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**BIOCHEMICAL ASPECTS OF SELF-INCOMPATIBILITY IN
*PETUNIA HYBRIDA.***

by

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A thesis submitted in fulfilment of the
requirements for the degree of
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PREFACE

Part of the work described in this thesis has been published or presented at scientific meetings as indicated below:

Incompatibility in cereal rye.

L.W. Tan and Jackson, J.F.

Proceedings of the Australian Biochemical Society **16,22** (1986)

Self incompatibility in *Phalaris coerulescens*.

L.W. Tan and Jackson, J.F.

Abstracts Plant Molecular Biology Conference, University of Auckland, New Zealand **1,2** (1987)

Stigma proteins of the two loci self-incompatible grass *Phalaris coerulescens*.

L.W. Tan and Jackson, J.F.

Sexual Plant Reproduction **1** (in press) 1988

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DECLARATION

I hereby declare that this thesis contains no material which has been accepted for the award of any other degree or diploma in any university. To the best of my knowledge and belief, no material described herein has been previously published or written by another person except when due reference is made in the text.

This thesis may **not** be loaned for the purpose of photocopying or used in any form for publications unless expressed permission is given by the author.

Lor-wai TAN

LIST OF ABBREVIATIONS

bluscrb	plasmid vector bluescribe
bp	base pair
cDNA	complementary deoxyribose nucleic acid
2,4-D	2,4-dichlorophenoxyacetic acid
dATP	deoxyadenine triphosphate
dCTP	deoxycytidine triphosphate
dGTP	deoxyguanine triphosphate
dTTP	deoxythymidine triphosphate
EDTA	ethylenediamine tetra acetic acid
IAA	indole-3-acetic acid
IEF	isoelectric focusing
IPTG	isopropylthiogalactoside
kinetin	N-furfurylaminopurine
mRNA	messenger ribonucleic acid
NAA	α -naphthalene acetic acid
PMSF	phenyl methyl sulphonyl fluoride
SDS	sodium dodecyl sulphate
Tris	2-amino-2-hydroxyl methyl amino methane

X-gal

5-bromo-4-chloro-3-indonyl-
galactopyranoside

UNITS AND SYMBOLS

°C	degree Celsius
Ci	curie
g	unit of gravitational force
gm	gram
h	hour(s)
kda	kilodaltons
M	molar
mCi	millicurie
mg	milligram
mm	millimetres
mM	millimolar
min	minute
μCi	microcurie
μl	microlitre
%	percent
s	second(s)

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SUMMARY

1. The S2- and S3-related proteins in pistils of *Petunia hybrida* W166H were expressed uniformly throughout the length of the mature styles.
2. There were no detectable differences in the level of expression of these proteins in either immature or mature styles of *P. hybrida* W166H.
3. Two-dimensional gel patterns of pistil proteins revealed a prominent cluster mainly in the acidic region in contrast to the basic nature of these proteins reported earlier (Kamboj and Jackson, 1986).
4. By the use of tissue culture techniques, callus was successfully generated from style tissues of *P. hybrida* W166H.
5. The protein profiles of the dedifferentiated callus tissue were very similar to those of stigmas and ovaries of *P. hybrida* W166H.
6. A cDNA library constructed from *P. hybrida* W166H styles showed no homology when screened with a 30 base sequence from a stylar-specific *Nicotiana alata* glycoprotein.
7. Messenger RNA prepared from immature styles were found to be a better source of templates for cDNA synthesis than mature styles.
8. The production of stigma surface secretions in *P. hybrida* W166H coincided with the onset of the self-incompatible reaction. By the method of fluorescence microscopy, only compatible pollen tubes were observed to traverse the lower portion of the styles intact.

9. Differences in the stigma protein patterns observed in the two loci self-incompatible system of *P. coerulescens*. could not be correlated simply to the S- and Z-alleles.