

Function analysis of a DNA phosphatase *APE1 in Arabidopsis*

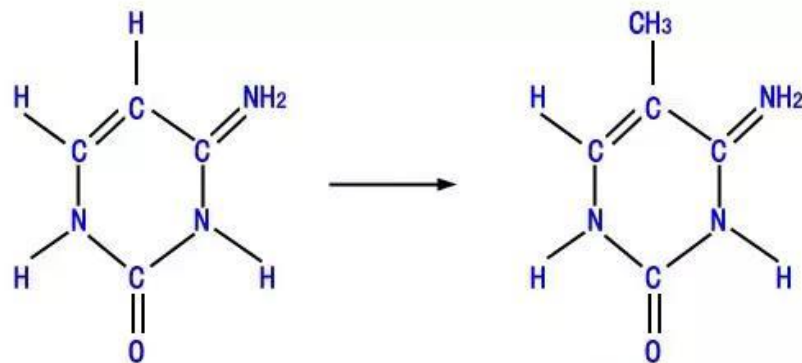
拟南芥 DNA 磷酸酶 APE1 的功能分析

By 第一小组

王礼鹏、朱思雨、杨双双、李金超

表观遗传学系列之

甲基化



胞嘧啶

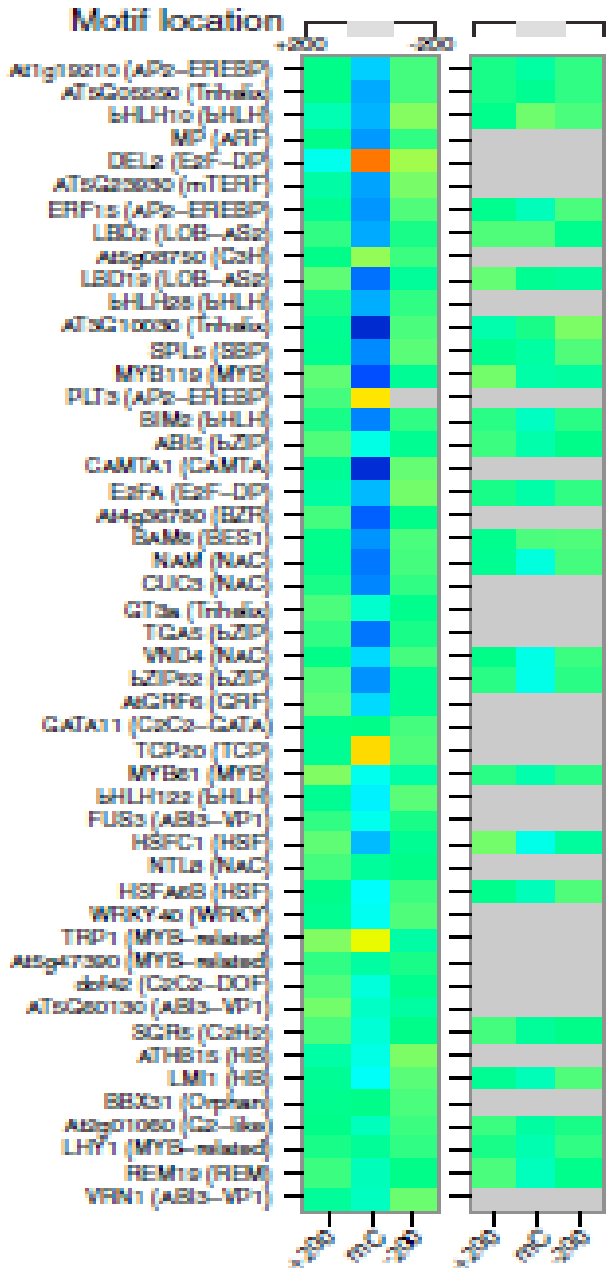
甲基化胞嘧啶

胞嘧啶和甲基化胞嘧啶

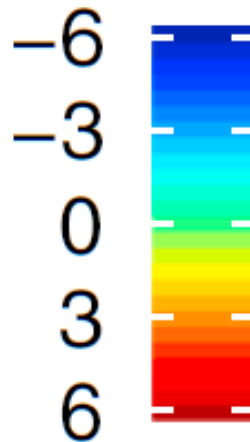


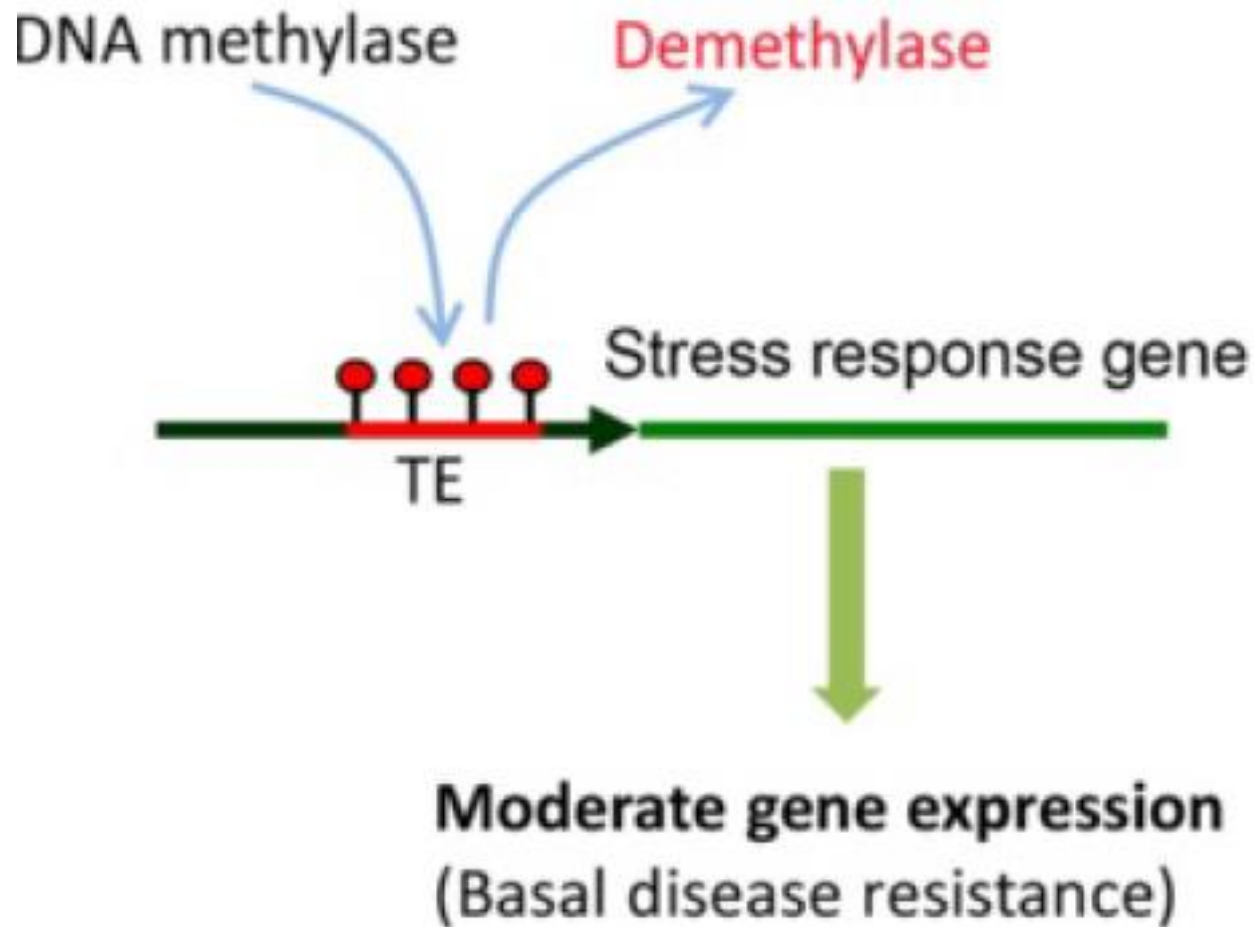
DNA 甲基化修饰的功能

甲基化 非甲基化



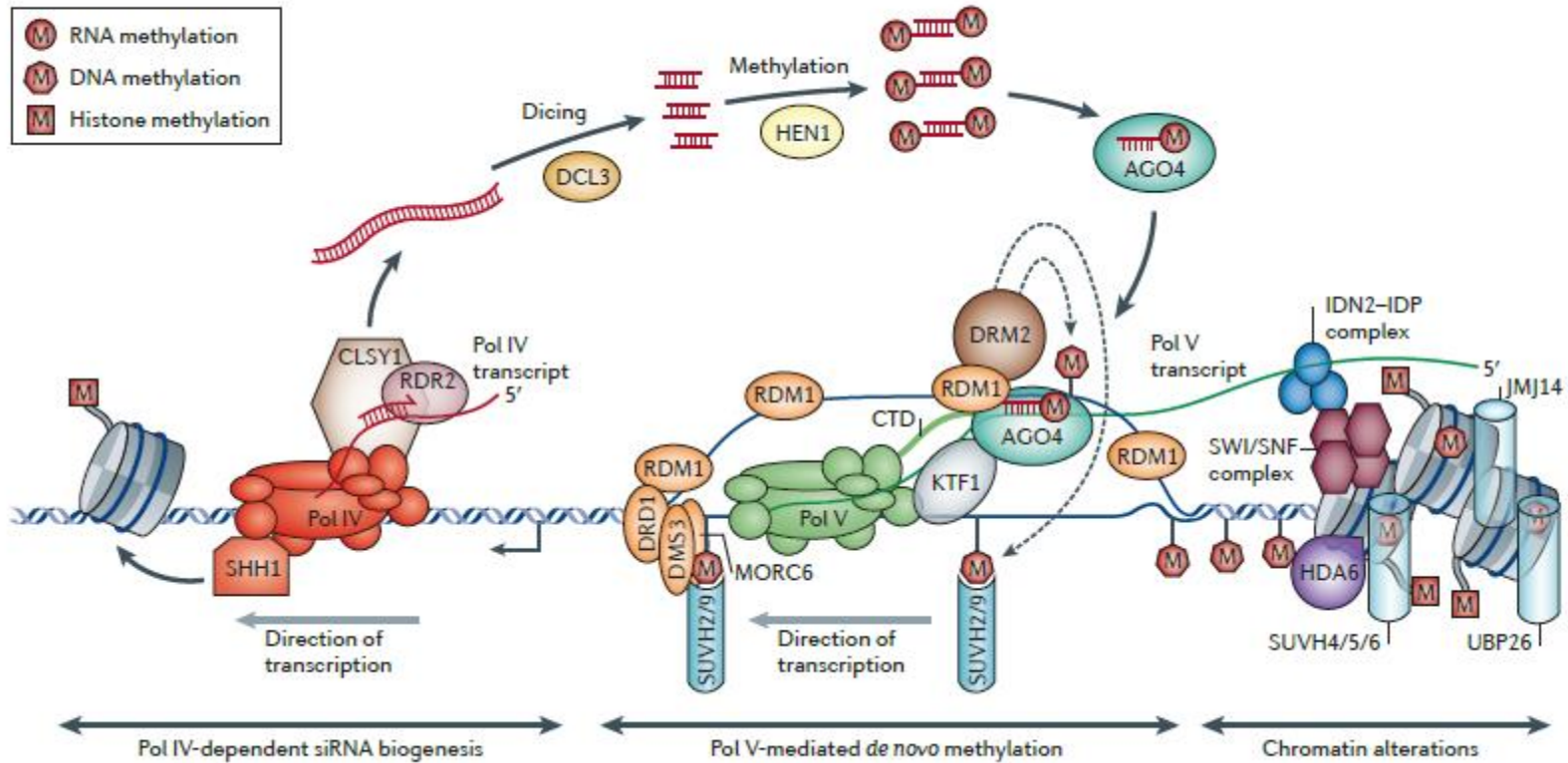
O'Malley RC, et. al: Cistrome and Epicistrome Features Shape the Regulatory DNA Landscape. **Cell** 2016, 165(5):1280-1292.





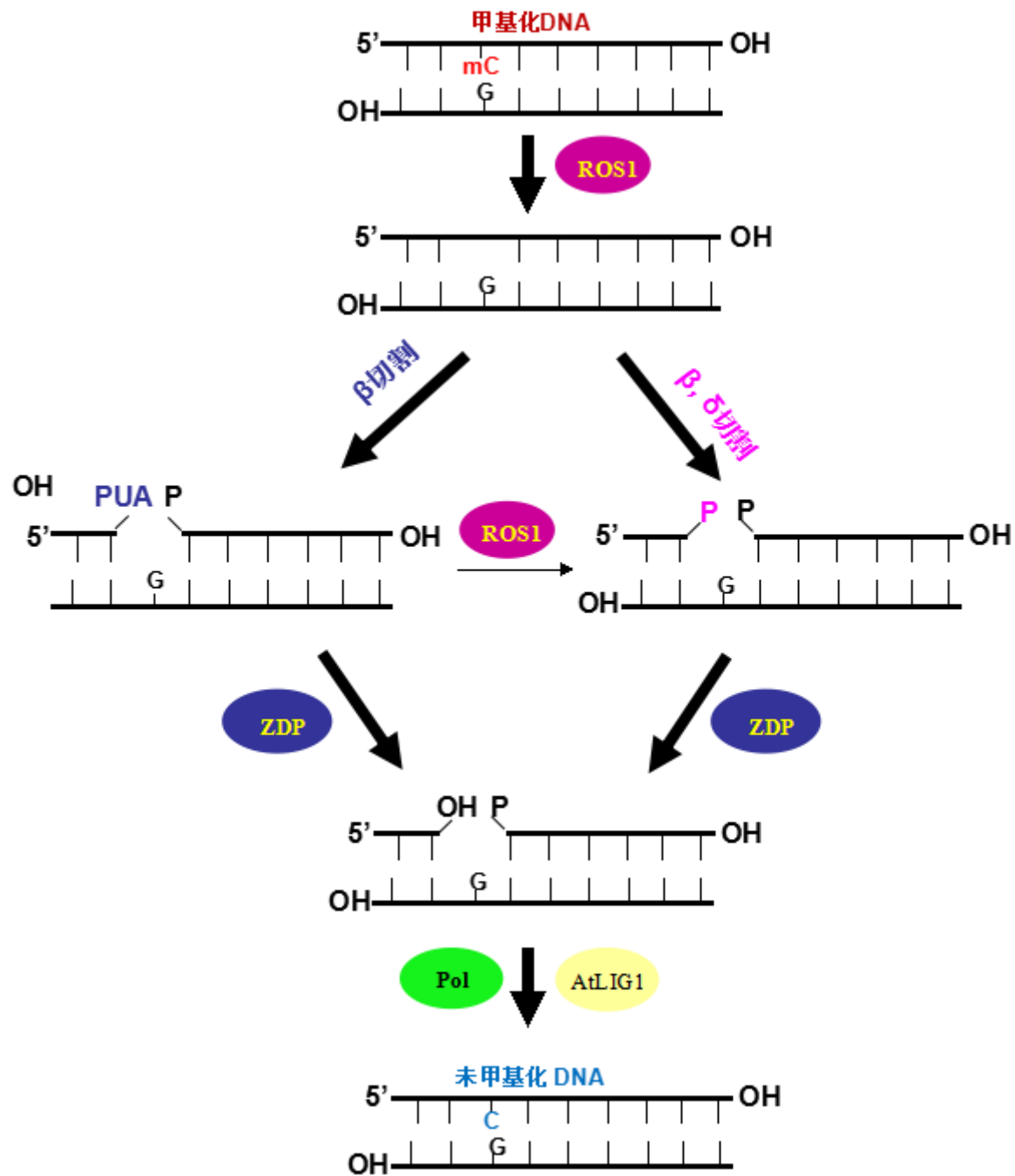
Le TN, et al: DNA demethylases target promoter transposable elements to positively regulate stress responsive genes in Arabidopsis. **Genome biology** 2014, 15(9):458.

DNA 甲基化修饰
是如何建立的？

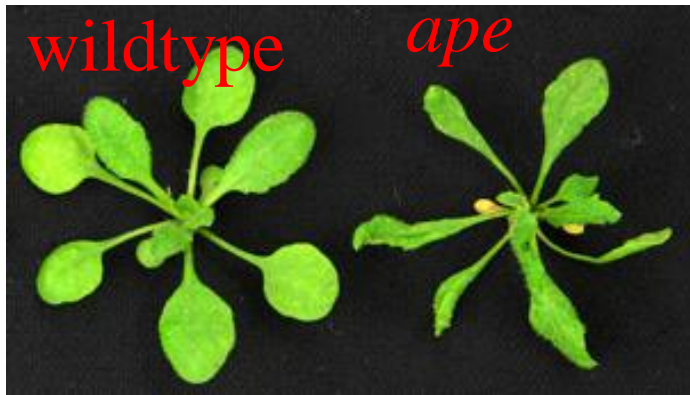


Matzke MA, Mosher RA: RNA-directed DNA methylation: an epigenetic pathway of increasing complexity. **Nature reviews Genetics** 2014, 15(6):394-408.

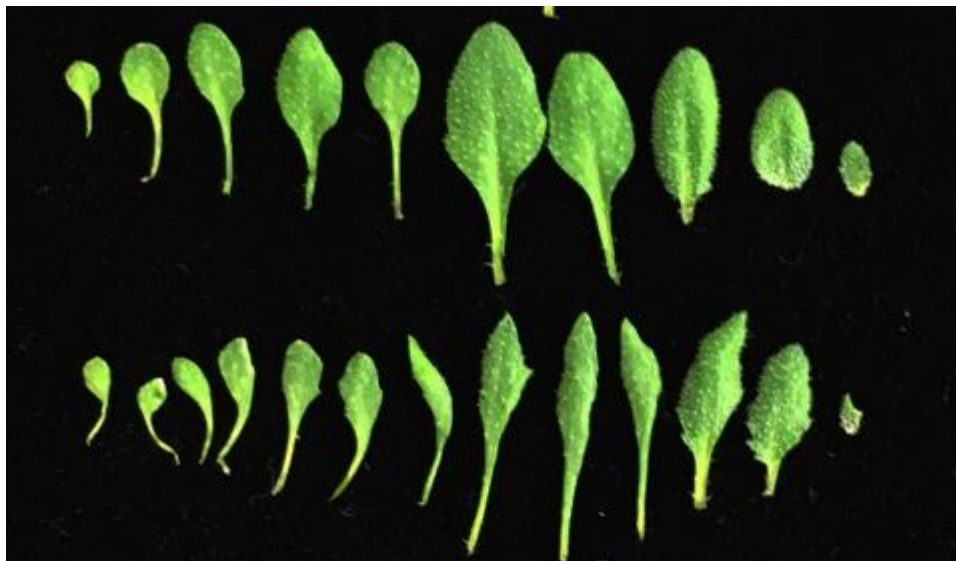
DNA 甲基化修饰
是如何去除的？



实验1: *APE*突变植株发育表型分析



wildtype



3 Day

7 Day

9 Day

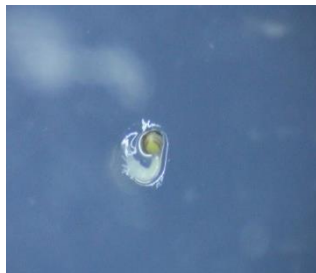
11 Day

14 Day

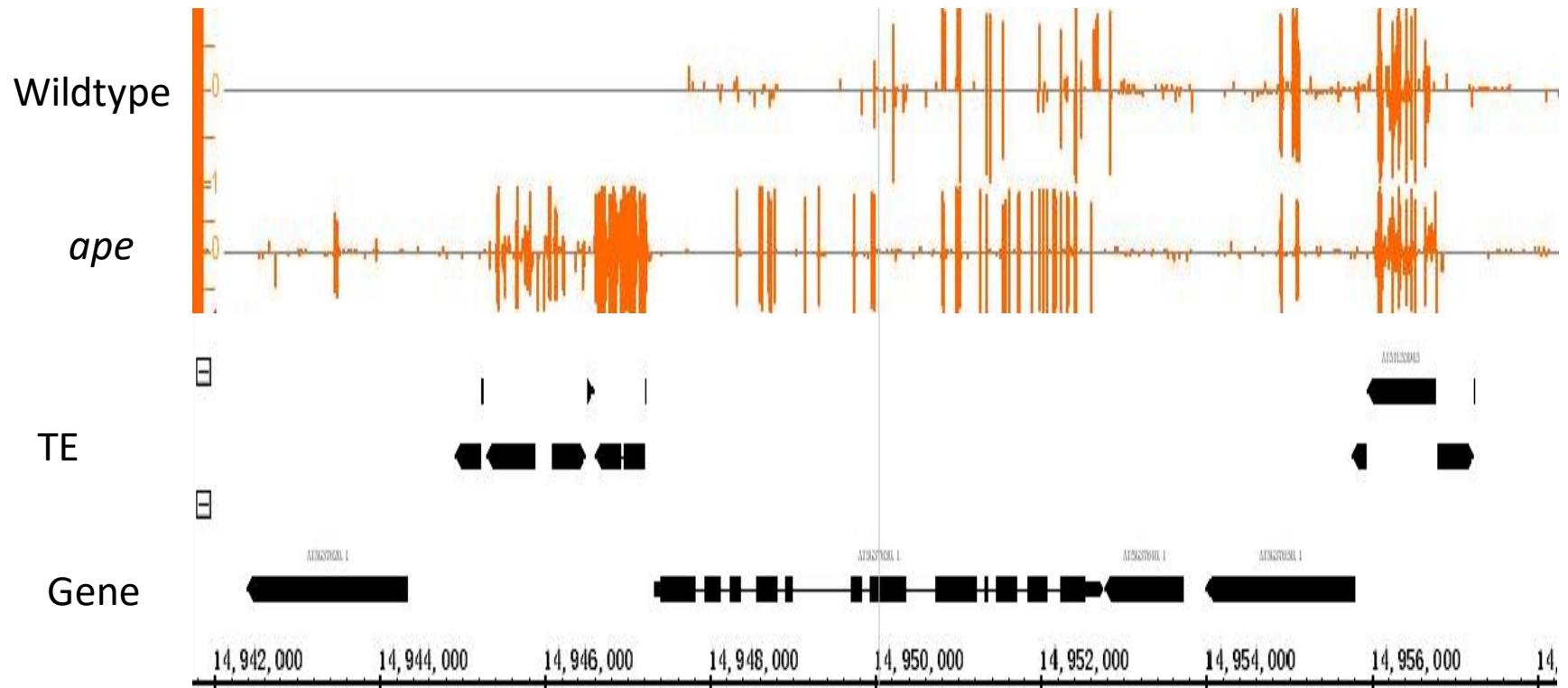
Wildtype



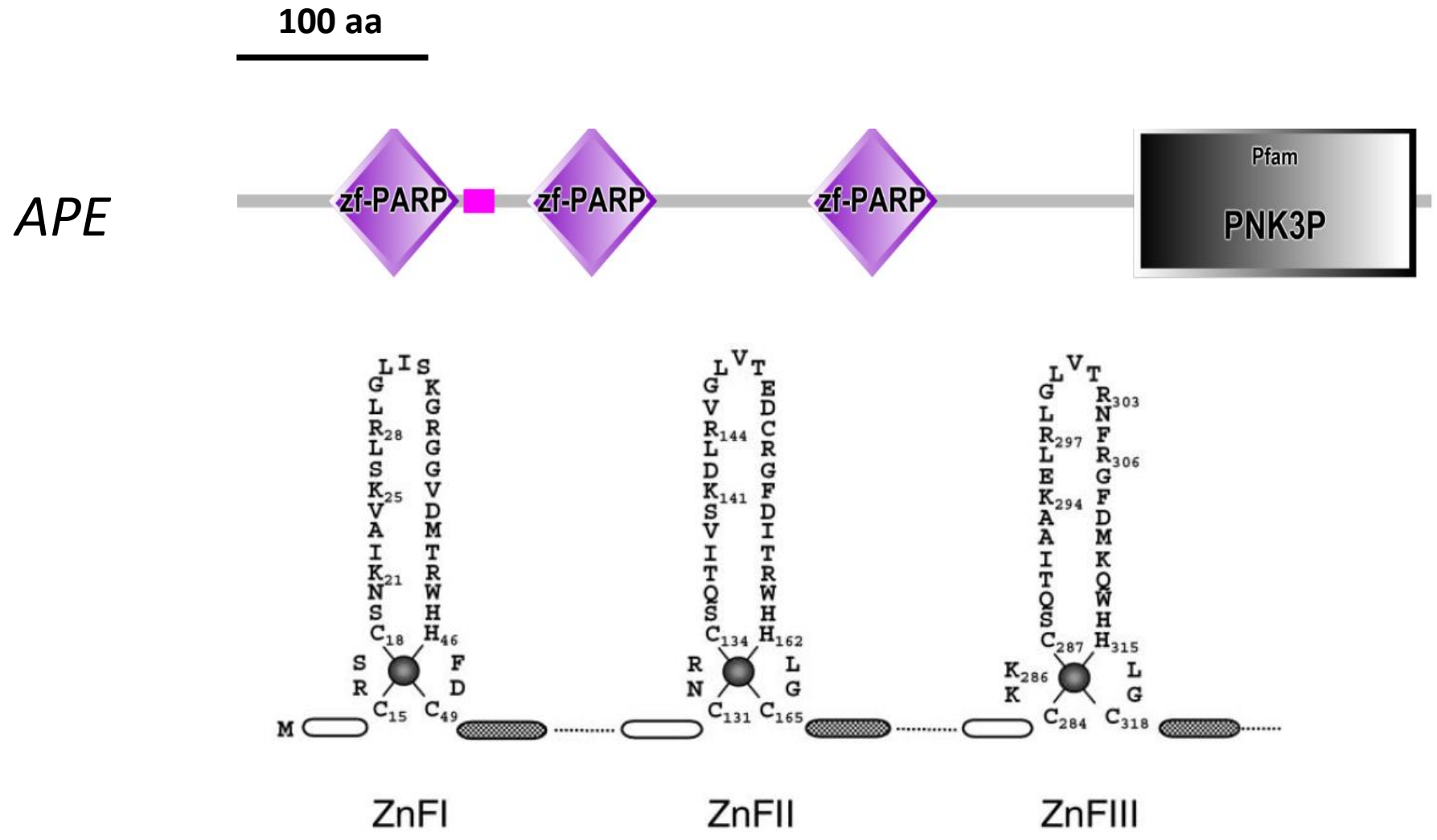
ape



实验2: *APE*突变植株DNA甲基化分析



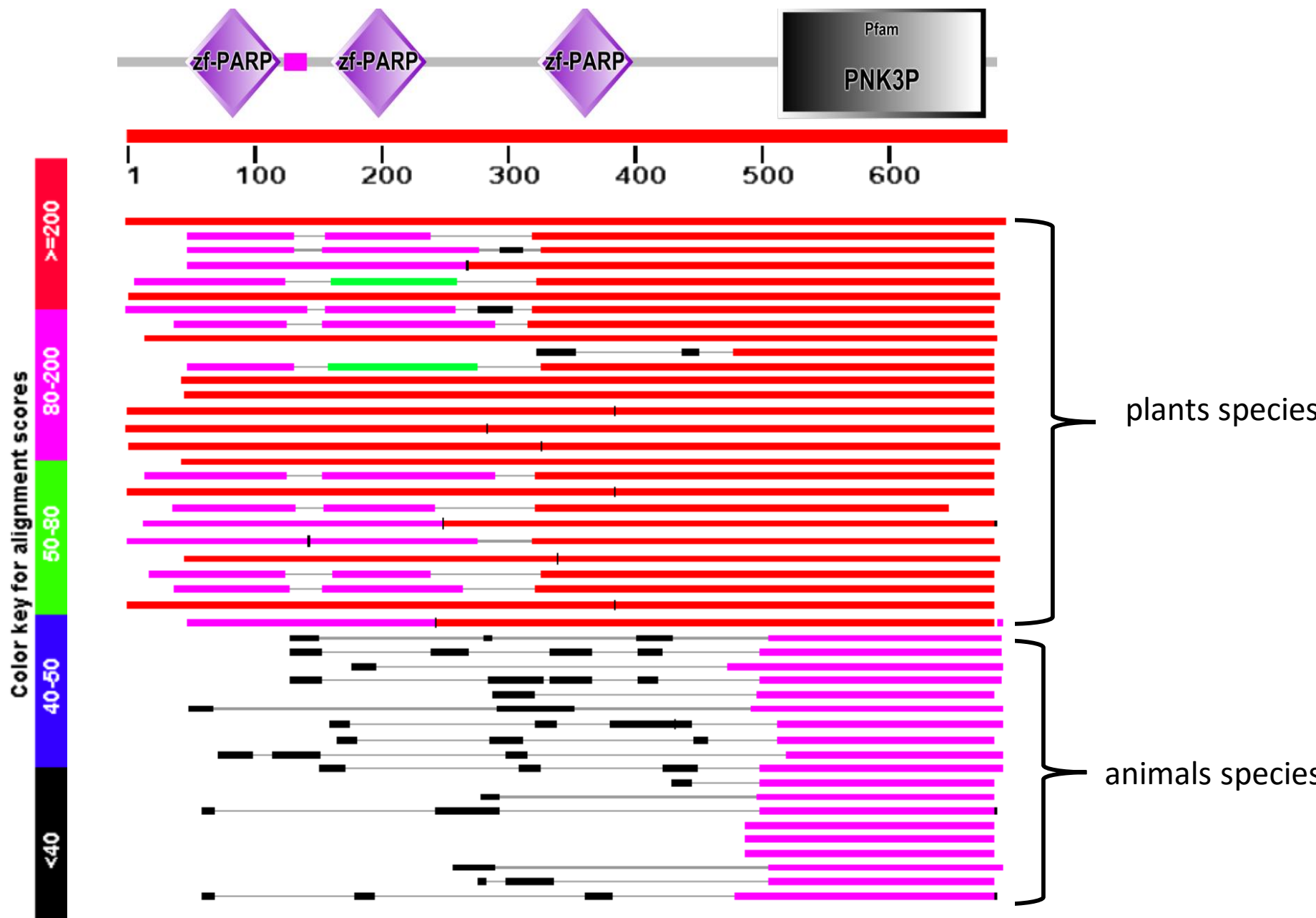
实验3: APE基因的结构分析



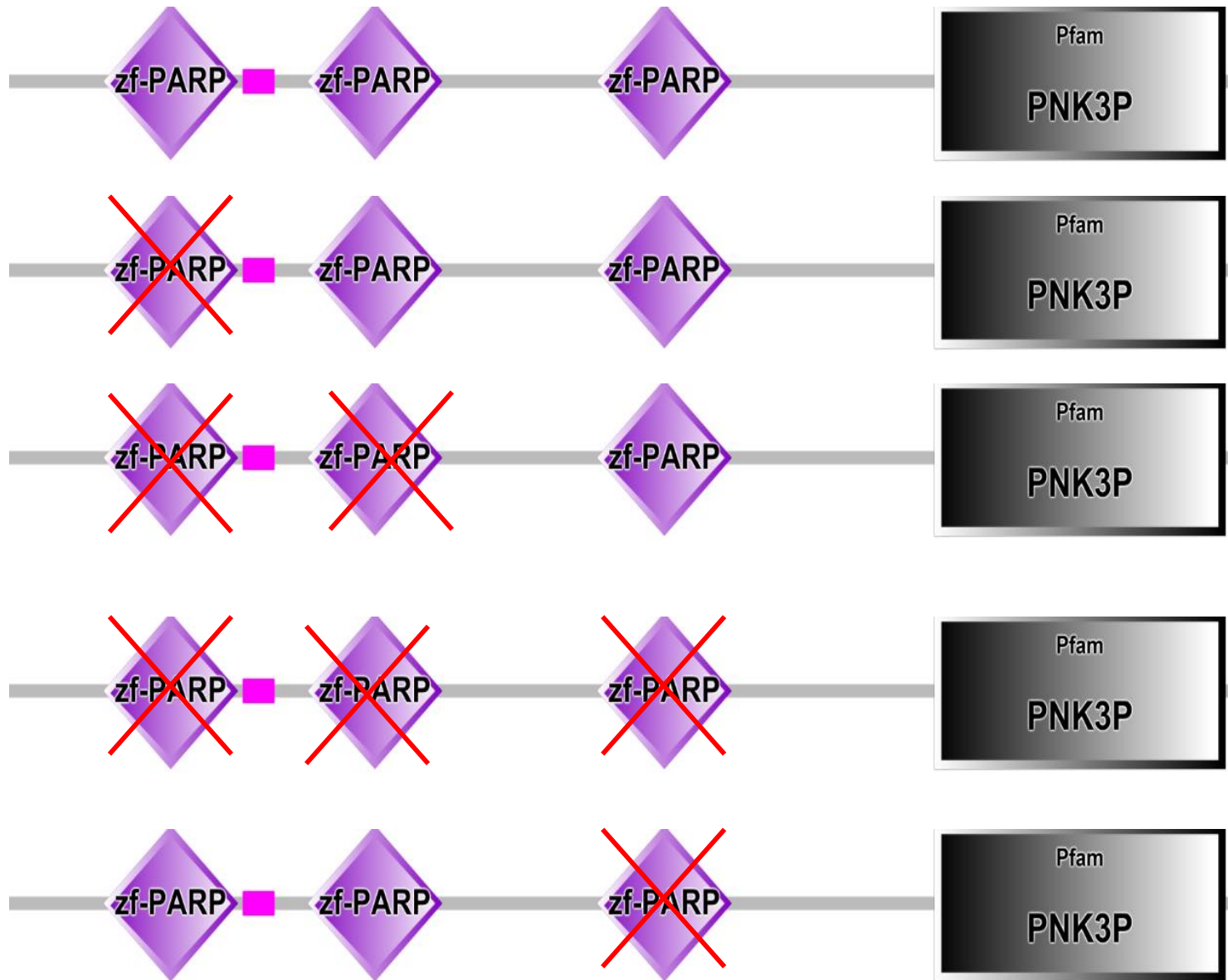
Petrucco S, Volpi G, Bolchi A, Rivetti C, Ottonello S: **A nick-sensing DNA 3'-repair enzyme from Arabidopsis.** *The Journal of biological chemistry* 2002, **277**(26):23675-23683.

DN	AKSSRSSC	...	NRCSQ..	.TIVS...	K	DLRVG..	LVT	ED...	SRGFD	IT--...	RW	HHLG.	CFPID
EY	ANSRAKC	...	KSCEI..	.KLLV...	K	KLRVG..	IDI	RH...	SMFGQ	TTY (10)	LQ	QHLE.	CTQIG
EY	SKSRAKC	...	KVNE..	.NIEK...	G	ILRIA..	TVV	QS...	PFH-D	KLE...	RW	HHSN.	CFEKK
DY	SKR-KSNC	...	KKCKQ..	.PIEK...	G	SPRIA..	KCV	PNY.	FNDG-D	EMK....	QY	HHIA.	CIFET
EY	ASGRATC	...	RGCEI..	.KILK...	D	EVRIK..	KMD	YTT.	EVGMKY	GQA....	MW	HHAE.	CFAKL
EH	AKSRAAC	...	RACEE..	.KIAK...	G	DLRFA..	VLC	EAE.	PGSRYP	PVP....	RW	YHKD.	CFIDG
EY	AKSRRSSC	...	KGCSA..	.SIAK...	G	ALRLG..	ASA	RD...	PRGYD	ST--...	KW	YHVA.	CFPAS
EY	AKSSRASC	...	KLOKL..	.SIQK...	D	SLRLA..	RMV	QG...	KIAKG	RCFC (6)	ARR	EEAM.	CILNA
EY	AKSNRAAC	...	KLORS..	.NIGK...	D	TLRLA..	VMV	QS...	MHF-D	KVP....	NW	YHFS.	CFEKK
EY	AKSSRASC	...	KLOKL..	.SIQK...	D	SLRLA..	RMV	QS...	PHF-D	KIP....	NW	FHYS.	CFEKK
QT	PTMRARC	...	RKCSQ..	.PILK...	G	DLKWG..	TPI	RH...	SHGAY	WIT....	AW	HHVG.	CTRI-
EY	AKQGRAGC	...	KKCKQ..	.KIEK...	G	LPRIG..	KIV	PN..	FFHEGD	EMK....	QW	YHVA.	CIFET
LV	SPNKRAGC	T.	DTVCKQGE	VKIQK...	G	ELRFG..	SWT	VI..	KEHGS	W---...	RW	KHWG.	CVSGS
EV	AKQGRAVC	...	KKCKQ..	.KCAQ...	G	ELRIA..	KLV	AN...	PFG-E	KMK....	NW	HHVN.	CLFEV
EY	AKSNRSSC	...	KTCCK..	.TISA...	N	AVRLG..	LVT	RG...	ARGFD	MT--...	KW	HHVH.	CFSAG
EY	AKSRAKC	...	RKCEE..	.KIEK...	D	IIRIA..	KIM	ES..	EESKFK	LIP....	FW	YHVK.	CFALS
EY	ARTGRATC	...	KGCKS..	.TISK...	D	TLRIA..	VMV	QS...	AFH-D	AKVP....	NW	FHKT.	CFEKN
EY	AKSNKSTC	...	KGCE..	.KIAK...	G	EVRIK..	KLD	YDG.	AFSKMR	PVP....	QW	YHVD.	CFVKK
EY	AKSRAAC	...	RGCEQ..	.KILK...	D	EIRIS.	KKDF	ET..	DIGKKY	GQD....	MW	HHVT.	CFAQL
EY	AKSRRASC	...	KGCKN..	.AIAK...	D	TLRLA..	VMV	QS...	PVY-D	KVP....	NW	FHVN.	CFEKK
EY	AKSGSSNC	...	RGCKS..	.PIGQ...	G	TVRLA..	VMV	QS...	PFH-D	MMP....	NW	HHLH.	CFEKN
EY	AKSRRASC	...	KKCGE..	.SIAK...	D	SLRLA..	IMV	QS...	PMF-D	KIP....	NW	HHYA.	CFWKR
EV	SKNNRAGC	K.	DSVCKKEA	VKITK...	G	ELRLG..	TWV	EI...	NEH-G	W--...	QW	RHWG.	CVSGE
EV	SQTSRAGC	...	RKCE..	.KILK...	G	EVRIK..	SKP	EG...	PGNKG	L---...	MW	HHAK.	CFLEM

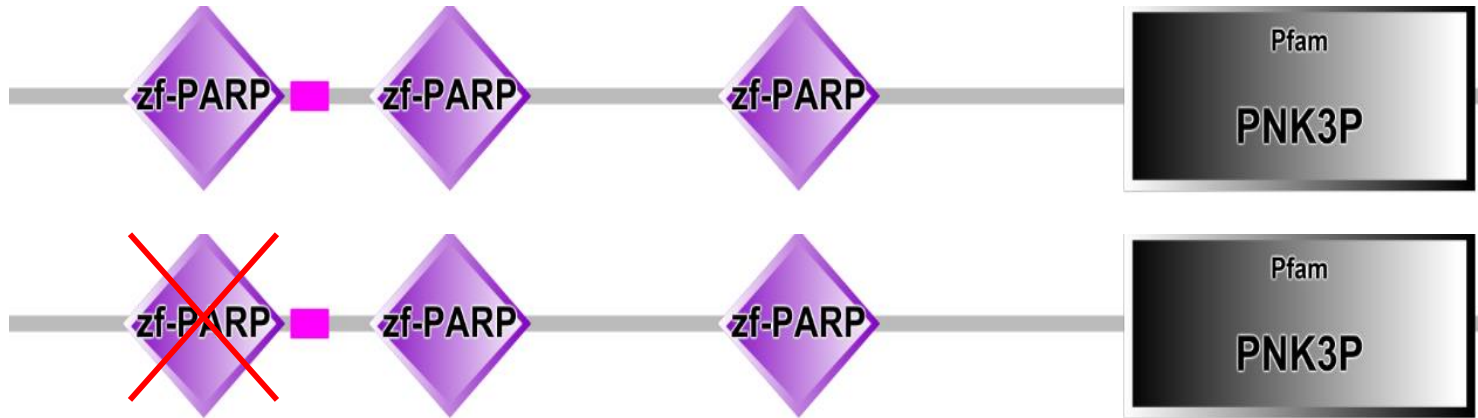
实验4: *APE*基因的演化分析



sp1300::APE::GFP/ape



sp1300::APE::GFP/ape



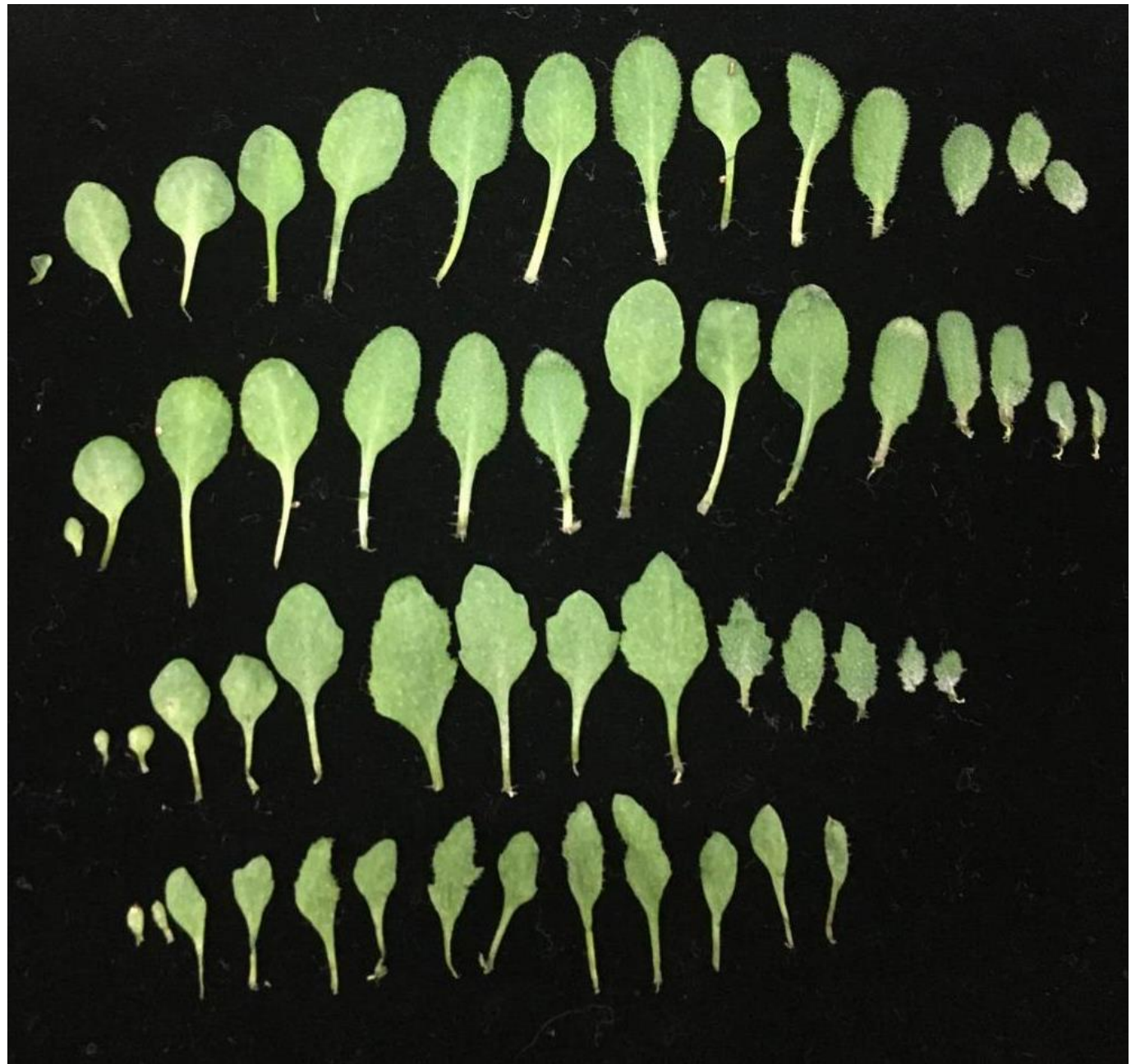
Col-0	<i>ape</i>
<i>sp1300::APE::GFP/ape</i>	<i>sp1300::APE (1stZFm)::GFP/ape</i>

Wildtype

sp1300::APE::GFP
/ape

sp1300::APE
(1stZFm)::GFP
/ape

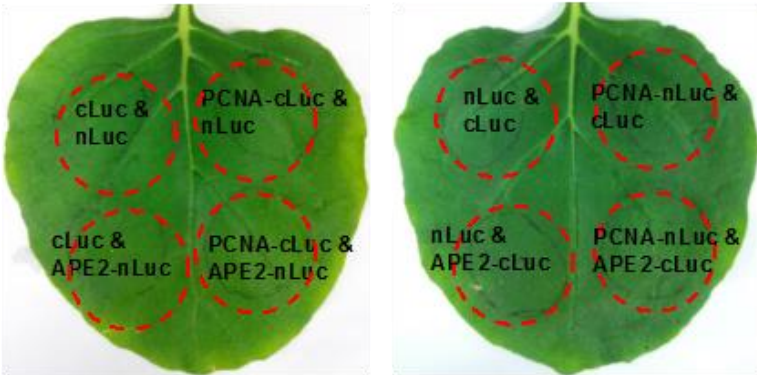
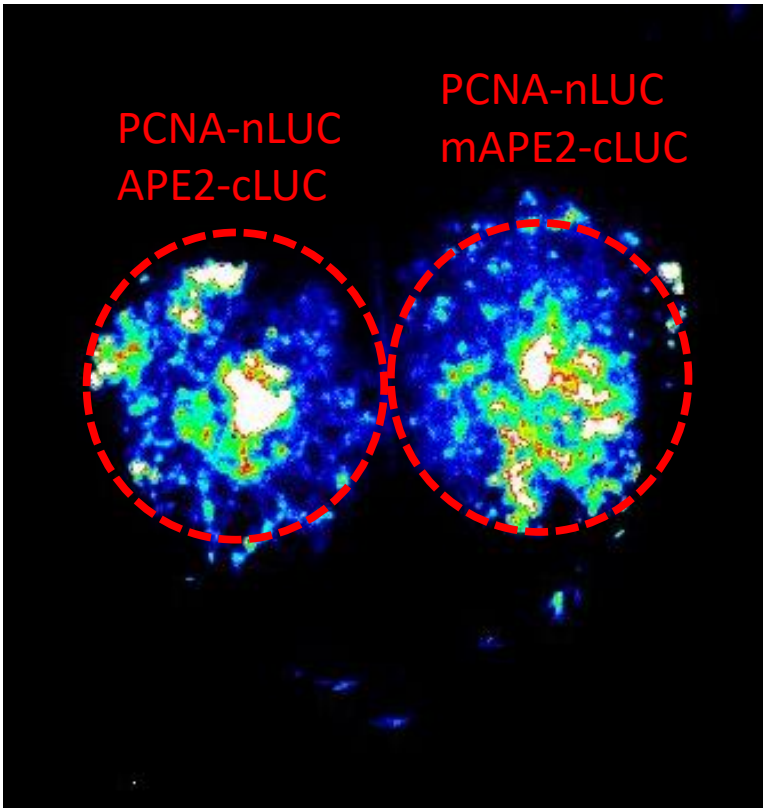
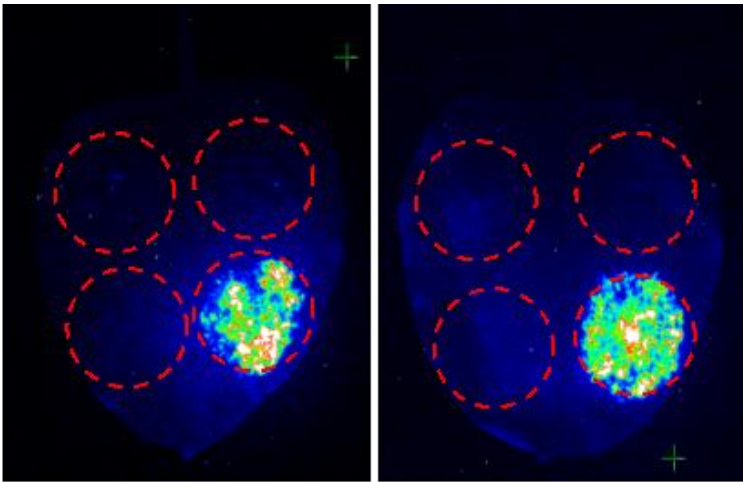
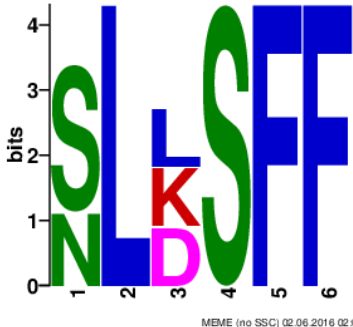
ape





实验5: APE与PCNA的相互作用

人APE	NKSLDSFF
酵母APE	QGNLLSFF
拟南芥APE	QLSLKSFF
	: . * ***



致谢

感谢我们小组所有成员，这学期的共同学习我们结下了深厚的友谊！

感谢罗老师的教导！

