



Copyright Statement

The digital copy of this thesis is protected by the Copyright Act 1994 (New Zealand). This thesis may be consulted by you, provided you comply with the provisions of the Act and the following conditions of use:

- Any use you make of these documents or images must be for research or private study purposes only, and you may not make them available to any other person.
- Authors control the copyright of their thesis. You will recognise the author's right to be identified as the author of this thesis, and due acknowledgement will be made to the author where appropriate.
- You will obtain the author's permission before publishing any material from their thesis.

To request permissions please use the Feedback form on our webpage.
<http://researchspace.auckland.ac.nz/feedback>

General copyright and disclaimer

In addition to the above conditions, authors give their consent for the digital copy of their work to be used subject to the conditions specified on the Library [Thesis Consent Form](#)



STUDIES ON THE NEW ZEALAND, AND
SOME RELATED, SPECIES OF *PTERIS* L.

John E. Braggins

Submitted for the degree of
Doctor of Philosophy in Botany,
at the University of Auckland, Auckland, NZ.

1975

UNIVERSITY OF AUCKLAND
LIBRARY

BIOLOGY

THESIS

76-88

cop. 2

Biology
Thesis

7	6	6	4	0	0	2	7	7	5	0	1
---	---	---	---	---	---	---	---	---	---	---	---

76-88

cop. 2

ORDER OF CONTENTS

Frontispiece	
Title page	
<u>Abstract</u>	i
<u>Acknowledgements</u>	iii
<u>Introduction</u>	1
<u>Materials and Methods</u>	10
<u>Taxonomic Revision : Nomenclature</u>	11
<u>Pteris</u> L.	11
Section I <u>Eupteris</u>	11
Section II <u>Litobrochia</u>	23
Section III Other species reported from New Zealand.	45
<u>Distribution and Habitat</u>	
Distribution	46
Habitat and Life form	51
<u>Features of the Morphology of Rhizome and Fronds</u>	65
General form of the lamina	65
Indumentum	67
The Rhizome	83
The Stipes	88
<u>Taxonomic value of Features of the Sorus</u>	95
The reflex margin	95
The fertile portion of the pinnule margin	99
Sporangia	101
Paraphyses and other accessory structures of the Sorus	105

<u>Spores</u>	110
<u>Germination</u>	121
<u>Hybridisation</u>	127
<u>Chemotaxonomy</u>	132
<u>Descriptions</u>	133
<u>P.tremula</u>	134
<u>P.comans</u>	137
<u>P.carsei</u>	140
<u>P.macilenta</u>	142
<u>P.pendula</u>	145
 <u>Summary and Discussion</u>	 148
Appendix 1 Bibliography	156
Appendix 2 List of specimens examined	170
Appendix 3 Formula : Long Ashton Nutrient Solution	196
Appendix 4 Spore measurements	197
Appendix 5 Original description of <u>P.pendula</u>	200

Plate 28	Figs. 108-113	Paleal detail.	78
Plate 29	Figs. 114-118	Sections of hairs and paleae.	85
Plate 30	Figs. 119-122	Sporangial detail of hybrid and paleal detail in <u>P. comans</u> .	86
Plate 31	Figs. 123-126	Indumentum on the unrolling fronds.	87
Plate 32	Figs. 127-133	Costal spines.	91
Plate 33	Figs. 134-140	Sections of pinnules at the costule region.	92
Plate 34	Figs. 141-149	Pinna clearings to show veins.	94
Plate 35	Figs. 150-157	Details of sori, surface view.	96
Plate 36	Figs. 158-166	Surface details of sori continued.	97
Plate 37	Figs. 167-174	Sections of sori.	98
Plate 38	Figs. 175-179	Sporangial details.	107
Plate 39	Figs. 180-184	Comparison of spore types.	114
Plate 40	Figs. 185-189	Spore sculpture and form.	115
Plate 41	Figs. 190-195	Spore details.	117
Plate 42	Figs. 196-201	Spore details (continued).	118
Plate 43	Figs. 202-207	Spores from hybrid plants.	120
Plate 44	Figs. 208 & 209	Hybrid fronds.	125
Plate 45	Figs. 210-212	Fronds of hybrids.	126
Plate 46	Figs. 213-216	Large gametophytes.	129

ABSTRACT

Studies on the New Zealand and some related species of Pteris L.

Four New Zealand species are recognised:

- (1) P. tremula R.Br., (also in Australia, Lord Howe Is., Norfolk Is., the Kermadecs Is. and the Chatham Is.).
- (2) P. carsei sp. nov. (previously 'P. comans') (also in Australia and the Kermadec Is.).
- (3) P. macilenta A. Rich. (previously P. macilenta var. saxatilis Carse) endemic.
- (4) P. pendula Col. (previously P. macilenta Auct. non. Rich. and P. macilenta var. pendula (Col.) Cheeseman) endemic.

The taxonomy and nomenclature of these species is discussed in detail and the nomenclature is also discussed for P. kingiana Endl. (previously sometimes treated as P. tremula) and P. zahlbruckneriana Endl. (previously treated under 'P. comans' or P. endlicheriana Agardh) both Norfolk Is. endemics, and the taxonomy of P. sp.aff.comans LHI (previously 'P. comans') endemic to Lord Howe Island is also discussed.

Detailed study of the spores and paleae using conventional light microscopy and SEM was made for these species and also P. comans Forst. f. (from the New Hebrides) and P. novae-caledoniae from New Caledonia.

Comparisons of the distribution, fronds, stipes, venation, rhizomes, paleae, indumentum, apices, sori, sporangia and spores have been made and where appropriate material of P. dentata

ssp. flabellata, P. pacifica and P. vittata, has also been compared. Further comparisons have been made with material of 'P. comans' from other Pacific Islands including Fiji (three species), Rarotonga, Samoa, Tahiti (each one species).

P. tremula, P. kingiana and P. novae-caledoniae are exceptional in the genus because they lack paraphyses in the sori. P. kingiana and P. novae-caledoniae have a copious waxy deposit around and among the sporangial stalks but P. tremula has no accessory sporangial features at all.

Germination and gametophyte growth follow the normal pattern for the genus. Some gametophytes can be kept alive and growing for considerable periods (up to three years) and become elongate, ribbon-like and unisexual (female).

Hybridisation was achieved between P. carsei and P. macilenta. The progeny resemble the natural hybrid swarms suspected of being the product of the same parents.

ACKNOWLEDGEMENTS

I wish to thank all who have helped in any way in the production of this thesis.

In particular my supervisors Associate Professors L.H. Millener and J.A. Rattenbury, for general help and guidance with special thanks to Professor Millener for discussion and criticism of the manuscript, Professor Blaiklock for the Latin translation of the descriptions of P. carsei; Dr. G. Brownlie and Miss M. Crookes for the loan of papers and specimens; Mr. A.E. Esler for helpful comments, specimens and localities; K. Haydock and A. Wright and all others who have collected specimens; the directors of institutions where I have examined specimens or from which I have borrowed species. Finally I wish to thank my wife, Raewyn, for her help and encouragement in the completion of this project.