highly significantly lower value of mean radial count than vitiligo, alopecia areata and actinic keratosis. Psoriasis showed a highly significantly lower radial count compared to vitiligo, alopecia areata and actinic keratosis. Atopic eczema females showed a reduced radial count that was significantly different to that found in vitiligo an alopecia areata and highly significantly different from actinic keratosis. Ulnar counts on LIII showed controls to have highly significantly smaller means than vitiligo and actinic keratosis and significantly smaller than atopic eczema. Alopecia areata had a smaller mean ulnar count which was highly significant compared to actinic keratosis and significant compared to vitiligo and atopic eczema. Actinic keratosis females had a highly

significantly larger ulnar count compared to controls and alopeciads.

On RIII control females had a decreased radial count which was significantly lower when compared to atopic eczema and highly significantly lower in comparison to vitiligo, alopecia areata, BCC and actinic keratosis. Psoriasis patients also had a significantly lower radial count compared to BCC and a highly significantly lower count compared to vitiligo, alopecia areata, and actinic keratosis. Actinic keratosis had a highly significantly larger radial count than all other groups except vitiligo. Vitiligo showed a highly significantly greater mean radial count when compared to BCC, atopic eczema, psoriasis and controls and a significantly higher count than alopecia areata. BCC had a higher value which was highly significant compared to controls and significant in comparison to psoriasis.

Finger IV of the left hand showed a statistically significantly lower ulnar count in controls compared to psoriasis, BCC and actinic keratosis and a highly significantly lower count compared to vitiligo. Vitiligo showed a highly significantly increased ulnar count compared to alopeciads and to controls. Vitiligo also showed a highly significantly increased radial count on LIV when compared to atopic eczema, psoriasis and controls. The difference was significant for vitiligo compared with alopecia areata. BCC females were found to have a decreased radial count when compared to actinic keratosis this was highly significant and compared to atopic eczema and to alopecia areata the difference was significant.

On RIV, control female subjects were found to have a decreased ulnar count which was significant in comparison to psoriasis and highly significant when compared to atopic eczema, vitiligo, BCC and actinic keratosis. Alopecia areata females showed a lower radial count which was statistically significant in comparison to atopic eczema and vitiligo female patients.

No statistically significant differences were found for comparisons of ulnar counts on left hand finger V. For radial counts on this finger, however, psoriatic females were found to have a highly significantly lower count than controls, vitiligo and actinic keratosis. Vitiligo had an increased radial count which was highly significant in comparison to BCC and vitiligo and significant compared to atopic eczema and to alopecia areata. BCC females were found to have a highly significantly lower mean value for radial count on LV

Table 6.66(a) - Summary of significant differences from Mann-Whitney U Tests. Finger ridge counts LFUI to RFR5: Males

FINGER	ULNAR COUNT		RADIAL COUNT	
	SIG.	H. SIG.	SIG.	H.SIG.
LI		Psor. : Vit.	A.Ecz. : A.Ker. Vit. : A.Ker. Psor. : Vit.	Psor. : A.Ecz. A.Ecz.: Vit. A.Ecz.: Alop. A.Ecz.: BCC
LII	Cont. : A.Ecz.		A.Ecz. : A.ker. Vit. : Alop. BCC : A.Ker.	Alop. : A.Ker Psor. : A.Ker
LIII	Vit. : BCC		Cont. : A.Ecz. Psor. : A.Ker. Vit. : A.Ker. Alop. : A.Ker.	Cont. : A.Ker A.Ecz.: BCC BCC : A.Ker
LIV			Psor. : A.Ecz. A.Ecz. : Alop. A.Ecz. : BCC	Psor. : A.Ker Alop. : A.Ker BCC : A.Ker
LV	Cont. : Vit. Cont. : A.Ker. A.Ecz.: BCC A.Ecz.: A.Ker.	Cont. : BCC	Psor. : Vit. Vit. : Alop.	
RI	A.Ecz.: Vit.		Cont. : A.Ecz. Psor. : A.Ecz.	A.Ecz.: Vit. A.Ecz.: Alop. A.Ecz.: BCC
RII	A.Ecz.: Vit.	Cont. : A.Ecz. Psor. : A.Ecz. A.Ecz.: BCC		
RIII			Cont. : Alop. Psor. : A.Ker. BCC : A.Ker.	Cont. : A.Ecz Cont. : Vit. Cont. : A.Ker
RIV			Cont. : A.Ecz. Psor. : A.Ecz. BCC : A.Ker.	A.Ecz.: BCC Vit. : BCC
RV	Cont. : Vit. Cont. : BCC A.Ecz.: Vit. A.Ecz.: A.Ker.	Cont. : A.Ker.	Cont. : BCC Psor. : A.Ker. Vit. : Alop.	Psor. : Vit. A.Ecz.: BCC Vit. : BCC BCC : A.Ker

Table 6.66(b) - Summary Table of significant results from Mann-Whitney
U Tests (LFUI to RFR5): FEMALES

FINGER	ULNAR COUNT		RADIAL COUNT	
	SIG.	H.SIG.	SIG.	H.SIG.
LI	Psor. : A.Ker.	Psor. : BCC	Vit. : BCC Alop. : A.Ker.	Cont. : Vit. Cont. : A.Ker. Psor. : Vit. Psor. : A.Ker. BCC : A.Ker.
LII	A.Ecz. : Alop. A.Ecz. : BCC	Cont. : A.Ecz. Cont. : Vit. Cont. : A.Ker. Psor. : Vit. Psor. : A.Ker. Vit. : Alop. Vit. : BCC Alop. : A.Ker. BCC : A.Ker.	Cont. : BCC A.Ecz.: BCC	Cont. : Vit. Cont. : A.Ker. Psor. : Vit. Psor. : BCC Psor. : A.Ker. A.Ecz.: Vit. A.Ecz.: A.Ker. Vit. : Alop. Alop. : A.Ker.
LIII	Cont. : A.Ecz. A.Ecz.: Alop. Vit. : Alop.	Cont. : Vit. Cont. : A.Ker. Alop. : A.Ker.	A.Ecz. : Vit. A.Ecz. : Alop. Vit. : A.Ker.	Cont. : Vit. Cont. : Alop. Cont. : A.Ker. Psor. : Vit. Psor. : Alop. Psor. : A.Ker. Vit. : BCC Alop. : BCC Alop. : A.Ker. BCC : A.Ker.
LIV	Cont. : Psor. Cont. : BCC Cont. : A.Ker.	Cont. : Vit. Vit. : Alop.	A.Ecz.: BCC Vit. : Alop. Alop. : BCC	Cont. : Vit. Psor. : Vit. Psor. : A.Ker. A.Ecz.: Vit. BCC : A.Ker.
LV			A.Ecz.: Vit. Vit. : Alop.	Cont. : Psor. Cont. : BCC Psor. : Vit. Psor. : A.Ker. Vit. : BCC BCC : A.Ker.

Table 6.66(b) continued

FINGER	ULNAR COUNT		RADIAL COUNT	
	SIG.	H.SIG.	SIG.	H.SIG.
RI	Cont. : Vit. A.Ecz.: BCC BCC : A.Ker.	Cont. : BCC Psor. : BCC Alop. : BCC	Cont. : A.Ecz. Psor. : Vit. Psor. : A.Ker. BCC : A.Ker.	Cont. : Vit. Cont. : A.Ker. Vit. : BCC
RII	Psor. : Vit. Vit. : Alop.	Cont. : Psor. Cont. : A.Ecz. Cont. : Vit. Cont. : Alop. Cont. : BCC Cont. : A.Ker. Psor. : A.Ker. Alop. : A.Ker. BCC : A.Ker.	Psor. : Alop. Psor. : BCC Alop. : A.Ker.	Cont. : Psor. Cont. : Vit. Psor. : Vit. Psor. : A.Ker. A.Ecz.: Vit. A.Ecz.: A.Ker. Vit. : Alop. Vit. : BCC BCC : A.Ker.
RIII	Cont. : BCC Psor. : Vit. Vit. : Alop. BCC : A.Ker.	Cont. : Vit. Cont. : A.Ker. Psor. : A.Ker. A.Ecz.: A.Ker. Alop. : A.Ker.	Cont. : A.Ecz. Psor. : BCC Vit. : Alop.	Cont. : Vit. Cont. : Alop. Cont. : A.Ker. Psor. : Vit. Psor. : Alop. Psor. : A.Ker. A.Ecz.: Vit. A.Ecz.: A.Ker. Vit. : BCC Alop. : A.Ker. BCC : A.Ker.
RIV	Cont. : Psor. A.Ecz.: Alop. Vit. : Alop.	Cont. : A.Ecz. Cont. : Vit. Cont. : BCC Cont. : A.Ker.	Psor. : A.Ker. BCC : A.Ker.	Cont. : Vit. Psor. : Vit. A.Ecz.: Vit. Vit. : Alop. Vit. : BCC Vit. : A.Ker.
RV	Psor. : A.Ker.	Psor. : Alop. Psor. : BCC	Psor. : A.Ker. A.Ecz.: Alop. Vit. : Alop. BCC : A.Ker.	Cont. : Psor. Psor. : Vit. Psor. : Alop. Psor. : BCC Vit. : BCC

when compared to controls, vitiligo and to actinic keratosis female patients.

On finger V of the right hand psoriatic females were found to have a lower mean ulnar count which was highly significant compared to BCC and alopecia areata and significant in comparison with actinic keratosis. For radial counts on RV vitiligo females were found to have an increased mean value which was shown to be highly significant in comparison to BCC and psoriasis and significant in comparison to alopecia areata. Psoriatics showed a decreased radial count which was significantly lower than in actinic keratosis and highly significantly lower than in controls, vitiligo, alopecia areata and in BCC females.

Table 6.67 shows a summary of the number of statistically significant differences found between groups. As can be seen more were found in females (159/420) than in males (68/420). For females vitiligo (59 differences), actinic keratosis and (55) show the greatest number of statistically significant differences. In males atopic eczema (32) and actinic keratosis (24) show the greatest number of statistically significant differences between the groups.

Table 6.67 - Summary Table of statistically significant differences from Mann-Whitney U Test results

Variables LFU1 to LFU5

(a) Males

Alop.	3					
Psor.	4	0				
A.Ecz.	5	3	5			
A.Ker.	2	3	5	4		
BCC	3	0	0	8	6	
Cont.	3	1	0	7	4	2
	Vit.	Alop.	Psor.	A.Ecz.	A.Ker.	BCC

(b) Females

Alop.	13					
Psor.	13	5				
A.Ecz.	7	5	0			
A.Ker.	2	9	15	5		
BCC	9	3	7	4	13	
Cont.	15	3	6	6	11	8
	Vit.	Alop.	Psor.	A.Ecz.	A.Ker.	BCC

Discriminant analysis was carried out using the variables LFU1 to RFR5 and the results are shown in Tables 6.68 to 6.72 and in Figures 6.19 to 6.21 for male subjects. From Table 6.68 it can be seen that the first two functions only account for 52.12% of the variance. From Table 6.70 it can be seen that LFR2 and LFU1 are the two most important variables in Function 1 which takes out 32.37% of the variance and that ulnar counts predominantly make up Function 2. Indeed in the first seven variables making up Functions 1 and 2 only one is a radial count. The greatest intergroup differences can be seen from Table 6.71 to be between vitiligo and psoriasis ($F = 3.2166$) and between vitiligo and atopic eczema ($F = 3.1343$). The territorial map (Figure 6.19) shows vitiligo to be most separated from psoriasis, atopic eczema and BCC. This is also evident from the scatterplot and the diagram of group centroid distribution (Figures 6.20 and 6.21 respectively). The classification results show that the set of variables can classify 25.48% of cases to their 'correct' groups. The largest number of correctly classified cases are found for atopic eczema males (31.0% correct) followed by vitiligo (29.0% correct).

The results of discriminant analysis for female subjects are shown in Tables 6.73 to 6.76 and Figures 6.22 to 6.24. Functions 1 and 2 account for 62.83% of the variance (Table 6.73). The most important variables in these Functions are located on fingers II and III of both hands. Figures 6.22 and 6.24 show that the groups most widely separated are vitiligo, controls and psoriasis. The classification results Table 6.76 show that 27.38% of the cases can be put into their correct groups using the set of variables. The best correctly classified groups are actinic keratosis (40.7% correct) and controls (36.1% correct).

When the groups were reclassified according to disease aetiology type the results of statistical analysis are shown in Tables 6.77 and 6.78.

For male subjects no significant differences were found between controls and the other groups apart from on RIII where controls were found to have a highly significantly smaller ulnar count compared to GD and a significantly smaller ulnar count compared to ND. For ulnar counts on finger V of both hands, controls had an increased

Table 6.68 - Canonical Discriminant Functions: Males LFU1 to RFR5

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.06049	32.37	32.37	0.2388279
2*	0.03689	19.74	52.12	0.1886141
3*	0.03519	13.83	70.95	0.1843640
4*	0.02923	15.11	86.06	0.1657012
5*	0.01590	3.51	94.56	0.1259992
6*	0.01016	5.44	100.00	0.1002694

Table 6.69 - Males: Variables LFU1 to RFR5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
LFU1	0.42411	-0.07892	-0.58686	-0.52930	0.23422	-0.13113
LFR1	0.47035	-0.04294	0.47653	0.21868	-0.15695	0.39283
LFU2	-0.17198	0.42931	0.32062	-0.28753	0.11387	0.43821
LFR2	-0.74908	0.00406	0.29698	0.05449	0.12425	0.20512
LFU3	0.19726	-0.35779	0.25906	-0.46123	-0.32901	0.17194
LFR3	0.44899	-0.38658	-0.06180	-0.46778	1.05103	-0.56916
LFR4	-0.21587	-0.01451	0.77493	0.26477	0.03058	0.10437
LFU5	0.21495	-0.03115	-0.28958	0.51239	-0.05216	-0.31311
LFR5	-0.30870	-0.36576	-0.34997	0.27579	-0.03720	0.48093
RFR1	0.16242	-0.14742	-0.16844	0.48884	0.04874	-0.36373
RFU1	-0.27279	-0.28211	0.39730	0.21537	-0.20933	0.42475
RFR2	0.18966	0.20011	-0.36394	-0.28177	0.07976	-0.10236
RFU2	0.38582	0.49886	-0.22953	0.43460	-0.24802	-0.42429
RFR3	-0.13817	0.34299	0.37513	-0.14092	-0.82531	0.01477
RFU3	-0.44246	0.06229	-0.27436	0.34879	-0.26028	-0.75375
RFR4	0.34226	0.47431	-0.14432	-0.20603	0.05223	0.01577
RFU4	-0.12059	-0.73890	0.12159	0.12633	0.14067	-0.24855
RFR5	-0.51187	0.38084	-0.27227	-0.02610	0.42038	-0.10351
RFU5	0.31392	0.17301	-0.07723	-0.09808	0.20005	0.79440

Table 6.70 - Males: Variables LFU1 to RFR5

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
LFR2	-0.29714*	-0.06219	0.26988	0.03266	0.29545	-0.10288
LFU1	0.29183*	-0.21147	-0.09460	-0.13074	0.11841	0.05265
RFR1	0.11947	-0.29865*	0.16184	0.10306	0.04101	0.16192
RFR4	-0.00974	-0.28359*	0.14516	0.23081	0.14595	-0.13968
LFU2	0.12470	0.26509*	0.18166	0.05735	0.06031	0.01032
LFU3	0.05813	-0.24768*	0.10892	-0.05645	-0.20731	-0.20003
LFU4	0.02469	-0.17747*	0.12756	0.12271	0.12552	-0.11014
LFR4	-0.02962	0.14863	0.54521*	0.26294	0.40336	-0.04244
LFR1	0.38590	-0.04211	0.45944*	0.31354	0.26337	0.01721
RFR3	0.05418	0.28996	0.44042*	-0.03979	0.06296	-0.18727
RFR2	0.14209	0.27469	0.10624	0.43514*	0.03305	-0.27436
RFR1	0.25573	-0.02256	0.30341	0.42111*	0.28801	-0.14387
LFR5	-0.19978	0.04557	0.04035	0.39834*	0.38342	0.17563
LFU5	0.24652	-0.02669	-0.23389	0.30856*	0.03732	0.07332
RFR5	0.21923	0.00136	-0.21774	0.30192*	0.10274	0.24718
LFR3	0.15910	0.03671	0.41192	0.01318	0.59840*	-0.33093
RFR5	-0.22491	0.31198	0.02612	0.25500	0.51012*	-0.02412
RFR4	0.07944	0.34383	0.31091	0.12076	0.36585*	-0.08974
RFR2	-0.03744	0.01640	0.11030	-0.19536	0.22714*	-0.05904
RFR3	-0.06361	-0.12053	-0.03969	0.21118	-0.14861	-0.42543*

Table 6.71 - Males: Variables LFU1 to RFR5

Code Group
 0 -- Controls
 1 -- Psoriasis
 2 -- Atopic Eczema
 3 -- BCC
 5 -- Alopecia areata
 6 -- Actinic Keratosis
 7 -- Vitiligo

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

GROUP	GROUP	0	1	2	3	5	6
1		2.5420 0.0003					
2		2.9037 0.0000	1.9583 0.0081				
5		1.7324 0.0259	2.0988 0.0038	2.5568 0.0003			
6		2.2279 0.0018	1.2554 0.2043	1.7701 0.0215	2.3199 0.0011		
7		2.0992 0.0037	1.9106 0.0104	2.0290 0.0055	1.2219 0.2302	2.2251 0.0018	
	1	2.2750 0.0014	3.2166 0.0000	3.1343 0.0000	2.1837 0.0023	2.1648 0.0026	1.6129 0.0459

Figure 6.19 - Territorial Map - Males: Variables LFU1 to RFR5

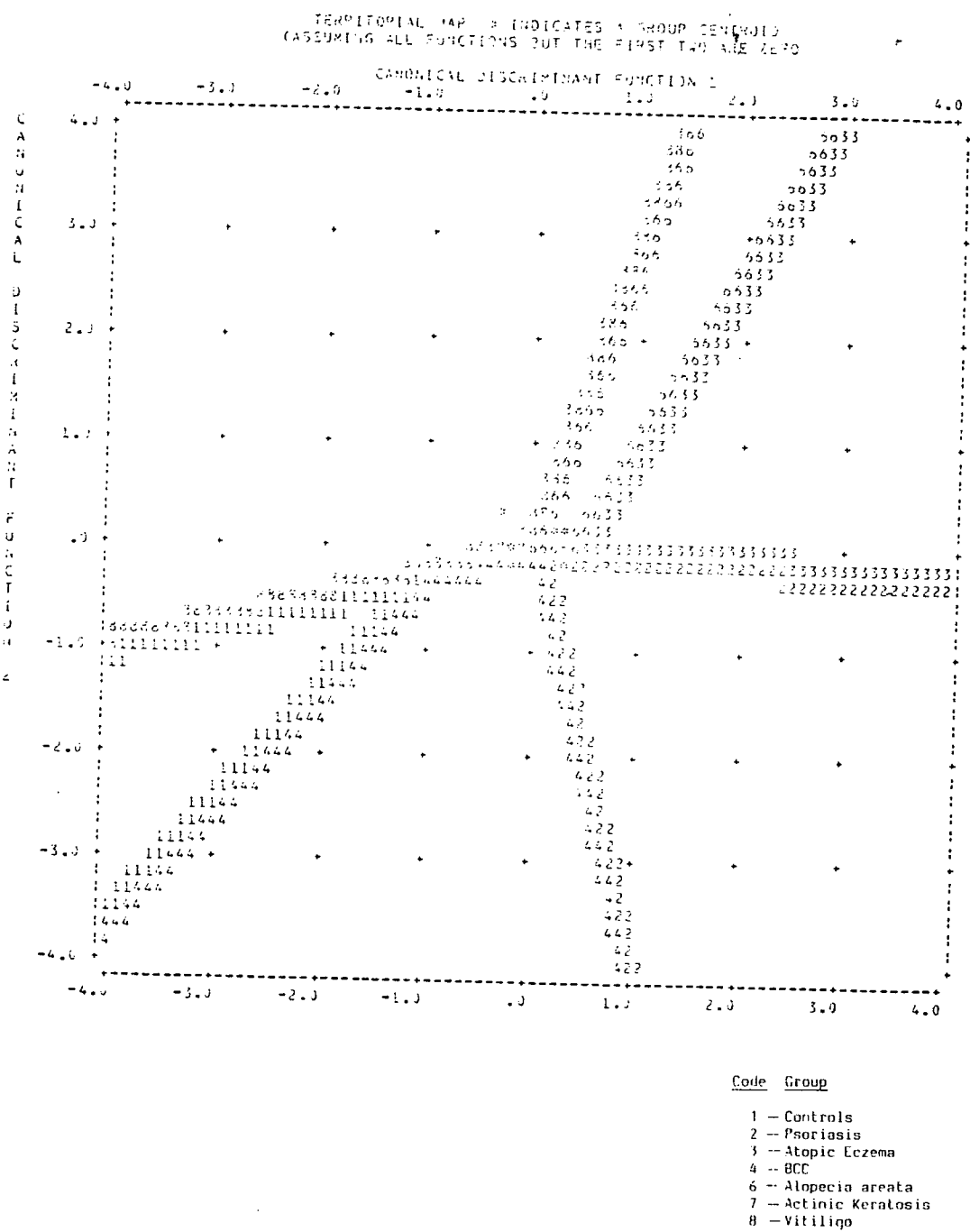
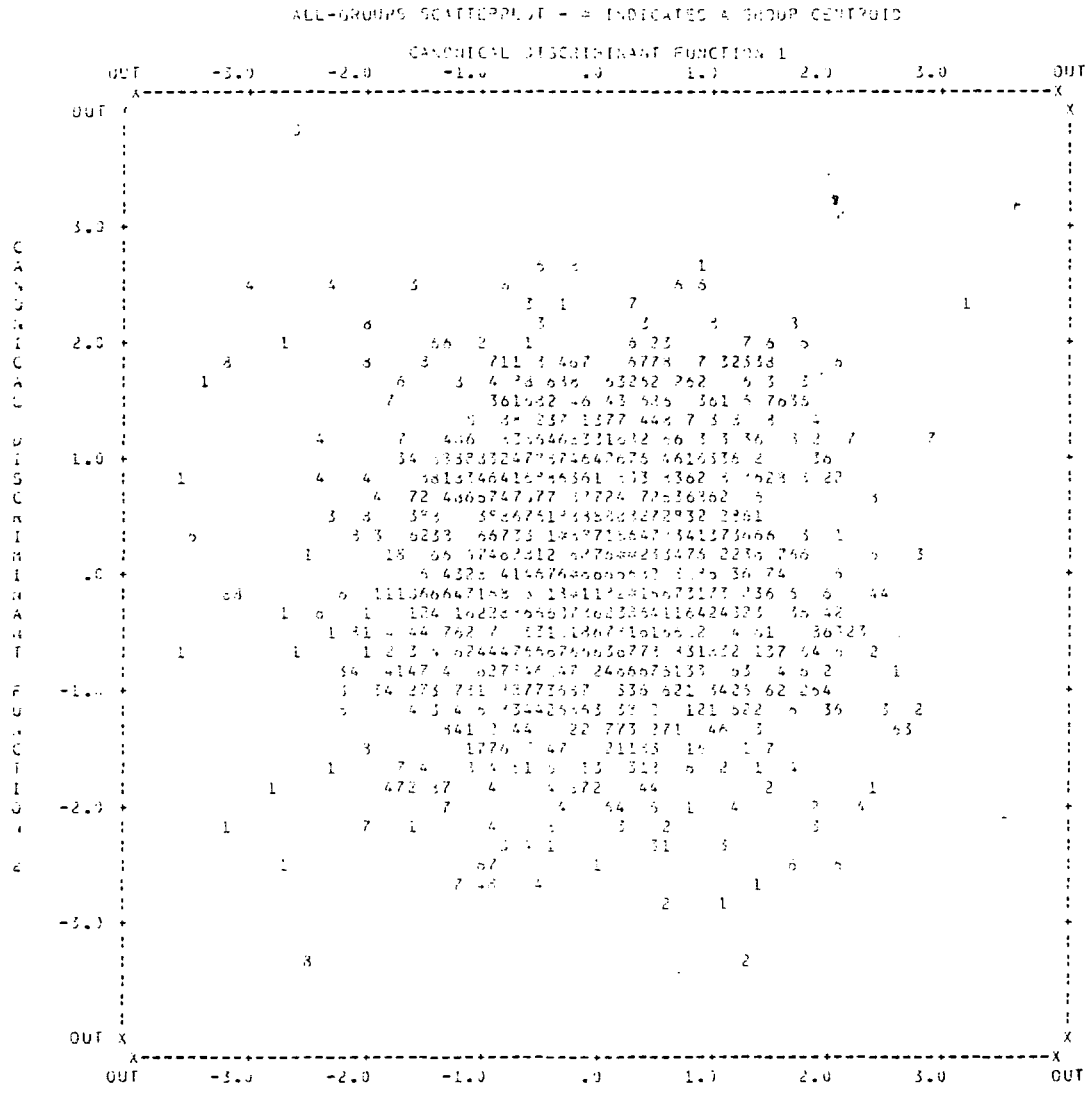


Figure 6.20 - Scatterplot - Males: Variables LFU1 to RFR5



- Code Group
- 1 - Controls
 - 2 - Psoriasis
 - 3 - Atopic Eczema
 - 4 - BCC
 - 6 - Alopecia areata
 - 7 - Actinic Keratosis
 - 8 - Vitiligo

Figure 6.21 - Group Centroids

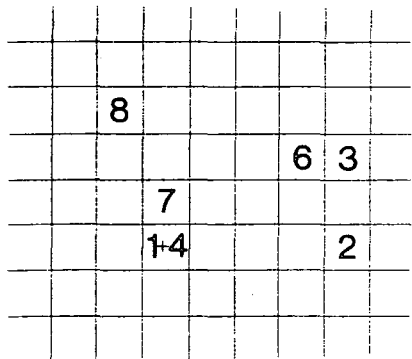


Table 6.72 - Males: Variables LFU1 to RFR5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	200	53 26.5%	24 12.0%	32 16.0%	21 10.5%	18 9.0%	21 10.5%	31 15.5%
GROUP	1	201	23 11.4%	57 28.4%	30 14.9%	16 8.0%	21 10.4%	28 13.9%	26 12.9%
GROUP	2	203	19 9.4%	23 11.3%	63 31.0%	21 10.3%	26 12.8%	24 11.8%	27 13.3%
GROUP	3	211	30 14.2%	31 14.7%	26 12.3%	43 20.4%	22 10.4%	25 11.8%	34 16.1%
GROUP	5	210	24 11.4%	35 16.7%	37 17.6%	15 7.1%	35 16.7%	36 17.1%	28 13.3%
GROUP	6	129	13 10.1%	20 15.5%	17 13.2%	11 8.5%	10 7.8%	36 27.9%	22 17.1%
GROUP	7	200	32 16.0%	15 7.5%	23 11.5%	14 7.0%	22 11.0%	36 18.0%	58 29.0%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 25.48%

Table 6.73 - Canonical Discriminant Functions - Females:
Variables LFU1 to RFR5

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.10271	39.15	39.15	0.3051873
2*	0.06211	23.68	62.83	0.2419260
3*	0.04290	16.35	79.19	0.2028175
4*	0.03063	11.68	90.86	0.1723810
5*	0.01311	5.00	95.86	0.1137600
6*	0.01086	4.14	100.00	0.1036563

Table 6.74

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
RFR3	0.69995*	0.07489	0.29606	0.10512	0.38095	-0.14412
LFR3	0.61097*	0.13491	0.07705	-0.07447	0.36377	-0.14321
RFU3	0.45394*	-0.01390	0.22035	0.15755	-0.10617	0.21364
RFU2	0.45269*	-0.15852	0.33643	-0.01594	0.38734	0.06991
RFR2	0.36759	0.46795*	0.34419	0.07416	0.01143	0.04157
RFR4	0.23527	0.24645	0.63237*	-0.08548	0.35244	-0.31156
LFU2	0.38737	-0.08741	0.47750*	-0.10088	0.20006	0.33624
LFR4	0.26597	0.23653	0.46667*	-0.25751	0.38516	-0.16397
LFU4	0.17779	-0.02826	0.38011*	0.03903	0.19851	0.19604
RFU1	0.05857	-0.07222	0.18272	0.52582*	0.32713	0.00112
LFR2	0.36658	0.27260	0.33562	0.46633*	0.03245	0.11163
LFU1	0.15598	0.07865	0.06023	0.31356*	0.16362	0.39758
RFR5	0.23139	0.45755	0.32073	-0.03598	0.60047*	0.25370
RFR1	0.34387	-0.04796	0.32869	-0.07626	0.48704*	-0.00730
LFR5	0.24126	0.30613	0.34340	-0.11413	0.40786*	0.08172
LFR1	0.35635	0.06945	0.22324	-0.02337	0.37215*	0.03996
RFU4	0.15576	-0.19837	0.31103	0.12124	0.34733*	0.19447
RFU5	0.12688	0.15462	-0.18626	0.24939	0.29808*	-0.06246
LFU3	0.24451	-0.14359	0.27966	-0.05878	0.08736	0.28961*
LFU5	0.07322	-0.06369	0.05587	0.00372	-0.10225	0.19079*

Table 6.75 - Females: Variables LFU1 to RFR5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
LFU1	0.09432	0.32135	-0.33514	-0.00445	-0.10295	0.53022
LFU2	0.11137	0.05469	0.41932	0.05861	-0.10933	0.42945
LFR2	-0.06395	0.11404	0.33249	0.85375	-0.29917	0.30549
LFU3	-0.12735	-0.24277	0.04872	-0.28017	0.25927	0.18560
LFR3	0.46594	0.04901	-0.91265	-0.29794	0.12779	-0.20550
LFR4	-0.35708	0.29189	0.18272	-0.64920	-0.01227	-0.09072
LFU5	-0.03637	-0.28774	0.02354	-0.11865	-0.40210	0.15356
RFR1	0.10058	-0.36025	0.07132	-0.18679	0.25548	0.16369
RFU1	-0.32655	-0.26761	0.16827	0.63051	0.35716	-0.40352
RFR2	0.14242	0.60711	0.05910	-0.35079	-0.13489	-0.18903
RFU2	0.33748	-0.22934	-0.11507	-0.11202	0.29834	-0.11009
RFR3	0.77027	-0.44291	0.07335	0.28473	0.02426	-0.22670
RFU3	0.50945	0.12901	0.15152	0.03103	-0.73052	0.03696
RFR4	-0.27695	0.15399	0.78104	0.25957	-0.25269	-0.82800
RFU4	-0.40533	-0.62048	0.13468	-0.00042	0.32339	0.12388
RFR5	-0.18343	0.57183	-0.07011	-0.02398	0.59014	0.79481
RFU5	-0.08584	0.46802	-0.39512	0.27533	0.41326	-0.38413

Figure 6.22 - Territorial Map - Females: Variables LFU1 to RFU5

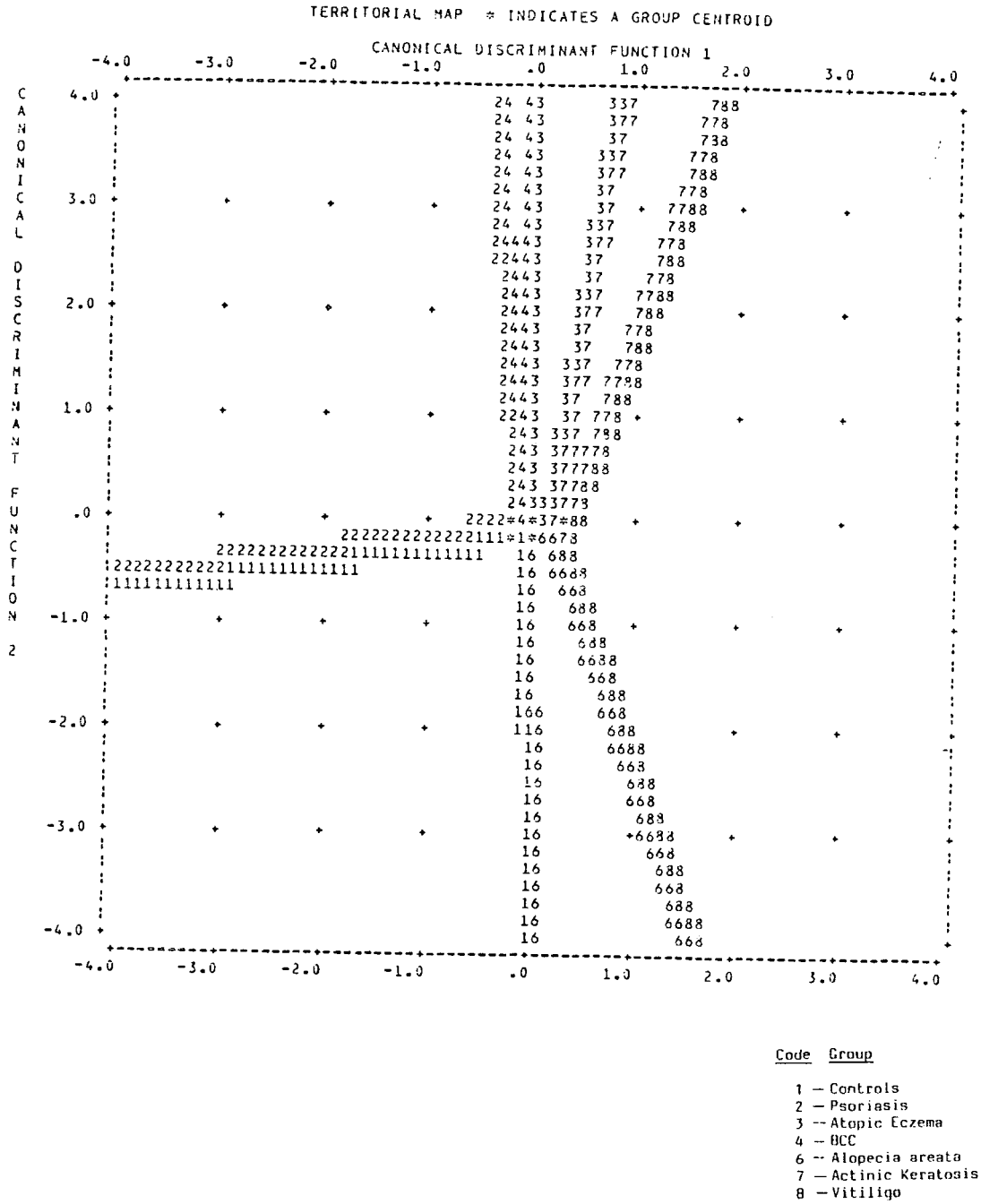


Table 6.76 - Females: Variables LFU1 to RFR5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	202	73 36.1%	27 13.4%	20 9.9%	20 9.9%	19 9.4%	20 9.9%	23 11.4%
GROUP	1	205	30 14.6%	57 27.8%	25 12.2%	23 11.2%	16 7.8%	31 15.1%	23 11.2%
GROUP	2	203	30 14.8%	43 21.2%	35 17.2%	22 10.8%	23 11.3%	32 15.8%	18 8.9%
GROUP	3	202	27 13.4%	28 13.9%	17 8.4%	60 29.7%	18 8.9%	31 15.3%	21 10.4%
GROUP	5	206	42 20.4%	28 13.6%	9 4.4%	25 12.1%	37 18.0%	42 20.4%	23 11.2%
GROUP	6	172	16 9.3%	19 11.0%	11 6.4%	16 9.3%	23 13.4%	70 40.7%	17 9.9%
GROUP	7	205	32 15.6%	28 13.7%	15 7.3%	22 10.7%	18 8.8%	40 19.5%	50 24.4%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 27.33%

Table 6. 77

Means and Standard Deviations

Finger Ridge Counts – Subjects grouped by disorder type.

Gp	Sex	No	LFU1		LFR1		LFU2		LFR2		LFU3	
			Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
Cont	M	206	6.350 +/- 8.554		17.927 +/- 5.410		6.519 +/- 8.204		10.333 +/- 7.370		2.296 +/- 5.793	
GD	M	816	6.544 +/- 2.538		18.527 +/- 4.376		7.885 +/- 8.210		9.831 +/- 7.804		2.323 +/- 5.989	
ND	M	340	6.088 +/- 8.156		18.500 +/- 4.313		7.338 +/- 7.627		11.012 +/- 7.235		2.947 +/- 6.229	
Cont	F	203	4.300 +/- 7.211		15.616 +/- 5.663		4.719 +/- 6.936		8.813 +/- 6.561		1.493 +/- 4.558	
GD	F	819	4.492 +/- 7.307		16.382 +/- 5.080		6.491 +/- 7.371		9.076 +/- 7.214		2.530 +/- 6.005	
ND	F	374	5.551 +/- 7.622		16.906 +/- 4.218		6.837 +/- 7.616		10.714 +/- 6.787		2.741 +/- 5.816	

Gp	Sex	No	LFR3		LFU4		LFR4		LFU5		LFR5	
			Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
Cont	M	206	13.587 +/- 6.171		5.320 +/- 7.497		15.922 +/- 6.597		1.505 +/- 4.073		13.825 +/- 5.047	
GD	M	816	14.310 +/- 5.582		5.234 +/- 7.255		16.404 +/- 4.731		1.282 +/- 3.962		13.322 +/- 3.865	
ND	M	340	14.497 +/- 4.905		5.894 +/- 7.451		16.732 +/- 4.036		0.753 +/- 3.279		13.344 +/- 3.383	
Cont	F	203	11.591 +/- 5.405		3.300 +/- 6.224		14.567 +/- 5.339		0.818 +/- 2.940		12.122 +/- 4.438	
GD	F	819	12.930 +/- 5.752		4.733 +/- 7.050		15.084 +/- 5.614		0.926 +/- 3.372		11.921 +/- 4.166	
ND	F	374	13.655 +/- 5.095		4.896 +/- 6.744		14.717 +/- 4.594		1.064 +/- 3.451		11.904 +/- 3.479	

Table 6.77 continued

Gp	Sex	No	RFR1		RFU1		RFR2		RFU2		RFR3	
			Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
Cont	M	206	19.796 +/- 5.101		7.393 +/- 8.676		9.767 +/- 7.417		7.568 +/- 8.365		13.277 +/- 5.780	
GD	M	816	19.999 +/- 4.508		7.219 +/- 8.817		10.165 +/- 8.136		8.221 +/- 7.832		14.583 +/- 5.334	
ND	M	340	19.935 +/- 3.835		7.779 +/- 8.811		10.453 +/- 7.820		7.535 +/- 7.554		14.712 +/- 5.168	
Cont	F	203	16.877 +/- 5.425		4.409 +/- 7.123		9.690 +/- 6.951		4.631 +/- 6.411		11.315 +/- 5.538	
GD	F	819	18.172 +/- 4.972		5.361 +/- 7.872		9.252 +/- 7.891		7.405 +/- 8.446		13.241 +/- 5.697	
ND	F	374	18.152 +/- 4.396		6.096 +/- 8.013		10.350 +/- 7.619		7.837 +/- 7.631		14.190 +/- 5.291	

Gp	Sex	No	RFU3		RFR4		RFU4		RFR5		RFU5	
			Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
Cont	M	206	3.199 +/- 6.708		15.942 +/- 6.056		6.864 +/- 8.864		14.058 +/- 5.018		1.825 +/- 4.336	
GD	M	816	2.591 +/- 6.197		16.789 +/- 5.105		6.115 +/- 7.644		13.895 +/- 4.076		1.650 +/- 4.462	
ND	M	340	3.059 +/- 6.410		16.494 +/- 4.315		6.962 +/- 7.777		13.712 +/- 3.215		1.021 +/- 3.494	
Cont	F	203	1.227 +/- 4.068		14.650 +/- 5.760		3.660 +/- 6.336		12.532 +/- 4.475		0.714 +/- 2.505	
GD	F	819	2.263 +/- 5.916		15.170 +/- 5.399		5.322 +/- 7.673		12.402 +/- 4.268		0.801 +/- 3.595	
ND	F	374	3.420 +/- 6.935		14.848 +/- 4.667		5.393 +/- 7.151		12.513 +/- 3.546		1.152 +/- 3.471	

Table 6.78

Man-Whitney U Test Results

Finger Ridge Counts

			Variables with Probability (** = highly significant, * = significant)				
Sex	Gp1	Gp2	LFU1	LFR1	LFU2	LFR2	LFU3
M	Cont	GD	0.7774	0.4446	0.0543	0.2956	0.7177
M	Cont	ND	0.7471	0.7377	0.3134	0.5647	0.2718
M	GD	ND	0.4097	0.6209	0.3578	0.0494*	0.0465*
F	Cont	GD	0.9404	0.1547	0.0041**	0.3778	0.0284*
F	Cont	ND	0.0774	0.0204*	0.0064**	0.0004**	0.0061**
F	GD	ND	0.0188*	0.1585	0.7835	0.0004**	0.3237

			Variables with Probability (** = highly significant, * = significant)				
Sex	Gp1	Gp2	LFR3	LFU4	LFR4	LFU5	LFR5
M	Cont	GD	0.3546	0.7158	0.7836	0.1680	0.1507
M	Cont	ND	0.4532	0.6159	0.9416	0.0015**	0.1527
M	GD	ND	0.8335	0.2393	0.5931	0.0155*	0.7732
F	Cont	GD	0.0007**	0.0267*	0.2418	0.9577	0.2926
F	Cont	ND	0.0000**	0.0093**	0.9824	0.4611	0.1679
F	GD	ND	0.0820	0.5547	0.1157	0.3509	0.6495

Table 6.78 continued

			Variables with Probability (** = highly significant, * = significant)				
Sex	Gp1	Gp2	RFR1	RFU1	RFR2	RFU2	RFR3
M	Cont	GD	0.9900	0.4617	0.5840	0.4689	0.0079**
M	Cont	ND	0.4699	0.9511	0.3637	0.8446	0.0190*
M	GD	ND	0.2454	0.4535	0.6918	0.2037	0.9256
F	Cont	GD	0.0050**	0.2595	0.5872	0.0000**	0.0000**
F	Cont	ND	0.0169*	0.00254*	0.2083	0.0000**	0.0000**
F	GD	ND	0.7774	0.1093	0.0370*	0.2297	0.0063**

			Variables with Probability (** = highly significant, * = significant)				
Sex	Gp1	Gp2	RFU3	RFR4	RFU4	RFR5	RFU5
M	Cont	GD	0.1506	0.2270	0.1580	0.3027	0.1037
M	Cont	ND	0.8167	0.9845	0.9466	0.0682	0.0052**
M	GD	ND	0.1500	0.0551	0.0845	0.1064	0.0915
F	Cont	GD	0.0250	0.4138	0.0029**	0.4411	0.9236
F	Cont	ND	0.0001**	0.8731	0.0023**	0.5513	0.2929
F	GD	ND	0.0028**	0.2053	0.6630	0.7695	0.1035

mean value in comparison to ND females and the difference was found to be highly significant. When GD and ND males were compared significantly higher mean values for radial count on LII and ulnar count on LIII were found in GD males.

For females a highly significantly greater radial count was found for GD and a significantly higher radial count for ND were found when they were compared to controls on finger RI. Significantly greater radial counts on LI and ulnar count on RI were also found for ND females in comparison to controls. On finger II a highly significantly smaller ulnar count in controls compared to each of GD and ND was found on both hands. A highly significantly greater radial count was found for ND females compared to controls and to GD on LII and a significant value for ND compared to GD on RII was found. For radial counts on finger III highly significant differences were found between controls and the other groups on both hands and between GD and ND on the right hand. In all these cases the ND females had the highest radial count. Ulnar counts on finger III showed highly significant differences between controls and ND on both hands and between ND and GD on the right hand. A significant difference was also found between controls and GD on the left hand. ND had the highest ulnar count followed by GD and controls in order of decreasing value.

On finger IV controls had a decreased ulnar count which was highly significant on both hands when compared to ND and highly significant on the right hand and significant on the left hand when compared to GD. Table 6.69 shows the significant differences found from Mann-Whitney U Test analysis. Females showed more differences (25/60) than males 7/60. For females and males GD appeared to be the group showing most differences.

Table 6.79 - Summary Table of significant differences for intergroup comparisons from Mann-Whitney U Test results - Variables LFU1 to RFR5 - Subjects grouped by Disorder Type

(a) Males			(b) Females		
GROUPS	ND	GD	GROUPS	ND	GD
Cont.	3	1	Cont.	12	8
GD	3		GD	5	

(ii) Unilateral Ridge Counts (RF1 to LF5)

For finger I atopic eczema males were found to have highly significantly increased ridge counts on both hands compared to vitiligo, alopecia areata and BCC and on the left hand in comparison to controls. A significantly higher count was found in male atopic eczema patients when compared to psoriasis and to controls on the right hand. On LI vitiligo male patients were found to have a smaller count which was significantly different to that in psoriatics and highly significant to actinic keratosis.

On finger II of the left hand actinic keratosis males showed a significantly higher count than psoriasis, alopecia areata and BCC. Actinic keratosis males also showed increased counts which were highly significant in comparison to controls for both hands and when compared to vitiligo and to BCC on the left hand. The difference was found to be significant on the right hand when compared to psoriasis and BCC. Controls were found to have a decreased count on the left hand which was significant when compared to vitiligo and to alopecia areata and highly significant when compared to atopic eczema and actinic keratosis (both hands). On the left hand BCC males were found to have a highly significantly lower count compared to atopic eczema males on finger III.

Actinic keratosis males had the highest count on both hands compared to all the other groups. It was found to be highly significantly greater than that in psoriasis and BCC and significantly higher than that for alopecia areata on the left hand. On the right hand actinic keratosis males had a significantly higher value than BCC. BCC males showed significantly lower values compared to vitiligo, actinic keratosis and atopic eczema (H.SIG.) on the right hand. Atopic eczema showed higher counts and were significantly greater than alopecia areata, psoriasis and BCC on the left hand and to psoriasis and BCC (H.SIG.) on the right hand.

On finger V vitiligo males had a highly significantly greater count when compared to psoriasis, alopecia areata and BCC on the right hand and a significantly higher value compared to psoriasis on the left hand. BCC males were found to have a highly significantly smaller count on RV in comparison to actinic keratosis, vitiligo, atopic eczema and controls (SIG.).

For females on finger I actinic keratosis patients were found to have a highly statistically significantly greater count on both hands compared to controls and on the left hand in comparison with BCC, alopecia areata and psoriasis. On the right hand the difference was statistically significant when actinic keratosis was compared to BCC and to psoriasis. Vitiligo females also were found to have a statistically significantly higher count on both hands compared to psoriasis (highly significant on left) and on the left hand in comparison to controls, BCC and to alopecia areata. On the right hand vitiligo males showed a highly significantly greater count in comparison to BCC and controls.

For fingers III, IV and V a plethora of highly significant differences exist when the groups were compared and a smaller number of significant differences were found, see Table 6.84(b). It is easier to perceive the differences by looking at the discriminant analysis results below. Females showed many more (102/210) differences than males (45/210), see Table 6.85. For males, atopic eczema (19) showed the most intergroup differences followed by BCC (15). Controls and alopecia areata showed the least (8 each). In female vitiligo showed the most statistically significant differences (46) followed by actinic keratosis (35) and psoriasis (32). Atopic eczema showed the smallest number (18).

Table 6.85 - Statistical differences from Mann-Whitney U Test
Variables RF1 to LF5

(a) Males

Alop.	1					
Psor.	3	0				
A.Ecz.	2	3	4			
A.Ker.	2	3	4	1		
BCC	2	0	0	6	6	
Cont.	1	1	0	3	2	1
	Vit.	Alop.	Psor.	A.Ecz.	A.Ker.	BCC

(b) Females

Alop.	8					
Psor.	10	4				
A.Ecz.	8	1	3			
A.Ker.	2	3	10	4		
BCC	10	2	3	0	10	
Cont.	8	3	2	2	6	3
	Vit.	Alop.	Psor.	A.Ecz.	A.Ker.	BCC

Table 6 .80

Means and Standard Deviations

Unilateral Ridge Counts - Males (RF1 to LF5)

		Variables									
		RF1		RF2		RF3		RF4		RF5	
Group	Cases	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Cont	206	19.951	+/- 5.068	12.709	+/- 6.961	13.602	+/- 5.762	16.374	+/- 5.958	14.083	+/- 5.018
Psoriasis	202	20.059	+/- 4.389	13.366	+/- 6.177	14.342	+/- 5.176	16.490	+/- 4.708	13.480	+/- 3.714
Atop Ecz	203	21.113	+/- 4.034	13.655	+/- 6.490	15.246	+/- 4.956	17.384	+/- 5.190	14.182	+/- 3.906
Vitiligo	201	19.582	+/- 4.633	13.378	+/- 6.460	14.891	+/- 5.110	17.194	+/- 5.081	14.587	+/- 4.332
Alop Are	210	19.762	+/- 4.518	13.710	+/- 5.866	14.814	+/- 5.594	16.664	+/- 5.235	13.776	+/- 4.089
B.C.C.	211	19.754	+/- 3.978	13.104	+/- 5.858	14.573	+/- 4.961	16.232	+/- 4.413	13.313	+/- 3.329
Act Ker	129	20.543	+/- 3.267	14.186	+/- 5.702	15.667	+/- 4.772	17.574	+/- 3.903	14.426	+/- 2.880

		Variables									
		LF1		LF2		LF3		LF4		LF5	
Group	Cases	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Cont	206	18.257	+/- 5.506	12.709	+/- 6.871	13.854	+/- 6.225	16.184	+/- 6.386	13.883	+/- 5.068
Psor	202	18.990	+/- 4.406	12.748	+/- 5.761	14.741	+/- 5.009	16.257	+/- 4.309	13.059	+/- 3.592
Atop Ecz	203	19.857	+/- 4.131	13.685	+/- 8.277	15.000	+/- 5.573	17.315	+/- 4.397	13.754	+/- 3.741
Vitiligo	201	17.975	+/- 4.397	13.493	+/- 6.136	14.000	+/- 5.684	16.756	+/- 4.722	13.761	+/- 4.049
Alop Are	210	18.343	+/- 4.413	12.733	+/- 5.846	14.376	+/- 5.624	15.895	+/- 5.333	12.957	+/- 4.074
B.C.C.	211	18.403	+/- 4.660	12.900	+/- 5.385	13.782	+/- 5.128	16.256	+/- 4.370	13.190	+/- 3.714
Act Ker	129	19.233	+/- 3.452	14.217	+/- 5.368	15.984	+/- 4.091	17.682	+/- 3.187	13.674	+/- 2.796

Table 6 .81

Means and Standard Deviations

Unilateral Ridge Counts – Females (RF1 to LF5)

		Variables									
		RF1		RF2		RF3		RF4		RF5	
Group	Cases	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Cont	206	17.143	+/- 5.335	11.177	+/- 6.231	11.458	+/- 5.522	14.921	+/- 5.663	12.542	+/- 4.467
Psor	202	17.571	+/- 5.643	10.654	+/- 6.759	12.302	+/- 5.167	14.322	+/- 5.482	11.098	+/- 4.056
Atop Ecz	203	18.355	+/- 4.977	12.153	+/- 6.889	12.852	+/- 5.797	14.867	+/- 5.431	12.448	+/- 4.285
Vitiligo	201	19.156	+/- 4.469	14.537	+/- 8.020	15.024	+/- 5.079	17.161	+/- 5.428	13.459	+/- 4.409
Alop Are	210	18.044	+/- 4.576	12.549	+/- 7.463	13.738	+/- 6.686	15.218	+/- 6.821	12.820	+/- 5.517
B.C.C.	211	17.792	+/- 4.482	11.847	+/- 6.200	13.381	+/- 5.267	14.579	+/- 4.610	12.149	+/- 3.659
Act Ker	129	18.810	+/- 4.195	14.351	+/- 5.391	15.661	+/- 4.977	15.649	+/- 4.611	12.954	+/- 3.413

		Variables									
		LF1		LF2		LF3		LF4		LF5	
Group	Cases	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Cont	206	15.961	+/- 5.715	10.847	+/- 6.251	11.700	+/- 5.376	14.897	+/- 5.320	12.251	+/- 4.478
Psor	202	15.463	+/- 5.905	10.517	+/- 6.404	12.122	+/- 5.801	14.176	+/- 5.414	11.254	+/- 4.049
Atop Ecz	203	16.458	+/- 5.370	11.773	+/- 6.313	12.640	+/- 6.209	14.842	+/- 5.420	11.882	+/- 4.401
Vitiligo	201	17.512	+/- 4.220	13.493	+/- 5.917	14.171	+/- 5.265	16.620	+/- 6.463	12.854	+/- 4.325
Alop Are	210	16.592	+/- 4.278	11.597	+/- 5.434	13.709	+/- 5.496	15.019	+/- 4.878	11.883	+/- 3.881
B.C.C.	211	16.465	+/- 4.519	11.941	+/- 6.117	12.683	+/- 4.856	14.193	+/- 4.406	11.441	+/- 3.527
Act Ker	129	17.701	+/- 3.821	13.667	+/- 5.060	15.098	+/- 4.858	15.770	+/- 4.329	12.529	+/- 3.108

Table 6.82 Mann-Whitney U Test Results
Unilateral Finger Ridge Counts

Males

		Probability (* = significant $P < 0.05$. ** = highly significant $P < 0.01$)				
Group 1	Group 2	RF1	RF2	RF3	RF4	RF5
Control	Psoriasis	0.9654	0.3416	0.1708	0.7657	0.1122
Control	Atop Ecz	0.0402*	0.2527	0.0071**	0.1747	0.9977
Control	Vitiligo	0.2425	0.3248	0.0177*	0.2351	0.3731
Control	Alop Are	0.4897	0.2071	0.0143*	0.949	0.3868
Control	BCC	0.1943	0.6694	0.1185	0.3108	0.0180*
Control	Act Ker	0.3368	0.0664	0.0017**	0.3075	0.8460
Psoriasis	Atop Ecz	0.0224*	0.9170	0.1873	0.0470*	0.0712
Psoriasis	Vitiligo	0.2329	0.9603	0.2447	0.0877	0.0044**
Psoriasis	Alop Are	0.5035	0.9474	0.2087	0.6969	0.4044
Psoriasis	BCC	0.1424	0.4528	0.8930	0.3403	0.2282
Psoriasis	Act Ker	0.8809	0.3364	0.0372*	0.2172	0.0640
Atop Ecz	Vitiligo	0.0006**	0.9370	0.8631	0.8364	0.2905
Atop Ecz	Alop Are	0.0021**	0.9285	0.9690	0.1293	0.3166
Atop Ecz	BCC	0.0002**	0.3717	0.2199	0.0045**	0.0026**
Atop Ecz	Act Ker	0.0600	0.3877	0.4019	0.6329	0.8656
Vitiligo	Alop Are	0.6113	0.9694	0.8538	0.2239	0.0445*
Vitiligo	BCC	0.9387	0.4349	0.2917	0.0113*	0.0001**
Vitiligo	Act Ker	0.1648	0.3655	0.2872	0.8456	0.3410
Alop Are	BCC	0.4975	0.3661	0.2703	0.2242	0.0511
Alop Are	Act Ker	0.3822	0.3154	0.3665	0.3027	0.2897
BCC	Act Ker	0.1043	0.0888	0.0494*	0.0364*	0.0013**

Table 6.82 continued

Group 1	Group 2	Probability (* = significant $P < 0.05$. ** = highly significant $P < 0.01$)				
		LF1	LF2	LF3	LF4	LF5
Control	Psoriasis	0.2166	0.8377	0.4356	0.3948	0.0787
Control	Atop Ecz	0.0011**	0.4628	0.0983	0.3018	0.8289
Control	Vitiligo	0.1963	0.2917	0.9550	0.7960	0.9831
Control	Alop Are	0.8359	0.8114	0.5069	0.3264	0.0875
Control	BCC	0.8635	0.8595	0.4624	0.3458	0.1310
Control	Act Ker	0.2429	0.0971	0.0089**	0.1879	0.5890
Psoriasis	Atop Ecz	0.0423*	0.3040	0.2850	0.0300*	0.0749
Psoriasis	Vitiligo	0.0106*	0.1463	0.4853	0.2073	0.0422*
Psoriasis	Alop Are	0.1233	0.9917	0.8658	0.9002	0.8811
Psoriasis	BCC	0.1666	0.9825	0.0714	0.8316	0.7875
Psoriasis	Act Ker	0.9986	0.0462*	0.0359*	0.0076**	0.1882
Atop Ecz	Vitiligo	0.0000**	0.6731	0.0907	0.3852	0.7212
Atop Ecz	Alop Are	0.0002**	0.2927	0.2908	0.0317*	0.1138
Atop Ecz	BCC	0.0006**	0.2731	0.0067**	0.0152*	0.1259
Atop Ecz	Act Ker	0.0392*	0.3167	0.2750	0.5340	0.6432
Vitiligo	Alop Are	0.2499	0.1430	0.5442	0.1955	0.0618
Vitiligo	BCC	0.2849	0.1276	0.3492	0.1524	0.0802
Vitiligo	Act Ker	0.0097**	0.5468	0.0080**	0.1625	0.4418
Alop Are	BCC	0.9952	0.9769	0.1333	0.9404	0.8615
Alop Are	Act Ker	0.1380	0.0461*	0.0323*	0.0116*	0.3140
BCC	Act Ker	0.1574	0.0372*	0.0002**	0.0042**	0.3190

Table 6.83 Man-Whitney U Test Results

Unilateral Finger Ridge Counts

Females

		Probability (* = significant P<0.05. ** = highly sig. : P<0.01)				
Group 1	Group 2	RF1	RF2	RF3	RF4	RF5
Control	Psoriasis	0.5851	0.4633	0.1947	0.2435	0.0002**
Control	Atop Ecz	0.0235*	0.1311	0.0162*	0.8021	0.4563
Control	Vitiligo	0.0011**	0.0000**	0.0000**	0.0001**	0.0728
Control	Alop Are	0.1382	0.0405*	0.0000**	0.6804	0.9829
Control	BCC	0.4325	0.3495	0.0009	0.1978	0.1256
Control	Act Ker	0.0050**	0.0000**	0.0000**	0.2190	0.5982
Psoriasis	Atop Ecz	0.1168	0.0378*	0.2067	0.3679	0.0024**
Psoriasis	Vitiligo	0.0112*	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Alop Are	0.4003	0.0083**	0.0020**	0.4168	0.0001**
Psoriasis	BCC	0.8189	0.0852	0.0323*	0.9970	0.0103*
Psoriasis	Act Ker	0.0353*	0.0000**	0.0000**	0.0163*	0.0000**
Atop Ecz	Vitiligo	0.3482	0.0012**	0.0000**	0.0000**	0.0145*
Atop Ecz	Alop Are	0.3963	0.6875	0.0802	0.8730	0.4877
Atop Ecz	BCC	0.1294	0.5617	0.4352	0.3220	0.5288
Atop Ecz	Act Ker	0.5819	0.0020**	0.0000**	0.1210	0.1753
Vitiligo	Alop Are	0.0641	0.0023**	0.0047**	0.0000**	0.0454*
Vitiligo	BCC	0.0090**	0.0000**	0.0001**	0.0000**	0.0009**
Vitiligo	Act Ker	0.7194	0.7790	0.2853	0.0046**	0.1644
Alop Are	BCC	0.4496	0.2529	0.2830	0.4149	0.1075
Alop Are	Act Ker	0.1589	0.0060	0.0002**	0.0817	0.6014
BCC	Act Ker	0.0321*	0.0001**	0.0000**	0.0093**	0.0159*

Table 6.83 continued

Group 1	Group 2	Probability (* = significant $P < 0.05$. ** = highly sig. $P < 0.01$)				
		LF1	LF2	LF3	LF4	LF5
Control	Psoriasis	0.2630	0.6476	0.3604	0.1933	0.0085**
Control	Atop Ecz	0.4150	0.1258	0.0538	0.8659	0.3155
Control	Vitiligo	0.0215*	0.0000**	0.0000**	0.0024**	0.2707
Control	Alop Are	0.7341	0.2076	0.0001**	0.7185	0.1774
Control	BCC	0.7868	0.0910	0.1004	0.0383*	0.0056**
Control	Act Ker	0.0054**	0.0000**	0.0000**	0.0885	0.9677
Psoriasis	Atop Ecz	0.0657	0.0451*	0.2959	0.2886	0.1183
Psoriasis	Vitiligo	0.0006**	0.0000**	0.0002**	0.0000**	0.0001**
Psoriasis	Alop Are	0.0830	0.1073	0.0041**	0.0975	0.1396
Psoriasis	BCC	0.1184	0.0356*	0.5473	0.4766	0.9379
Psoriasis	Act Ker	0.0001**	0.0000**	0.0000**	0.0023**	0.0015**
Atop Ecz	Vitiligo	0.1343	0.0054**	0.0144*	0.0016**	0.0317*
Atop Ecz	Alop Are	0.6499	0.5942	0.0001**	0.6218	0.8404
Atop Ecz	BCC	0.6045	0.9106	0.3443	0.0559	0.1061
Atop Ecz	Act Ker	0.0547	0.0063**	0.0006**	0.0600	0.1891
Vitiligo	Alop Are	0.0438*	0.0001**	0.0888	0.0075**	0.0142*
Vitiligo	BCC	0.0328*	0.0047**	0.0091**	0.0000**	0.0001**
Vitiligo	Act Ker	0.5892	0.8154	0.0060**	0.1029	0.2313
Alop Are	BCC	0.8810	0.5740	0.0000**	0.0224*	0.1167
Alop Are	Act Ker	0.0062**	0.0002**	0.4268	0.2365	0.1219
BCC	Act Ker	0.0066**	0.0050**	0.0006**	0.0001**	0.0004**

The canonical discriminant functions for males are shown in Table 6.86 with Function 1 and 2 accounting for 61.67% of the variance. Table 6.88 shows that these functions are composed predominantly of LF1 and RF3 respectively. Functions 1 and 2 were used to plot the territorial map and scatterplot, Figures 6.24 and 6.25. From these it can be seen that vitiligo, controls and psoriasis and actinic keratosis are the most widely separated groups. From Table 6.89 the F statistics show that vitiligo and psoriasis ($F = 5.4018$), vitiligo and atopic eczema ($F = 4.8906$) and controls and atopic eczema ($F = 4.3817$) are most separated.

The classification results (Table 6.30) show that 20.75% of grouped cases were correctly classified. The best classification was for actinic keratosis where it was 34.1% correct.

For females, Table 6.91 shows that Functions 1 and 2 account for 74.77% of the variance with Function 1 taking out 53.30% on its own. The main variables making up the functions are shown in Table 6.92 and 6.93. From these tables it can be seen that finger III is the most important on both hands because they are the main counts producing an effect in Function 1. Table 6.94 shows the most widely separated groups are actinic keratosis and controls ($F = 11.056$) followed by actinic keratosis and psoriasis ($F = 6.8838$). The territorial map (Figure 6.28) shows the most widely separated groups to be controls, vitiligo, actinic keratosis and psoriasis. The positions of the group centroids relative to each other are shown in figure 6.30 and show a much greater amount of separation than for other sets of variables.

The classification results show 23.15% correctness of grouping cases with the best grouping results being for actinic keratosis at 42.4% correct.

When the groups were reclassified according to aetiology of disorder type only three significant differences were found for males. On RIII control males were found to have a significantly lower count in comparison to both of GD and ND. On R5, GD males had a significantly higher count than ND males (Table 6.97).

For female subjects 12/30 significant differences were shown (Table 6.98) and these were, apart from two, all between controls and the disorder types. In all cases where a significant

Table 6.84 - Summary Table of statistical differences found from Mann-Whitney U Tests for Variables RF1 to LF5 - (a) Males

FINGER	RIGHT		LEFT	
	SIG.	H.SIG.	SIG.	H.SIG.
I	Cont. : A.Ecz. Psor. : A.Ecz.	A.Ecz. : Vit. A.Ecz. : Alop. A.Ecz. : BCC	Psor. : A.Ecz. Psor. : Vit. A.Ecz.: A.Ker.	Cont. : A.Ecz. A.Ecz.: Vit. A.Ecz.: Alop. A.Ecz.: BCC Vit. : A.Ker.
II			Psor. : A.Ker. Alop. : A.Ker. BCC : A.Ker.	
III	Cont. : Vit. Cont. : Alop. Psor. : A.Ker. BCC : A.Ker.	Cont. : A.Ecz. Cont. : A.Ker.	Psor. : A.Ker. Alop. : A.Ker.	Cont. : A.Ker. A.Ecz.: BCC Vit. : A.Ker. BCC : A.Ker.
IV	Psor. : A.Ecz. Vit. : BCC BCC : A.Ker.	A.Ecz. : BCC	Psor. : A.Ecz. A.Ecz.: Alop. A.Ecz.: BCC Alop. : A.Ker.	Psor. : A.Ker. BCC : A.Ker.
V	Cont. : BCC	Psor. : Vit. A.Ecz.: BCC Vit. : Alop. Vit. : BCC BCC : A.Ker.	Psor. : Vit.	

Table 6.84 (b) - Females - Variables RF1 to LF5

FINGER	RIGHT		LEFT	
	SIG.	H.SIG.	SIG.	H.SIG.
I	Cont. : A.Ecz. Psor. : Vit. Psor. : A.Ker. BCC : A.Ker.	Cont. : Vit. Cont. : A.Ker. Vit. : BCC	Cont. : Vit. Vit. : Alop. Vit. : BCC	Cont. : A.Ker. Psor. : Vit. Psor. : A.Ker. Alop. : A.Ker. BCC : A.Ker.

Table 6.84(b) continued

II	Cont. : Alop. Psor. : A.Ecz.	Cont. : Vit. Cont. : A.Ker. Psor. : Vit. Psor. : Alop. Psor. : A.Ker. A.Ecz.: Vit. A.Ecz.: A.Ker. Vit. : Alop. Vit. : BCC BCC : A.Ker.	Psor. : BCC Psor. : A.Ecz.	Cont. : Vit. Cont. : A.Ker. Psor. : Vit. Psor. : A.Ker. A.Ecz.: Vit. A.Ecz.: A.Ker. Vit. : Alop. Vit. : BCC Alop. : A.Ker. BCC : A.Ker.
III	Cont. : A.Ecz. Psor. : BCC	Cont. : Vit. Cont. : Alop. Cont. : A.Ker. Psor. : Vit. Psor. : Alop. Psor. : A.Ker. A.Ecz.: Vit. A.Ecz.: A.Ker. Vit. : Alop. Vit. : BCC Alop. : A.Ker. BCC : A.Ker.	A.Ecz. : Vit.	Cont. : Vit. Cont. : Alop. Cont. : A.Ker. Psor. : Vit. Psor. : Alop. Psor. : A.Ker. A.Ecz.: Alop. A.Ecz.: A.Ker. Vit. : BCC Vit. : A.Ker. Alop. : BCC BCC : A.Ker.
IV	Psor. : A.Ker.	Cont. : Vit. Psor. : Vit. A.Ecz.: Vit. Vit. : Alop. Vit. : BCC Vit. : A.Ker. BCC : A.Ker.	Cont. : BCC Alop. : BCC	Cont. : Vit. Psor. : Vit. Psor. : A.Ker. A.Ecz.: Vit. Vit. : Alop. Vit. : BCC BCC : A.Ker.
V	Psor. : BCC A.Ecz.: Vit. Vit. : Alop. BCC : A.Ker.	Cont. : Psor. Psor. : A.Ecz. Psor. : Vit. Psor. : Alop. Psor. : A.Ker. Vit. : BCC	Vit. : Alop. A.Ecz.: Vit.	Vit. : BCC Cont. : Psor. Cont. : BCC Psor. : Vit. Psor. : A.Ker. BCC : A.Ker.

Table 6.86 - Males: Variables RF1 to LF5

CANONICAL DISCRIMINANT FUNCTIONS

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.03346	41.95	41.95	0.1799226
2*	0.01572	19.72	61.67	0.1244183
3*	0.01375	17.24	78.91	0.1164659
4*	0.01317	16.52	95.43	0.1140278
5*	0.00331	4.15	99.58	0.0574522
6*	0.00033	0.42	100.00	0.0182508

Table 6.87 - Males: Variables RF1 to LF5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
RF3	-0.06162	1.18443	-0.11565	-0.52134	0.26089	0.71351
RF5	-0.63689	0.14047	0.19037	0.80474	0.93113	-0.50787
LF1	0.76955	-0.35674	0.26386	-0.47064	0.76418	-0.07261
LF3	0.48731	-0.53601	-0.62591	1.26478	-0.46873	0.32575
LF4	0.19302	0.35293	1.03328	-0.13951	-0.84277	-0.85074
LF5	-0.45639	-0.69546	0.13916	-0.56600	-0.29843	1.08330

Table 6.88 - Males: Variables RF1 to LF5

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
LF1	0.64837*	-0.15126	0.52560	0.04904	0.45852	0.26046
RF3	0.24006	0.60934*	0.37141	0.23846	0.11851	0.60185
LF4	0.20255	0.17037	0.87182*	0.29663	-0.22611	0.17541
LF5	-0.21050	-0.27197	0.67343*	0.13211	-0.00525	0.64088
RF5	-0.26390	0.05055	0.64011*	0.53524	0.42025	0.23446
RF4	0.09708	0.22590	0.62575*	0.37559	0.06839	0.33830
RF1	0.39620	-0.03471	0.51546*	0.13268	0.28132	0.28982
LF3	0.43627	0.05980	0.33893	0.65847*	-0.07521	0.50197
RF2	0.19412	0.23555	0.41389	0.28422	0.06574	0.46170*
LF2	0.22668	0.13650	0.34774	0.29146	0.03738	0.41161*

Table 6.89 - Males: Variables RF1 to LF5

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

GROUP	0	1	2	3	5	6
1	3.1721 0.0043					
2	4.3817 0.0002	1.7463 0.1068				
3	3.4460 0.0022	2.0936 0.0513	2.1951 0.0411			
5	3.4183 0.0024	1.5623 0.1546	3.4249 0.0023	1.8823 0.0806		
6	3.9615 0.0006	1.6418 0.1320	1.7989 0.0959	3.0925 0.0052	2.2191 0.0390	
7	2.5848 0.0171	5.4018 0.0000	4.8906 0.0001	3.0585 0.0056	2.7676 0.0112	3.5287 0.0018

Code Group
0 - Controls
1 - Psoriasis
2 - Atopic Eczema
3 - BCC
5 - Alopecia areata
6 - Actinic Keratosis
7 - Vitiligo

Table 6.90 - Males: Variables RF1 to LF5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
-----		-----	-----	-----	-----	-----	-----	-----	-----
GROUP	0	200	47 23.5%	24 12.0%	27 13.5%	17 8.5%	23 11.5%	30 15.0%	32 16.0%
GROUP	1	201	24 11.9%	35 17.4%	36 17.9%	19 9.5%	24 11.9%	37 18.4%	26 12.9%
GROUP	2	203	15 7.4%	22 10.8%	49 24.1%	25 12.3%	21 10.3%	40 19.7%	31 15.3%
GROUP	3	211	25 11.8%	25 11.8%	37 17.5%	33 15.6%	20 9.5%	32 15.2%	39 18.5%
GROUP	5	210	20 9.5%	23 11.0%	28 13.3%	25 11.9%	29 13.8%	55 26.2%	30 14.3%
GROUP	6	129	10 7.8%	13 10.1%	21 16.3%	9 7.0%	14 10.9%	44 34.1%	18 14.0%
GROUP	7	200	32 16.0%	9 4.5%	21 10.5%	24 12.0%	29 14.5%	41 20.5%	44 22.0%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 20.75%

Table 6.91 - Females: Variables RF1 to LF5

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.08838	53.30	53.30	0.2849626
2*	0.03560	21.47	74.77	0.1853996
3*	0.02057	12.40	87.17	0.1419632
4*	0.01052	6.34	93.52	0.1020138
5*	0.00677	4.08	97.60	0.0820101
6*	0.00398	2.40	100.00	0.0629733

Table 6.92 - Females: Variables RF1 to LF5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
RF1	-0.00077	-0.49874	0.57837	0.14728	1.07836	0.81358
RF2	0.33065	0.40783	-0.21741	0.30358	0.14289	0.37338
RF3	0.96938	-0.36123	0.49679	-0.30497	-0.24386	-0.52099
RF4	-0.51992	0.19997	1.00241	0.16520	-0.17890	-0.97019
RF5	-0.09147	0.53884	-1.00786	-0.07809	0.98675	-0.21393
LF1	0.05622	0.50920	-0.48060	-0.43990	-0.55674	-0.34137
LF2	-0.07695	0.22404	0.34662	-1.17339	-0.08313	0.15563
LF3	0.53499	-0.50970	-0.72629	1.05238	-0.04983	0.12900
LF4	-0.42350	0.40544	0.11413	0.40713	-0.01647	0.33733
LF5	-0.20800	0.04878	0.11112	0.06793	-0.96563	0.53805

Table 6.93 - Females: Variables RF1 to LF5

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
RF3	0.76636*	0.43886	0.30474	0.13145	0.00481	-0.08979
LF3	0.63545*	0.37965	0.04373	0.40784	-0.07335	0.12284
RF5	0.21400	0.76392*	-0.14541	0.15372	0.30696	-0.08815
RF2	0.51591	0.68904*	0.23184	0.16044	0.06738	0.22119
RF4	0.19523	0.68447*	0.45834	0.34425	0.09484	-0.22936
LF4	0.20955	0.66570*	0.32118	0.41044	-0.06624	0.21955
LF5	0.13551	0.63835*	0.08600	0.22464	-0.27793	0.37015
LF2	0.49030	0.57063*	0.24167	-0.24683	-0.04821	0.24908
LF1	0.40124	0.50239*	0.04148	-0.07108	0.00753	0.18414
RF1	0.34038	0.32517	0.37127	0.09547	0.40124	0.44775*

Table 6.94 - Females: Variables LF1 to RF5

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS							
		Code Group					
		0 - Controls 1 - Psoriasis 2 - Atopic Eczema 3 - BCC 5 - Alopecia areata 6 - Actinic Keratosis 7 - Vitiligo					
GROUP	GROUP	0	1	2	3	5	6
1		4.8037 0.0000					
2		2.7307 0.0025	2.0190 0.0283				
3		4.9534 0.0000	2.3547 0.0093	1.1586 0.3148			
5		5.0812 0.0000	3.1841 0.0005	1.5367 0.1206	1.5727 0.1091		
6		11.056 0.0000	6.8838 0.0000	4.9082 0.0000	3.1177 0.0006	2.7361 0.0024	
7		5.4664 0.0000	4.8609 0.0000	2.4297 0.0072	2.9298 0.0012	3.0422 0.0008	4.0035 0.0000

Figure 6.29 - Females: Variables RF1 to LF5

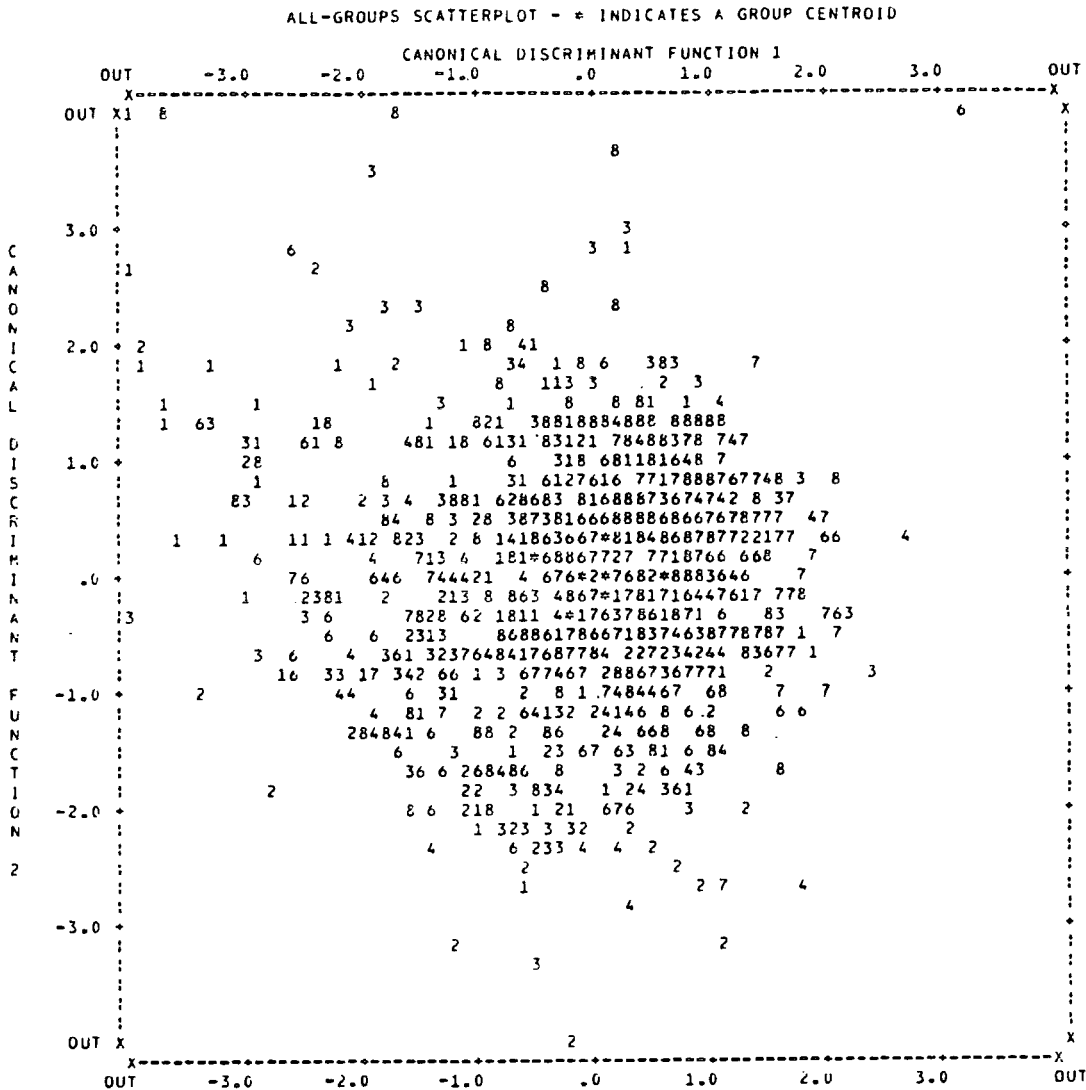


Figure 6.30 - Group Centroids

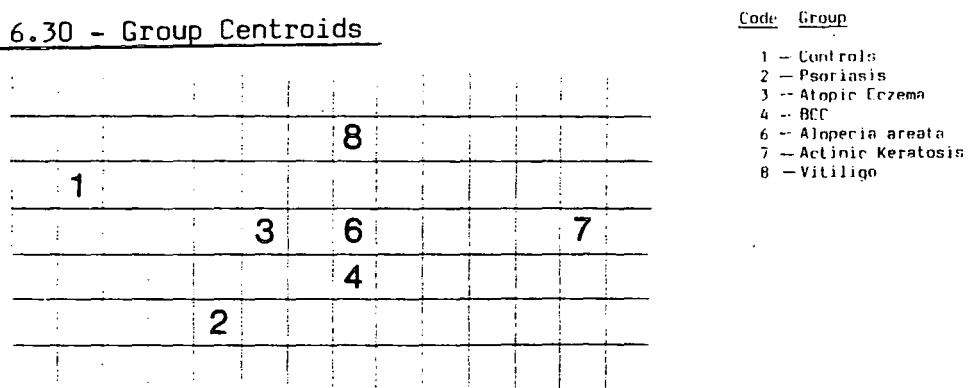


Table 6.95 - Females: Variables RF1 to LF5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	202	69 34.2%	29 14.4%	10 5.0%	14 6.9%	21 10.4%	28 13.9%	31 15.3%
GROUP	1	205	34 16.6%	62 30.2%	8 3.9%	13 6.3%	21 10.2%	43 21.0%	24 11.7%
GROUP	2	203	39 19.2%	41 20.2%	10 4.9%	17 8.4%	22 10.8%	45 22.2%	29 14.3%
GROUP	3	202	31 15.3%	38 18.8%	9 4.5%	21 10.4%	23 11.4%	51 25.2%	29 14.4%
GROUP	5	206	31 15.0%	39 18.9%	5 2.4%	16 7.8%	29 14.1%	52 25.2%	34 16.5%
GROUP	6	172	14 8.1%	22 12.8%	4 2.3%	12 7.0%	27 15.7%	73 42.4%	20 11.6%
GROUP	7	205	31 15.1%	26 12.7%	3 1.5%	19 9.3%	14 6.8%	53 25.9%	59 28.8%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 23.15%

Table 6.96 Means and Standard Deviations
Unilateral Finger Ridge Counts
Subjects Grouped by Disorder Type

Group	Sex	No	RF1		RF2		RF3		RF4		RF5	
			Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
Cont	M	206	19.951 +/-	5.068	12.709 +/-	6.961	13.602 +/-	5.762	16.374 +/-	5.958	14.083 +/-	5.018
GD	M	816	20.127 +/-	4.431	13.529 +/-	6.240	14.824 +/-	5.218	16.931 +/-	5.064	14.004 +/-	4.031
ND	M	340	20.053 +/-	3.739	13.515 +/-	5.808	14.988 +/-	4.912	16.741 +/-	4.271	13.735 +/-	3.208
Cont	F	203	17.143 +/-	5.335	11.177 +/-	6.231	11.458 +/-	5.522	14.921 +/-	5.663	12.542 +/-	4.467
GD	F	819	18.281 +/-	4.962	12.474 +/-	7.418	13.481 +/-	5.801	15.393 +/-	5.910	12.457 +/-	4.675
ND	F	374	18.283 +/-	4.352	13.056 +/-	5.937	14.473 +/-	5.227	15.040 +/-	4.623	12.532 +/-	3.549

Group	Sex	No	LF1		LF2		LF3		LF4		LF5	
			Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
Cont	M	206	18.257 +/-	5.506	12.709 +/-	6.871	13.854 +/-	6.225	16.184 +/-	6.386	13.883 +/-	5.068
GD	M	816	18.789 +/-	4.389	13.161 +/-	6.584	14.529 +/-	5.484	16.550 +/-	4.735	13.379 +/-	3.882
ND	M	340	18.718 +/-	4.256	13.400 +/-	5.408	14.618 +/-	4.874	16.797 +/-	4.018	13.374 +/-	3.399
Cont	F	203	15.961 +/-	5.715	10.847 +/-	6.251	11.700 +/-	5.376	14.897 +/-	5.320	12.251 +/-	4.478
GD	F	819	16.507 +/-	5.037	11.845 +/-	6.111	13.162 +/-	5.750	15.165 +/-	5.635	11.968 +/-	4.200
ND	F	374	17.086 +/-	4.168	12.765 +/-	5.698	13.848 +/-	4.961	14.904 +/-	4.439	11.963 +/-	3.377

Table 6.97 Mann-Whitney U Test Results

Unilateral Finger Ridge Counts

Subjects grouped by disorder types.

			Variables and Probabilities				
Sex	Gp1	Gp2	RF1	RF2	RF3	RF4	RF5
M	Cont	GD	0.8668	0.3281	0.0148*	0.6306	0.3856
M	Cont	ND	0.3187	0.4169	0.0240*	0.6702	0.0559
M	GD	ND	0.1929	0.8659	0.9698	0.1308	0.0425*
F	Cont	GD	0.0139*	0.0141*	0.0000**	0.5073	0.4436
F	Cont	ND	0.0343*	0.0010**	0.0000**	0.8367	0.5829
F	GD	ND	0.8080	0.1924	0.0045**	0.2648	0.7293

			Variables and Probabilities				
Sex	Gp1	Gp2	LF1	LF2	LF3	LF4	LF5
M	Cont	GD	0.4810	0.9678	0.5735	0.6779	0.1416
M	Cont	ND	0.8136	0.7567	0.7263	0.8108	0.1168
M	GD	ND	0.5863	0.7438	0.7467	0.8241	0.6315
F	Cont	GD	0.4758	0.0383*	0.0003**	0.4991	0.2618
F	Cont	ND	0.0828	0.0005**	0.0000**	0.7447	0.1259
F	GD	ND	0.1164	0.0315*	0.1440	0.1787	0.5915

difference was shown (see Table 6.97) the female controls showed a significantly lower count than the finger ridge counts found in the two disorder type groups of females.

Table 6.98 - Summary Tables of significant differences from Mann-Whitney U Tests - Variables RF1 to LF5 by Disorder Type

(a) Males			(b) Females		
GROUP	ND	GD	GROUPS	ND	GD
Cont.	1	1	Cont.	5	5
GD	1		GD	2	

(iii) Absolute Ridge Counts (RFA1 to LFA5)

For absolute finger ridge counts, atopic eczema male patients were found to have increased counts on finger I which were statistically significantly greater than for alopecia areata (right hand) and BCC (left hand), and highly significantly greater when compared to vitiligo on both hands. Vitiligo males showed a decreased count which was highly statistically significant when compared to psoriasis (left hand) and atopic eczema (both hands) and significant compared to actinic keratosis on the left hand. On finger II left hand actinic keratosis male patients were found to possess a statistically significantly higher absolute count in comparison to controls, psoriasis, BCC and to alopecia areata males. Similarly on finger III actinic keratosis males showed a significantly higher count than vitiligo and BCC, on the left hand, and than controls, on both hands. The pattern continued on finger IV left hand with actinic keratosis having a significantly higher count compared to controls, psoriasis, vitiligo, BCC and actinic keratosis. The latter difference was found to be highly significant statistically. Atopic eczema males were also found to have a significantly higher count compared to vitiligo and to alopecia areata male patients.

On finger V BCC males were found to have a lower absolute finger ridge which was highly significant compared to actinic keratosis, alopecia areata, vitiligo and atopic eczema on the right hand. The difference was statistically significant when compared to controls (both hands) and atopic eczema (left hand). On RV psoriasis males were found to have a statistically significantly lower count than

Table Means and Standard Deviations
6.99
Absolute Finger Ridge Counts

Males

		Variables									
		RFA1		RFA2		RFA3		RFA4		RFA5	
Group	Cases	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Control	206	27.189 +/- 11.526		17.335 +/- 12.317		16.476 +/- 10.232		22.806 +/- 12.187		15.883 +/- 7.712	
Psoriasis	202	27.743 +/- 11.434		17.490 +/- 11.291		16.257 +/- 8.477		22.589 +/- 10.308		15.089 +/- 6.569	
Atop Ecz	203	29.064 +/- 11.322		19.335 +/- 12.940		17.837 +/- 9.474		24.163 +/- 11.020		16.084 +/- 6.845	
Vitiligo	201	25.746 +/- 11.192		18.299 +/- 12.476		17.104 +/- 8.798		22.532 +/- 10.772		15.831 +/- 6.610	
Alop Are	210	26.338 +/- 11.047		18.414 +/- 11.452		17.481 +/- 9.854		22.348 +/- 10.911		15.186 +/- 6.263	
BCC	211	27.526 +/- 11.134		17.204 +/- 10.901		17.412 +/- 9.006		22.701 +/- 10.135		14.403 +/- 5.520	
Act Ker	129	28.023 +/- 10.485		19.271 +/- 11.511		18.357 +/- 9.515		24.690 +/- 10.798		15.271 +/- 5.270	

		Variables									
		LFA1		LFA2		LFA3		LFA4		LFA5	
Group	Cases	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Control	206	24.277 +/- 11.532		16.854 +/- 12.074		15.883 +/- 9.308		21.243 +/- 11.864		15.330 +/- 7.249	
Psoriasis	202	26.406 +/- 11.790		17.050 +/- 11.147		17.055 +/- 9.070		21.708 +/- 9.782		14.282 +/- 5.648	
Atop Ecz	203	26.271 +/- 11.073		18.300 +/- 13.440		17.281 +/- 9.968		22.867 +/- 9.639		15.350 +/- 6.472	
Vitiligo	201	22.995 +/- 10.432		18.612 +/- 12.222		15.625 +/- 8.715		21.343 +/- 9.878		14.557 +/- 5.639	
Alop Are	210	24.848 +/- 10.716		16.933 +/- 11.189		16.548 +/- 9.474		20.667 +/- 10.471		14.238 +/- 6.189	
BCC	211	24.313 +/- 10.719		17.479 +/- 11.279		16.773 +/- 9.639		21.796 +/- 9.981		13.991 +/- 5.672	
Act Ker	129	25.039 +/- 9.865		19.775 +/- 11.585		18.543 +/- 8.698		23.984 +/- 9.650		14.271 +/- 4.677	

Table . Means and Standard Deviations
6.100
Absolute Finger Ridge Counts

Females

		Variables									
		RFA1		RFA2		RFA3		RFA4		RFA5	
Group	Cases	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Control	203	21.286 +/-	9.933	14.320 +/-	10.470	12.542 +/-	7.452	18.310 +/-	9.555	13.246 +/-	5.401
Psoriasis	205	22.366 +/-	11.244	14.180 +/-	11.417	14.059 +/-	8.107	19.175 +/-	10.472	11.488 +/-	4.824
Atop Ecz	203	23.601 +/-	10.794	15.887 +/-	11.880	14.690 +/-	8.966	20.522 +/-	11.303	13.113 +/-	5.457
Vitiligo	205	25.283 +/-	10.246	20.283 +/-	13.296	17.893 +/-	9.294	23.107 +/-	10.728	14.293 +/-	6.047
Alop Are	206	22.888 +/-	10.078	16.272 +/-	11.800	15.364 +/-	10.475	19.170 +/-	10.598	13.903 +/-	8.096
BCC	202	24.609 +/-	10.513	16.020 +/-	11.710	15.673 +/-	9.319	19.708 +/-	9.983	13.371 +/-	5.788
Act Ker	174	23.776 +/-	9.824	20.534 +/-	11.775	19.741 +/-	10.330	21.000 +/-	9.877	13.971 +/-	4.953

		Variables									
		LFA1		LFA2		LFA3		LFA4		LFA5	
Group	Cases	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Control	203	19.916 +/-	10.383	13.532 +/-	10.258	13.084 +/-	8.005	17.867 +/-	9.149	13.000 +/-	5.637
Psoriasis	205	19.059 +/-	10.636	13.585 +/-	10.741	14.171 +/-	9.218	18.454 +/-	10.096	12.141 +/-	5.967
Atop Ecz	203	21.049 +/-	10.800	15.365 +/-	11.040	15.192 +/-	10.360	19.601 +/-	11.013	12.867 +/-	6.493
Vitiligo	205	22.444 +/-	9.912	19.044 +/-	11.820	16.976 +/-	9.657	22.493 +/-	12.131	13.756 +/-	6.050
Alop Are	206	20.947 +/-	9.398	14.217 +/-	9.439	15.500 +/-	8.932	18.723 +/-	9.451	12.621 +/-	5.399
BCC	202	21.911 +/-	9.822	16.069 +/-	11.360	14.653 +/-	8.252	18.738 +/-	9.128	12.297 +/-	5.306
Act Ker	174	22.925 +/-	9.475	19.161 +/-	11.009	18.287 +/-	9.078	20.690 +/-	9.672	13.695 +/-	5.561

Table . Mann-Whitney U Test Results

6.101

Absolute Finger Ridge Counts

Males

Group 1	Group 2	Variables and Probability (* = significant ** = highly significant)				
		RFA1	RFA2	RFA3	RFA4	RFA5
Control	Psoriasis	0.8517	0.6910	0.3771	0.9417	0.2475
Control	Atop Ecz	0.1717	0.1575	0.0266*	0.1733	0.6322
Control	Vitiligo	0.1357	0.4756	0.0710	0.9926	0.6735
Control	Alop Are	0.3523	0.2612	0.0658	0.7574	0.5612
Control	BCC	0.9029	0.8294	0.1131	0.9481	0.0331*
Control	Act Ker	0.7040	0.1072	0.0229*	0.1605	0.6962
Psoriasis	Atop Ecz	0.2107	0.8106	0.1825	0.1619	0.0469*
Psoriasis	Vitiligo	0.1114	0.5579	0.2830	0.8762	0.0333*
Psoriasis	Alop Are	0.2566	0.7388	0.2667	0.6987	0.3906
Psoriasis	BCC	0.7242	0.2205	0.4486	0.9507	0.2807
Psoriasis	Act Ker	0.8578	0.2205	0.1134	0.1987	0.2662
Atop Ecz	Vitiligo	0.0030**	0.4900	0.7691	0.1116	0.8970
Atop Ecz	Alop Are	0.0164*	0.6475	0.8882	0.0617	0.2491
Atop Ecz	BCC	0.1045	0.1732	0.5374	0.1372	0.0013**
Atop Ecz	Act Ker	0.3548	0.7433	0.7481	0.9948	0.3274
Vitiligo	Alop Are	0.5594	0.7514	0.8934	0.7740	0.2141
Vitiligo	BCC	0.1815	0.5272	0.7732	0.9435	0.0008**
Vitiligo	Act Ker	0.0763	0.3408	0.5322	0.1731	0.1885
Alop Are	BCC	0.3930	0.3186	0.7369	0.6992	0.0459*
Alop Are	Act Ker	0.2082	0.4515	0.6011	0.0983	0.9370
BCC	Act Ker	0.5955	0.1062	0.3392	0.1567	0.0158*

Table 6.101 continued

Group 1	Group 2	Variables and Probability (* = significant . ** = highly significant)				
		LFA1	LFA2	LFA3	LFA4	LFA5
Control	Psoriasis	0.1949	0.7645	0.3298	0.5377	0.1503
Control	Atop Ecz	0.0763	0.4323	0.1414	0.0576	0.9936
Control	Vitiligo	0.1186	0.1943	0.9200	0.8031	0.5385
Control	Alop Are	0.7400	0.8861	0.4960	0.8003	0.1322
Control	BCC	0.8132	0.5802	0.8040	0.5700	0.0488*
Control	Act Ker	0.6191	0.0237*	0.0158*	0.0203*	0.2427
Psoriasis	Atop Ecz	0.6641	0.5743	0.5059	0.1500	0.1201
Psoriasis	Vitiligo	0.0061**	0.2409	0.2971	0.6930	0.2591
Psoriasis	Alop Are	0.2265	0.8638	0.7481	0.3759	0.9993
Psoriasis	BCC	0.0993	0.8083	0.3282	0.8894	0.6420
Psoriasis	Act Ker	0.4709	0.0336*	0.0939	0.0413*	0.5800
Atop Ecz	Vitiligo	0.0005**	0.5752	0.1022	0.0421*	0.6960
Atop Ecz	Alop Are	0.1280	0.4643	0.4459	0.0206*	0.1292
Atop Ecz	BCC	0.0399*	0.7086	0.1464	0.1327	0.0379*
Atop Ecz	Act Ker	0.2317	0.1243	0.3229	0.5286	0.3151
Vitiligo	Alop Are	0.0616	0.1721	0.4137	0.7670	0.2696
Vitiligo	BCC	0.2032	0.3395	0.8391	0.8330	0.0956
Vitiligo	Act Ker	0.0830*	0.3105	0.0106*	0.0156*	0.3982
Alop Are	BCC	0.5524	0.6589	0.6113	0.4216	0.6873
Alop Are	Act Ker	0.7896	0.0242*	0.0611	0.0088**	0.6704
BCC	Act Ker	0.4167	0.0436*	0.0123*	0.0330*	0.3542

Table Mann-Whitney U Test Results

6.102

Absolute Finger Ridge Counts

Females

		Probability (* = significant . ** = highly significant)				
Group 1	Group 2	RFA1	RFA2	RFA3	RFA4	RFA5
Control	Psoriasis	0.7450	0.6262	0.1477	0.6958	0.0001
Control	Atop Ecz	0.0456*	0.2850	0.0290*	0.1152	0.3256
Control	Vitiligo	0.0004**	0.0000**	0.0000**	0.0000**	0.1412
Control	Alop Are	0.1810	0.0947	0.0004**	0.8436	0.8727
Control	BCC	0.0027**	0.2294	0.0011**	0.3785	0.3658
Control	Act Ker	0.0195*	0.0000**	0.0000**	0.0087**	0.2476
Psoriasis	Atop Ecz	0.1097	0.1533	0.3908	0.2564	0.0034**
Psoriasis	Vitiligo	0.0026**	0.0000**	0.0000**	0.0002**	0.0000**
Psoriasis	Alop Are	0.3512	0.0389*	0.0312*	0.9934	0.0000**
Psoriasis	BCC	0.0201*	0.0995	0.0569	0.6362	0.0024**
Psoriasis	Act Ker	0.0459*	0.0000**	0.0000**	0.0476*	0.0000**
Atop Ecz	Vitiligo	0.1476	0.0005**	0.0000**	0.0105*	0.0161*
Atop Ecz	Alop Are	0.4480	0.5920	0.1778	0.2297	0.2756
Atop Ecz	BCC	0.3450	0.8785	0.3001	0.5089	0.9068
Atop Ecz	Act Ker	0.6881	0.0000**	0.0000**	0.3796	0.0284*
Vitiligo	Alop Are	0.0260*	0.0023**	0.0010**	0.0001**	0.1609
Vitiligo	BCC	0.6274	0.0005**	0.0006**	0.0009**	0.0205*
Vitiligo	Act Ker	0.2915	0.5178	0.1110	0.0910	0.6900
Alop Are	BCC	0.0982	0.5869	0.7466	0.5953	0.2715
Alop Are	Act Ker	0.2652	0.0003**	0.0000**	0.0205*	0.3038
BCC	Act Ker	0.4995	0.0001**	0.0000**	0.1143	0.0286*

Table 6.102 continued

		Variables and Probability (* = significant . ** = highly significant)				
Group 1	Group 2	LFA1	LFA2	LFA3	LFA4	LFA5
Control	Psoriasis	0.1800	0.8877	0.2976	0.5938	0.0095**
Control	Atop Ecz	0.3836	0.1034	0.0595	0.2891	0.2507
Control	Vitiligo	0.0262*	0.0000**	0.0000**	0.0002	0.3849
Control	Alop Are	0.3765	0.1757	0.0005**	0.4693	0.1947
Control	BCC	0.0523	0.0242*	0.0788	0.6029	0.0169*
Control	Act Ker	0.0020**	0.0000**	0.0000**	0.0056**	0.7345
Psoriasis	Atop Ecz	0.0372*	0.0772	0.3810	0.5533	0.1449
Psoriasis	Vitiligo	0.0004**	0.0000**	0.0008**	0.0013**	0.0002**
Psoriasis	Alop Are	0.0185	0.1580	0.0294*	0.7886	0.1276
Psoriasis	BCC	0.0018**	0.0224*	0.5391	0.9697	0.8154
Psoriasis	Act Ker	0.0000**	0.0000**	0.0000**	0.0312*	0.0008**
Atop Ecz	Vitiligo	0.1793	0.0017**	0.0211*	0.0085**	0.0347*
Atop Ecz	Alop Are	0.9863	0.6235	0.2760	0.8081	0.9826
Atop Ecz	BCC	0.3348	0.5712	0.7557	0.4798	0.2275
Atop Ecz	Act Ker	0.0374*	0.0004**	0.0001**	0.1027	0.0942
Vitiligo	Alop Are	0.1710	0.0001**	0.1559	0.0023**	0.0277*
Vitiligo	BCC	0.7259	0.0076**	0.0028**	0.0008**	0.0006**
Vitiligo	Act Ker	0.3941	0.6890	0.0526	0.2112	0.4956
Alop Are	BCC	0.2792	0.2900	0.0666	0.7993	0.2084
Alop Are	Act Ker	0.0186*	0.0000**	0.0004**	0.0585	0.0842
BCC	Act Ker	0.2408	0.0025**	0.0000**	0.0149*	0.0011**

found in vitiligo and atopic eczema.

For female subjects many more statistical differences were found 97/210 compared with 28/210 in males (see Table 6.103). On RI controls had the smallest count, followed by psoriasis. Vitiligo had the highest absolute ridge count, followed by BCC. On the left hand psoriasis had the smallest mean count followed by controls and actinic keratosis had the largest count followed by vitiligo. The significant differences for finger I, therefore, reflect these values and are shown in Table 6.103(b).

Table 6.103(a) - Significant differences: Variables RFA1 to LFA5

FINGER	RIGHT		LEFT	
	SIG.	H.SIG.	SIG.	H.SIG.
I	A.Ecz. : Alop.	A.Ecz. : Vit.	A.Ecz. : BCC Vit. : A.Ker	Psor. : Vit. A.Ecz.: Vit.
II			Cont. : A.Ker Psor. : A.Ker Alop. : A.Ker BCC : A.Ker	
III	Cont. : A.Ker.		Cont. : A.Ker Vit. : A.Ker BCC : A.Ker	
IV			Cont. : A.Ker Psor. : A.Ker A.Ecz. : Vit. A.Ecz. : Alop. Vit. : A.Ker BCC : A.Ker	Alop. : A.Ker
V	Cont. : BCC Psor. : A.Ecz. Psor. : Vit.	A.Ecz. : BCC Vit. : BCC Alop. : BCC BCC : A.Ker.	Cont. : BCC A.Ecz. : BCC	

On RII psoriatic females had the lowest value followed by controls and actinic keratosis followed by vitiligo have the highest values. On LII actinic keratosis have the highest value followed by vitiligo and the lowest values are shown in atopic eczema followed by controls. Significant differences between these and the other groups are shown in Table 6.103(b).

Table 6.103(b) - Significant differences: Variables RFA1 to LFA5

Females

FINGER	RIGHT		LEFT	
	SIG.	H.SIG.	SIG.	H.SIG.
I	Cont. : A.Ecz. Cont. : A.Ker. Psor. : BCC Psor. : A.Ker. Vit. : Alop.	Cont. : Vit. Cont. : BCC Psor. : Vit.	Cont. : Vit. Psor. : A.Ecz. A.Ecz.: A.Ker. Alop. : A.Ker.	Cont. : A.Ker. Psor. : Vit. Psor. : BCC Psor. : A.Ker.
II	Psor. : Alop.	Cont. : Vit. Cont. : A.Ker. Psor. : Vit. Psor. : A.Ker. A.Ecz.: Vit. A.Ecz.: A.Ker. Vit. : Alop. Vit. : BCC Alop. : A.Ker. BCC : A.Ker.	Cont. : BCC Psor. : BCC	Cont. : Vit. Cont. : A.Ker. Psor. : Vit. Psor. : A.Ker. A.Ecz.: Vit. A.Ecz.: A.Ker. Vit. : Alop. Vit. : BCC Alop. : A.Ker. BCC : A.Ker.
III	Cont. : A.Ecz. Psor. : Alop.	Cont. : Vit. Cont. : Alop. Cont. : BCC Cont. : A.Ker. Psor. : Vit. Psor. : A.Ker. A.Ecz.: Vit. A.Ecz.: A.Ker. Vit. : Alop. Vit. : BCC Alop. : A.Ker. BCC : A.Ker.	Psor. : Alop. A.Ecz.: Vit.	Cont. : Vit. Cont. : Alop. Cont. : A.Ker. Psor. : Vit. Psor. : A.Ker. A.Ecz.: A.Ker. Vit. : BCC Alop. : A.Ker. BCC : A.Ker.
IV	Psor. : A.Ker. A.Ecz.: Vit. Alop. : A.Ker.	Cont. : Vit. Cont. : A.Ker. Psor. : Vit. Vit. : Alop. Vit. : BCC	Psor. : A.Ker. BCC : A.Ker.	Cont. : A.Ker. Psor. : Vit. A.Ecz.: Vit. Vit. : Alop. Vit. : BCC
V	A.Ecz.: Vit. A.Ecz.: A.Ker. Vit. : BCC BCC : A.Ker.	Psor. : A.Ecz. Psor. : Vit. Psor. : Alop. Psor. : A.Ker. Psor. : BCC	Cont. : BCC A.Ecz.: Vit. Vit. : Alop.	Cont. : Psor. Psor. : Vit. Psor. : A.Ker. Vit. : BCC BCC : A.Ker.

On finger III of both hands the highest values are found in actinic keratosis followed by vitiligo. The smallest value is found in controls on both hands for finger III. On finger IV of both hands vitiligo followed by actinic keratosis have the highest values and controls have the smallest. The smallest ridge count on finger V was found for psoriasis females and the largest value was found for vitiligo female patients on both hands. The significant differences found are summarized in Table 6.103.

Table 6.104 shows that for female subjects the greatest number of significant differences was found for vitiligo patients (40 differences) followed by actinic keratosis (37) and psoriasis (32). Atopic eczema showed the smallest number (18) of significant differences.

Table 6.104 - Variables RFA1 to LFA5

(a) Males

Alop.	0					
Psor.	2	0				
A.Ecz.	3	2	1			
A.Ker.	3	2	2	0		
BCC	1	1	0	3	4	
Cont.	0	0	0	1	1	2

Vit.
Alop.
Psor.
A.Ecz.
A.Ker.
BCC

(b) Females

Alop.	7					
Psor.	10	5				
A.Ecz.	8	0	2			
A.Ker.	0	6	10	6		
BCC	8	0	4	0	7	
Cont.	7	2	1	2	8	4

Vit.
Alop.
Psor.
A.Ecz.
A.Ker.
BCC

Discriminant function analysis using variables RFA1 to LFA5 shows that Functions 1 and 2 account for 66.97% of the variance (see Table 6.105). The most important variables in the first two functions are the absolute counts on fingers I and V of the left hand (Table 6.107). The F statistic shows that vitiligo and psoriasis are the two most widely separate groups ($F = 4.2113$) and controls and atopic eczema are the closest ($F = 0.67233$).

Table 6.105 - Canonical Discriminant Functions - Males:
Variables RFA1 to LFA5

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.03095	37.19	37.19	0.1732694
2*	0.02478	29.78	66.97	0.1555066
3*	0.01356	16.29	83.26	0.1156720
4*	0.00841	10.10	93.37	0.0913208
5*	0.00445	5.34	98.71	0.0665369
6*	0.00108	1.29	100.00	0.0327718

Table 6.106 - Males: RFA1 to LFA5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
RFA1	0.04997	-0.40719	1.03007	-0.49483	0.15722	0.28314
RFA2	-0.23749	0.72889	-0.59263	-0.09872	0.95818	-0.07089
RFA3	-0.52316	-0.45700	-0.29653	-1.19249	0.41027	0.29397
RFA5	-0.47663	0.34836	-0.18521	0.97432	0.11875	-0.08924
LFA1	0.56540	0.90171	-0.62336	0.29196	-0.07237	0.54844
LFA2	-0.49910	-0.86291	-0.00029	0.71628	-0.51135	0.52653
LFA3	1.01113	0.15048	-0.26666	0.37426	-0.17421	-1.20307
LFA4	0.52494	-0.70312	0.46969	0.38029	0.21873	0.09531
LFA5	-0.25897	0.44091	0.83962	-0.63530	-0.15061	-0.34414

Table 6.107 - Males: Variables RFA1 to LFA5

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
LFA1	0.47830*	0.32322	0.12246	0.14334	0.47086	0.44294
LFA5	-0.17804	0.25019	0.54830*	0.14519	0.47452	-0.29836
RFA2	-0.03310	-0.01583	-0.03647	0.20999	0.90131*	0.01447
RFA3	0.01606	-0.21687	-0.05472	-0.15709	0.77575*	-0.14840
LFA4	0.24782	-0.27595	0.31397	0.34303	0.72762*	-0.05371
RFA4	0.08532	-0.15964	0.23249	0.25832	0.71867*	-0.05261
LFA3	0.38027	-0.14526	0.02736	0.14447	0.60954*	-0.43700
RFA1	0.35630	0.04888	0.48283	0.00129	0.56839*	0.34768
RFA5	-0.27406	0.22588	0.32055	0.42377	0.56824*	-0.22558
LFA2	-0.04202	-0.32415	0.05681	0.40071	0.55959*	0.11366

Table 6.108 - Males: Variables RFA1 to LFA5

Code Group
 0 -- Controls
 1 -- Psoriasis
 2 -- Atopic Eczema
 3 -- BCC
 5 -- Alopecia areata
 6 -- Actinic Keratosis
 7 -- Vitiligo

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

	GROUP	0	1	2	3	5	6
GROUP							
1		2.1744 0.0214					
2		0.67233 0.7346	1.3319 0.2153				
3		2.0703 0.0293	2.3023 0.0145	1.5749 0.1176			
5		1.7975 0.0644	1.7883 0.0660	1.4403 0.1656	2.2856 0.0152		
6		2.7810 0.0031	1.9423 0.0426	1.8269 0.0593	0.93765 0.4910	2.6512 0.0048	
7		1.6391 0.0992	4.2113 0.0000	2.4480 0.0092	2.7535 0.0034	2.2418 0.0174	2.5600 0.0064

Figure 6.31 - Territorial Map - Males: Variables RFA1 to LFA5

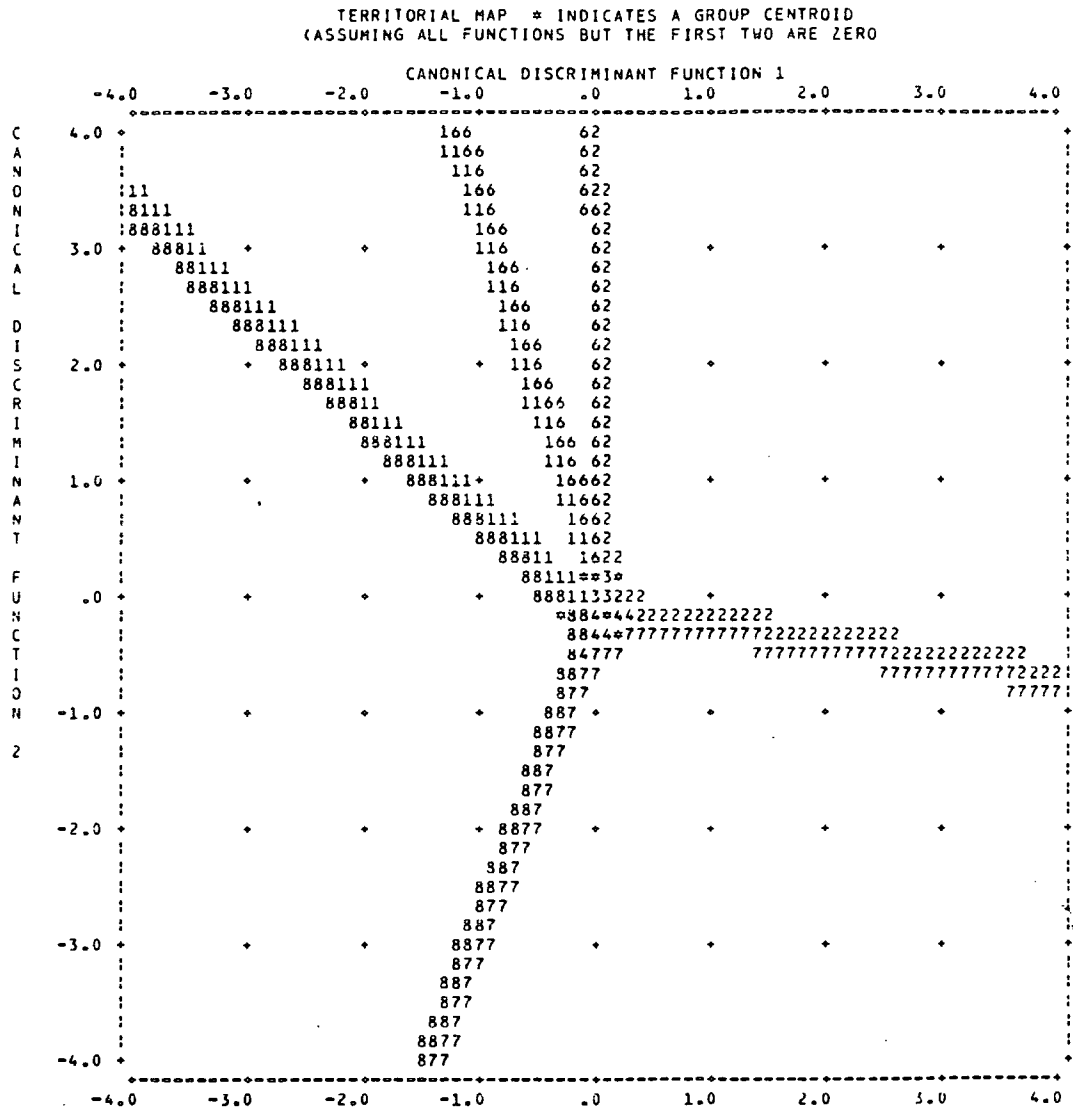


Table 6.109 - Males: Variables RFA1 to LFA5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
-----		-----	-----	-----	-----	-----	-----	-----	-----
GROUP	0	200	30 15.0%	34 17.0%	18 9.0%	28 14.0%	31 15.5%	16 8.0%	43 21.5%
GROUP	1	201	23 11.4%	40 19.9%	12 6.0%	32 15.9%	34 16.9%	25 12.4%	35 17.4%
GROUP	2	203	26 12.8%	31 15.3%	24 11.8%	30 14.8%	28 13.8%	28 13.8%	36 17.7%
GROUP	3	211	22 10.4%	38 18.0%	10 4.7%	27 12.8%	33 15.6%	43 20.4%	38 18.0%
GROUP	5	210	26 12.4%	42 20.0%	14 6.7%	16 7.6%	48 22.9%	28 13.3%	36 17.1%
GROUP	6	129	13 10.1%	17 13.2%	5 3.9%	13 10.1%	21 16.3%	38 29.5%	22 17.1%
GROUP	7	200	34 17.0%	13 6.5%	9 4.5%	27 13.5%	34 17.0%	29 14.5%	54 27.0%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 19.28%

Figure 6.31 shows the territorial map plotted using Functions 1 and 2 the most widely dispersed groups are vitiligo, psoriasis, actinic keratosis and controls. There is, however, much overlap of the groups (Figure 6.32). The group centroids (Figure 6.33) show vitiligo and psoriasis, actinic keratosis and controls to be furthest apart. Classification is 19.28% correct (Table 6.109) with best classified group being actinic keratosis (29.5% correct).

For females Functions 1 and 2 account for 72.58% of the variance (Table 6.110) and the most important variables are the absolute counts on fingers II and III on both hands (Table 6.112). From Table 6.113 the most widely separated groups are controls and actinic keratosis ($F = 10.332$), actinic keratosis and psoriasis ($F = 9.1549$) and actinic keratosis and atopic eczema ($F = 7.5019$). The territorial map (Figure 6.34) shows psoriasis, actinic keratosis, controls and alopecia areata to be the most widely separated groups within the matrix. The scatterplot (Figure 6.35) again shows much overlap between groups but the centroids relationship (Figure 6.36) show actinic keratosis females to be removed from the rest.

The classification results (Table 6.114) show that 25.16% of cases are correctly classified, with actinic keratosis (41.3%), psoriasis (39%) and controls (31.2%) being the best correctly classified groups.

When the groups were reclassified according to aetiology of disorder the only significant differences between groups were found on finger V. ND males had statistically significantly smaller mean absolute ridge count on finger V of both hands in comparison to controls and on the left hand when compared to GD (Table 6.116). Female subjects showed more significant differences, 16/30 compared to 3/30 for males. Control females were found to have a smaller mean value for absolute ridge count on the first four fingers of both hands. The difference was highly significant statistically when controls were compared to ND females for fingers I, II and III. When controls and GD were compared significant differences were found for RI, finger II both hands, and for finger III of both hands where the difference was highly significant. When GD and ND were compared significant differences were found for LI, RII(H.SIG), LII, and for R III (Tables 6.115 and 6.116).

Table 6.110 - Canonical Discriminant Functions - Females:
Variables RFA1 to LFA5

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.08268	50.14	50.14	0.2763428
2*	0.03700	22.44	72.58	0.1888892
3*	0.02183	13.24	85.82	0.1461532
4*	0.01351	8.19	94.01	0.1154569
5*	0.00833	5.05	99.06	0.0908739
6*	0.00155	0.94	100.00	0.0393488

Table 6.111 - Females: Variables RFA1 to LFA5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
RFA1	-0.32585	-0.59598	0.43020	-0.76701	0.29522	-0.23275
RFA2	0.38512	0.33717	-0.07875	0.52197	0.76086	-0.81032
RFA3	1.01887	-0.43615	-0.48064	-0.41101	-0.45053	-0.67137
RFA4	-0.66548	-0.85712	0.46109	0.36170	0.48663	0.15191
RFA5	-0.04510	1.16243	0.65113	-0.39620	0.32398	-0.10217
LFA1	0.24059	0.68080	0.00973	0.11423	-0.49271	0.66587
LFA2	0.18590	-0.24741	0.75659	0.14416	-1.07184	0.41301
LFA3	0.07187	0.18593	-0.65586	-0.21931	0.85732	1.04695
LFA5	-0.19459	-0.19965	-0.36501	0.88066	-0.35754	-0.00667

Table 6.112 - Females: Variables RFA1 to LFA5

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
RFA3	0.81718*	-0.19720	0.22122	0.01066	0.24431	0.07982
RFA2	0.64608*	-0.08340	0.42837	0.39686	0.38396	-0.02101
LFA2	0.61614*	-0.21341	0.57305	0.31998	-0.02714	0.29223
LFA3	0.58179*	-0.11678	0.08066	0.13884	0.49012	0.56608
RFA4	0.28352	-0.32404	0.54176*	0.29444	0.47675	0.25405
RFA1	0.25279	-0.23932	0.53925*	-0.29923	0.17697	0.25111
RFA5	0.30983	0.39261	0.53895*	0.13730	0.37945	0.05258
LFA4	0.36839	-0.24609	0.41061*	0.32213	0.37051	0.30905
LFA5	0.23541	0.05588	0.21183	0.57651*	0.14554	0.21271
LFA1	0.38683	0.06673	0.41181	-0.06797	-0.02743	0.52542*

Table 6.113 - Females: Variables RFA1 to LFA5

Code Group
 0 -- Controls
 1 -- Psoriasis
 2 -- Atopic Eczema
 3 -- HCC
 5 -- Alopecia areata
 6 -- Actinic Keratosis
 7 -- Vitiligo

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

GROUP	GROUP	0	1	2	3	5	6
1		4.5100 0.0000					
2		1.9186 0.0456	1.5980 0.1106				
3		3.6103 0.0002	3.6853 0.0001	1.4489 0.1621			
5		2.7590 0.0034	4.7657 0.0000	2.1146 0.0256	2.2294 0.0181		
6		10.332 0.0000	9.1549 0.0000	7.5019 0.0000	5.7974 0.0000	5.4376 0.0000	
7		5.6455 0.0000	4.5834 0.0000	2.1872 0.0206	2.2249 0.0183	3.9292 0.0001	4.4030 0.0000

Figure 6.34 - Territorial Map - Females: Variables RFA1 to LFA5

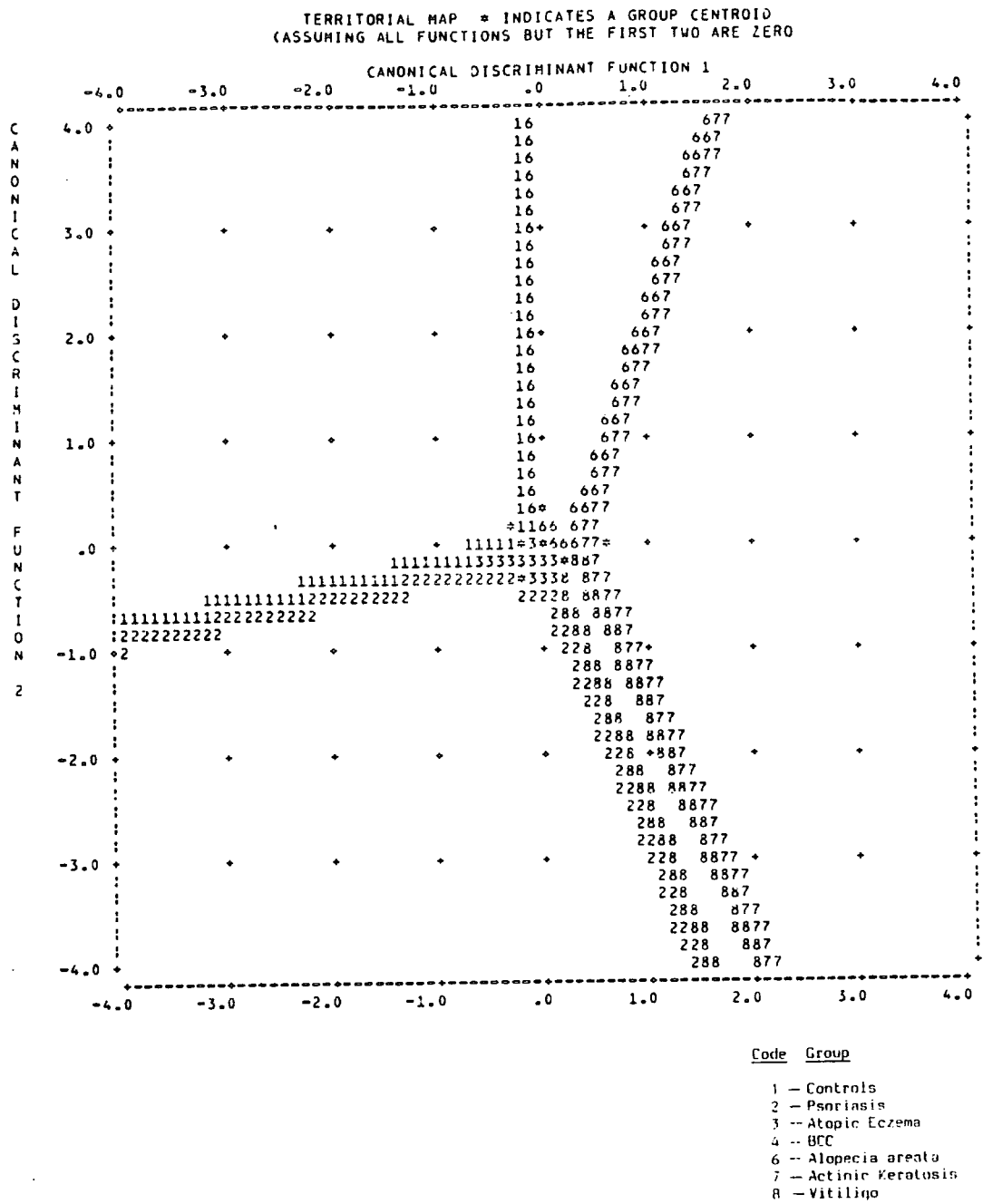


Figure 6.35 - Scatterplot - Females: Variables RFA1 to LFA5

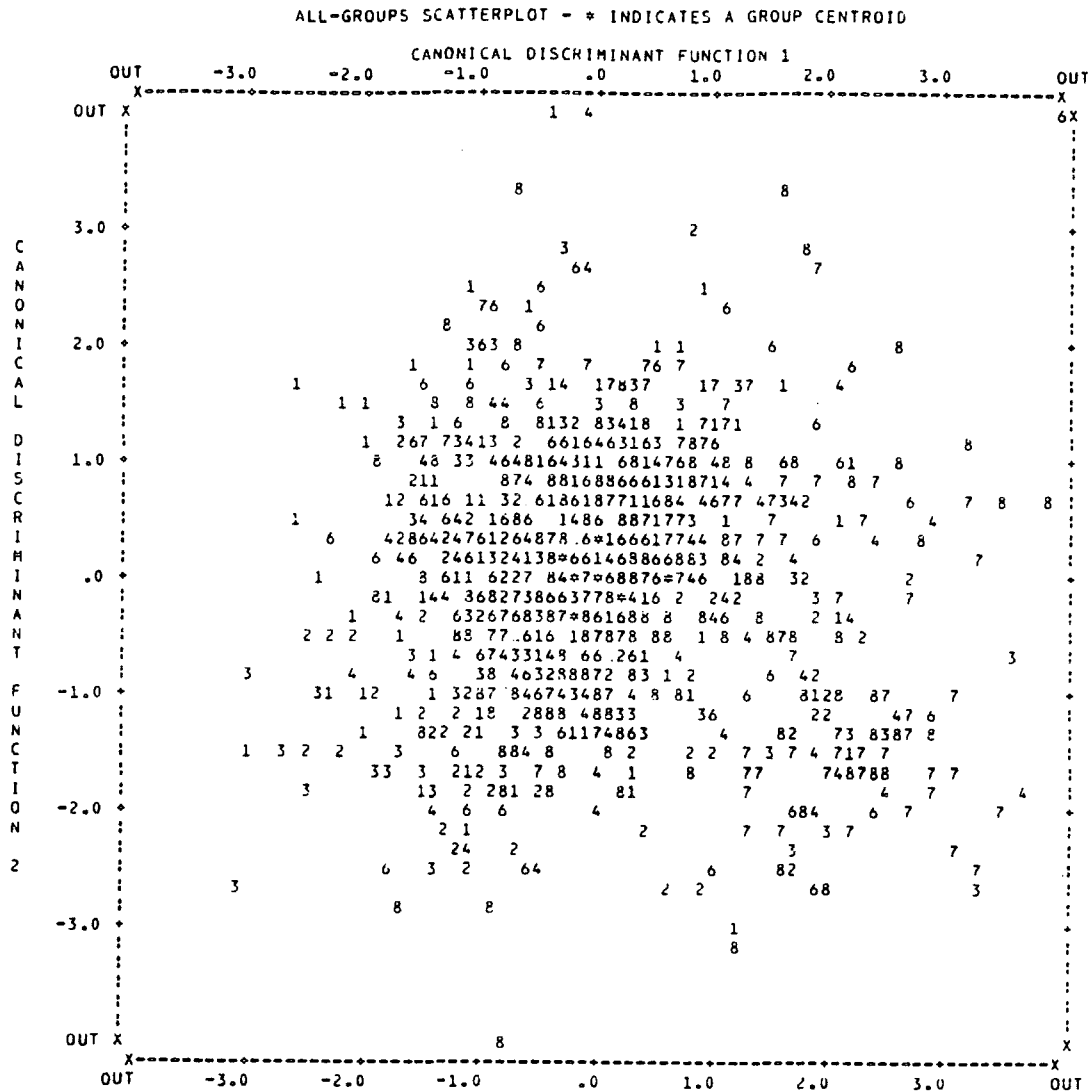
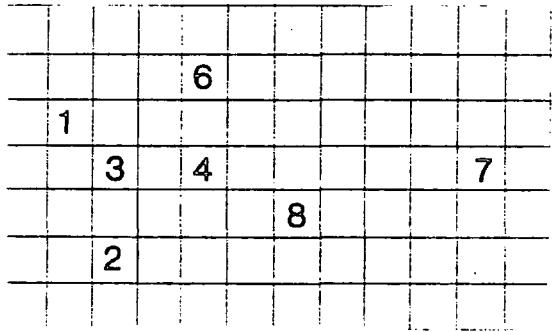


Figure 6.36 - Group Centroids



- Code Group
- 1 - Controls
 - 2 - Psoriasis
 - 3 - Atopic Eczema
 - 4 - BCC
 - 6 - Alopecia areata
 - 7 - Actinic Keratosis
 - 8 - Vitiligo

Table 6.114 - Females: Variables RFA1 to LFA5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
-----		-----	-----	-----	-----	-----	-----	-----	-----
GROUP	0	202	63 31.2%	35 17.3%	13 6.4%	25 12.4%	29 14.4%	23 11.4%	14 6.9%
GROUP	1	205	29 14.1%	80 39.0%	6 2.9%	24 11.7%	12 5.9%	31 15.1%	23 11.2%
GROUP	2	203	38 18.7%	50 24.6%	10 4.9%	29 14.3%	30 14.8%	25 12.3%	21 10.3%
GROUP	3	202	24 11.9%	40 19.8%	9 4.5%	46 22.8%	21 10.4%	40 19.8%	22 10.9%
GROUP	5	206	34 16.5%	39 18.9%	4 1.9%	26 12.6%	45 21.8%	38 18.4%	20 9.7%
GROUP	6	172	15 8.7%	21 12.2%	7 4.1%	14 8.1%	31 18.0%	71 41.3%	13 7.6%
GROUP	7	205	26 12.7%	40 19.5%	5 2.4%	29 14.1%	18 8.8%	51 24.9%	36 17.6%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 25.16%

Table Means and Standard Deviations

6.115

Absolute Finger Ridge Counts : Subjects grouped by disorder type

Group	Sex	No	RFA1		RFA2		RFA3		RFA4		RFA5	
			Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
Cont	M	206	27.189 +/-	11.526	17.335 +/-	12.317	16.476 +/-	10.232	22.806 +/-	12.187	15.883 +/-	7.712
GD	M	816	27.218 +/-	11.300	18.386 +/-	12.050	17.174 +/-	9.176	22.904 +/-	10.763	15.544 +/-	6.574
ND	M	340	27.715 +/-	10.880	17.988 +/-	11.165	17.771 +/-	9.200	23.456 +/-	10.421	14.732 +/-	5.435
Cont	F	203	21.286 +/-	9.933	14.320 +/-	10.470	12.542 +/-	7.452	18.310 +/-	9.555	13.246 +/-	5.401
GD	F	819	25.534 +/-	10.637	16.657 +/-	12.303	15.503 +/-	9.349	20.492 +/-	10.894	13.203 +/-	6.313
ND	F	374	24.249 +/-	10.181	18.187 +/-	11.921	17.610 +/-	9.987	20.241 +/-	9.917	13.666 +/-	5.414

Group	Sex	No	LFA1		LFA2		LFA3		LFA4		LFA5	
			Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
Cont	M	206	24.277 +/-	11.532	16.854 +/-	12.074	15.883 +/-	9.308	21.243 +/-	11.864	15.330 +/-	7.249
GD	M	816	25.131 +/-	11.077	17.716 +/-	12.030	16.629 +/-	9.327	21.638 +/-	9.966	14.604 +/-	6.006
ND	M	340	24.588 +/-	10.394	18.350 +/-	11.434	17.444 +/-	9.320	22.626 +/-	9.899	14.097 +/-	5.311
Cont	F	203	19.916 +/-	10.383	13.532 +/-	10.258	13.084 +/-	8.005	17.867 +/-	9.149	13.000 +/-	5.637
GD	F	819	20.874 +/-	10.252	15.567 +/-	10.976	15.460 +/-	9.589	19.817 +/-	10.818	12.846 +/-	6.006
ND	F	374	22.457 +/-	9.615	17.551 +/-	11.290	16.396 +/-	8.800	19.612 +/-	9.425	12.968 +/-	5.467

Table . Mann-Whitney U Test Results

6.116

Absolute Finger Ridge Counts

Subjects grouped by disorder type.

			Probability for variables (** = Highly significant, * = Significant)				
Sex	Gp 1	Gp 2	RFA1	RFA2	RFA3	RFA4	RFA5
M	Cont	GD	0.5958	0.4554	0.0815	0.9984	0.5206
M	Cont	ND	0.8884	0.5882	0.0655	0.5812	0.0415*
M	GD	ND	0.6648	0.8036	0.6984	0.6469	0.0141*
F	Cont	GD	0.0190*	0.0299*	0.0000**	0.0416*	0.3520
F	Cont	ND	0.0013**	0.0002**	0.0000**	0.0588	0.8611
F	GD	ND	0.1434	0.0237*	0.0006**	0.9509	0.1345

			Probability for variables (** = Highly significant, * = Significant)				
Sex	Gp 1	Gp 2	LFA1	LFA2	LFA3	LFA4	LFA5
M	Cont	GD	0.6147	0.6793	0.6025	0.5974	0.1897
M	Cont	ND	0.9950	0.2678	0.3475	0.2056	0.0370*
M	GD	ND	0.5174	0.3163	0.5997	0.2566	0.2207
F	Cont	GD	0.3685	0.0185*	0.0006**	0.0506	0.2195
F	Cont	ND	0.0025**	0.0000**	0.0000**	0.0688	0.2539
F	GD	ND	0.0031**	0.0036**	0.0535	0.9063	0.9696

(iv) Summed Ulnar and Radial Counts (R1 to U5)

Male atopic eczema patients were found to have a highly significantly larger summed radial count for finger I compared to all groups apart from actinic keratosis (Table 6.121). Actinic keratosis males were found to have a statistically significantly higher summed radial count in comparison to vitiligo. Vitiligo patients were shown to have a significantly lower summed ulnar count in comparison to psoriasis and to atopic eczema male patients. On finger II actinic keratosis male patients were found to have a significantly higher summed radial count in comparison to controls and atopic eczema and a highly significantly larger count compared to alopecia areata. Atopic eczema males proved to have a highly significantly larger summed ulnar count compared to controls and BCC and also compared to psoriasis where the difference was found to be statistically significant.

On finger III actinic keratosis males were found to have a summed radial count which was significantly higher when compared to psoriasis, vitiligo and alopecia areata. The difference was highly significant when actinic keratosis males were compared to controls, and BCC. Atopic eczema males were found to have a increased summed radial count which was highly significantly different in comparison to BCC and significantly different to that found for alopecia areata. Vitiligo patients were found to have a significantly lower ulnar count than that for BCC on finger III.

Summed radial counts on finger IV showed that actinic keratosis males had the highest value and it was highly significantly larger when compared to BCC and significantly higher in comparison to psoriasis and alopecia areata. Atopic eczema males had the next highest value and this was found to be significantly larger in comparison to psoriasis and to alopecia areata and highly significantly larger in comparison to BCC. Vitiligo patients had a higher mean summed radial count compared to BCC on finger IV. Actinic keratosis males were found to have a significantly higher summed ulnar count compared to vitiligo and to alopecia areata.

On finger V BCC males were found to have a significantly decreased summed radial count in comparison to controls, atopic eczema, actinic keratosis and vitiligo, where the difference was

highly significant. Vitiligo patients were discovered to have a highly significantly increased radial count compared to psoriasis, alopecia areata and to BCC. For ulnar counts on finger V control male subjects were found to have a highly significantly larger value in comparison to actinic keratosis and vitiligo. A significantly increased summed ulnar count was found for controls compared to BCC and alopecia areata and also for atopic eczema compared to actinic keratosis and to vitiligo.

For female subjects vitiligo patients had the highest summed radial count for finger I which was found to be highly significantly greater than controls, psoriasis, BCC and alopecia areata (significant difference). Actinic keratosis females had the second highest summed radial count which was highly significantly larger in comparison to BCC, psoriasis, controls and alopecia areata, the latter difference being significant (5% level). BCC patients had a larger ulnar count on finger I which was significantly different compared to controls and atopic eczema and highly significantly different in comparison to alopecia areata and to psoriasis. Vitiligo females were also found to have a significantly higher ulnar count on finger I in comparison to psoriatics.

On finger II highly significantly higher radial counts were found in vitiligo females in comparison to controls, psoriasis, alopecia areata and BCC and in actinic keratosis patients compared to alopecia areata, atopic eczema, psoriasis and controls. Psoriasis female patients had a highly significantly lower value than vitiligo, BCC, actinic keratosis and alopecia areata (SIG.), atopic eczema had a significantly lower value than BCC. For ulnar counts on finger II actinic keratosis females were found to have a highly significantly larger value in comparison to BCC, alopecia areata, psoriasis and controls. Controls had a highly significantly decreased summed ulnar count compared to atopic eczema, vitiligo, actinic keratosis and psoriasis (SIG.). Vitiligo had a highly significant ulnar count compared to BCC, alopecia areata, psoriasis and controls. Psoriasis had a highly significantly lower ulnar count compared to actinic keratosis, vitiligo and controls (SIG.).

Radial count on finger III was found to be highly significantly greater in actinic keratosis in comparison to BCC, alopecia areata, atopic eczema, psoriasis and controls and in vitiligo compared to BCC,

Table Means and Standard Deviations

6.117

Summed Radial and Ulnar Counts

Males

		Variables									
		R1		R2		R3		R4		R5	
Group	Cases	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Control	206	37.723 +/- 9.633		20.102 +/- 12.979		26.864 +/- 11.065		31.864 +/- 12.095		27.883 +/- 9.330	
Psoriasis	202	38.505 +/- 8.213		20.079 +/- 14.441		28.726 +/- 9.714		32.480 +/- 8.606		26.406 +/- 6.713	
Atop Ecz	203	40.749 +/- 7.814		19.640 +/- 14.990		29.798 +/- 10.219		34.502 +/- 9.121		27.709 +/- 7.028	
Vitiligo	201	37.224 +/- 8.398		21.040 +/- 14.089		28.642 +/- 9.659		33.597 +/- 8.800		28.284 +/- 7.748	
Alop Are	210	37.876 +/- 8.457		19.262 +/- 14.071		28.448 +/- 10.733		32.229 +/- 9.743		26.500 +/- 7.225	
BCC	211	37.801 +/- 8.000		20.507 +/- 12.909		27.943 +/- 9.148		32.085 +/- 8.335		26.441 +/- 6.441	
Act Ker	129	39.473 +/- 6.190		23.031 +/- 14.185		31.279 +/- 8.820		35.093 +/- 6.218		28.062 +/- 4.818	

		Variables									
		U1		U2		U3		U4		U5	
Group	Cases	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Control	206	13.743 +/- 16.028		14.087 +/- 15.304		5.495 +/- 11.356		12.184 +/- 14.694		3.330 +/- 7.596	
Psoriasis	202	15.644 +/- 16.993		14.460 +/- 13.557		4.622 +/- 10.416		11.817 +/- 14.117		2.965 +/- 7.898	
Atop Ecz	203	14.586 +/- 16.336		17.995 +/- 15.079		5.320 +/- 12.340		12.527 +/- 14.126		3.724 +/- 8.892	
Vitiligo	201	11.517 +/- 15.183		15.871 +/- 14.078		4.120 +/- 10.266		10.279 +/- 13.798		2.104 +/- 6.977	
Alop Are	210	13.310 +/- 15.713		16.086 +/- 14.139		5.581 +/- 12.158		10.786 +/- 14.489		2.924 +/- 7.943	
BCC	211	14.038 +/- 15.897		14.175 +/- 13.554		6.242 +/- 11.660		12.412 +/- 13.837		1.953 +/- 7.865	
Act Ker	129	13.589 +/- 16.079		16.016 +/- 13.936		5.620 +/- 12.013		13.581 +/- 14.751		1.481 +/- 6.078	

Table Means and Standard Deviations

6.118

Summer Radial and Ulnar Counts

Females

		Variables									
		R1		R2		R3		R4		R5	
Group	Cases	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Control	206	32.493 +/-	10.073	18.502 +/-	11.791	22.906 +/-	10.000	29.217 +/-	10.055	24.714 +/-	8.212
Psoriasis	202	32.893 +/-	10.913	15.429 +/-	12.819	24.020 +/-	10.293	28.346 +/-	10.328	22.263 +/-	7.339
Atop Ecz	203	34.507 +/-	9.818	16.931 +/-	14.122	24.961 +/-	11.245	29.453 +/-	10.203	24.291 +/-	8.159
Vitiligo	201	36.380 +/-	7.969	22.605 +/-	14.203	28.595 +/-	9.757	33.502 +/-	11.173	26.254 +/-	8.041
Alop Are	210	34.437 +/-	8.341	18.330 +/-	13.258	27.092 +/-	11.002	29.709 +/-	9.167	24.481 +/-	7.222
BCC	211	33.911 +/-	8.461	19.668 +/-	12.387	25.559 +/-	9.493	28.347 +/-	8.785	23.485 +/-	6.750
Act Ker	129	36.247 +/-	7.599	22.557 +/-	12.913	30.322 +/-	9.192	31.098 +/-	8.263	25.437 +/-	5.916

		Variables									
		U1		U2		U3		U4		U5	
Group	Cases	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Control	206	8.709 +/-	12.217	9.350 +/-	11.748	2.719 +/-	7.360	6.961 +/-	11.230	1.532 +/-	4.776
Psoriasis	202	8.532 +/-	13.371	12.337 +/-	13.234	4.210 +/-	9.734	9.283 +/-	12.495	1.376 +/-	4.622
Atop Ecz	203	10.143 +/-	15.038	14.320 +/-	13.746	4.921 +/-	10.453	10.670 +/-	14.186	1.690 +/-	5.398
Vitiligo	201	11.346 +/-	14.054	16.722 +/-	15.573	6.273 +/-	12.037	12.098 +/-	14.881	1.795 +/-	6.377
Alop Are	210	9.398 +/-	13.936	12.218 +/-	13.724	3.772 +/-	9.959	8.184 +/-	13.696	2.044 +/-	6.892
BCC	211	12.609 +/-	14.187	12.421 +/-	13.583	4.767 +/-	10.140	10.099 +/-	12.269	2.183 +/-	6.128
Act Ker	129	10.454 +/-	14.794	17.138 +/-	13.852	7.707 +/-	13.264	10.592 +/-	13.670	2.230 +/-	6.592

Table 6. 119

Mann-Whitney U Test Results : Summed Radial and Ulnar Counts

Males

Group 1	Group 2	Variables and Probability (* = significant ** = highly significant)				
		R1	R2	R3	R4	R5
Control	Psoriasis	0.5511	0.8544	0.1162	0.7422	0.0694
Control	Atop Ecz	0.0008**	0.7101	0.0088**	0.1015	0.7826
Control	Vitiligo	0.3130	0.3719	0.1409	0.4426	0.5925
Control	Alop Are	0.9061	0.5597	0.1212	0.7348	0.0751
Control	BCC	0.6348	0.7205	0.6090	0.3543	0.0431*
Control	Act Ker	0.2584	0.0373*	0.0004**	0.1280	0.8998
Psoriasis	Atop Ecz	0.0039**	0.5900	0.2008	0.0190*	0.0653
Psoriasis	Vitiligo	0.0854	0.4368	0.9390	0.1855	0.0040**
Psoriasis	Alop Are	0.5294	0.4598	0.8679	0.9215	0.8873
Psoriasis	BCC	0.2702	0.8811	0.2038	0.3522	0.6891
Psoriasis	Act Ker	0.5786	0.0675	0.0177*	0.0495*	0.0625
Atop Ecz	Vitiligo	0.0000**	0.2217	0.2107	0.2941	0.3112
Atop Ecz	Alop Are	0.0004**	0.8130	0.2789	0.0228*	0.0737
Atop Ecz	BCC	0.0001**	0.5049	0.0131*	0.0012**	0.0259*
Atop Ecz	Act Ker	0.0310*	0.0290*	0.1970	0.8768	0.9602
Vitiligo	Alop Are	0.2776	0.1307	0.8276	0.1888	0.0078**
Vitiligo	BCC	0.5816	0.5398	0.2604	0.0308*	0.0015**
Vitiligo	Act Ker	0.0264*	0.2648	0.0167*	0.4116	0.2806
Alop Are	BCC	0.5882	0.3722	0.1996	0.4732	0.7172
Alop Are	Act Ker	0.2276	0.0096**	0.0368*	0.0454*	0.0972
BCC	Act Ker	0.0874	0.0539	0.0007**	0.0027**	0.0183*

Table 6.119 continued

		Variables and Probability (* = significant ** = highly significant)				
Group 1	Group 2	U1	U2	U3	U4	U5
Control	Psoriasis	0.3226	0.4438	0.3242	0.6875	0.1074
Control	Atop Ecz	0.6310	0.0028**	0.3745	0.6225	0.7649
Control	Vitiligo	0.1240	0.1383	0.0739	0.1649	0.0074**
Control	Alop Are	0.6605	0.1132	0.7325	0.1522	0.0280*
Control	BCC	0.9054	0.6129	0.6555	0.7250	0.0314*
Control	Act Ker	0.8181	0.1366	0.6289	0.4144	0.0046**
Psoriasis	Atop Ecz	0.5881	0.0188*	0.9303	0.4233	0.1879
Psoriasis	Vitiligo	0.0130*	0.4233	0.4135	0.3262	0.3289
Psoriasis	Alop Are	0.1353	0.3490	0.5130	0.3504	0.5441
Psoriasis	BCC	0.3358	0.7594	0.1589	0.4987	0.6929
Psoriasis	Act Ker	0.2706	0.3396	0.7012	0.2437	0.1838
Atop Ecz	Vitiligo	0.0442*	0.1597	0.3726	0.0549	0.0214*
Atop Ecz	Alop Are	0.3729	0.2064	0.5849	0.0587	0.0548
Atop Ecz	BCC	0.6986	0.0074**	0.2130	0.9514	0.0806
Atop Ecz	Act Ker	0.5219	0.2832	0.8028	0.6434	0.0129*
Vitiligo	Alop Are	0.2516	0.8875	0.1407	0.9488	0.7227
Vitiligo	BCC	0.0936	0.2717	0.0298*	0.0746	0.5049
Vitiligo	Act Ker	0.2766	0.8809	0.2771	0.0414*	0.6246
Alop Are	BCC	0.6280	0.2154	0.4842	0.0879	0.8232
Alop Are	Act Ker	0.8824	0.9582	0.8406	0.0436*	0.4326
BCC	Act Ker	0.7544	0.2269	0.4512	0.5709	0.2729

Table 6 .120

Mann-Whitney U Test Results : Summed Radial and Ulnar Counts

Females

		Variables and Probability (* = significant ** = highly significant)				
Group 1	Group 2	R1	R2	R3	R4	R5
Control	Psoriasis	0.7725	0.0145*	0.2649	0.4624	0.0005**
Control	Atop Ecz	0.0514	0.1766	0.0105*	0.8087	0.4241
Control	Vitiligo	0.0002**	0.0004**	0.0000**	0.0000**	0.1125
Control	Alop Are	0.1144	0.9709	0.0000**	0.6392	0.4786
Control	BCC	0.3468	0.3532	0.0061**	0.1635	0.0153*
Control	Act Ker	0.0004**	0.0004**	0.0000**	0.0650	0.7410
Psoriasis	Atop Ecz	0.1126	0.3756	0.2345	0.3895	0.0112*
Psoriasis	Vitiligo	0.0014**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Alop Are	0.2067	0.0373*	0.0006**	0.2140	0.0031**
Psoriasis	BCC	0.4913	0.0012**	0.1379	0.5583	0.2476
Psoriasis	Act Ker	0.0025**	0.0000**	0.0000**	0.0119*	0.0000**
Atop Ecz	Vitiligo	0.1090	0.0001**	0.0004**	0.0001**	0.0156*
Atop Ecz	Alop Are	0.6343	0.3259	0.0339*	0.7491	0.8673
Atop Ecz	BCC	0.2870	0.0369*	0.9097	0.1065	0.1480
Atop Ecz	Act Ker	0.1542	0.0001**	0.0000**	0.1305	0.1959
Vitiligo	Alop Are	0.2255*	0.0005**	0.1142	0.0002**	0.0207*
Vitiligo	BCC	0.0051**	0.0087**	0.0001**	0.0000**	0.0001**
Vitiligo	Act Ker	0.8513	0.7578	0.1125	0.0089**	0.1713
Alop Are	BCC	0.4641	0.3724	0.0210*	0.0634	0.0690
Alop Are	Act Ker	0.0441*	0.0011**	0.0016**	0.1904	0.2646
BCC	Act Ker	0.0093**	0.0128*	0.0000**	0.0009**	0.0014**

Table 6.120 continued

Group 1	Group 2	Variables and Probability (* = significant ** = highly significant)				
		U1	U2	U3	U4	U5
Control	Psoriasis	0.3093	0.0309*	0.1148	0.0601	0.7247
Control	Atop Ecz	0.9448	0.0002**	0.0115*	0.0301*	0.8169
Control	Vitiligo	0.1298	0.0000**	0.0013**	0.0024**	0.6603
Control	Alop Are	0.6242	0.0541	0.4905	0.7973	0.2813
Control	BCC	0.0106*	0.0505	0.0151*	0.0044**	0.3098
Control	Act Ker	0.8126	0.0000**	0.0001**	0.01161*	0.7573
Psoriasis	Atop Ecz	0.3889	0.12259	0.3435	0.6537	0.9031
Psoriasis	Vitiligo	0.0205*	0.0080**	0.0854	0.1509	0.9334
Psoriasis	Alop Are	0.6685	0.8314	0.4085	0.1380	0.1443
Psoriasis	BCC	0.0013**	0.8662	0.3309	0.3583	0.1686
Psoriasis	Act Ker	0.2760	0.0013**	0.0110*	0.4836	0.5309
Atop Ecz	Vitiligo	0.2038	0.2284	0.4463	0.3448	0.8602
Atop Ecz	Alop Are	0.5646	0.0731	0.0718	0.0733	0.1860
Atop Ecz	BCC	0.0398*	0.1023	0.9879	0.6898	0.2134
Atop Ecz	Act Ker	0.8597	0.0611	0.0929	0.8367	0.6137
Vitiligo	Alop Are	0.0625	0.0041**	0.0127*	0.0070**	0.1236
Vitiligo	BCC	0.3789	0.0083**	0.4143	0.5176	0.1519
Vitiligo	Act Ker	0.3161	0.5752	0.3587	0.4665	0.5021
Alop Are	BCC	0.0073**	0.9402	0.0830	0.0173*	0.9647
Alop Are	Act Ker	0.5489	0.0005**	0.0010**	0.0449*	0.4668
BCC	Act Ker	0.0767	0.0012**	0.0869	0.9041	0.5060

Table 6.121 - Significant differences from Mann-Whitney U Tests
Variables R1 to U5 - (a) Males

FINGER	RADIAL		ULNAR	
	SIG.	H.SIG.	SIG.	H.SIG.
I	Vit. : A.Ker.	Cont. : A.Ecz. Psor. : A.Ecz. Vit. : A.Ecz. Alop. : A.Ecz. BCC : A.Ecz.	Psor. : Vit. A.Ecz.: Vit.	
II	Cont. : A.Ker. A.Ecz.: A.Ker.	Alop. : A.Ker.	Psor. : A.Ecz.	Cont. : A.Ecz. BCC. : A.Ecz.
III	Psor. : A.Ker. A.Ecz.: BCC Vit. : A.Ker. Alop. : A.Ker.	Cont. : A.Ecz. Cont. : A.Ker. BCC : A.Ker.	Vit. : BCC	
IV	Psor. : A.Ecz. Psor. : A.Ker. A.Ecz.: Alop. Vit. : BCC Alop. : A.Ker.	A.Ecz.: BCC BCC : A.Ker.	Vit. : A.Ker. Alop. : A.Ker.	
V	Cont. : BCC A.Ecz.: BCC BCC : A.Ker.	Psor. : Vit. Vit. : Alop. Vit. : BCC	A.Ecz. : A.Ker. A.Ecz. : Vit. Cont. : BCC Cont. : Alop.	Cont.: A.Ker. Cont.: Vit.

Table 6.121(b) Females

FINGER	RADIAL		ULNAR	
	SIG.	H.SIG.	SIG.	H.SIG.
I	Vit. : Alop. Alop.: A.Ker.	Cont. : Vit. Cont. : A.Ker. Psor. : Vit. Psor. : A.Ker. Vit. : BCC BCC : A.Ker.	Cont. : BCC Psor. : Vit. A.Ecz.: BCC	Psor. : BCC Alop. : BCC
II	Cont.: Psor. Psor.: Alop. A.Ecz.: BCC	Cont. : Vit. Cont. : A.Ker. Psor. : Vit. Psor. : BCC Psor. : A.Ker. A.Ecz.: A.Ker. Vit. : Alop. Vit. : BCC Alop. : A.Ker.	Cont. : Psor.	Cont. : A.Ecz. Cont. : Vit. Cont. : A.Ker. Psor. : Vit. Psor. : A.Ker. Vit. : Alop. Vit. : BCC Alop. : A.Ker. BCC : A.Ker.
III	Cont. : A.Ecz A.Ecz.: Alop. Alop. : BCC	Cont. : Vit. Cont. : Alop. Cont. : BCC Cont. : A.Ker. Psor. : Vit. Psor. : Alop. Psor. : A.Ker. A.Ecz.: Vit. A.Ecz.: A.Ker. Vit. : BCC Alop. : A.Ker. BCC. : A.Ker.	Cont. : A.Ecz. Cont. : BCC Psor. : A.Ker. Vit. : Alop.	Cont. : Vit. Cont. : A.Ker. Alop. : A.Ker.
IV	Psor. : A.Ker	Cont. : Vit. Psor. : Vit. A.Ecz.: Vit. Vit. : Alop. Vit. : BCC Vit. : A.Ker. BCC : A.Ker.	Cont. : A.Ecz. Cont. : A.Ker. Alop. : BCC Alop. : A.Ker.	Cont. : Vit. Cont. : BCC Vit. : Alop.
V	Cont. : BCC Psor. : A.Ecz A.Ecz.: Vit. Vit. : Alop.	Cont. : Psor. Psor. : Vit. Psor. : Alop. Psor. : A.Ker. Vit. : BCC BCC : A.Ker.		

atopic eczema, psoriasis and controls. Control females were shown to have a lower summed radial count which was highly significantly smaller in comparison to vitiligo, BCC, actinic keratosis, alopecia areata and atopic eczema (SIG.). Alopecia areata females had a higher summed radial count which was highly significant in comparison to psoriasis and controls and significant to BCC and to atopic eczema. For ulnar counts on finger III control females were shown to have decreased values compared to vitiligo and actinic keratosis (both highly significant) and compared to atopic eczema and BCC (both significant). Actinic keratosis had a higher summed ulnar count compared to controls and alopecia areata (highly significant) and to psoriasis (significant). Vitiligo females had a significantly higher count in comparison to alopecia areata.

On finger IV vitiligo female patients were found to have a statistically highly significantly greater mean summed radial count compared to all of the other groups. Actinic keratosis females were also found to have a larger radiant count compared to BCC and vitiligo (both highly significant) and psoriasis (significant). Control females had a decreased summed ulnar count which was significantly smaller compared to atopic eczema and actinic keratosis and highly significantly smaller when compared to vitiligo and to BCC. Alopecia areata females had significantly lower ulnar counts compared to BCC and actinic keratosis and highly significantly lower values compared to vitiligo female patients.

Summed radial count values were found to be highly significantly lower in psoriatic females compared to controls, vitiligo, alopecia areata and actinic keratosis and significantly lower compared to atopic eczema. BCC females had significantly smaller ulnar count compared to controls and highly significantly smaller compared to vitiligo and to actinic keratosis. Vitiligo had an increased radial count in comparison to atopic eczema and alopecia areata (both significant) and to BCC and psoriasis (both highly significant).

Table 6.122 shows the significant differences found in the Mann-Whitney U Tests. Females showed 84/210 differences and males showed 43/210. For males atopic eczema showed the most differences (19) followed by actinic keratosis (17). Alopecia areata and psoriasis both showed the least differences (7 each). In females vitiligo

patients showed the greatest number of intergroup differences (32) followed by controls (26). Atopic eczema females (14) showed the least.

The results of discriminant analysis for male subjects for the variables R1 to U5 show that the first two functions account for 63.50% of the variance (Table 6.123). Summed ulnar counts on finger I, II and V were found to be the most important in the first two functions (Table 6.125). The F Statistics shown in Table 6.126 show that atopic eczema males exhibit the largest difference when compared to vitiligo ($F = 4.8781$), BCC ($F = 4.2973$), controls ($F = 4.5938$) and actinic keratosis ($F = 3.1179$).

Figure 6.37 shows that the most separated groups are controls, atopic eczema, psoriasis, vitiligo and BCC. Figure 6.39 shows the spatial relationship of the group centroids with vitiligo and atopic eczema being removed from the other groups which are clustered together. The classification results shown in Table 6.127 show that 21.64% of cases were correctly grouped using the variables R1 to U5. The groups with the best percentage classification were shown to be actinic keratosis (34.1% correct) and atopic eczema (31% correct).

Table 6.122 - Summary Table of Mann-Whitney U Test significant values
Variables: R1 to U5

(a) Males

Alop.	1					
Psor.	2	0				
A.Ecz.	3	2	3			
A.Ker.	3	3	2	3		
BCC	3	0	0	5	3	
Cont.	1	1	0	3	3	2
	Vit.	Alop.	Psor.	A.Ecz.	A.Ker.	BCC

(b) Females

Alop.	7					
Psor.	7	3				
A.Ecz.	4	1	1			
A.Ker.	1	6	7	2		
BCC	6	3	2	2	6	
Cont.	7	1	3	4	6	5
	Vit.	Alop.	Psor.	A.Ecz.	A.Ker.	BCC

Table 6.123 - Canonical Discriminant FunctionsMales - Variables R1 to U5

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.04603	39.36	39.36	0.2097625
2*	0.02823	24.14	63.50	0.1657068
3*	0.02377	20.33	83.83	0.1523774
4*	0.01217	10.40	94.23	0.1096320
5*	0.00568	4.85	99.09	0.0751249
6*	0.00107	0.91	100.00	0.0326576

Table 6.124 - Males - Variables: R1 to U5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
R1	0.81070	-0.18139	0.22359	0.64201	-0.35166	-0.13125
R2	-0.56185	0.28490	-0.10986	-0.01858	0.21130	-0.30523
R3	0.27411	-0.07422	-0.64923	-0.50920	0.39267	1.35900
R4	0.30573	0.52327	-0.45382	0.16351	0.02337	-1.20040
R5	-0.89422	0.19214	0.63945	0.54610	0.05365	0.54661
U1	0.05080	-0.47029	0.07325	-0.30253	0.63891	-0.15448
U2	0.24431	0.84728	0.13070	-0.46707	-0.31777	-0.06728
U3	-0.26524	-0.36801	-0.16113	-0.08622	-1.01319	0.14002
U4	-0.07759	-0.69629	-0.32623	0.80879	0.09069	0.10405
U5	0.48650	0.13005	0.76973	-0.15855	0.31869	0.21302

Table 6.125 - Males - Variables: R1 to U5

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
U2	0.26578	0.37685*	0.00517	0.10811	-0.28498	0.22338
U1	0.22278	-0.32242*	0.01763	0.12345	0.31963	0.00822
U5	0.25594	-0.02440	0.50063*	0.08435	0.05973	0.36679
R5	-0.16684	0.43118	0.13138	0.65217*	0.10654	0.34002
R1	0.54517	0.08786	-0.11977	0.64165*	0.00192	0.13252
R4	0.19790	0.46328	-0.33062	0.52624*	0.12854	0.03808
U4	0.08179	-0.20411	-0.13900	0.50907*	-0.06308	0.27021
R2	-0.15931	0.07648	-0.31494	0.32073*	0.22482	0.18759
U3	0.01488	-0.21788	-0.05888	0.11981	-0.55214*	0.31496
R3	0.24935	0.28536	-0.48669	0.29136	0.19594	0.58900*

Table 6.126 - Males - Variables R1 to U5

		Code Group					
		0 - Controls 1 - Psoriasis 2 - Alopecia Areata 3 - BCC 5 - Alopecia areata 6 - Actinic Keratosis 7 - Vitiligo					
F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS							
GROUP	GROUP	0	1	2	3	5	6
1		2.4459 0.0068					
2		4.5938 0.0000	2.1622 0.0178				
3		1.8073 0.0549	1.3565 0.1952	4.2973 0.0000			
5		2.5228 0.0052	0.98898 0.4508	2.0371 0.0267	1.4937 0.1358		
6		3.2518 0.0004	2.1137 0.0209	3.1179 0.0006	1.4925 0.1363	2.2384 0.0138	
7		2.4832 0.0060	3.6839 0.0001	4.8781 0.0000	3.2149 0.0004	2.2796 0.0120	2.2090 0.0152

Figure 6.37 - Males - Variables: R1 to U5

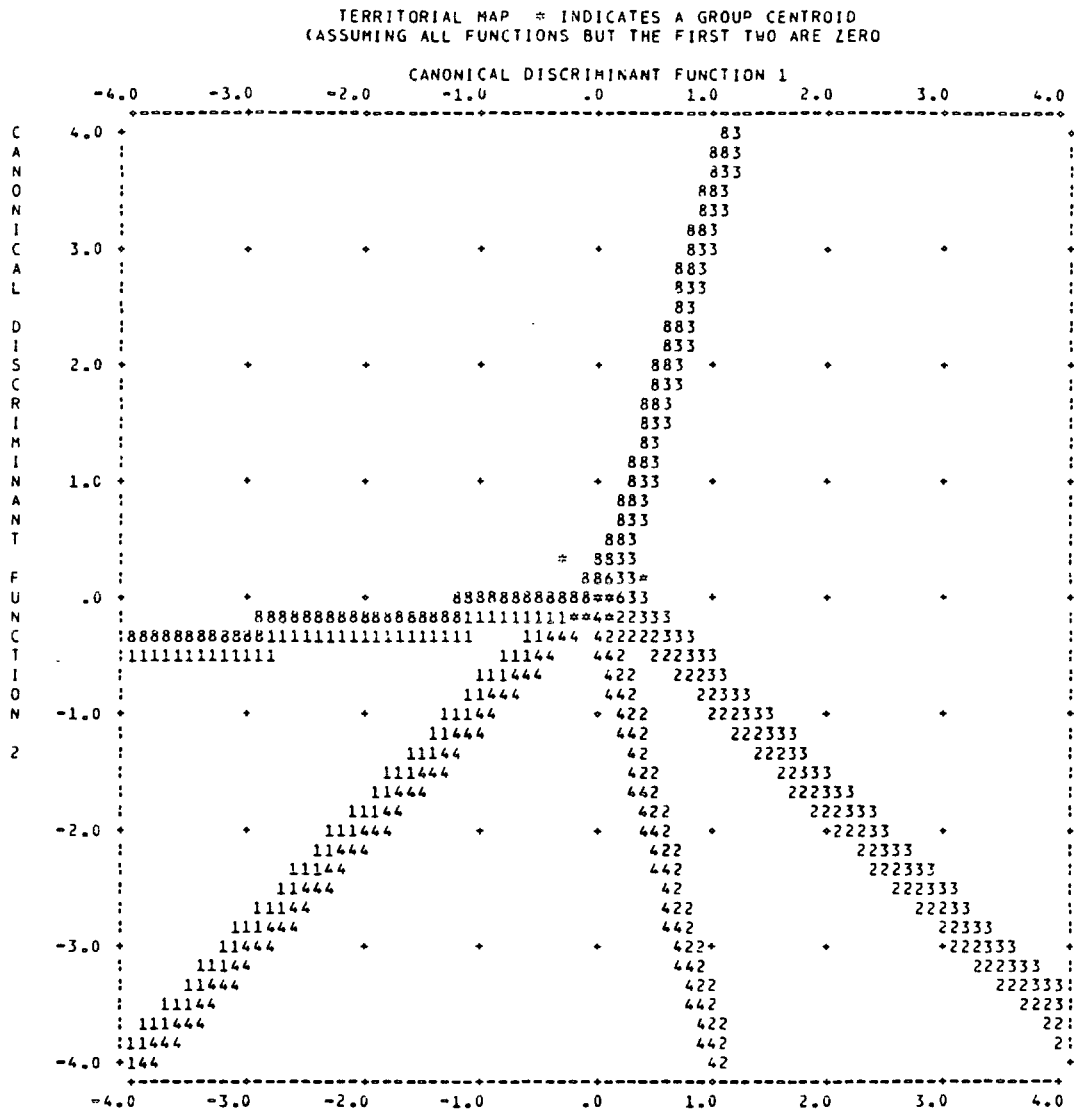


Figure 6.38 - Males - Variables: R1 to U5

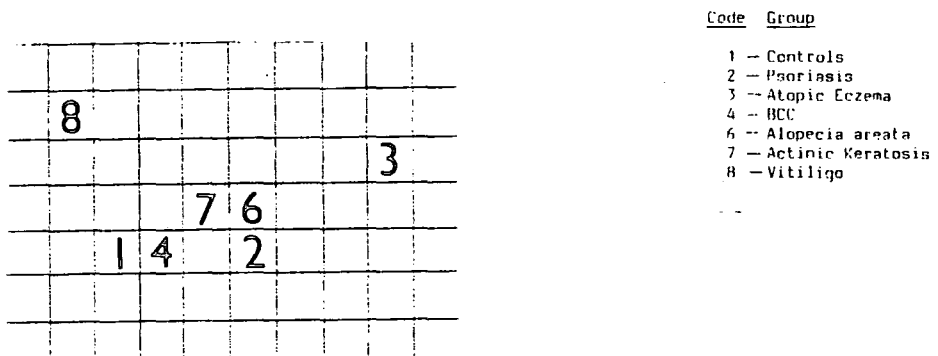
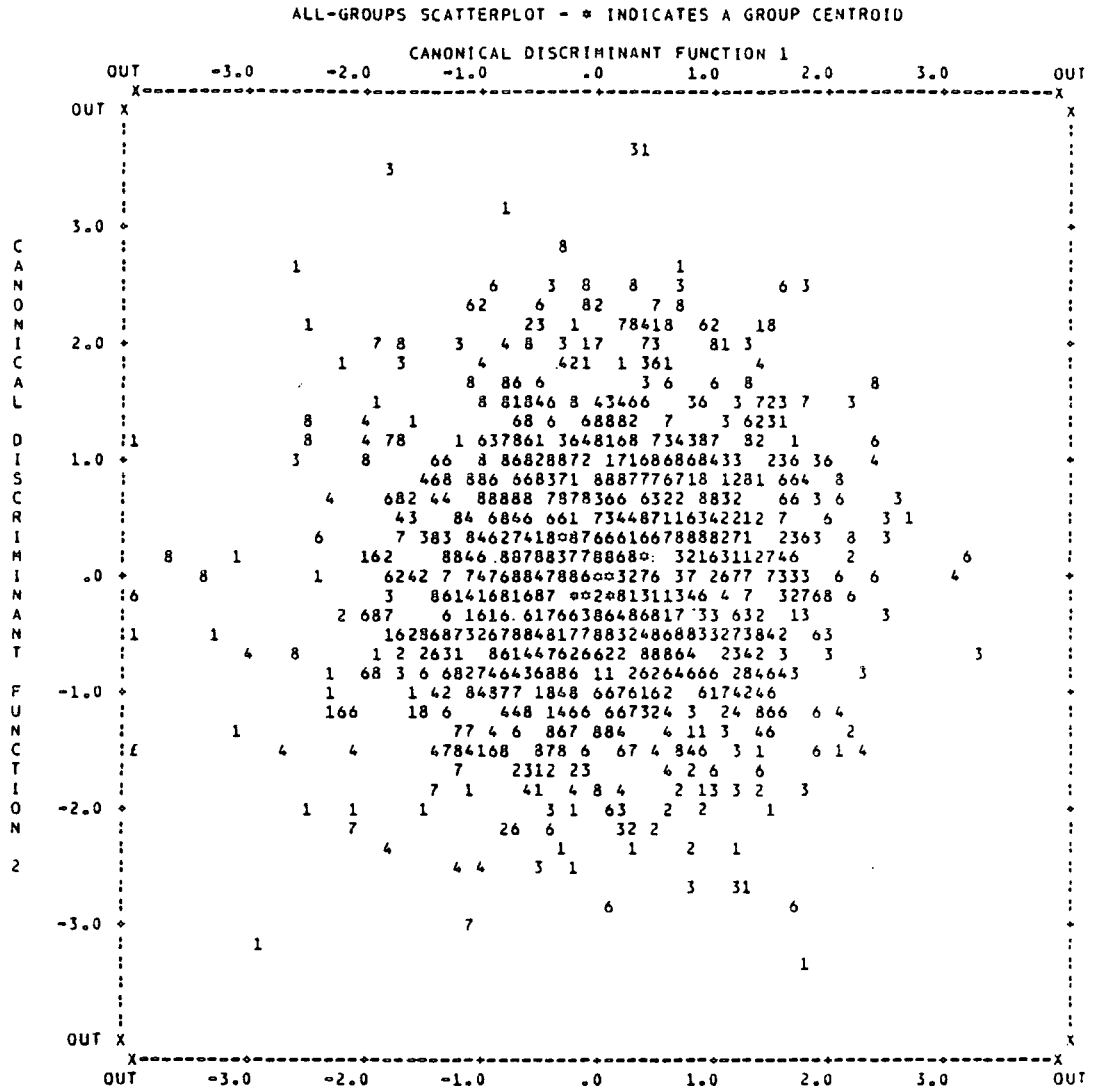


Figure 6.39 - Group Centroids

Table 6.127 - Males - Variables: R1 to U5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	200	51 25.5%	19 9.5%	38 19.0%	18 9.0%	18 9.0%	27 13.5%	29 14.5%
GROUP	1	201	22 10.9%	36 17.9%	40 19.9%	19 9.5%	18 9.0%	45 22.4%	21 10.4%
GROUP	2	203	14 6.9%	29 14.3%	63 31.0%	11 5.4%	21 10.3%	30 14.8%	35 17.2%
GROUP	3	211	26 12.3%	29 13.7%	31 14.7%	28 13.3%	21 10.0%	42 19.9%	34 16.1%
GROUP	5	210	26 12.4%	30 14.3%	47 22.4%	18 8.6%	17 8.1%	37 17.6%	35 16.7%
GROUP	6	129	10 7.8%	7 5.4%	22 17.1%	10 7.8%	11 8.5%	44 34.1%	25 19.4%
GROUP	7	200	34 17.0%	15 7.5%	29 14.5%	14 7.0%	12 6.0%	42 21.0%	54 27.0%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 21.64%

Table 6.128 - Canonical Discriminant FunctionsFemales - Variables: R1 to U5

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.09057	48.89	48.89	0.2881869
2*	0.04311	23.27	72.16	0.2033004
3*	0.02693	14.53	86.69	0.1619321
4*	0.01322	7.14	93.83	0.1142222
5*	0.00618	3.34	97.16	0.0783792
6*	0.00525	2.84	100.00	0.0722874

Table 6.129 - Females - Variables: R1 to U5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
R2	0.04221	0.79480	-0.34507	0.55133	-0.07035	-0.67208
R3	1.25399	-0.70806	-0.40150	-0.32552	0.49328	0.31184
R4	-0.59724	0.62604	0.86295	-0.30650	0.87261	-0.56055
R5	-0.26763	0.51242	-0.42665	-0.17418	-0.78493	1.00028
U1	-0.18413	-0.16013	-0.24472	0.70571	0.21522	0.33144
U2	0.48844	0.07323	0.37472	0.12144	-0.43640	0.12871
U3	0.31485	0.06295	0.15733	-0.23970	-0.68182	-0.58779
U4	-0.35899	-0.46305	0.60941	0.47846	0.19456	0.44488
U5	-0.10161	-0.05530	-0.45910	-0.10993	0.33700	0.05738

Table 6.130 - Females - Variables: R1 to U5

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
R3	0.74147*	0.34663	0.05803	0.06202	0.39942	0.30472
U3	0.41784*	0.12617	0.26518	0.30623	-0.36219	-0.09757
R5	0.21570	0.68354*	0.03501	-0.03291	-0.04318	0.63613
R2	0.39489	0.65303*	-0.12712	0.51203	0.13358	-0.14357
R4	0.26151	0.63139*	0.43531	-0.01959	0.43929	0.26787
R1	0.34067	0.36764*	0.09837	0.12668	0.28666	0.28196
U2	0.50976	0.19349	0.54371*	0.26062	-0.20026	0.31244
U1	0.12787	0.05944	-0.02663	0.75913*	0.16902	0.28457
U4	0.21488	0.06664	0.47216	0.52224*	0.01787	0.26977
U5	0.12217	0.01553	-0.17208	0.16091	0.06218	0.18175*

Table 6.131 - Females - Variables: R1 to U5

Code Group
 0 - Controls
 1 - Psoriasis
 2 - Atopic Eczema
 3 - BCC
 5 - Alopecia areata
 6 - Actinic Keratosis
 7 - Vitiligo

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

GROUP	0	1	2	3	5	6
1	5.9188 0.0000					
2	4.2907 0.0000	1.2011 0.2900				
3	4.9204 0.0000	2.7532 0.0034	2.1317 0.0243			
5	5.3293 0.0000	2.8425 0.0025	2.3926 0.0109	2.0041 0.0356		
6	13.138 0.0000	8.1358 0.0000	7.0214 0.0000	6.0455 0.0000	4.0315 0.0000	
7	5.8835 0.0000	5.3549 0.0000	3.3648 0.0004	4.7176 0.0000	4.0556 0.0000	5.1273 0.0000

Table 6.132 - Females - Variables: R1 to U5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
-----		-----	-----	-----	-----	-----	-----	-----	-----
GROUP	0	202	75 37.1%	31 15.3%	8 4.0%	28 13.9%	21 10.4%	15 7.4%	24 11.9%
GROUP	1	205	39 19.0%	58 28.3%	12 5.9%	14 6.8%	19 9.3%	39 19.0%	24 11.7%
GROUP	2	203	39 19.2%	43 21.2%	11 5.4%	27 13.3%	19 9.4%	36 17.7%	28 13.8%
GROUP	3	202	38 18.8%	36 17.8%	9 4.5%	44 21.8%	23 11.4%	35 17.3%	17 8.4%
GROUP	5	206	43 20.9%	33 16.0%	10 4.9%	25 12.1%	35 17.0%	40 19.4%	20 9.7%
GROUP	6	172	14 8.1%	16 9.3%	8 4.7%	18 10.5%	23 13.4%	78 45.3%	15 8.7%
GROUP	7	205	37 18.0%	28 13.7%	6 2.9%	19 9.3%	25 12.2%	39 19.0%	51 24.9%

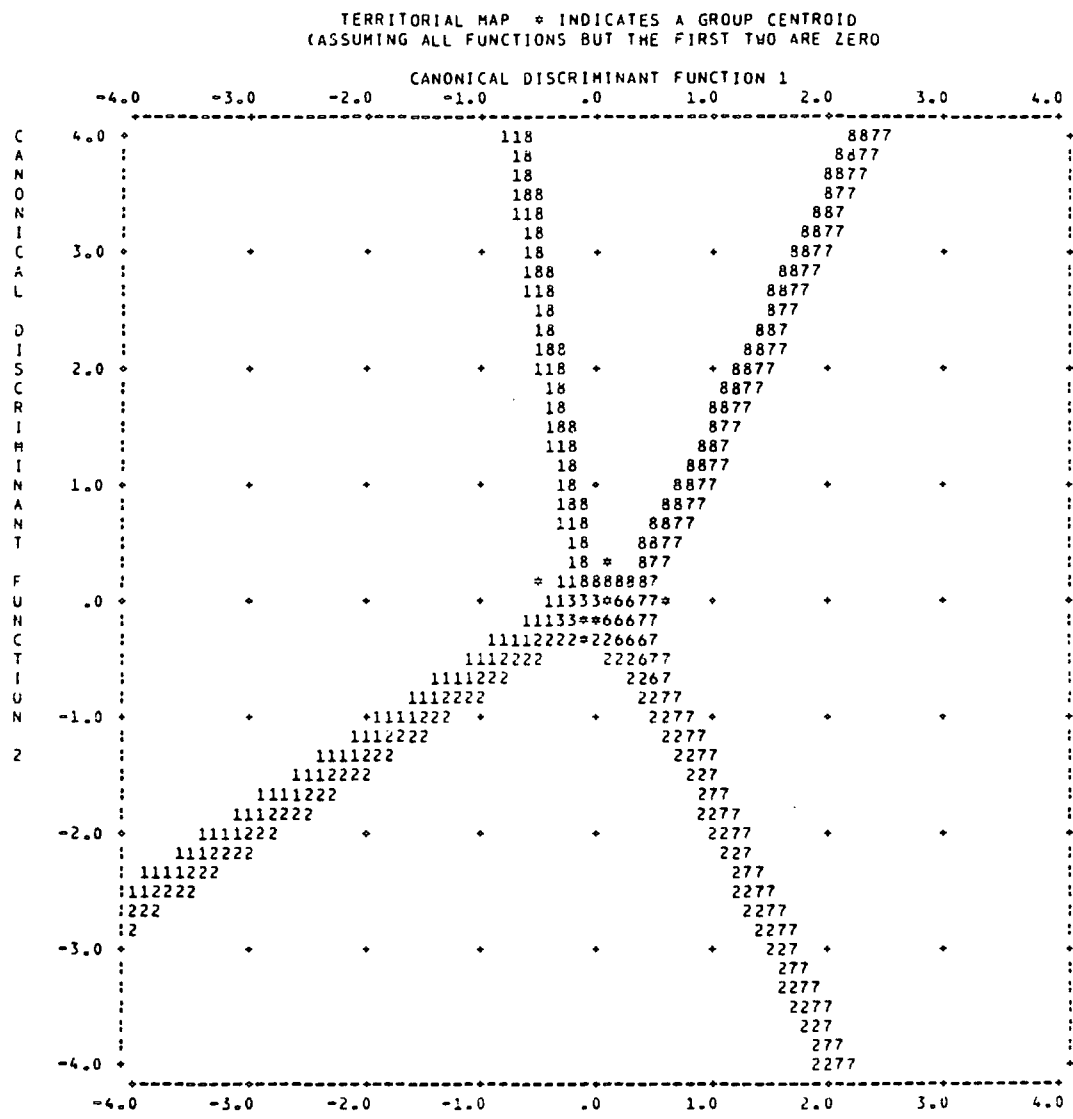
PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 25.23%

The results of Discriminant Function Analysis for female subjects are shown in Tables 6.128 to 6.132 and in Figures 6.40 to 6.42. The canonical discriminant functions shown in Table 6.128 show that Functions 1 and 2 account for 72.16% of the variance. The radial counts appear to be the most important variables for discriminating purposes. They make up the most part of both Function 1 and 2 with only U3 occurring in the first six most important variables (Table 6.139). The F Statistics and intergroup significances shown in Table 6.131 point to the fact that controls and actinic keratosis subjects show the greatest differences between other groups. Indeed between controls and actinic keratosis the intergroup difference is the greatest ($F = 13.138$). These differences are shown in Figure 6.40 and also by the group centroid relationships which are shown in Figure 6.42. Actinic keratosis and controls are the furthest apart with vitiligo and psoriasis being well separated in the other direction. There are, however, four groups clustered together. Classification results show that there is 25.23% correct classification of cases. The best classification occurred in actinic keratosis (45.3%) and controls (37.1%).

When the groups were reclassified using the disease aetiology as the criterion no significant differences were found for male subjects apart from summed ulnar counts on finger V. Here controls were found to have a higher count which was statistically significantly different from that found for Genodermatoses (GD) and highly significantly larger than the count found for ND males.

For females smaller summed radial counts were found in controls on fingers I and III. On finger I the radial count was statistically lower than that found in GD and ND and on finger II the difference was found to be statistically highly significant. For ulnar counts again lower values were found in controls on fingers II, III and IV which were highly significantly smaller compared to ND for all fingers and for finger II compared to GD. The differences were statistically significant for fingers III and IV in comparison to GD. When ND and GD females were compared significantly higher values were found on fingers II and III in ND females for radial count and on fingers I and III for ulnar count, see Tables 6.133 and 6.134.

Figure 6.40 - Females - Variables: R1 to U5



Code Group

1 - Controls

2 -- Psoriasis

3 -- Atopic Eczema

4 -- BCC

6 -- Alopecia areata

7 - Actinic Keratosis

8 - Vitiligo

Table 6.133

Means and Standard Deviations

Summed Radial and Ulnar Counts : Subjects grouped by disorder type.

Group	Sex	No	R1		R2		R3		R4		R5	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Cont	M	206	37.723 +/-	9.633	20.102 +/-	12.979	26.864 +/-	11.065	31.864 +/-	12.095	27.883 +/-	9.330
GD	M	816	38.586 +/-	8.317	19.996 +/-	14.389	28.901 +/-	10.093	33.194 +/-	9.114	27.217 +/-	7.219
ND	M	340	38.435 +/-	7.401	21.465 +/-	13.442	29.209 +/-	9.156	33.226 +/-	7.731	27.056 +/-	5.923
Cont	F	203	32.493 +/-	10.073	18.502 +/-	11.791	22.906 +/-	10.000	29.217 +/-	10.055	24.714 +/-	8.212
GD	F	819	34.554 +/-	9.397	18.327 +/-	13.848	26.171 +/-	10.721	30.254 +/-	10.406	24.322 +/-	7.815
ND	F	374	35.059 +/-	8.047	21.064 +/-	12.685	27.845 +/-	9.576	29.564 +/-	8.636	24.417 +/-	6.428

Group	Sex	No	U1		U2		U3		U4		U5	
			Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
Cont	M	206	13.743 +/-	16.028	14.087 +/-	15.304	5.495 +/-	11.356	12.184 +/-	14.694	3.330 +/-	7.596
GD	M	816	13.763 +/-	16.112	16.105 +/-	14.254	4.920 +/-	11.342	11.349 +/-	14.139	2.931 +/-	7.965
ND	M	340	13.868 +/-	15.944	14.874 +/-	13.708	6.006 +/-	11.782	12.856 +/-	14.180	1.774 +/-	6.163
Cont	F	203	8.709 +/-	12.217	9.350 +/-	11.748	2.719 +/-	7.360	6.961 +/-	11.230	1.532 +/-	4.776
GD	F	819	9.853 +/-	14.122	13.896 +/-	14.191	4.792 +/-	10.607	10.055 +/-	13.894	1.726 +/-	5.884
ND	F	374	11.647 +/-	14.518	14.674 +/-	13.894	6.160 +/-	11.789	10.289 +/-	12.907	2.217 +/-	6.353

Table 6.134

Mann-Whitney U Test Results

Summed Radial Counts - Subjects grouped by disorder type
and Ulnar Counts.

			Variables and Probabilities (** = Highly significant, * = Significant)				
Sex	Gp 1	Gp 2	R1	R2	R3	R4	R5
M	Cont	GD	0.4599	0.8361	0.0604	0.7837	0.1582
M	Cont	ND	0.9790	0.3137	0.0891	0.8839	0.0768
M	GD	ND	0.3674	0.1224	0.9140	0.3732	0.3045
F	Cont	GD	0.0167*	0.9290	0.0000**	0.1805	0.3271
F	Cont	ND	0.0102*	0.0111*	0.0000**	0.9080	0.2395
F	GD	ND	0.6655	0.0016**	0.0256*	0.0978	0.8037

			Variables and Probabilities (** = Highly significant, * = Significant)				
Sex	Gp 1	Gp 2	U1	U2	U3	U4	U5
M	Cont	GD	0.8125	0.0714	0.2093	0.2741	0.0334*
M	Cont	ND	0.9120	0.4450	0.9357	0.6817	0.0041**
M	GD	ND	0.9234	0.2135	0.1172	0.0560	0.2423
F	Cont	GD	0.9378	0.0001**	0.0149*	0.0236*	0.9809
F	Cont	ND	0.0714	0.0000**	0.0003**	0.0032**	0.4261
F	GD	ND	0.0337*	0.3697	0.0385*	0.3198	0.2768

(V) Summed Radial and Ulnar Counts (RFR - TFU)

For male subjects, actinic keratosis patients were found to have the highest mean radial count of all of the groups on both hands when taken separately and when the two counts from both hands were combined (see Table 6.135). The counts for actinic keratosis male subjects were significantly higher in comparison to controls and BCC (highly significant) for the right hand; to psoriasis, alopecia areata, BCC (all highly significant) and vitiligo on the left hand; and to alopecia areata, BCC (both highly significant), controls and psoriasis for both hands combined. BCC male subjects were found to have statistically significantly lower radial counts on the left hand in comparison to vitiligo and on both hands individually and combined when compared to atopic eczema and actinic keratosis (highly significant). Alopecia areata male sufferers were found to have statistically highly significantly lower radial counts on the left hand and for both hands combined when compared to actinic keratosis and to atopic eczema (significant for TFR). Atopic eczema males showed higher radial counts on both hands individually and combined in comparison to vitiligo. The difference was statistically significant for LFU and TFU and highly significant for RFU.

For female subjects vitiligo patients had the highest summed radial counts which were highly significantly larger for both hands individually and combined, than those found in atopic eczema and psoriasis; and for left hand and both hands combined, in comparison to controls, BCC and alopecia areata. Psoriasis sufferers had the smallest radial counts which were found to be statistically smaller in comparison to BCC, vitiligo, alopecia areata and actinic keratosis for both hands individually and combined. In addition actinic keratosis females were found to have statistically significantly higher radial summed counts in comparison to controls and psoriasis for right hand, left hand and both hands combined, and to atopic eczema, alopecia areata and BCC patients, for left hands and both hands combined.

For ulnar counts, control females were found to have highly significantly lower mean values on right hand, left hand and both hands combined, when compared to atopic eczema, vitiligo and

Table Summed Ulnar and Radial Counts
6.135(a)

Means and Standard Deviations

(a) Males

		Variables					
		RFR		LFR		TFR	
Group	Cases	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.
Control	203	72.840 +/- 22.120		71.597 +/- 23.663		144.437 +/- 44.375	
Psoriasis	205	74.342 +/- 20.554		71.965 +/- 19.707		146.507 +/- 38.872	
Atop Ecz	203	77.064 +/- 21.000		75.335 +/- 19.962		152.399 +/- 39.758	
Vitiligo	205	76.025 +/- 20.757		72.761 +/- 20.412		148.786 +/- 39.038	
Alop Are	206	74.333 +/- 20.747		69.981 +/- 20.775		144.314 +/- 39.825	
BCC	202	73.152 +/- 18.215		71.626 +/- 19.585		144.777 +/- 35.956	
Act Ker	174	78.829 +/- 17.870		78.109 +/- 16.131		156.938 +/- 32.277	

		Variables					
		RFU		LFU		TFU	
Group	Cases	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.
Control	203	26.850 +/- 28.121		21.990 +/- 25.020		48.840 +/- 51.066	
Psoriasis	205	24.827 +/- 24.612		24.781 +/- 25.772		49.701 +/- 48.830	
Atop Ecz	203	29.419 +/- 27.332		24.734 +/- 26.287		54.153 +/- 51.565	
Vitiligo	205	23.488 +/- 26.025		20.315 +/- 23.122		43.710 +/- 47.125	
Alop Are	206	25.433 +/- 26.236		23.252 +/- 24.487		48.686 +/- 49.351	
BCC	202	26.095 +/- 23.894		22.725 +/- 23.270		48.820 +/- 45.258	
Act Ker	174	26.783 +/- 25.184		23.504 +/- 24.067		50.287 +/- 47.337	

Table 6.136(b) Mann-Whitney U Test

Summed Radial and Ulnar Counts

Females

		Variables and Probability (* = significant ** = highly significant)					
Group 1	Group 2	RFR	LFR	TFR	RFU	LFU	TFU
Control	Psoriasis	0.1316	0.2261	0.1559	0.0884	0.2113	0.1545
Control	Atop Ecz	0.6108	0.4921	0.5214	0.0013**	0.0026**	0.0021**
Control	Vitiligo	0.0000	0.0000**	0.0000**	0.0000**	0.0004**	0.0000**
Control	Alop Are	0.0695	0.1480	0.0739	0.1989	0.4464	0.3779
Control	BCC	0.7062	0.5565	0.6817	0.0001**	0.0783	0.0014**
Control	Act Ker	0.0000**	0.0000**	0.0000**	0.0010**	0.0012**	0.0012**
Psoriasis	Atop Ecz	0.0683	0.0899	0.0748	0.1554	0.0867	0.1018
Psoriasis	Vitiligo	0.0000**	0.0000**	0.0000**	0.0052**	0.0192*	0.0068**
Psoriasis	Alop Are	0.0018**	0.0114*	0.0024**	0.7528	0.5426	0.6297
Psoriasis	BCC	0.0487*	0.0927	0.0514	0.0381*	0.5761	0.0910
Psoriasis	Act Ker	0.0000**	0.0000**	0.0000**	0.0675	0.0431*	0.0485*
Atop Ecz	Vitiligo	0.0000**	0.0007**	0.0001**	0.1642	0.4244	0.2362
Atop Ecz	Alop Are	0.2663	0.5132	0.3130	0.0586	0.0208*	0.0327*
Atop Ecz	BCC	0.9607	0.4057	0.9790	0.5651	0.3013	0.9641
Atop Ecz	Act Ker	0.0007	0.0016**	0.0006**	0.5815	0.5943	0.5811
Vitiligo	Alop Are	0.0006	0.0020**	0.0009**	0.0015**	0.0031**	0.0015**
Vitiligo	BCC	0.0000**	0.0002**	0.0000**	0.4098	0.0803	0.2499
Vitiligo	Act Ker	0.2367	0.6001	0.3976	0.5064	0.8314	0.6327
Alop Are	BCC	0.1424	0.3648	0.1894	0.0127*	0.2513	0.0250*
Alop Are	Act Ker	0.0225*	0.0042**	0.0068**	0.0412*	0.0091**	0.0195*
BCC	Act Ker	0.0001**	0.0003**	0.0001**	0.9958	0.1413	0.6876

Table 6.135(b)

(b) Females

		Variables					
		RFR		LFR		TFR	
Group	Cases	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.
Control	203	65.064 +/- 20.733		62.768 +/- 20.098		127.833 +/- 38.994	
Psoriasis	205	62.610 +/- 21.171		60.341 +/- 21.538		122.951 +/- 41.639	
Atop Ecz	203	66.360 +/- 22.164		63.783 +/- 23.930		130.143 +/- 45.356	
Vitiligo	205	75.717 +/- 21.342		71.620 +/- 21.501		147.337 +/- 41.518	
Alop Are	206	68.238 +/- 21.712		65.811 +/- 20.022		134.049 +/- 40.263	
BCC	202	66.475 +/- 19.392		64.495 +/- 19.668		130.970 +/- 37.702	
Act Ker	174	74.057 +/- 18.179		71.603 +/- 17.576		145.661 +/- 34.382	

		Variables					
		RFU		LFU		TFU	
Group	Cases	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.
Control	203	14.640 +/- 17.118		14.631 +/- 19.024		29.271 +/- 33.496	
Psoriasis	205	18.668 +/- 20.520		17.068 +/- 20.366		35.737 +/- 39.237	
Atop Ecz	203	21.453 +/- 21.918		20.291 +/- 21.921		41.744 +/- 42.057	
Vitiligo	205	25.141 +/- 24.290		23.093 +/- 24.217		48.234 +/- 46.248	
Alop Are	206	19.359 +/- 29.000		16.257 +/- 20.837		35.617 +/- 45.753	
BCC	202	22.966 +/- 23.201		19.173 +/- 22.236		42.079 +/- 42.863	
Act Ker	174	24.966 +/- 26.044		23.155 +/- 25.145		48.121 +/- 49.923	

Table Mann-Whitney U Test
6.136(a)
Summed Radial and Ulnar Counts

Males

		Variables and Probability (* = significant ** = highly significant)					
Group 1	Group 2	RFR	LFR	TFR	RFU	LFU	TFU
Control	Psoriasis	0.4417	0.8578	0.7674	0.8919	0.3485	0.5128
Control	Atop Ecz	0.0543	0.1343	0.0843	0.0782	0.0979	0.0659
Control	Vitiligo	0.1259	0.6827	0.3939	0.2816	0.5689	0.4422
Control	Alop Are	0.5046	0.3799	0.8295	0.9042	0.3745	0.7521
Control	BCC	0.8834	0.7951	0.6958	0.5169	0.6332	0.3730
Control	Act Ker	0.0232*	0.0294*	0.0235*	0.4409	0.3364	0.2959
Psoriasis	Atop Ecz	0.2687	0.0676	0.1186	0.0697	0.6562	0.2307
Psoriasis	Vitiligo	0.4401	0.5378	0.5396	0.2307	0.1256	0.1609
Psoriasis	Alop Are	0.8364	0.4356	0.6715	0.8522	0.8096	0.7662
Psoriasis	BCC	0.2474	0.9396	0.3907	0.4499	0.6008	0.8266
Psoriasis	Act Ker	0.1002	0.0085**	0.0384*	0.3867	0.9943	0.6104
Atop Ecz	Vitiligo	0.6681	0.2283	0.3225	0.0040**	0.0396*	0.0065**
Atop Ecz	Alop Are	0.1791	0.0088**	0.0316*	0.0553	0.5231	0.1145
Atop Ecz	BCC	0.0138*	0.0428*	0.0147*	0.2930	0.3440	0.2888
Atop Ecz	Act Ker	0.5825	0.3330	0.5000	0.4485	0.7299	0.5554
Vitiligo	Alop Are	0.3451	0.1725	0.2547	0.3044	0.1490	0.2562
Vitiligo	BCC	0.0453*	0.4382	0.1386	0.0541	0.2590	0.0831
Vitiligo	Act Ker	0.3647	0.0424*	0.1092	0.0691	0.1352	0.0631
Alop Are	BCC	0.3062	0.5158	0.7955	0.3651	0.7396	0.6196
Alop Are	Act Ker	0.0699	0.0011**	0.0085**	0.3470	0.8950	0.4397
BCC	Act Ker	0.0057**	0.0056**	0.0039**	0.8767	0.6030	0.7311

actinic keratosis, and for right hand and both hands combined in comparison to BCC. Actinic keratosis females had significantly higher summed ulnar counts, for right, left and both hands, in comparison to alopecia areata and controls, and for left hand and both hands combined when compared to psoriasis. Alopecia areata females were found to have significantly lower mean summed ulnar counts, for right, left and both hands combined, in comparison to actinic keratosis and vitiligo, for right hand and both combined in comparison to BCC and for left hand and both hands combined when compared to atopic eczema (see Table 6.135(b)).

Table 6.138 shows a summary of the statistical differences. Males show 20/126 and females 60/126. The greatest number of differences for male subjects was shown by actinic keratosis (11) and atopic eczema (8). For females the greatest numbers of differences were shown by actinic keratosis and vitiligo (both 23) followed by alopecia areata (19) and then psoriasis and controls (both 16).

When the groups were reclassified using the criterion of aetiology of disorder no significant differences were found for male subjects from Mann-Whitney U Test comparisons (Table 6.140). For female subjects, however, highly significantly larger counts were found in ND females in comparison to controls for both radial and ulnar summed counts on both hands individually and also when combined.

Table 6.137 - Summary Table of Significant Differences from Mann-Whitney U Tests: Summed Radial and Ulnar Counts

(a) Males

(i) Radial Counts

RFR		LFR		TFR	
SIG.	H.SIG.	SIG.	H.SIG.	SIG.	H.SIG.
Cont:A.Ker A.Ecz:BCC Vit. :BCC	BCC :A.Ker	A.Ecz:BCC Vit.:A.ker	Psor:A.Ker A.Ecz:Alop Alop:A.Ker BCC:A.Ker	Cont:A.Ker Psor:A.Ker A.Ecz:Alop A.Ecz:BCC	Alop:A.Ker BCC :A.Ker

Table 6.137 continued

(a) Males

(ii) Ulnar Counts

RFU		LFU		TFU	
SIG.	H.SIG.	SIG.	H.SIG.	SIG.	H.SIG.
	A.Ecz:Vit	A.Ecz:Vit		A.Ecz:Vit	

Table 6.137 - (b) Females

(i) Radial Counts

RFR		LFR		TFR	
SIG.	H.SIG.	SIG.	H.SIG.	SIG.	H.SIG.
Psor:BCC	Cont:A.Ker Psor:Vit Psor :Alop Psor:A.Ker A.Ecz:Vit	Psor:Alop	Cont:Vit Cont:A.Ker Psor:Vit Psor:A.Ker A.Ecz:Vit A.Ecz:AKer Vit:Alop Vit:BCC Alop:AKer BCC:A.Ker		Cont:Vit Cont:A.Ker Psor:Vit Psor:Alop Psor:A.Ker A.Ecz:Vit A.Ecz:AKer Vit:Alop Vit:BCC Alop:A.Ker BCC:A.Ker

(ii) Ulnar Counts

RFU		LFU		TFU	
SIG.	H.SIG.	SIG.	H.SIG.	SIG.	H.SIG.
Psor:BCC Alop:BCC Alop:A.Ker	Cont:A.Ecz Cont:Vit Cont:BCC Cont:A.Ker Psor:Vit Vit :Alop	Psor:Vit Psor:A.Ker A.Ecz:Alop	Cont:A.Ecz Cont:Vit Cont:A.Ker Vit :Alop Alop:A.Ker	Psor:A.Ker A.Ecz:Alop Alop:BCC Alop:A.Ker	Cont:A.Ecz Cont:Vit Cont:BCC Cont:A.Ker Psor:Vit Vit :Alop

Table 6.138 - Summary of significant results from Mann-Whitney U Tests

Variables: RFR - TFU

(a) Males

Alop.	0					
Psor.	0	0				
A.Ecz.	3	2	0			
A.Ker.	1	2	2	0		
BCC	1	0	0	3	3	
Cont.	0	0	0	0	3	0

Vit.	Alop.	Psor.	A.Ecz.	A.Ker.	BCC

(b) Females

Alop.	6					
Psor.	6	3				
A.Ecz.	3	2	0			
A.Ker.	0	6	5	3		
BCC	3	2	2	0	3	
Cont.	5	0	0	3	6	2

Vit.	Alop.	Psor.	A.Ecz.	A.Ker.	BCC

Female genodermatoses (GD) subjects were found to have highly significantly greater summed ulnar counts on both hands individually and also when the counts from both hands were combined in comparison to control females (Tables 6.139 and 6.140).

Table Means and Standard Deviations
6.139

Summed Ulnar and Radial Counts

Subjects grouped by Disorder Type

Group	Sex	No	RFR		LFR		TFR	
			Mean	SD	Mean	SD	Mean	SD
Cont	M	206	72.840 +/- 22.120		71.597 +/- 23.663		144.437 +/- 44.375	
GD	M	816	75.431 +/- 20.760		72.490 +/- 20.279		147.972 +/- 39.423	
ND	M	340	75.306 +/- 18.268		74.085 +/- 18.598		149.391 +/- 35.059	
Cont	F	203	65.064 +/- 20.733		62.768 +/- 20.098		127.833 +/- 38.994	
GD	F	819	68.236 +/- 22.195		65.393 +/- 22.128		133.629 +/- 43.073	
ND	F	374	70.053 +/- 19.219		67.896 +/- 19.014		137.949 +/- 36.903	

Group	Sex	No	RFU		LFU		TFU	
			Mean	SD	Mean	SD	Mean	SD
Cont	M	206	26.850 +/- 28.121		21.990 +/- 25.020		48.840 +/- 51.066	
GD	M	816	25.795 +/- 26.118		23.278 +/- 24.966		49.077 +/- 49.300	
ND	M	340	26.356 +/- 24.356		23.021 +/- 23.543		49.376 +/- 45.994	
Cont	F	203	14.640 +/- 17.118		14.631 +/- 19.084		29.271 +/- 33.496	
GD	F	819	21.153 +/- 24.247		19.171 +/- 22.013		40.324 +/- 43.655	
ND	F	374	23.898 +/- 24.591		21.088 +/- 23.718		44.987 +/- 46.381	

Table Mann-Whitney U Test Results : Summed Absolute Counts
6.140
Subjects Grouped by Disorder Type

Sex	Gp 1	Gp 2	Probabilities for Variables					
			RFR	LFR	TFR	RFU	LFU	TFU
M	Cont	GD	0.2331	0.9081	0.6503	0.9189	0.4287	0.6850
M	Cont	ND	0.5079	0.5962	0.6403	0.6143	0.4984	0.3793
M	GD	ND	0.4535	0.3391	0.9793	0.2852	0.9631	0.4561
F	Cont	GD	0.0562	0.0793	0.0552	0.0007**	0.0063**	0.0025**
F	Cont	ND	0.0094**	0.0043**	0.0049**	0.0000**	0.0038**	0.0002**
F	GD	ND	0.2946	0.1393	0.1790	0.0995	0.4535	0.1428

(vi) Summed Unilateral Ridge Counts (F1 to F5)

Atopic eczema male subjects were found to have an increased unilateral ridge count on finger I which was significantly greater in comparison to psoriasis and actinic keratosis and highly significantly greater when compared to controls, vitiligo and alopecia areata. Actinic keratosis males were found to have a statistically significantly higher count for finger I in comparison to vitiligo and to atopic eczema male subjects and for finger II in comparison to BCC males. On finger III actinic keratosis males again had an increased count which was significantly different from psoriasis and vitiligo and highly significantly different from controls and BCC. Atopic eczema males showed a statistically significantly higher summed unilateral ridge count on finger III in comparison to BCC and to controls (see Table 6.141(a)).

On finger IV atopic eczema male subjects were found to have a statistically increased count in comparison to psoriasis, alopecia areata and to BCC (highly significant). BCC subjects were found to have a highly significantly lower count on finger IV in comparison to atopic eczema and actinic keratosis, and a significantly lower count compared to vitiligo male subjects (Tables 6.141, 6.142 and 6.143). On finger V BCC male subjects were found to have a statistically significantly lower summed unilateral ridge count in comparison to controls, atopic eczema, actinic keratosis and to vitiligo (highly significant). Vitiligo males were found to have a highly significant larger summed unilateral count in comparison to psoriasis and BCC and a significantly higher count compared to alopecia areata for finger V.

In female subjects vitiligo patients were found to have highly significantly larger summed unilateral ridge counts on all fingers compared to all of the other groups. Many other highly significant differences were found and these are shown in Table 6.143. The summary table of statistical differences (Table 6.144) shows that female subjects were found to have 51/105 differences compared with 26/105 in males. Female vitiligo patients were found to show the largest numbers of differences (23) followed, in decreasing order of differences shown, by psoriasis (17), actinic keratosis (16),

BCC (14), alopecia areata (13), controls (12) and atopic eczema (7). For male subjects atopic eczema patients showed the largest number of intergroup significant differences (12) followed by BCC (11) and actinic keratosis (9).

The χ^2 test showed that the number of significant differences were too great to have occurred by chance alone. When the groups were reclassified no significant differences were found for male subjects but for females controls were found to have a decreased summed unilateral ridge count which was highly significantly different from the counts found in GD and ND for finger III and ND for finger II. The count found in controls was also found to be statistically significantly lower in comparison to ND on finger I and GD on finger II.

Table Means and Standard Deviations
6.141
Summed Unilateral Finger Ridge Counts

(a) Males

		Variables									
		F1		F2		F3		F4		F5	
Group	Cases	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Control	206	38.209 +/- 9.777		25.417 +/- 12.798		27.456 +/- 11.221		32.558 +/- 11.879		27.966 +/- 9.409	
Psoriasis	202	39.050 +/- 8.238		26.114 +/- 11.382		29.109 +/- 9.492		32.748 +/- 8.617		26.540 +/- 6.788	
Atop Ecz	203	40.970 +/- 7.790		27.340 +/- 12.985		30.246 +/- 10.077		34.700 +/- 9.169		27.936 +/- 7.123	
Vitiligo	201	37.557 +/- 8.498		26.871 +/- 11.595		28.885 +/- 9.677		33.950 +/- 8.825		28.348 +/- 7.769	
Alop Are	210	38.105 +/- 8.472		26.443 +/- 10.931		29.190 +/- 10.494		32.562 +/- 9.773		26.733 +/- 7.323	
BCC	211	38.156 +/- 7.875		26.005 +/- 10.212		28.355 +/- 9.108		32.488 +/- 8.220		26.502 +/- 6.435	
Act Ker	129	39.775 +/- 6.185		28.403 +/- 10.312		31.651 +/- 8.310		35.256 +/- 6.351		28.101 +/- 4.908	

(b) Females

		Variables									
		F1		F2		F3		F4		F5	
Group	Cases	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Control	206	33.103 +/- 10.058		22.025 +/- 11.415		23.158 +/- 10.106		29.818 +/- 10.094		24.793 +/- 8.259	
Psoriasis	202	33.034 +/- 10.968		21.171 +/- 12.268		24.424 +/- 10.478		28.498 +/- 10.362		22.351 +/- 7.445	
Atop Ecz	203	34.813 +/- 9.883		23.926 +/- 12.422		25.493 +/- 11.394		29.709 +/- 10.407		24.330 +/- 8.175	
Vitiligo	201	36.668 +/- 7.815		28.029 +/- 12.273		29.195 +/- 9.734		33.780 +/- 11.267		26.312 +/- 8.067	
Alop Are	210	34.636 +/- 8.427		24.146 +/- 11.909		27.447 +/- 11.344		30.238 +/- 10.572		24.704 +/- 8.261	
BCC	211	34.257 +/- 8.419		23.787 +/- 11.356		26.064 +/- 9.381		28.772 +/- 8.511		23.589 +/- 6.648	
Act Ker	129	36.511 +/- 7.552		28.017 +/- 9.752		30.759 +/- 9.179		31.420 +/- 8.333		25.483 +/- 5.929	

Table 6.142(a) Mann-Whitney U test Results
Summed Unilateral Finger Ridge Counts

Males

		Variables and Probability (* = significant ** = highly significant)				
Group 1	Group 2	F1	F2	F3	F4	F5
Control	Psoriasis	0.3940	0.5862	0.2284	0.5114	0.0904
Control	Atop Ecz	0.0028**	0.1990	0.0216*	0.2197	0.9579
Control	Vitiligo	0.2627	0.2520	0.2915	0.5879	0.5841
Control	Alop Are	0.8635	0.5349	0.1201	0.5475	0.1278
Control	BCC	0.5133	0.8600	0.7530	0.2409	0.0426*
Control	Act Ker	0.3347	0.0555	0.0016**	0.2570	0.8568
Psoriasis	Atop Ecz	0.0194*	0.4432	0.2040	0.0348*	0.0541
Psoriasis	Vitiligo	0.0394	0.5050	0.8994	0.1570	0.0062**
Psoriasis	Alop Are	0.2257	0.9736	0.5901	0.9524	0.7864
Psoriasis	BCC	0.1057	0.6399	0.2922	0.4537	0.5744
Psoriasis	Act Ker	0.9332	0.1211	0.0223*	0.0770	0.1125
Atop Ecz	Vitiligo	0.0000**	0.8891	0.2112	0.4316	0.4365
Atop Ecz	Alop Are	0.0004**	0.4187	0.5397	0.0375*	0.0854
Atop Ecz	BCC	0.0001**	0.1842	0.0253*	0.0041**	0.0129*
Atop Ecz	Act Ker	0.0386*	0.4333	0.2334	0.8893	0.7789
Vitiligo	Alop Are	0.3773	0.5388	0.4694	0.1748	0.0178*
Vitiligo	BCC	0.6563	0.2409	0.4116	0.0345*	0.0013**
Vitiligo	Act Ker	0.0328*	0.3490	0.0186*	0.5674	0.2334
Alop Are	BCC	0.6354	0.5780	0.1385	0.5439	0.4818
Alop Are	Act Ker	0.1974	0.1441	0.0914	0.0667	0.2110
BCC	Act Ker	0.0759	0.0433*	0.0016**	0.0083**	0.0209*

Table 6.142(b)
Mann-Whitney U Test Results
Summed Unilateral Finger Ridge Counts

Females

		Variables and Probability (* = significant ** = highly significant)				
Group 1	Group 2	F1	F2	F3	F4	F5
Control	Psoriasis	0.7926	0.5529	0.1928	0.2186	0.0005**
Control	Atop Ecz	0.1076	0.1004	0.0151*	0.9187	0.4026
Control	Vitiligo	0.0012**	0.0000**	0.0000**	0.0001**	0.1156
Control	Alop Are	0.2973	0.0617	0.0000**	0.9054	0.4336
Control	BCC	0.5432	0.1266	0.0053**	0.0942	0.0154*
Control	Act Ker	0.0019**	0.0000**	0.0000**	0.1203	0.7677
Psoriasis	Atop Ecz	0.0753	0.0289*	0.2551	0.3053	0.0131*
Psoriasis	Vitiligo	0.0009**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Alop Are	0.1723	0.0193*	0.0019**	0.1606	0.0044**
Psoriasis	BCC	0.3474	0.0487*	0.1917	0.7432	0.2426
Psoriasis	Act Ker	0.0015**	0.0000**	0.0000**	0.0061**	0.0000**
Atop Ecz	Vitiligo	0.1303	0.0012**	0.0003**	0.0001**	0.0148*
Atop Ecz	Alop Are	0.5522	0.9180	0.0691	0.7580	0.8918
Atop Ecz	BCC	0.2912	0.7750	0.9526	0.1297	0.1559
Atop Ecz	Act Ker	0.1742	0.0018**	0.0000**	0.1072	0.1957
Vitiligo	Alop Are	0.0262*	0.0002**	0.0408*	0.0001**	0.0181*
Vitiligo	BCC	0.0068**	0.0002**	0.0001**	0.0000**	0.0001**
Vitiligo	Act Ker	0.8932	0.8264	0.1648	0.0085	0.1595
Alop Are	BCC	0.5739	0.7029	0.0357*	0.0768	0.0784
Alop Are	Act Ker	0.0338*	0.0008**	0.0005**	0.1708	0.2444
BCC	Act Ker	0.0100*	0.0002**	0.0000**	0.0008**	0.0014**

Table 6.143 - Statistically significant differences from Mann-Whitney
U Test intergroup comparison: Variables F1 to F5

VARIABLE	MALES		FEMALES	
	SIG.	H.SIG.	SIG.	H.SIG.
F1	Psor. : A.Ecz. A.Ker.: A.Ecz. A.Ker.: Vit.	Cont. : A.Ecz. Vit. : A.Ecz. Alop. : A.Ecz.	Vit. : A.Ecz.	Vit. : Cont. A.Ker.: Cont. Vit. : Psor. A.Ker.: Psor. Vit. : A.Ecz. Vit. : Alop. Vit. : BCC. Alop. : A.Ker. BCC : A.Ker.
F2	BCC : A.Ker.		Psor. : A.Ecz. Psor. : Alop. Psor. : BCC	Cont. : Vit. Cont. : A.Ker. Psor. : Vit. Psor. : A.Ker. A.Ecz.: Vit. A.Ecz.: A.Ker. Vit. : Alop. Vit. : BCC Alop. : A.Ker. BCC : A.Ker.
F3	Cont. : A.Ecz. Psor. : A.Ker. A.Ecz.: BCC Vit. : A.Ker.	Cont. : A.Ker. BCC : A.Ker.	Cont. : A.Ecz. Vit. : Alop.	Cont. : Vit. Cont. : Alop. Cont. : BCC Cont. : A.Ker. A.Ker.: Alop. Psor. : Vit. Psor. : A.Ker. Psor. : Alop. A.Ecz.: Vit. A.Ecz.: A.Ker. Vit. : BCC A.Ker.: BCC
F4	Psor. : A.Ecz. Alop. : A.Ecz. Vit. : BCC	A.Ecz. : BCC BCC : A.Ker.		Cont. : Vit. Psor. : Vit. Psor. : A.Ker. A.Ecz.: Vit. Vit. : Alop. Vit. : BCC BCC : A.Ker.
F5	Cont. : BCC A.Ecz.: BCC Vit. : Alop. BCC : A.Ker.	Psor. : Vit. Vit. : BCC	Cont. : BCC Psor. : A.Ecz. A.Ecz.: Vit. Vit. : Alop.	Cont. : Psor. Psor. : Vit. Psor. : Alop. Psor. : A.Ker. Vit. : BCC BCC : A.Ker.

Table 6.144 - Summary Table of significant differences from
intergroup comparison using Mann-Whitney U Test - Variables F1 to F5

(a) Males

Alop.	1					
Psor.	2	0				
A.Ecz.	1	2	2			
A.Ker.	2	0	1	1		
BCC	2	0	0	4	4	
Cont.	0	0	0	2	1	1

Vit.
Alop.
Psor.
A.Ecz.
A.Ker.
BCC

(b) Females

Alop.	5					
Psor.	5	3				
A.Ecz.	4	0	2			
A.Ker.	0	3	5	0		
BCC	5	1	1	0	5	
Cont.	4	1	1	1	3	2

Vit.
Alop.
Psor.
A.Ecz.
A.Ker.
BCC

Table Means and Standard Deviations
6.145
Summed Unilateral Finger Ridge Counts
Subjects Grouped by Disorder Type

Group	Sex	No	F1		F2		F3		F4		F5	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Cont	M	206	38.209 +/-	9.777	25.417 +/-	12.798	27.456 +/-	11.221	32.558 +/-	11.879	27.966 +/-	9.409
GD	M	816	38.917 +/-	8.342	26.690 +/-	11.730	29.359 +/-	9.945	33.482 +/-	9.139	27.382 +/-	7.287
ND	M	340	38.771 +/-	7.313	26.915 +/-	10.301	26.606 +/-	8.946	33.538 +/-	7.675	27.109 +/-	5.946
Cont	F	203	33.103 +/-	10.058	22.022 +/-	11.415	23.158 +/-	10.106	29.818 +/-	10.094	24.793 +/-	8.259
GD	F	819	34.788 +/-	9.424	24.319 +/-	12.439	26.643 +/-	10.894	30.558 +/-	10.820	24.425 +/-	8.103
ND	F	374	35.369 +/-	7.994	25.821 +/-	10.799	28.321 +/-	9.497	29.944 +/-	8.512	24.495 +/-	6.371

Table 6.146
Mann-Whitney U Test Results
Summed Unilateral Finger Ridge Counts
Subjects Grouped by Disorder Type

			Variables and Probability				
Sex	Gp1	Gp2	F1	F2	F3	F4	F5
M	Cont	GD	0.5737	0.4724	0.1288	0.8950	0.2234
M	Cont	ND	0.8452	0.5166	0.1715	0.6027	0.0717
M	GD	ND	0.2842	0.9632	0.9344	0.4123	0.1600
F	Cont	GD	0.0713	0.0121*	0.0000**	0.3774	0.3147
F	Cont	ND	0.0309*	0.0002**	0.0000**	0.8254	0.2326
F	GD	ND	0.5522	0.0715	0.0289*	0.1373	0.8112

(vii) Summed Unilateral Counts (RFRC, LFRC, TFRC)

BCC male subjects were found to have decreased summed unilateral counts on both hands and for the two hands combined which were highly significantly smaller in comparison to BCC and actinic keratosis patients. In addition alopecia areata males were found to have a significantly smaller count on the left hand when compared to atopic eczema and to actinic keratosis males (see Tables 6.147(a) and 6.148(a)). Only 9/63 possible significant differences for intergroup comparisons using the Mann-Whitney U Test were found in male subjects (Table 6.149).

For female subjects 32/63 significant intergroup differences were found for variables RFRC, LFRC and TFRC. Vitiligo females were found to have highly significantly larger summed unilateral counts for both hands individually and for the two combined when compared to all groups apart from actinic keratosis females. Similarly actinic keratosis females had highly significantly larger counts in comparison to all groups apart from vitiligo. Psoriasis female subjects had the smallest values for each of the counts and significant differences were found in comparison to all groups except BCC and controls (Table 6.148(b)).

For male subjects Table 6.150 shows that Function 1 of discriminant analysis accounts for 70.04% of the variance and this function can be seen from Table 6.152 to have the left summed unilateral count (LFRC) as its most important variable. From Table 6.153 the most widely separated groups appear to be alopecia areata and actinic keratosis ($F = 6.1353$), alopecia areata and atopic eczema ($F = 5.6022$). The territorial map (Figure 6.43) shows actinic keratosis, BCC, alopecia areata and controls to be most widely separated. The group centroid relationships (Figure 6.45) show alopecia areata to be furthest to the left but close to vitiligo, controls, psoriasis and BCC. Atopic eczema and actinic keratosis are removed to the right and share the same group centroid.

The set of variables RFRC, LFRC and TFRC were not good at correctly classifying male subjects. Classification results show only 14.33% correct grouping. The best results were found to be in actinic keratosis (44.2% correct) and alopecia areata (34.3% correct).

Discriminant analysis for female subjects using this set of variables showed that RFRC was the most important variable and only one function was produced (Table 6.155) to account for all of the variance. Figure 6.46 shows vitiligo and psoriasis to be the furthest removed groups with the others clustered in the centre. The F Statistic (Table 6.156) shows that actinic keratosis is furthest removed from psoriasis ($F = 37.225$) and from controls ($F = 30.439$). Alopecia areata is removed furthest from psoriasis ($F = 25.980$) and from controls ($F = 20.642$).

Classification results (Table 6.157) shows that there was 18.78% correct classification with vitiligo (57.6% correct) and psoriasis (49.3%) having the most correctly classified cases.

When regrouping using aetiology type was carried out no significant differences were found for male subjects. Female subjects, however, showed more statistically significant differences using the Mann-Whitney U Test (see Tables 6.158 and 6.159). Control female subjects have significantly lower counts on both hands and for the two hands combined when compared to both GD and ND female patients. The differences were statistically highly significant for controls compared to ND for RFRC, LFRC and TFRC and for controls and GD for RFRC (see Table 6.159).

Table Means and Standard Deviations
6.147

Summed Unilateral Counts

(a) Males

Group	Cases	Variables					
		RFRC		LFRC		TFRC	
		Mean	SD	Mean	SD	Mean	SD
Control	206	76.718 +/- 23.405		74.888 +/- 24.759		151.607 +/- 47.056	
Psoriasis	202	77.738 +/- 20.237		75.950 +/- 19.306		153.886 +/- 38.447	
Atop Ecz	203	81.581 +/- 20.812		79.611 +/- 19.336		161.192 +/- 39.033	
Vitiligo	201	79.632 +/- 20.854		75.935 +/- 20.151		155.550 +/- 39.606	
Alop Are	210	78.729 +/- 21.237		74.305 +/- 20.559		153.033 +/- 40.464	
BCC	211	76.976 +/- 17.720		74.531 +/- 18.675		151.507 +/- 35.154	
Act Ker	129	82.395 +/- 16.205		80.791 +/- 14.787		163.186 +/- 29.674	

(b) Females

Group	Cases	Variables					
		RFRC		LFRC		TFRC	
		Mean	SD	Mean	SD	Mean	SD
Control	206	67.241 +/- 21.036		65.655 +/- 20.857		132.897 +/- 40.446	
Psoriasis	202	65.946 +/- 21.798		65.532 +/- 22.432		129.478 +/- 43.369	
Atop Ecz	203	70.675 +/- 23.086		67.596 +/- 23.964		138.271 +/- 46.129	
Vitiligo	201	79.337 +/- 22.527		74.649 +/- 21.389		153.985 +/- 42.596	
Alop Are	210	72.369 +/- 27.239		68.801 +/- 20.349		141.170 +/- 44.886	
BCC	211	69.748 +/- 19.923		66.723 +/- 19.448		136.470 +/- 38.440	
Act Ker	129	77.425 +/- 18.126		74.764 +/- 17.193		152.190 +/- 34.357	

Table 1. Mann-Whitney U Test Results
6.148(a)
Summed Unilateral Counts

Males

Group 1	Group 2	Probability		
		RFRC	LFRC	TFRC
Control	Psoriasis	0.8131	0.8502	0.7507
Control	Atop Ecz	0.0556	0.0725	0.0575
Control	Vitiligo	0.2308	0.7859	0.4826
Control	Alop Are	0.4701	0.7264	0.8676
Control	BCC	0.6776	0.5569	0.6098
Control	Act Ker	0.0807	0.0693	0.0774
Psoriasis	Atop Ecz	0.1209	0.0625	0.0966
Psoriasis	Vitiligo	0.3613	0.9197	0.6485
Psoriasis	Alop Are	0.6564	0.5533	0.8680
Psoriasis	BCC	0.2649	0.3425	0.2354
Psoriasis	Act Ker	0.1317	0.0661	0.1244
Atop Ecz	Vitiligo	0.4265	0.0942	0.2200
Atop Ecz	Alop Are	0.2346	0.0184*	0.0606
Atop Ecz	BCC	0.0034**	0.0042**	0.0030**
Atop Ecz	Act Ker	0.8797	0.9006	0.9747
Vitiligo	Alop Are	0.6388	0.5114	0.5136
Vitiligo	BCC	0.0315*	0.2963	0.1054
Vitiligo	Act Ker	0.5937	0.0848	0.2286
Alop Are	BCC	0.1083	0.7353	0.2914
Alop Are	Act Ker	0.3034	0.0194*	0.0810
BCC	Act Ker	0.0110*	0.0050**	0.0055**

Table : Mann-Whitney U Test Results

6.148(b)

Summed Unilateral Counts

Females

Group 1	Group 2	Probability		
		RFRC	LFRC	TFRC
Control	Psoriasis	0.4483	0.3725	0.3999
Control	Atop Ecz	0.0877	0.2138	0.1293
Control	Vitiligo	0.0000**	0.0000**	0.0000**
Control	Alop Are	0.0253*	0.1000	0.0362*
Control	BCC	0.3455	0.8319	0.5709
Control	Act Ker	0.0000**	0.0000**	0.0000**
Psoriasis	Atop Ecz	0.0186*	0.04909*	0.0272*
Psoriasis	Vitiligo	0.0000**	0.0000**	0.0000**
Psoriasis	Alop Are	0.0037**	0.0131*	0.0055**
Psoriasis	BCC	0.0775	0.2700	0.1359
Psoriasis	Act Ker	0.0000**	0.0000**	0.0000**
Atop Ecz	Vitiligo	0.0001**	0.0025**	0.0005**
Atop Ecz	Alop Are	0.6716	0.8209	0.7407
Atop Ecz	BCC	0.4629	0.2902	0.3312
Atop Ecz	Act Ker	0.0031**	0.0051**	0.0029**
Vitiligo	Alop Are	0.0004**	0.0021**	0.0008**
Vitiligo	BCC	0.0000**	0.0000**	0.0000**
Vitiligo	Act Ker	0.2895	0.6083	0.4170
Alop Are	BCC	0.1829	0.1289	0.1221
Alop Are	Act Ker	0.0079**	0.0043**	0.0043**
BCC	Act Ker	0.0001**	0.0000**	0.0000**

Table 6.149 - Summary Table of statistical differences from
Mann-Whitney U Test - Variables: RFRC, LFRC and TFRC

(a) Males

Alop.	0					
Psor.	0	0				
A.Ecz.	0	1	0			
A.Ker.	0	1	0	0		
BCC	1	0	0	3	3	
Cont.	0	0	0	0	0	0

Vit.
Alop.
Psor.
A.Ecz.
A.Ker.
BCC

(b) Females

Alop.	3					
Psor.	3	3				
A.Ecz.	3	0	0			
A.Ker.	0	3	3	3		
BCC	3	0	0	0	3	
Cont.	3	2	0	0	3	0

Vit.
Alop.
Psor.
A.Ecz.
A.Ker.
BCC

Table 6.150 - Males - Variables: RFRC to TFRC

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.01424	70.04	70.04	0.1184927
2*	0.00609	29.96	100.00	0.0778126

Table 6.151 Males - Variables: RFRC to TFRCSTANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2
RFRC	-2.98633	2.85467
TFRC	3.58351	-2.04691

Table 6.152 Males - Variables: RFRC to TFRCSTRUCTURE MATRIX:

	FUNC 1	FUNC 2
LFRC	0.84713*	0.53139
RFRC	0.49547	0.86863*
TFRC	0.69099	0.72286*

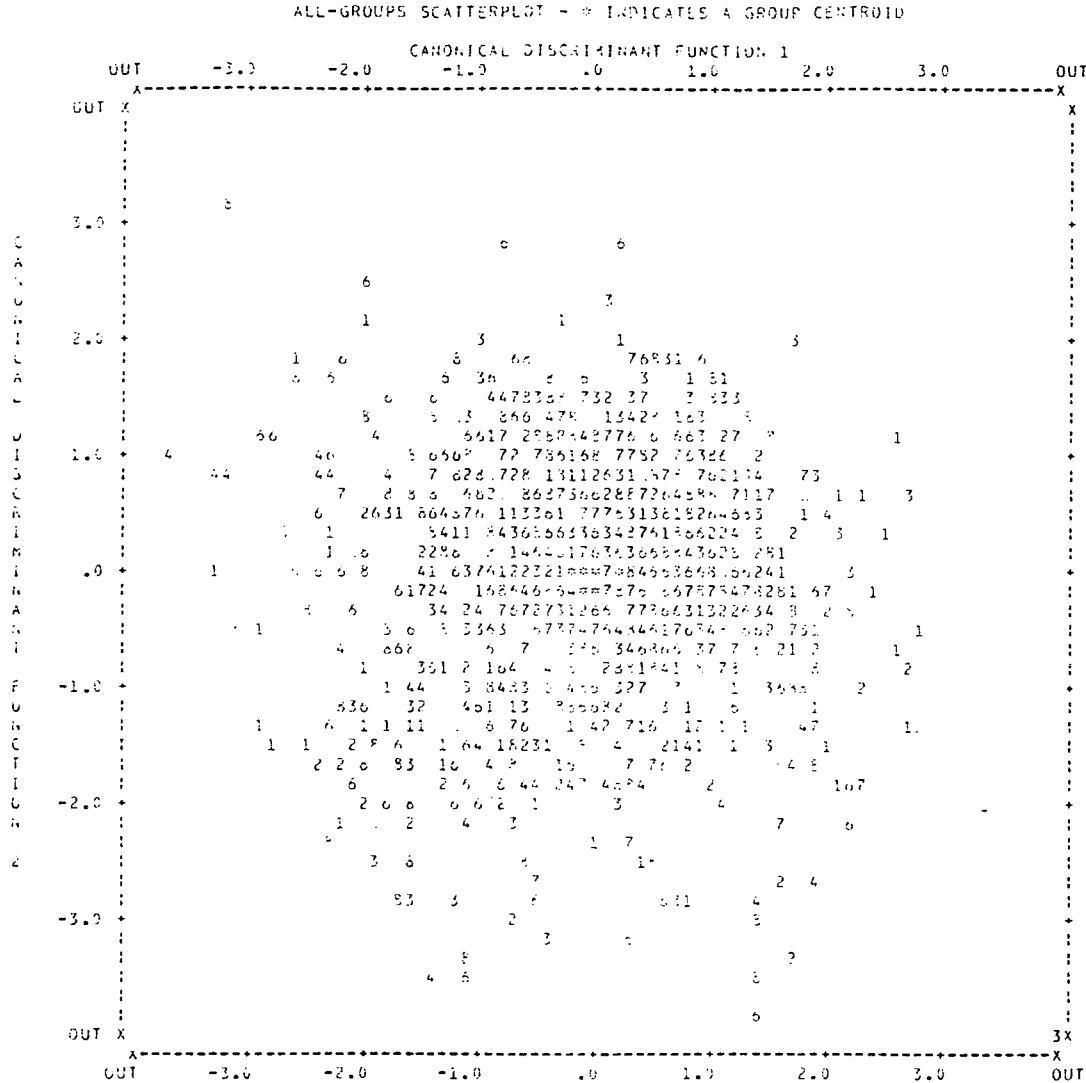
Table 6.153 - Males - Variables: RFRC to TFRC

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

Code Group
 0 -- Controls
 1 -- Psoriasis
 2 -- Atopic Eczema
 3 -- BCC
 5 -- Alopecia areata
 6 -- Actinic Keratosis
 7 -- Vitiligo

GROUP	GROUP	0	1	2	3	5	6
1		0.27905E-01 0.9725					
2		2.1929 0.1120	1.7615 0.1722				
3		0.24421 0.7834	0.31094 0.7328	3.3232 0.0363			
5		3.3882 0.0341	3.1987 0.0411	5.6022 0.0038	2.1883 0.1125		
6		2.6943 0.0680	2.2977 0.1009	0.16103 0.8513	3.9136 0.0202	6.1353 0.0022	
7		1.8246 0.1617	1.5604 0.2104	2.6384 0.0718	1.3214 0.2671	0.51847 0.5956	3.3274 0.0362

Figure 6.44 - Scatterplot - Males - Variables: RFRC to TFRC



	6	8	2		37
		4	1		

Figure 6.45 - Group Centroids

Table 6.154 - Males - Variables: RFRC to TFRC

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
-----		-----	-----	-----	-----	-----	-----	-----	-----
GROUP	0	200	27 13.5%	0 0.0%	0 0.0%	29 14.5%	57 28.5%	83 41.5%	4 2.0%
GROUP	1	201	24 11.9%	0 0.0%	7 3.5%	31 15.4%	56 27.9%	75 37.3%	8 4.0%
GROUP	2	203	18 8.9%	1 0.5%	4 2.0%	21 10.3%	55 27.1%	100 49.3%	4 2.0%
GROUP	3	211	26 12.3%	1 0.5%	4 1.9%	30 14.2%	65 30.8%	79 37.4%	6 2.8%
GROUP	5	210	18 8.6%	0 0.0%	0 0.0%	23 11.0%	72 34.3%	85 40.5%	12 5.7%
GROUP	6	129	19 14.7%	1 0.8%	2 1.6%	11 8.5%	30 23.3%	57 44.2%	9 7.0%
GROUP	7	200	21 10.5%	0 0.0%	1 0.5%	24 12.0%	72 36.0%	78 39.0%	4 2.0%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 14.33%

Table 6.155 - Females - Variables: RFRC to TFRC

(a) FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL : CORRELATION :
1*	0.04384	100.00	100.00	0.2049321

(b) STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1
RFRC	1.00000

(c) STRUCTURE MATRIX:

	FUNC 1
RFRC	1.00000
TFRC	0.96939
LFRC	0.87213

437

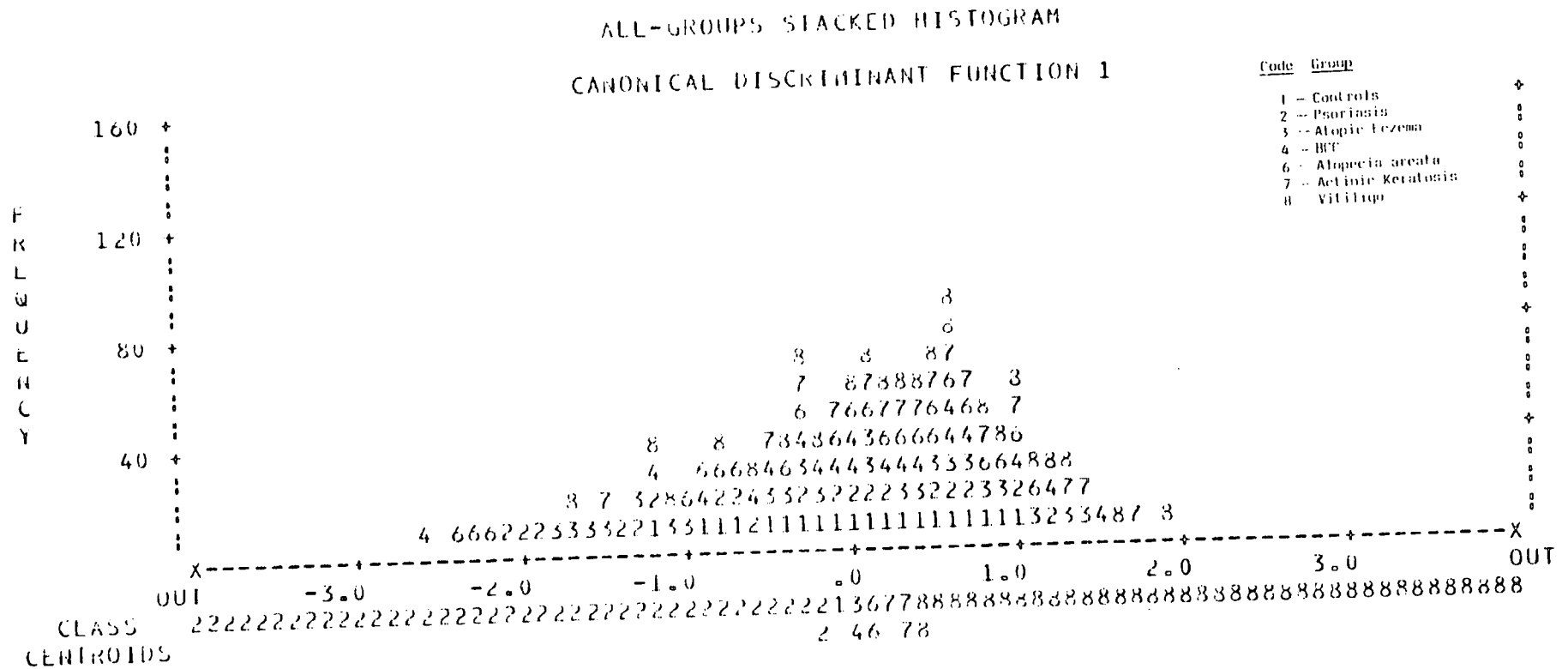


Table 6.156 - Females - Variables: RFRC to TFRC

Code Group
 0 - Controls
 1 - Psoriasis
 2 - Atopic Eczema
 3 - BCC
 5 - Alopecia areata
 6 - Actinic Keratosis
 7 - Vitiligo

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

	GROUP	0	1	2	3	5	6
GROUP							
1		0.31525 0.5746					
2		2.5003 0.1141	4.6193 0.0318				
3		1.3453 0.2463	2.9777 0.0846	0.17636 0.6746			
5		5.5554 0.0186	8.5848 0.0034	0.59433 0.4409	1.4196 0.2337		
6		20.642 0.0000	25.980 0.0000	9.1938 0.0025	11.771 0.0006	5.3091 0.0214	
7		30.439 0.0000	37.225 0.0000	15.500 0.0001	18.949 0.0000	10.104 0.0015	0.53442 0.4649

Table 6.157 - Females - Variables: RFRC to TFRC

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	202	8 4.0%	37 43.1%	5 2.5%	7 3.5%	16 7.9%	7 3.5%	72 35.6%
GROUP	1	205	4 2.0%	101 49.3%	2 1.0%	9 4.4%	12 5.9%	13 6.3%	64 31.2%
GROUP	2	203	7 3.4%	73 36.0%	3 1.5%	7 3.4%	20 9.9%	9 4.4%	84 41.4%
GROUP	3	202	7 3.5%	75 37.1%	7 3.5%	9 4.5%	11 5.4%	18 8.9%	75 37.1%
GROUP	5	206	5 2.4%	70 34.0%	5 2.4%	8 3.9%	11 5.3%	13 6.3%	94 45.6%
GROUP	6	172	3 1.7%	37 21.5%	1 0.6%	6 3.5%	16 9.3%	12 7.0%	97 56.4%
GROUP	7	205	1 0.5%	54 26.3%	2 1.0%	4 2.0%	13 6.3%	13 6.3%	118 57.6%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 18.78%

Table Means and Standard Deviations : Summed Unilateral Counts
6.158
Subjects Grouped by Disorder Type

			RFRC		LFRC		TFRC	
Group	Sex	No	Mean	SD	Mean	SD	Mean	SD
Cont	M	206	76.718 +/- 23.405		74.888 +/- 24.759		151.607 +/- 47.056	
GD	M	816	79.415 +/- 20.802		76.435 +/- 19.911		155.897 +/- 39.462	
ND	M	340	79.032 +/- 17.338		76.906 +/- 17.546		155.938 +/- 33.619	
Cont	F	302	67.241 +/- 21.036		65.655 +/- 20.857		132.897 +/- 40.416	
GD	F	819	72.085 +/- 24.202		68.647 +/- 22.384		140.733 +/- 45.047	
ND	F	374	73.385 +/- 19.485		70.504 +/- 18.814		143.949 +/- 37.383	

Table Mann-Whitney U Test Results : Summed Unilateral Counts
6.159
Subjects Grouped by Disorder Type

			Variables and Probabilities		
Sex	Gp 1	Gp 2	RFRC	LFRC	TFRC
M	Cont	GD	0.3702	08.557	0.5847
M	Cont	ND	0.8565	0.9344	0.9226
M	GD	ND	0.1752	0.8233	0.3895
F	Cont	GD	0.0047**	0.0398*	0.0109*
F	Cont	ND	0.0008**	0.0073**	0.0021**
F	GD	ND	0.3698	0.3989	0.3803

(viii) Summed Absolute Ridge Counts (AF1 to AF5)

Male vitiligo patients were found to have a decreased absolute finger ridge count for finger I which was significantly smaller in comparison to psoriasis and actinic keratosis and highly significantly smaller in comparison to atopic eczema (see Tables 6.160(a) and 6.161(a)). On finger II actinic keratosis males had a significantly higher count in comparison to BCC and controls, the latter difference was also found to be significant on finger III. On finger IV actinic keratosis males again showed a significantly higher count in comparison to vitiligo and alopecia areata. Alopeciads were found to have a statistically significantly lower absolute ridge count on finger IV in comparison to atopic eczema and to actinic keratosis. BCC males were found to have a statistically highly significantly lower absolute ridge count on finger V in comparison to vitiligo, atopic eczema and controls (significant). Male psoriatics were found to have a significantly lower count on finger V in comparison to vitiligo and to atopic eczema subjects.

For female subjects controls were found to have a highly significantly lower absolute ridge count in comparison to vitiligo, BCC and actinic keratosis patients on finger I. Psoriasis female patients also had a highly significantly lower count when compared to vitiligo, BCC and actinic keratosis on finger I. Vitiligo showed a significantly higher value in comparison to alopecia areata and highly significantly greater count compared to controls and psoriasis.

On finger II actinic keratosis females were found to have a highly significantly greater summed absolute ridge count in comparison to all of the other groups apart from vitiligo. Vitiligo showed a highly significantly larger value in all groups apart from actinic keratosis. In addition psoriatic females were found to have a significantly lower absolute count on finger II in comparison to BCC probands.

The same pattern was found for finger III with actinic keratosis and vitiligo having the highest mean counts and these being significantly greater in comparison to all of the other groups. In addition control females were found to have a significantly lower count in comparison to all groups apart from psoriasis patients.

On finger IV vitiligo females were found to have a highly significantly larger absolute count in comparison to all groups apart from actinic keratosis. Actinic keratosis males had significantly higher counts in comparison to alopecia areata, controls and psoriasis.

Female psoriatics were found to have a significantly lower absolute finger ridge count on finger V in comparison to controls, vitiligo, alopecia areata, atopic eczema and actinic keratosis. Vitiligo and a significantly higher value in comparison to BCC, atopic eczema and psoriasis (see Tables 6.160(b) and 6.161(b)).

Table 6.162 shows the significant differences found between groups as a result of the Mann-Whitney U Tests which were carried out. Males showed 15/105 possible differences and females showed 54/105. In females the most differences were found for vitiligo (25) followed by actinic keratosis (22) and psoriasis (16). For males vitiligo and actinic keratosis showed the most differences (6 each) followed by BCC and atopic eczema (4 each).

When discriminant analysis was carried out for male subjects using variables AF1 to AF5 five functions were produced the first two of which accounted for 80.31% of the variance (Table 6.163). The absolute counts on finger I followed by fingers IV and V are the most important (Table 6.165). The largest intergroup differences were found between actinic keratosis and controls ($F = 3.9808$), vitiligo and psoriasis ($F = 3.9955$) and vitiligo and BCC ($F = 3.9018$) (Table 6.166). The territorial map shows actinic keratosis, controls, psoriasis and vitiligo to be the groups furthest apart (Figure 6.47). These differences are reflected in Figure 6.49 the group centroid relationships. Classification results (Table 6.167) show that these variables were 17.43% successful in classifying cases into groups. The best classification was found for actinic keratosis (31% correct) followed by vitiligo (25% correct).

For female subjects the first two functions account for 79.05% of the variance (Table 6.168). The most important variables are AF3 and AF2 followed by AF4 (Table 6.170). Table 6.171 show the largest intergroup separations are shown for actinic keratosis and controls ($F = 16.934$), and psoriasis ($F = 12.564$), and atopic eczema ($F = 10.523$).

The territorial map shows the most widely separated groups to be vitiligo, alopecia areata, actinic keratosis and controls (Fig. 6.50).

The group centroids (Figure 6.52) show vitiligo and actinic keratosis to be most separated to the right away from the cluster of the rest of the group centroids with controls being the furthest to the left.

Classification results are shown in Table 6.172. The best results for correct classification was found for actinic keratosis (47.7% correct) followed by controls (35.6% correct) and psoriasis (34.6% correct). Overall the percentage of correctly grouped cases was 24.27%.

When groups were regrouped according to aetiology type only one statistically significant difference was found for male subjects. This was for the summed absolute count on finger V where control subjects were found to have a statistically significantly higher mean count when compared to ND males. For female subjects, however, 10/15 of the comparisons showed statistically significant differences (Table 6.174). When female controls were compared to GD females the controls were found to be significantly smaller counts on fingers II and IV and a highly significant count on finger III. When controls were compared to ND female subjects, the female controls were found to have lower counts on fingers I to IV which were highly significantly lower on fingers I, II and III and significantly lower on IV. When the female subjects of the two disorder types were compared for summed absolute counts, GD females were found to have smaller counts for fingers I to III. The differences were found to be statistically significant for finger I and highly significant for II and III (see Tables 6.173 and 6.174).

Table Means and Deviations
6.160
Summed Absolute Ridge Counts

Males (a)

		Variables									
		AF1		AF2		AF3		AF4		AF5	
Group	Cases	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Control	206	51.466 +/-	21.512	34.189 +/-	22.960	32.359 +/-	18.395	44.049 +/-	23.204	31.214 +/-	14.004
Psoriasis	202	54.149 +/-	22.156	34.540 +/-	21.686	33.348 +/-	16.312	44.297 +/-	19.296	29.371 +/-	11.593
Atop Ecz	203	55.335 +/-	21.096	37.635 +/-	24.627	35.118 +/-	18.801	47.030 +/-	19.773	31.433 +/-	12.609
Vitiligo	201	48.741 +/-	20.364	36.910 +/-	23.184	32.735 +/-	16.402	43.876 +/-	19.345	30.388 +/-	11.596
Alop Are	210	51.186 +/-	20.461	35.348 +/-	21.630	34.029 +/-	18.405	43.014 +/-	20.482	29.424 +/-	11.669
BCC	211	51.839 +/-	20.835	34.682 +/-	20.932	34.185 +/-	17.370	44.498 +/-	19.096	28.393 +/-	10.232
Act Ker	129	53.062 +/-	19.252	39.047 +/-	22.109	36.899 +/-	17.543	48.674 +/-	19.057	29.543 +/-	9.354

Females (b)

		Variables									
		AF1		AF2		AF3		AF4		AF5	
Group	Cases	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std. Dev.
Control	203	41.202 +/-	18.100	27.852 +/-	18.928	25.626 +/-	14.247	36.177 +/-	17.551	26.246 +/-	10.062
Psoriasis	205	41.424 +/-	20.706	27.766 +/-	20.757	28.229 +/-	16.511	37.629 +/-	19.888	23.639 +/-	9.704
Atop Ecz	203	44.650 +/-	20.723	31.251 +/-	21.860	29.882 +/-	18.037	40.123 +/-	21.819	25.980 +/-	11.198
Vitiligo	205	47.727 +/-	18.345	39.327 +/-	23.508	34.868 +/-	17.892	45.600 +/-	21.922	28.049 +/-	11.482
Alop Are	206	43.835 +/-	18.651	30.549 +/-	20.294	30.864 +/-	17.634	37.893 +/-	18.986	26.542 +/-	11.693
BCC	202	46.520 +/-	18.999	32.089 +/-	21.829	30.327 +/-	16.382	38.446 +/-	18.017	25.668 +/-	10.439
Act Ker	174	46.701 +/-	18.203	39.695 +/-	21.789	38.029 +/-	18.526	41.690 +/-	18.651	27.667 +/-	9.722

Table Mann-Whitney U Test Results
6.161(a)
Summed Absolute Counts

Males

		Probability (* = significant ** = highly significant)				
Group 1	Group 2	AF1	AF2	AF3	AF4	AF5
Control	Psoriasis	0.3702	0.7158	0.2660	0.7398	0.1695
Control	Atop Ecz	0.0870	0.1749	0.0814	0.1033	0.7969
Control	Vitiligo	0.1195	0.2032	0.4978	0.9650	0.9358
Control	Alop Are	0.8878	0.4512	0.2461	0.6762	0.1924
Control	BCC	0.8773	0.6803	0.4160	0.7313	0.03367*
Control	Act Ker	0.6095	0.0383*	0.0174*	0.0548	0.3852
Psoriasis	Atop Ecz	0.4868	0.3203	0.4932	0.1644	0.0494*
Psoriasis	Vitiligo	0.0188*	0.3254	0.6037	0.7419	0.0465*
Psoriasis	Alop Are	0.2352	0.6908	0.8942	0.4311	0.7693
Psoriasis	BCC	0.2772	0.9937	0.6713	0.9271	0.4951
Psoriasis	Act Ker	0.7451	0.0546	0.1603	0.0946	0.3442
Atop Ecz	Vitiligo	0.0010**	0.9263	0.2585	0.0602	0.9307
Atop Ecz	Alop Are	0.0603	0.5187	0.6064	0.0242*	0.0734
Atop Ecz	BCC	0.0525	0.2921	0.2674	0.1342	0.0063**
Atop Ecz	Act Ker	0.2923	0.4088	0.4429	0.7222	0.2083
Vitiligo	Alop Are	0.1655	0.5475	0.5335	0.5854	0.1010
Vitiligo	BCC	0.1663	0.3181	0.9222	0.8338	0.0066**
Vitiligo	Act Ker	0.0437*	0.3618	0.0677	0.0463*	0.1292
Alop Are	BCC	0.9799	0.6594	0.6836	0.4793	0.3947
Alop Are	Act Ker	0.4883	0.1268	0.2172	0.0159*	0.6410
BCC	Act Ker	0.4542	0.0478*	0.0615	0.0600	0.1067

Table. Mann-Whitney U Test Results

6.161(b)

Summed Absolute Counts

Females

Group 1	Group 2	Probability (* = significant ** = highly significant)				
		AF1	AF2	AF3	AF4	AF5
Control	Psoriasis	0.5351	0.7240	0.1703	0.6429	0.0005**
Control	Atop Ecz	0.2255	0.2313	0.0235*	0.1606	0.1929
Control	Vitiligo	0.0019**	0.0000**	0.0000**	0.0000**	0.2925
Control	Alop Are	0.3378	0.1923	0.0002**	0.6177	0.4126
Control	BCC	0.0082**	0.0848	0.0029**	0.2988	0.0400*
Control	Act Ker	0.0068**	0.0000**	0.0000**	0.0047**	0.5400
Psoriasis	Atop Ecz	0.0785	0.1325	0.3686	0.3384	0.0327*
Psoriasis	Vitiligo	0.0005**	0.0000**	0.0000**	0.0004**	0.0000**
Psoriasis	Alop Are	0.1055	0.1156	0.0363*	0.8726	0.0057**
Psoriasis	BCC	0.0034**	0.0482*	0.1414	0.6246	0.1550
Psoriasis	Act Ker	0.0015**	0.0000**	0.0000**	0.0289*	0.0000**
Atop Ecz	Vitiligo	0.0844	0.0003**	0.0010**	0.0078**	0.0192*
Atop Ecz	Alop Are	0.7795	0.9470	0.2694	0.4821	0.5999
Atop Ecz	BCC	0.2160	0.6140	0.6151	0.5918	0.4655
Atop Ecz	Act Ker	0.1548	0.0001**	0.0000**	0.2235	0.0440*
Vitiligo	Alop Are	0.0391*	0.0003**	0.0109*	0.0003**	0.0668
Vitiligo	BCC	0.6572	0.0019**	0.0021**	0.0013**	0.0027**
Vitiligo	Act Ker	0.7465	0.6542	0.0842	0.1349	0.6377
Alop Are	BCC	0.1124	0.6718	0.4466	0.7008	0.1880
Alop Are	Act Ker	0.0719	0.0000**	0.0000**	0.0306*	0.1210
BCC	Act Ker	0.9966	0.0003**	0.0000**	0.0681	0.0032**

Table 6.162 - Summary Table of significant differences from Mann-Whitney U Tests - Variables: AF1 to AF5

(a) Males

Alop.	0						
Psor.	2	0					
A.Ecz.	1	1	1				
A.Ker.	2	1	0	0			
BCC	1	0	0	1	1		
Cont.	0	0	0	0	2	1	
	Vit.	Alop.	Psor.	A.Ecz.	A.Ker.	BCC	

(b) Females

Alop.	4						
Psor.	5	2					
A.Ecz.	4	0	1				
A.Ker.	4	3	5	3			
BCC	4	0	2	0	3		
Cont.	4	1	1	1	4	3	
	Vit.	Alop.	Psor.	A.Ecz.	A.Ker.	BCC	

Table 6.163 - Canonical Discriminant Functions

Males - Variables: AF1 to AF5

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.02361	49.15	49.15	0.1518645
2*	0.01496	31.16	80.31	0.1214202
3*	0.00656	13.66	93.97	0.0807421
4*	0.00177	3.69	97.66	0.0420511
5*	0.00112	2.34	100.00	0.0335087

Table 6.164 Males - Variables: AF1 to AF5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5
AF1	0.41071	1.02984	-0.21310	0.47655	-0.34032
AF2	-0.62354	-0.84931	0.19459	1.04375	-0.82763
AF3	0.71536	-0.33422	-0.56745	0.34147	1.30078
AF4	0.71394	-0.00421	1.23332	-1.14373	-0.25912
AF5	-1.14445	0.55843	0.11917	0.04661	0.51909

Table 6.165 - Males - Variables: AF1 to AF5

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5
AF1	0.34575	0.61356*	0.36064	0.61048	-0.03543
AF4	0.24208	0.07029	0.91597*	0.21243	0.22874
AF5	-0.41238	0.32130	0.62124*	0.29752	0.50225
AF2	0.02203	-0.19254	0.66371	0.72142*	0.03857
AF3	0.31726	-0.07620	0.45119	0.54231	0.62918*

Table 6.166 - Males - Variables: AF1 to AF5

Code Group
 0 - Controls
 1 - Psoriasis
 2 - Atopic Eczema
 3 - BCC
 5 - Alopecia areata
 6 - Actinic Keratosis
 7 - Vitiligo

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

	GROUP	0	1	2	3	5	6
GROUP							
1		1.7614 0.1178					
2		1.0078 0.4116	0.67530 0.6422				
3		3.3030 0.0057	1.0254 0.4011	2.0583 0.0681			
5		1.7952 0.1108	1.2856 0.2675	1.6809 0.1361	1.0935 0.3621		
6		3.9808 0.0014	2.3522 0.0388	2.2560 0.0467	0.92520 0.4636	2.2656 0.0459	
7		1.8256 0.1049	3.9955 0.0013	3.1322 0.0081	3.9018 0.0016	1.7956 0.1107	3.5828 0.0032

Figure 6.47 - Territorial Map - Males - Variables: AF1 to AF5

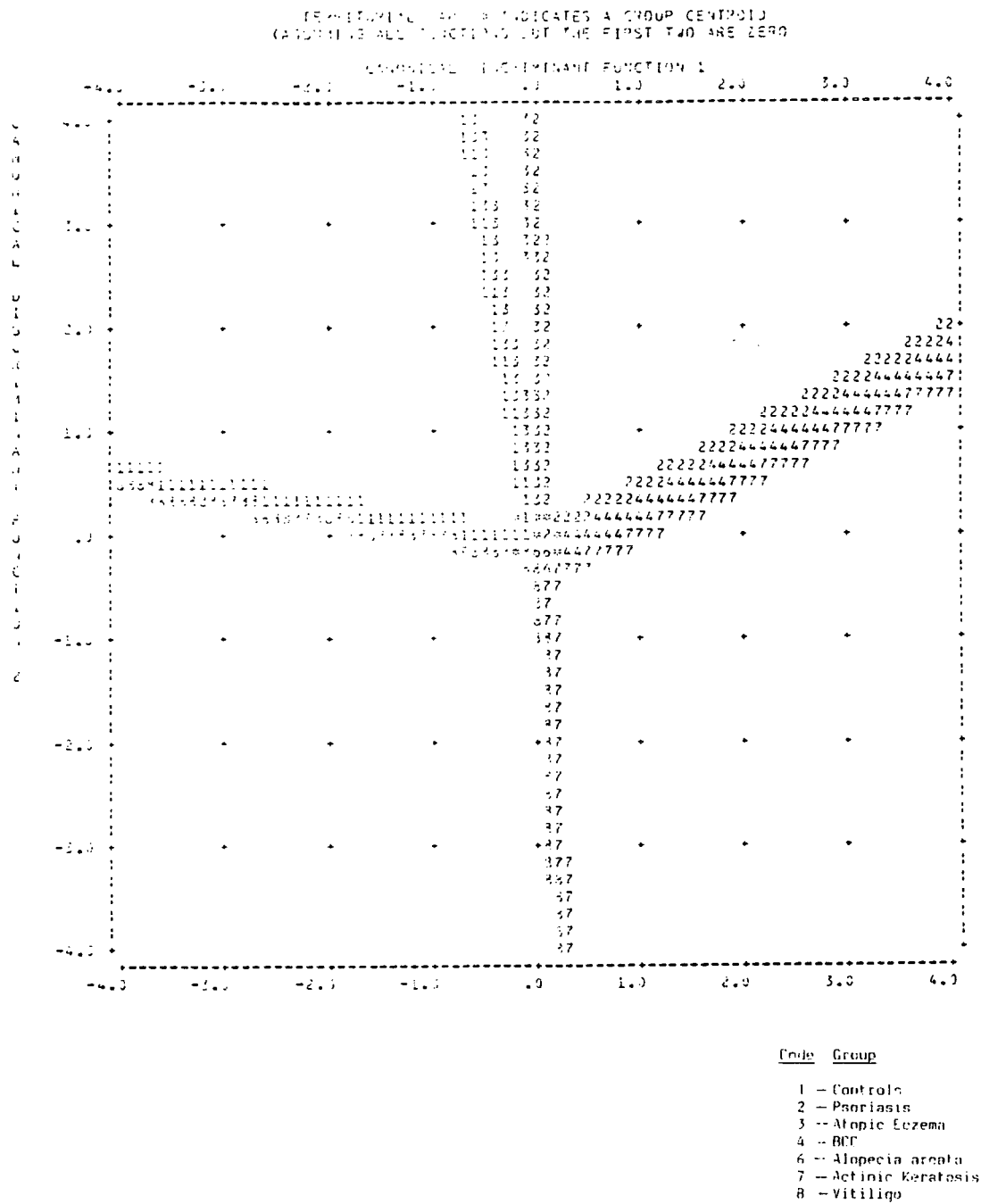
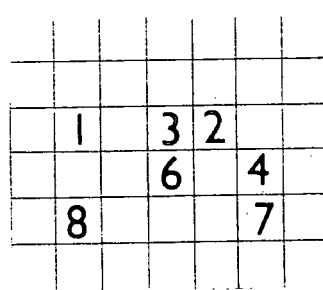
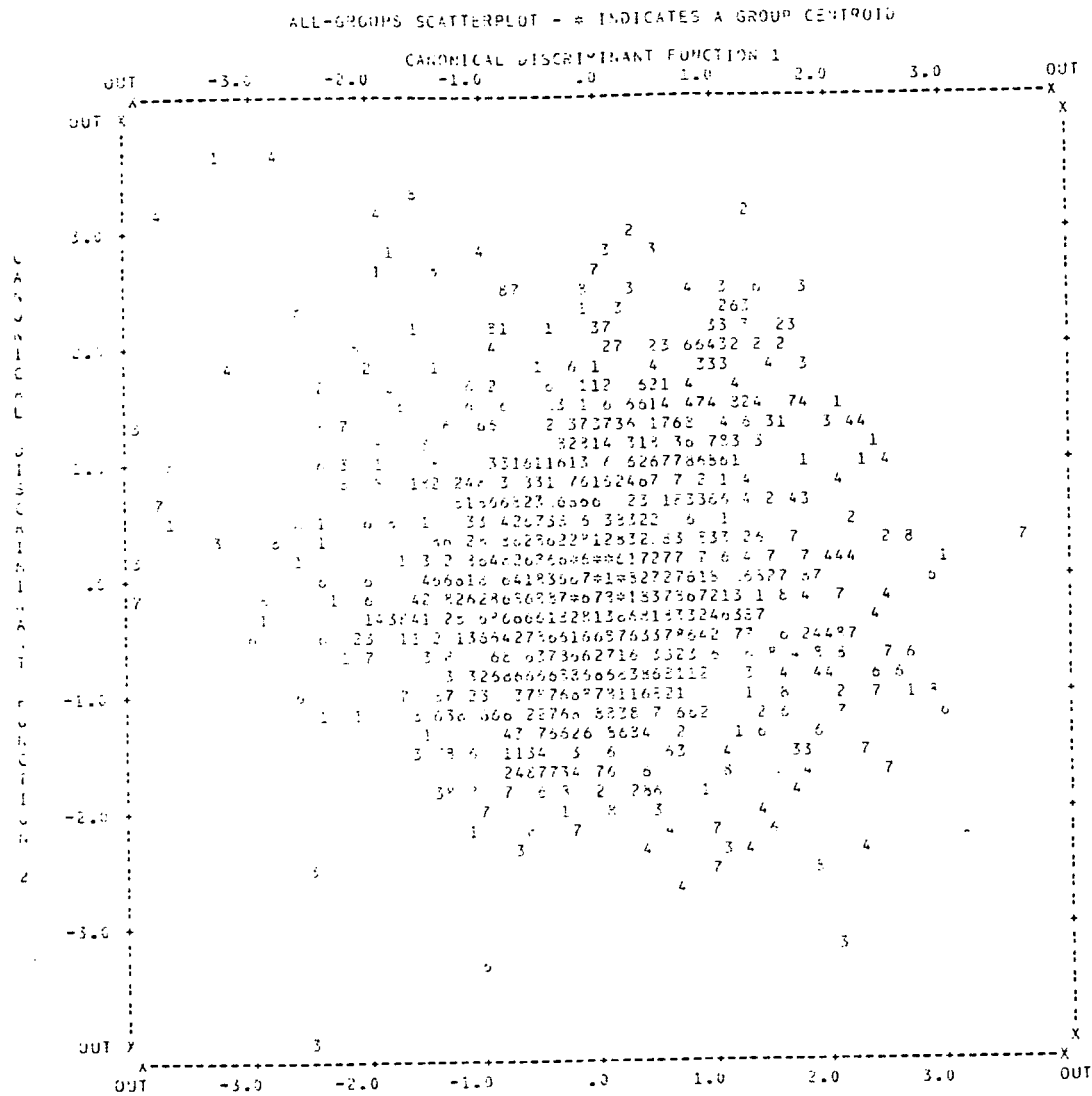


Figure 6.48 - Scatterplot - Males - Variables AF1 to AF5



Code Group

1 - Controls
2 - Psoriasis
3 - Atopic Eczema
4 - BCC
6 - Alopecia areata
7 - Actinic Keratosis
8 - Vitiligo

Figure 6.49 - Group Centroids

Table 6.167 - Males - Variables: AF1 to AF5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	200	35 17.5%	19 9.5%	22 11.0%	23 11.5%	26 13.0%	33 16.5%	42 21.0%
GROUP	1	201	21 10.4%	38 18.9%	17 8.5%	24 11.9%	24 11.9%	38 18.9%	39 19.4%
GROUP	2	203	22 10.8%	40 19.7%	21 10.3%	17 8.4%	30 14.8%	33 16.3%	40 19.7%
GROUP	3	211	23 10.9%	38 18.0%	6 2.8%	13 6.2%	30 14.2%	54 25.6%	42 19.9%
GROUP	5	210	23 11.0%	39 18.6%	13 6.2%	20 9.5%	34 16.2%	35 16.7%	46 21.9%
GROUP	6	129	12 9.3%	17 13.2%	3 2.3%	13 10.1%	19 14.7%	40 31.0%	25 19.4%
GROUP	7	200	42 21.0%	12 6.0%	11 5.5%	18 9.0%	30 15.0%	37 18.5%	50 25.0%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 17.43%

Table 6.168 - Females - Variables: AF1 to AF5

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.07146	61.36	61.36	0.2582599
2*	0.02061	17.70	79.05	0.1421055
3*	0.01693	14.53	93.59	0.1290245
4*	0.00564	4.84	98.43	0.0743773
5*	0.00183	1.57	100.00	0.0427541

Table 6.169 - Females - Variables: AF1 to AF5

STANDARDIZED

CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5
AF1	-0.07908	0.04231	0.04798	1.22072	0.21926
AF2	0.62375	0.38509	0.75066	-0.07076	-1.28642
AF3	1.13946	-0.80537	-0.86806	-0.25143	0.62215
AF4	-0.75319	1.37177	-0.57373	-0.38059	0.48662
AF5	-0.26221	-0.42769	1.18045	-0.18773	0.53929

Table 6.170 - Females - Variables: AF1 to AF5

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5
AF3	0.81631*	0.27327	0.04194	-0.04890	0.50478
AF2	0.72101*	0.57461	0.38558	0.01733	-0.03170
AF4	0.36005	0.78027*	0.12516	-0.09602	0.48647
AF5	0.30332	0.20329	0.68701*	-0.12498	0.61569
AF1	0.36883	0.36413	0.17567	0.76096*	0.34849

Table 6.171 - Females - Variables: AF1 to AF5

Code Group
 0 -- Controls
 1 -- Psoriasis
 2 -- Atopic Eczema
 3 -- BCC
 5 -- Alopecia areata
 6 -- Actinic Keratosis
 7 -- Vitiligo

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

	GROUP	0	1	2	3	5	6
GROUP							
1		5.0496 0.0001					
2		2.7602 0.0173	1.4714 0.1962				
3		4.2379 0.0008	2.9904 0.0109	1.0680 0.3763			
5		3.5322 0.0035	3.0502 0.0096	1.5589 0.1687	1.2661 0.2761		
6		16.934 0.0000	12.564 0.0000	10.523 0.0000	7.6502 0.0000	6.8784 0.0000	
7		8.5466 0.0000	6.4926 0.0000	3.0303 0.0100	3.6869 0.0026	5.0516 0.0001	6.7894 0.0000

Figure 6.50 - Territorial Map - Females - Variables: AF1 to AF5

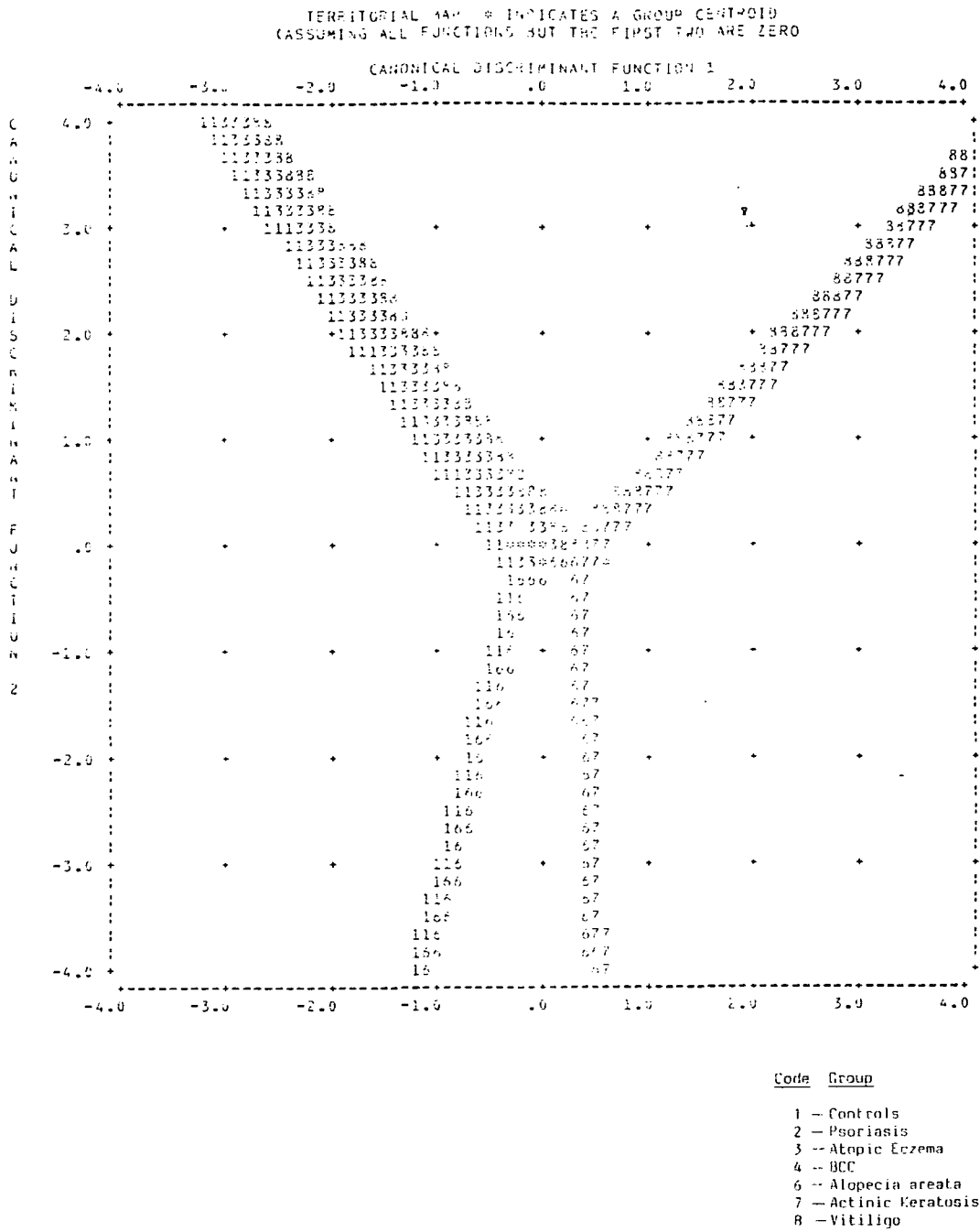


Figure 6.51 - Scatterplot - Females - Variables: AF1 to AF5

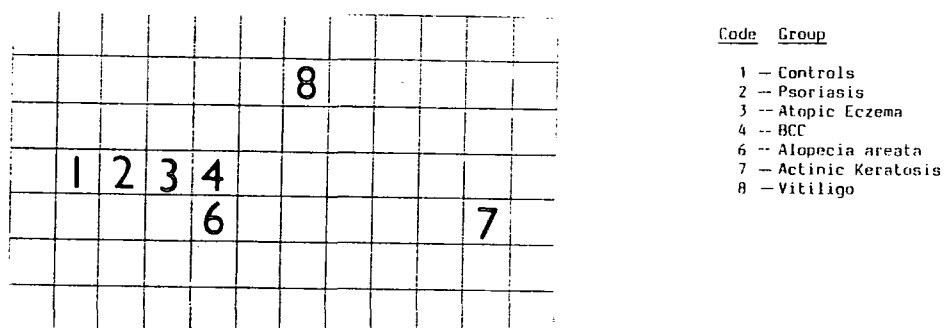
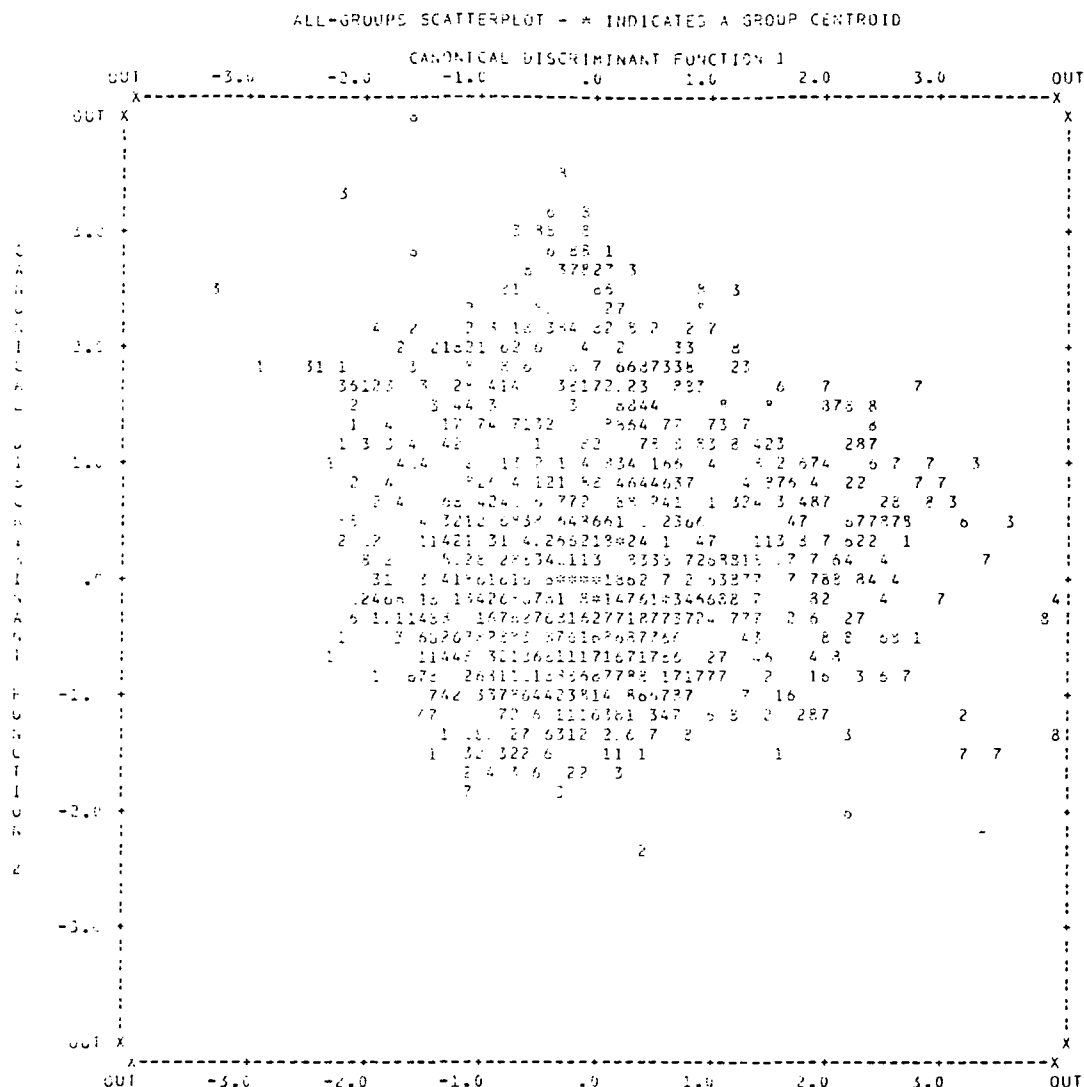


Figure 6.52 - Group Centroids

Table 6.172 - Females - Variables: AF1 to AF5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
-----			0	1	2	3	5	6	7
			-----	-----	-----	-----	-----	-----	-----
GROUP	0	202	72 35.6%	41 20.3%	5 2.5%	26 12.9%	11 5.4%	25 12.4%	22 10.9%
GROUP	1	205	35 17.1%	71 34.6%	3 1.5%	17 8.3%	15 7.3%	39 19.0%	25 12.2%
GROUP	2	203	44 21.7%	49 24.1%	4 2.0%	25 12.3%	16 7.9%	35 17.2%	30 14.8%
GROUP	3	202	37 18.3%	39 19.3%	6 3.0%	31 15.3%	21 10.4%	37 18.3%	31 15.3%
GROUP	5	206	34 16.5%	53 25.7%	3 1.5%	26 12.6%	27 13.1%	39 18.9%	24 11.7%
GROUP	6	172	15 8.7%	25 14.5%	1 0.6%	12 7.0%	22 12.8%	82 47.7%	15 8.7%
GROUP	7	205	31 15.1%	41 20.0%	1 0.5%	19 9.3%	19 9.3%	50 24.4%	44 21.5%

Table Means and Standard Deviations

6.173

Summed Absolute Counts : Subject Grouped by Disorder Type

			AF1		AF2		AF3		AF4		AF5	
Group	Sex	No	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Cont	M	206	51.466 +/- 21.512		34.189 +/- 22.960		32.359 +/- 18.395		44.049 +/- 23.204		31.214 +/- 14.004	
GD	M	816	52.349 +/- 21.143		36.102 +/- 22.796		33.814 +/- 17.521		44.543 +/- 19.759		30.148 +/- 11.882	
ND	M	340	52.303 +/- 20.229		36.338 +/- 21.459		35.215 +/- 17.460		46.082 +/- 19.161		28.829 +/- 9.910	
Cont	F	203	41.202 +/- 18.100		27.852 +/- 18.988		25.626 +/- 14.247		36.177 +/- 17.551		26.246 +/- 10.062	
GD	F	819	44.408 +/- 19.727		32.223 +/- 22.024		30.963 +/- 17.666		40.309 +/- 20.897		26.049 +/- 11.140	
ND	F	374	46.706 +/- 18.553		35.738 +/- 22.090		34.005 +/- 17.769		39.853 +/- 18.338		26.634 +/- 10.149	

Table Mann-Whitney U Test Results : Summed Absolute Counts

6.174

Subjects Grouped by Disorder Type

			Variables and Probabilities				
Sex	Gp 1	Gp 2	AF1	AF2	AF3	AF4	AF5
M	Cont	GD	0.9084	0.4481	0.2904	0.8584	0.2669
M	Cont	ND	0.9863	0.3775	0.1852	0.3834	0.0309*
M	GD	ND	0.8623	0.7871	0.6689	0.3611	0.0622
F	Cont	GD	0.1222	0.0291*	0.0000**	0.0383*	0.1761
F	Cont	ND	0.0013**	0.0001**	0.0000**	0.0332*	0.4221
F	GD	ND	0.0181*	0.0073**	0.0036**	0.9317	0.4781

(ix) Summed Absolute Counts (RFAC, LFAC and TFAC)

For male subjects only two statistically significant differences were found for intergroup comparisons (Table 6.176(a)) for summed absolute counts (RFAC, LFAC and TFAC). Actinic keratosis male subjects were found to have a statistically significantly higher mean value when compared to both vitiligo and control males (Table 6.175(a)). The males, therefore, only showed 2 out of a possible 63 significant differences (Table 6.177(a)).

When the groups of female subjects were compared they were found to show 32/63 differences for these variables (see Table 6.177(b)). From this table it can be seen that actinic keratosis females were found to have the greatest number of intergroup differences (15) followed by vitiligo (13), BCC (9), controls (8), psoriasis (7) and finally alopecia areata and atopic eczema (both with 6). Actinic keratosis females were found to have highly significantly larger counts for all three variables in comparison to all groups except vitiligo females. Vitiligo females had highly significantly greater counts for all variables in comparison to all groups apart from actinic keratosis females. Control females had significantly lower counts in comparison to BCC in addition to the highly significant differences when compared to vitiligo and actinic keratosis (see Table 6.176(b)).

Discriminant analysis was carried out for male subjects using the variables RFAC, LFAC and TFAC. Table 6.178 shows that only two functions could be produced to account for all of the variance. Function 1 took out 63.39% of the variance by itself. From Table 6.180 it can be seen that RFAC is the most important of the three variables for discriminating followed by TFAC and then LFAC (see also Table 6.179). When territorial maps and scatterplots were produced using these functions the groups were overlapping and the centroids closely clustered (Figures 6.54 to 6.56). Vitiligo and alopecia areata were found to be furthest separated from psoriasis and actinic keratosis with atopic eczema equidistant from both (Figure 6.56). Table 6.181 shows the largest F Statistic and hence greatest separation to be between atopic eczema and psoriasis ($F = 3.1058$) followed by controls and psoriasis ($F = 2.5234$). Only 15.36% of grouped cases were correctly

classified, as shown in Table 6.182, with best results for psoriasis (25.9% correct).

When discriminant analysis was carried out for females, only one function was produced which accounted for 100% of the variance (Table 6.183). The variable RFAC was shown to be the most important (Tables 6.184 and 6.185). The furthest separated groups using this discriminant function were found to be controls and vitiligo ($F = 30.842$), vitiligo and psoriasis ($F = 26.468$), controls and actinic keratosis ($F = 24.223$) and actinic keratosis and psoriasis ($F = 20.504$), as shown in Table 6.186. Figure 6.57 shows that the centroids of controls and vitiligo are the furthest apart with the other group centroids closely clustered in the middle. Classification results show that the function produced 17.28% correct 'grouped' case classification with controls being 52,5% correctly classified and vitiligo being 44.4% correct.

Grouping by aetiology of disorder type showed there to be no statistically significant differences for male subjects (Table 6.189). For females however statistical differences were shown for all comparisons apart from GD: ND for LFAC. ND females had the highest mean values for each of the variables RFAC, LFAC and TFAC followed by GD and controls in order of decreasing mean values (see Table 6.188) and all of the intergroup comparisons showed significant differences with the one exception shown (Table 6.189).

Table Means and Standard Deviations
6.175
Summed Absolute Counts

(a) Males

Group	Cases	Variable					
		RFAC		LFAC		TFAC	
		Mean	SD	Mean	SD	Mean	SD
Control	206	99.689 +/- 45.206		93.587 +/- 42.894		193.277 +/- 86.167	
Psoriasis	202	99.168 +/- 39.581		96.746 +/- 39.558		196.209 +/- 77.540	
Atop Ecz	203	106.483 +/- 42.790		100.069 +/- 39.517		206.552 +/- 80.693	
Vitiligo	201	99.512 +/- 40.962		92.990 +/- 38.184		192.440 +/- 77.150	
Alop Are	210	99.767 +/- 40.936		93.233 +/- 38.960		193.000 +/- 78.146	
BCC	211	99.246 +/- 36.448		94.351 +/- 37.517		193.597 +/- 72.426	
Act Ker	129	105.612 +/- 37.949		101.612 +/- 35.853		207.225 +/- 72.103	

(b) Females

Group	Cases	Variable					
		RFAC		LFAC		TFAC	
		Mean	SD	Mean	SD	Mean	SD
Control	206	79.704 +/- 32.259		77.399 +/- 33.722		157.103 +/- 63.626	
Psoriasis	202	81.278 +/- 36.941		77.410 +/- 36.909		158.688 +/- 72.407	
Atop Ecz	203	87.813 +/- 39.834		84.074 +/- 40.707		171.887 +/- 79.257	
Vitiligo	201	100.859 +/- 40.159		94.712 +/- 40.077		195.571 +/- 78.425	
Alop Are	210	87.597 +/- 42.984		82.068 +/- 35.260		169.665 +/- 75.196	
BCC	211	89.381 +/- 37.959		83.668 +/- 35.967		173.050 +/- 72.179	
Act Ker	129	99.023 +/- 38.467		94.759 +/- 36.533		193.782 +/- 73.580	

Table Mann-Whitney U Test Results
6.176(a)
Summed Absolute Counts

Males

		Probability (* = significant ** = highly significant)		
Group 1	Group 2	RFAC	LFAC	TFAC
Control	Psoriasis	0.7322	0.3620	0.5028
Control	Atop Ecz	0.0554	0.0602	0.0612
Control	Vitiligo	0.6694	0.9272	0.7795
Control	Alop Are	0.5997	0.8537	0.7063
Control	BCC	0.6646	0.7013	0.7176
Control	Act Ker	0.1361	0.0442*	0.0834
Psoriasis	Atop Ecz	0.1365	0.2916	0.2264
Psoriasis	Vitiligo	0.8521	0.3710	0.5783
Psoriasis	Alop Are	0.9660	0.4752	0.6700
Psoriasis	BCC	0.9750	0.5493	0.6844
Psoriasis	Act Ker	0.2637	0.2280	0.2666
Atop Ecz	Vitiligo	0.0885	0.0543	0.0634
Atop Ecz	Alop Are	0.1294	0.0565	0.0695
Atop Ecz	BCC	0.0918	0.1122	0.0913
Atop Ecz	Act Ker	0.7684	0.8973	0.9238
Vitiligo	Alop Are	0.8407	0.8512	0.8702
Vitiligo	BCC	0.9673	0.7453	0.8710
Vitiligo	Act Ker	0.2271	0.0423*	0.0990
Alop Are	BCC	0.9326	0.8482	0.9847
Alop Are	Act Ker	0.2662	0.0687	0.1271
BCC	Act Ker	0.2139	0.0698	0.1001

Table Mann-Whitney U Test Results
6.176(b)
Summed Absolute Counts

Females

		Probability (* = significant ** = highly significant)		
Group 1	Group 2	RFAC	LFAC	TFAC
Control	Psoriasis	0.9692	0.9839	0.9538
Control	Atop Ecz	0.0840	0.0992	0.0959
Control	Vitiligo	0.0000**	0.0000**	0.0000**
Control	Alop Are	0.1147	0.1563	0.1382
Control	BCC	0.0193*	0.0939	0.0344*
Control	Act Ker	0.0000**	0.0000**	0.0000**
Psoriasis	Atop Ecz	0.0919	0.1155	0.1016
Psoriasis	Vitiligo	0.0000**	0.0000	0.0000**
Psoriasis	Alop Are	0.1192	0.1842	0.1409
Psoriasis	BCC	0.0281*	0.1014	0.0418*
Psoriasis	Act Ker	0.0000**	0.0000**	0.0000**
Atop Ecz	Vitiligo	0.0015**	0.0087**	0.0034**
Atop Ecz	Alop Are	0.8232	0.6666	0.7751
Atop Ecz	BCC	0.5738	0.9469	0.7338
Atop Ecz	Act Ker	0.0072**	0.0102*	0.0061**
Vitiligo	Alop Are	0.0004**	0.0008**	0.0007**
Vitiligo	BCC	0.0042	0.0043**	0.0039**
Vitiligo	Act Ker	0.6397	0.9359	0.7995
Alop Are	BCC	0.4413	0.7392	0.5007
Alop Are	Act Ker	0.0029**	0.0009**	0.0017**
BCC	Act Ker	0.0266**	0.0034**	0.0117*

Table 6.177 - Summary Table of significant differences from
Mann-Whitney U Tests - Variables: RFAC, LFAC, TFAC

(a) Males

Alop.	0					
Psor.	0	0				
A.Ecz.	0	0	0			
A.Ker.	1	0	0	0		
BCC	0	0	0	0	0	
Cont.	0	0	0	0	1	0
	Vit.	Alop.	Psor.	A.Ecz.	A.Ker.	BCC

(b) Females

Alop.	3					
Psor.	2	0				
A.Ecz.	3	0	0			
A.Ker.	0	3	3	3		
BCC	2	0	2	0	3	
Cont.	3	0	0	0	3	2
	Vit.	Alop.	Psor.	A.Ecz.	A.Ker.	BCC

(Table 6.178 - Canonical Discriminant Functions

Males - Variables: RFAC, LFAC, TFAC

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.00795	63.39	63.39	0.0882347
2*	0.00459	36.61	100.00	0.0676226

Table 6.179 - Males - Variables: RFAC, LFAC, TFAC

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2
RFAC	-4.47035	2.02234
TFAC	4.78916	-1.06378

Table 6.180 - Structure Matrix - Males - Variables: RFAC, LFAC, TFAC

	FUNC 1	FUNC 2
RFAC	0.21781	0.97599*
TFAC	0.41214	0.91112*
LFAC	0.59599	0.80299*

Table 6.181 - Males - Variables: RFAC to TFAC

Code Group
0 - Controls
1 - Psoriasis
2 - Atopic Eczema
3 - BCC
5 - Alopecia areata
6 - Actinic Keratosis
7 - Vitiligo

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

	GROUP	0	1	2	3	5	6
GROUP							
1		2.5234 0.0806					
2		1.0120 0.3638	3.1058 0.0451				
3		0.44442 0.6413	0.98906 0.3722	1.7144 0.1805			
5		0.58736 0.9430	2.8962 0.0556	1.5827 0.2058	0.52280 0.5930		
6		1.8904 0.1514	0.93924 0.3912	0.84616 0.4293	1.4196 0.2422	2.4847 0.0837	
7		0.80244 0.9229	2.7728 0.0628	1.6642 0.1897	0.48109 0.6182	0.33376 0.9967	2.4935 0.0830

Figure 6.54 - Territorial Map - Males - Variables: RFAC to TFAC

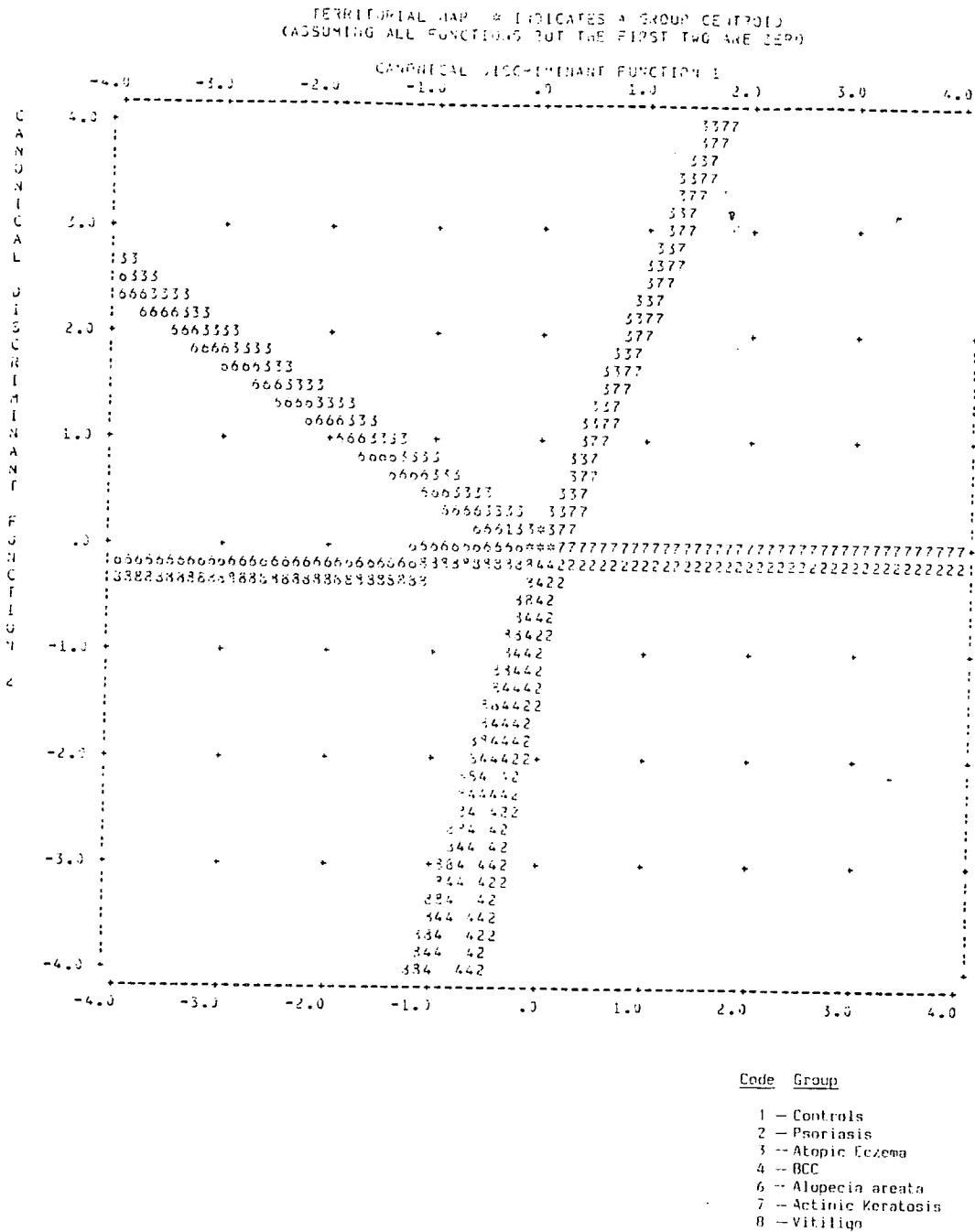


Table 6.182 - Males - Variables: RFAC to TFAC

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	200	0 0.0%	51 25.5%	37 18.5%	12 6.0%	17 8.5%	37 18.5%	46 23.0%
GROUP	1	201	2 1.0%	52 25.9%	31 15.4%	12 6.0%	19 9.5%	40 19.9%	45 22.4%
GROUP	2	203	0 0.0%	54 26.6%	45 22.2%	10 4.9%	17 8.4%	38 18.7%	39 19.2%
GROUP	3	211	2 0.9%	47 22.3%	29 13.7%	11 5.2%	23 10.9%	44 20.9%	55 26.1%
GROUP	5	210	0 0.0%	50 23.8%	32 15.2%	11 5.2%	32 15.2%	35 16.7%	50 23.8%
GROUP	6	129	2 1.6%	37 28.7%	25 17.8%	5 3.9%	12 9.3%	25 19.4%	25 19.4%
GROUP	7	200	0 0.0%	54 27.0%	40 20.0%	12 6.0%	25 12.5%	26 13.0%	43 21.5%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 15.36%

Table 6.183 - Canonical Discriminant FunctionsFemales - Variables: RFAC to TFAC

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.03771	100.00	100.00	0.1906333

Table 6.184 - Females - Variables: RFAC to TFAC

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1
RFAC	1.00000

Table 6.185 - Structure Matrix - Females - Variables: RFAC to TFAC

	FUNC 1
RFAC	1.00000
TFAC	0.97549
LFAC	0.89941

Table 6.186 - Females - Variables: RFAC to TFAC

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS AFTER STEP 3
EACH F STATISTIC HAS 1 AND 1388.0 DEGREES OF FREEDOM.

GROUP	0	1	2	3	5	6
1	0.18307 0.6688					
2	4.5509 0.0331	2.9335 0.0870				
3	6.4502 0.0112	4.4995 0.0341	0.16774 0.6822			
5	4.3453 0.0373	2.7633 0.0967	0.32045E-02 0.9549	0.21865 0.6401		
6	24.223 0.0000	20.504 0.0000	8.5034 0.0040	6.1802 0.0130	8.6756 0.0033	
7	30.842 0.0000	26.468 0.0000	11.691 0.0006	9.0269 0.0027	12.170 0.0005	0.14915 0.6994

[illegible]

Table 6.187 - Females - Variables: RFAC to TFAC

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	202	106 52.5%	6 3.0%	4 2.0%	13 6.4%	10 5.0%	13 6.4%	50 24.8%
GROUP	1	205	112 54.6%	6 2.9%	2 1.0%	11 5.4%	9 4.4%	9 4.4%	56 27.3%
GROUP	2	203	93 45.8%	12 5.9%	4 2.0%	17 8.4%	3 1.5%	7 3.4%	67 33.0%
GROUP	3	202	84 41.6%	10 5.0%	1 0.5%	14 6.9%	11 5.4%	12 5.9%	70 34.7%
GROUP	5	206	92 44.7%	20 9.7%	2 1.0%	15 7.3%	8 3.9%	12 5.8%	57 27.7%
GROUP	6	172	58 33.7%	13 7.6%	3 1.7%	14 8.1%	7 4.1%	12 7.0%	65 37.8%
GROUP	7	205	69 33.7%	8 3.9%	6 2.9%	12 5.9%	7 3.4%	12 5.9%	91 44.4%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 17.28%

Table 6.188

Means and Standard Deviations : Summed Absolute Counts

Subjects Grouped by Disorder Types

Group	Sex	No	RFAC		LFAC		TFAC	
			Mean	SD	Mean	SD	Mean	SD
Cont	M	206	99.689 +/-	45.206	93.587 +/-	42.894	193.277 +/-	86.167
GD	M	816	101.227 +/-	41.121	95.746 +/-	39.095	197.034 +/-	78.459
ND	M	340	101.662 +/-	37.098	97.106 +/-	37.010	198.768 +/-	72.501
Cont	F	203	79.704 +/-	32.259	77.399 +/-	33.722	157.103 +/-	63.626
GD	F	819	89.388 +/-	40.599	84.564 +/-	38.747	173.952 +/-	77.401
ND	F	374	93.952 +/-	38.514	88.984 +/-	36.596	182.936 +/-	73.531

Table 6.189 - Probabilities from Mann-Whitney U Tests:

Subjects grouped by disorder type

Sex	Gp 1	Gp 2	RFAC	LFAC	TFAC
M	Cont	GD	0.5380	0.5116	0.5196
M	Cont	ND	0.5261	0.3419	0.4576
M	GD	ND	0.9157	0.6408	0.8147
F	Cont	GD	0.0067**	0.0167**	0.0111*
F	Cont	ND	0.0001**	0.0003**	0.0001**
F	GD	ND	0.0425*	0.0673	0.0427*

(x) Results of Factor Analysis for Finger Ridge Counts

(1) Individual Finger Ridge Counts: Variables LFU1 to RFU5

(a) All Subjects

The results of Factor Analysis using variables LFU1 to RFU5, for all subjects, are shown in Table 6.190 to 6.192 and in Figure 6.58. Principal Components Analysis (PC) shows that four factors were extracted and these accounted for 66% of the total variance (Table 6.190). The rotated factor matrix (Table 6.191) shows that Factor 1, accounting for 41.4% of the variance, is composed entirely of radial counts. All of the radial counts are included in Factor 1 with the exception of those for finger II on both hands which make up Factor 4. The variables for all ulnar counts apart from those on finger I of both hands make up Factor 2 which accounts for 12.3% of the variance. Radial counts therefore appear to be the most important variables in Factor Analysis. The Variables Plot (Figure 6.58) shows the separation of ulnar and radial counts into two distinct groups, the ulnar count variables being higher and to the left and those for radial counts being lower and to the right, corresponding to their inclusion in the particular Factors 1 - 4 (see Table 6.192 for key to Plot).

(b) Male Subjects

When Factor Analysis was carried out using subjects grouped according to sex and disorder types the results showed the same trend as for all of the subjects combined. The results were collected together into summary tables (Tables 6.193 and 6.194) to make intergroup comparison easier. Figure 6.59 shows plots of the variables for each of the groups of male subjects.

Four factors were extracted, using PC, for controls, psoriasis, atopic eczema, alopecia areata and vitiligo, whilst five factors were extracted for BCC and actinic keratosis (see Table 6.193). In all of the groups radial counts appeared to be the most important and were always exclusively present in Factor 1, the most important factor (39 - 43.2% of variance), apart from in actinic keratosis where RFU4 also appears in Factor 1. Factor 2 was made up of ulnar counts in all of the groups (see Table 6.194). Fingers I, II and V appeared to be the least important in producing the first two factors. The plots in Figure 6.59 show the relationships of the variables in space to the factors produced.

Table 6.190 - All Subjects - Variables: LFU1 to RFU5

1. PRINCIPAL COMPONENTS ANALYSIS (PC)

FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT
1	9.27790	41.4	41.4*
2	2.46838	12.3	53.7*
3	1.26454	5.3	59.1*
4	1.18655	5.3	64.0*
5	.93695	4.3	68.3
6	.74501	3.3	71.6
7	.54984	2.2	73.8
8	.58514	2.3	76.1
9	.55636	2.3	78.4
10	.51323	2.3	80.7
11	.42321	1.9	82.6
12	.35183	1.6	84.2
13	.32579	1.4	85.6
14	.23591	1.0	86.6
15	.26756	1.2	87.8
16	.23787	1.0	88.8
17	.23356	1.0	89.8
18	.21789	1.0	90.8
19	.20810	1.0	91.8
20	.20329	1.0	92.8

PC EXTRACTED 4 FACTORS.

Table 6.191 - All Subjects - Variables: LFU1 to RFU5

ROTATED FACTOR MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
LFU4	.92431	.18526	.10621	.10731
RFU4	.82041	.18001	.08039	.11647
RFU5	.76904	.20907	.00119	.06872
LFU5	.75595	.21747	.03011	.03389
LFU3	.73896	.19548	.11786	.33981
RFU1	.69876	.02280	.38303	.09598
RFU3	.69559	.19635	.10696	.37905
LFU1	.64316	.01843	.42918	.16948
RFU3	.13353	.74402	.18133	.07011
RFU5	.07051	.72842	.02591	.10766
LFU3	.10913	.72401	.17371	.14570
LFU4	.25616	.70956	.22093	.19980
RFU4	.30273	.70723	.21284	.11374
LFU5	.02666	.70377	.01542	.15321
LFU2	.37261	.65350	.29932	.28628
RFU2	.49660	.52632	.20702	.31109
LFU1	.12923	.25769	.83029	.10872
RFU1	.16833	.27218	.81235	.11285
RFU2	.36412	.27024	.18869	.71998
LFU2	.37877	.25776	.13512	.68484

Figure 6.58 - Factor Analysis Plot - All Subjects - Variables: LFU1 to RFU5

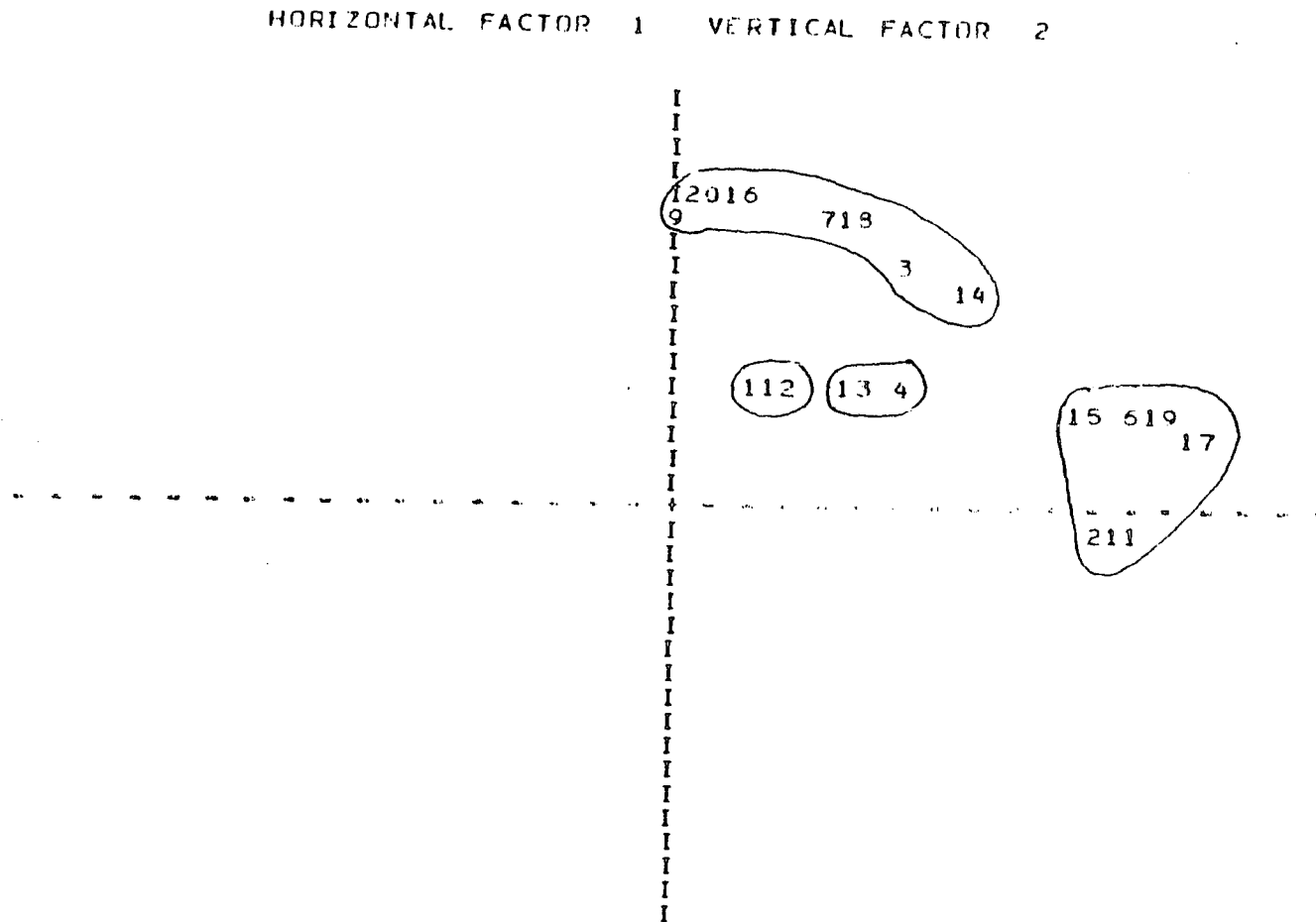


Table 6.192 - Key to symbols used in Figure 6.58

SYMBOL	VARIABLE	COORDINATES	SYMBOL	VARIABLE	COORDINATES	SYMBOL	VARIABLE	COORDINATES
1	LFU1	(.12923, .25760)	2	LFR1	(.64316, .01843)	3	LFU2	(.37261, .55359)
4	LFR2	(.37877, .25776)	5	LFU3	(.10913, .72401)	6	LFR3	(.73896, .19548)
7	LFU4	(.25616, .70866)	8	LFR4	(.92431, .18526)	9	LFU5	(.02666, .70377)
10	LFR5	(.75595, .21747)	11	RFR1	(.69876, .02280)	12	RFU1	(.16838, .27218)
13	RFR2	(.30412, .27024)	14	RFU2	(.49060, .52632)	15	RFR3	(.69550, .19635)
16	RFU3	(.13353, .74402)	17	RFR4	(.82041, .18901)	18	RFU4	(.30273, .70723)
19	RFR5	(.76904, .20907)	20	RFU5	(.07051, .72842)			

(c) Females

The results of Factor Analysis for female subjects using variables LFU1 to RFU5 are summarized in Tables 6.195 and 6.196 and in Figure 6.60. Five factors ere extracted using PC for all of the groups except BCC and actinic keratosis where only four were produced (see Table 6.195). As for male subjects, radial counts were again the most important variables in Factor 1 (34 - 44% of variance) and ulnar counts were most important in Factor 2 (9.7 - 16.2%). Again fingers I, II and V were present mostly in Factors 3, 4 and 5.

Table 6.193 - Principal Components Analysis - Males - Variables: LFU1 to RFU5

	Controls			Psoriasis			Atopic Eczema		
FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT	EIGENVALUE	PCT OF VAR	CUM PCT	EIGENVALUE	PCT OF VAR	CUM PCT
1	8.64842	43.2	43.2	8.52398	42.6	42.6	8.46751	42.3	42.3
2	2.32062	11.6	54.8	2.84471	14.2	56.8	2.98736	14.9	57.3
3	1.38859	6.9	61.8	1.50177	7.5	64.4	1.49842	7.5	64.8
4	1.05855	5.3	67.1	1.32935	6.6	71.0	1.12617	5.6	70.4

	BCC			Actinic Keratosis		
FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT	EIGENVALUE	PCT OF VAR	CUM PCT
1	7.79979	39.0	39.0	8.05431	40.3	40.3
2	2.13027	10.7	49.7	2.14934	10.7	51.0
3	1.63823	8.2	57.8	1.60342	8.0	59.0
4	1.50776	7.5	65.4	1.28168	6.4	65.4
5	1.30375	6.5	71.9	1.00234	5.0	70.5

	Alopecia areata			Vitiligo		
FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT	EIGENVALUE	PCT OF VAR	CUM PCT
1	8.01816	40.1	40.1	8.10427	40.5	40.5
2	2.84023	14.2	54.3	2.56677	12.8	53.4
3	1.60246	8.0	62.3	1.40041	7.0	60.4
4	1.47376	7.4	69.7	1.22631	6.1	66.5

Table 6.194 - Extracted Factors with variables ordered by size of correlation coefficients from Rotated Factor Matrix - Males -
Variables: LFU1 to RFU5

	Cont.	Psor.	A.Ecz.	BCC	A.Ker.	Alop.	Vit.
FACTOR 1	LFR3 LFR4 RFR4 LFR5 RFR5 RFR1 LFR1 RFR3	RFR4 LFR4 RFR5 LFR3 RFR3 LFR5 RFR1	RFR4 LFR4 RFR5 LFR5 LFR3 RFR3 RFR1	RFR4 LFR5 RFR5 LFR4 RFR1	RFR3 RFR2 LFR3 LFR2 RFR4 RFU4 LFR4	RFR4 LFR4 RFR5 LFR5 RFR1 LFR3 RFR3 LFR1	LFR5 RFR5 LFR4 RFR4 LFR1 RFR1
FACTOR 2	RFU2 RFU4 RFU3 LFU2 LFU3 LFU4	LFU5 RFU5 RFU3 LFU4 RFU4 LFU3 LFU2 RFU2	RFU4 LFU4 RFU3 LFU2 RFU5 LFU5 LFU3 RFU2	RFU3 LFU3 LFU4 RFU4 RFU2 LFU2	RFU1 LFU1	RFU5 LFU5 LFU4 RFU3 LFU3 RFU4 LFU2 RFU2	RFU2 LFU1 LFU2 RFU1 LFU4 RFU4 RFU3
FACTOR 3	LFU1 RFU1 RFR2 LFR2	LFU1 RFU1 LFR1	LFU1 RFU1 LFR1	RFR2 RFR3 LFR3 LFR2	LFU2 RFU2 RFU3 LFU3 LFU4	RFU1 LFU1	LFR2 RFR2 RFR3 LFR3
FACTOR 4	LFU5 RFU5	RFR2 LFR2	LFR2 RFR2	LFU1 RFU1 LFR1	LFU5 RFU5 RFR5 LFR5	LFR2 RFR2	RFU5 LFU5 LFU3
FACTOR 5				LFU5 RFU5	LFR1 RFR1		

Figure 6.59 - Factor Analysis Variable Plots - Males - Variables: LFU1 to RFU5

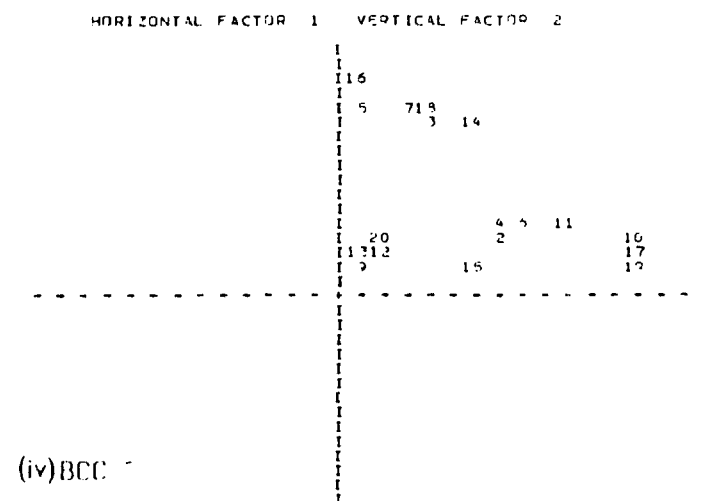
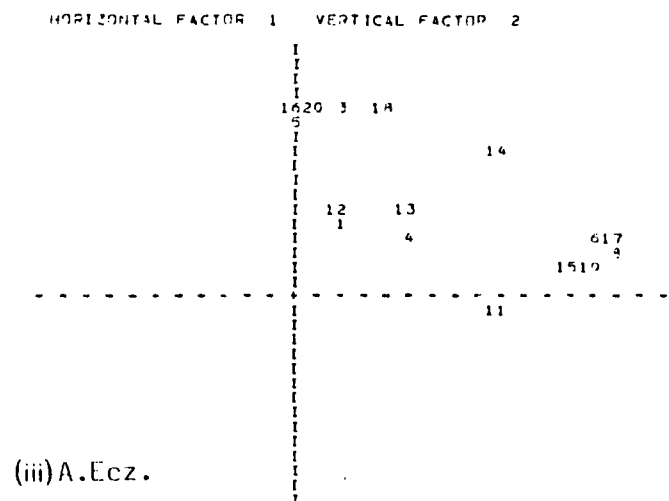
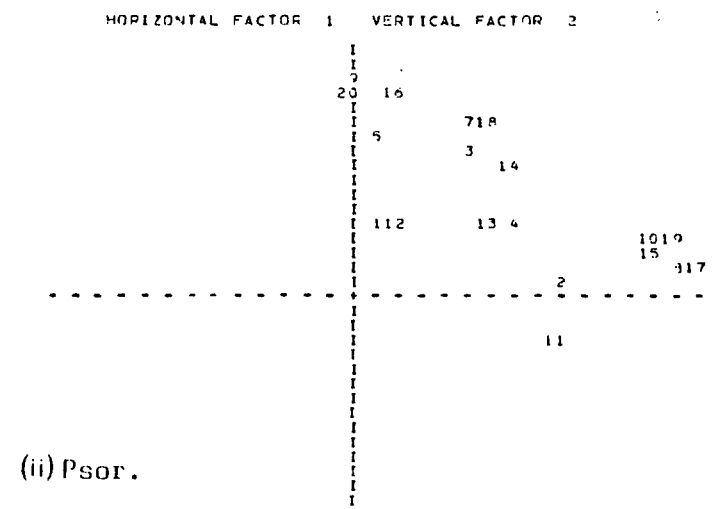
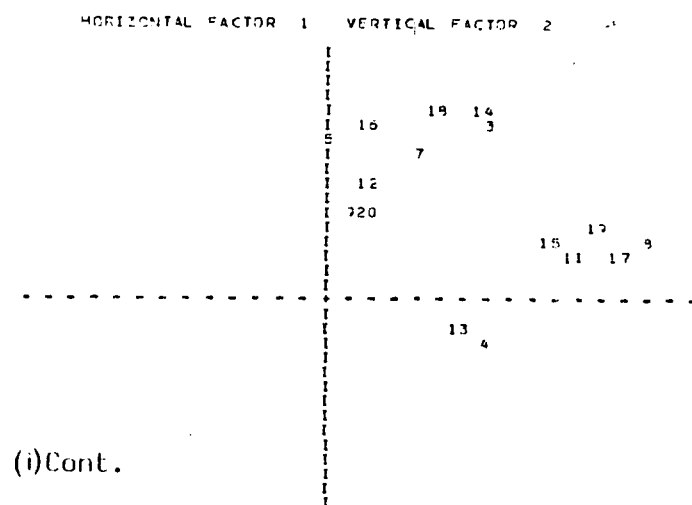
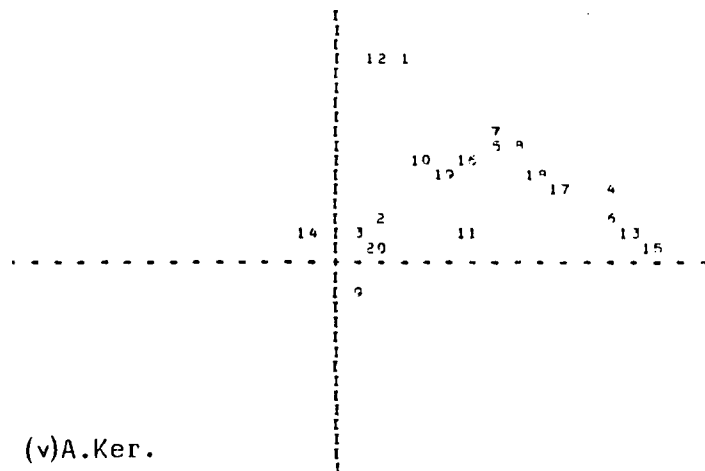
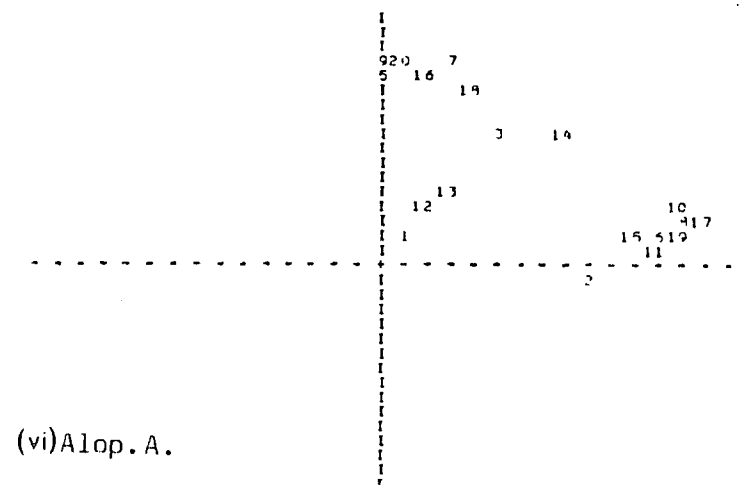


Figure 6.59 continued

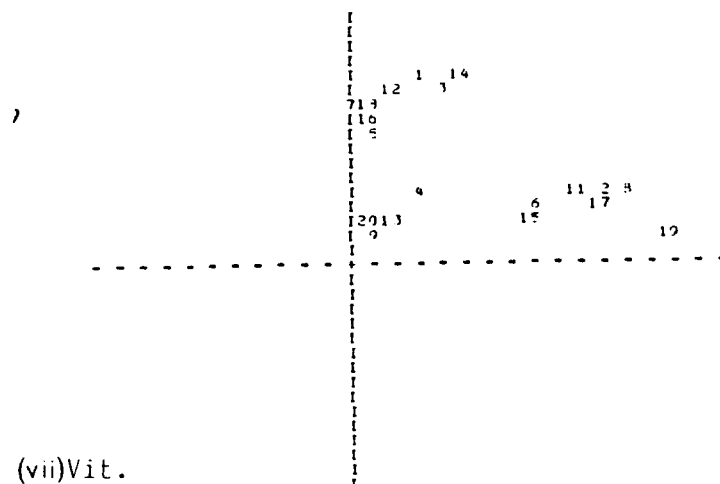
HORIZONTAL FACTOR 1 VERTICAL FACTOR 2



HORIZONTAL FACTOR 1 VERTICAL FACTOR 2



HORIZONTAL FACTOR 1 VERTICAL FACTOR 2



SYMBOL VARIABLE

1 LFR1
2 LFR1
3 LFR2
4 LFR2
5 LFR3
6 LFR3
7 LFR4
8 LFR4
9 LFR5
10 LFR5
11 RFR1
12 RFR1
13 RFR2
14 RFR2
15 RFR3
16 RFR3
17 RFR4
18 RFR4
19 RFR5
20 RFR5

Table 6.195 - Principal Components Analysis - Females - Variables: LFU1 to RFU5

	Controls				Psoriasis				Atopic Eczema			
FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT		EIGENVALUE	PCT OF VAR	CUM PCT		EIGENVALUE	PCT OF VAR	CUM PCT	
1	6.79053	34.0	34.0		8.13930	40.7	40.7		8.79019	44.0	44.0	
2	2.44604	12.2	46.2		2.10061	10.5	51.2		1.94578	9.7	53.7	
3	1.35969	6.8	53.0		1.63464	8.2	59.4		1.54248	7.7	61.4	
4	1.22613	6.1	59.1		1.28061	6.4	65.8		1.33792	6.7	68.1	
5	1.03689	5.2	64.3		1.10949	5.5	71.3		1.10010	5.5	73.6	

	Alopecia Areata				Vitiligo			
FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT		EIGENVALUE	PCT OF VAR	CUM PCT	
1	8.23097	41.2	41.2		8.04767	40.2	40.2	
2	2.68206	13.4	54.6		2.42663	12.1	52.4	
3	1.56946	7.8	62.4		1.60381	8.0	60.4	
4	1.33345	6.7	69.1		1.40110	7.0	67.4	
5	1.18205	5.9	75.0		1.17467	5.9	73.3	

	BCC				Actinic Keratosis			
FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT		EIGENVALUE	PCT OF VAR	CUM PCT	
1	8.40628	42.0	42.0		7.90101	39.5	39.5	
2	2.55939	12.8	54.8		3.24573	16.2	55.7	
3	1.35099	6.8	61.6		1.64992	8.2	64.0	
4	1.04191	5.2	66.8		1.17370	5.9	69.9	

Table 6.196 - Factors with variables from Rotated Factor Matrix
 Females - Variables: LFU1 to RFU5

	Cont.	Psor.	A.Ecz.	Alop.	Vit.	BCC	A.Ker.
FACTOR 1	RFR5 LFR5 LFR4 RFR4 RFR1 LFR3	RFR4 LFR4 RFR5 LFR5 RFR3 LFR3 RFR1 LFR1	LFR4 LFR3 RFR4 LFR5 RFR3 RFR5 RFR1 RFR1 LFR1 LFR2	RFR4 LFR3 LFR4 RFR1 RFR3 LFR1 RFR5 LFR5	LFR4 RFR4 RFR1 RFU2 LFR5 LFR1	LFR4 LFR3 RFR5 RFR1 RFR4 RFR3 RFR4 LFR5 LFR2	RFR4 RFR5 LFR3 RFR3 LFR4 LFR5 RFR1 LFR1
FACTOR 2	LFU4 RFU5 RFU4 LFU5 LFU3 RFU3	RFU3 RFU4 LFU4 RFU2 LFU3 LFU2	LFU3 RFU3 RFU4 LFU4 RFR2	RFU5 RFU3 RFU4 RFU2	RFR2 LFR2 RFR3 LFR3 RFR5	LFU2 RFU2 LFU3 LFU4 RFU3 RFU4	RFU4 LFU2 RFU3 RFU2 LFU4 LFU3
FACTOR 3	LFR2 RFR2 RFR3	LFU1 RFU1	RFU1 LFU1	LFU5 LFU4 LFU3 LFU2	LFU4 LFU2 RFU4 LFU3 RFU3	RFU5 LFU5 RFR2	LFU1 RFR2 RFU1 LFR2
FACTOR 4	RFU1 LFU1 LFR1	LFR2 RFR2	RFU2 LFU2	LFU1 RFU1	RFU5 LFU5	LFU1 RFU1	RFU5 LFU5
FACTOR 5	RFU2 LFU2	LFU5 RFU5	LFU5 RFU5	LFR2 RFR2	RFU1 LFU1		

Figure 6.60 - Variable Plot - Females - Variables: LFU1 to RFU5

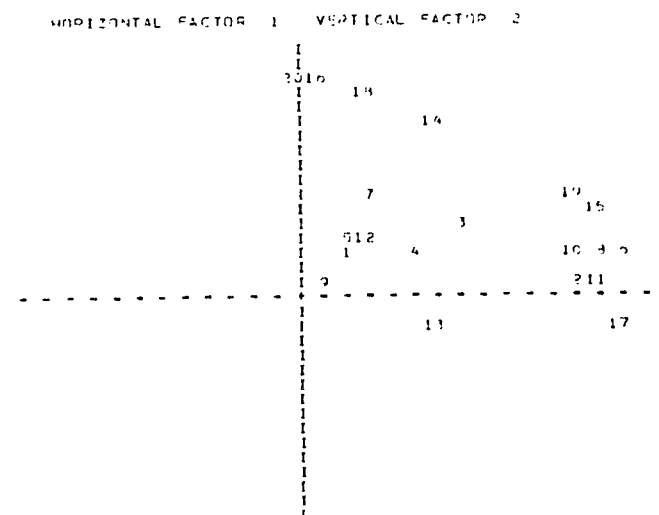
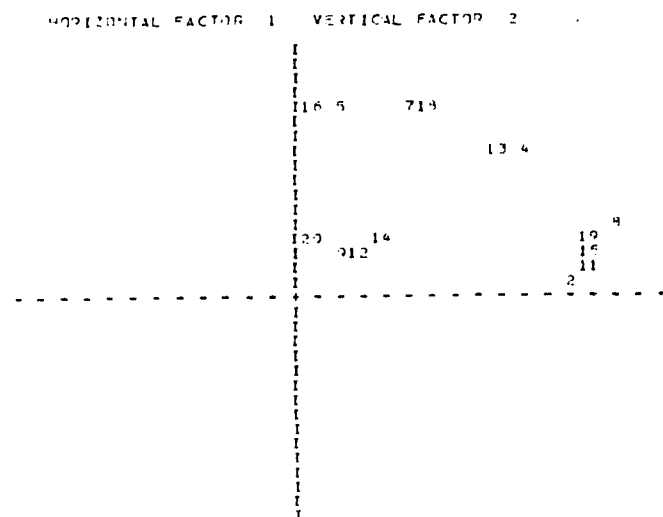
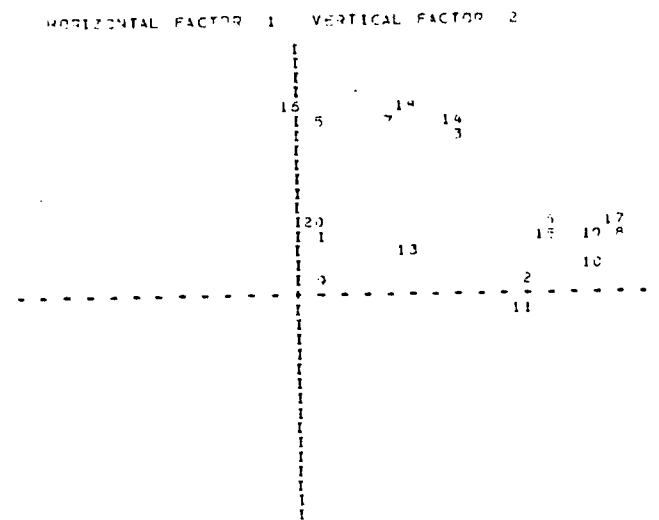
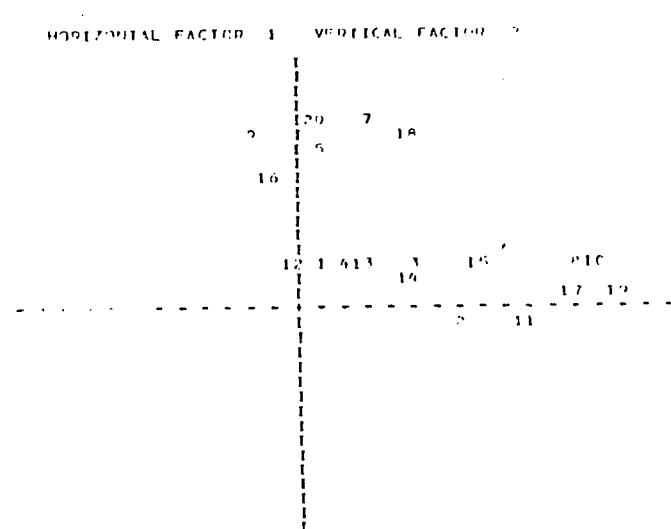
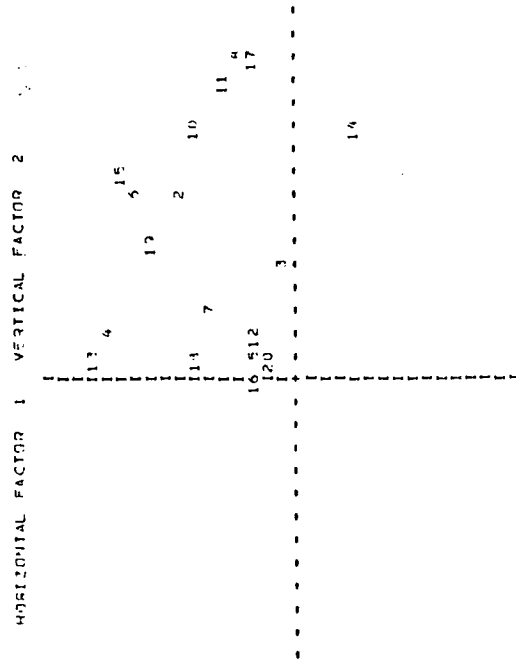
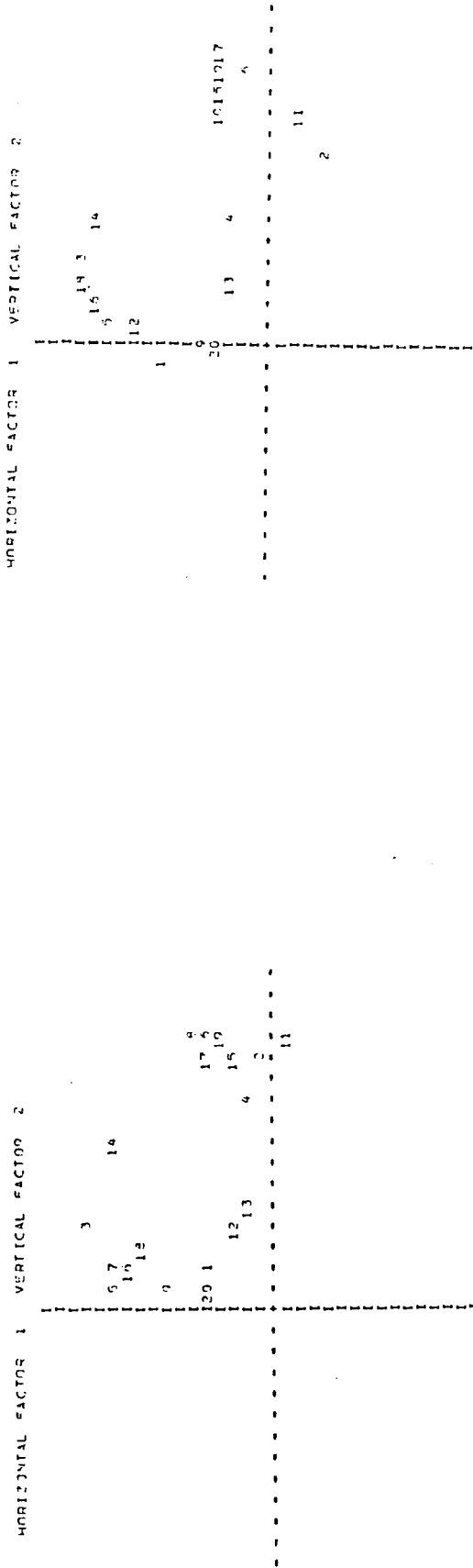


Figure 6.60 continued



(2) Computed Variable for Finger Ridge Counts

(a) All Subjects: Variables RFA1 to TFU

Six factors were extracted using PC which together accounted for 90.5% of the total variance. Factor 1 was responsible for 65.9% of the total variance (see Table 6.197). From Table 6.198 the 17 variables making up Factor 1 can be seen. Radial counts and absolute counts predominate. Note that in Factors 1 and 2, six counts concerning finger IV are to be found. Factor 2 contains four ulnar count variables out of the eight variables which the factor is composed of. Figure 6.61 shows the relationships of the variables to each other and shows their clustering into Factor groups.

(b) Male Subjects: Variables RF1 to TFU

Since variable RFA1 to LFA5 produced only little effect in forming the Factors, when subjects were grouped by sex and disorder type for Factor Analysis, the variable set was reduced by removing these variables. The results for male subjects are shown in Tables 6.200 and 6.201 and in Figure 6.62. For all groups, except controls and psoriasis, seven factors were extracted with only six factors being extracted for these two groups. Factor 1 was responsible in the groups for between 60.7 and 66.0% of the total variance (see Table 6.200). The rotated factor matrix was only produced for two subject groups, controls and alopecia areata, by the Factor program. The Factors extracted with the variables of which they are composed are shown in Table 6.201 and in Figure 6.62.

(c) Female Subjects: Variables RF1 to TFU

As a result of PC seven factors were extracted for all female disorder groups apart from psoriasis and actinic keratosis where only six were extracted (see Table 6.202). Factor 1 accounted for 59.2 to 67.6% of the variance. The variables which make up the extracted factors are shown in Table 6.202 and Figure 6.63. The importance of the individual variables in different groups are much more varied than for LFU1 to RFU5.

Table 6.197 - All Subjects - Variables: RFA1 to TFU

1. PRINCIPAL COMPONENTS ANALYSIS (PC)

FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT
1	27.67359	55.9	55.9*
2	3.45325	8.2	74.1*
3	2.52068	5.0	80.1*
4	2.02419	4.3	84.9*
5	1.17793	2.3	87.7*
6	1.14901	2.3	90.5*
7	.77853	1.9	92.3
8	.64608	1.5	93.9
9	.59564	1.4	95.3
10	.46958	1.1	96.4
11	.32899	.8	97.2
12	.24262	.5	97.8
13	.22425	.5	98.3
14	.18913	.3	98.7
15	.15056	.4	99.1
16	.15798	.4	99.5
17	.12135	.3	99.8
18	.03349	.1	99.9
19	.01356	.0	99.9
20	.01513	.0	100.0
21	.01314	.0	100.0
22	.00632	.0	100.0
23	.00000	.0	100.0
24	.00000	.0	100.0
25	.00000	.0	100.0
26	.00000	.0	100.0
27	.00000	.0	100.0
28	.00000	.0	100.0
29	.00000	.0	100.0
30	.00000	.0	100.0
31	.00000	.0	100.0
32	.00000	.0	100.0
33	.00000	.0	100.0
34	.00000	.0	100.0
35	.00000	.0	100.0
36	.00000	.0	100.0
37	.00000	.0	100.0
38	.00000	.0	100.0
39	.00000	.0	100.0
40	.00000	.0	100.0
41	.00000	.0	100.0
42	.00000	.0	100.0

PC EXTRACTED 6 FACTORS.

Table 6.198 - All Subjects - Variables: RFA1 to TFU
ROTATED FACTOR MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6
R4	.83040	.38324	.13704	.09525	.15812	.05119
F4	.81474	.41804	.14264	.09842	.19375	.08013
TFR	.81341	.16950	.27654	.35714	.20772	.20349
TFRC	.80491	.23095	.28351	.33280	.24274	.19011
RFRC	.78715	.23938	.25063	.30632	.24255	.18405
LFR	.78622	.15560	.27743	.35428	.19635	.20291
RFR	.78600	.17203	.25710	.35534	.25515	.19041
R3	.77704	.10442	.15434	.25534	.07849	.43237
LFRC	.77613	.20873	.30086	.34066	.22872	.18523
F3	.76245	.13824	.15954	.26108	.10473	.46746
R5	.69991	.16287	.12282	.12756	.57071	.05865
F5	.68511	.17706	.12562	.13643	.50899	.03356
R1	.66280	.00284	.58966	.11803	.05285	.34275
FI	.65048	.02695	.62244	.13212	.07675	.04667
RFAC	.49581	.46918	.39099	.36493	.31772	.32259
TFAC	.49399	.46657	.41335	.39276	.31710	.33423
LFAC	.46943	.44247	.41760	.40364	.30192	.33100
U4	.18198	.79115	.17780	.21594	.22178	.27170
AF4	.53084	.72408	.18771	.19304	.22786	.20920
RFA4	.51343	.69963	.17420	.16600	.22981	.19420
LFA4	.50052	.68347	.18466	.20360	.20502	.20572
TFU	.10593	.63513	.44975	.33408	.34899	.38165
RFU	.13418	.61957	.41833	.29104	.34318	.36384
LFU	.06659	.59427	.44233	.34935	.32364	.36602
U2	.16141	.57957	.20538	.51148	.19131	.09929
AF1	.32704	.20450	.88660	.16212	.13026	.12622
U1	.04237	.27713	.84995	.14920	.14545	.14608
LFA1	.28976	.16542	.84689	.16821	.11540	.13173
RFA1	.32586	.21913	.82365	.13761	.12981	.10638
AF2	.36079	.40618	.22481	.75357	.18227	.21578
LFA2	.31690	.37867	.22298	.72574	.16778	.20678
RF42	.36444	.38917	.20257	.69868	.17679	.20133
R2	.42086	.06088	.15346	.69807	.09869	.24884
F2	.55648	.21253	.18673	.68388	.15936	.17925
AF5	.40965	.24353	.15680	.15675	.83505	.15715
LFA5	.35593	.20593	.16563	.18963	.78235	.12382
U5	.08447	.23098	.12878	.12343	.77842	.33091
RFA5	.40438	.24485	.12674	.10376	.77011	.16728
U3	.00716	.42290	.16236	.20139	.26215	.73777
AF3	.46950	.32304	.19240	.27691	.20849	.71332
RFA3	.43114	.30557	.17727	.26825	.20767	.67464
LFA3	.45316	.30284	.18512	.25322	.18553	.66880

Figure 6.61 - Variable Plot - All Subjects - Variables: RFA1 to IFU

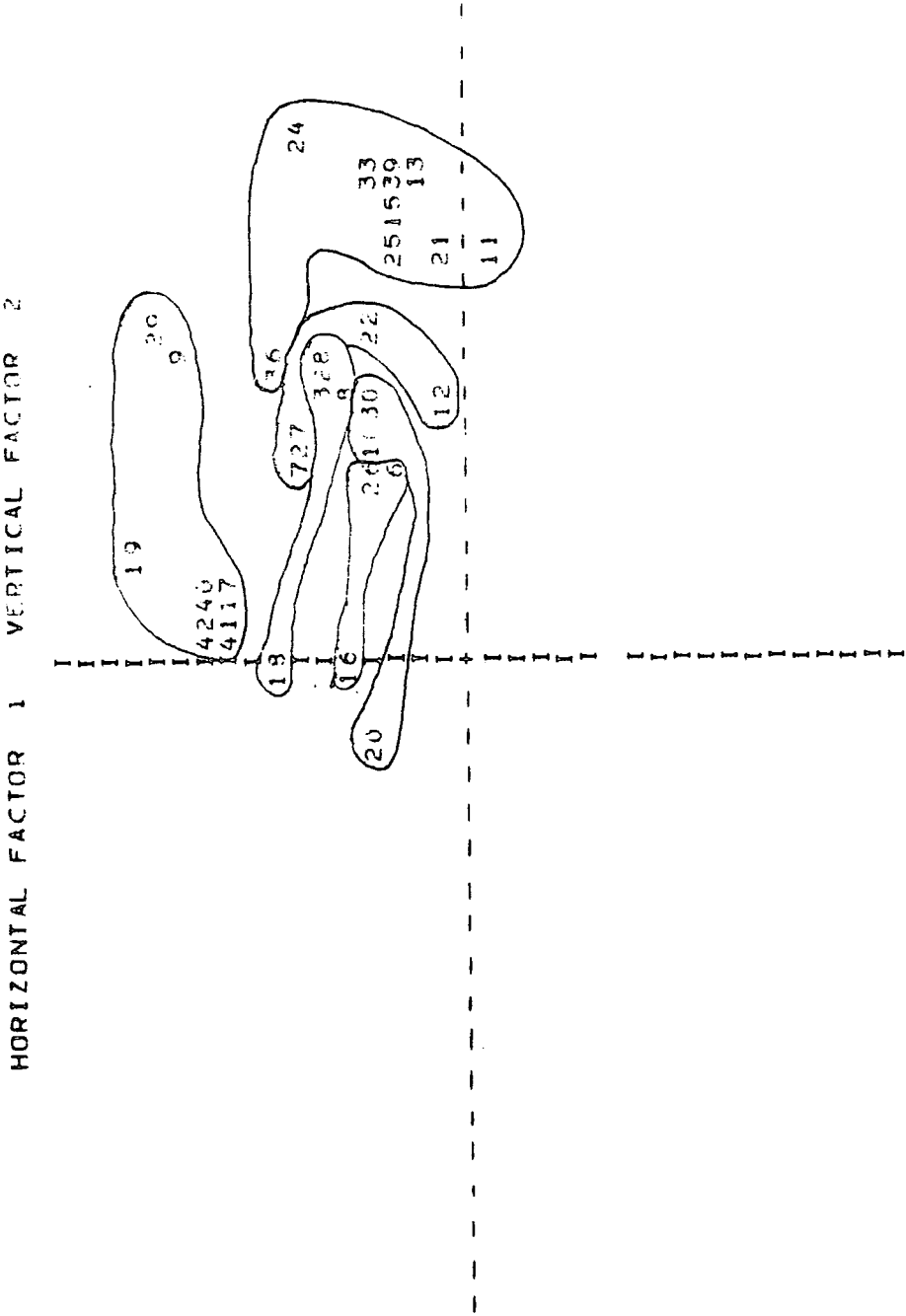


Table 6.199 - Key to Variable Plot

SYMBOL	VARIABLE	COORDINATES	SYMBOL	VARIABLE	COORDINATES	SYMBOL	VARIABLE	COORDINATES
1	RFA1	(.32586. .21913)	2	RFA2	(.36444. .38917)	3	RFA3	(.43114. .31557)
4	RFA4	(.51343. .69963)	5	RFA5	(.46438. .24485)	6	LFA1	(.28976. .16547)
7	LFA2	(.31690. .37867)	8	LFA3	(.45316. .30284)	9	LFA4	(.50052. .68347)
10	LFA5	(.35593. .20693)	11	R1	(.66280. .00284)	12	R2	(.42086. .06088)
13	R3	(.77704. .10442)	14	R4	(.83040. .38324)	15	R5	(.69991. .16287)
16	U1	(.04237. .27713)	17	U2	(.16141. .57957)	18	U3	(.00716. .42290)
19	U4	(.18198. .79115)	20	U5	(.08447. .23598)	21	F1	(.65048. .02605)
22	F2	(.55648. .21253)	23	F3	(.76245. .13824)	24	F4	(.81474. .41914)
25	F5	(.68511. .17706)	26	AF1	(.32704. .20450)	27	AF2	(.36079. .40618)
28	AF3	(.46950. .32304)	29	AF4	(.53084. .72400)	30	AF5	(.40965. .24353)
31	RFRC	(.78715. .23938)	32	LFRC	(.77613. .20873)	33	TFRC	(.80491. .23095)
34	RFAC	(.49581. .46918)	35	LFAC	(.46943. .44247)	36	TFAC	(.49399. .46657)
37	RFR	(.78600. .17203)	38	LFR	(.78622. .15560)	39	TFR	(.81341. .16950)
40	RFU	(.13418. .61957)	41	LFU	(.06659. .59427)	42	TFU	(.10593. .63513)

Table 6.200 - Principal Components Analysis (PC) - Males - Variables: RF1 to IFU

FACTOR	Controls			Psoriasis		
	EIGENVALUE	PCT OF VAR	CUM PCT	EIGENVALUE	PCT OF VAR	CUM PCT
1	34.33466	66.0	66.0	33.87102	65.1	65.1
2	3.76978	7.2	73.3	4.73522	9.1	74.2
3	2.91409	5.6	78.9	3.37704	6.5	80.7
4	2.29139	4.4	83.3	2.20373	4.2	85.0
5	1.79377	3.4	86.7	1.47504	2.8	87.8
6	1.46306	2.8	89.6	1.23127	2.4	90.2

FACTOR	Atopic Eczema			Alopecia Areata		
	EIGENVALUE	PCT OF VAR	CUM PCT	EIGENVALUE	PCT OF VAR	CUM PCT
1	32.64902	62.8	62.8	32.62881	62.7	62.7
2	5.17541	10.0	72.7	4.91942	9.5	72.2
3	3.73606	7.2	79.9	3.63893	7.0	79.2
4	2.49989	4.8	84.7	2.59545	5.0	84.2
5	1.51625	2.9	87.6	1.36263	2.6	86.8
6	1.40981	2.7	90.4	1.19986	2.3	89.1
7	1.00275	1.9	92.3	1.09452	2.1	91.2

FACTOR	Vitiligo			Actinic Keratosis		
	EIGENVALUE	PCT OF VAR	CUM PCT	EIGENVALUE	PCT OF VAR	CUM PCT
1	32.78234	63.0	63.0	31.55811	60.7	60.7
2	4.43822	8.5	71.6	4.06093	7.8	68.5
3	3.54111	6.8	78.4	3.61464	7.0	75.4
4	2.38002	4.6	83.0	3.22081	6.2	81.6
5	1.62176	3.1	86.1	1.90975	3.7	85.3
6	1.30028	2.5	88.6	1.41906	2.7	88.0
7	1.14213	2.2	90.8	1.19056	2.3	90.3

Table 6.201
Factors with component
variables from
Rotated Factor Matrix
Males: RF1 to TFU

	Cont.	Alop.
Factor 1	TFU LFU RFU U4 U1 U3 RFAC TFAC U5 LFAC U2	F3 R3 LF3 RF3 TFR F2 TFRC RFR LF2 R2 LFRC LFR RFRC RF2 F4 R4 LF4
Factor 2	F4 R4 LF4 RF4 AF4 LFA4 RFA4 LFR LFRC TFRC LF3 RFRC	AF5 LFA5 RFA5 F5 R5 U5 LF5 RF5
Factor 3	FI R1 LF1 RF1 AF1 LFA1 RFA1	AF2 RFA2 U2 LFA2 TFU LFU RFU TFAC RFAC
Factor 4	R2 F2 LFA2 LF2 AF2 RF2 RFA2 RFR TFR	U1 AF1 LFA1 RFA1 LFA4 LFAC
Factor 5	AF5 F5 R5 RFA5 RF5 LF5 LFA5	R1 FI RF1 LF1
Factor 6	RFA3 AF3 RF3 F3 LFA3 R3	U3 AF3 RFA3 LFA3
Factor 7		RFA4 RF4 AF4 U4

Figure 6.62 - Variable Plots - Males - Variables RF1 to TFU

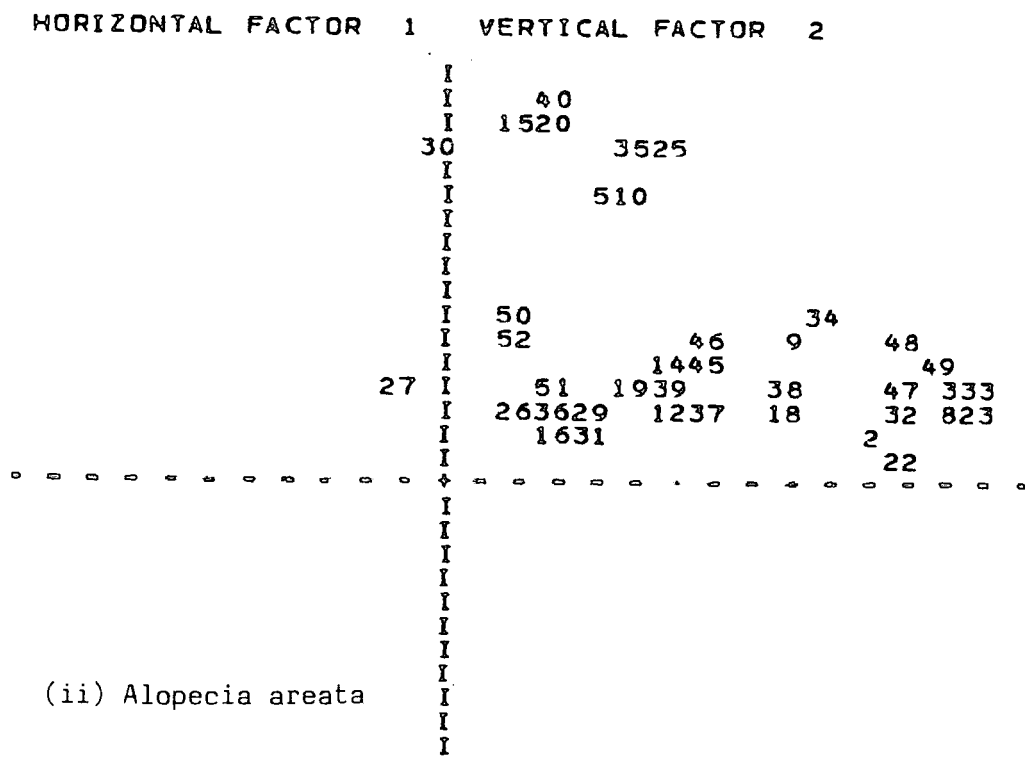
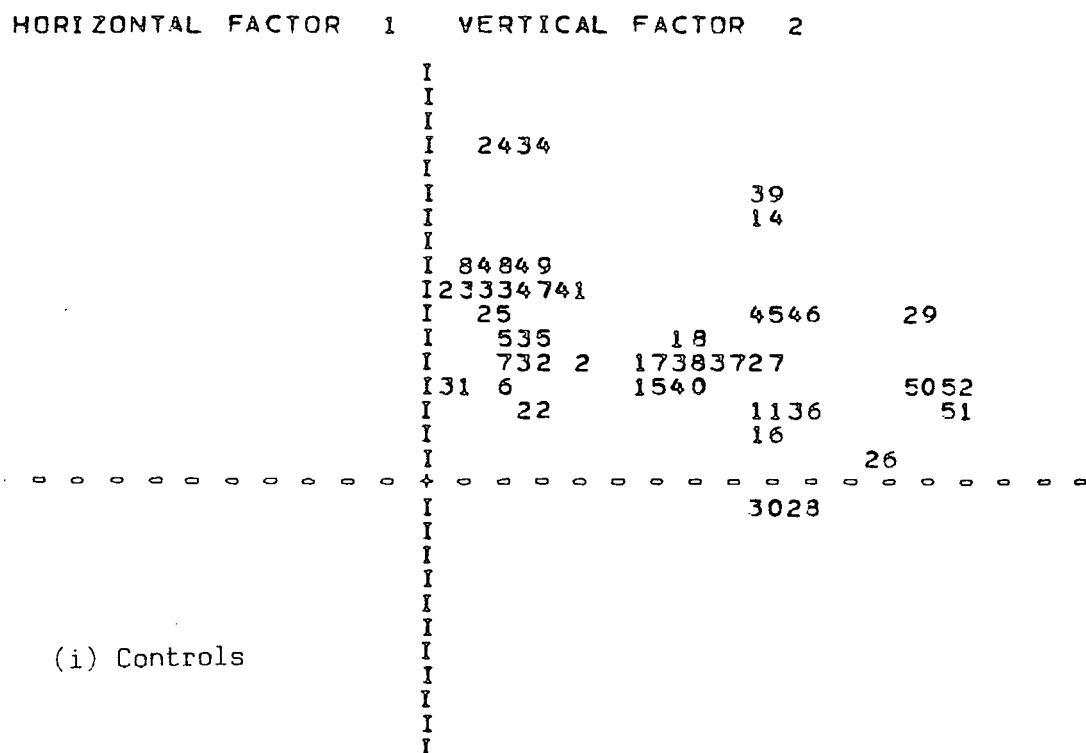


Table 6.202 - Principal Components Analysis (PC) - Females

Variables: RF1 to TFU

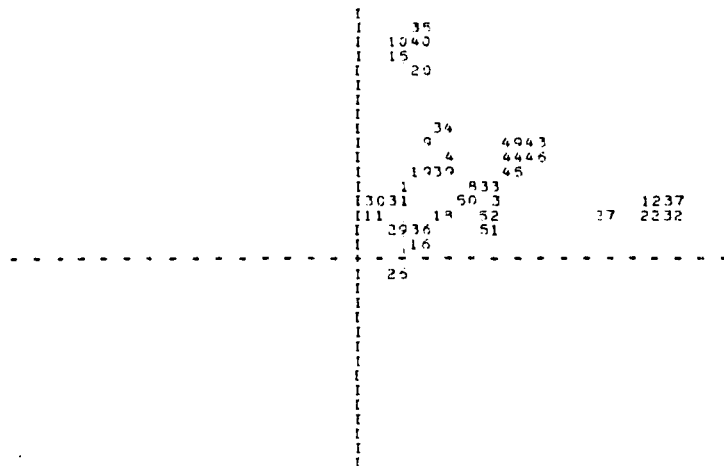
	FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT
Cont.	1	30.75303	59.2	59.2
	2	4.18219	8.0	67.2
	3	3.93180	7.6	74.8
	4	2.93203	5.6	80.4
	5	1.96088	3.6	84.0
	6	1.52770	2.9	86.9
	7	1.20587	2.3	89.2
Psor.	1	33.24026	63.9	63.9
	2	3.77984	7.3	71.2
	3	3.61377	6.9	78.1
	4	2.47315	4.8	82.9
	5	1.92973	3.7	86.6
	6	1.58785	3.1	89.7
A.Ecz.	1	35.15594	67.6	67.6
	2	3.58293	5.9	74.5
	3	3.03571	5.8	80.3
	4	2.05043	3.9	84.3
	5	1.62937	3.1	87.4
	6	1.35565	2.6	90.0
	7	1.05949	2.0	92.1
BCC	1	33.89880	65.2	65.2
	2	4.47395	8.6	73.8
	3	3.12552	6.0	79.8
	4	2.40006	4.6	84.4
	5	1.66861	3.2	87.6
	6	1.33495	2.6	90.2
	7	1.05040	2.0	92.2
Alop.	1	33.91484	65.2	65.2
	2	4.33927	8.3	73.6
	3	3.09114	5.9	79.5
	4	2.07863	4.0	83.5
	5	1.71589	3.3	86.8
	6	1.12695	2.2	89.0
	7	1.02245	2.0	90.9
A.Ker.	1	31.75685	61.1	61.1
	2	6.20327	11.9	73.0
	3	4.13452	8.0	81.0
	4	1.94489	3.7	84.7
	5	1.57549	3.0	87.7
	6	1.28985	2.5	90.2
Vit.	1	32.87216	63.2	63.2
	2	4.18655	8.1	71.3
	3	3.29521	6.3	77.6
	4	2.46864	4.7	82.4
	5	2.08934	4.0	86.4
	6	1.20553	2.3	88.7
	7	1.02821	2.0	90.7

Table 6.202 continued - Females - Variables: RF1 to TFU

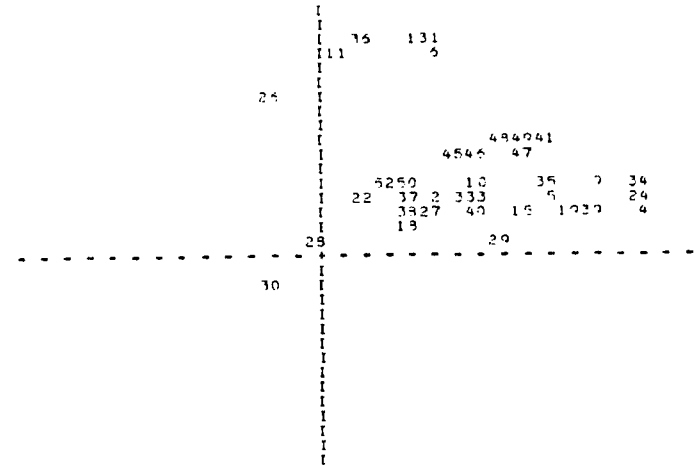
	Cont.	Psor.	A.Ecz.	BCC	Alop.	A.Ker.	Vit.
FACTOR 1	AF2 F2 RFA2 LFA2 RF2 LF2 R2 U2 RFRC TFRC RFAC	RF4 F4 R4 LF4 RFA4 AF4 LFA4 RF5 R5 RFRC TFRC RFR TFR LFRC LFR	R5 F5 RF5 LF5 R4 F4 RF4 AF5 RFA5 LF4 RFRC LFA5 TFRC RFR LFRC TFR LFR RFAC TFAC	TFU LFU U4 RFU U3 AF4 LFA4 LFAC TFAC U5 U2 RFAC AF3 RFA3	RFA5 RF5 RF4 RFRC F5 AF5 U5 RFA3 RF2 RFU RF3 RFAC F4 TFRC	TFU RFU U4 LFU U3 AF4 U2 RFA4 AF3 RFA3 TFAC LFA4 RFAC LFAC LFA3 AF2 LFA2 RFA2	R4 F4 LF4 RF4 RF2 RF1 RFRC TFRC F2 R1 FI LFRC TFR RFR RFA2 LFR
FACTOR 2	F5 R5 RF5 LF5 AF5 RFA5 LFA5 RFR TFR	AF1 FI R1 LFA1 RF1 RFA1 LF1 U1	AF2 U2 LFA2 RFA2 F2 RF2 LF2 R2	R2 RF2 F2 RFA2 AF2 LF2 LFA2 RFR TFR LFR	R2 LF2 F2 AF2 LFA2 TFR RFA2 LFR RFR LFRC R3 R4 LF3 F3	R4 F4 F3 R3 LF3 TFRC RF4 LFRC RFR TFR FI LF4 R1 LFR RF3 RF1 RFR LF1 LF2	U4 TFU LFU RFU U3 AF4 RFA4 LFA4 LFAC TFAC LFA2 U2 AF2 RFAC
FACTOR 3	FI LF1 R1 AF1 LFA1 RF1 RFA1 LFRC LFR	F2 AF2 LF2 RF2 RFA2 LFA2 R2 U2	R1 FI LF1 RF1	AF1 RFA1 LFA1 FI R1 RF1 LF1 U1	R1 FI RF1 LF1	R5 F5 RF5 LF5 RFA5 AF5	RF5 F5 R5 RFA5 AF5 LFA5 LF5
FACTOR 4	TFU LFU U3 U5 U4 RFU LFAC TFAC	TFU RFU LFU U3 U4 RFAC TFAC LFAC	RFA3 AF3 RF3 F3 LFA3 R3 U3 LF3	RF4 R4 F4 LF4 RFA4 RFRC F3 R3 TFRC RF3 LFRC	U4 U2 LFU U3 TFU AF4 LFA4 RFA4 LFAC TFAC	AF1 LFA1 RFA1 U1	R3 LF3 F3 RF3 AF3 LFA3 RFA3
FACTOR 5	F3 RF3 R3 AF3 RFA3 LF3 LFA3	R3 F3 RF3 LF3 AF3 LFA3 RFA3	U4 AF4 LFA4 RFA4 LFU LFAC	AF5 LFA5 R5 F5 LF5	LFA5 LF5 R5 LF4	R2 RF2 F2	AF1 U1
FACTOR 6	F4 RF4 R4	LFA5 AF5	U1 AF1	RFA5 RF5	LFA1 RFA1 U1 AF1	U5 LFA5	LFA1 RFA1 LF1
FACTOR 7	AF4 RFA4 LFA4 LF4 U1	U5 LF5 F5 RFA5	RFA LFA1 RFU TFU U5	LFA3 LF3	LFA3 AF3 U3		R2 LF2 U5

Figure 6.63 - Variable Plot - Females - Variables: RF1 to TFU

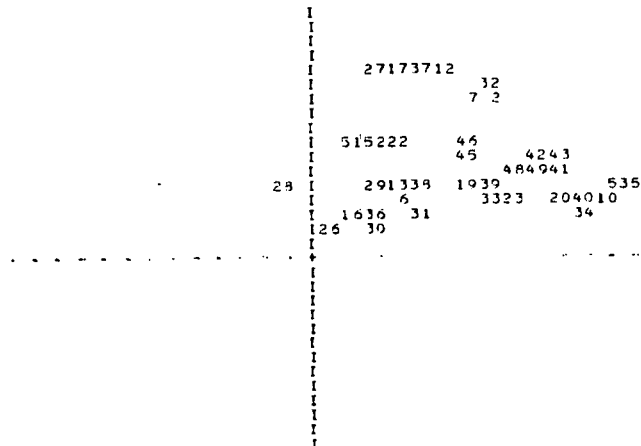
HORIZONTAL FACTOR 1 VERTICAL FACTOR 2



HORIZONTAL FACTOR 1 VERTICAL FACTOR 2



HORIZONTAL FACTOR 1 VERTICAL FACTOR 2



HORIZONTAL FACTOR 1 VERTICAL FACTOR 2

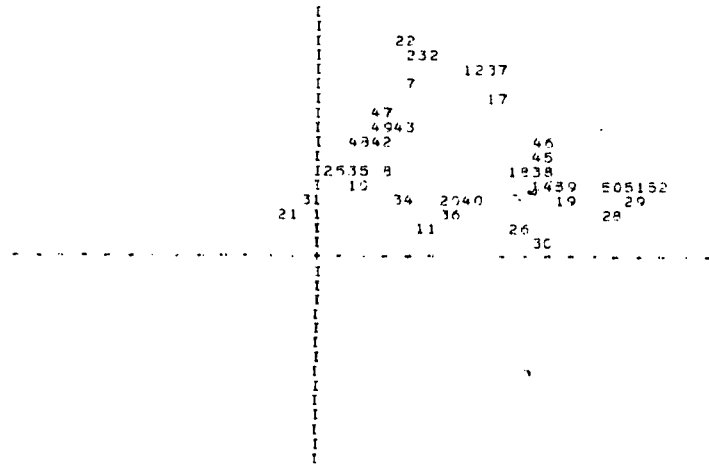
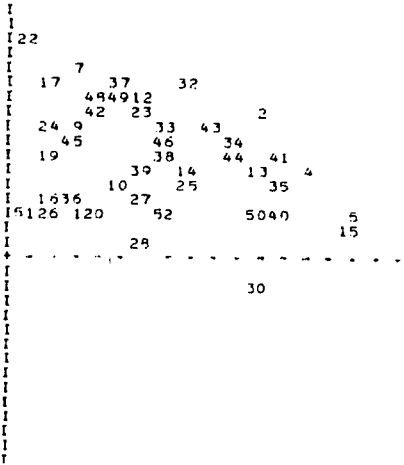
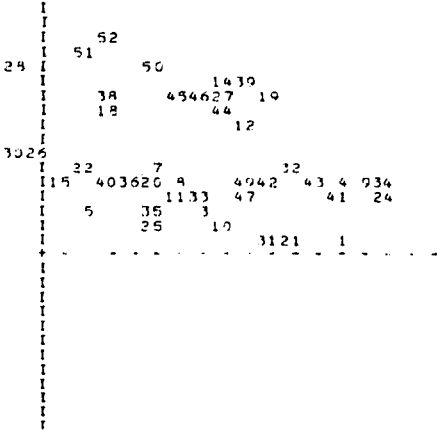


Figure 6.63 continued

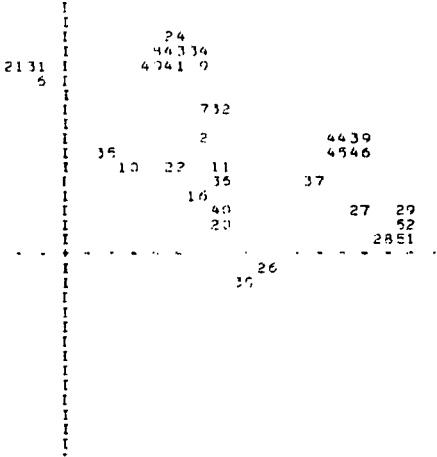
HORIZONTAL FACTOR 1 VERTICAL FACTOR 2



HORIZONTAL FACTOR 1 VERTICAL FACTOR 2



HORIZONTAL FACTOR 1 VERTICAL FACTOR 2



SYMBOL	VARIABLE
1	RF1
2	RF2
3	RF3
4	RF4
5	RF5
6	LF1
7	LF2
8	LF3
9	LF4
10	LF5
11	RF41
12	RF42
13	RF43
14	RF44
15	RF45
16	LF41
17	LF42
18	LF43
19	LF44
20	LF45
21	R1
22	R2
23	R3
24	R4
25	R5
26	U1
27	U2
28	U3
29	U4
30	U5
31	F1
32	F2
33	F3
34	F4
35	F5
36	AF1
37	AF2
38	AF3
39	AF4
40	AF5
41	RFRC
42	LFRC
43	TFRC
44	RFAC
45	LFAC
46	TFAC
47	RFR
48	LFR
49	TFR
50	RFU
51	LFU
52	TFU

(c) Finger Ridge Disturbances

(i) White Lines: Variables LW1 to RW5

For male subjects statistically highly significant differences in the occurrence of white lines were found for all fingers of control subjects in comparison to atopic eczema, BCC and actinic keratosis (see Table 6.205). In all cases there was a smaller occurrence of white lines in the present, moderate and severe (1, 2 and 3) categories and a greater frequency of absence of white lines. Atopic eczema males were found to have highly significantly greater occurrence of white lines on all fingers in comparison to vitiligo, alopecia areata and psoriasis. Actinic keratosis males were found to have a highly significantly greater occurrence of white lines in comparison to controls, alopecia areata, vitiligo and psoriasis. BCC also had highly significantly greater occurrence of white lines compared to, alopecia areata, vitiligo, psoriasis and controls. Conversely psoriasis, vitiligo and alopecia areata had highly significantly lower frequency of occurrence in comparison to actinic keratosis, BCC and atopic eczema for all fingers (see Table 6.203).

In female subjects there were highly significant differences for all fingers for all intergroup comparisons except for psoriasis compared to alopecia areata and for atopic eczema compared to actinic keratosis (see Table 6.206). Actinic keratosis, BCC and atopic eczema had greatest frequency of occurrence whilst controls, psoriasis, vitiligo and alopecia areata had the least (see Table 6.204).

When discriminant analysis was performed the results show that six functions were produced with the first two being responsible for 87.34% of the variance. Indeed Function 1 alone takes out 75.62% of the variance (see Table 6.207). Table 6.209 shows that all of the variables contribute to Function 1 with the size of correlation shown. The Table of F Statistics and significances (Table 6.120) shows that the groups furthest removed from one another are BCC and alopecia areata ($F = 22.658$) followed by BCC and vitiligo ($F = 20.041$). The group centroid relationships in Figure 6.66 show that atopic eczema, BCC and actinic keratosis (the groups with the highest frequencies of white lines) are separated from alopecia areata, vitiligo, controls and psoriasis. Note also that atopic eczema although on the same side as BCC and actinic keratosis is none the less separate from them.

Both BCC and actinic keratosis have no known genetic aetiological basis. The relationships between groups are also shown in Figures 6.64 and 6.65.

Discriminant analysis for female subjects shows that six functions were produced with Function 1 accounting for 78.17% of the variance and Function 2 taking out a further 9.51% (Table 6.212). Again, as for males, all variables are important in Function 1 (Table 6.214) with fingers I and V being the most important. The Table of F Statistics shows that using these functions BCC and vitiligo ($F = 40.631$) followed by controls and BCC ($F = 30.202$) are the pairs of groups whose members are most separated from one another. The plots (Figures 6.67 to 6.69) show that BCC which had the highest frequency of occurrence of white lines, is furthest to the right. Next to BCC are actinic keratosis and atopic eczema. In the centre are psoriasis and alopecia areata and to the left are controls and vitiligo (Figure 6.69). The results of classification analysis are shown in Table 6.216 and BCC (62.9% correct) is the group which shows the best classification results. This is followed by vitiligo (55.1% correct) but overall classification was only 28.26% using the white line occurrence variables.

When groups were reclassified using disorder aetiology as the criterion significant differences were found for all comparisons (Table 6.217(b)). From Table 6.217(a) it can be seen that both for males and females control subjects had the smallest frequency of occurrence followed by GD and then ND with the largest for all fingers.

Table 6. 203

Percentage Frequencies : White Lines

Males

Group	Cases	Percentage Frequencies for variables											
		LW1				LW2				LW3			
		0	1	2	3	0	1	2	3	0	1	2	3
Controls	206	54.9	25.7	13.6	5.8	62.6	25.7	6.3	5.3	58.5	26.3	8.8	6.3
Psoriasis	202	52.5	25.7	9.9	11.9	56.9	28.2	9.4	5.4	54.5	27.2	12.4	5.9
Atop Ecz	203	29.6	15.8	24.6	30.0	32.5	18.2	28.1	21.2	30.0	19.2	27.6	23.2
Vitiligo	201	55.7	31.8	8.0	4.5	66.2	23.9	7.5	2.5	59.7	29.4	7.0	4.0
Alop Are	210	52.4	37.6	8.1	1.9	58.6	34.3	6.7	0.5	57.1	35.2	5.7	1.9
BCC	211	23.7	19.4	16.6	40.3	33.2	18.5	27.0	25.1	29.4	18.5	27.0	25.1
Act Ker	129	14.1	28.9	36.7	20.3	25.6	34.9	33.3	6.2	18.6	36.4	38.8	6.2

Group	Cases	Percentage Frequencies for variables							
		LW4				LW5			
		0	1	2	3	0	1	2	3
Controls	206	53.4	30.6	10.2	5.8	56.8	27.2	9.7	6.3
Psoriasis	202	49.5	32.7	9.9	7.9	52.5	32.2	6.4	8.9
Atop Ecz	203	29.6	17.2	31.0	22.2	31.5	18.2	28.6	21.7
Vitiligo	201	55.7	34.3	6.0	4.0	68.2	21.9	6.0	4.0
Alop Are	210	50.0	40.5	7.6	1.9	61.9	30.5	6.7	1.0
BCC	211	28.0	20.9	22.3	28.9	29.9	20.9	19.9	29.4
Act Ker	129	14.0	38.8	37.2	10.1	19.4	35.7	35.7	9.3

Table 6.203 continued

		Percentage Frequencies for variables											
Group	Cases	RW1				RW2				RW3			
		0	1	2	3	0	1	2	3	0	1	2	3
Controls	206	53.4	30.1	10.2	6.3	62.6	25.7	7.8	3.9	58.3	28.2	9.7	3.9
Psoriasis	202	52.5	25.7	12.4	9.4	59.4	24.8	8.9	6.9	57.9	27.2	7.4	7.4
Atop Ecz	203	30.5	17.2	28.1	24.1	31.0	22.2	28.1	18.7	30.0	23.2	25.6	21.2
Vitiligo	201	50.2	32.3	10.9	6.5	61.2	27.9	7.5	3.5	60.2	28.4	8.5	3.0
Alop Are	210	49.5	35.2	13.8	1.4	54.8	34.8	8.1	2.4	55.7	33.3	9.0	1.9
BCC	211	22.7	13.3	28.4	35.5	34.6	20.4	23.2	21.3	31.8	20.9	22.7	24.6
Act Ker	129	13.2	24.8	38.0	24.0	22.5	35.7	31.8	10.1	14.7	36.4	37.2	11.6

		Percentage Frequencies for variables							
Group	Cases	RW4				RW5			
		0	1	2	3	0	1	2	3
Controls	206	58.3	28.6	9.2	3.9	55.8	31.6	8.3	4.4
Psoriasis	202	56.9	27.7	6.9	8.4	57.9	27.2	6.4	8.4
Atop Ecz	203	28.6	17.2	31.0	23.2	27.1	21.7	31.5	19.7
Vitiligo	201	54.2	33.3	10.0	2.5	65.7	23.4	7.5	3.5
Alop Are	210	50.5	38.6	9.5	1.4	59.5	30.5	9.0	1.0
BCC	211	29.4	19.4	23.7	27.5	27.0	24.2	21.8	27.0
Act Ker	129	18.6	25.6	41.9	14.0	16.4	29.7	39.1	14.8

Table 6. 204

Percentage Frequencies : White Lines

Females

Group	Cases	Percentage Frequencies for variables											
		LW1				LW2				LW3			
		0	1	2	3	0	1	2	3	0	1	2	3
Controls	206	36.9	36.5	19.7	6.9	48.8	33.0	13.3	4.9	45.3	35.0	15.3	4.4
Psoriasis	202	25.9	28.3	22.9	22.9	33.2	30.7	20.0	16.1	30.2	33.2	20.0	16.6
Atop Ecz	203	16.3	21.2	31.0	31.5	17.7	26.1	36.0	20.2	18.7	20.2	36.0	25.1
Vitiligo	201	45.4	29.8	22.9	2.9	49.8	32.7	16.6	1.0	49.3	34.1	15.6	1.0
Alop Are	210	20.4	38.3	27.7	13.6	27.2	38.8	24.8	9.2	26.2	39.8	24.3	9.7
BCC	211	4.0	12.4	24.8	58.9	8.4	22.3	36.1	33.2	6.9	22.3	33.7	27.1
Act Ker	129	8.0	27.0	36.2	28.7	20.7	25.3	34.5	19.5	38.4	24.1	33.9	23.6

Group	Cases	Percentage Frequencies for variables							
		LW4				LW5			
		0	1	2	3	0	1	2	3
Controls	206	41.4	35.0	18.2	5.4	41.4	35.0	18.2	5.4
Psoriasis	202	27.8	29.3	25.4	17.6	25.9	31.2	24.9	18.0
Atop Ecz	203	18.2	22.2	32.0	27.6	20.2	24.1	29.6	26.1
Vitiligo	201	46.8	35.6	16.1	1.5	53.7	29.3	16.1	1.0
Alop Are	210	24.3	39.8	25.7	10.2	24.8	38.8	26.2	10.2
BCC	211	7.4	18.8	30.2	43.6	6.9	18.3	34.7	40.1
Act Ker	129	17.2	22.4	35.6	24.7	16.1	24.7	34.5	24.7

Table 6.204 continued

Group	Cases	Percentage Frequencies for variables											
		RW1				RW2				RW3			
		0	1	2	3	0	1	2	3	0	1	2	3
Controls	206	36.9	32.5	21.7	8.9	48.8	33.0	12.3	5.9	48.0	29.7	16.8	5.4
Psoriasis	202	28.8	27.8	18.5	24.9	38.0	28.3	18.5	15.1	33.2	30.2	20.5	16.1
Atop Ecz	203	20.2	19.2	27.6	33.0	22.7	27.6	28.6	21.2	20.2	23.6	33.0	23.2
Vitiligo	201	42.9	35.1	18.5	3.4	51.2	36.6	11.2	1.0	48.8	38.0	11.2	2.0
Alop Are	210	22.8	33.0	30.1	14.1	27.7	34.5	26.2	11.7	30.6	31.6	27.7	10.2
BCC	211	3.5	11.9	21.8	62.9	10.9	22.3	35.6	31.2	8.9	18.8	39.1	33.2
Act Ker	129	8.0	24.1	37.9	29.9	15.5	26.4	33.3	24.7	14.4	28.2	30.5	27.0

Group	Cases	Percentage Frequencies for variables							
		RW4				RW5			
		0	1	2	3	0	1	2	3
Controls	206	43.6	34.2	15.3	6.9	39.9	39.4	14.3	6.4
Psoriasis	202	32.2	30.7	20.0	17.1	29.2	32.2	21.5	17.1
Atop Ecz	203	16.3	27.6	29.1	27.1	19.7	26.1	30.0	24.1
Vitiligo	201	45.4	40.5	12.7	1.5	54.1	33.7	11.2	1.0
Alop Are	210	24.8	36.9	27.2	11.2	26.7	35.9	26.7	10.7
BCC	211	7.4	21.3	36.6	34.7	6.9	16.8	41.6	34.7
Act Ker	129	12.6	25.3	33.9	28.2	12.1	25.3	36.2	26.4

Table 6.205 Mann-Whitney U Test Results : White Lines
Males

Group 1	Group 2	Probability (* = significant ** = highly significant)				
		LW1	LW2	LW3	LW4	LW5
Control	Psoriasis	0.4393	0.2259	0.3770	0.4055	0.4610
Control	Atop Ecz	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Control	Vitiligo	0.4715	0.4086	0.5767	0.3579	0.0138*
Control	Alop Are	0.6287	0.7496	0.6712	0.9342	0.0964
Control	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Control	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Atop Ecz	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Vitiligo	0.1505	0.0417*	0.1396	0.0782	0.0013**
Psoriasis	Alop Are	0.2228	0.3157	0.1579	0.3333	0.0155*
Psoriasis	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Vitiligo	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Alop Are	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	BCC	0.0942	0.9606	0.7186	0.5407	0.4381
Atop Ecz	Act Ker	0.6747	0.1821	0.3664	0.7515	0.6733
Vitiligo	Alop Are	0.7486	0.2381	0.8659	0.3494	0.3292
Vitiligo	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Vitiligo	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Alop Are	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Alop Are	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
BCC	Act Ker	0.2528	0.2067	0.2014	0.4732	0.3100

Table 6.205 continued

		Probability (* = significant ** = highly significant)				
Group 1	Group 2	RW1	RW2	RW3	RW4	RW5
Control	Psoriasis	0.5129	0.3553	0.8057	0.6096	0.9322
Control	Atop Ecz	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Control	Vitiligo	0.5626	0.8430	0.6024	0.5484	0.0596
Control	Alop Are	0.7098	0.1999	0.8539	0.2679	0.3464
Control	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Control	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Atop Ecz	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Vitiligo	0.9148	0.4618	0.4550	0.9428	0.0824
Psoriasis	Alop Are	0.7120	0.7846	0.9539	0.5754	0.4122
Psoriasis	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Vitiligo	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Alop Are	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	BCC	0.0061**	0.7419	0.8549	0.9234	0.6497
Atop Ecz	Act Ker	0.7781	0.7530	0.4568	0.9533	0.5093
Vitiligo	Alop Are	0.8149	0.2783	0.4654	0.6246	0.3158
Vitiligo	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Vitiligo	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Alop Are	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Alop Are	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
BCC	Act Ker	0.4456	0.9333	0.5844	0.9578	0.7704

Table 6.206
Females
Mann-Witney U Test Results : White Lines

		Probability (* = significant ** = highly significant)				
Group 1	Group 2	LW1	LW2	LW3	LW4	LW5
Control	Psoriasis	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Control	Atop Ecz	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Control	Vitiligo	0.1276	0.7266	0.3043	0.1838	0.0085**
Control	Alop Are	0.0000**	0.0000**	0.0000**	0.0000**	0.0001**
Control	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Control	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Atop Ecz	0.0014**	0.0001*	0.0000**	0.0006**	0.0125*
Psoriasis	Vitiligo	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Alop Are	0.5039	0.9606	0.8053	0.3637	0.2421
Psoriasis	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Act Ker	0.0001**	0.0015**	0.0002**	0.0012**	0.0023**
Atop Ecz	Vitiligo	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Alop Are	0.0000**	0.0000**	0.0000**	0.0000**	0.0001**
Atop Ecz	BCC	0.6535	0.0004*	0.0016**	0.0001**	0.0000**
Atop Ecz	Act Ker	0.6535	0.6026	0.6194	0.8737	0.6100
Vitiligo	Alop Are	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Vitiligo	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Vitiligo	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Alop Are	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Alop Are	Act Ker	0.0000**	0.0003**	0.0000**	0.0000**	0.0000**
BCC	Act Ker	0.0000**	0.0001**	0.0004**	0.0001**	0.0001**

Table 6.206 continued

		Probability (* = significant ** = highly significant)				
Group 1	Group 2	RW1	RW2	RW3	RW4	RW5
Control	Psoriasis	0.0014**	0.0012**	0.0002**	0.0007**	0.0002**
Control	Atop Ecz	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Control	Vitiligo	0.0523	0.2800	0.2871	0.2105	0.0012**
Control	Alop Are	0.0000**	0.0000**	0.0001**	0.0000**	0.0002**
Control	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Control	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0021**
Psoriasis	Atop Ecz	0.0082**	0.0003**	0.0002**	0.0000**	0.0000**
Psoriasis	Vitiligo	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Alop Are	0.8614	0.1600	0.9810	0.5667	0.7833
Psoriasis	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Vitiligo	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Alop Are	0.0003**	0.0114*	0.0001**	0.0000**	0.0003**
Atop Ecz	BCC	0.0000**	0.0002**	0.0003**	0.0024**	0.0000**
Atop Ecz	Act Ker	0.2735	0.0828	0.3425	0.3359	0.0988
Vitiligo	Alop Are	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Vitiligo	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Vitiligo	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Alop Are	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Alop Are	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
BCC	Act Ker	0.0000**	0.0562	0.0110*	0.0445*	0.0066**

Table 6.207 - Males - Variables: LW1 to RW5

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.27929	75.62	75.62	0.4672446
2*	0.04328	11.72	87.34	0.2036827
3*	0.03041	8.23	95.57	0.1717907
4*	0.01512	4.09	99.66	0.1220431
5*	0.00101	0.27	99.94	0.0318035
6*	0.00023	0.06	100.00	0.0152624

Table 6.208 - Males - Variables: LW1 to RW5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
LW1	0.41287	-0.17375	-0.17640	-0.24950	1.63863	-0.46214
LW2	0.07965	1.19664	0.27805	1.29554	-1.37029	1.05521
LW5	-0.01111	-0.63158	-1.47589	0.30900	0.23223	-1.01645
RW1	0.35083	-1.34547	0.92354	1.10605	-0.62216	0.46411
RW2	-0.66649	1.03603	0.14603	-0.06832	1.72693	0.47399
RW3	0.05178	-0.60576	-0.14838	-1.27089	0.16613	0.91345
RW4	0.05142	1.10760	1.36263	0.20347	-0.52845	-2.21273
RW5	0.73076	-0.33539	-0.86270	-1.24699	-1.07991	0.88745

Table 6.209 - Males - Variables: LW1 to RW5

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
RW5	0.91387*	0.21464	-0.01829	-0.22084	-0.00725	0.12417
LW1	0.90587*	0.13861	-0.02736	0.15786	0.35406	-0.00936
RW1	0.87918*	-0.06398	0.28377	0.13217	0.13946	0.15675
RW4	0.85203*	0.33764	0.22832	-0.13117	0.02549	-0.14146
LW5	0.84012*	0.22624	-0.28968	0.13487	0.09779	-0.06129
LW4	0.82448*	0.27457	-0.11775	0.10723	0.13572	-0.04463
LW3	0.81192*	0.33230	-0.09924	0.12294	0.11499	0.01132
RW3	0.81147*	0.24983	0.13220	-0.20452	0.09962	0.14911
LW2	0.80416*	0.44618	-0.09933	0.26090	0.02817	0.17944
RW2	0.73644*	0.38255	0.13585	-0.07185	0.29623	0.23600

Table 6.210 - Males - Variables: LW1 to RW5

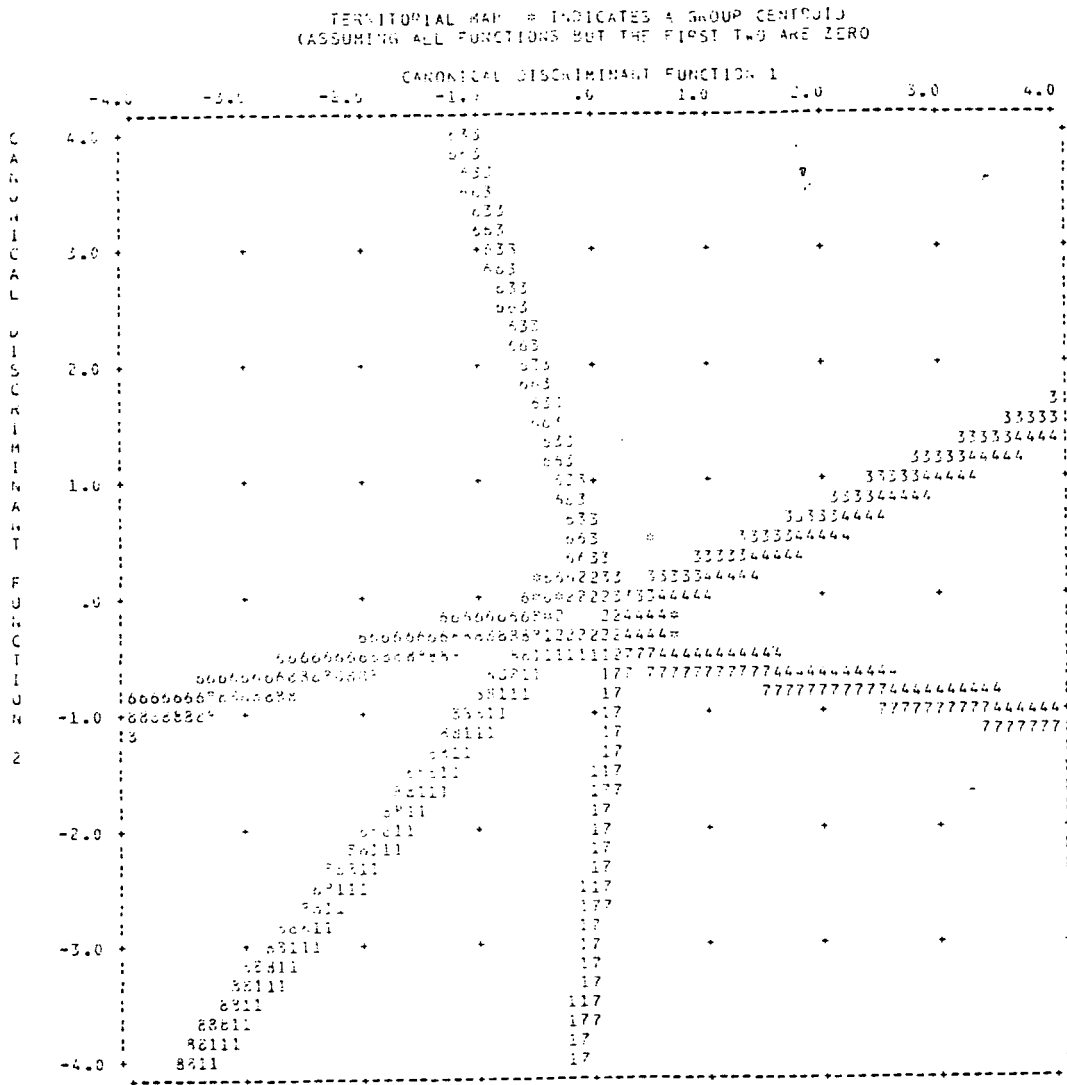
F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS AFTER STEP 12
EACH F STATISTIC HAS 8 AND 1339.0 DEGREES OF FREEDOM.

GROUP	0	1	2	3	5	6
1	0.62851 0.7544					
2	13.477 0.0000	10.956 0.0000				
3	16.931 0.0000	14.901 0.0000	5.7340 0.0000			
5	3.7655 0.0002	2.5119 0.0104	15.052 0.0000	22.658 0.0000		
6	13.219 0.0000	12.735 0.0000	6.1572 0.0000	2.5086 0.0105	17.150 0.0000	
7	3.7453 0.0002	2.5543 0.0092	15.910 0.0000	20.041 0.0000	0.58853 0.7880	15.617 0.0000

Code Group

- 0 --- Controls
- 1 - Psoriasis
- 2 - Atopic Eczema
- 3 - BCC
- 5 - Alopecia areata
- 6 - Actinic Keratosis
- 7 - Vitiligo

Figure 6.64 - Territorial Map- Males - Variables: LW1 to RW5



Code	Group
1	Controls
2	Psoriasis
3	Atopic Eczema
4	BCC
6	Alopecia areata
7	Actinic Keratosis
8	Vitiligo

Figure 6.65 - Scatterplot - Males - Variables: LW1 to RW5

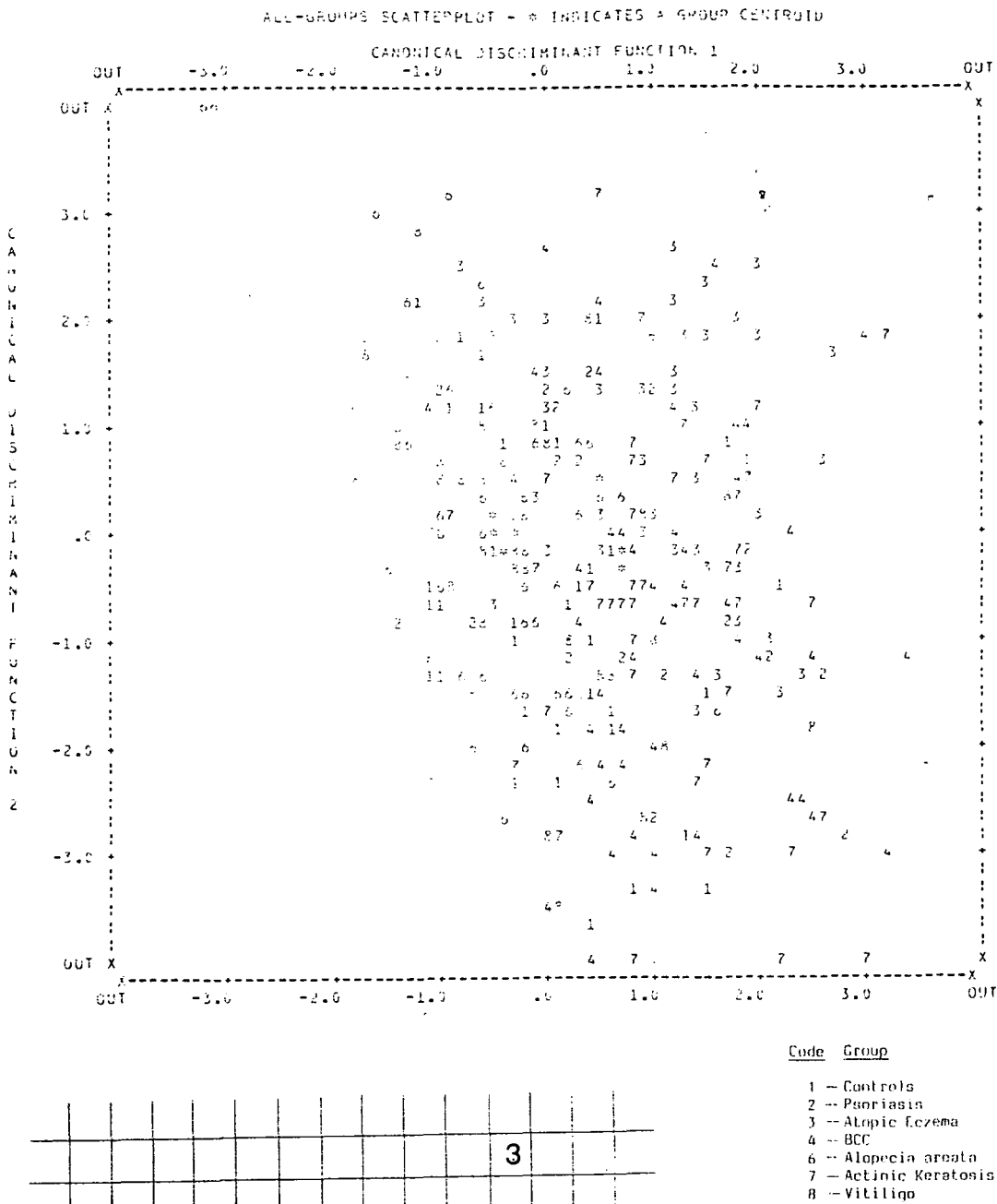


Figure 6.66 - Group Centroids

Table 6.211 - Males - Variables: LW1 to RW5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	200	20 10.0%	30 15.0%	20 10.0%	10 5.0%	94 47.0%	16 8.0%	10 5.0%
GROUP	1	202	12 5.9%	34 16.8%	25 12.4%	16 7.9%	91 45.0%	12 5.9%	12 5.9%
GROUP	2	203	3 1.5%	20 9.9%	82 40.4%	17 8.4%	53 26.1%	24 11.8%	4 2.0%
GROUP	3	211	4 1.9%	10 4.7%	61 28.9%	50 23.7%	40 19.0%	36 17.1%	10 4.7%
GROUP	5	210	8 3.8%	40 19.0%	14 6.7%	6 2.9%	95 45.2%	18 8.6%	29 13.8%
GROUP	6	127	4 3.1%	10 7.9%	33 26.0%	24 18.9%	17 13.4%	35 27.6%	4 3.1%
GROUP	7	201	6 3.0%	26 12.9%	19 9.5%	10 5.0%	96 47.8%	11 5.5%	33 16.4%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 25.78%

Code Group
 0 - Controls
 1 - Psoriasis
 2 - Atopic Eczema
 3 - BCC
 5 - Alopecia areata
 6 - Actinic Keratosis
 7 - Vitiligo

Table 6.212 - Females - Variables: LW1 to RW5

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.31400	78.17	78.17	0.4888380
2*	0.03822	9.51	87.69	0.1918641
3*	0.03086	7.68	95.37	0.1730213
4*	0.01385	3.45	98.82	0.1168674
5*	0.00449	1.12	99.93	0.0668217
6*	0.00027	0.07	100.00	0.0164580

Table 6.213

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
LW1	0.47080	-0.00713	0.25256	-0.13901	0.28424	-1.96237
LW2	-0.28423	-0.23265	1.36208	0.47071	1.04121	1.11933
LW3	0.33868	0.43025	0.58380	0.37031	-1.07129	0.25481
LW5	0.04788	-0.64728	-1.36420	0.74970	0.76930	-0.19470
RW1	0.39170	-1.33596	0.44903	-0.98238	-0.60731	1.12945
RW2	-0.22098	1.18510	-0.46875	-1.19855	1.17574	-0.09828
RW4	-0.14791	1.10388	0.54328	0.05472	-0.95105	-0.74679
RW5	0.44290	-0.23691	-1.29306	0.68660	-0.47297	0.61243

Table 6.214 - Females - Variables: LW1 to RW5

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
LW1	0.93377*	0.03214	0.15011	-0.01031	0.22032	-0.22863
RW1	0.92425*	-0.02716	0.05427	-0.27680	0.02174	0.17917
RW5	0.88289*	0.27916	-0.22167	0.04967	0.01365	0.22244
LW5	0.84715*	0.11025	-0.08599	0.28425	0.28961	0.07164
LW3	0.83857*	0.28687	0.21763	0.27499	0.07693	0.16731
LW4	0.82832*	0.18883	0.11877	0.24576	0.15141	0.10194
RW4	0.81671*	0.45493	0.01473	0.02603	-0.08340	0.07594
RW3	0.81112*	0.41943	-0.00036	-0.02316	0.02424	0.16290
LW2	0.79094*	0.22758	0.26895	0.21824	0.36107	0.23252
RW2	0.77681*	0.44619	-0.06913	-0.22815	0.30737	0.19838

Table 6.215 - Females - Variables: LW1 to RW5

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS AFTER STEP 10
EACH F STATISTIC HAS 3 AND 1380.0 DEGREES OF FREEDOM.

	GROUP	0	1	2	3	5	6
GROUP							
1		3.6230 0.0004					
2		12.732 0.0000	4.9391 0.0000				
3		30.202 0.0000	15.774 0.0000	9.9335 0.0000			
5		3.7389 0.0002	2.4762 0.0115	4.8472 0.0000	20.212 0.0000		
6		12.898 0.0000	5.9910 0.0000	3.1138 0.0017	3.3211 0.0000	5.1748 0.0000	
7		3.6294 0.0003	9.8819 0.0000	16.579 0.0000	40.631 0.0000	6.4420 0.0000	20.683 0.0000

Code Group

- 0 - Controls
- 1 - Psoriasis
- 2 - Atopic Eczema
- 3 - BCC
- 5 - Alopecia areata
- 6 - Actinic Keratosis
- 7 - Vitiligo

Figure 6.67 - Territorial Map - Females - Variables: LW1 to RW5

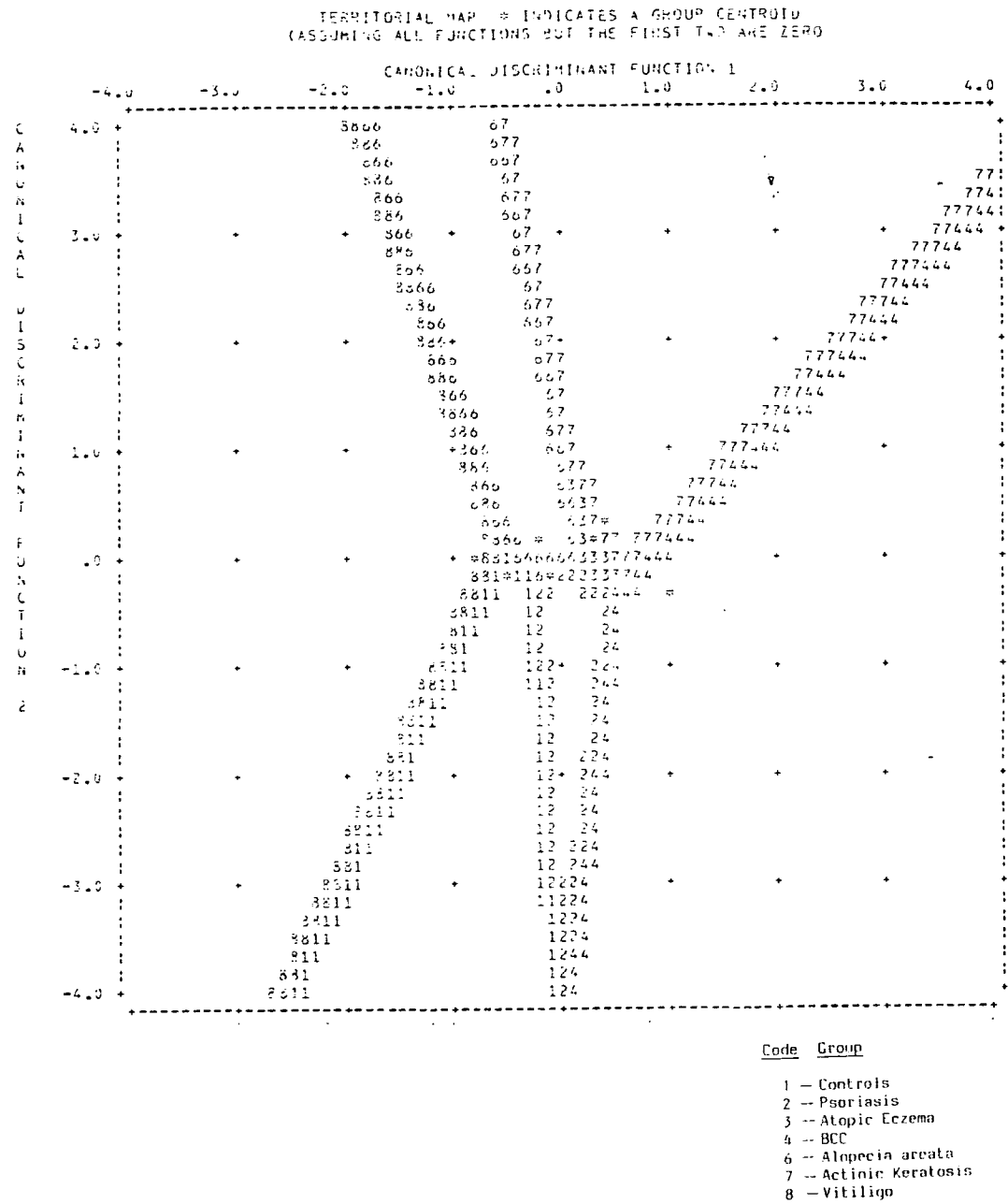


Figure 6.68 - Scatterplot - Females - Variables: LW1 to RW5

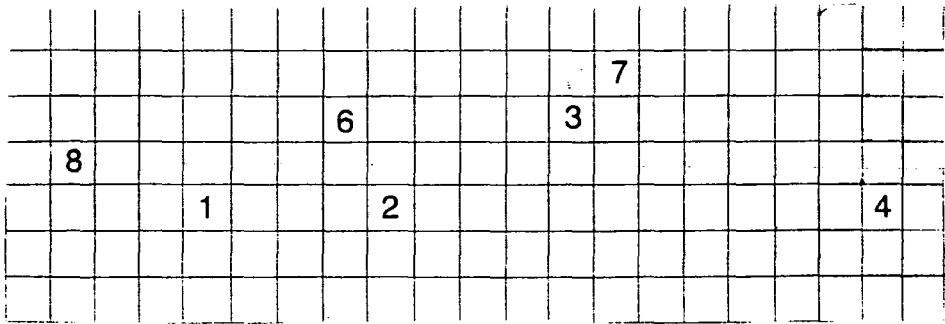
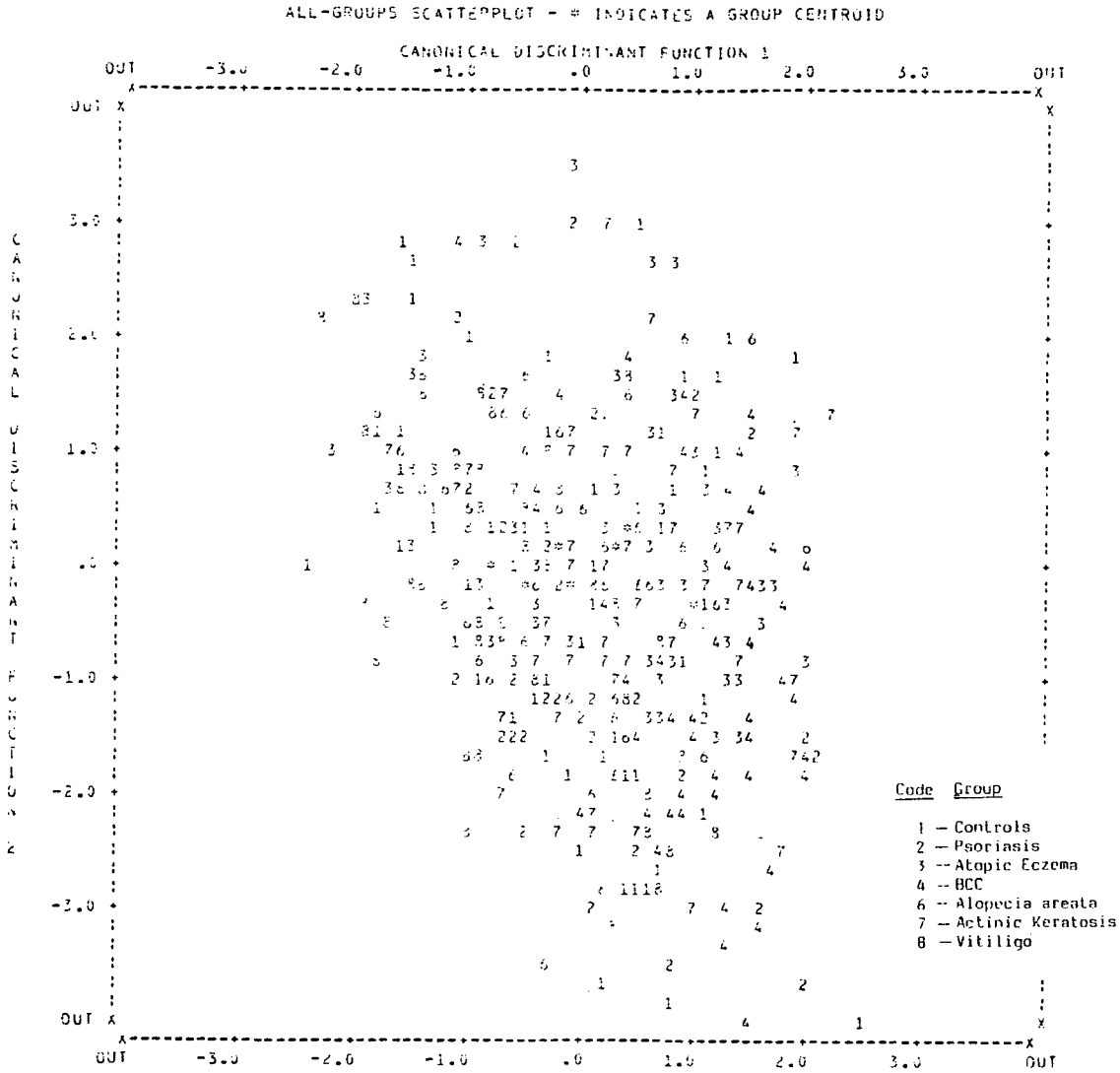


Figure 6.69 - Group Centroids

Table 6.216 - Females - Variables: LW1 to RW5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	201	32 15.9%	17 8.5%	16 8.0%	17 8.5%	28 13.9%	17 8.5%	74 36.8%
GROUP	1	205	22 10.7%	18 8.8%	18 8.8%	56 27.3%	27 13.2%	12 5.9%	52 25.4%
GROUP	2	203	6 3.0%	7 3.4%	36 17.7%	70 34.5%	17 8.4%	21 10.3%	46 22.7%
GROUP	3	202	7 3.5%	11 5.4%	16 7.9%	127 62.9%	14 6.9%	18 8.9%	9 4.5%
GROUP	5	206	13 6.3%	10 4.9%	35 17.0%	31 15.0%	43 20.9%	19 9.2%	55 26.7%
GROUP	6	172	13 7.6%	7 4.1%	42 24.4%	47 27.3%	19 11.0%	25 14.5%	19 11.0%
GROUP	7	205	6 2.9%	8 3.9%	19 9.3%	16 7.8%	37 18.0%	6 2.9%	113 55.1%

Code Group
0 - Controls
1 - Psoriasis
2 - Atopic Eczema
3 - BCC
5 - Alopecia areata
6 - Actinic Keratosis
7 - Vitiligo

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 28.26%

Table Percentage Frequencies : White Lines
6.217 (a)
Subjects Grouped by Disorder Type

			LW1				LW2				LW3			
Gp	Sex	No	0	1	2	3	0	1	2	3	0	1	2	3
Cont	M	206	54.9	25.7	13.6	5.8	62.6	25.7	6.3	5.3	58.5	26.3	8.8	6.3
GD	M	816	47.5	27.8	12.6	12.0	53.6	26.2	12.9	7.4	50.4	27.8	13.1	8.7
ND	M	340	20.1	23.0	24.2	32.7	30.3	25.3	27.1	17.4	25.3	25.3	31.5	17.9
Cont	F	203	36.9	36.5	19.7	6.9	48.8	33.0	13.3	4.9	45.3	35.0	15.3	4.4
GD	F	819	27.0	29.4	25.9	17.7	32.0	32.1	24.3	11.6	31.1	31.9	23.9	13.1
ND	F	374	5.9	19.3	30.2	44.7	14.2	23.5	35.6	26.7	12.3	23.0	33.7	31.0

			LW4				LW5			
Gp	Sex	No	0	1	2	3	0	1	2	3
Cont	M	206	53.4	30.6	10.2	5.6.8	56.8	7	9.7	6.3
GD	M	816	46.2	31.3	13.6	8.9	53.6	25.7	11.9	8.8
ND	M	340	22.6	27.6	27.9	21.8	25.9	26.5	25.9	21.8
Cont	F	203	41.4	35.0	18.2	5.4	41.4	35.0	18.2	5.4
GD	F	819	29.3	31.7	24.8	14.2	31.1	30.9	24.2	13.8
ND	F	374	12.0	20.3	32.6	35.0	11.2	21.1	34.5	33.2

Table 2.17(a) continued

			RW1				RW2				RW3			
Gp	Sex	No	0	1	2	3	0	1	2	3	0	1	2	3
Cont	M	206	53.4	30.1	10.2	6.3	62.6	25.7	7.8	3.9	58.3	28.2	9.7	3.9
GD	M	816	45.7	27.7	16.3	10.3	51.6	27.5	13.1	7.8	51.0	28.1	12.6	8.3
ND	M	340	19.1	17.6	32.1	31.2	30.0	26.5	26.5	17.1	25.3	26.8	28.2	19.7
Cont	F	203	36.9	32.5	21.7	8.9	48.8	33.0	12.3	5.9	48.0	29.7	16.8	5.4
GD	F	819	28.7	28.8	23.7	18.8	34.9	31.7	21.1	12.2	33.2	30.9	23.1	12.8
ND	F	374	5.6	17.4	29.4	47.6	12.8	24.1	34.8	28.3	11.2	23.3	35.3	30.2

			RW4				RW5			
Gp	Sex	No	0	1	2	3	0	1	2	3
Cont	M	206	58.3	28.6	9.2	3.9	55.8	31.6	8.3	4.4
GD	M	816	47.5	29.3	14.3	8.8	52.6	25.7	13.6	8.1
ND	M	340	25.3	21.8	30.6	22.4	23.0	26.3	28.3	22.4
Cont	F	203	43.6	34.2	15.3	6.9	39.9	39.4	14.3	6.4
GD	F	819	29.7	33.9	22.2	14.2	32.5	32.0	22.3	13.2
ND	F	374	9.6	23.3	35.6	31.6	9.1	20.9	39.3	30.7

Table Mann-Whitney U Test Results : White Lines.
6.217(b)
Subjects Grouped by Disorder Type

			Probability for Variables				
Sex	Gp 1	Gp 2	LW1	LW2	LW3	LW4	LW5
M	Cont	GD	0.0373*	0.0043**	0.0187*	0.0326*	0.2867
M	Cont	ND	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
M	GD	ND	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
F	Cont	GD	0.0000**	0.0000**	0.0000**	0.0000**	0.0001**
F	Cont	ND	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
F	GD	ND	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**

			Probabilities for Variables				
Sex	Gp 1	Gp 2	RW1	RW2	RW3	RW4	RW5
M	Cont	GD	0.0141*	0.0016**	0.0174*	0.0012**	0.1417
M	Cont	ND	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
M	GD	ND	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
F	Cont	GD	0.0005**	0.0000**	0.0000**	0.0000**	0.0004**
F	Cont	ND	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
F	GD	ND	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**

(ii) Hyperlinearity - Variables: LH1 to RH5

The results for frequency of occurrence of hyperlinearity on the fingers in male subjects are shown in Table 6.218 and Mann-Whitney U Test Results in Table 6.220. The least hyperlinearity was to be found in vitiligo, alopecia areata and controls in that order followed by psoriasis. The greatest hyperlinearity was found in actinic keratosis, BCC and atopic eczema (see Table 6.218). The Mann-Whitney U Test Results showed significant differences for all fingers for nearly all of the groups. The exceptions were for groups with very little hyperlinearity (e.g. controls compared alopecia and to vitiligo) or very much hyperlinearity (e.g. BCC compared to actinic keratosis, atopic eczema compared to BCC and to actinic keratosis) as shown in Table 6.220.

For female subjects the results were similar to those found for males. Controls and vitiligo had the least hyperlinearity followed by psoriasis and alopecia areata. BCC, atopic eczema and actinic keratosis had the most hyperlinearity (see Table 6.219). The Mann-Whitney U Test Results again showed significant differences for nearly all of the intergroup comparisons (Table 6.221). The exceptions again were groups with little hyperlinearity (e.g. controls and vitiligo, alopecia areata and psoriasis) or much hyperlinearity (e.g. BCC and actinic keratosis and atopic eczema and actinic keratosis).

Discriminant analysis for male subjects using variables LH1 to RH5 selected six functions. As shown in Table 6.222 Function 1 accounted for 84.54% of the variance. Table 6.224 shows that all of the variables contributed strongly to Function 1 and their order of correlation within the function. F Statistics show BCC and alopecia areata ($F = 25.536$) to be the most widely separated groups followed by BCC and vitiligo ($F = 20.340$) (see Table 6.225). These relationships are better shown in the plots Figures 6.70 to 7.72. Atopic eczema, BCC and actinic keratosis (with the greatest hyperlinearity) are close together and are removed from alopecia areata, vitiligo, controls and psoriasis (see Figure 6.72). The territorial map shows alopecia areata and actinic keratosis, BCC and vitiligo to be the furthest separated in the matrix (Figure 6.70).

Table Percentage Frequencies : Hyperlinearity
6.218
Males

Group	Cases	Percentage Frequencies for variables											
		LH1				LH2				LH3			
		0	1	2	3	0	1	2	3	0	1	2	3
Controls	206	71.4	16.0	8.3	4.4	80.1	11.7	4.9	3.4	77.7	12.1	5.8	4.4
Psoriasis	202	62.5	24.5	7.0	6.0	70.3	18.8	5.9	5.0	67.8	18.8	6.4	6.9
Atop Ecz	203	36.0	15.8	23.6	24.6	39.4	17.2	26.1	17.2	36.9	18.7	26.1	18.2
Vitiligo	198	80.8	7.6	7.1	4.5	83.6	8.0	5.5	3.0	83.1	8.0	5.5	3.5
Alop Are	210	81.0	12.9	5.7	0.5	82.9	12.4	4.3	0.5	82.9	12.4	4.3	0.5
BCC	211	31.8	18.0	19.0	31.3	38.4	18.5	20.9	22.3	37.9	14.7	22.7	24.6
Act Ker	129	26.4	29.6	23.2	20.8	33.3	32.6	24.0	10.1	30.2	34.1	24.8	10.9

Group	Cases	Percentage Frequencies for variables							
		LH4				LH5			
		0	1	2	3	0	1	2	3
Controls	206	74.8	15.0	7.3	2.9	74.8	15.0	5.8	4.4
Psoriasis	202	64.9	21.8	6.9	6.4	60.9	26.7	5.4	6.9
Atop Ecz	203	37.4	18.2	25.6	18.7	36.9	17.7	27.1	18.2
Vitiligo	198	80.1	11.4	5.0	3.5	82.1	9.0	5.0	4.0
Alop Are	210	81.0	12.9	5.7	0.5	82.9	11.0	5.7	0.5
BCC	211	36.0	16.6	21.8	25.6	35.5	15.6	23.2	25.6
Act Ker	129	27.1	33.3	28.7	10.9	28.7	32.6	27.9	10.9

Table 6.218 continued

Group	Cases	Percentage Frequencies for variables											
		RH1				RH2				RH3			
		0	1	2	3	0	1	2	3	0	1	2	3
Controls	206	70.4	16.0	8.7	4.9	79.1	12.1	5.3	3.4	78.6	11.7	6.3	3.4
Psoriasis	202	67.5	19.5	6.0	7.0	69.7	17.9	7.5	5.0	70.6	17.9	5.5	6.0
Atop Ecz	203	36.0	16.7	24.1	23.2	40.9	15.3	24.6	19.2	37.9	19.2	23.6	19.2
Vitiligo	198	72.6	13.9	8.0	5.5	80.1	11.4	6.0	2.5	77.1	13.9	6.5	2.5
Alop Are	210	79.9	11.5	6.7	1.9	83.7	7.7	6.7	1.9	84.7	7.7	6.7	1.0
BCC	211	28.9	19.4	21.8	29.9	36.5	21.3	21.8	20.4	34.1	22.7	19.4	23.7
Act Ker	129	24.8	25.6	27.1	22.5	31.0	31.8	26.4	10.9	29.5	30.2	31.0	9.3

Group	Cases	Percentage Frequencies for variables							
		RH4				RH5			
		0	1	2	3	0	1	2	3
Controls	206	76.2	14.6	5.8	3.4	74.3	15.0	6.8	3.9
Psoriasis	202	69.2	17.9	7.0	6.0	66.2	21.4	7.5	5.0
Atop Ecz	203	36.0	18.7	25.1	20.2	37.4	16.7	26.6	19.2
Vitiligo	198	79.1	11.9	6.0	3.0	79.6	10.4	6.5	3.5
Alop Are	210	80.4	11.5	7.2	1.0	82.8	9.1	7.2	1.0
BCC	211	32.7	22.3	20.9	24.2	28.4	24.2	21.8	25.6
Act Ker	129	26.4	28.7	32.6	12.4	24.8	33.3	25.6	16.3

Table . Percentage Frequencies : Hyperlinearity
6.219
Females

Group	Cases	Percentage Frequencies for variables											
		LH1				LH2				LH3			
		0	1	2	3	0	1	2	3	0	1	2	3
Controls	203	64.0	22.7	8.9	4.4	70.9	20.7	5.9	2.5	70.9	18.7	8.9	1.5
Psoriasis	205	52.5	15.2	12.7	19.6	54.1	16.6	13.2	16.1	53.7	17.1	13.2	16.1
Atop Ecz	202	28.2	25.7	25.2	20.8	33.5	24.6	24.1	28.7	32.5	24.6	24.1	18.7
Vitiligo	205	61.8	23.5	12.7	2.0	66.3	24.4	8.3	1.0	66.3	24.4	8.3	1.0
Alop Are	206	40.3	28.2	19.9	11.7	44.7	31.1	16.5	7.8	45.1	29.6	17.0	8.3
BCC	202	9.9	15.8	21.8	52.5	14.4	16.3	34.2	35.1	14.4	13.9	32.2	39.6
Act Ker	174	24.1	18.4	27.6	29.9	31.6	16.1	29.3	23.0	31.6	15.5	28.7	24.1

Group	Cases	Percentage Frequencies for variables							
		LH4				LH5			
		0	1	2	3	0	1	2	3
Controls	203	68.0	19.7	10.3	2.0	64.5	22.2	9.9	3.4
Psoriasis	205	49.8	20.0	13.2	17.1	48.3	20.0	14.6	17.1
Atop Ecz	202	28.6	26.6	24.1	20.7	26.6	29.1	15.6	18.7
Vitiligo	205	63.9	24.9	9.8	1.5	65.4	24.9	8.8	1.0
Alop Are	206	44.2	31.1	16.5	8.3	42.7	30.6	18.4	8.3
BCC	202	13.9	14.4	29.2	42.6	10.9	18.3	32.2	38.6
Act Ker	174	29.3	16.1	28.7	25.9	30.5	14.9	28.2	26.4

Table 6.219 continued

Group	Cases	Percentage Frequencies for variables											
		RH1				RH2				RH3			
		0	1	2	3	0	1	2	3	0	1	2	3
Controls	203	64.0	18.7	11.8	5.4	73.4	14.3	8.9	3.4	70.4	17.7	8.4	3.4
Psoriasis	205	49.3	13.7	16.6	20.5	54.6	15.1	15.6	14.6	54.1	16.6	13.7	15.6
Atop Ecz	203	31.0	23.2	23.6	22.2	33.5	27.1	21.7	17.7	31.0	26.6	24.6	17.7
Vitiligo	205	63.9	23.4	9.8	2.9	69.8	22.0	7.3	1.0	68.8	23.4	6.3	1.5
Alop Are	206	36.3	29.9	22.1	11.8	43.1	30.9	17.2	8.8	43.1	29.4	17.6	9.8
BCC	202	8.9	14.9	24.8	51.5	13.4	21.8	34.7	30.2	10.9	21.3	36.6	31.2
Act Ker	174	18.4	17.2	33.9	30.5	25.3	21.8	28.2	24.7	24.7	32.6	27.0	24.7

Group	Cases	Percentage Frequencies for variables							
		RH4				RH5			
		0	1	2	3	0	1	2	3
Controls	203	67.5	18.2	9.9	4.4	64.0	19.2	12.3	4.4
Psoriasis	205	51.2	17.1	15.1	16.6	49.8	14.6	19.5	16.1
Atop Ecz	203	29.1	25.1	25.6	20.2	26.1	29.6	24.6	19.7
Vitiligo	205	67.3	23.4	7.8	1.5	68.3	22.9	7.8	1.0
Alop Are	206	43.1	27.5	29.6	9.8	41.2	29.9	18.6	10.3
BCC	202	10.4	22.8	34.2	32.7	10.9	18.3	37.6	33.2
Act Ker	174	23.0	20.7	30.5	25.9	21.8	20.7	31.6	25.9

Table Mann-Whitney U Test Results

6.220

Hyperlinearity

Males

		Variables and Probabilities (* = Significant, ** = Highly significant)				
Group1	Group2	LH1	LH2	LH3	LH4	LH5
Cont	Psoriasis	0.0918	0.0271*	0.0305*	0.0312*	0.0052**
Cont	Atop Ecz	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Cont	Vitiligo	0.0487*	0.4062	0.1925	0.2208	0.0947
Cont	Alop Are	0.0134*	0.3821	0.1248	0.1042	0.0351*
Cont	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Cont	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Atop Ecz	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Vitiligo	0.0003**	0.0028**	0.0007**	0.0009**	0.0000**
Psoriasis	Atop Are	0.0000**	0.0017**	0.0002**	0.0001**	0.0000**
Psoriasis	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Vitiligo	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Alop Are	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	BCC	0.2598	0.6241	0.4996	0.3424	0.2985
Atop Ecz	Act Ker	0.1605	0.8240	0.5562	0.5846	0.9815
Vitiligo	Alop Are	0.0000**	0.9903	0.8668	0.7206	0.7111
Vitiligo	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Vitiligo	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Alop Are	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Alop Are	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
BCC	Act Ker	0.4365	0.3389	0.2680	0.3928	0.2232

Table 6.220 continued

		Variables and Probabilities (* = Significant, ** = Highly significant)				
Group1	Group2	RH1	RH2	RH3	RH4	RH5
Cont	Psoriasis	0.5728	0.0312*	0.0746	0.0984	0.0931
Cont	Atop Ecz	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Cont	Vitiligo	0.6766	0.8007	0.7810	0.5147	0.2398
Cont	Alop Are	0.0217*	0.2571	0.1125	0.2998	0.0374*
Cont	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Cont	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Atop Ecz	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Vitiligo	0.3278	0.0168*	0.1367	0.0233*	0.0049**
Psoriasis	Atop Are	0.0043**	0.0012**	0.0008**	0.0074**	0.0002**
Psoriasis	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Vitiligo	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Alop Are	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	BCC	0.1134	0.6702	0.4405	0.5282	0.1216
Atop Ecz	Act Ker	0.3002	0.9026	0.9367	0.8033	0.5461
Vitiligo	Alop Are	0.0653	0.3815	0.0616	0.7091	0.3793
Vitiligo	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Vitiligo	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Alop Are	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Alop Are	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
BCC	Act Ker	0.6692	0.6305	0.4466	0.7686	0.4194

Table 6.221 Mann-Whitney U Test Results

Hyperlinearity

Females

Group1	Group2	Variables and Probabilities (* = Significant, ** = Highly significant)				
		LH1	LH2	LH3	LH4	LH5
Cont	Psoriasis	0.0004**	0.0000**	0.0000**	0.0000**	0.0000**
Cont	Atop Ecz	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Cont	Vitiligo	0.6716	0.3543	0.4196	0.5065	0.6508
Cont	Alop Are	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Cont	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Cont	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Atop Ecz	0.0002**	0.0007**	0.0003**	0.0002**	0.0003**
Psoriasis	Vitiligo	0.0010**	0.0002**	0.0001**	0.0000**	0.0000**
Psoriasis	Alop Are	0.3114	0.5987	0.6357	0.9113	0.8924
Psoriasis	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Vitiligo	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Alop Are	0.0010**	0.0006**	0.0002**	0.0000**	0.0000**
Atop Ecz	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Act Ker	0.0348*	0.1019	0.1801	0.2344	0.2333
Vitiligo	Alop Are	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Vitiligo	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Vitiligo	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Alop Are	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Alop Are	Act Ker	0.0000**	0.0001**	0.0000**	0.0000**	0.0000**
BCC	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0001**

Table 6.221 continued

Group1	Group2	Variables and Probabilities (* = Significant, ** = Highly significant)				
		RH1	RH2	RH3	RH4	RH5
Cont	Psoriasis	0.0001**	0.0000**	0.0000**	0.0000**	0.0001**
Cont	Atop Ecz	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Cont	Vitiligo	0.7264	0.6656	0.9685	0.7216	0.1660
Cont	Alop Are	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Cont	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Cont	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Atop Ecz	0.0070**	0.0006**	0.0001**	0.0001**	0.0004**
Psoriasis	Vitiligo	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Alop Are	0.4653	0.3516	0.2981	0.6231	0.8272
Psoriasis	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Psoriasis	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Vitiligo	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Alop Are	0.0166**	0.0036**	0.0010**	0.0002**	0.0001**
Atop Ecz	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Atop Ecz	Act Ker	0.0008**	0.0133*	0.0485*	0.0522	0.0344*
Vitiligo	Alop Are	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Vitiligo	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Vitiligo	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Alop Are	BCC	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
Alop Are	Act Ker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
BCC	Act Ker	0.0000**	0.0119	0.0016**	0.0105*	0.0058**

Table 6.222 - Canonical Discriminant Functions- MalesVariables: LH1 to RH5

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT.	CANONICAL CORRELATION
1*	0.31125	84.54	84.54	0.4872029
2*	0.02435	6.61	91.15	0.1541817
3*	0.01954	5.31	96.46	0.1384384
4*	0.01066	2.89	99.36	0.1026853
5*	0.00166	0.45	99.81	0.0406633
6*	0.00071	0.19	100.00	0.0267268

Table 6.223 - Males - Variables: LH1 to RH5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
LH1	0.54550	-0.22756	-0.09151	-1.04002	1.41144	-1.70533
LH2	0.08640	0.46779	1.15757	1.46096	-1.27027	-0.99865
LH5	-0.21903	0.96350	-2.11374	-0.72781	0.31068	1.85318
RH1	0.18283	-1.57784	0.00951	0.73809	0.42908	0.97018
RH2	-0.33522	1.17158	0.78419	-0.88436	0.39847	-0.54968
RH3	-0.14732	0.49040	-1.52819	2.71197	0.89538	0.11714
RH4	0.31201	0.13388	2.54071	-1.66754	0.30721	1.69155
RH5	0.59843	-1.24271	-0.75021	-0.48228	-2.42293	-1.30101

Table 6.224 - Males - Variables: LH1 to RH5
STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
RH5	0.94663*	0.07348	-0.02473	0.03040	-0.19647	0.12483
LH1	0.94310*	0.15362	-0.08156	-0.02425	0.22540	-0.14530
RH4	0.92030*	0.19128	0.17337	0.03625	-0.01613	0.26465
RH1	0.90694*	-0.11910	0.02922	0.18027	0.14200	0.17539
RH3	0.88931*	0.21104	0.03594	0.26005	0.05205	0.19647
LH5	0.88824*	0.33825	-0.21714	-0.01361	-0.01683	0.15258
LH4	0.88506*	0.33076	-0.06348	0.04549	0.00469	0.11052
LH2	0.88160*	0.35322	0.02204	0.19333	-0.07017	-0.06075
LH3	0.87964*	0.34677	-0.04658	0.05606	-0.01492	0.07944
RH2	0.84883*	0.27153	0.13220	0.09131	0.04853	0.12671

Table 6.225 - Males - Variables: LH1 to RH5

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS .

	GROUP	0	1	2	3	5	6
GROUP							
1		1.4105 0.1873					
2		14.134 0.0000	11.155 0.0000				
3		17.506 0.0000	15.778 0.0000	2.5810 0.0085			
5		2.0327 0.0396	2.9422 0.0029	18.040 0.0000	25.536 0.0000		
6		12.079 0.0000	12.293 0.0000	2.8420 0.0039	1.9756 0.0462	16.743 0.0000	
7		1.0669 0.3837	2.9029 0.0033	15.847 0.0000	20.340 0.0000	1.5789 0.1264	14.408 0.0000

Code Group
0 - Controls
1 - Psoriasis
2 - Atopic Eczema
3 - BCC
5 - Alopecia areata
6 - Actinic Keratosis
7 - Vitiligo

Figure 6.70 - Territorial Map - Males - Variables: LH1 to RH5

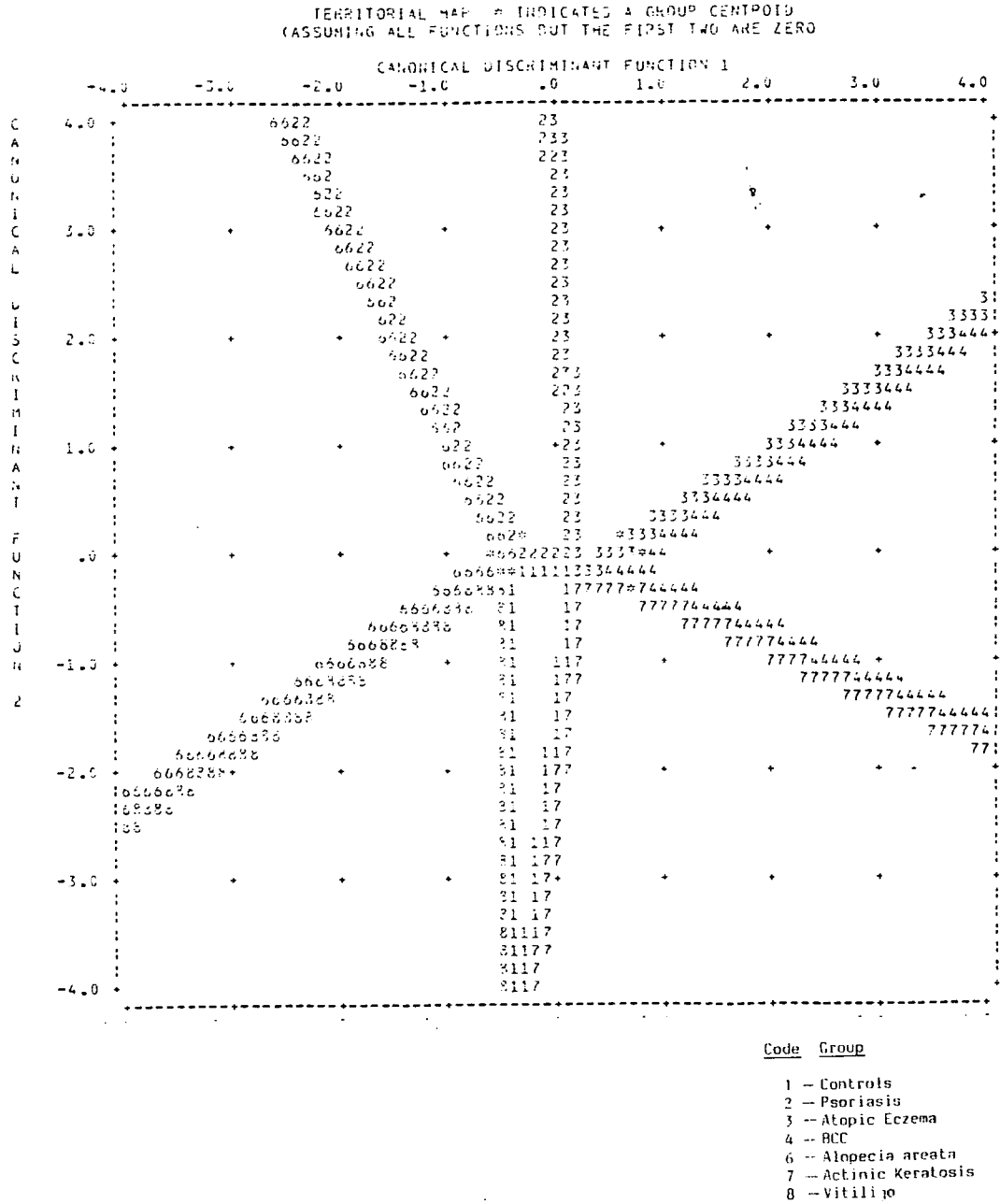


Figure 6.71 - Scatterplot - Males - Variables: LH1 to RH5

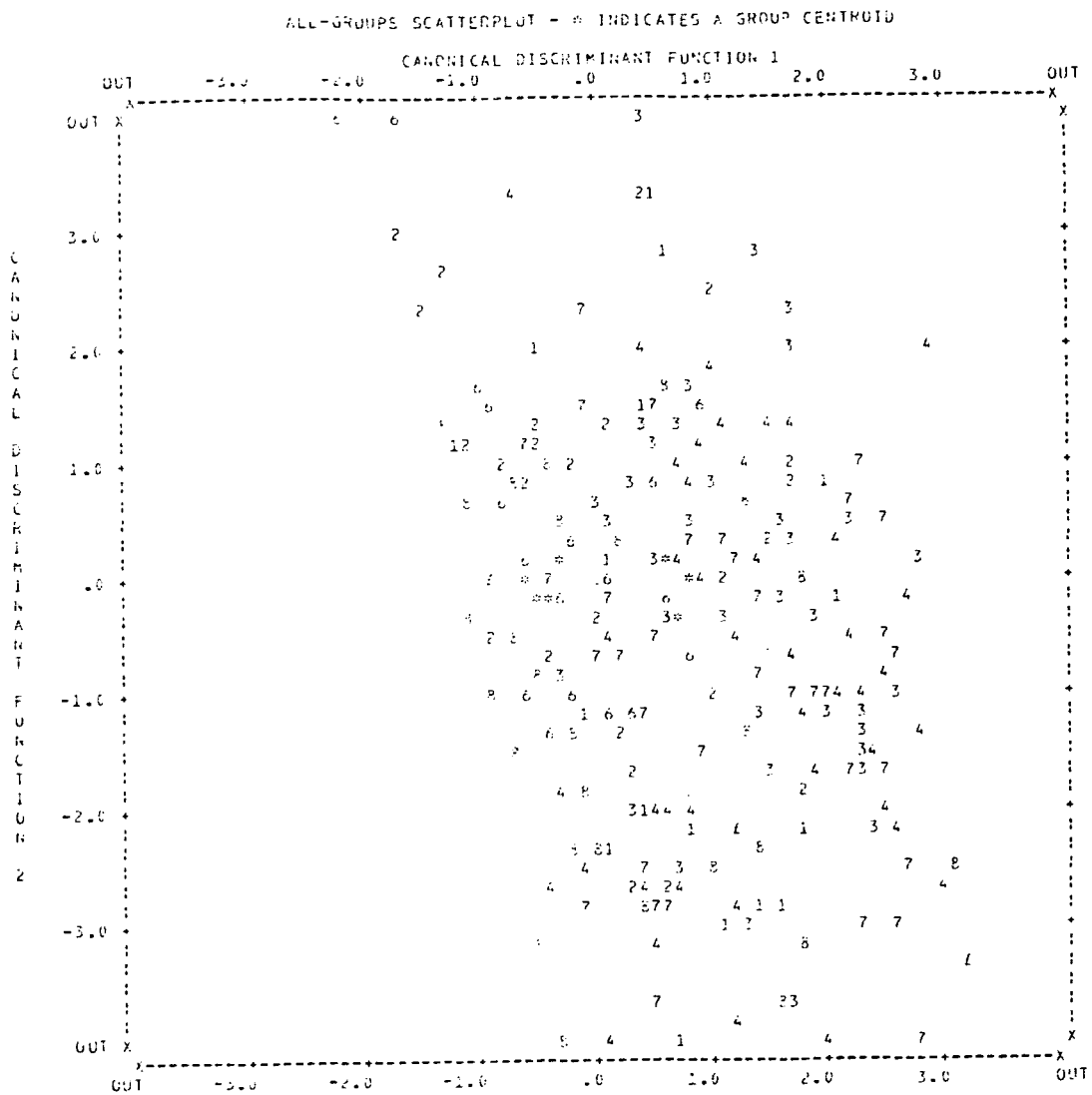
[illegible]

Figure 6.72 - Group Centroids

Classification results (Table 6.226) show that this set of variables correctly classified 26.26% of the 'grouped' variables. The best classification results were for alopecia areata (74.2% correct) followed by atopic eczema (39.9%).

For female subjects again 6 functions were extracted (Table 6.227) with Function 1 accounting for 85.32% of the variance. Function 1 had all the variables making important contributions with finger I being the most important (Table 6.229) with RH1 and LH1 being first and second in the list of size of correlation. The F Statistics and significances (Table 6.230) show vitiligo and BCC ($F = 40.808$) to be the furthest separated followed by vitiligo and actinic keratosis ($F = 20.874$) and then by BCC and alopecia areata ($F = 20.185$). The plot shows BCC and vitiligo to be the furthest apart (Figures 6.73 and 6.75). Atopic eczema and actinic keratosis are found to be close to BCC (all having high hyperlinearity) with psoriasis and alopecia areata in the centre and vitiligo and controls to the left with the least hyperlinearity. Classification results showed 26.12% correctness (Table 6.231). Best classified groups were vitiligo (66.7%) and BCC (57.9%).

When the subjects groups were regrouped using aetiology of disorder type highly significant differences were found for all comparisons (see Table 6.233) for all figures. In all cases for both males and females controls had the lowest hyperlinearity followed by GD. ND subjects showed the greatest finger ridge hyperlinearity (see Table 6.232).

Table 6.226 - Males - Variables: LH1 to RH5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	200	12 6.0%	6 3.0%	22 11.0%	6 3.0%	130 65.0%	17 8.5%	7 3.5%
GROUP	1	198	9 4.5%	23 11.6%	38 19.2%	5 2.5%	105 53.0%	13 6.6%	5 2.5%
GROUP	2	203	2 1.0%	7 3.4%	81 39.9%	10 4.9%	67 33.0%	33 16.3%	3 1.5%
GROUP	3	211	5 2.4%	7 3.3%	75 35.5%	25 11.8%	51 24.2%	36 17.1%	12 5.7%
GROUP	5	209	7 3.3%	6 2.9%	20 9.6%	2 1.0%	155 74.2%	11 5.3%	8 3.8%
GROUP	6	125	5 4.0%	7 5.6%	38 30.4%	13 10.4%	24 19.2%	35 28.0%	3 2.4%
GROUP	7	198	3 1.5%	3 1.5%	21 10.6%	5 2.5%	137 69.2%	7 3.5%	22 11.1%

Code Group
 0 - Controls
 1 - Psoriasis
 2 - Atopic Eczema
 3 - BCC
 5 - Alopecia areata
 6 - Actinic Keratosis
 7 - Vitiligo

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 26.26%

Table 6.227 - Canonical Discriminant Functions - FemalesVariables: LH1 to RH5

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.31633	85.32	85.32	0.4902170
2*	0.02495	6.73	92.05	0.1560271
3*	0.01596	4.30	96.36	0.1253326
4*	0.00809	2.18	98.54	0.0395674
5*	0.00380	1.02	99.56	0.0614875
6*	0.00103	0.44	100.00	0.0403271

Table 6.228 - Females - Variables: LH1 to RH5

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
LH1	0.27576	-0.87387	0.21004	-0.12869	-2.49009	0.48039
LH2	-0.06451	-0.91139	-0.33376	1.10638	2.06773	1.61684
LH4	0.29572	-0.41412	1.69750	0.12940	0.45322	-2.68952
LH5	0.03183	1.01375	0.01273	-2.14377	-0.05573	1.39987
RH1	0.52572	-0.79336	-1.57053	-0.21142	0.82713	-0.92073
RH4	-0.05931	0.49616	0.79317	2.25746	-0.80107	0.61402
RH5	0.04333	1.58513	-0.74513	-0.95024	0.05463	-0.41519

Table 6.229 - Females - Variables: LH1 to RH5

STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC. 1	FUNC 2	FUNC 3	FUNC 4	FUNC 5	FUNC 6
RH1	0.96519*	0.02024	-0.23245	0.06730	0.04767	-0.04724
LH1	0.94934*	-0.10690	0.10829	-0.01796	-0.18835	0.17628
LH4	0.92722*	0.04762	0.34735	-0.02403	0.12052	-0.03133
LH3	0.91744*	0.01335	0.25308	0.02020	0.15049	0.12380
LH5	0.91534*	0.15129	0.22422	-0.17164	0.09850	0.21342
LH2	0.91024*	-0.02862	0.18317	0.06206	0.20762	0.28059
RH5	0.90643*	0.38354	-0.02773	0.07312	0.01284	0.05966
RH3	0.90181*	0.22710	0.04701	0.20926	0.02889	0.11815
RH2	0.89885*	0.18487	-0.00675	0.16239	0.07396	0.10309
RH4	0.89521*	0.31231	0.07569	0.28702	-0.01582	0.09753

Table 6.230 - Females - Variables: LH1 to RH5

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

GROUP	0	1	2	3	5	6
1	4.3350 0.0001					
2	12.417 0.0000	3.5177 0.0009				
3	40.110 0.0000	20.213 0.0000	12.122 0.0000			
5	4.5354 0.0001	1.1020 0.3592	4.7641 0.0000	20.185 0.0000		
6	18.369 0.0000	6.5796 0.0000	3.2877 0.0018	5.4545 0.0000	6.2623 0.0000	
7	3.0784 0.0032	6.2971 0.0000	14.518 0.0000	40.808 0.0000	5.7452 0.0000	20.874 0.0000

Code Group

- 0 -- Controls
- 1 -- Psoriasis
- 2 -- Atopic Eczema
- 3 -- BCC
- 5 -- Alopecia areata
- 6 -- Actinic Keratosis
- 7 -- Vitiligo

Figure 6.73 - Territorial Map - Females - Variables: LH1 to RH5

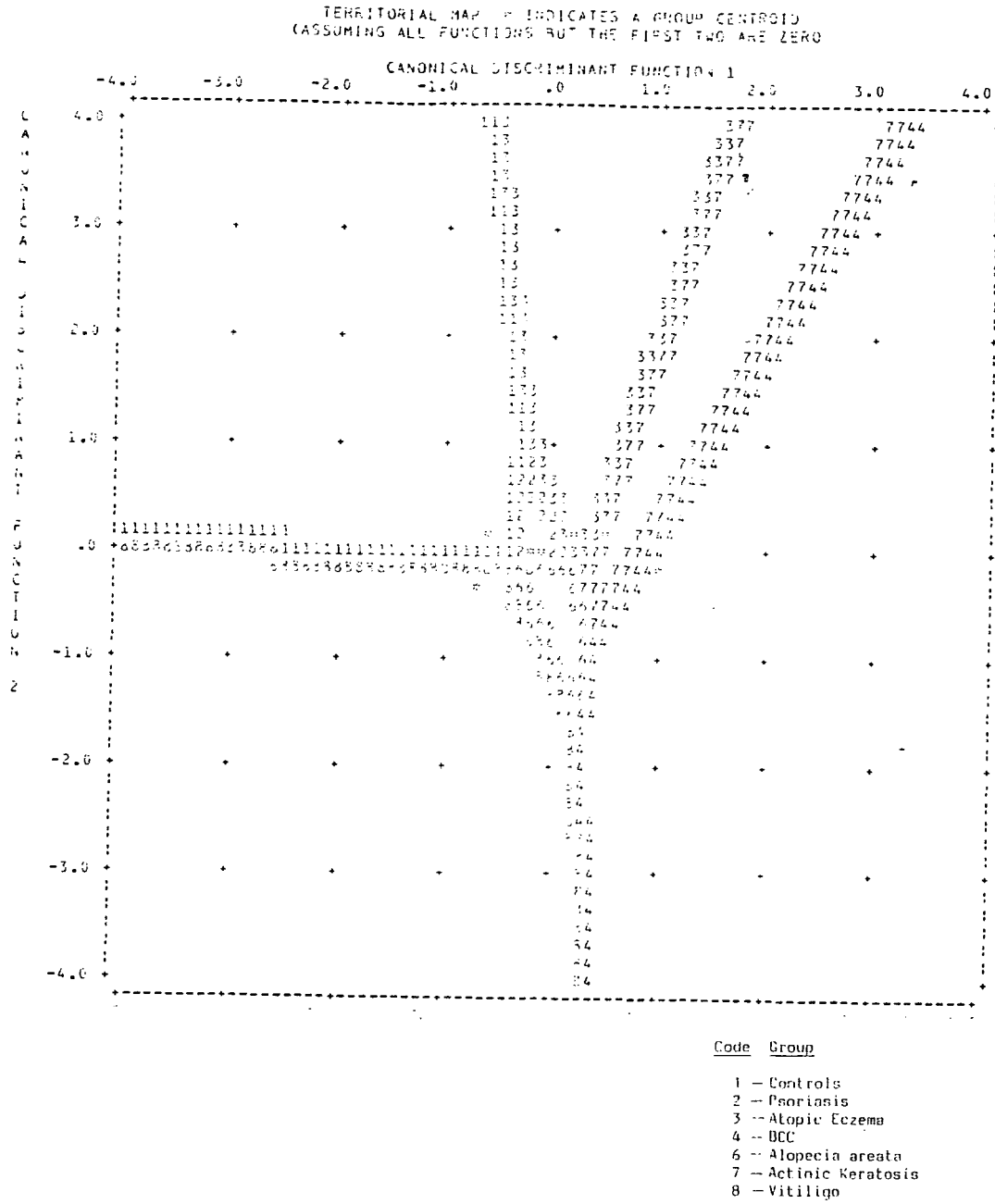


Figure 6.74 - Scatterplot - Females - Variables: LH1 to RH5

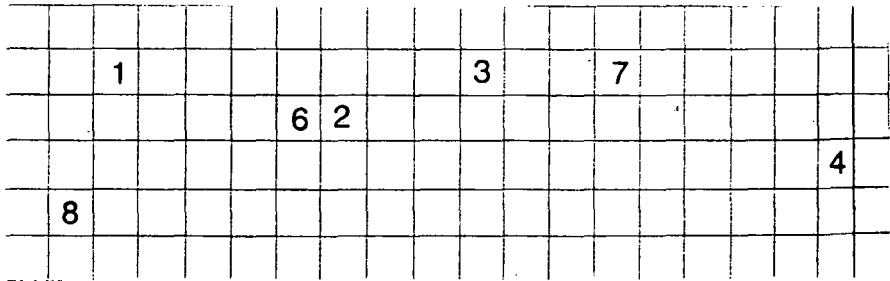
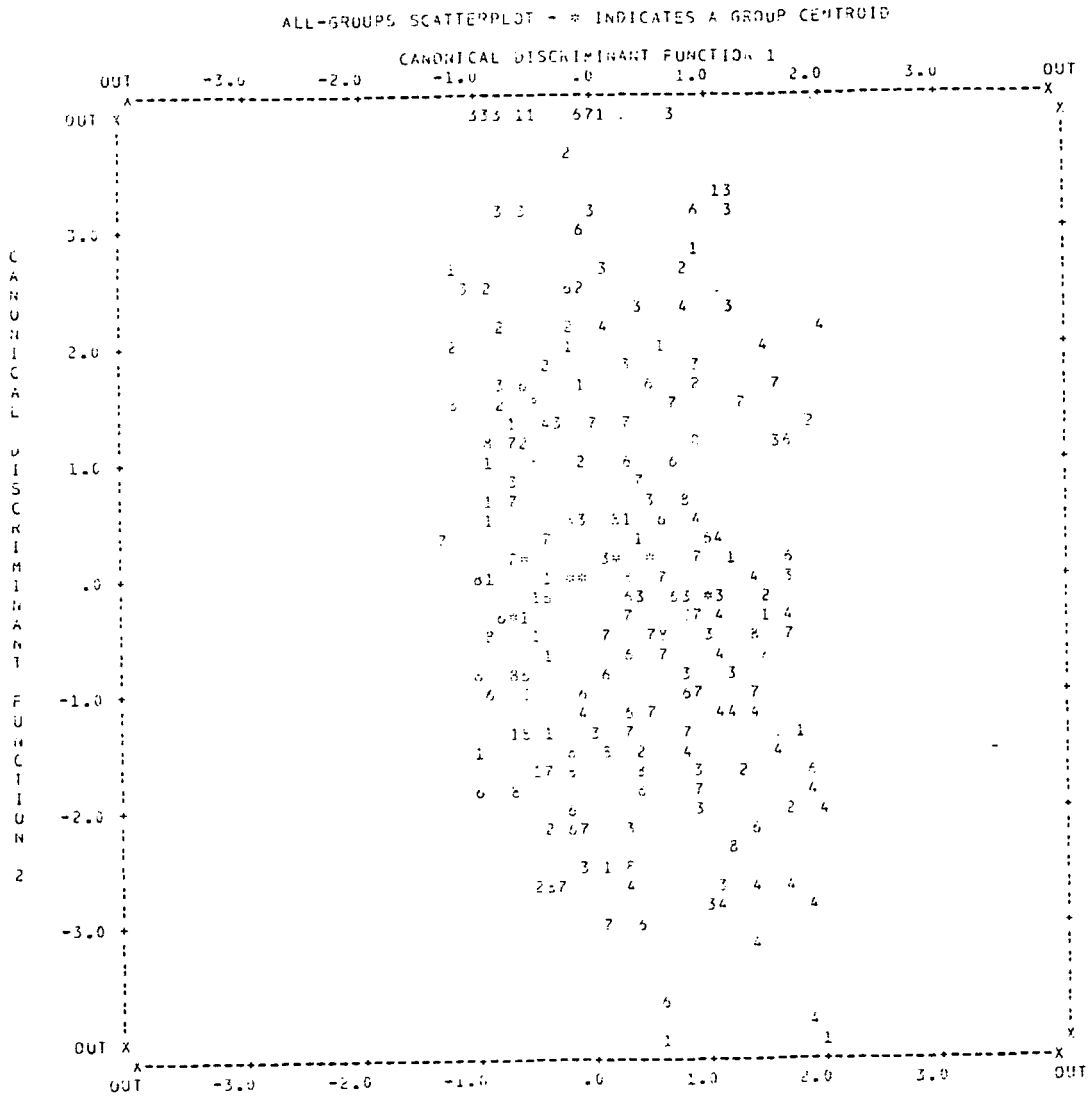


Figure 6.75 - Group Centroids

Table 6.231 - Females - Variables: LH1 to RH5

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	202	19 9.4%	14 6.9%	13 6.4%	9 4.5%	9 4.5%	20 9.9%	118 58.4%
GROUP	1	204	15 7.4%	12 5.9%	3 3.9%	46 22.5%	0 0.0%	28 13.7%	95 46.6%
GROUP	2	202	8 4.0%	23 11.4%	24 11.9%	56 27.7%	5 2.5%	31 15.3%	55 27.2%
GROUP	3	202	10 5.0%	14 6.9%	5 2.5%	117 57.9%	3 1.5%	33 16.3%	20 9.9%
GROUP	5	204	9 4.4%	36 17.6%	7 3.4%	28 13.7%	4 2.0%	40 19.6%	80 39.2%
GROUP	6	172	10 5.8%	8 4.7%	5 2.9%	55 32.0%	6 3.5%	51 29.7%	37 21.5%
GROUP	7	204	2 1.0%	28 13.7%	10 4.9%	9 4.4%	4 2.0%	15 7.4%	136 66.7%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 26.12%

Code Group
 0 -- Controls
 1 -- Psoriasis
 2 -- Atopic Eczema
 3 -- BCC
 5 -- Alopecia areala
 6 -- Actinic Keratosis
 7 -- Vitiligo

Table Percentage Frequencies
6.232
Hyperlinearity

Patients Grouped by Disorder Type

			Percentage Frequencies											
			LH1				LH2				LH3			
Gp	Sex	No.	0	1	2	3	0	1	2	3	0	1	2	3
Cont	M	206	71.4	16.0	8.3	4.4	80.1	11.7	4.9	3.4	77.7	12.1	5.8	4.4
GD	M	816	65.1	15.2	10.9	8.9	69.1	14.1	10.4	6.4	67.8	14.5	10.5	7.2
ND	M	340	29.8	22.3	20.5	27.4	36.5	23.8	22.1	17.6	35.0	22.1	23.5	19.4
Cont	F	203	64.0	22.7	8.9	4.4	70.9	20.7	5.9	2.5	70.9	18.7	8.9	1.5
GD	F	819	45.7	23.2	17.6	13.5	49.7	24.2	16.0	10.1	49.5	23.9	15.6	11.0
ND	F	374	16.6	17.1	24.6	41.7	22.5	16.0	32.1	29.5	22.2	14.7	30.7	32.4

			Percentage Frequencies							
			LH4				LH5			
Gp	Sex	No.	0	1	2	3	0	1	2	3
Cont	M	206	74.8	15.0	7.3	2.9	74.8	15.0	5.8	4.4
GD	M	816	65.9	16.1	10.8	7.2	65.8	16.1	10.8	7.4
ND	M	340	32.6	22.9	24.4	20.0	32.9	22.1	25.0	20.0
Cont	F	203	68.0	19.7	10.3	2.0	64.5	22.2	9.9	3.4
GD	F	819	46.6	25.6	15.9	11.8	45.8	26.1	16.8	11.2
ND	F	374	21.1	15.0	28.9	35.0	20.1	16.6	30.5	32.9

Table 6.232 continued

			Percentage Frequencies											
			RH1				RH2				RH3			
Gp	Sex	No.	0	1	2	3	0	1	2	3	0	1	2	3
Cont	M	206	70.4	16.0	8.7	4.9	79.1	12.1	5.3	3.4	78.6	11.7	6.3	3.4
GD	M	816	64.1	15.4	11.2	9.3	68.7	13.0	11.2	7.1	67.7	14.6	10.6	7.1
ND	M	340	27.4	21.8	23.8	27.1	34.4	25.3	23.5	16.8	32.4	25.6	23.8	18.2
Cont	F	203	64.0	18.7	11.8	5.4	73.4	14.3	8.9	3.4	70.4	17.7	8.4	3.4
GD	F	819	45.2	22.5	18.0	14.3	50.3	23.7	15.4	10.5	49.3	24.0	15.5	11.1
ND	F	374	13.4	16.0	28.9	41.7	19.0	21.7	31.6	27.8	17.4	22.2	32.1	28.3

			Percentage Frequencies							
			RH4				RH5			
Gp	Sex	No.	0	1	2	3	0	1	2	3
Cont	M	206	76.2	14.6	5.8	3.4	74.3	15.0	6.8	3.9
GD	M	816	66.2	15.0	11.3	7.5	66.6	14.4	11.9	7.1
ND	M	340	30.3	24.7	25.3	19.7	27.1	27.6	23.2	22.1
Cont	F	203	67.5	18.2	9.9	4.4	64.0	19.2	12.3	4.4
GD	F	819	47.7	23.3	17.0	12.0	46.4	24.2	17.6	11.8
ND	F	374	16.3	21.7	32.4	29.7	16.0	19.3	34.8	29.9

Table Mann-Whitney U Test Results
6.233
Hyperlinearity

Subjects Grouped by Disorder

			Probability for Variables				
Sex	Gp1	Gp2	LH1	LH2	LH3	LH4	LH5
M	Cont	GD	0.0427*	0.0008**	0.0031**	0.0062**	0.0075**
M	Cont	ND	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
M	GD	ND	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
F	Cont	GD	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
F	Cont	ND	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
F	GD	ND	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**

			Probability for Variables				
Sex	Gp1	Gp2	RH1	RH2	RH3	RH4	RH5
M	Cont	GD	0.0575	0.0028**	0.0013**	0.0021**	0.0187*
M	Cont	ND	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
M	GD	ND	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
F	Cont	GD	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
F	Cont	ND	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
F	GD	ND	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**

(iii) Finger Ridge Atrophy: Variables LA and RA

For male subjects a similar pattern emerged for ridge atrophy as was found for white lines and hyperlinearity. BCC, actinic keratosis and atopic eczema were found to have the greatest amount of ridge atrophy (Table 6.234) and controls, psoriasis and alopecia areata were found to have the least. This was reflected in the Mann-Whitney U Test Results (Table 6.235) where highly significant differences were found for both hands in a series of comparisons. BCC was found to have greater atrophy (H.SIG) in comparison to controls, psoriasis, vitiligo and alopecia areata. Actinic keratosis males were found to have highly significantly greater atrophy than psoriasis, vitiligo and alopecia areata. Atopic eczema had a highly significantly greater level of ridge atrophy in comparison to controls and to psoriasis. Controls had a highly significantly smaller incidence of atrophy in comparison to atopic eczema, alopecia areata, BCC and actinic keratosis. Psoriasis had a highly significantly lower incidence than atopic eczema, BCC and actinic keratosis. Alopecia areata had a highly significantly lower incidence of ridge atrophy in comparison to BCC, actinic keratosis and atopic eczema and a highly significantly greater incidence than controls.

For females BCC and actinic keratosis have the highest incidence of ridge atrophy with controls, vitiligo and alopecia areata having the least (Table 6.234). Highly significant differences were found for BCC, actinic keratosis and controls compared to all other groups (Table 6.235).

Only two functions were produced by Discriminant Analysis since only two variables were involved. Function 1 accounted for 87.84% of variance and finger ridge atrophy on the left hand was marginally the most important (Table 2.236). F Statistics show the most separated groups to be BCC and alopecia areata ($F = 55.180$) followed by BCC and controls ($F = 51.293$), see Table 6.237. The plots show that BCC, atopic eczema and actinic keratosis are grouped together and separated from the other groups (Figures 6.76 to 6.78). Classification results show 21.47% correct classification with best groups being controls (82.4%) and BCC (45.5%) see Table 6.238.

Table Percentage Frequencies
6.234
Finger Ridge Atrophy

(a) Males

Group	Cases	Percentage Frequencies							
		LA				RA			
		0	1	2	3	0	1	2	3
Controls	206	87.4	7.3	5.3	0.0	87.9	9.8	5.9	0.0
Psoriasis	201	80.6	11.9	6.0	1.5	82.1	9.5	7.0	1.5
Atop Ecz	203	50.7	20.1	17.2	3.0	51.2	22.7	20.2	5.9
Vitiligo	199	79.9	14.1	6.0	0.0	75.0	18.0	7.0	0.0
Alop Are	210	85.7	12.9	1.4	0.0	81.4	14.3	4.3	0.0
BCC	211	48.8	23.2	18.5	9.5	50.7	19.4	18.5	11.4
Act Ker	128	57.0	21.9	20.3	0.8	41.9	30.2	24.8	3.1

(b) Females

Group	Cases	Percentage Frequencies							
		LA				RA			
		0	1	2	3	0	1	2	3
Controls	203	84.2	10.8	4.4	0.5	85.7	8.4	5.9	0.0
Psoriasis	205	66.8	15.6	11.2	6.3	63.4	19.0	11.7	5.9
Atop Ecz	203	69.0	18.2	5.4	7.4	67.0	14.3	10.3	8.4
Vitiligo	205	74.5	21.6	2.9	1.0	73.5	21.6	3.9	1.0
Alop Are	206	73.8	9.7	13.1	3.4	68.4	17.0	10.7	3.9
BCC	202	36.1	25.2	20.8	17.8	37.6	21.3	24.3	16.8
Act Ker	174	49.7	22.5	22.0	5.8	43.7	27.0	21.8	7.5

Table 6.235 Mann-Whitney U Test Results : Finger Ridge Atrophy
Males

Group 1	Group 2	Probability	
		LA	RA
Control	Psoriasis	0.0637	0.5769
Control	Atop Ecz	0.0000**	0.0000**
Control	Vitiligo	0.0520	0.0374*
Control	Alop Are	0.0000**	0.0000**
Control	BCC	0.0000**	0.0000**
Control	Act Ker	0.0000**	0.0000**
Psoriasis	Atop Ecz	0.0000**	0.0000**
Psoriasis	Vitiligo	0.9448	0.1383
Psoriasis	Atop Are	0.1096	0.9571
Psoriasis	BCC	0.0000**	0.0000**
Psoriasis	Act Ker	0.0000**	0.0000**
Atop Ecz	Vitiligo	0.0000**	0.0000**
Atop Ecz	Alop Are	0.0000**	0.0000**
Atop Ecz	BCC	0.2193	0.5143
Atop Ecz	Act Ker	0.3947	0.2502
Vitiligo	Alop Are	0.0877	0.1046
Vitiligo	BCC	0.0000**	0.0000**
Vitiligo	Act Ker	0.0000**	0.0000**
Alop Are	BCC	0.0000**	0.0000**
Alop Are	Act Ker	0.0000**	0.0000**
BCC	Act Ker	0.0591	0.6192

Females

Group 1	Group 2	Probability	
		LA	RA
Control	Psoriasis	0.0000**	0.0000**
Control	Atop Ecz	0.0002**	0.0000**
Control	Vitiligo	0.0238*	0.0046**
Control	Alop Are	0.0036**	0.0000**
Control	BCC	0.0000**	0.0000**
Control	Act Ker	0.0000**	0.0000**
Psoriasis	Atop Ecz	0.5460	0.6568
Psoriasis	Vitiligo	0.0169*	0.0052**
Psoriasis	Alop Are	0.1547	0.2584
Psoriasis	BCC	0.0000**	0.0000**
Psoriasis	Act Ker	0.0015**	0.0002**
Atop Ecz	Vitiligo	0.0863	0.0284*
Atop Ecz	Alop Are	0.3983	0.5197
Atop Ecz	BCC	0.0000**	0.0000**
Atop Ecz	Act Ker	0.0001**	0.0001**
Vitiligo	Alop Are	0.3763	0.1020
Vitiligo	BCC	0.0000**	0.0000**
Vitiligo	Act Ker	0.0000**	0.0000**
Alop Are	BCC	0.0000**	0.0000**
Alop Are	Act Ker	0.0000**	0.0000**
BCC	Act Ker	0.0015**	0.0248*

Table 6.236 - Males - Variables: LA and RA

i CANONICAL DISCRIMINANT FUNCTIONS

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.16358	87.84	87.84	0.3749440
2*	0.02265	12.16	100.00	0.1488112

* MARKS THE 2 CANONICAL DISCRIMINANT FUNCTIONS REMAIN

ii STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2
LA	0.57809	-1.83920
RA	0.45974	1.87229

iii STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2
LA	0.97115*	-0.23847
RA	0.95399*	0.29935

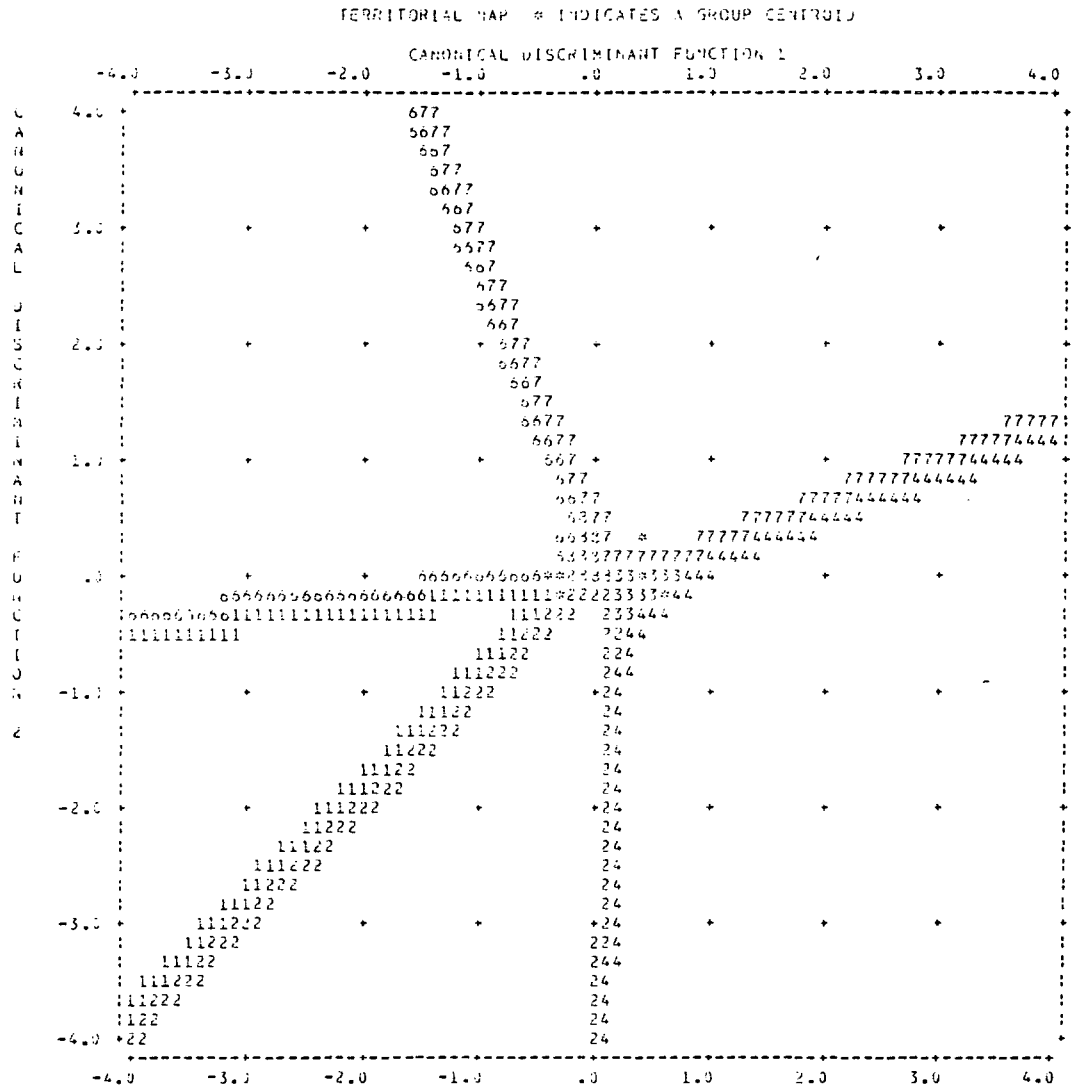
Table 6.237 - Males - Variables: LA and RA

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

GROUP	GROUP	0	1	2	3	5	6
1		1.5752 0.2073					
2		32.037 0.0000	24.011 0.0000				
3		51.293 0.0000	38.407 0.0000	3.5797 0.0282			
5		0.31988 0.7263	3.0599 0.0472	33.693 0.0000	55.180 0.0000		
6		29.998 0.0000	27.668 0.0000	5.6075 0.0038	14.183 0.0000	28.856 0.0000	
7		0.93463 0.3930	1.3154 0.2687	22.289 0.0000	39.455 0.0000	1.0969 0.3342	21.563 0.0000

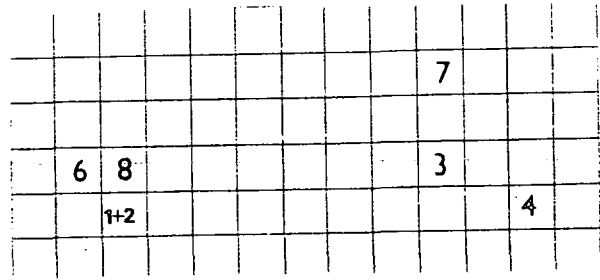
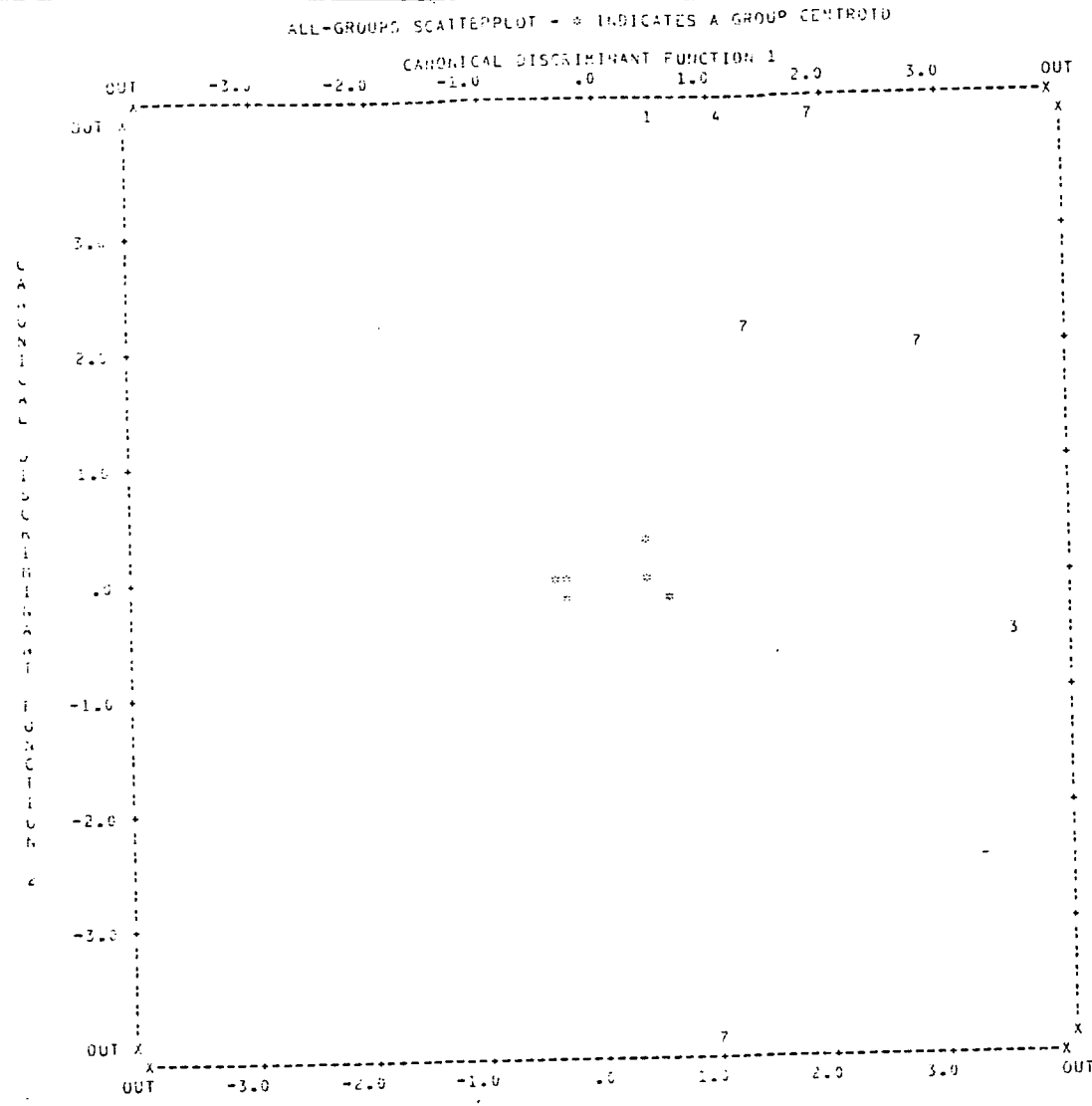
Code Group
0 - Controls
1 - Psoriasis
2 - Atopic Eczema
3 - BCC
5 - Alopecia areata
6 - Actinic Keratosis
7 - Vitiligo

Figure 6.76 - Territorial Map - Males - Variables: LA and RA



Code Group
1 - Controls
2 - Psoriasis
3 - Atopic Eczema
4 - BCC
5 - Alopecia areata
6 - Actinic Keratosis
7 - Vitiligo
8
9

Figure 6.77 - Scatterplot - Males - Variables: RA and LA



- Code Group
- 1 - Controls
 - 2 - Psoriasis
 - 3 - Atopic Dermatitis
 - 4 - BCC
 - 6 - Alopecia areata
 - 7 - Actinic Keratosis
 - 8 - Vitiligo

Figure 6.78 - Group Centroids

Table 6.238 - Males - Variables: LA and RA

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	199	164 82.4%	0 0.0%	0 0.0%	24 12.1%	0 0.0%	11 5.5%	0 0.0%
GROUP	1	201	158 78.6%	0 0.0%	0 0.0%	36 17.9%	0 0.0%	7 3.5%	0 0.0%
GROUP	2	203	90 44.3%	0 0.0%	0 0.0%	84 41.4%	0 0.0%	29 14.3%	0 0.0%
GROUP	3	211	99 46.9%	0 0.0%	0 0.0%	96 45.5%	0 0.0%	16 7.6%	0 0.0%
GROUP	5	210	170 81.0%	0 0.0%	0 0.0%	25 11.9%	0 0.0%	15 7.1%	0 0.0%
GROUP	6	128	53 41.4%	0 0.0%	0 0.0%	45 35.2%	0 0.0%	30 23.4%	0 0.0%
GROUP	7	199	148 74.4%	0 0.0%	0 0.0%	39 19.6%	0 0.0%	12 6.0%	0 0.0%

Code Group

- 0 -- Controls
- 1 -- Psoriasis
- 2 -- Atopic Eczema
- 3 -- BCC
- 5 -- Alopecia areata
- 6 -- Actinic Keratosis
- 7 -- Vitiligo

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 21.47%

Table 6.239 shows that Discriminant Analysis for females using LA and RA produced two functions. Function 1 accounts for 94.9% and RA had a slightly greater correlation than LA (see Table 6.239). The widest separated groups were controls and BCC ($F = 71.627$) followed by BCC and vitiligo ($F = 57.797$) as shown in Table 6.240. The plots (Figures 6.79 to 6.81) show that BCC was furthest removed from controls. BCC was furthest to the right with actinic keratosis being closest to it. Alopecia areata, psoriasis and atopic eczema were in the middle. Controls were furthest to the left with vitiligo between them and the three groups occupying the centre (see Figure 6.80 and 6.81). The Territorial Map (Figure 6.79) shows controls and BCC to be furthest apart and also BCC and actinic keratosis to be significantly apart. This can also be seen in Figure 6.81.

Classification results show 21.11% correct grouping (Table 6.241) with the best groups being controls (85.1% correct) and BCC (53.5% correct).

The results of regrouping groups according to aetiology type are shown in Table 6.242. Highly significant differences were found for all intergroup comparisons. In both males and females controls showed the smallest amount of atrophy followed by GD and ND which showed the greatest amount. These differences were found for finger atrophy on both hands.

Table 6.239 - Females - Variables: LA and RA

i CANONICAL DISCRIMINANT FUNCTIONS

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION
1*	0.14359	94.90	94.90	0.3543444
2*	0.00771	5.10	100.00	0.0874786

* MARKS THE 2 CANONICAL DISCRIMINANT FUNCTIONS REMAINING IN THE ANALY

ii STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2
LA	0.49258	1.97166
RA	0.54136	-1.95882

iii STRUCTURE MATRIX:

POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES
AND CANONICAL DISCRIMINANT FUNCTIONS
(VARIABLES ORDERED BY SIZE OF CORRELATION WITHIN FUNCTION)

	FUNC 1	FUNC 2
RA	0.97018*	-0.24238
LA	0.96387*	0.26639

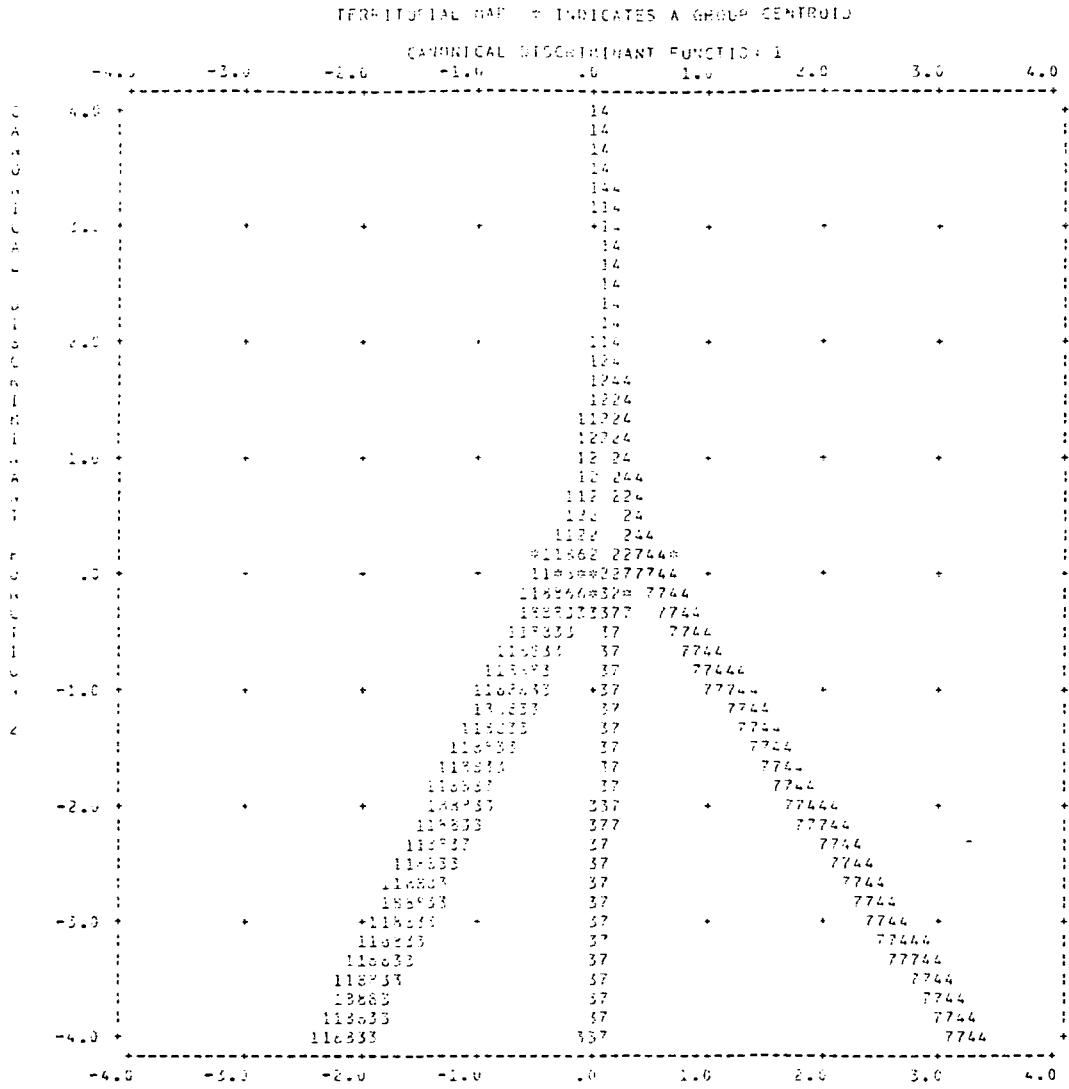
Table 6.240 - Females - Variables: LA and RA

F STATISTICS AND SIGNIFICANCES BETWEEN PAIRS OF GROUPS

GROUP	GROUP	0	1	2	3	5	6
1		10.660 0.0000					
2		11.060 0.0000	1.0072 0.3655				
3		71.627 0.0000	28.212 0.0000	32.902 0.0000			
5		5.9408 0.0027	0.84233 0.4309	1.0463 0.3515	38.810 0.0000		
6		33.311 0.0000	7.3574 0.0007	7.3648 0.0007	9.4790 0.0001	12.006 0.0000	
7		1.0148 0.3628	5.4094 0.0046	5.4069 0.0046	57.797 0.0000	2.1143 0.1211	23.415 0.0000
	<u>Code</u> <u>Group</u>						

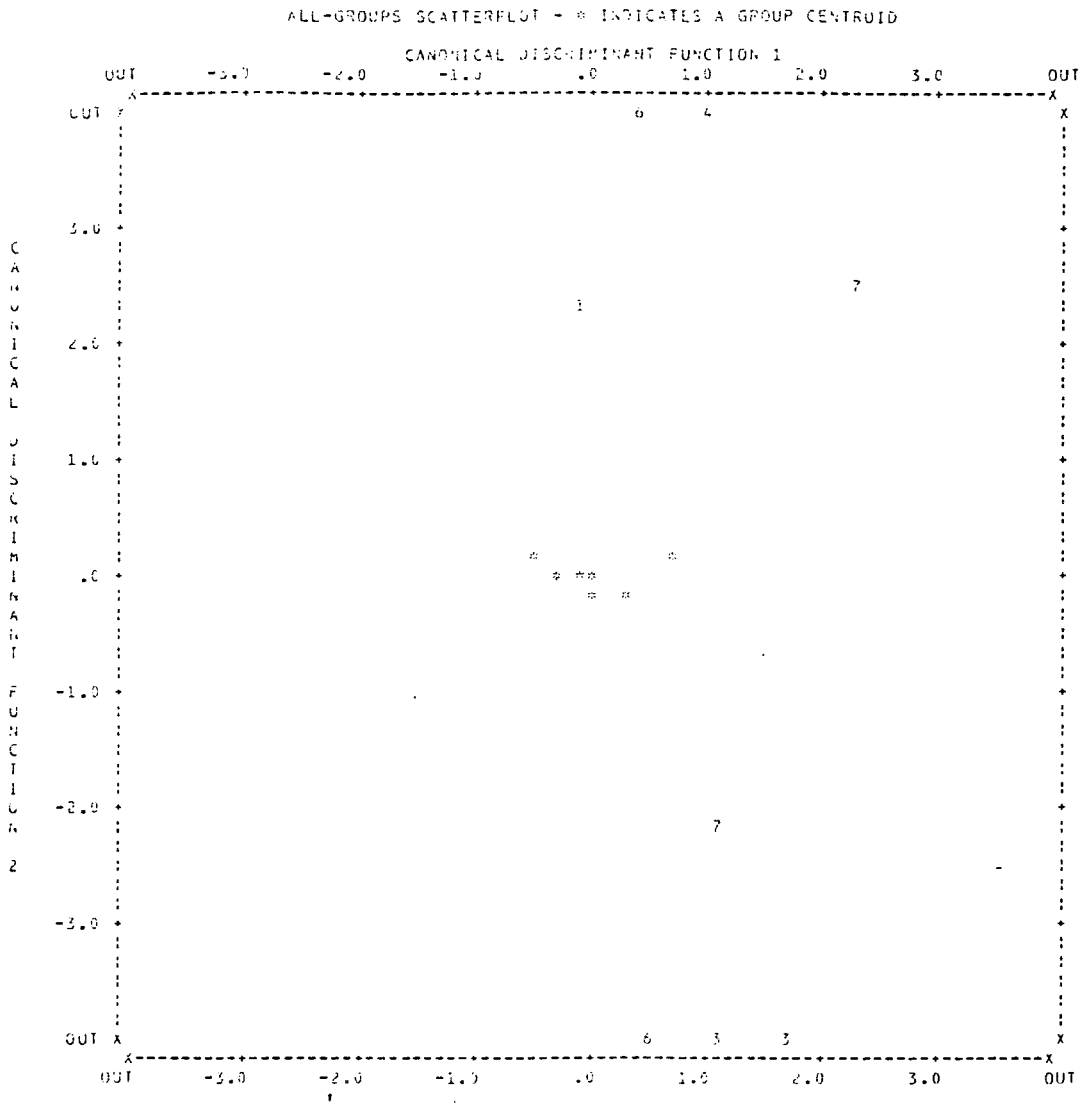
0 -- Controls
1 -- Psoriasis
2 -- Atopic Eczema
3 -- BCC
5 -- Alopecia areata
6 -- Actinic Keratosis
7 -- Vitiligo

Figure 6.79 - Territorial Map - Females - Variables: LA and RA

Code Group

- 1 - Controls
- 2 - Psoriasis
- 3 - Atopic Eczema
- 4 - DCL
- 6 - Alopecia areata
- 7 - Actinic Keratosis
- 8 - Vitiligo

Figure 6.80 - Scatterplot - Females - Variables: LA and RA



Code Group	
1	Controls
2	Psoriasis
3	Alopic Eczema
4	BCC
6	Alopecia areata
7	Actinic Keratosis
8	Vitiligo

1								4
	8	6	2					
			3		7			

Figure 6.81 - Group Centroids

Table 6.241 - Females - Variables: LA and RA

CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP						
			0	1	2	3	5	6	7
GROUP	0	202	172 85.1%	0 0.0%	2 1.0%	23 11.4%	0 0.0%	5 2.5%	0 0.0%
GROUP	1	205	129 62.9%	0 0.0%	11 5.4%	58 28.3%	0 0.0%	7 3.4%	0 0.0%
GROUP	2	203	136 67.0%	0 0.0%	5 2.5%	49 24.1%	0 0.0%	13 6.4%	0 0.0%
GROUP	3	202	72 35.6%	0 0.0%	8 4.0%	108 53.5%	0 0.0%	14 6.9%	0 0.0%
GROUP	5	206	140 68.0%	0 0.0%	11 5.3%	52 25.2%	0 0.0%	3 1.5%	0 0.0%
GROUP	6	171	74 43.3%	0 0.0%	11 6.4%	77 45.0%	0 0.0%	9 5.3%	0 0.0%
GROUP	7	204	150 73.5%	0 0.0%	7 3.4%	44 21.6%	0 0.0%	3 1.5%	0 0.0%

Code Group

- 0 - Controls
- 1 - Psoriasis
- 2 - Atopic Eczema
- 3 - BCF
- 5 - Alopecia areata
- 6 - Actinic Keratosis
- 7 - Vitiligo

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 21.11%

(a) Table Percentage Frequencies

6.242

Finger Ridge Atrophy – Subjects Grouped by Disorder Type

			Percentage Frequencies							
			LA				RA			
Gp	Sex	No.	0	1	2	3	0	1	2	3
Cont	M	206	87.4	7.3	5.3	0.0	83.9	9.8	5.9	0.0
GD	M	816	74.3	17.0	7.6	1.1	72.5	16.1	9.6	1.8
ND	M	340	51.9	22.7	19.2	6.2	47.4	23.5	20.9	8.2
Cont	F	203	84.2	10.8	4.4	0.5	85.7	8.4	5.9	0.0
GD	F	819	71.0	16.3	8.2	4.5	68.1	18.0	9.2	4.8
ND	F	374	42.4	24.1	21.2	12.3	40.1	24.1	23.3	12.6

(b) Mann-Whitney U Test Results

			Probability			
Sex	Gp1	Gp2	LA	RA	FNL	FNR
M	Cont	GD	0.0001**	0.0004**	0.0000**	0.0002**
M	Cont	ND	0.0000**	0.0000**	0.0000**	0.0000**
M	GD	ND	0.0000**	0.0000**	0.0000**	0.0000**
F	Cont	GD	0.0001**	0.0000**	0.0000**	0.0000**
F	Cont	ND	0.0000**	0.0000**	0.0000**	0.0000**
F	GD	ND	0.0000**	0.0000**	0.0000**	0.0000**