THE ROLE OF CYCLIC NUCLEOTIDES IN THE MODEL PLANT *ARABIDOPSIS*

MALINNA JUSOH

M. Sc. BY RESEARCH IN PLANT SCIENCES
TRINITY TERM 2010
UNIVERSITY OF OXFORD

Malinna Jusoh

Linacre College

University of Oxford

The role of cyclic nucleotides in the model plant *Arabidopsis*

Thesis submitted for the degree of

M.Sc. by Research in Plant Sciences

Trinity Term 2010

Abstract

The role of cyclic nucleotides in the model plant *Arabidopsis*

Malinna Jusoh

Linacre College

Thesis submitted for the degree of MSc by Research, Trinity Term 2010

Adenylyl cyclases (ACs) catalyze the formation of adenosine3',5'-cyclic monophosphate (cAMP) from adenosine 5'-triphosphate (ATP). The *Arabidopsis* genome contains two genes, At3g14460 (*AC1*) and At3g14470 (*AC2*) which have an amino-terminal nucleotide binding domain and sequence homology to maize AC. Expression of AC1 and AC2 complemented the *E.coli* cAMP mutant, *cya* suggesting that both proteins produce functional cAMP *in vivo*. Gene expression studies using RT-PCR and promoter-GUS staining showed that *AC1* is expressed in root tips, inflorescence and anthers, while *AC2* is expressed in stem, roots, cauline leaves, senescent leaves, and inflorescences. T-DNA insertion mutants of *ac1* and *ac2* showed a delay and a reduction in germination under salt stress. Conversely, overexpression of *AC1* and *AC2* conferred some protection against salt stress. Taken together, I infer that cAMP may have a role in salinity tolerance.