进化和结构分析预测拟南芥PRK6的共受体

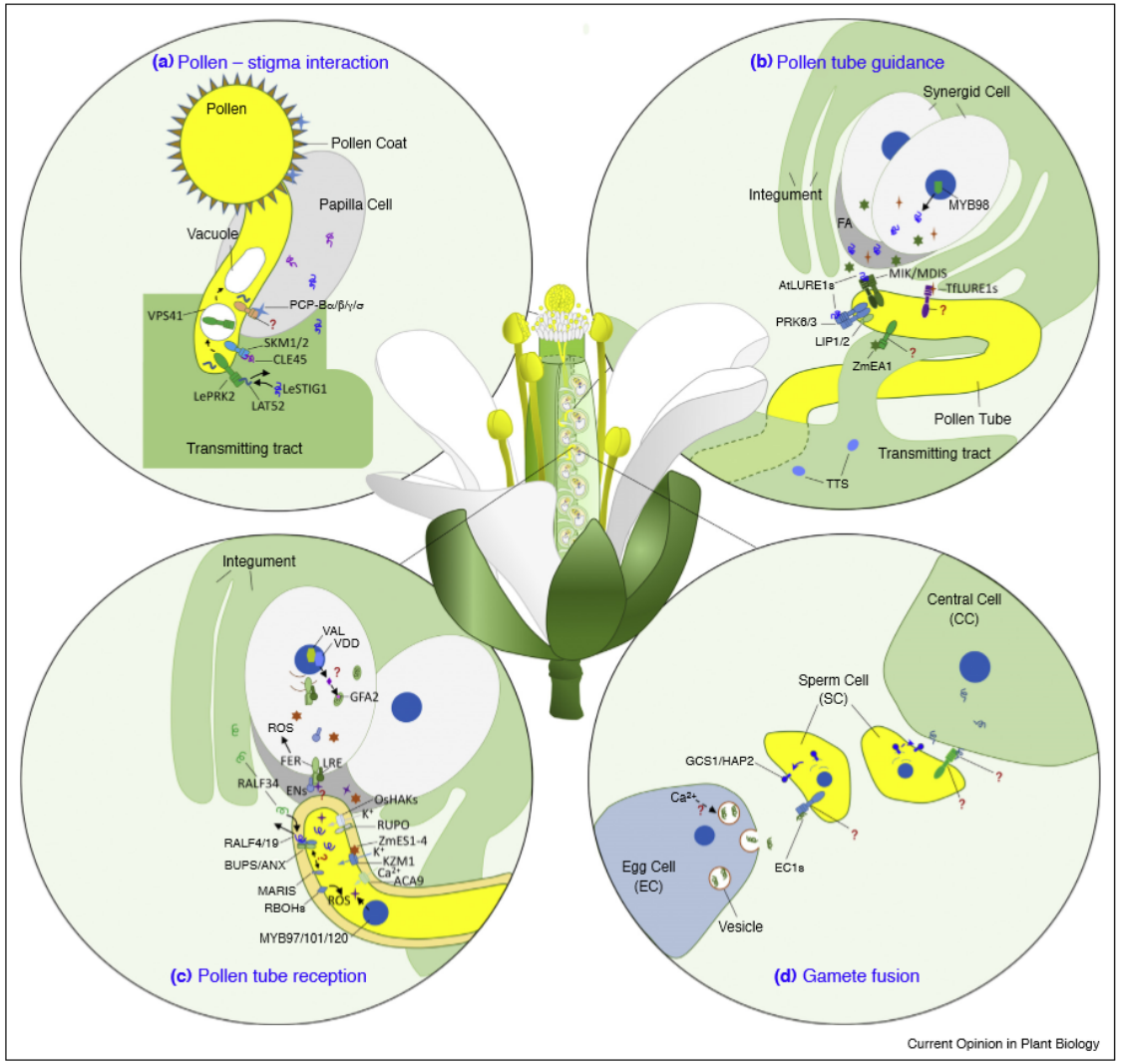
G01成员：　G01A 宁妮娜
G01B 路菡
G01C 王鼎岳
G01D 李其昀

汇报人：　G01B 路菡

北京大学
PEKING UNIVERSITY

BACKGROUND

BACKGROUND



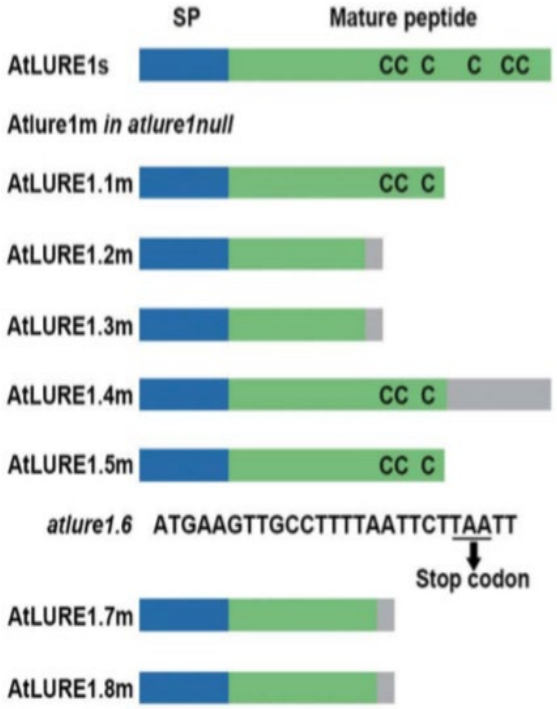
- 花粉粘附，水合，萌发
- 花粉管生长，导向，接受
- 配子激活，融合

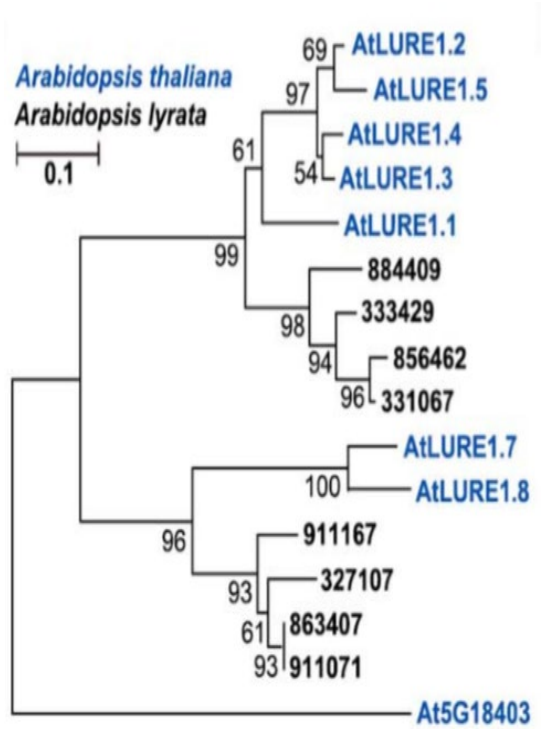
Zhong et al. *Curr Opin Plant Bio* 2019

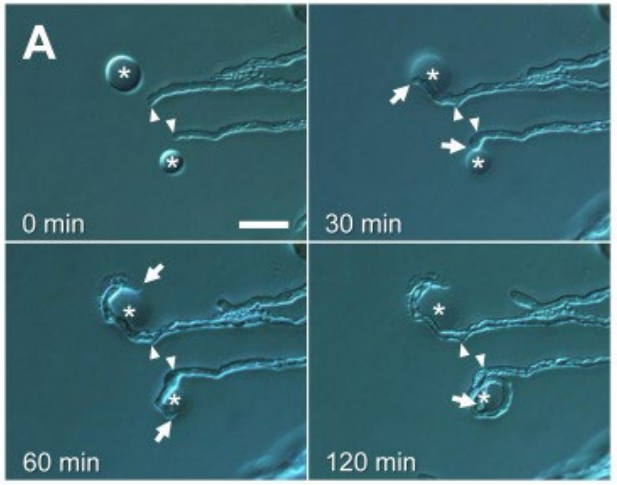
北京大学 PEKING UNIVERSITY

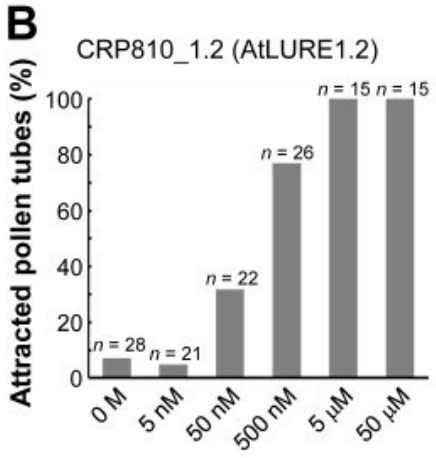
ATTRCTANT

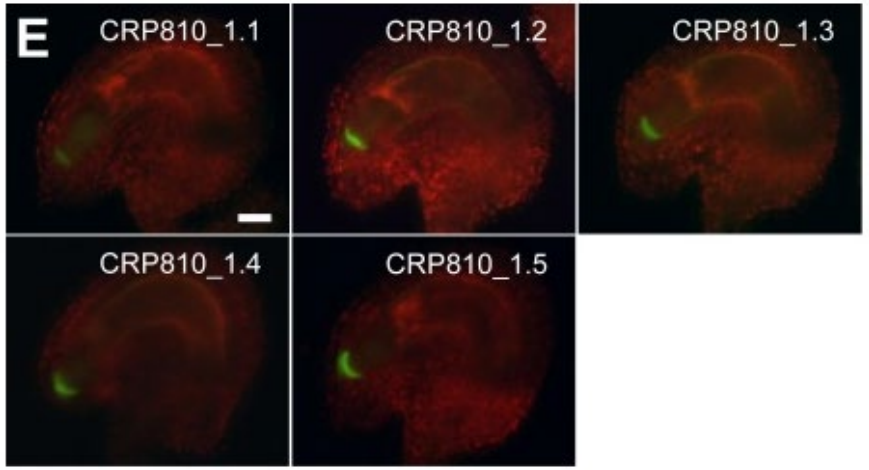
AtLURE1s











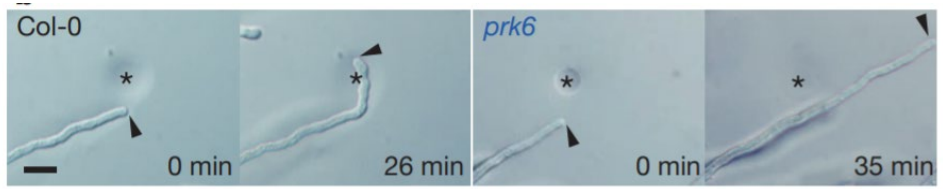
Zhong et al. *Science* 2019

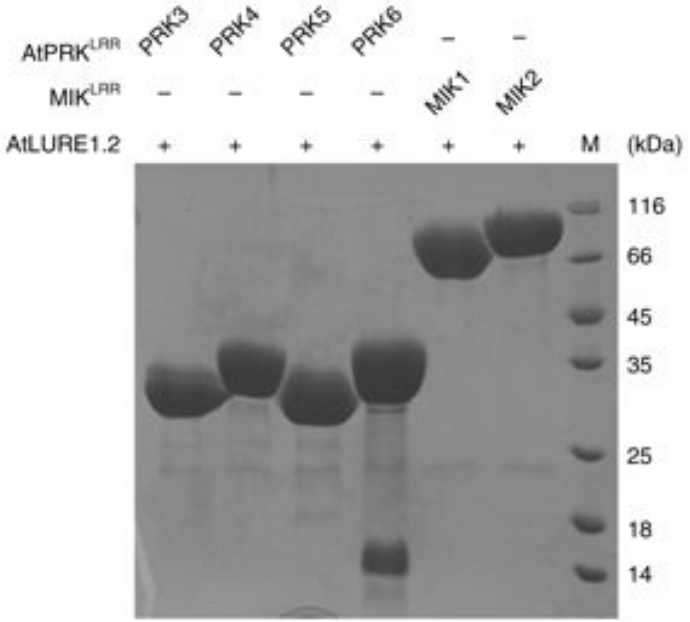
Takeuchi et al. *PloS Biol* 2012

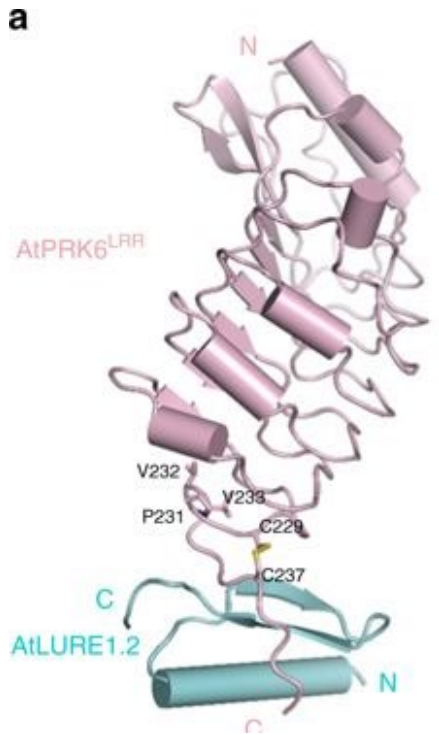
北京大学 PEKING UNIVERSITY

ATTRCTANT RESPONSE-PRK6（pollen-specific receptor kinase 6)

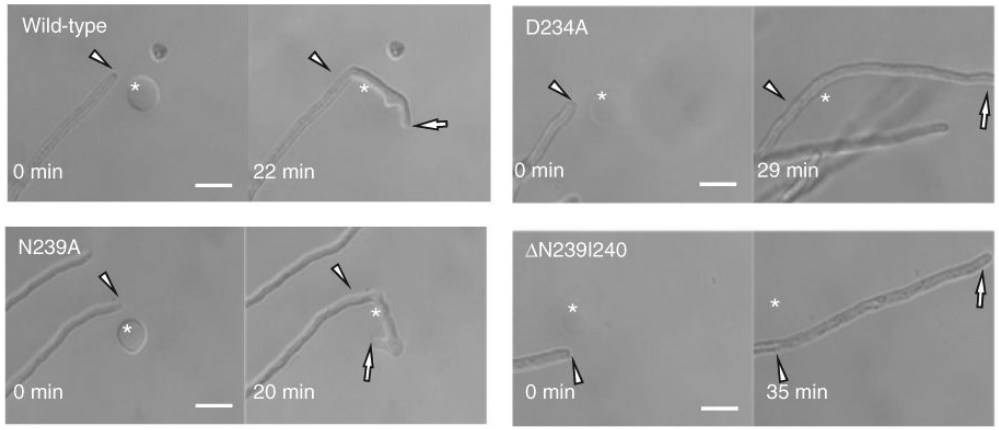
AtLURE1s receptor PRK6（pollen-specific receptor kinase 6)







f



- AtLURE1.2 specifically interacts with AtPRK6^{LRR}
- Interaction between AtLURE1.2 and AtPRK6^{LRR} is mediated by a combination of polar and hydrophobic contacts

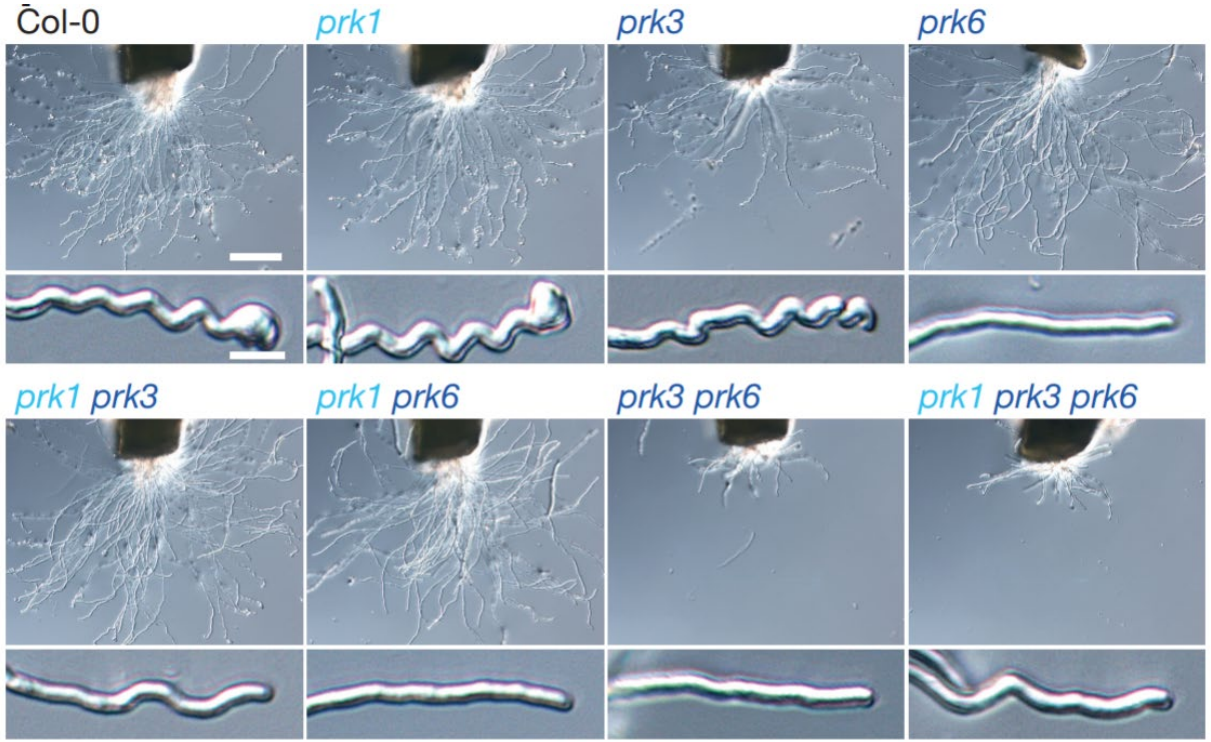
Takeuchi et al. *Nature* 2016

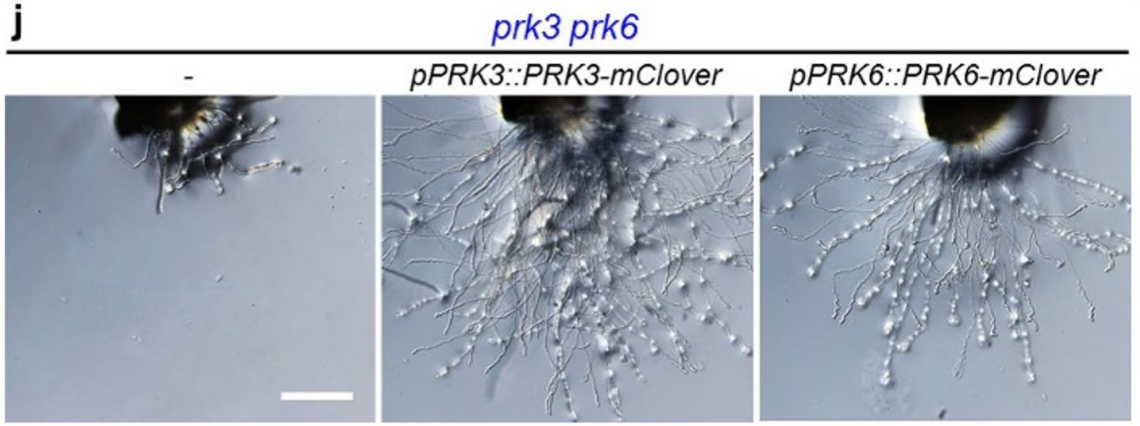
Zhang et al. *Nat Comm* 2017

北京大学 PEKING UNIVERSITY

PRK FAMILY

PRKs in ovular guidance——PRK1/3/6

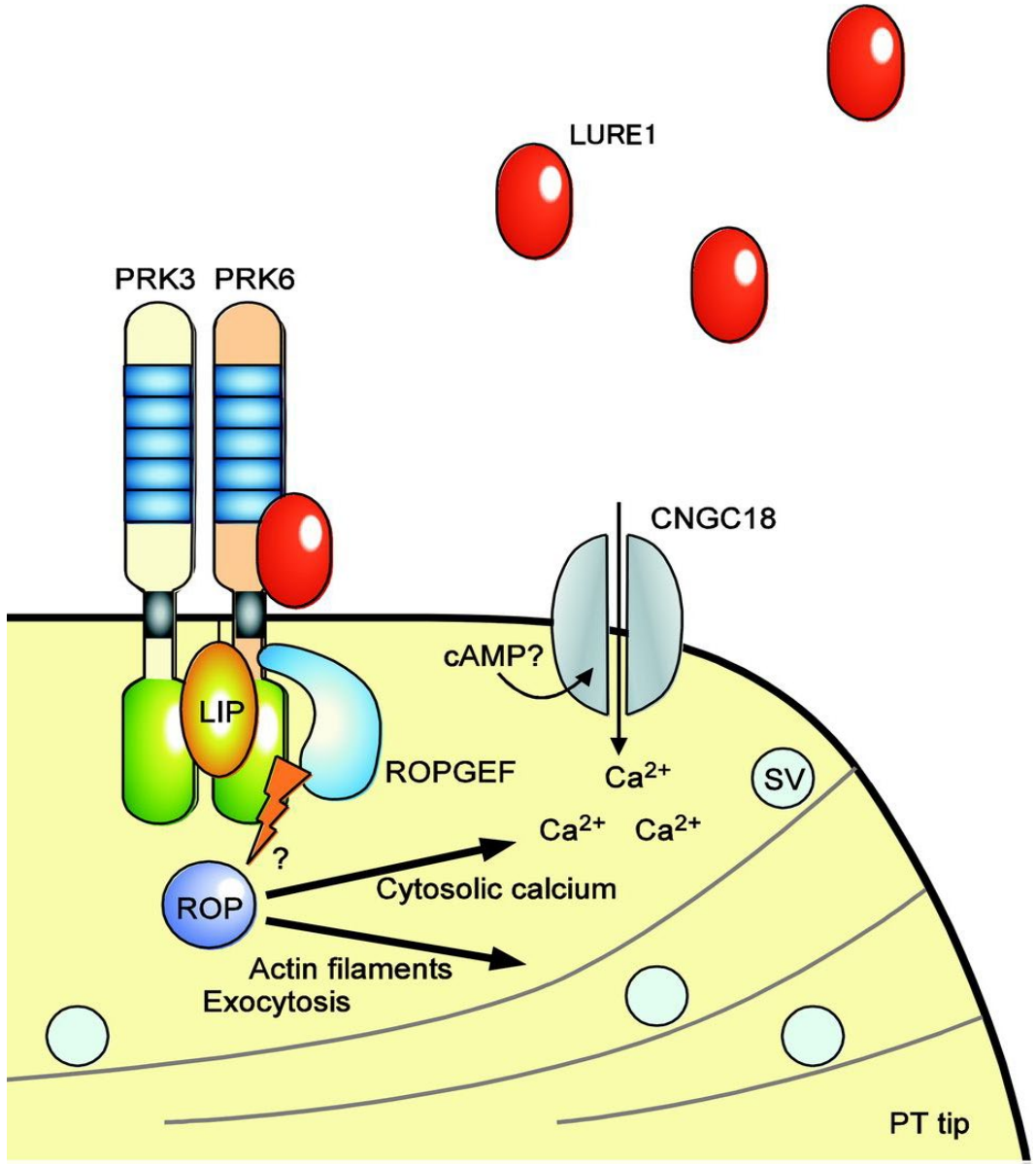




- *prk1 prk3* double mutations as well as a *prk6* single mutation **impaired the response to AtLURE1.2**
- **Expression of PRK3 in *prk3 prk6***, which showed similar tip localization to that of PRK6, restored the growth defect but **not the wavy response to AtLURE1**

Takeuchi et al. *Nature* 2016

北京大学 PEKING UNIVERSITY



Higashiyama et al. *Plant Physiol* 2016

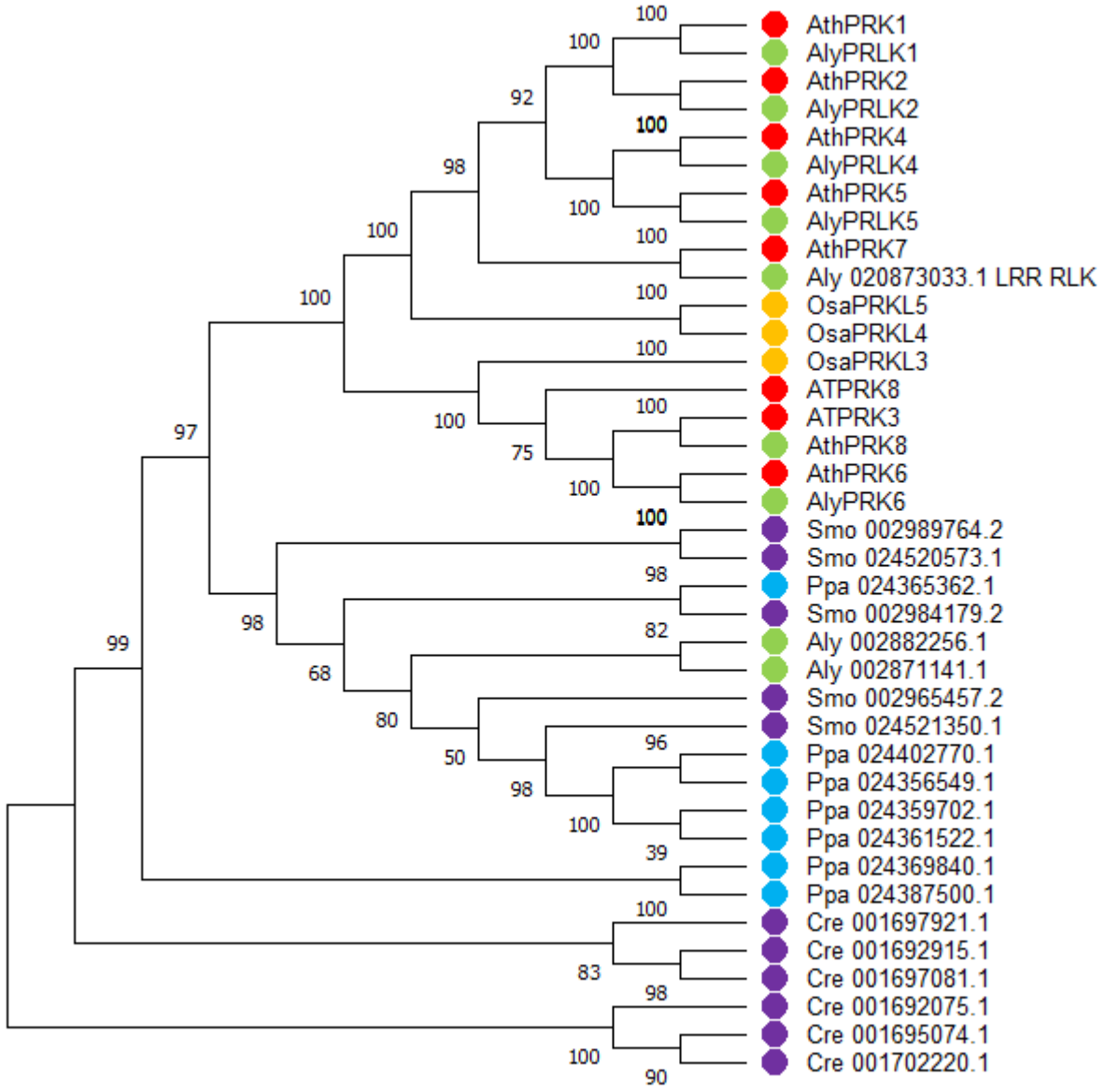
- 1.PRK6二聚化起作用
- 2.PRK3似乎可增强PRK6的作用

- **PRK6结合LURE是否有共受体?**
- **进化分析+结构预测**

北京大学 PEKING UNIVERSITY

Phylogenetic analysis

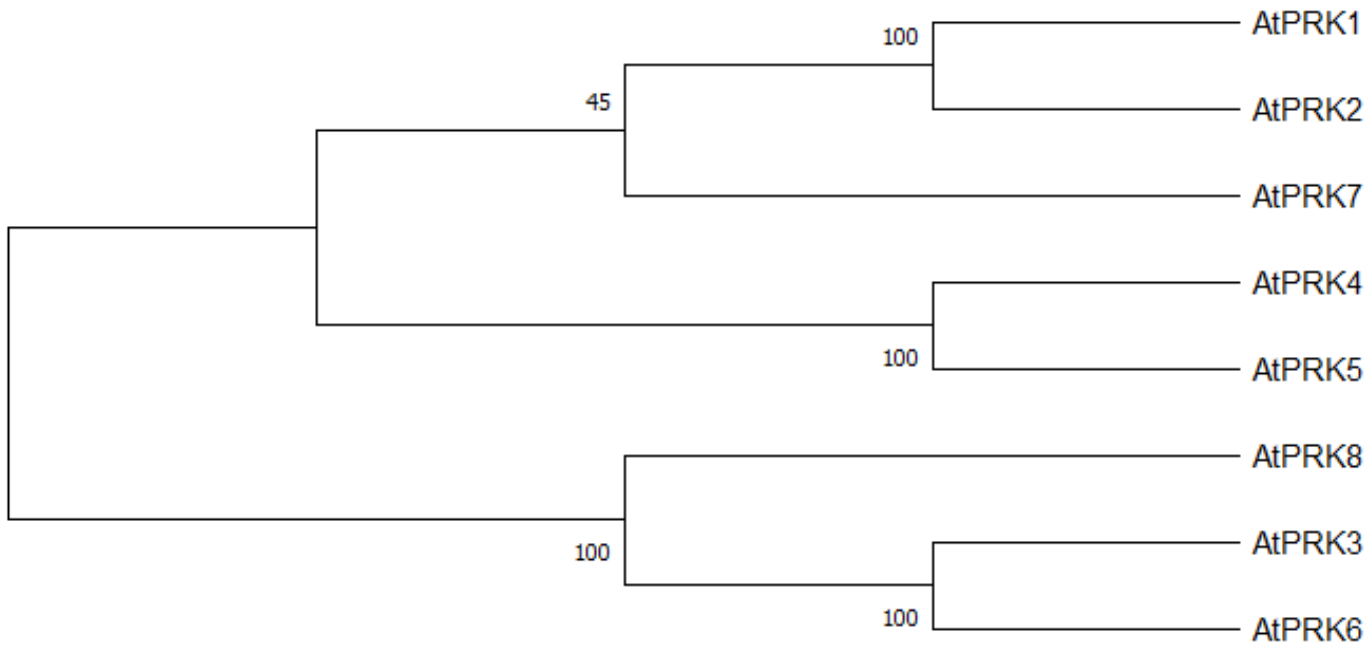
Phylogenetic tree of plant PRKs



Ath - *Arabidopsis thaliana*, 拟南芥
Aly – *Arabidopsis, lyrata*,琴叶拟南芥
Osa - *Oryza sativa*, 水稻
Smo - *Selaginella moellendorffii*, 江南卷柏
Ppa – *Physcomitrella patens*, 小立碗藓
Cre-*Chlamydomonas reinhardtii* , 莱茵绿藻

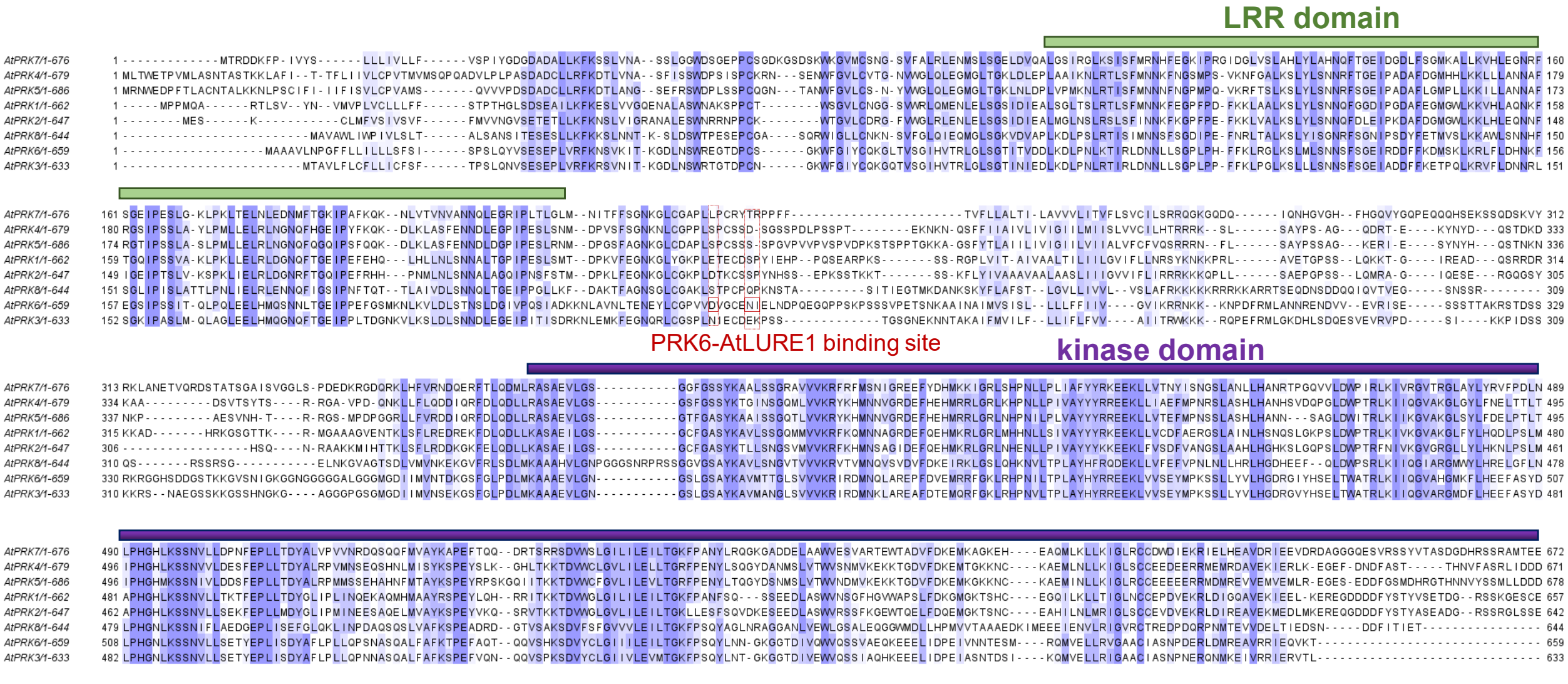
北京大学 PEKING UNIVERSITY

Phylogenetic tree of AtPRKs



北京大学
PEKING UNIVERSITY

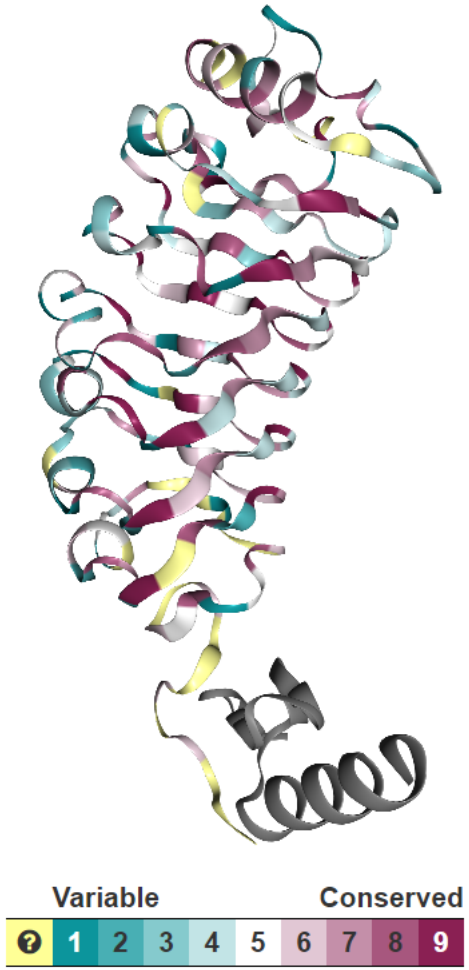
Multi sequence alignment of AtPRKs



Structure analysis

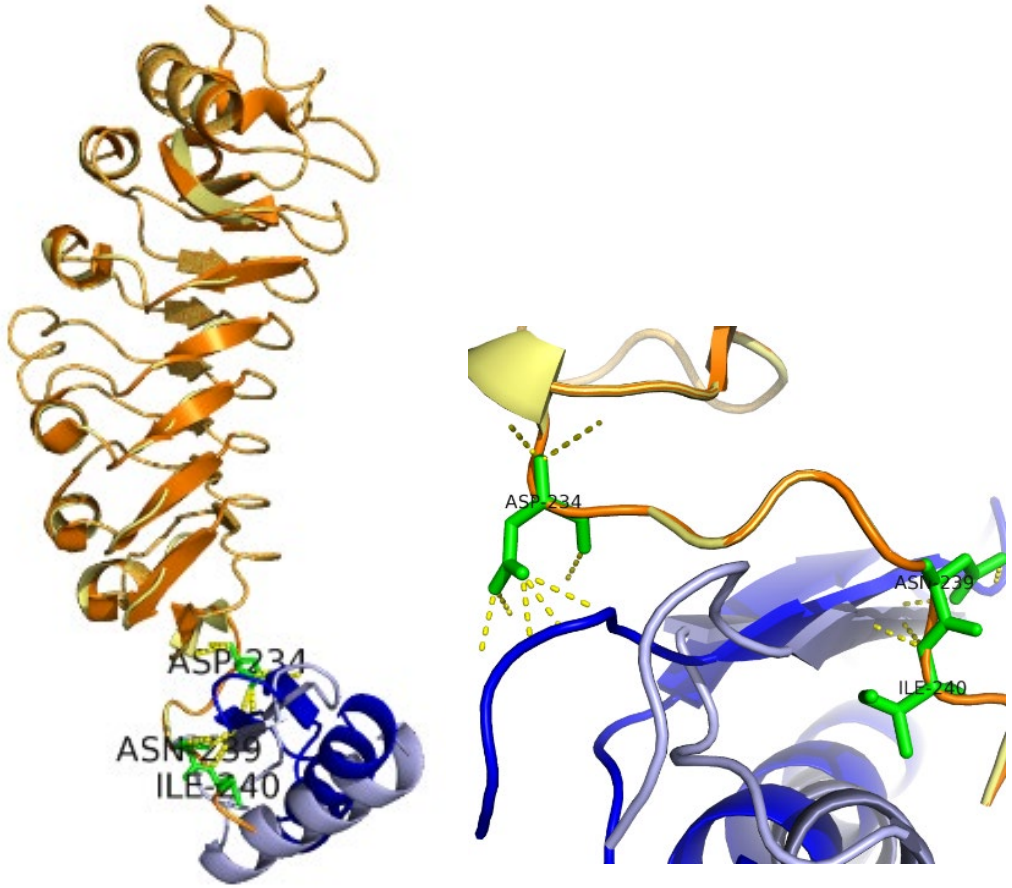
Mutant structure prediction of PRK6

WT PRK6 保守度分析



WT PRK6-AtLURE1.2

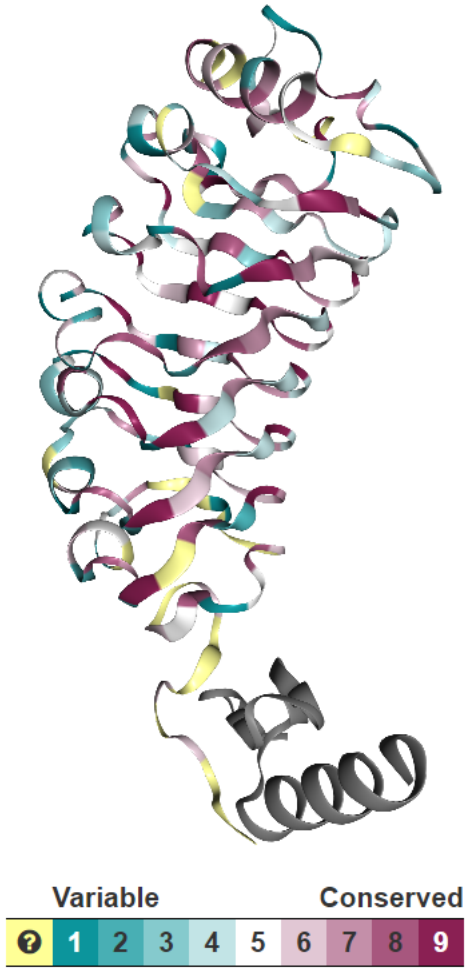
WT PRK6-ZDOCK PRK6 结构对比



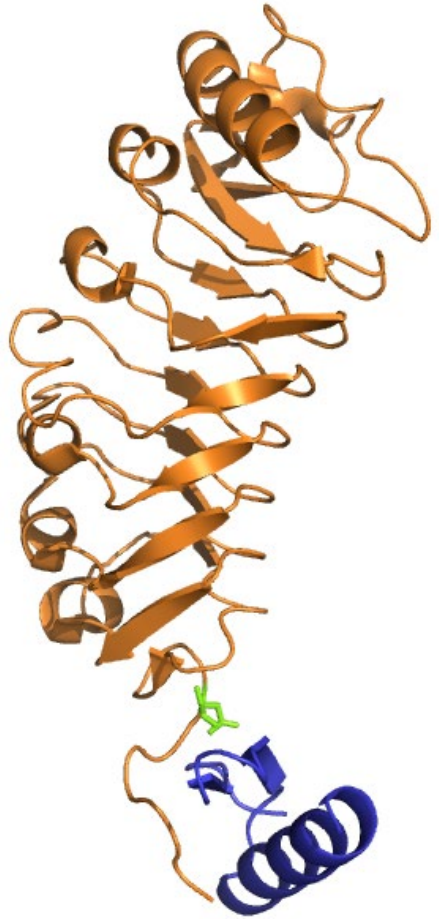
北京大学
PEKING UNIVERSITY

Mutant structure prediction of PRK6

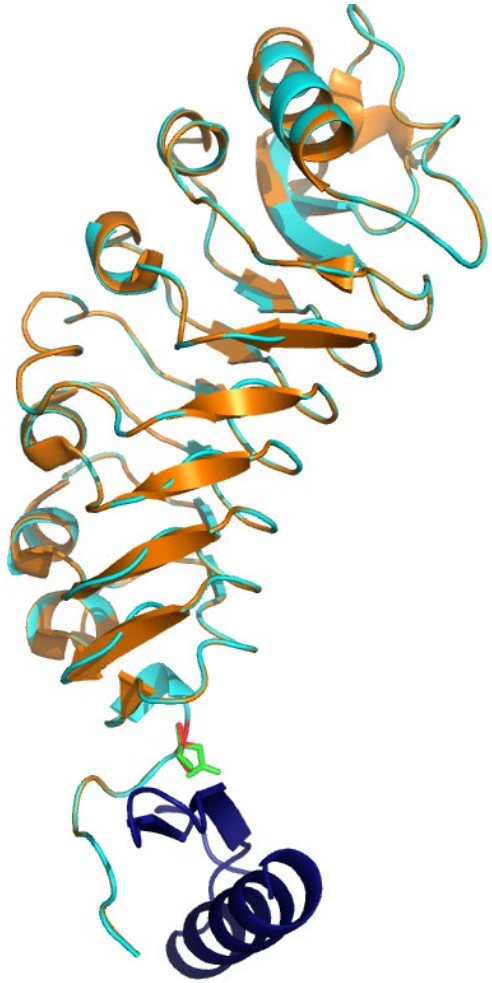
WT PRK6 保守度分析



WT PRK6-AtLURE1.2



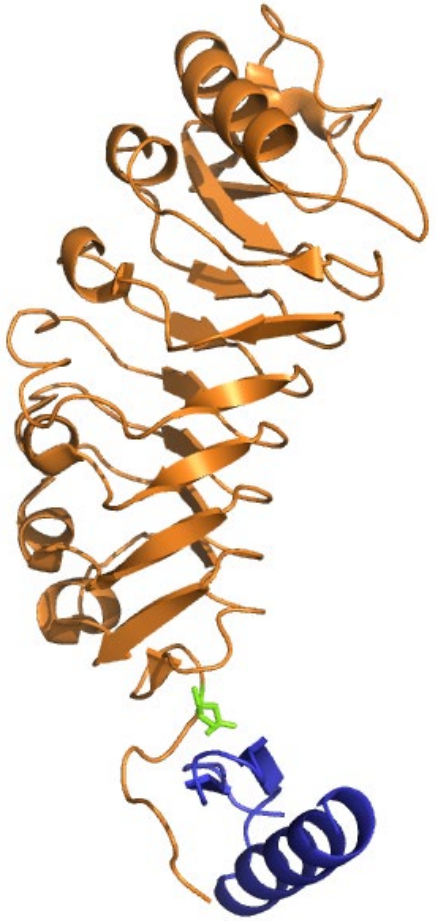
D234A PRK6-WT PRK6 结构对比



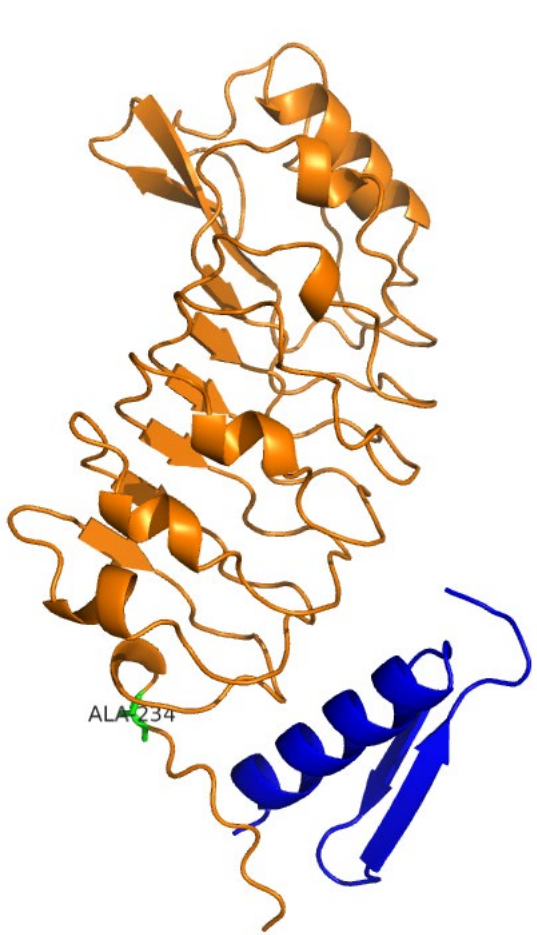
北京大学 PEKING UNIVERSITY

Moleculer docking prediction of mutant PRK6 and AtLURE1.2

WT PRK6-AtLURE1.2



D234A PRK6-AtLURE1.2 ZDOCK对接预测

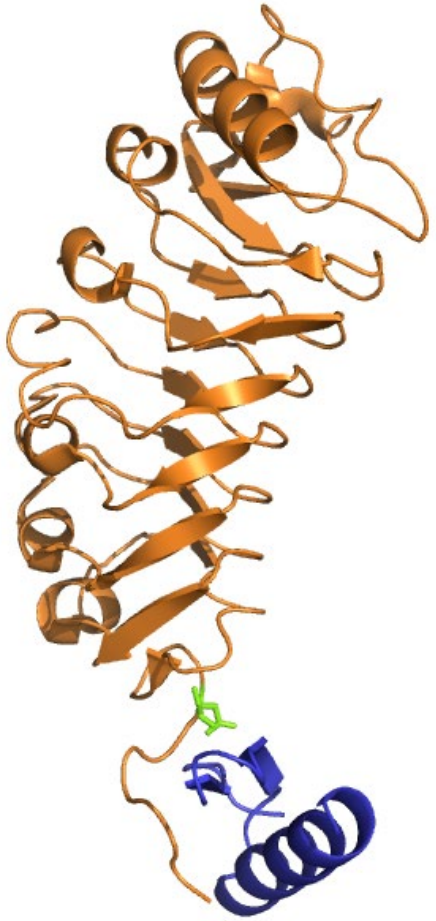


- 初步认为突变结合位点后的PRK6丧失与LURE的结合能力

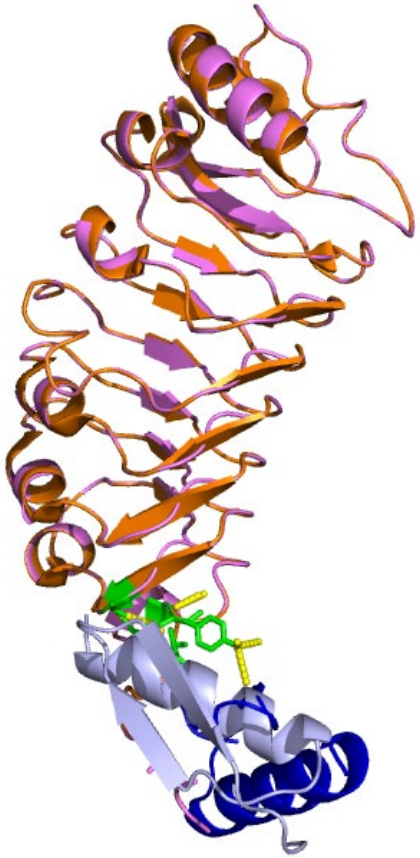
北京大学 PEKING UNIVERSITY

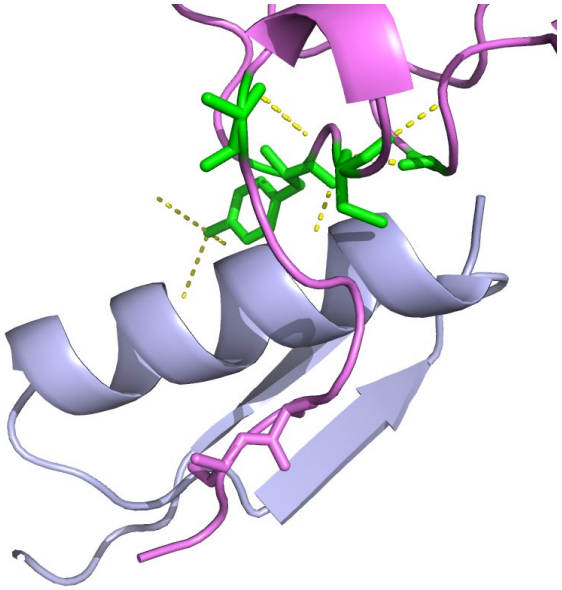
Moleculer docking prediction of mutant PRK6 and AtLURE1.2

WT PRK6-AtLURE1.2



D234A N239A I240A PRK6-AtLURE1.2 ZDOCK对接预测



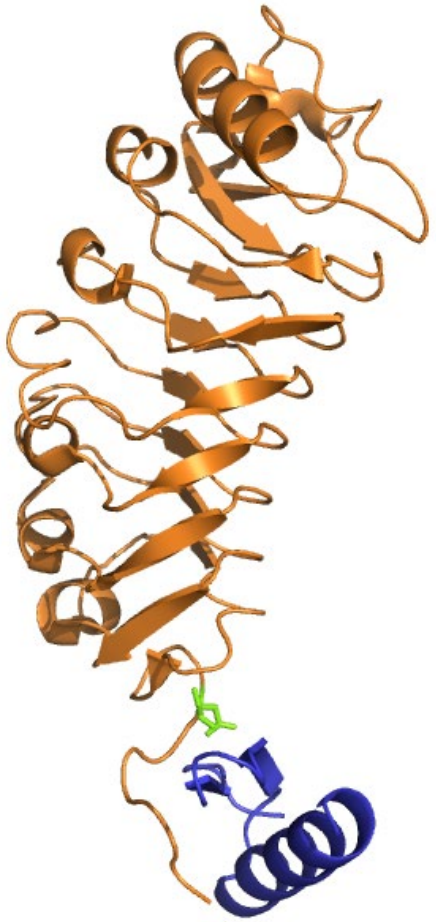


- 初步认为突变结合位点后的PRK6丧失与LURE的结合能力，无有效氢键

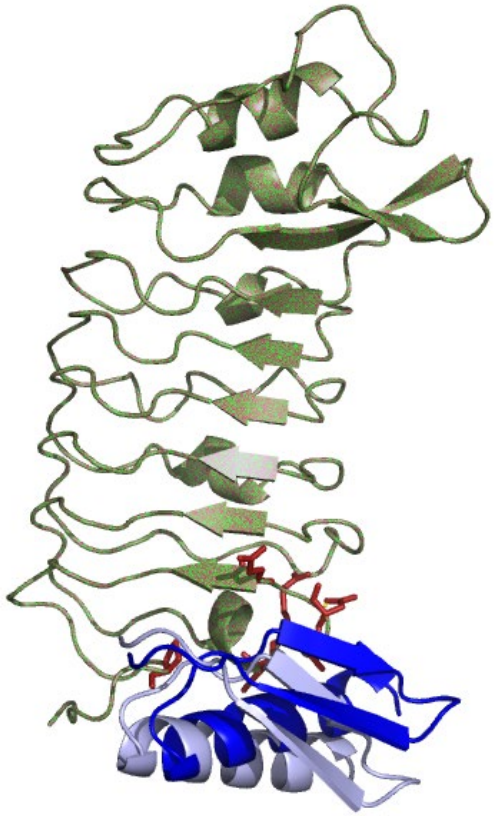
北京大学 PEKING UNIVERSITY

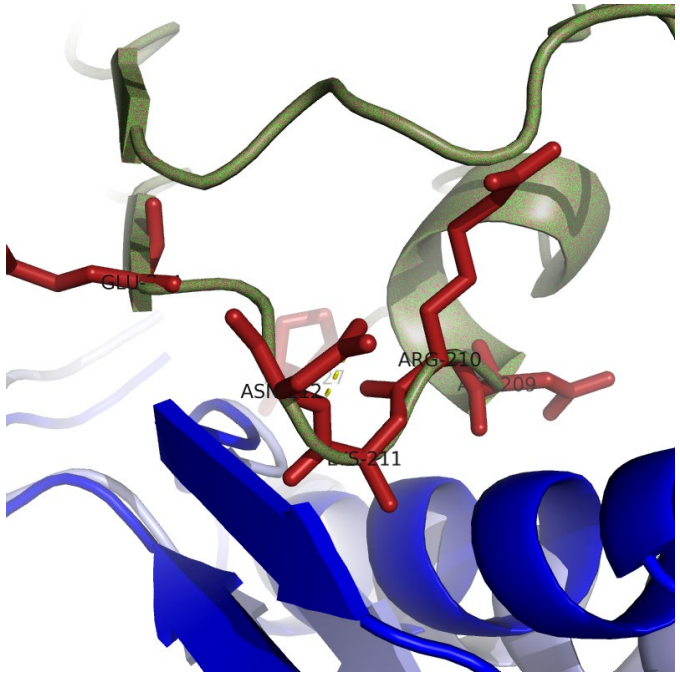
Moleculer docking prediction of PRK3 and AtLURE1.2

WT PRK6-AtLURE1.2



WT PRK3-AtLURE1.2 ZDOCK对接预测





PRK3-AtLURE1.2实际上无有效氢键联系

- 初步认为PRK3不具备与LURE的结合能力

北京大学 PEKING UNIVERSITY

总结

- 1.与PRK6亲缘关系最近的 PRK3或许不是PRK6结合AtLURE1的共受体，或者是共受体但不负责结合AtLURE1。
- 2.应通过生化、遗传实验进一步证实
- 3.应考虑其他家族受体作为PRK6共受体的可能性。

Thanks!