Arabidopsis

A PRACTICAL APPROACH

Edited by
Z. A. WILSON

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Preface

Over the past fifteen years *Arabidopsis thaliana* has changed from being an insignificant weed, to one of the most cultivated laboratory plants around the world. This increase in popularity can be put down to its small genome, low levels of repetitive DNA, small size and fast generation time. As such it is an ideal molecular genetic tool for the analysis of development in higher plants. The acknowledgement of the importance of a model plant species was brought about by the desire of researchers around the world to come together in an International effort which will allow the advancement of Plant Sciences across all plant species.

This book provides an introduction to the key techniques required for the use of *Arabidopsis* as an experimental system. It gives a basic introduction to the optimal growth conditions and the genetic resources available for *Arabidopsis*, how this material should be handled, maintained and used. Individual chapters describe strategies for the identification, mapping and characterization of different mutants by microscopy, molecular cytogenetics and gene expression analysis. Different cloning strategies, using transposons, T-DNA and map position are described in detail and provide a means to generate, identify and characterise genes of developmental interest.

I would like to thank all the contributors for their help and patience in completing their chapters and revealing their innermost laboratory secrets. I would also like to thank Dr. Bernard Mulligan who instigated most of the original ground work for this book.

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September 1999

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Abbreviations

2,4-D	2,4-dichlorophenoxyacetic acid
2-ip	2-isopentenyladenine
A_{260}	absorbance (260 nm)
A_{280}	absorbance (280 nm)
ABRC	*Arabidopsis* Biological Research Centre
Ac	Activator
AFLP	amplified fragment length polymorphism
AGI	*Arabidopsis* genome initiative
AGR	*Arabidopsis* Genome Resources
AIMS	*Arabidopsis* Information Management System
ARMS	*Arabidopsis* RFLP mapping set
AtDB	*Arabidopsis thaliana* database
ATGC	*Arabidopsis thaliana* Genome Centre
ATP	adenosine triphosphate
BAC	bacterial artificial chromosome
BLAST	basic local alignment search tool
bp	base pair
BSA	bovine serum albumin
CAPS	cleaved amplified polymorphic DNAs
cDNA	complementary DNA
CIAP	calf intestinal alkaline phosphatase
CIM	callus inducing medium
cM	centimorgan
Col	Columbia
CTAB	cetyltrimethylammonium bromide
Cvi	Cape Verde Islands
DAPI	4′,6-diamidino-2-phenylindole
dCTP	deoxycytidine triphosphate
ddW	double distilled water
DMSO	dimethyl sulfoxide
DNA	deoxyribonucleic acid
DNase	deoxyribonuclease
dNTP	deoxynucleoside triphosphate
Ds	Dissociation
dSpm	defective Suppressor-mutator
DTT	dithiothreitol
EDTA	ethylenediaminetetraacetic acid
EM	electron microscopy
EMS	ethylmethane sulfonate
En	Enhancer

EST	expressed sequence tag
FISH	fluorescence *in situ* hybridization
fm	femtomole
FTP	file transfer protocol
FW	fresh weight
GDE	Genetic Data Environment
GFP	green fluorescent protein
GMI	germination medium I
GUS	β-glucuronidase
HPT	hygromycin phosphotransferase
HSP	high scoring segment pair
hyg^r	hygromycin resistant
I	Inhibitor element
IAA	indole-3-acetic acid
IP	Internet protocol
IPCR	inverse polymerase chain reaction
IPTG	isopropyl-β-D-thiogalactopyranoside
kb	kilobase pair
LA-IPCR	long-range IPCR
L*er*	Landsberg *erecta*
LLR	log likelihood ratio
LM	light microscopy
LMP	low melting point
LUC	luciferase
MAFF	Ministry of Farming and Fisheries
Mb	megabase pair
MES	2-(*N*-morpholino)ethanesulfonic acid
MOPS	morpholinopropanesulfonic acid
mRNA	messenger RNA
MSU	Michigan State University
MU	4-methylumbelliferone
MUG	4-methylumbelliferyl glucuronide
NASC	Nottingham *Arabidopsis* Stock Centre
NBT	nitro blue tetrazolium salt
NCBI	National Centre for Biotechnology Information
NM	nitrosomethyl biuret
NMU	nitrosomethyl urea
NOR	nucleolar organizer region
NPG	*NetPlantGene*
ORF	open reading frame
PBS	phosphate-buffered saline
PCR	polymerase chain reaction
PEG	polyethylene glycol
PFGE	pulsed-field gel electrophoresis

PIR	International Protein Sequence Database
PMSF	phenylmethylsulfonyl fluoride
RAPD	random amplified polymorphic DNA
r.c.f.	relative centrifugal force
RFLP	restriction fragment length polymorphism
RI	recombinant inbred
RIL	recombinant inbred lines
RNase	ribonuclease
RTF	rich text format
SAM	*S*-adenosylmethionine
SC	synaptonemal complexes
SCOP	Structural Classification of Proteins
SDS	sodium dodecyl sulfate
SEM	shoot elongation medium
SIM	shoot inducing medium
SOM	shoot overlay medium
Spm	Supressor-mutator
SRS	Sequence Retrieval System
SSC	standard saline citrate
SSLP	simple sequence length polymorphism
SSPE	standard saline/phosphate/EDTA
strep^r	streptomycin resistant
TAC	transformable artificial chromosome
TBE	Tris/borate/EDTA buffer
TC	tentative consensus
T-DNA	transfer DNA
TE	Tris/EDTA buffer
TIGR	The Institue for Genomic Research
TIR	terminal inverted repeat
tRNA	transfer RNA
U.Minn	University of Minnesota
UV	ultraviolet
VAST	Vector Alignment Search Tool
WS	Wassilewskija
WT	wild-type (normal)
X-gluc	5-bromo-4-chloro-3-indoyl glucuronide
X-phosphate	5-bromo-4-chloro-3-indoyl phosphate
YAC	yeast artificial chromosome