

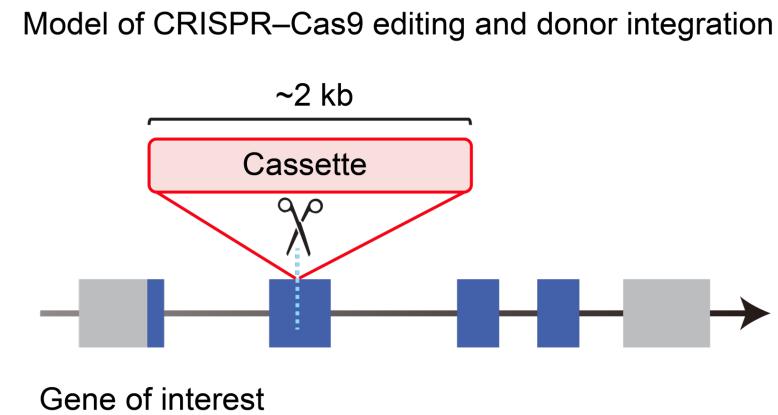
Read me:

1. This file displays **the phenotypes of CRISPR/Cas9 mutants and their genotypes**. The catalog is on Slide 2.
2. A phenotype image of the original ARENA mutant is shown on each slide and labeled with mutant ID and gene information. See [Table S1](#) for details.
3. Transformants from wild-type CC-5325 background (WT) were arrayed.
4. '1', '2', and '3' refer to CRISPR–Cas9 mutants that resembled the original mutant in phenotype; 'N' refers to a transformant with wild-type phenotype.
5. For most genes, over 20% of transformants showed mutant-like phenotypes, explaining why '1', '2', '3' lines often had neighbors with similar phenotypes.
6. PCR demonstrated the correlation between successful editing and mutant-like phenotype. Typically, two genomic primers across the editing site showed lack of wild-type product, yielding a product larger than WT. If no product was yielded from WT, a genomic primer and repair donor marker cassette primer amplified the edited junction absent in WT.
7. Sequences of sgRNAs and genotyping primers are presented in [Table S3](#).
8. For *YAK1* and *NYC1*, we counted them as 'expected' in [Figure 1G](#) and the 'Validation status' column of [Table S2](#). We still performed CRISPR–Cas9 validation because their mutants were characterized in our proof-of-principle study.

Catalog

Gene ID	Gene name	Slide
Cre08.g381950	<i>YAK1</i> (Expected gene)	Slide 3
Cre02.g111050	<i>AMT1G</i>	Slide 4
Cre12.g517700	<i>NYC1</i> (Expected gene)	Slide 5
Cre07.g356800	<i>OPR33</i>	Slide 6
Cre12.g513600	<i>SGT1</i>	Slide 7
Cre07.g331000	<i>PIDN1</i>	Slide 8
Cre12.g501550	<i>CBR1</i>	Slide 9
Cre10.g462300	<i>SNX8</i>	Slide 10
Cre12.g554250	<i>LPB1</i>	Slide 11
Cre03.g183800	<i>NEDN1</i>	Slide 12
Cre12.g524500	<i>RMT2</i>	Slide 13
Cre16.g675250	<i>LPL2</i>	Slide 14
Cre02.g114400	<i>LAS2</i>	Slide 15
Cre14.g621351	<i>RSH3</i>	Slide 16
Cre03.g159800	<i>MESH1</i>	Slide 17
Cre10.g428650	<i>CDPKK1</i>	Slide 18
Cre07.g357500	<i>CETL</i>	Slide 19
Cre03.g188700	<i>PLAP6</i>	Slide 20
Cre17.g731100	<i>CPL14</i>	Slide 21

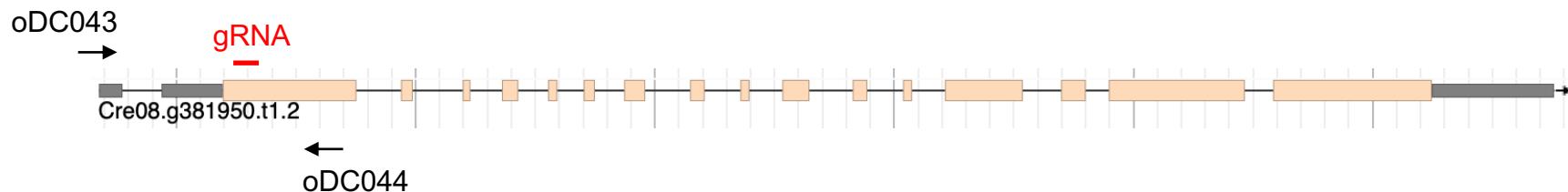
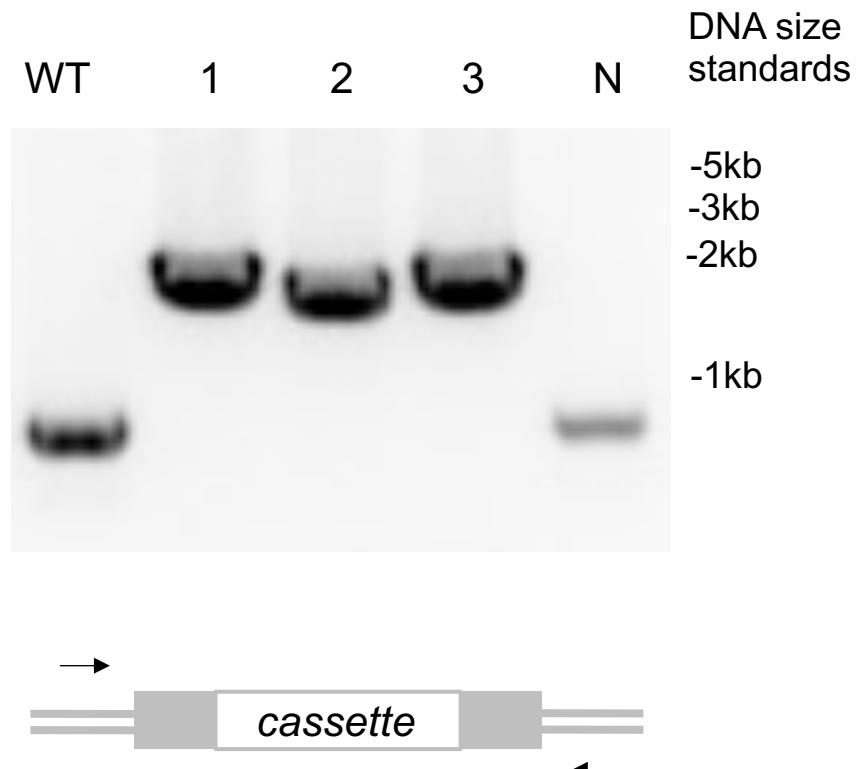
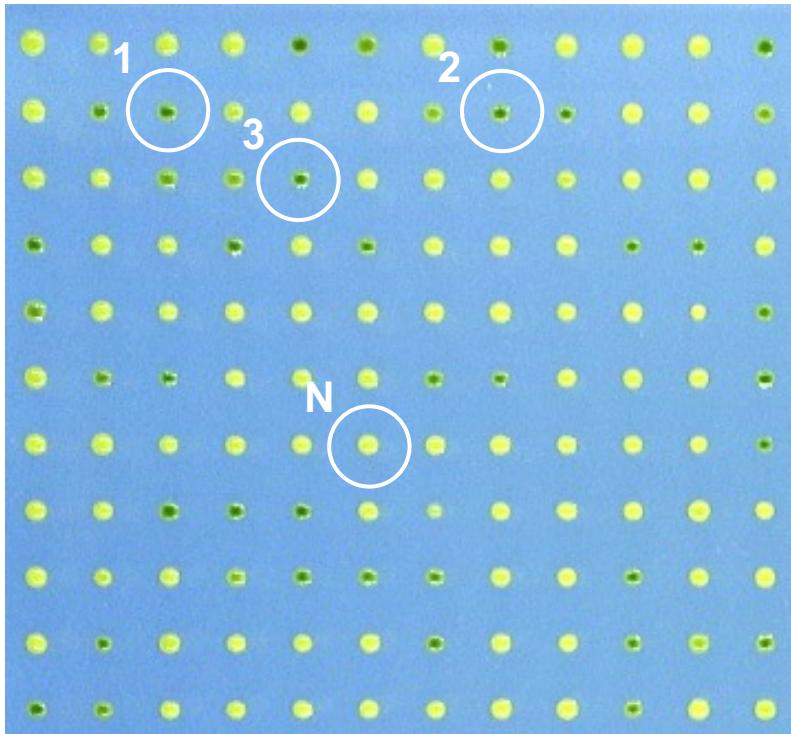
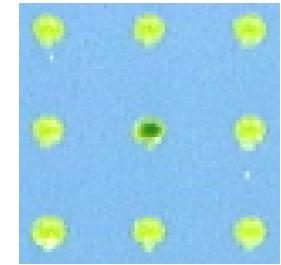
Gene ID	Gene name	Slide
Cre02.g114250	<i>MEN2</i>	Slide 22
Cre08.g373878	<i>RAA13</i>	Slide 23
Cre11.g478750	<i>FKB15-2</i>	Slide 24
Cre10.g448950	<i>PMR1</i>	Slide 25
Cre02.g105650	<i>LPA2</i>	Slide 26
Cre12.g527850	<i>TRA1</i>	Slide 27
Cre11.g476900	<i>MED20</i>	Slide 28
Cre17.g736950	<i>MED25</i>	Slide 29
Cre12.g510750	<i>MED27</i>	Slide 30
Cre12.g496200	<i>XPOT</i>	Slide 31
Cre09.g391900	<i>TRXH2</i>	Slide 32
Cre08.g376200	<i>NOT10</i>	Slide 33
Cre17.g726800	<i>NOT11</i>	Slide 34
Cre09.g392208	<i>PRN1</i>	Slide 35
Cre06.g281050	<i>VPS5A</i>	Slide 36
Cre12.g494550	<i>RNP10</i>	Slide 37
Cre14.g630883	<i>DESA1</i>	Slide 38
Cre03.g176550	<i>PRMT5</i>	Slide 39
Cre11.g478528	<i>SDN1</i>	Slide 40



yak1-1, arn0569

YAK1, Cre08.g381950

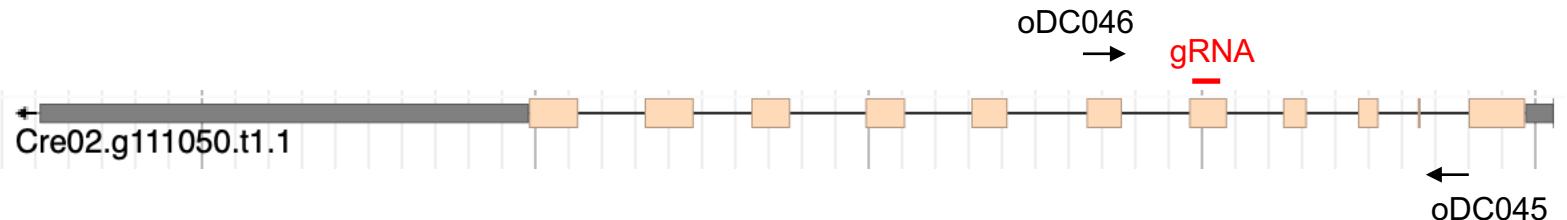
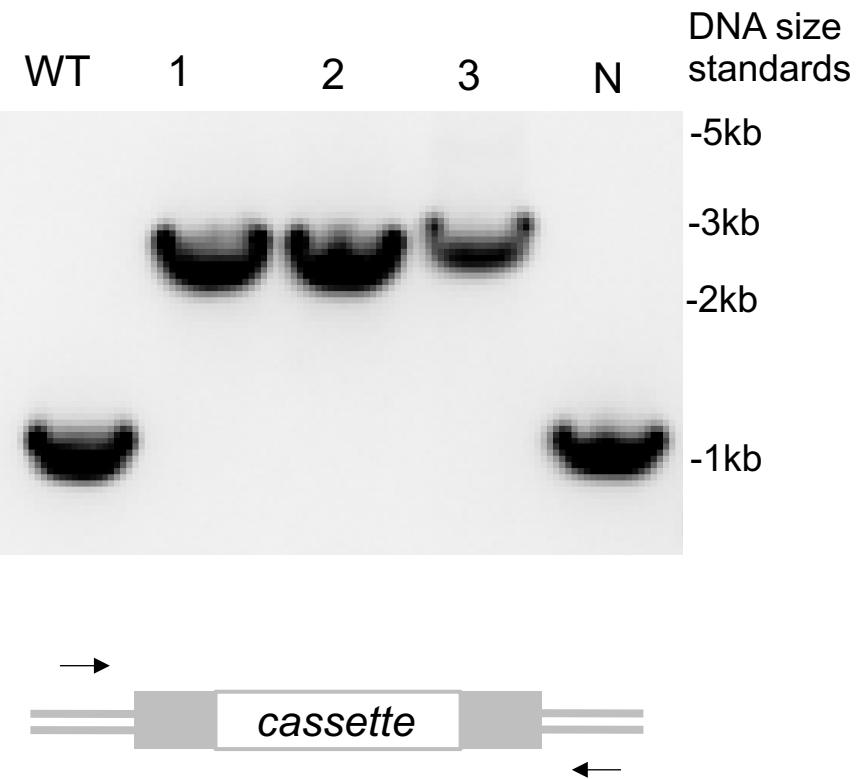
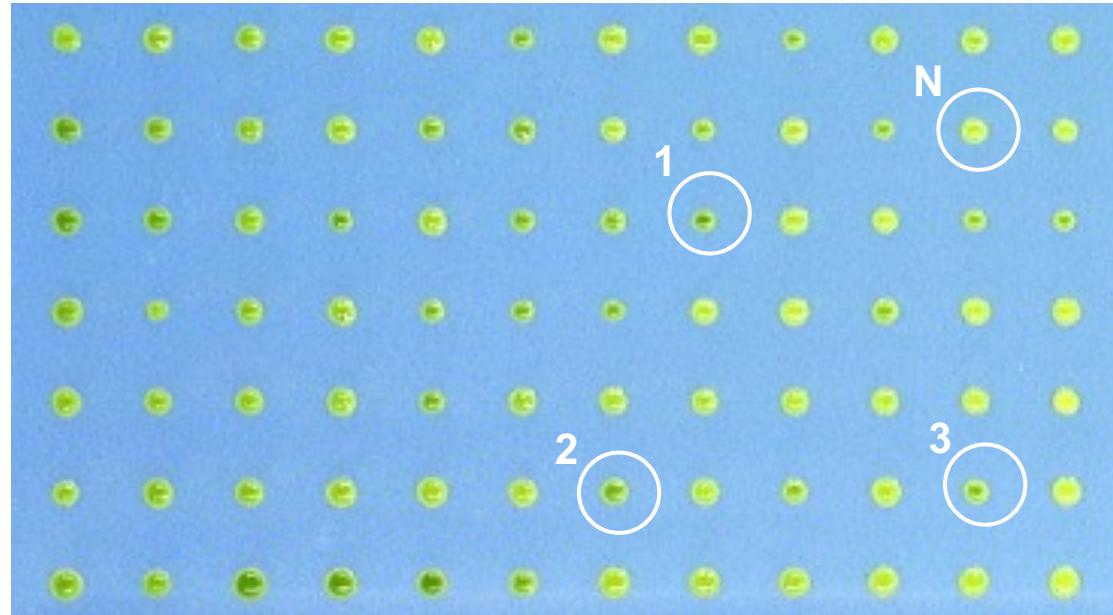
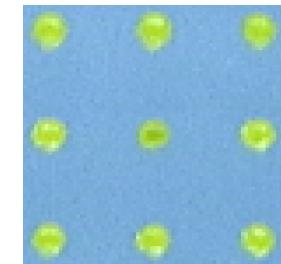
Dual specificity protein kinase YAK1



amt1g, arn0559

AMT1G, Cre02.g111050

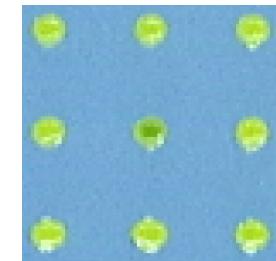
Ammonium transporter, AMT1G, AMT7



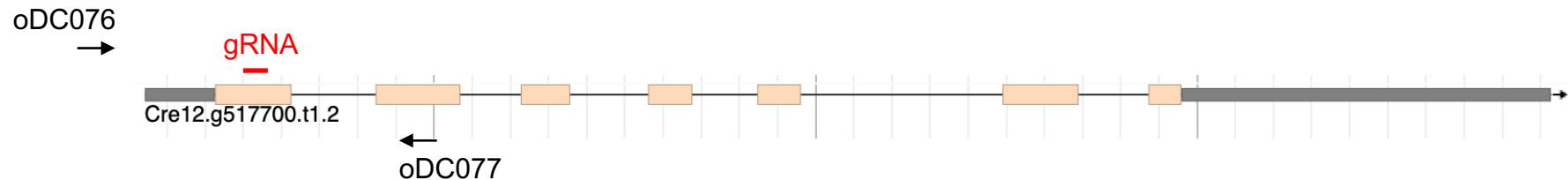
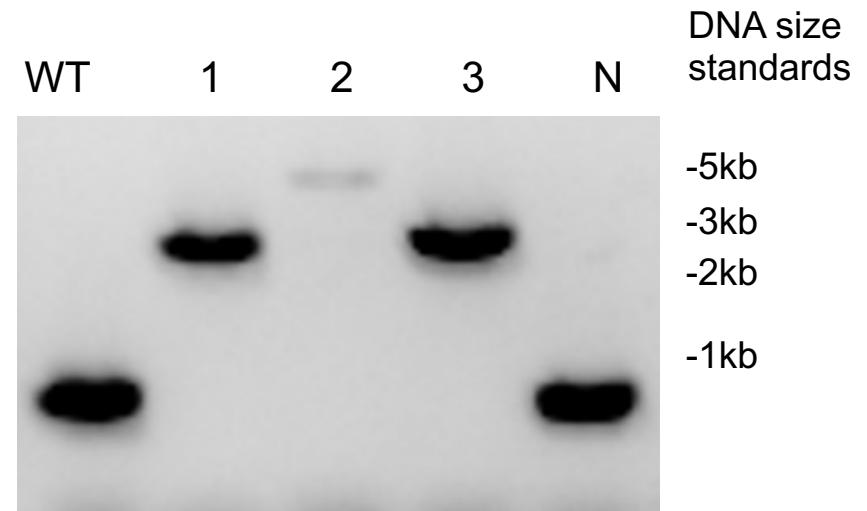
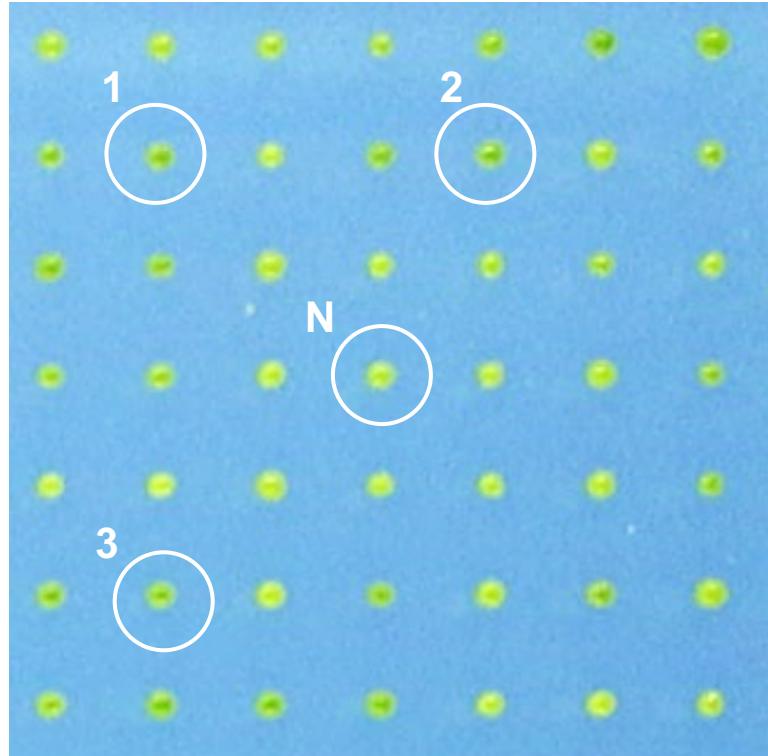
nyc1, arn0593

NYC1, Cre12.g517700

Short-chain dehydrogenase/reductase, probably chlorophyll b reductase, SDR21, NYC1



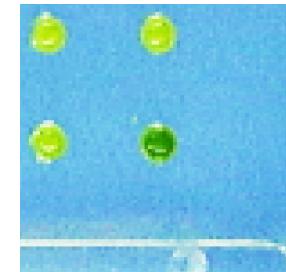
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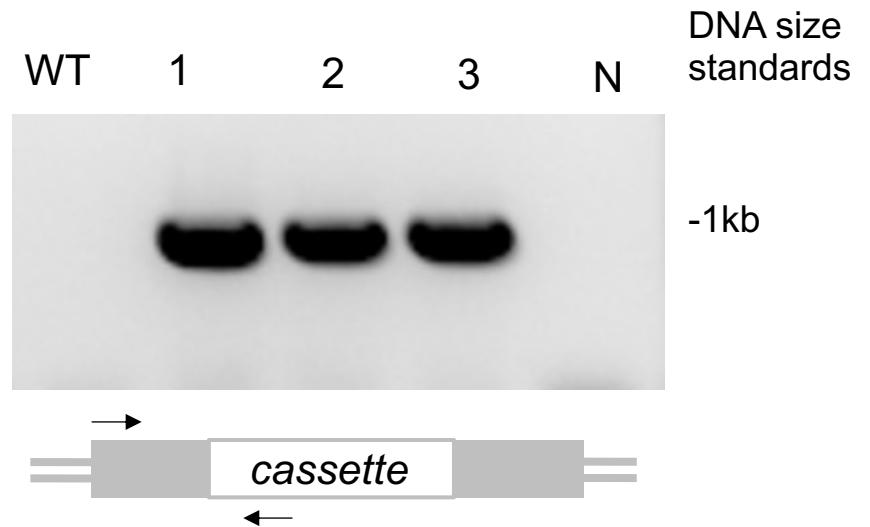
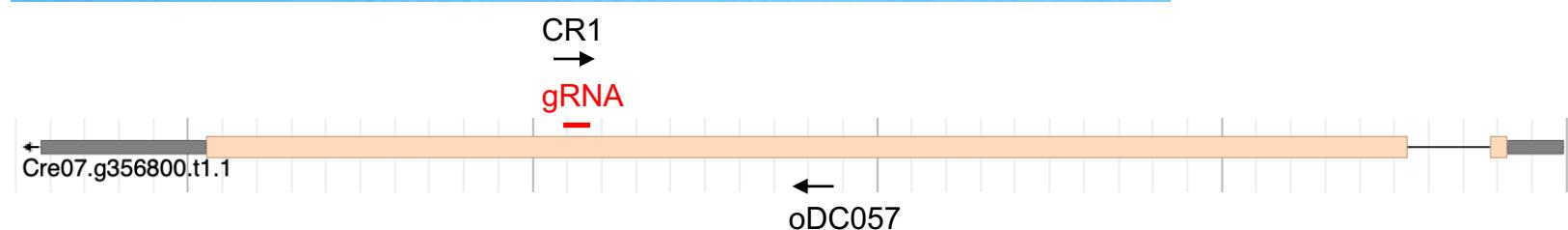
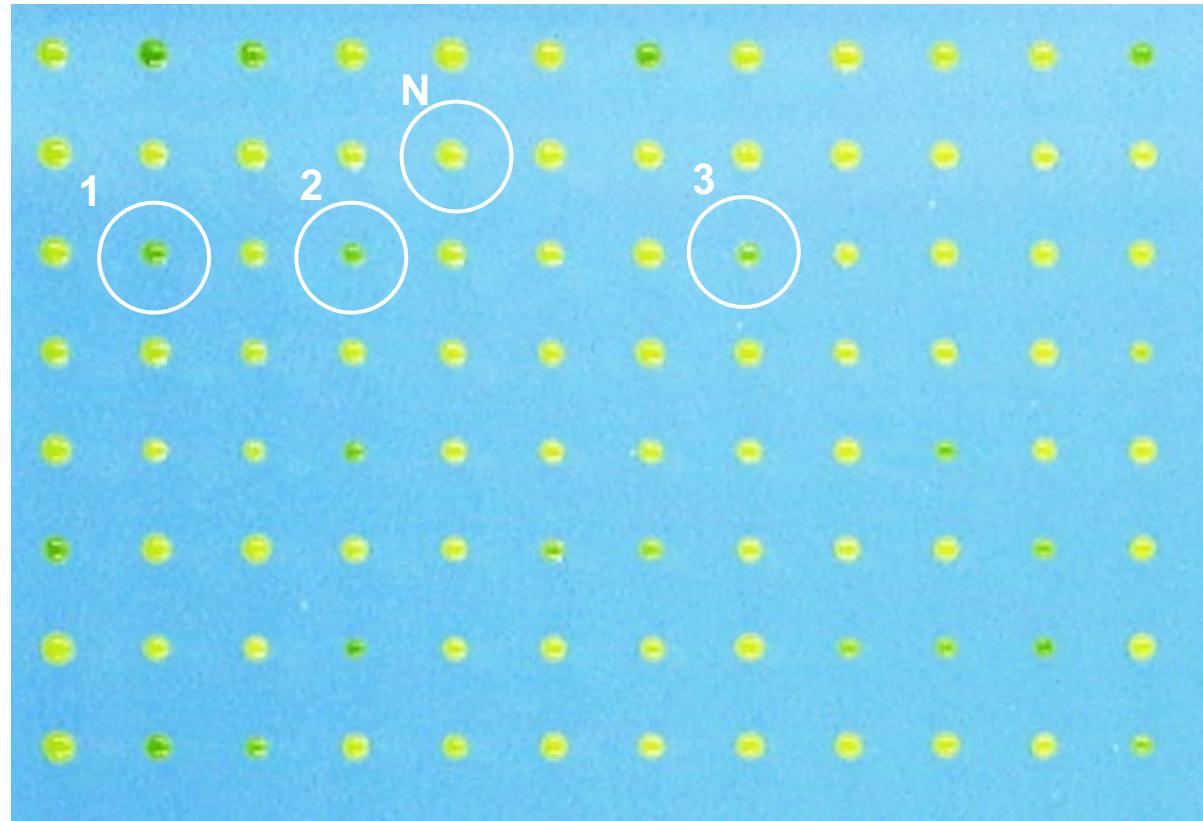
opr33, arn0648

OPR33, Cre07.g356800

Octotricopeptide repeat protein, OPR33



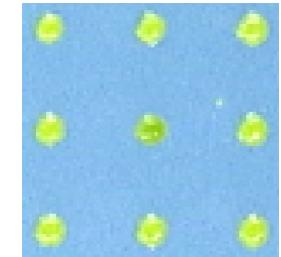
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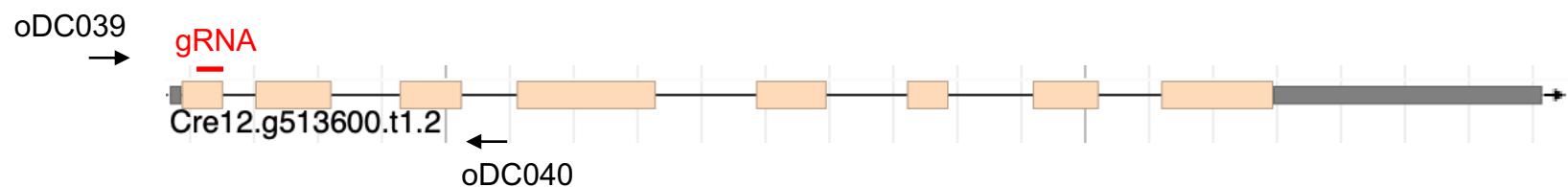
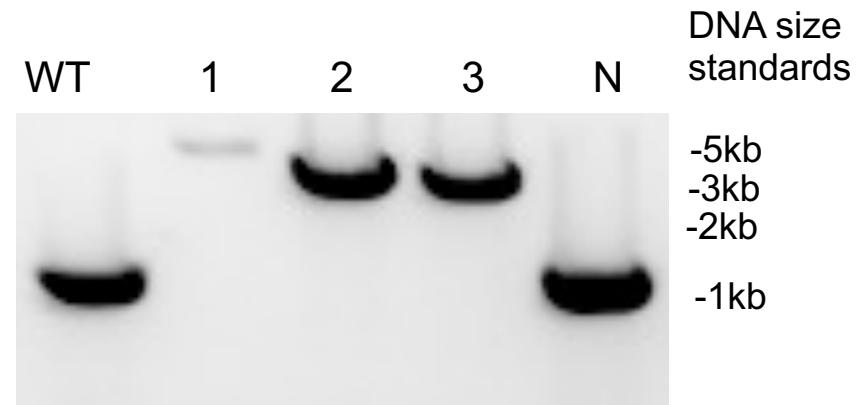
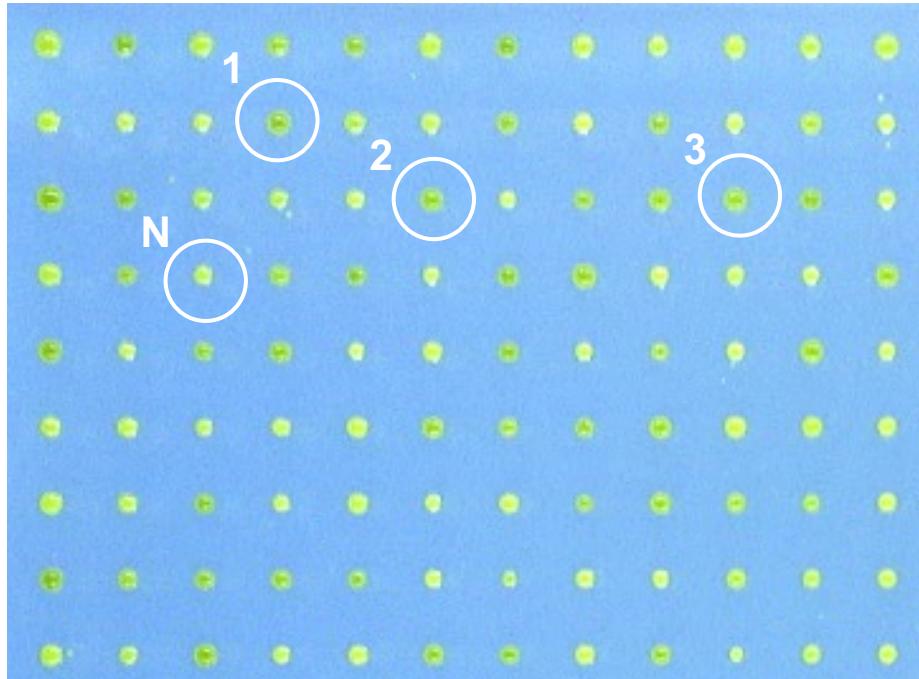
sgt1-1, arn0442

SGT1, Cre12.g513600

suppressor of G2 allele of SKP1 (SUGT1, SGT1)



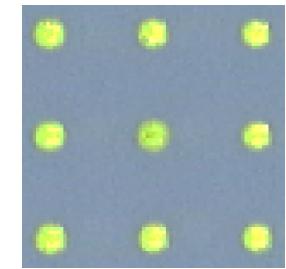
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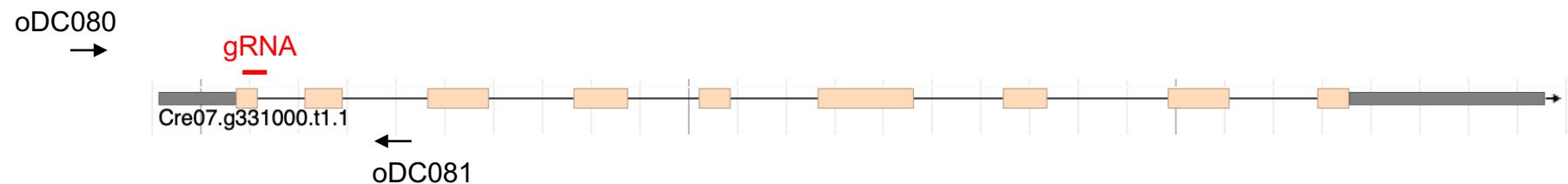
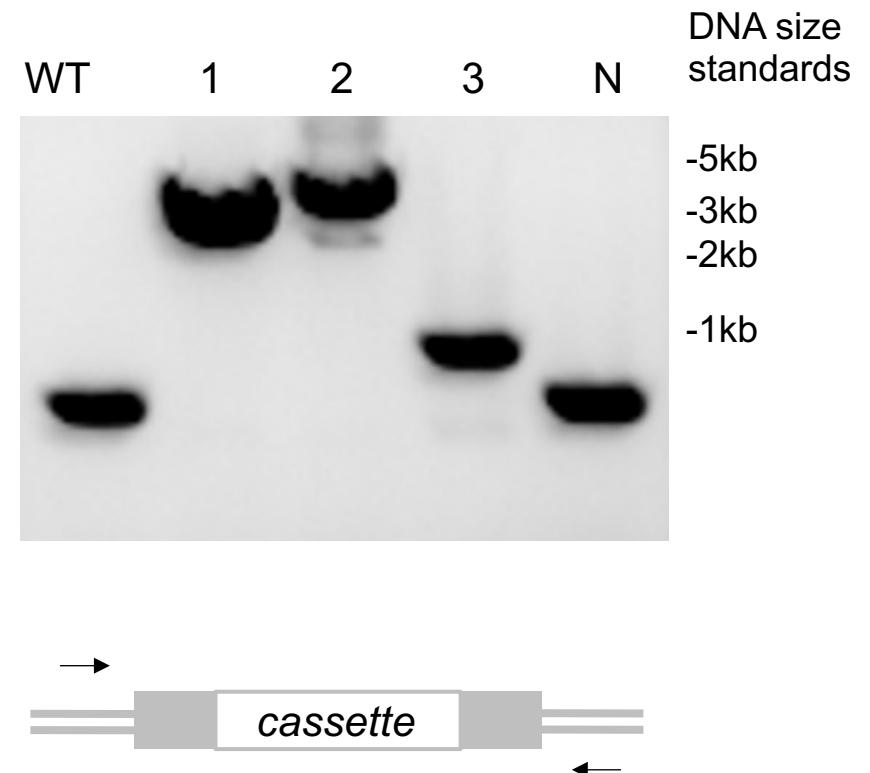
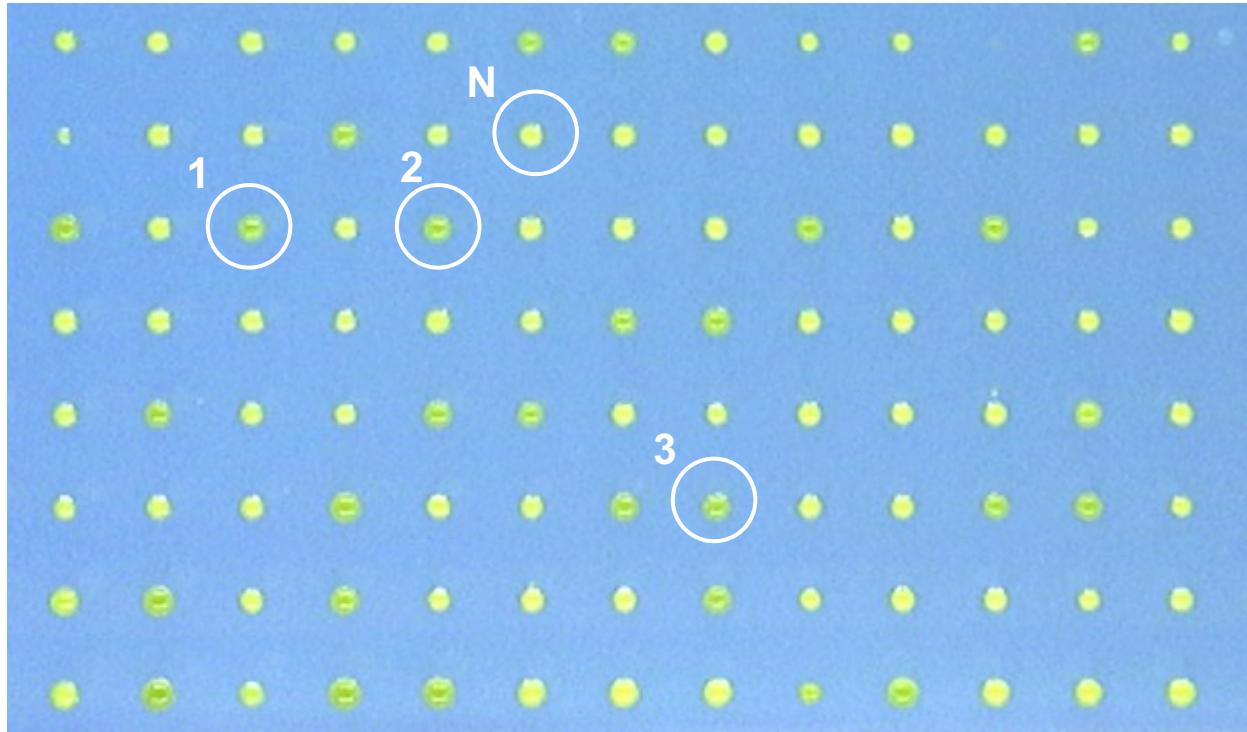
pidn1, arn0983

PIDN1, Cre07.g331000

Proteasome inhibitor, chloroplast

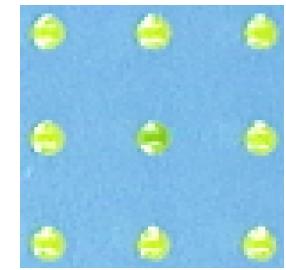


-N delayed
chlorosis

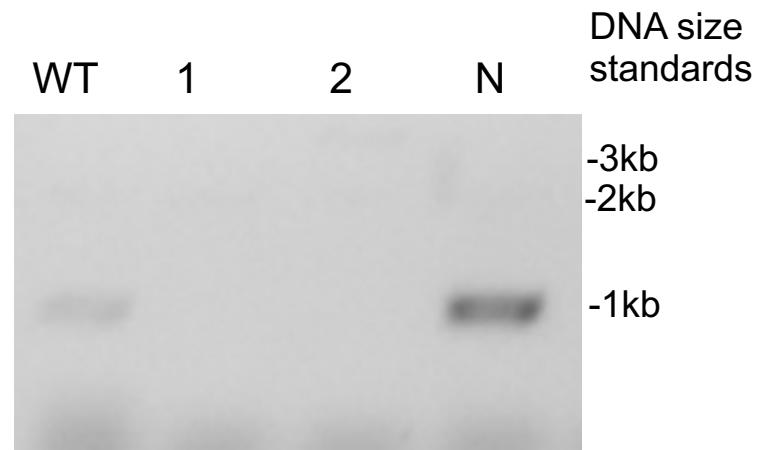
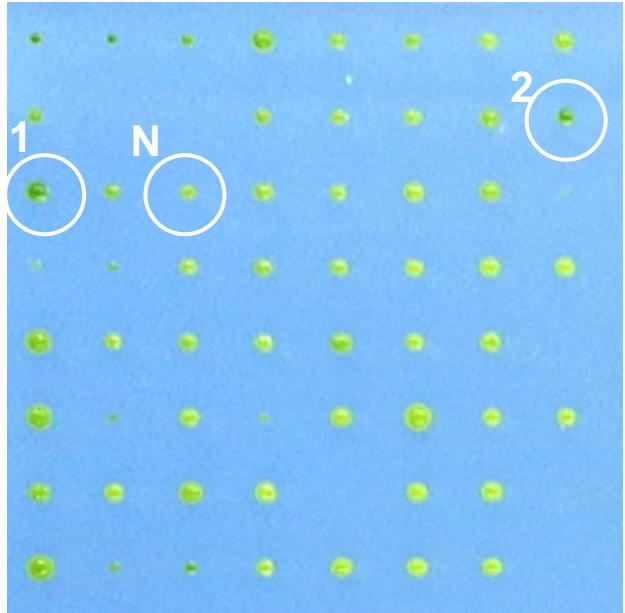


cbr1-1, arn0130

CBR1, Cre12.g501550



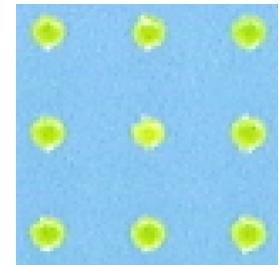
-N delayed chlorosis



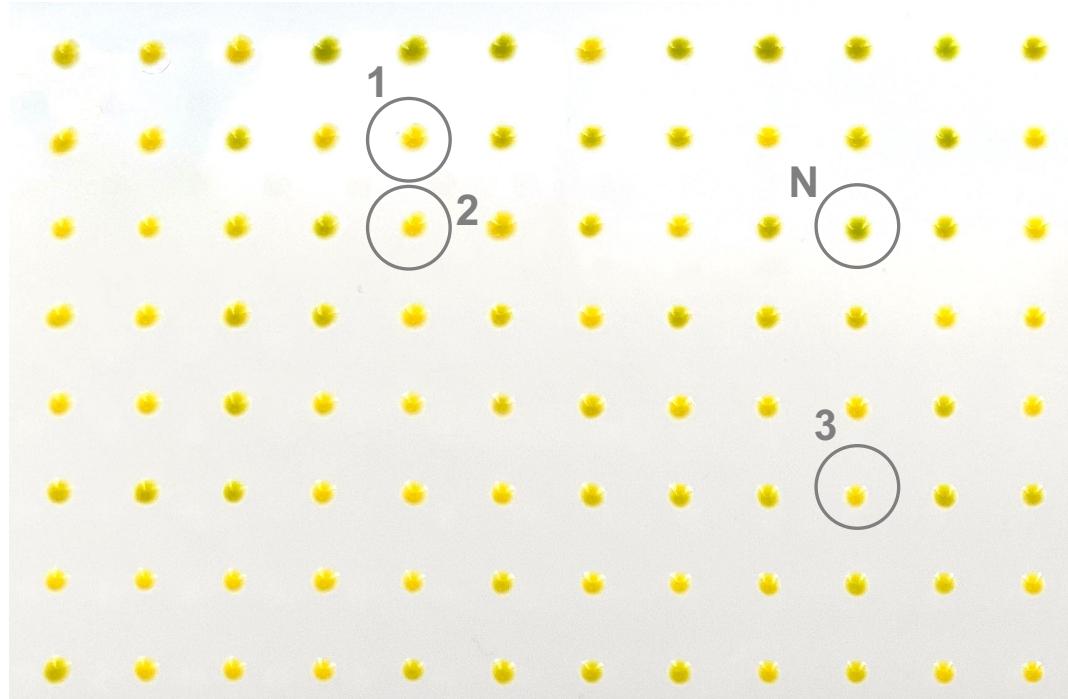
snx8, arn0855

SNX8, Cre10.g462300

Sorting nexin/sorting nexin-8



-N fast
chlorosis



oDC144

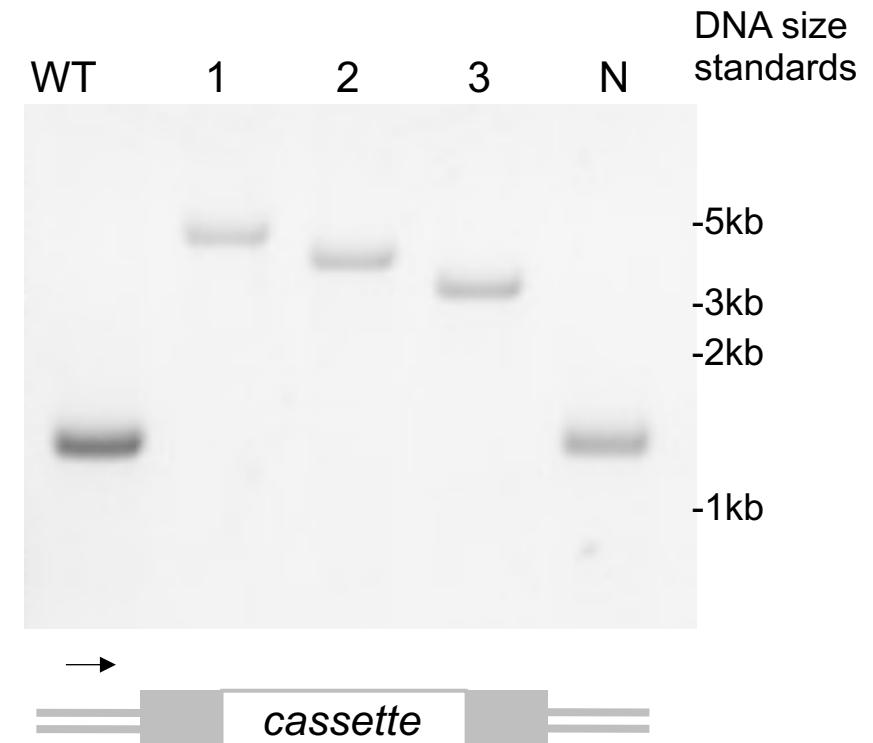


gRNA



Cre10.g462300.t1.1

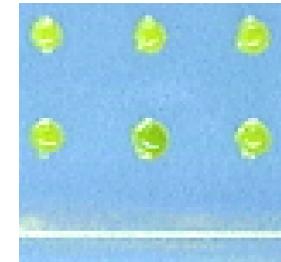
oDC145



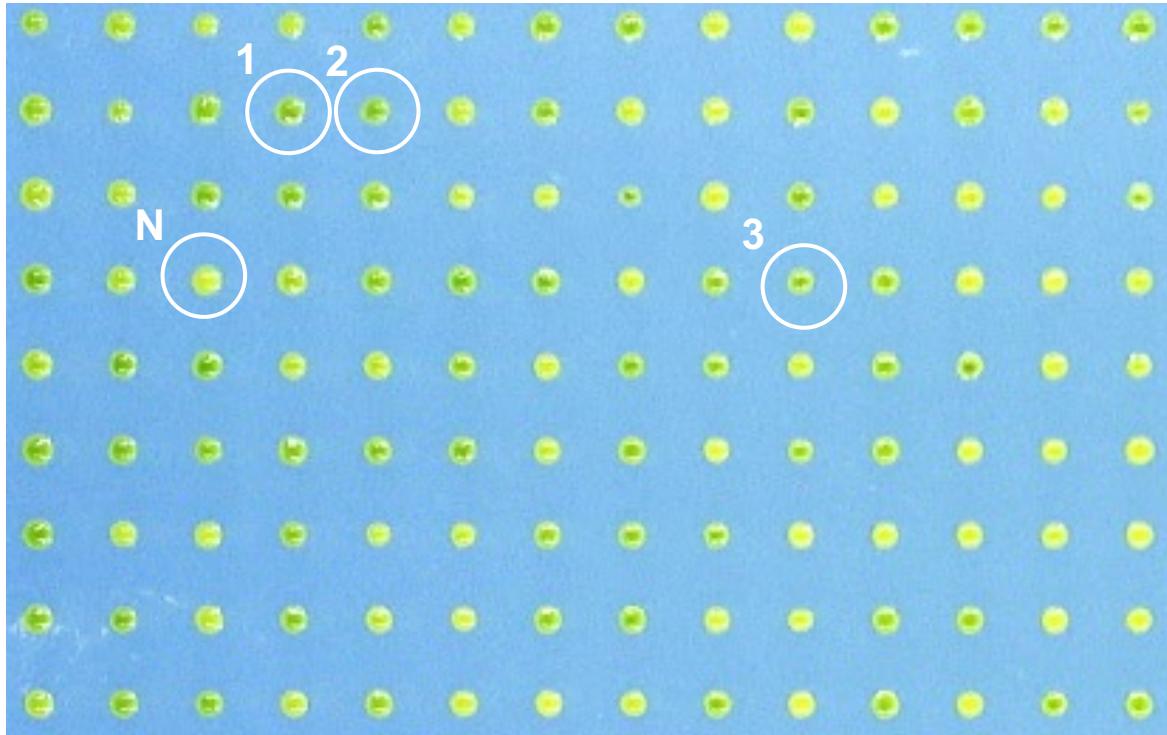
lpb1-1, arn0647

LPB1, Cre12.g554250

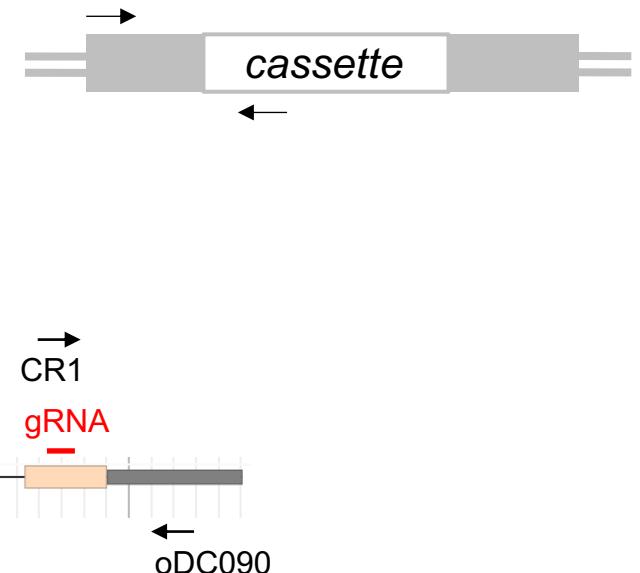
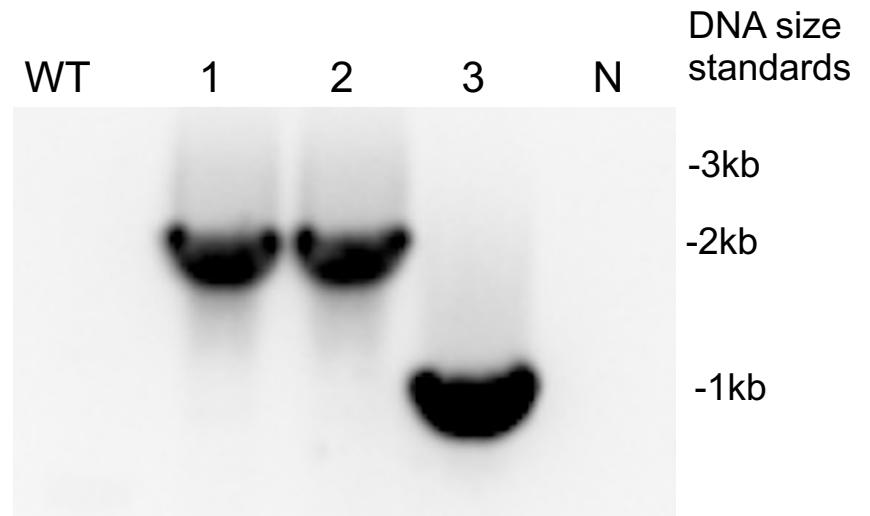
Low photochemical bleaching protein, LPB1



-N delayed chlorosis



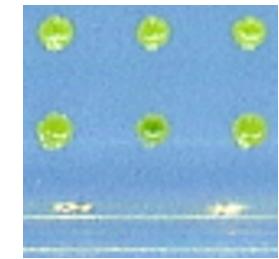
Cre12.g554250.t1.1



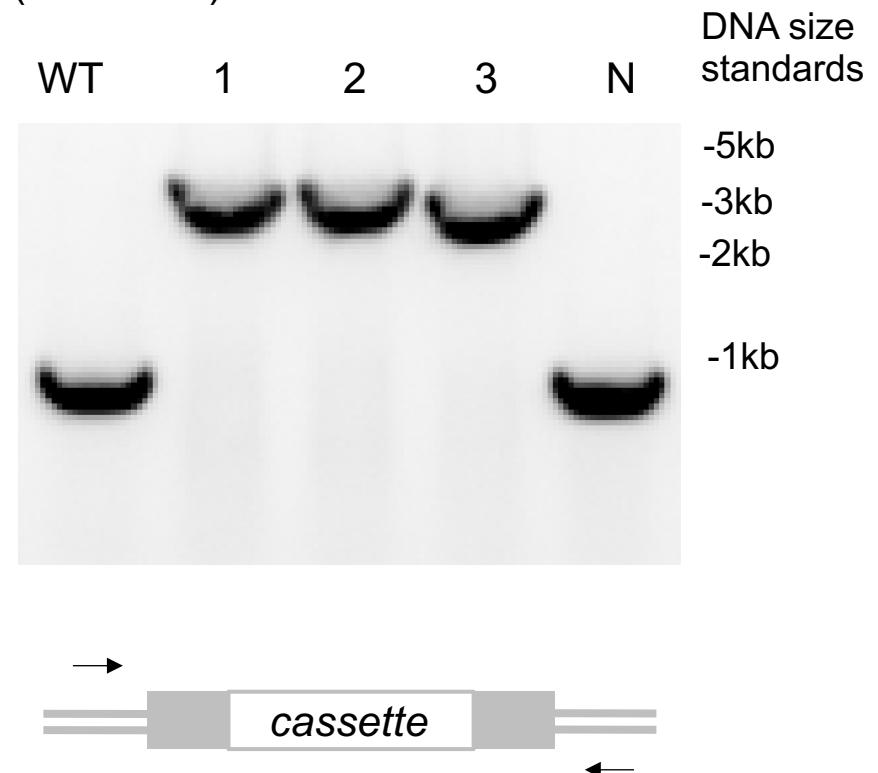
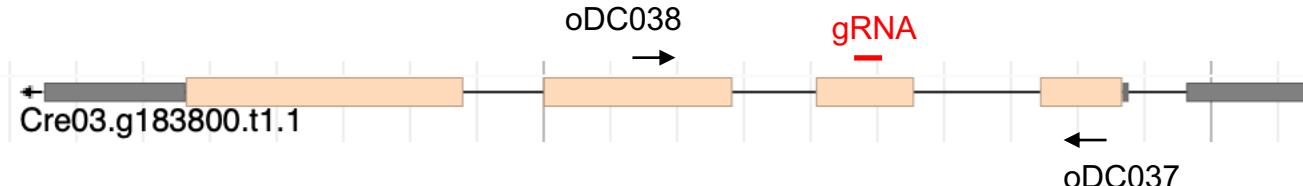
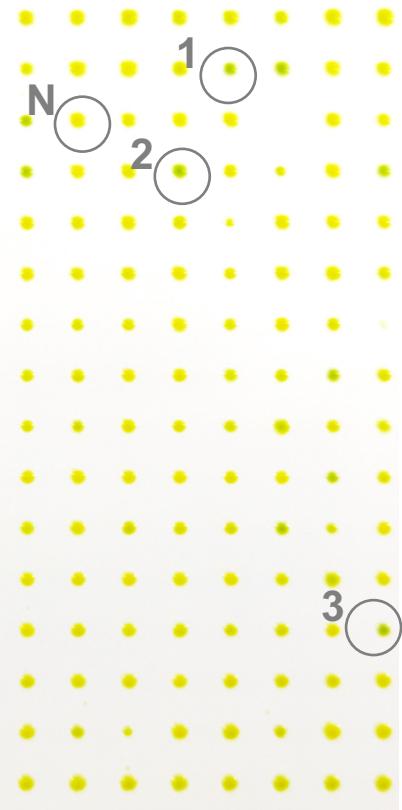
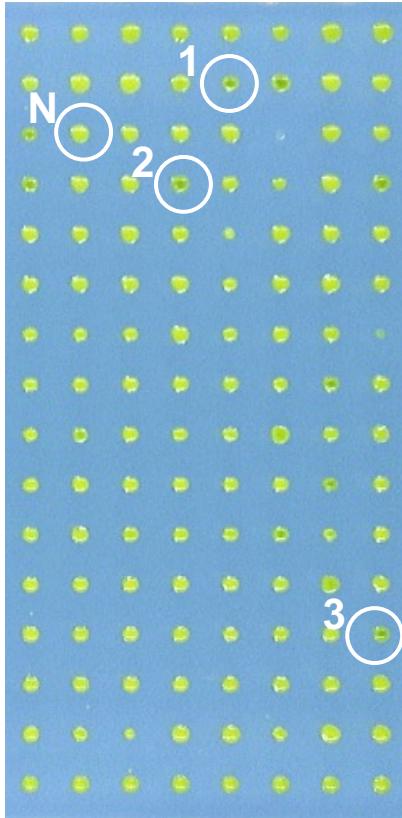
nedn1, arn1022

NEDN1, Cre03.g183800

NEMP family, NEMP1 is a RanGTP-binding protein, Uncharacterized conserved protein (DUF2215)



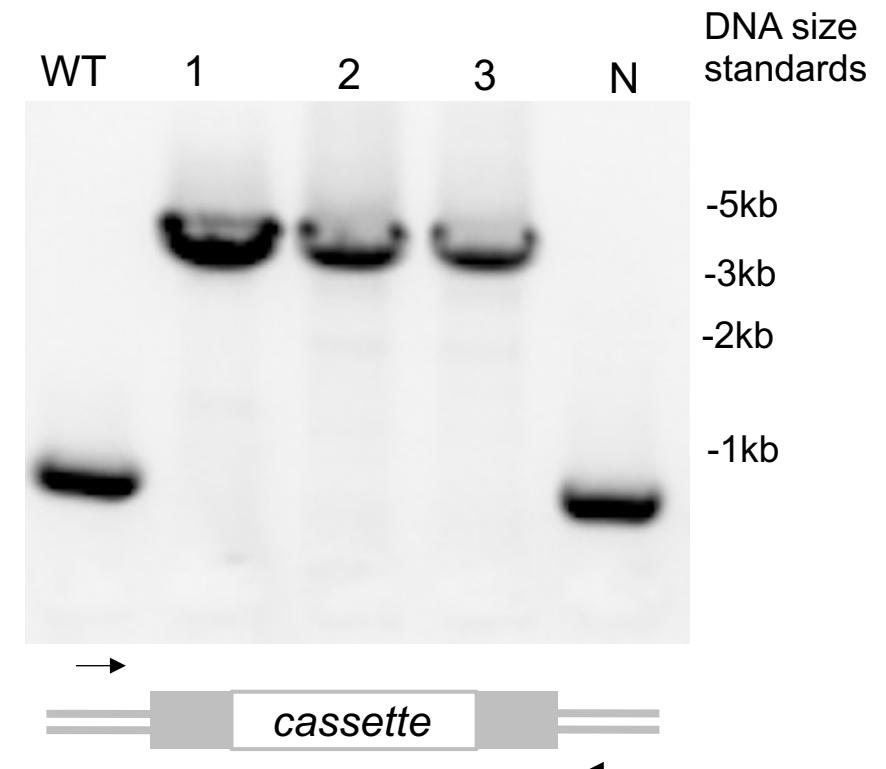
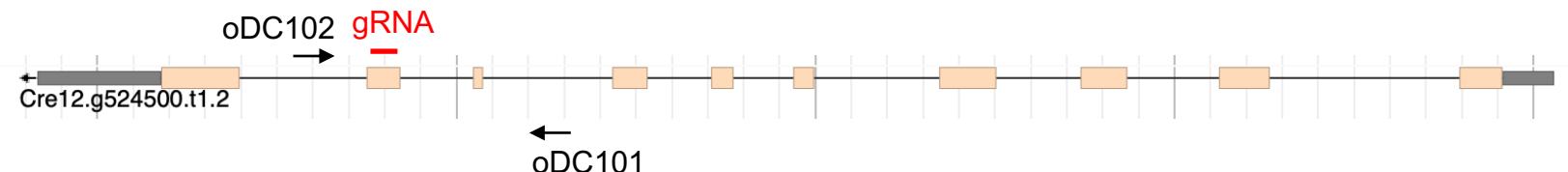
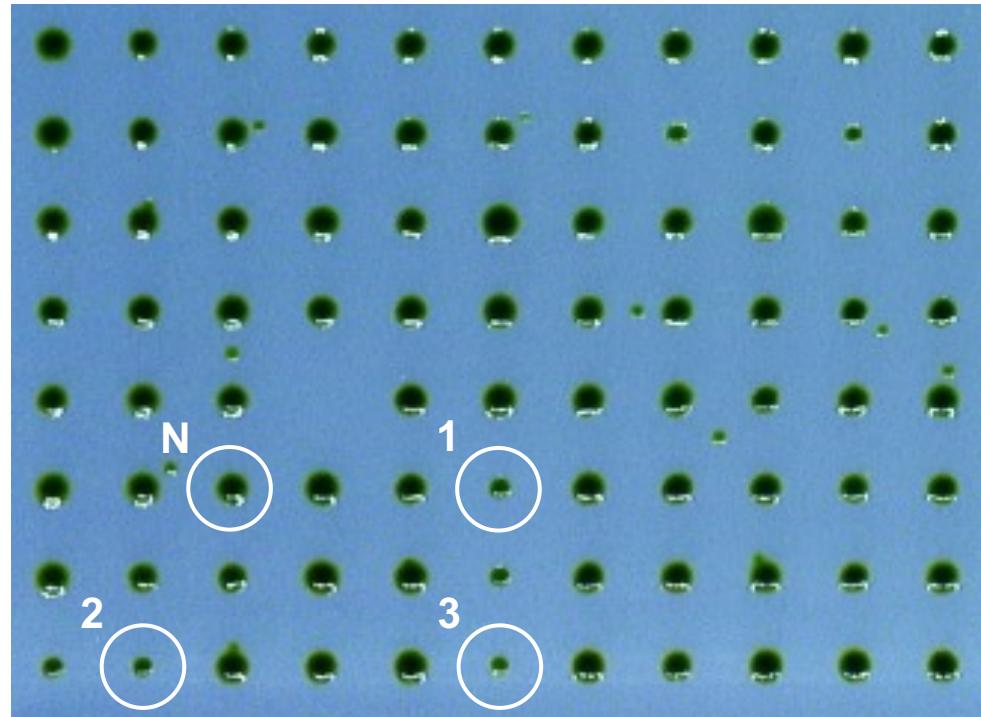
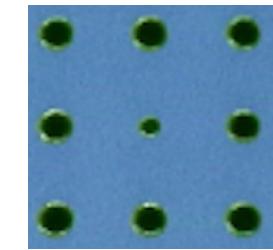
-N delayed
chlorosis



rmt2-1, arn0141

RMT2, Cre12.g524500

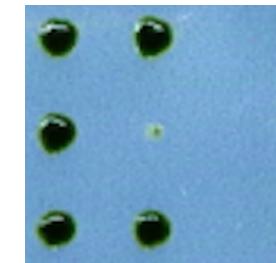
Rubisco small subunit N-methyltransferase, RMT2



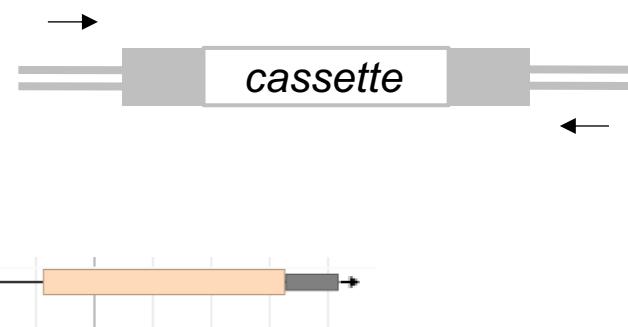
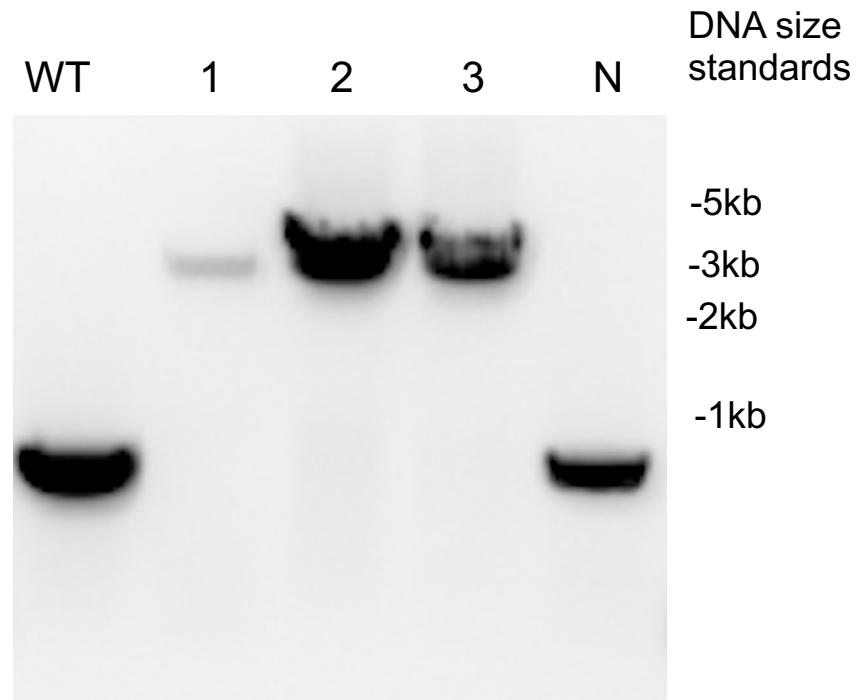
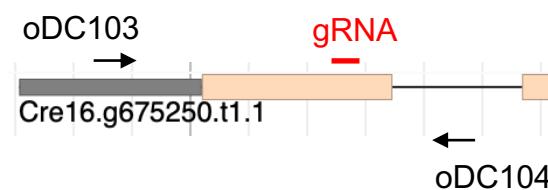
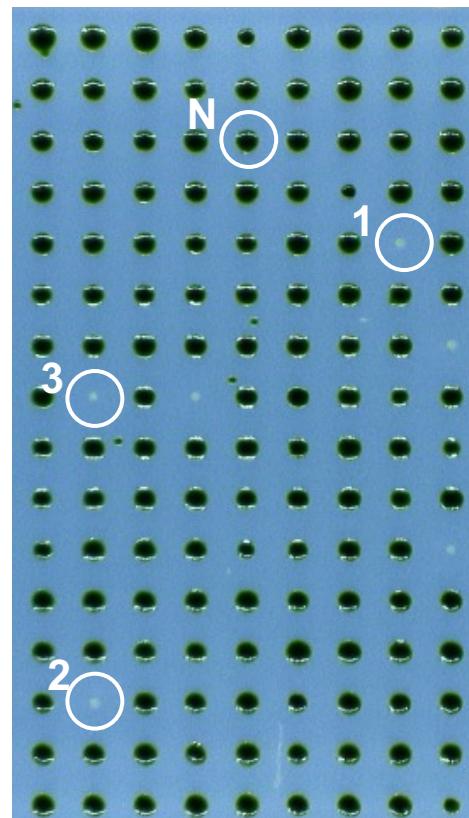
lpl2, arn0850

LPL2, Cre16.g675250

Lipoate-protein ligase B, LPL2



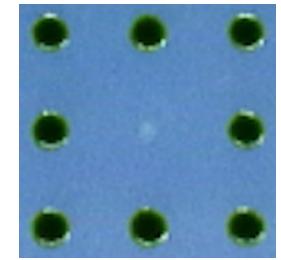
TP_small size



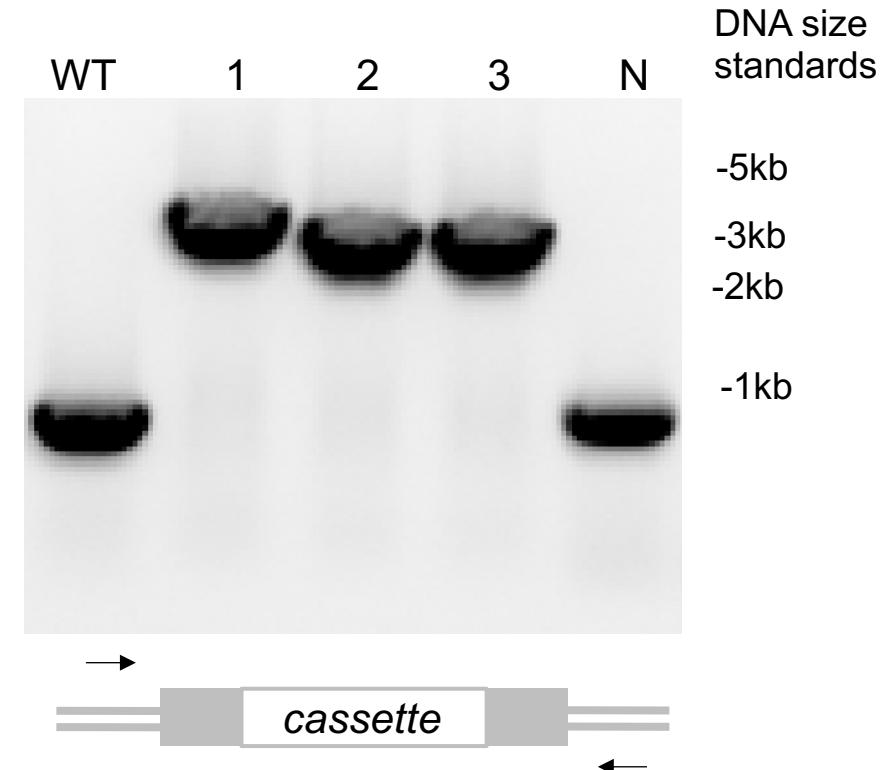
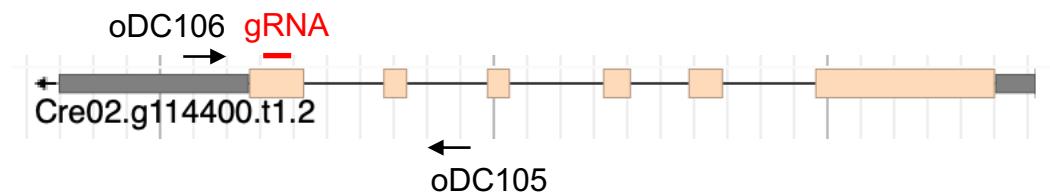
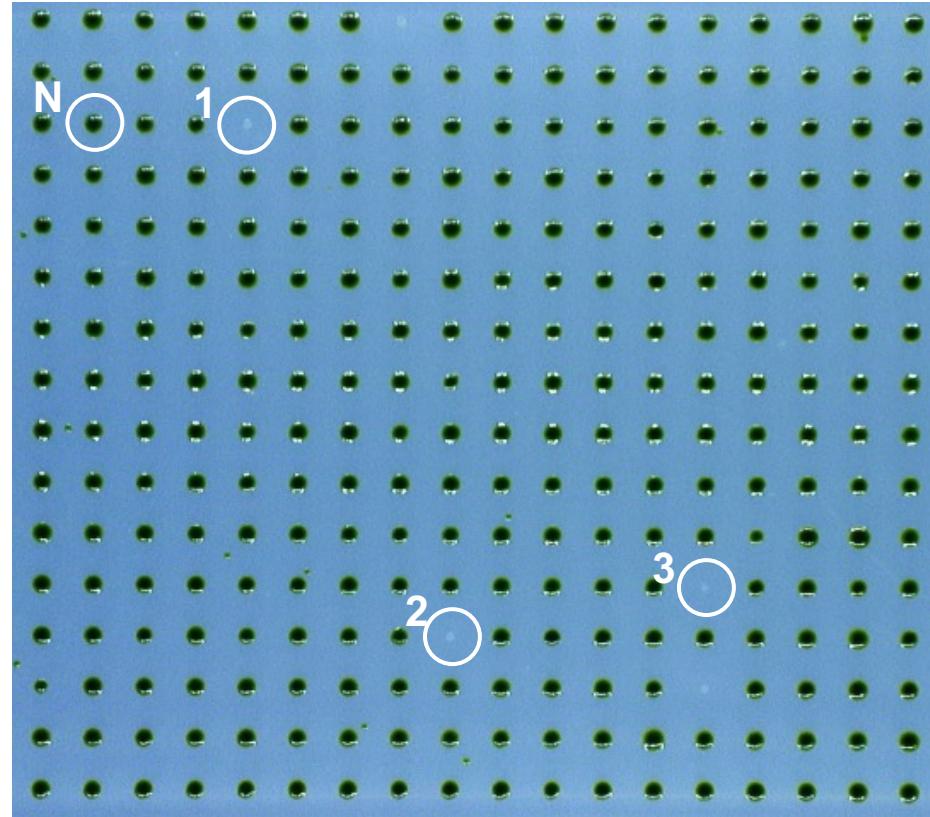
las2, arn0913

LAS2, Cre02.g114400

Lipoic acid synthetase 2



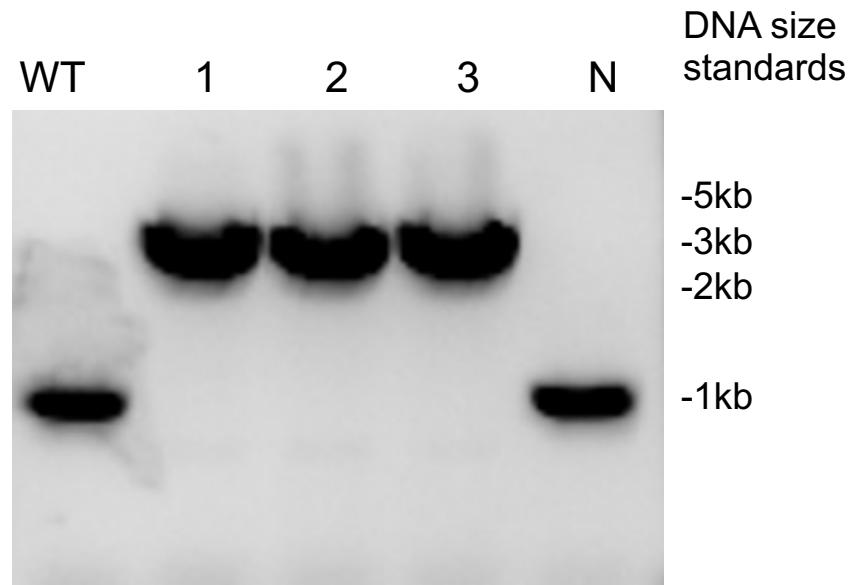
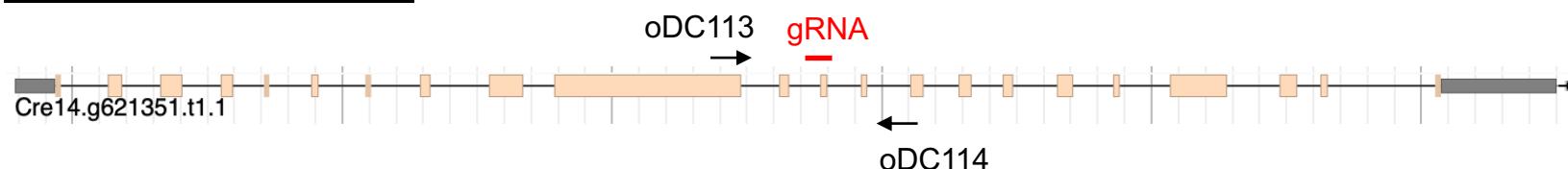
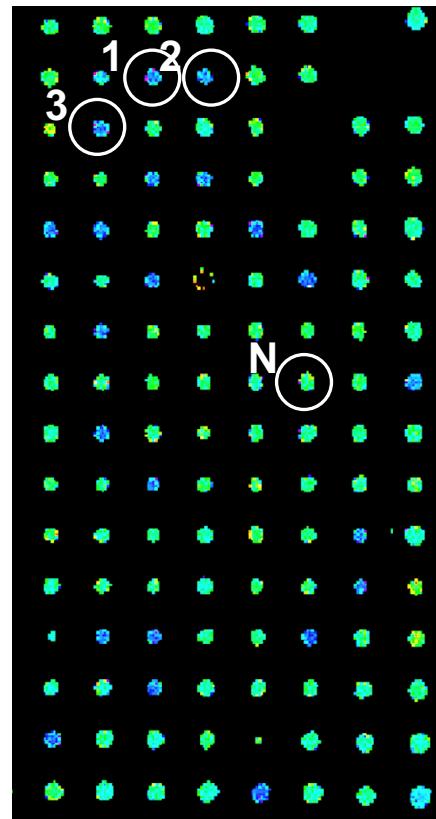
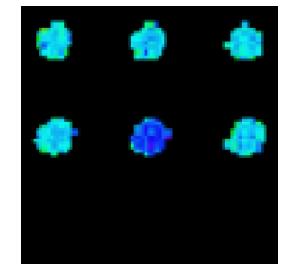
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rsh3-1, arn0165

RSH3, Cre14.g621351

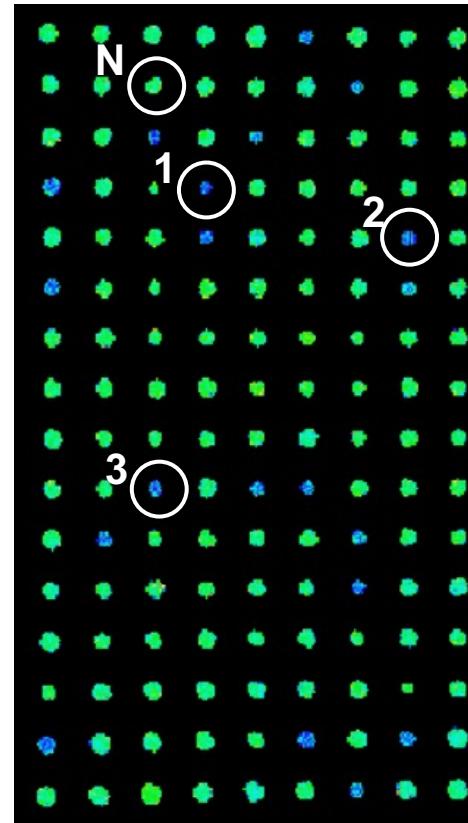
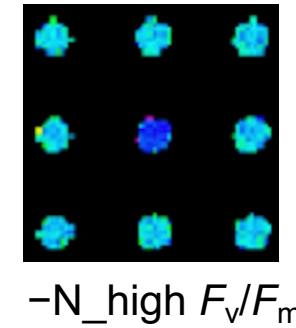
Guanosine-3',5'-bis diphosphate 3'-pyrophosphohydrolase



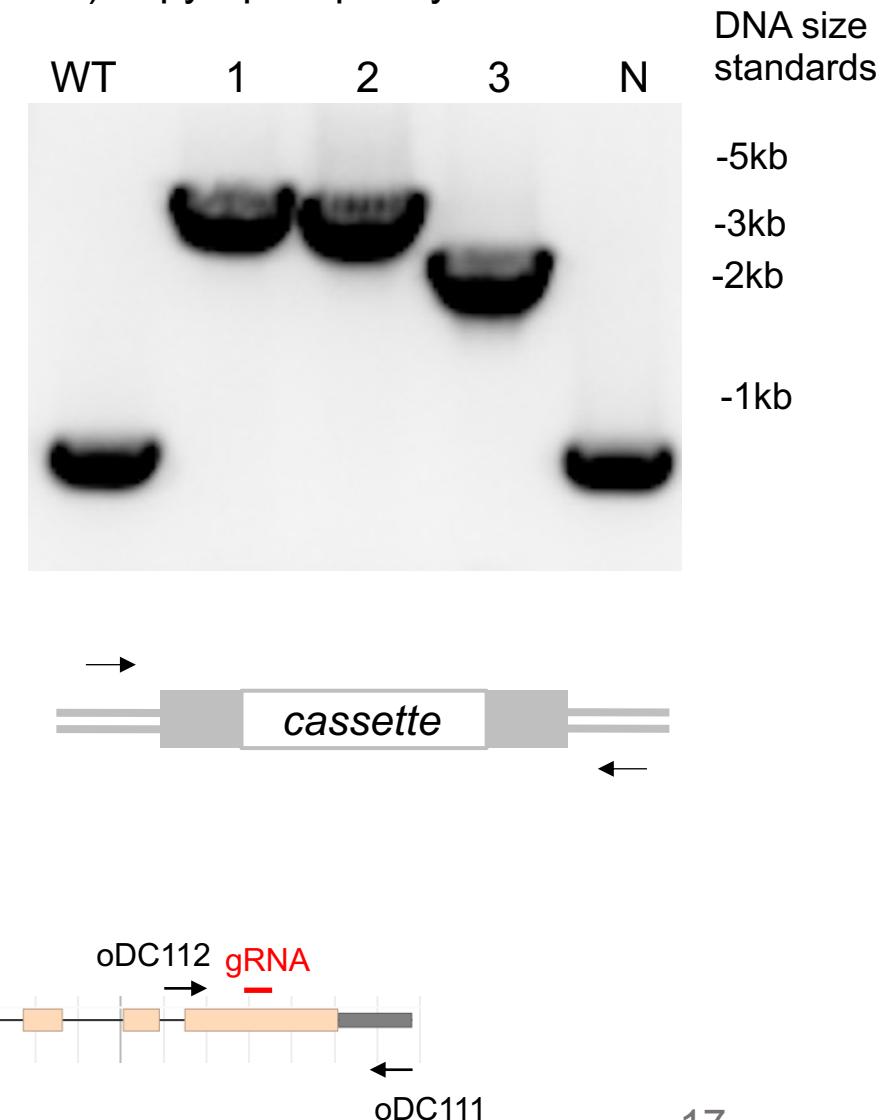
mesh1-1, arn0027

MESH1, Cre03.g159800

Guanosine-3',5'-bis diphosphate 3'-pyrophosphohydrolase/guanosine-3',5'-bis(diphosphate) 3'-pyrophosphohydrolase *MESH1*



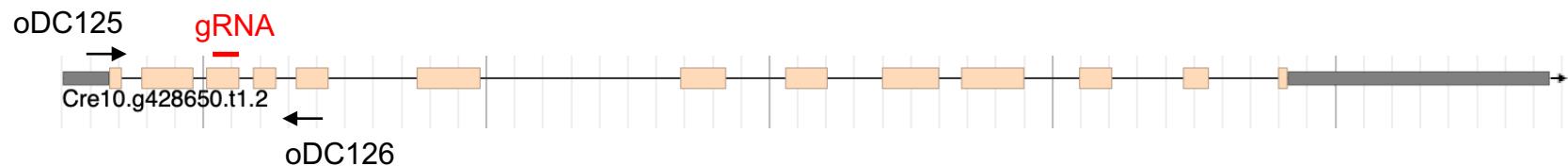
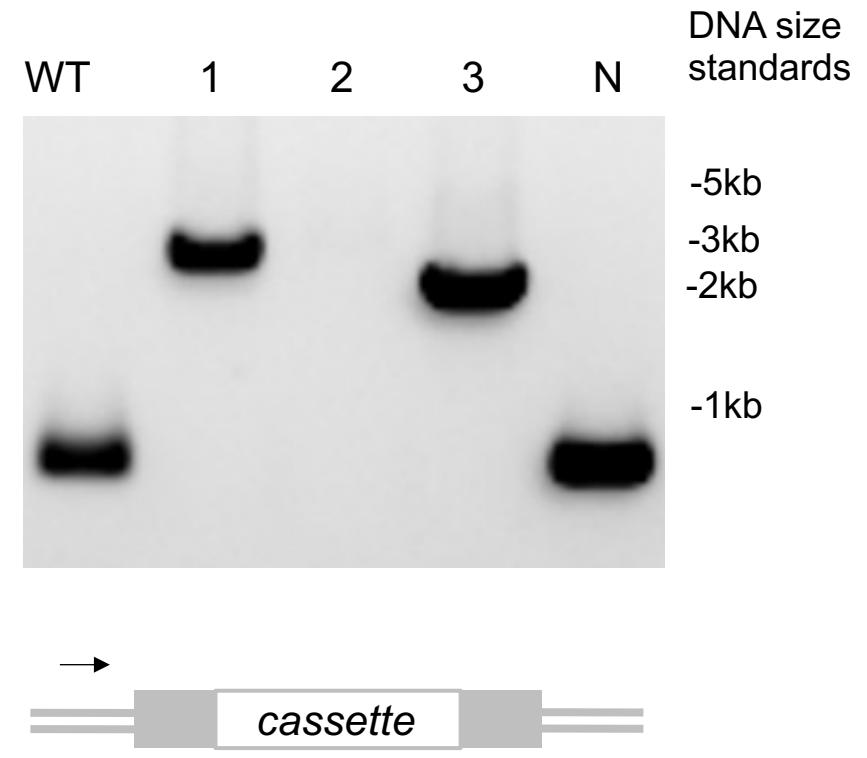
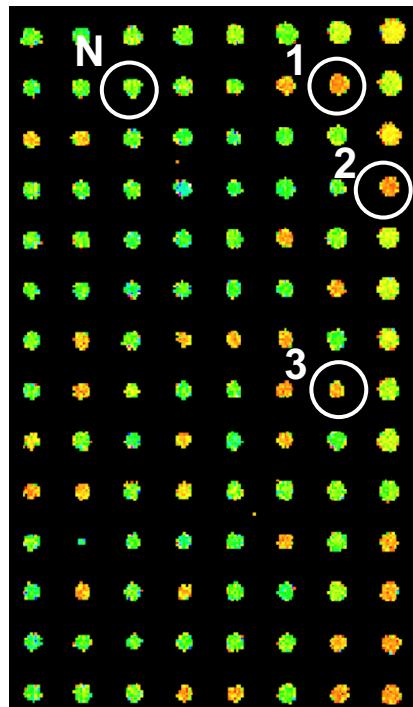
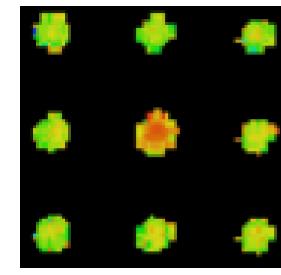
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cdpkk1-1, arn0099

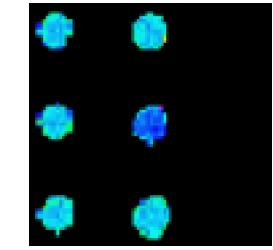
CDPKK1, Cre10.g428650

Calcium-dependent protein kinase kinase, CDPKK1

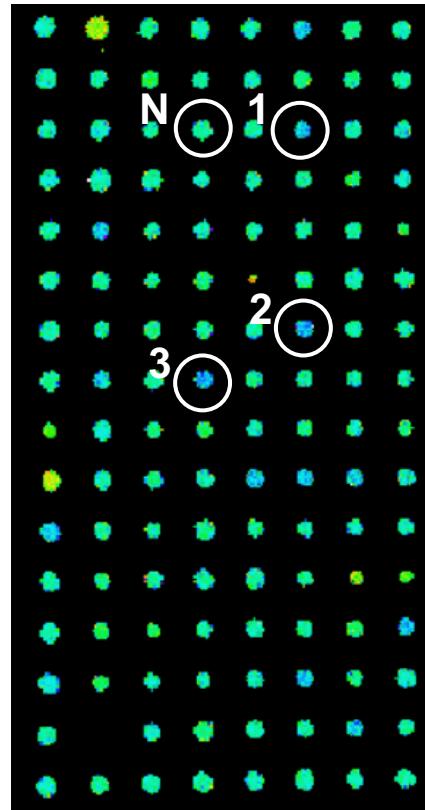


cetl, arn0156

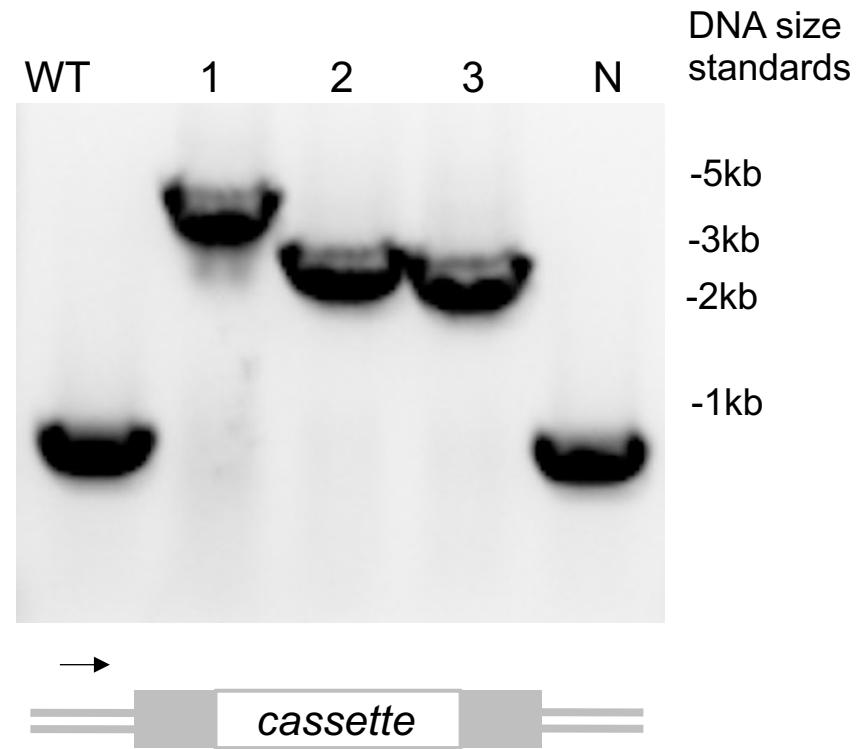
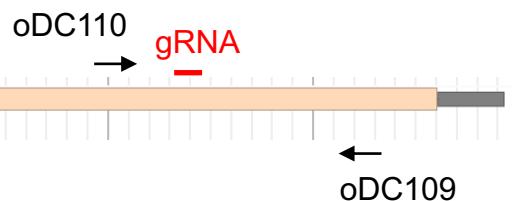
CETL, Cre07.g357500



-N high F_v/F_m



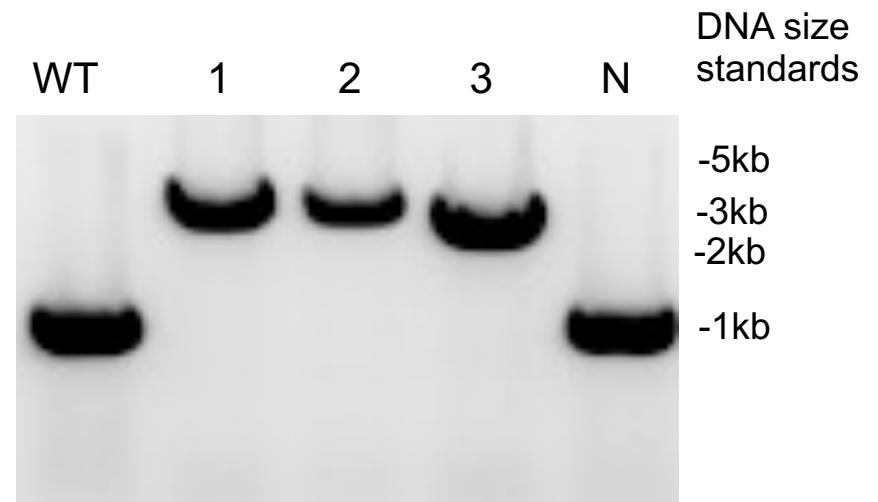
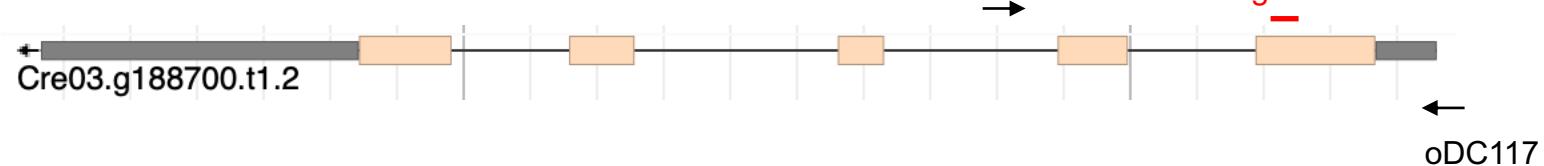
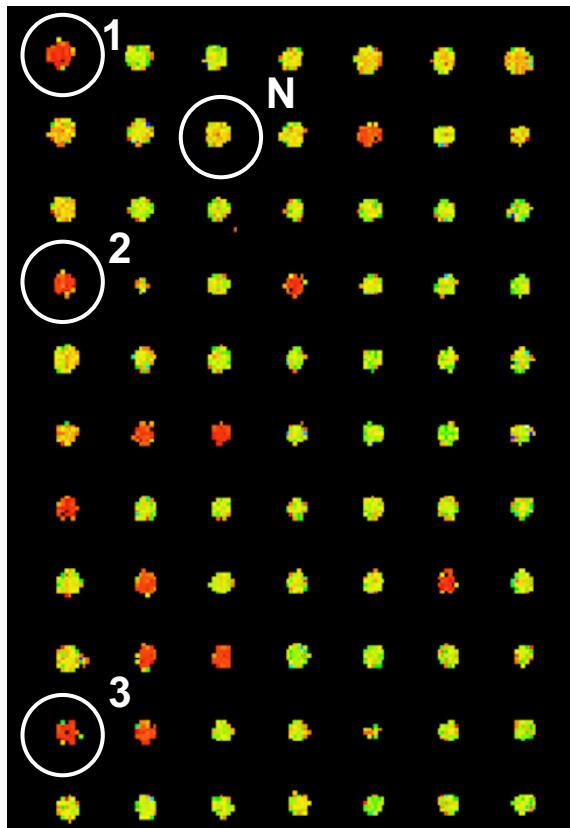
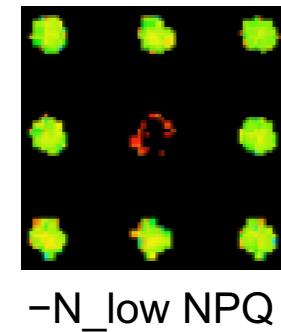
Cre07.g357500.t1.1



plap6, arn0107

PLAP6, Cre03.g188700

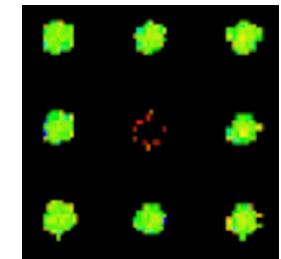
Plastid lipid associated protein, Fibrillin, PLP6, PLAP6



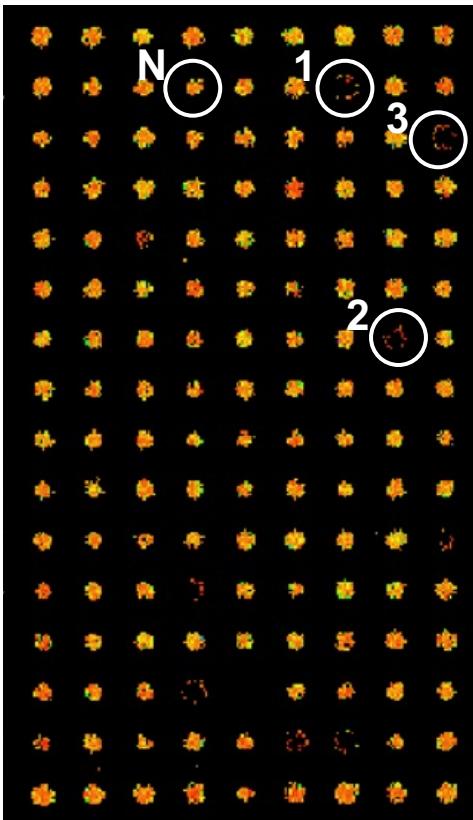
cpl14, arn0566

CPL14, Cre17.g731100

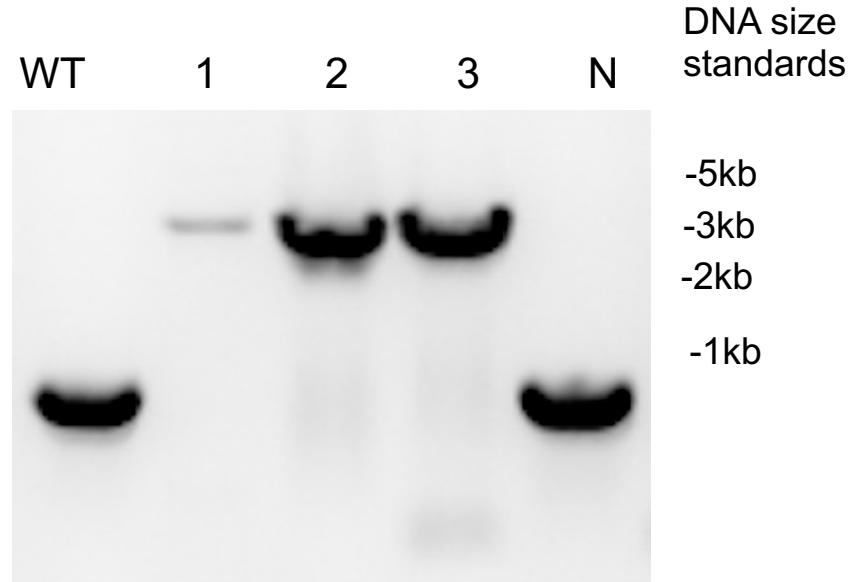
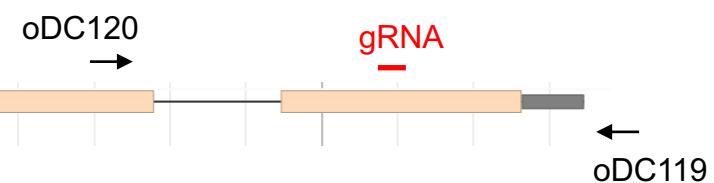
Uncharacterized conserved protein, CPL14



-N_low NPQ



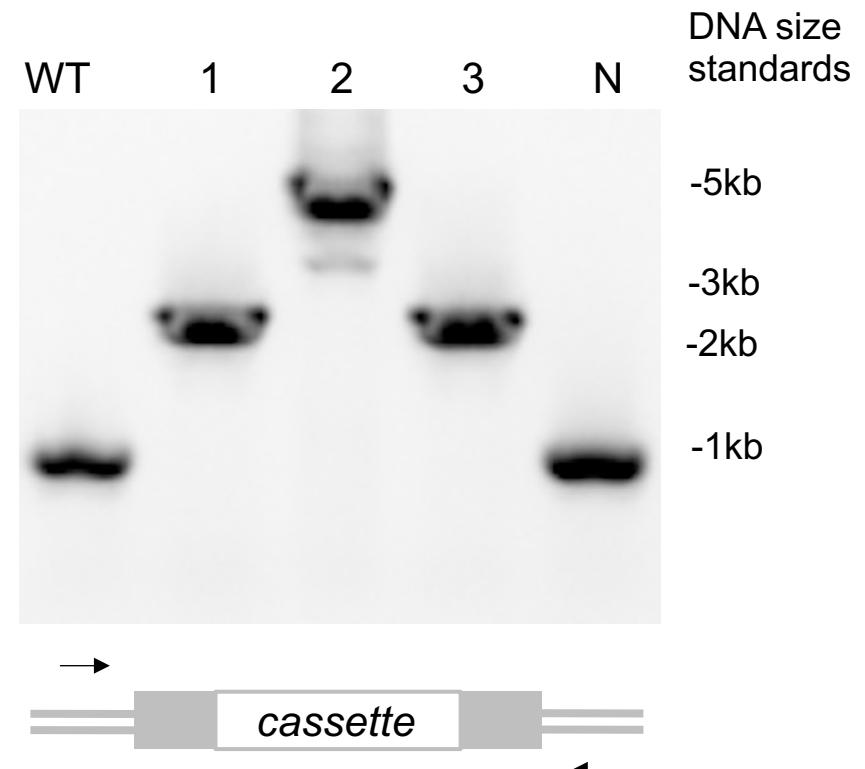
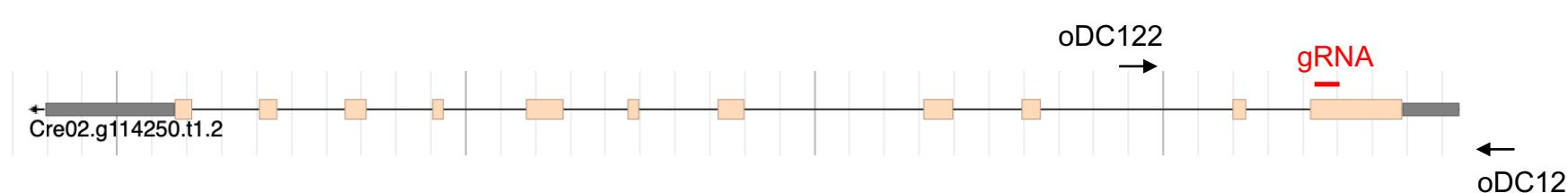
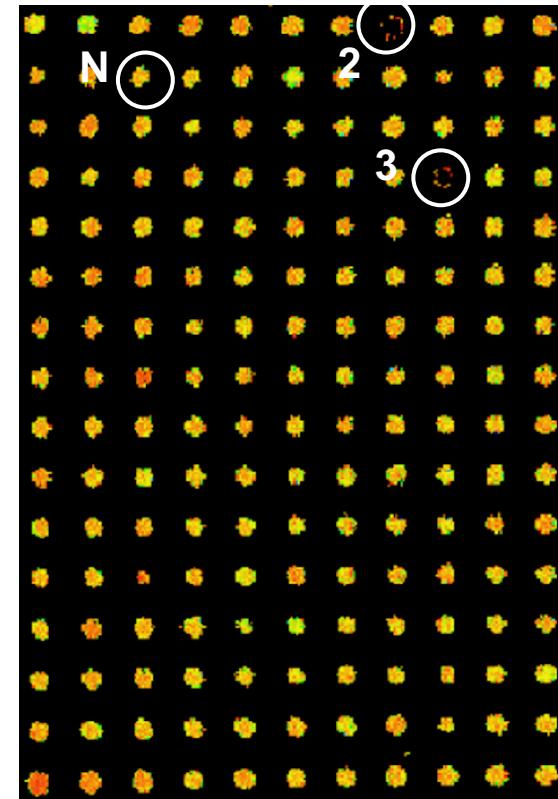
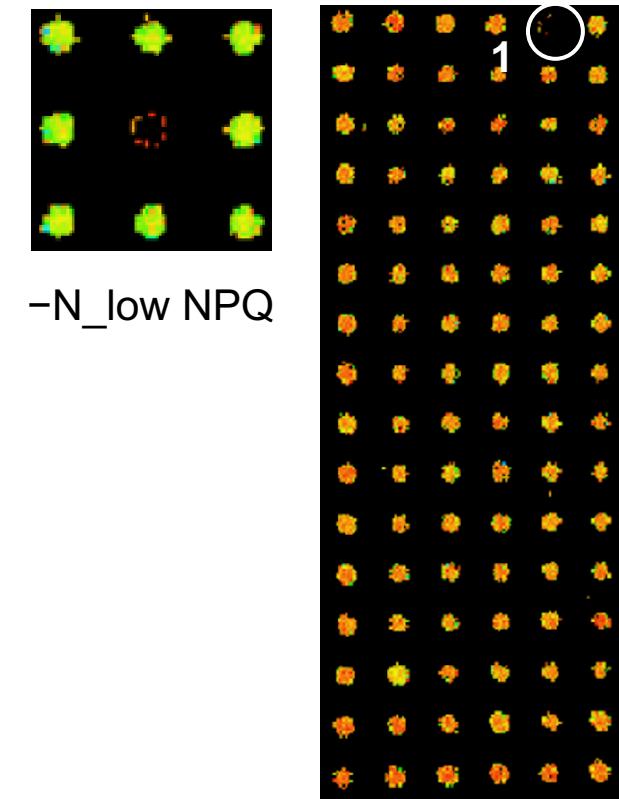
Cre17.g731100.t1.2



men2, arn0129

MEN2, Cre02.g114250

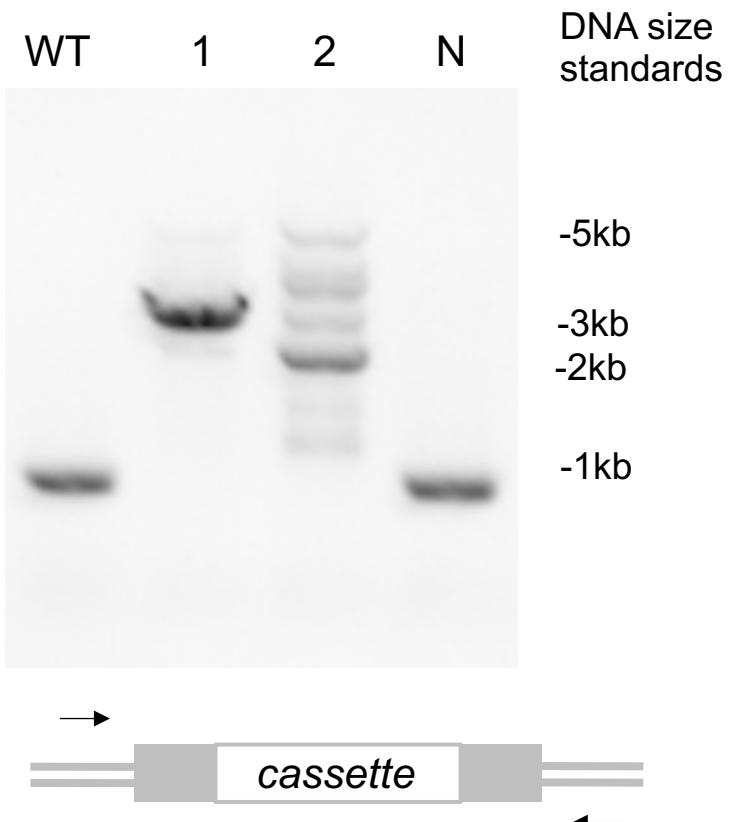
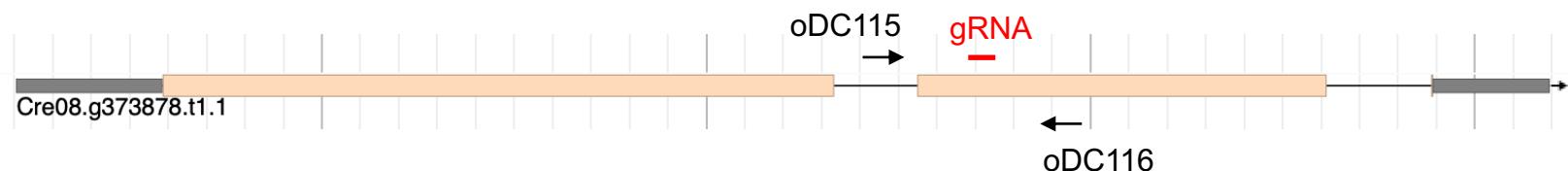
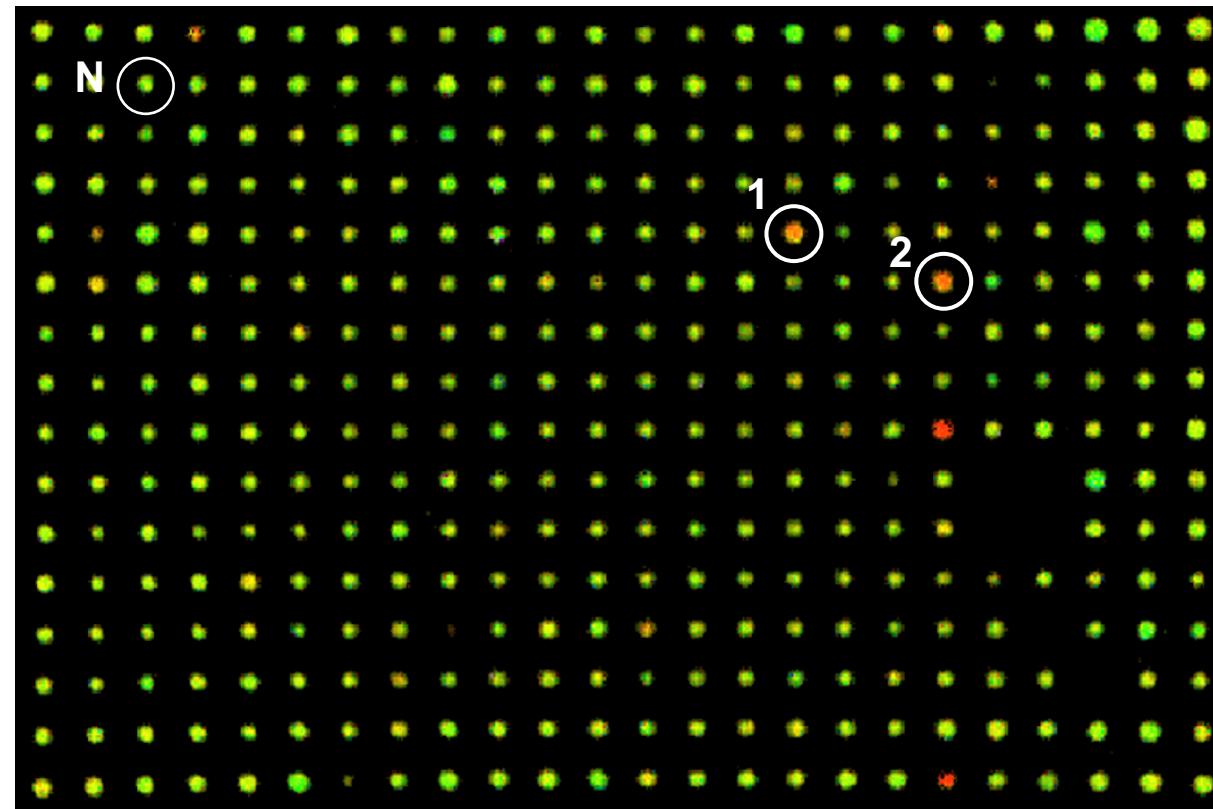
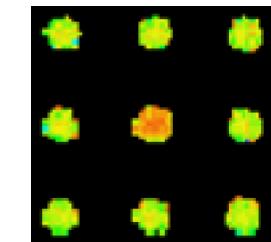
Naphthoate synthase



raa13, arn0148

RAA13, Cre08.g373878

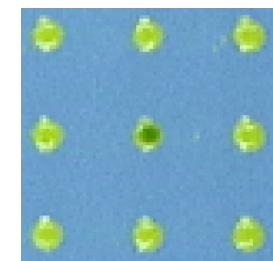
Non-specific serine/threonine protein kinase / Threonine-specific protein kinase



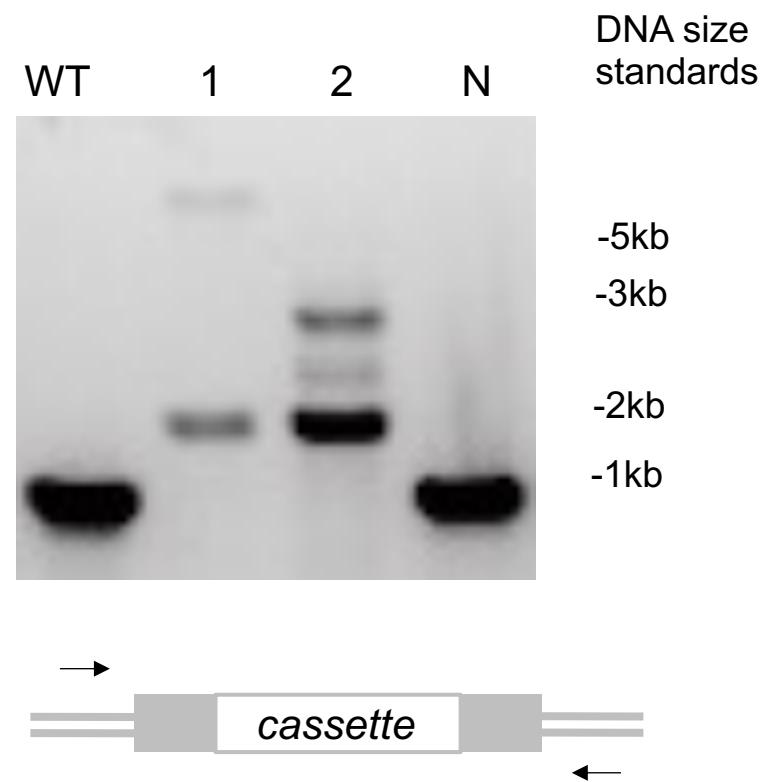
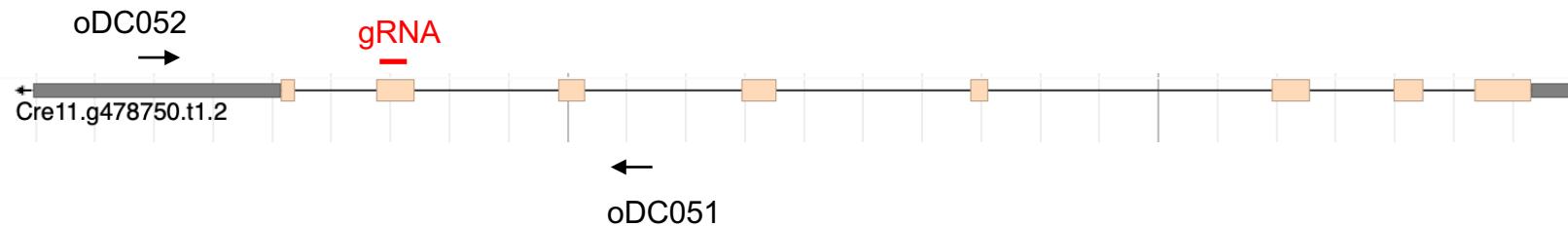
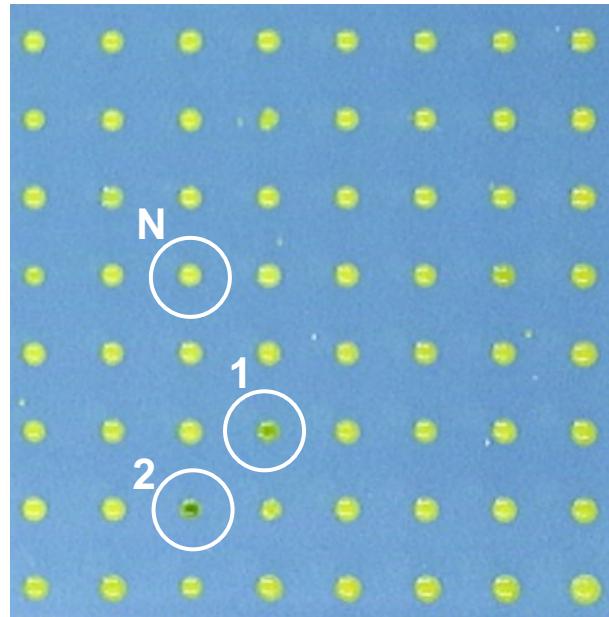
fkb15-2, arn0599

FKB15-2, Cre11.g478750

Peptidyl-prolyl cis-trans isomerase, FKBP-type, FKB2, FKB15-2



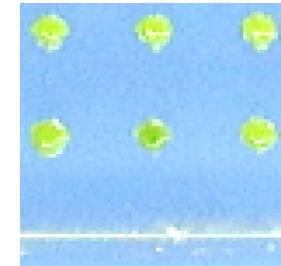
-N delayed chlorosis



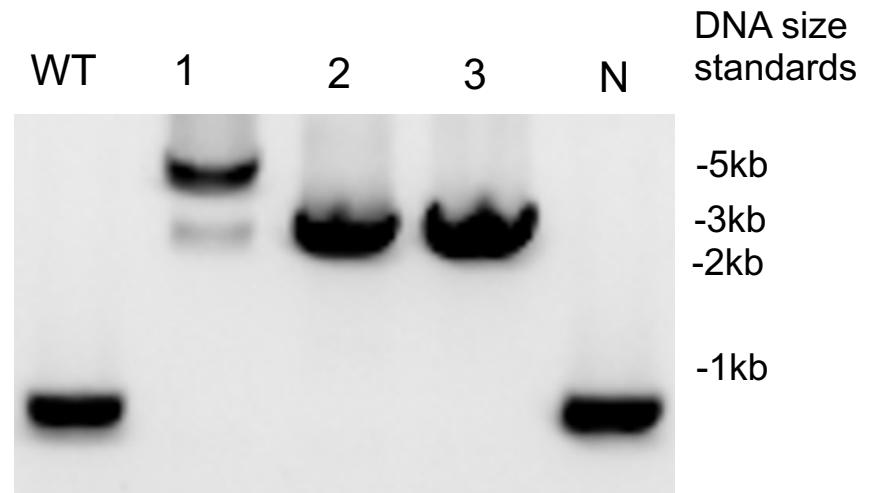
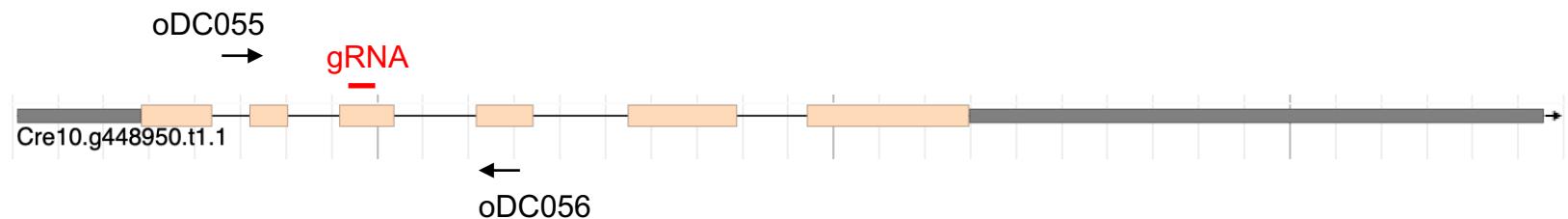
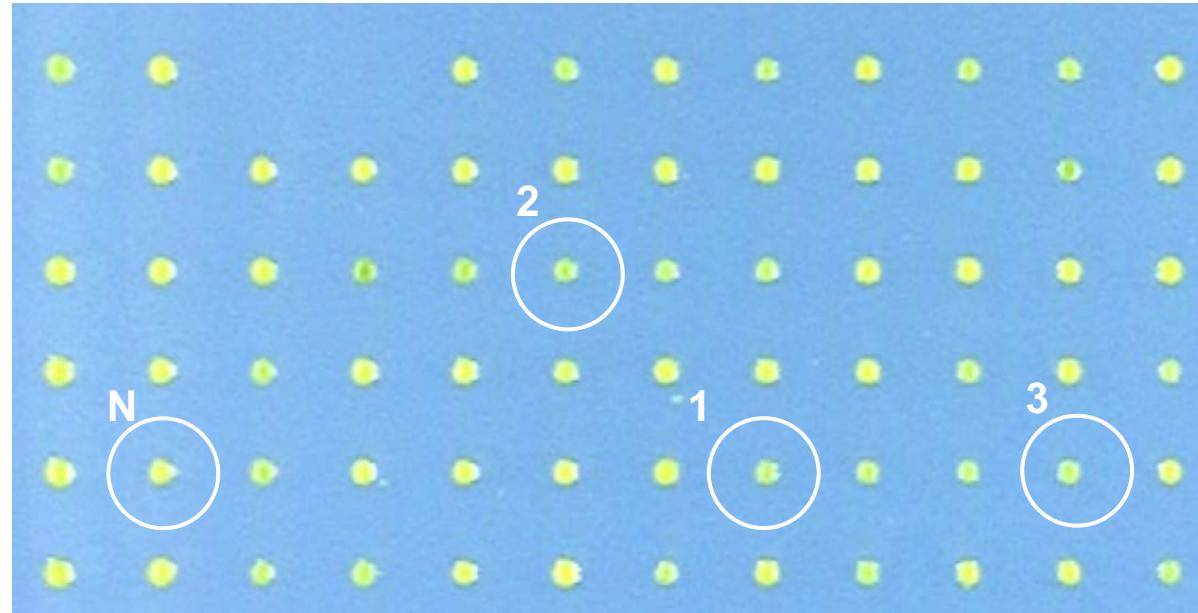
pmr1, arn0638

PMR1, Cre10.g448950

Nocturnin (CCRN4L)



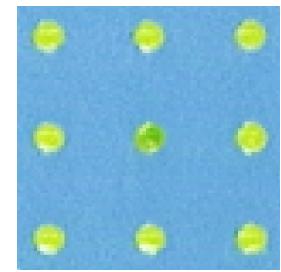
-N delayed chlorosis



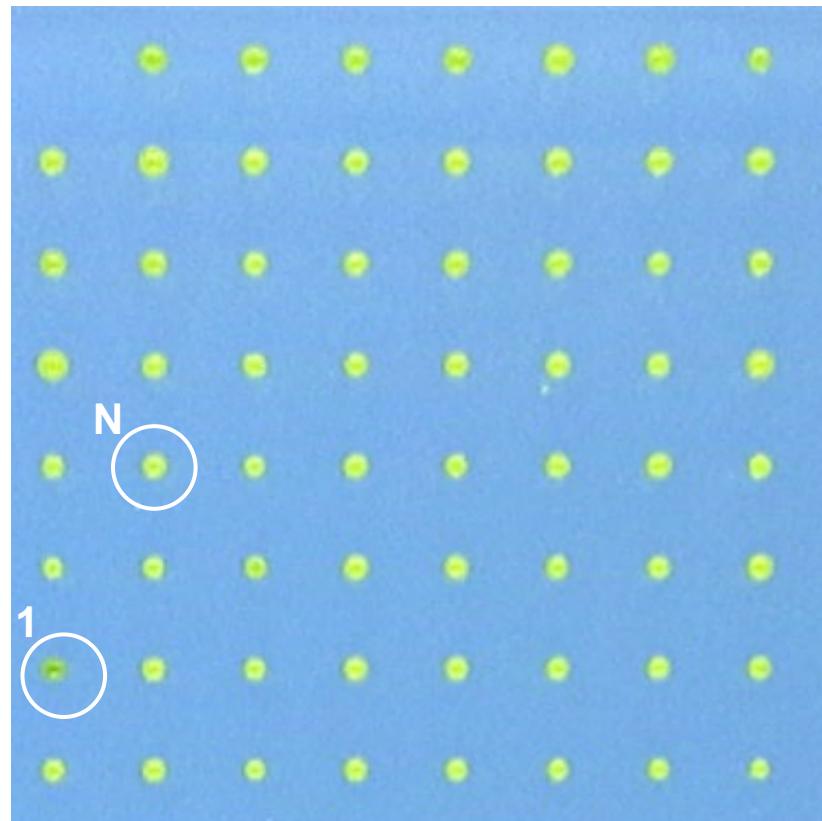
lpa2, arn0020

LPA2, Cre02.g105650

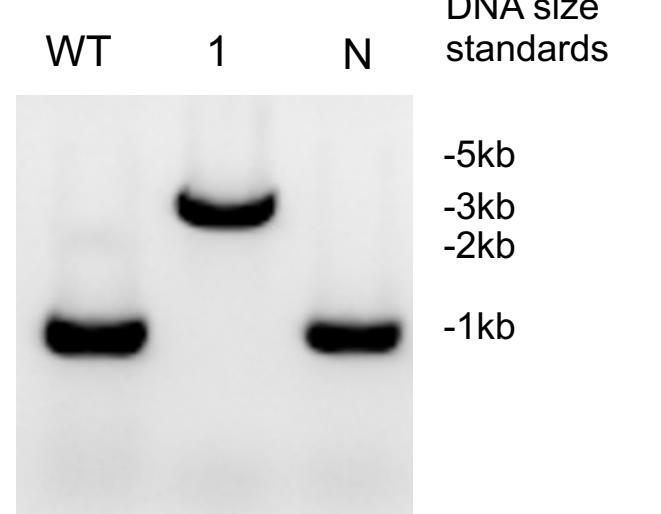
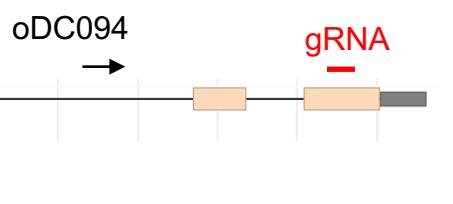
Low PSII accumulation 2



-N delayed chlorosis



Cre02.g105650.t1.2



DNA size standards

-5kb
-3kb
-2kb
-1kb

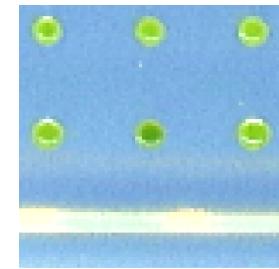
oDC093

26

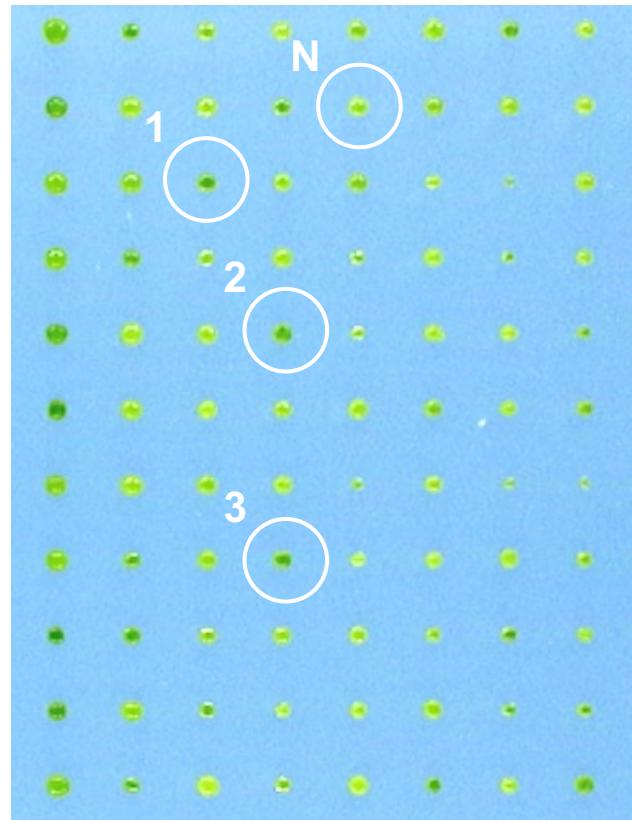
tra1, arn0644

TRA1, Cre12.g527850

Translin-like protein, TRA1



-N, dark
delayed
chlorosis

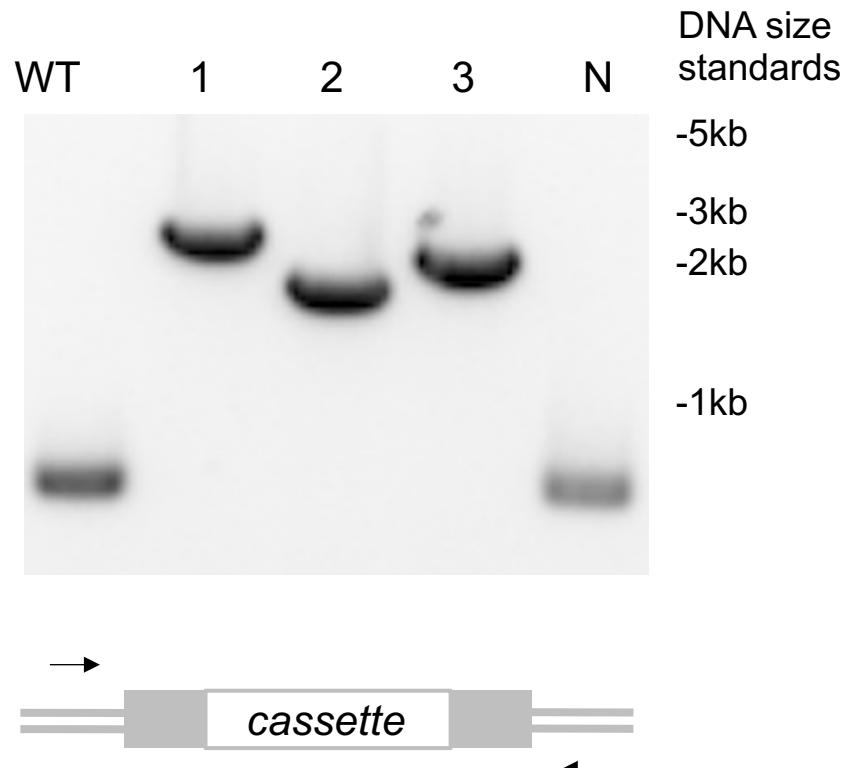


oDC088
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gRNA
—

Cre12.g527850.t1.1

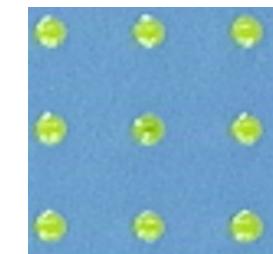
oDC089
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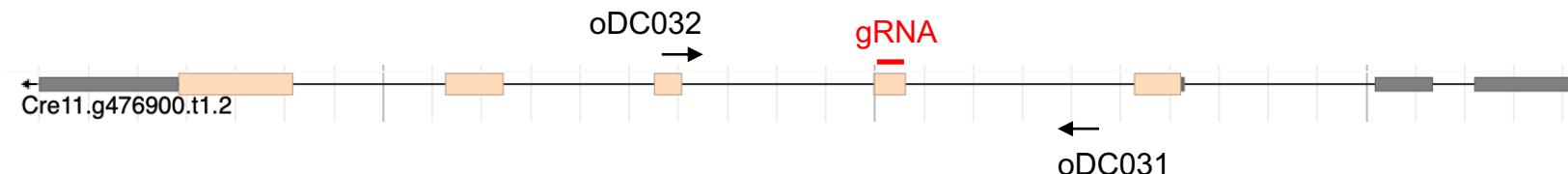
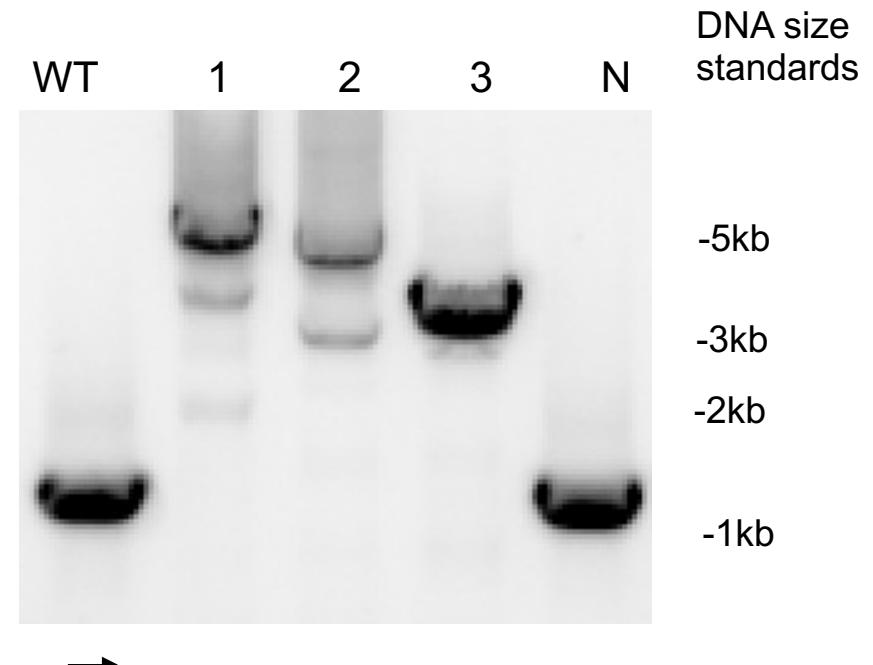
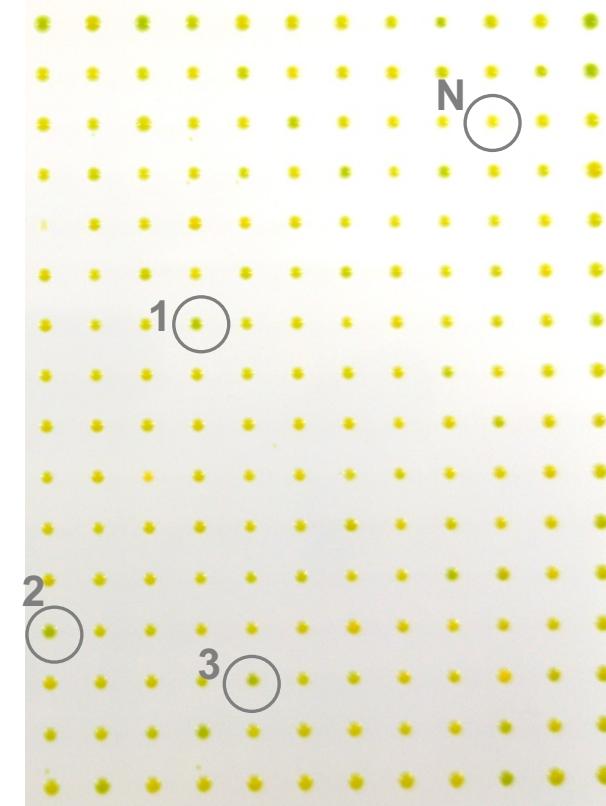
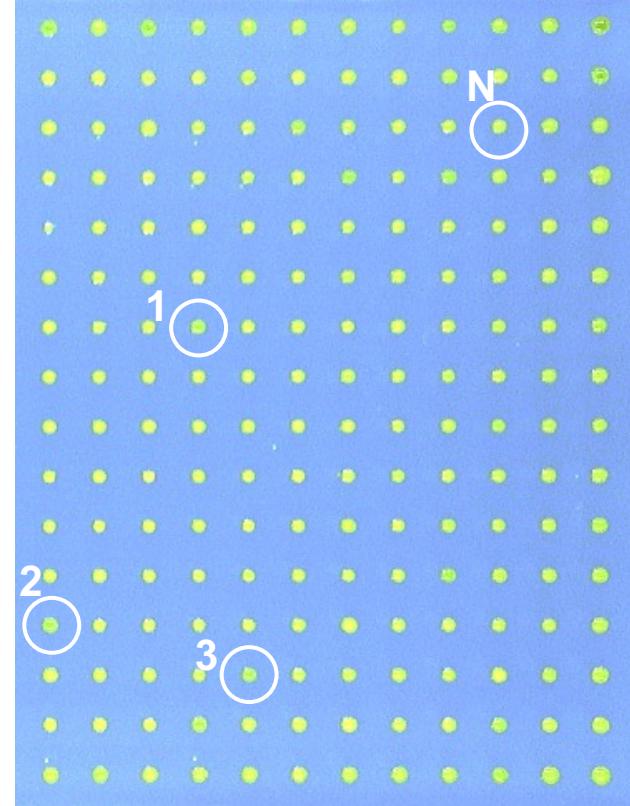
med20, arn0106

MED20, Cre11.g476900

mediator of RNA polymerase ii transcription subunit 20



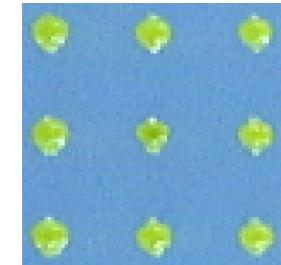
-N delayed
chlorosis



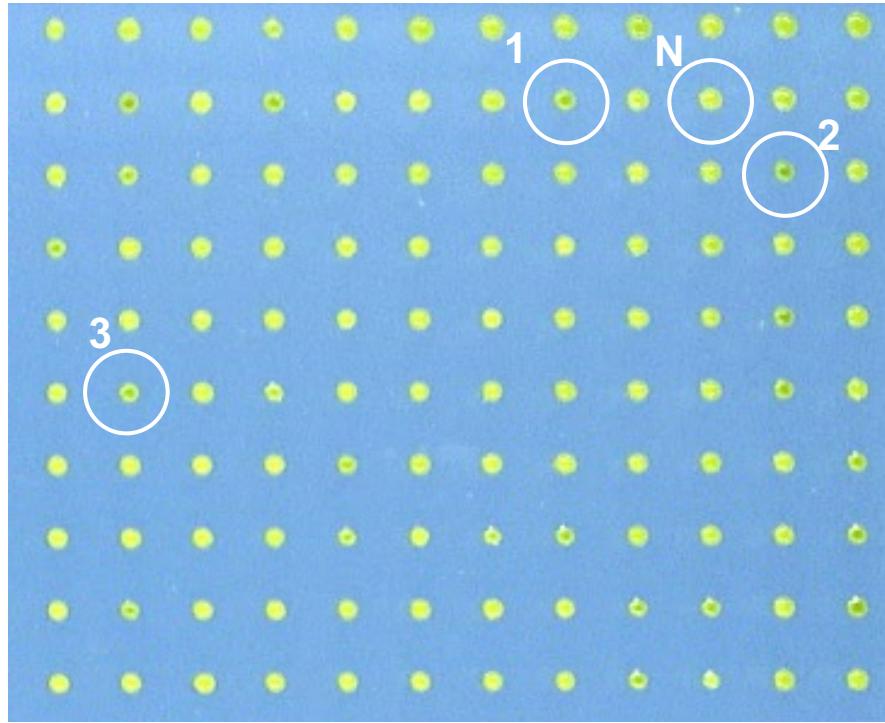
med25, arn0685

MED25, Cre17.g736950

Mediator complex subunit 25 VON willebrand factor type A (*Med25_VWA*)



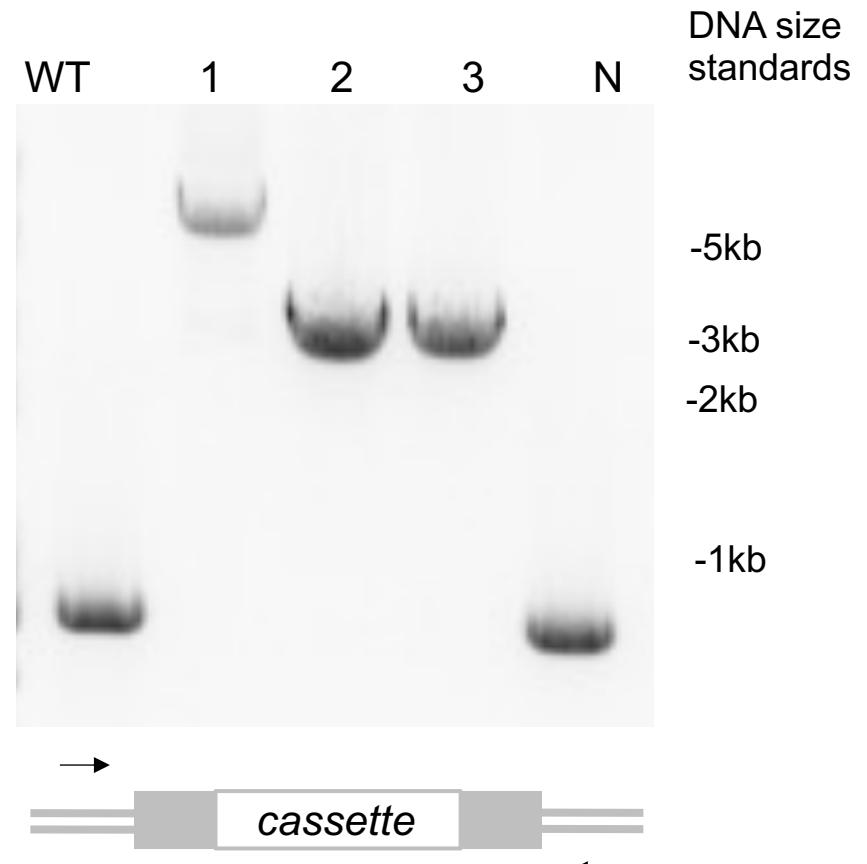
-N delayed
chlorosis



oDC062 → gRNA

Cre17.g736950.t1.1 ←

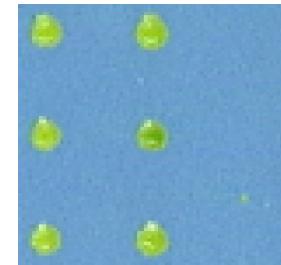
oDC063
Cre17.g736950.t2.1



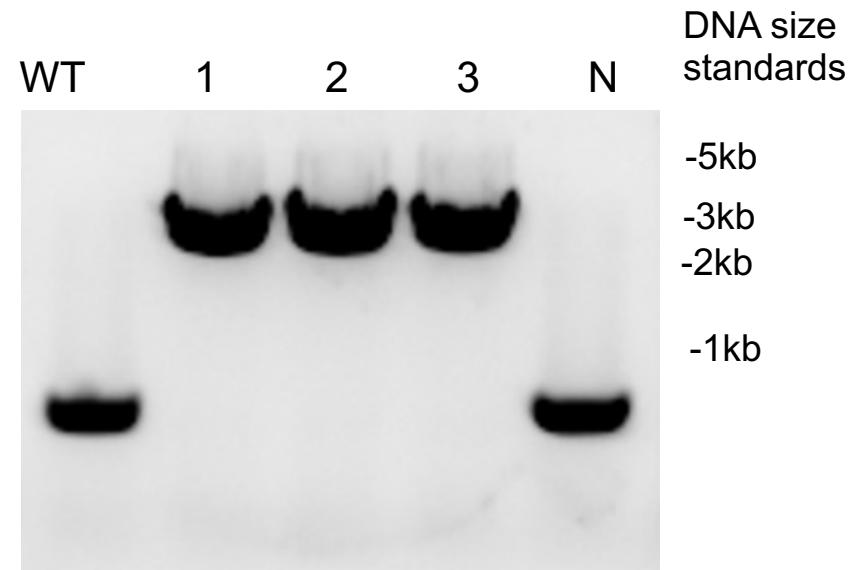
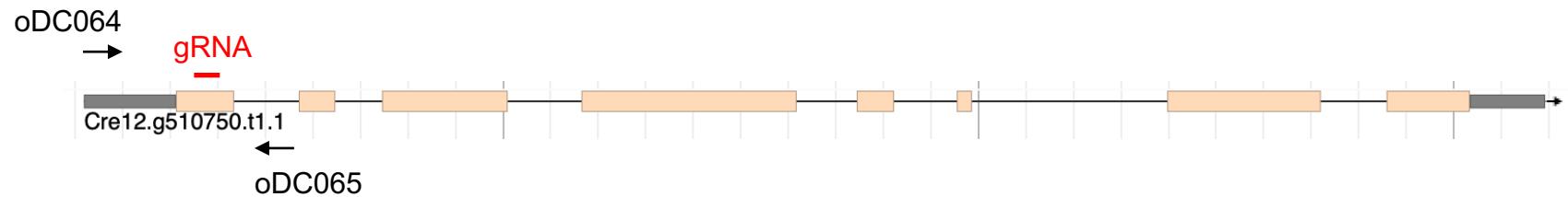
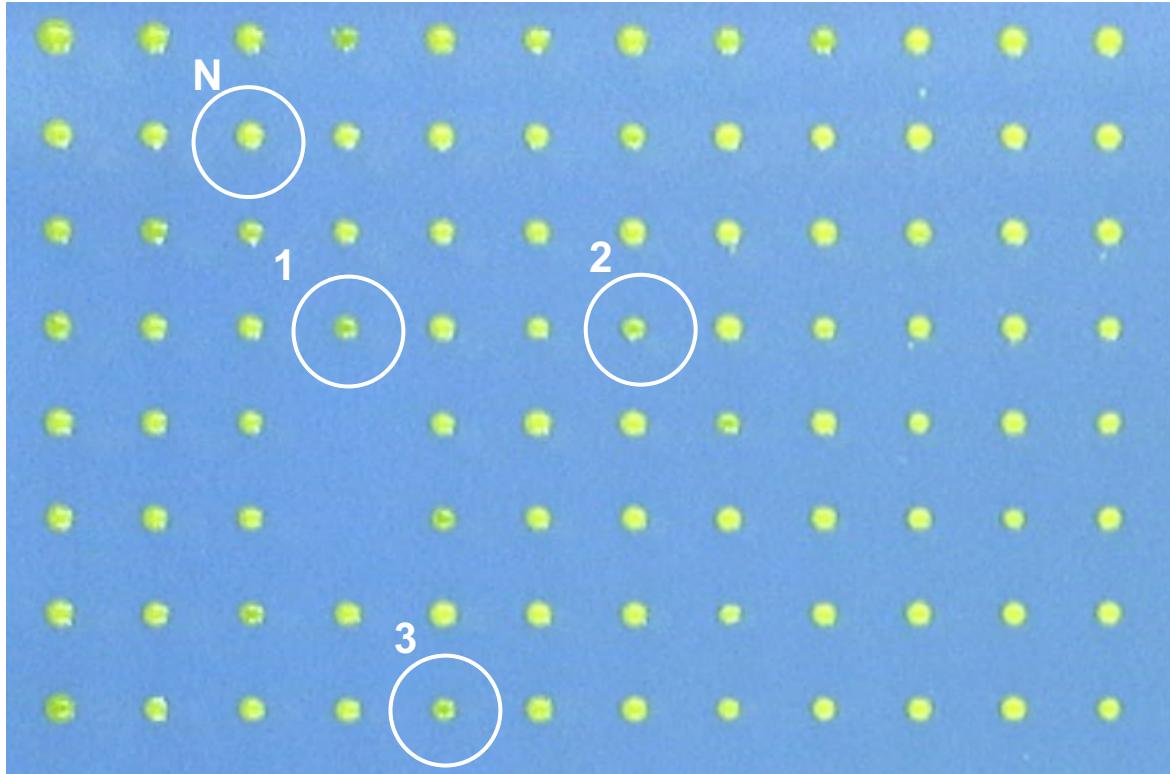
med27, arn0814

MED27, Cre12.g510750

MED27 homology. ts lethal mutations isolated



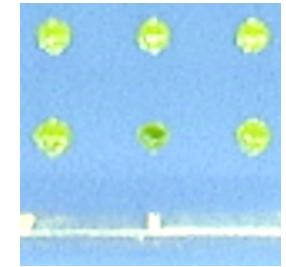
-N delayed chlorosis



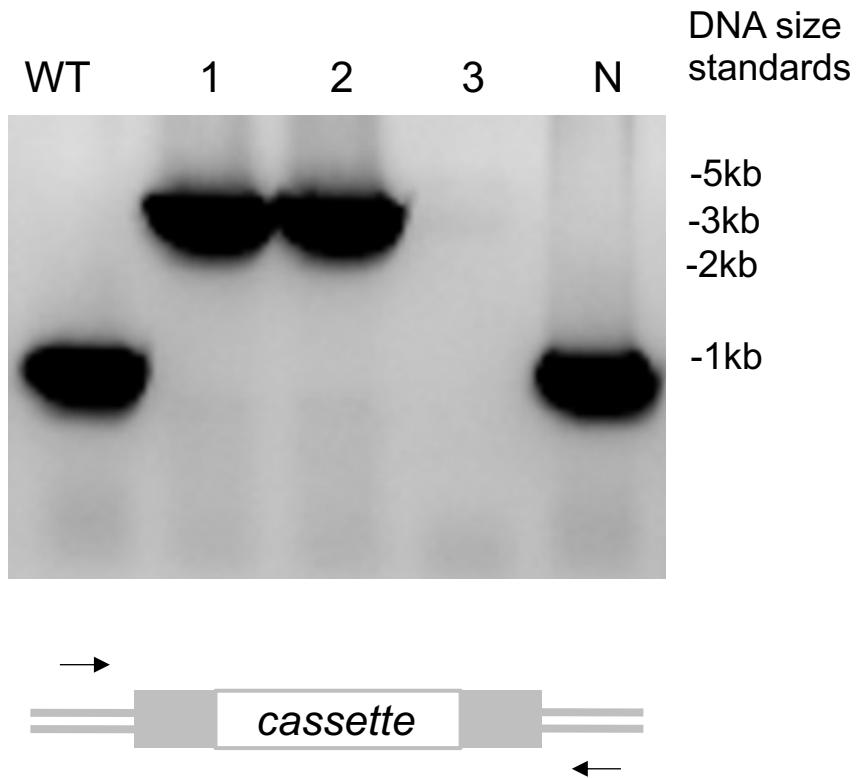
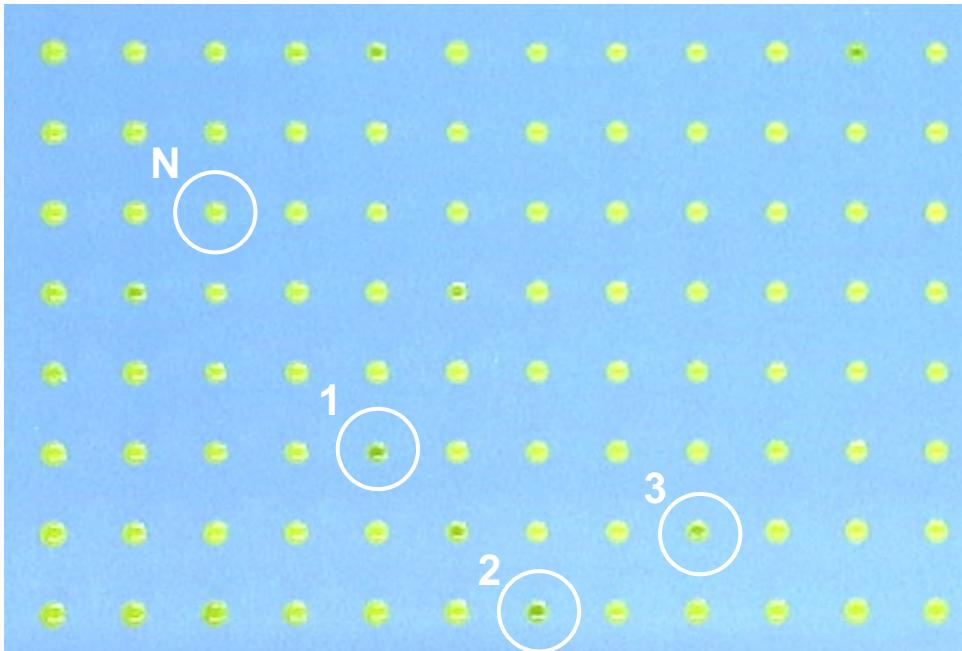
xpot, arn0641

XPOT, Cre12.g496200

Exportin-T (XPOT)



-N delayed
chlorosis



oDC041
→

gRNA

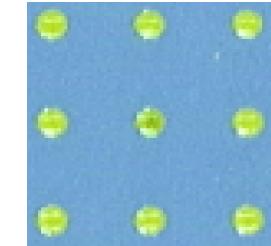
Cre12.g496200.t1.2

← oDC042

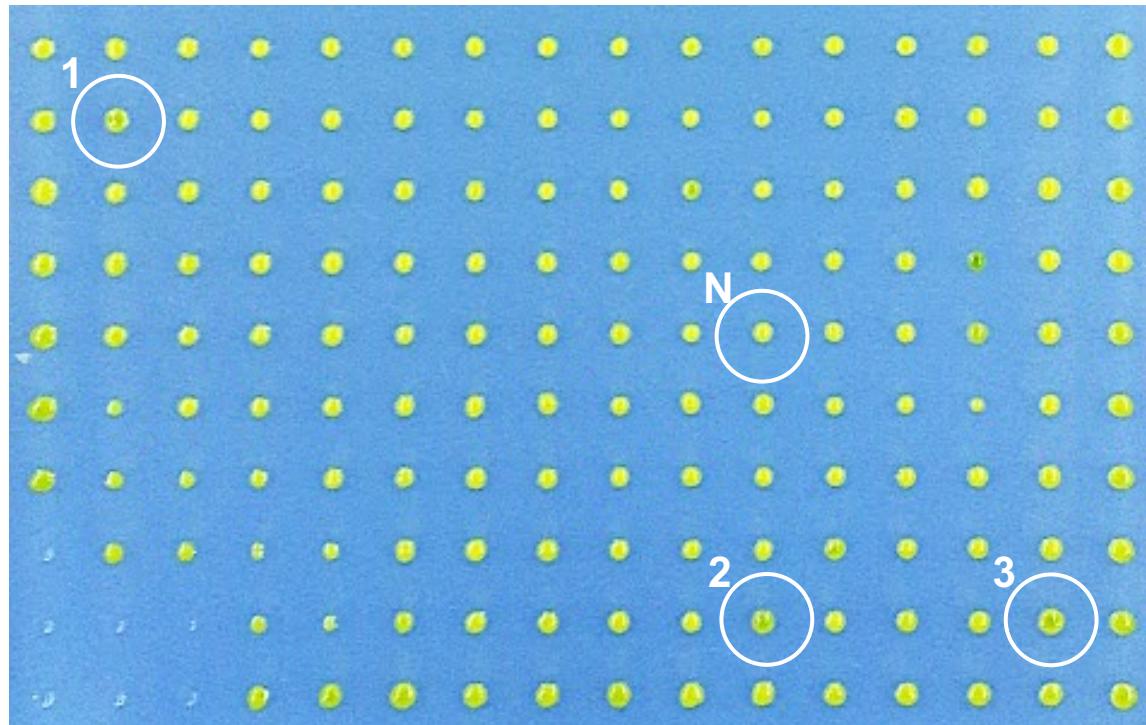
trxh2, arn0031

TRXH2, Cre09.g391900

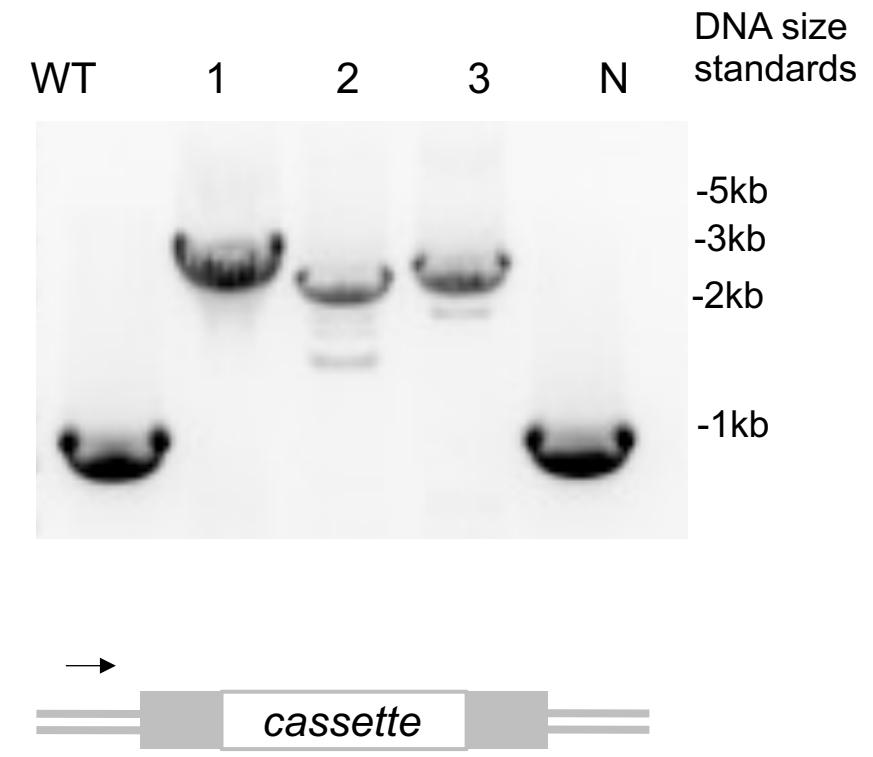
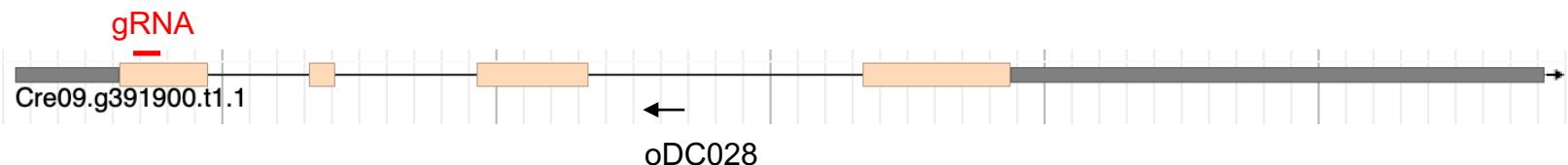
Thioredoxin h1, cytosolic



-N delayed chlorosis



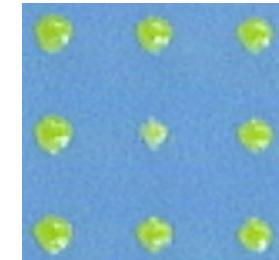
oDC027
→



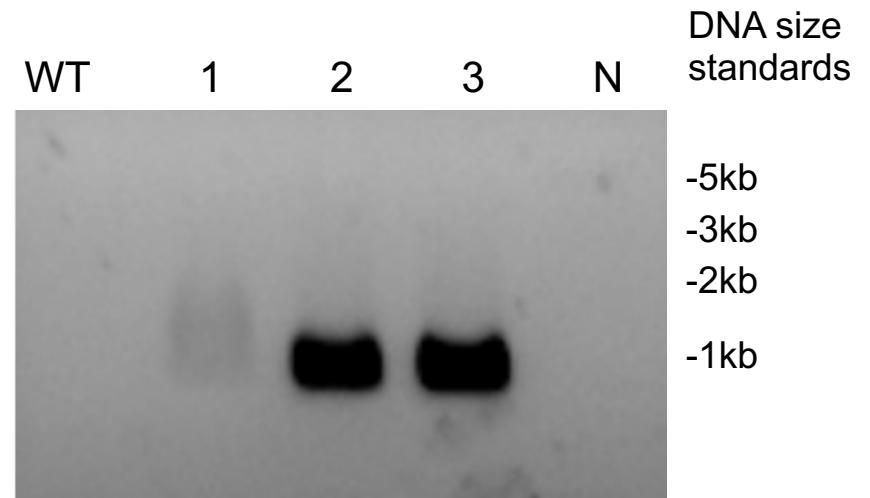
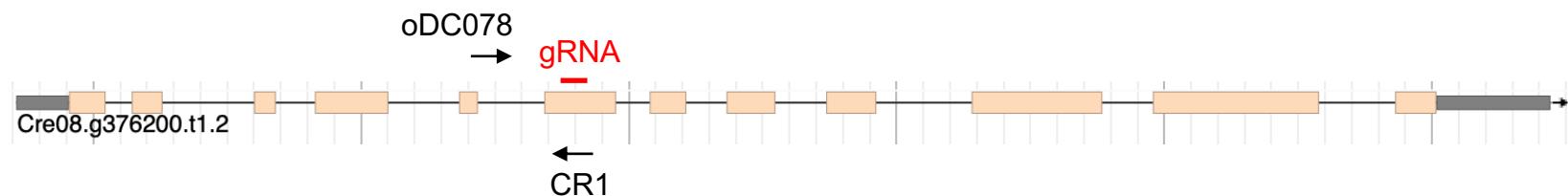
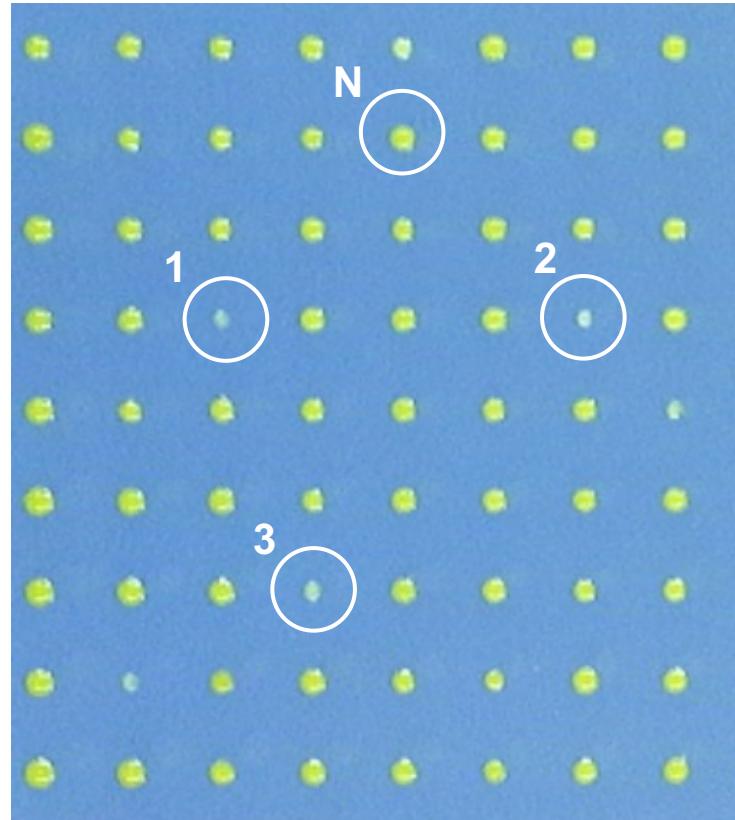
not10-1, arn0661

NOT10, Cre08.g376200

CCR4-NOT transcription complex subunit 10



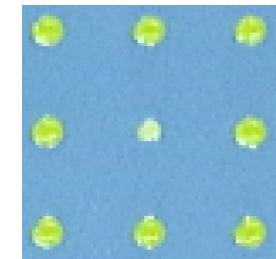
-N fast
chlorosis



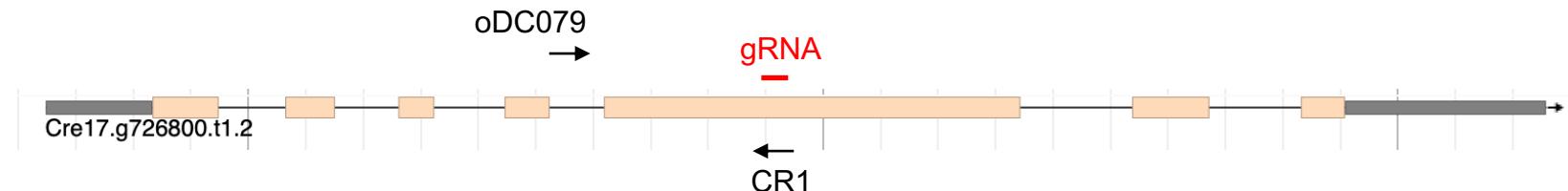
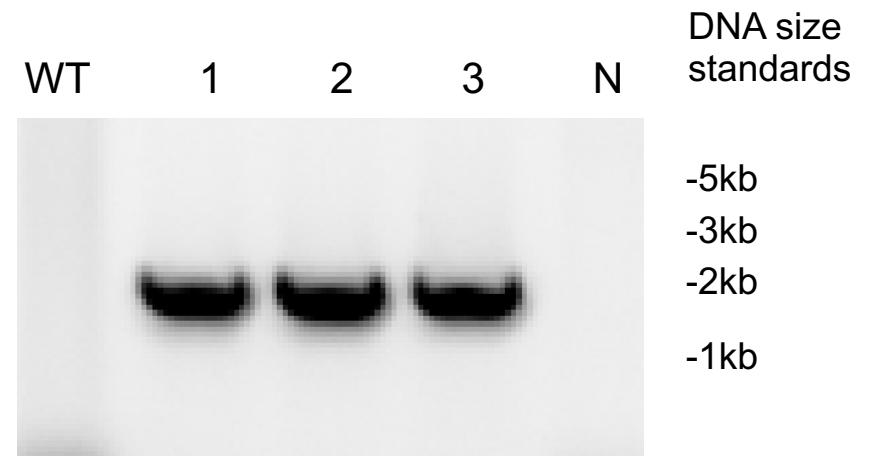
not11-1, arn0415

NOT11, Cre17.g726800

Uncharacterized conserved protein (DUF2363)

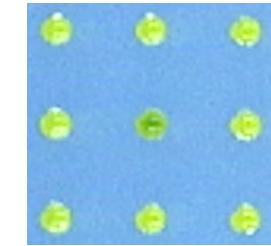


-N fast
chlorosis

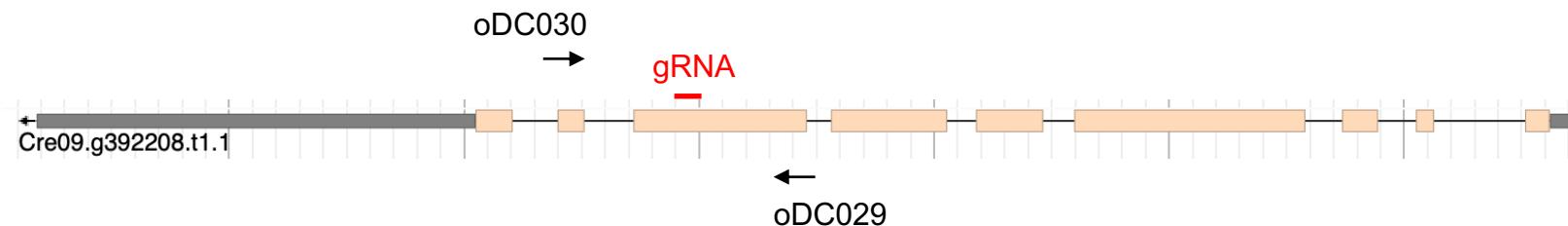
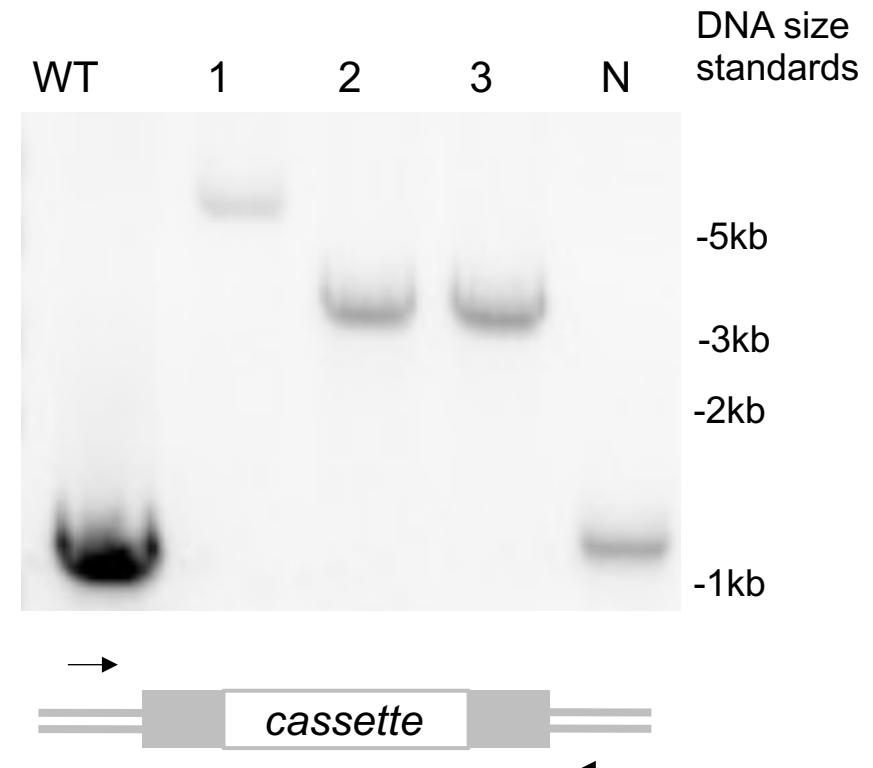
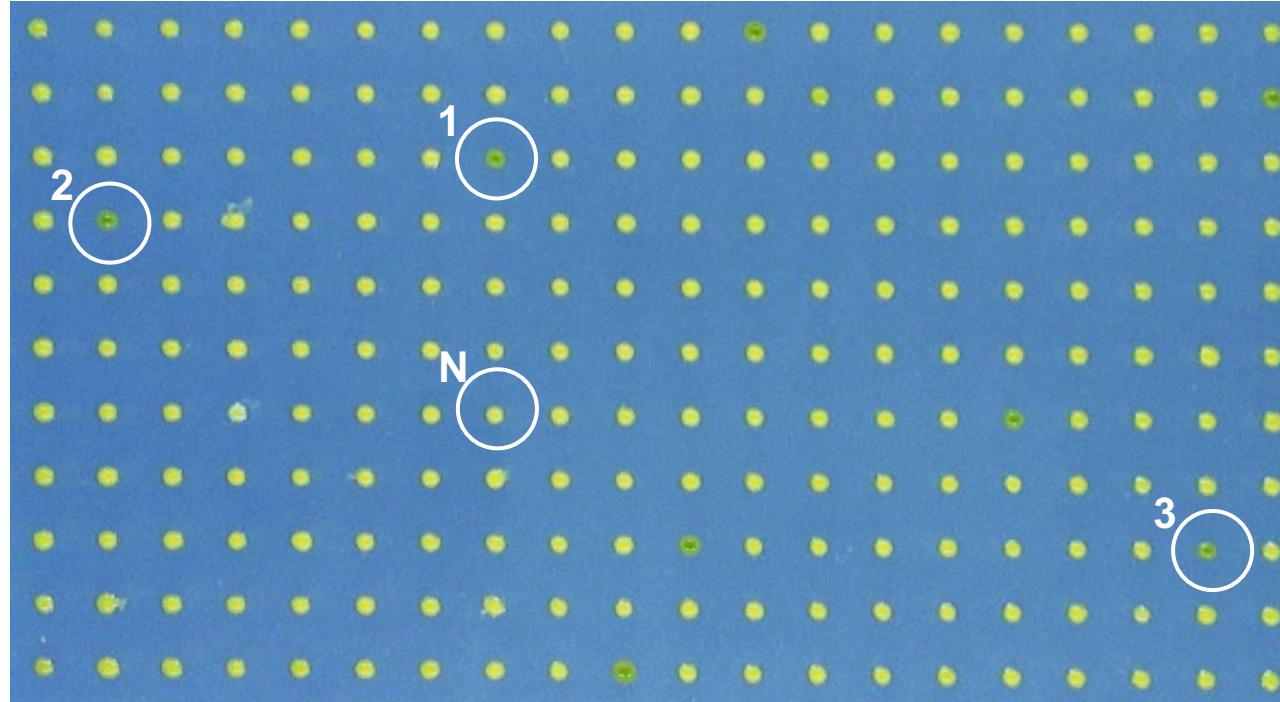


prn1-1, arn0110

PRN1, Cre09.g392208



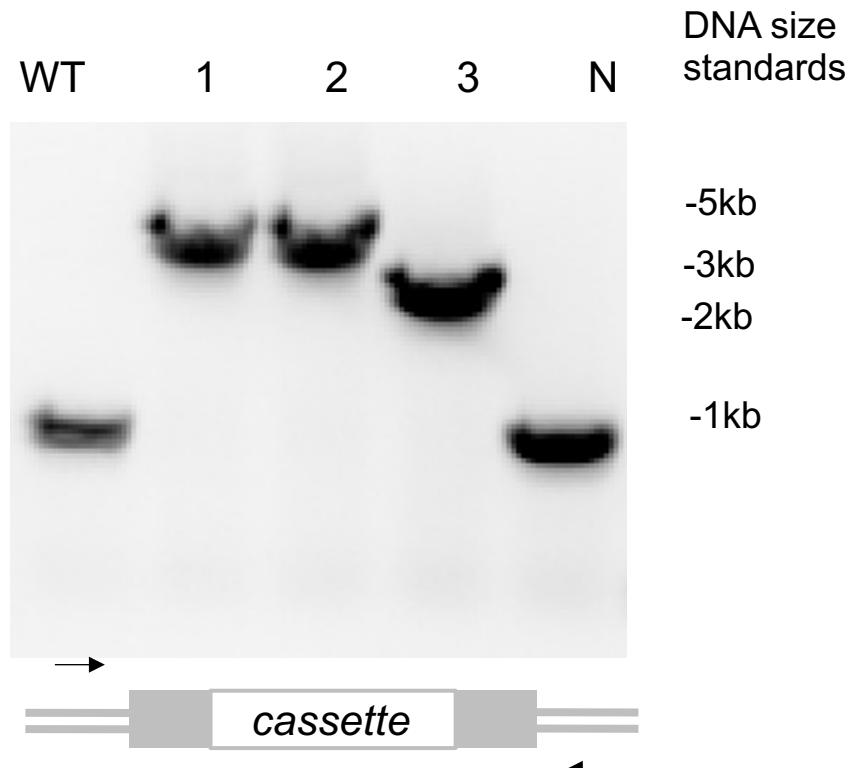
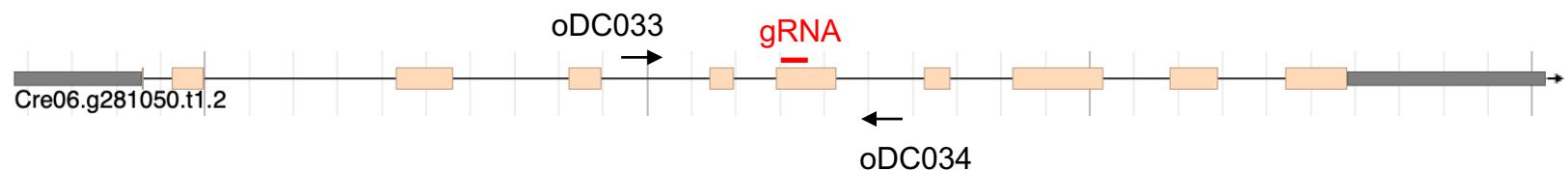
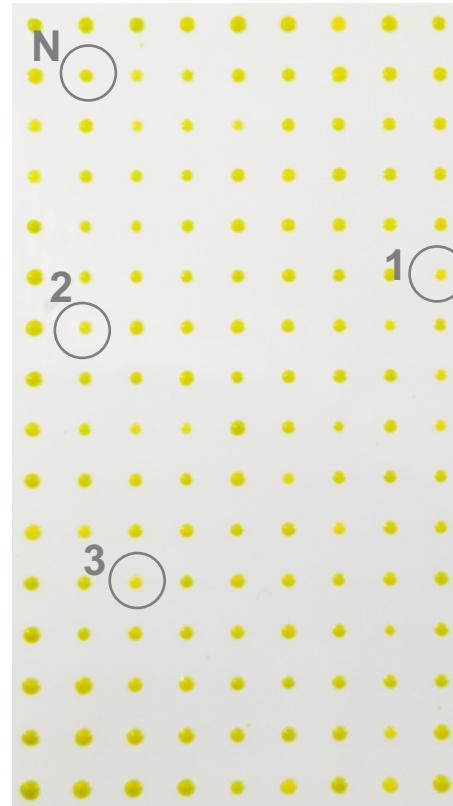
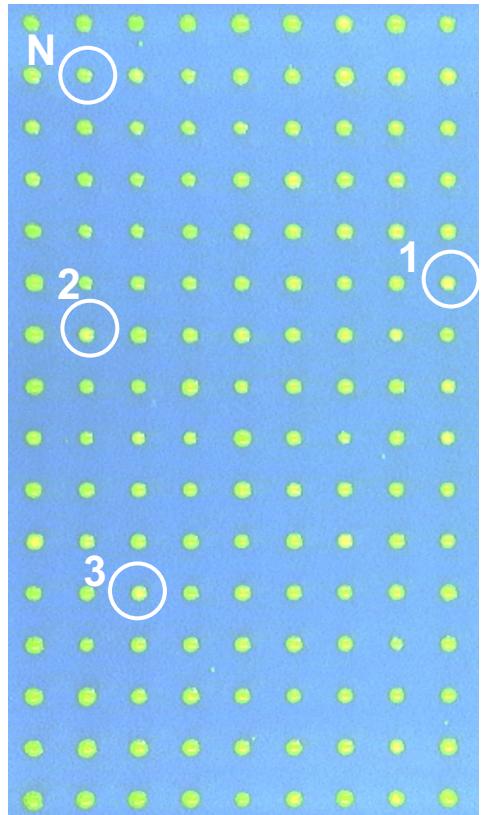
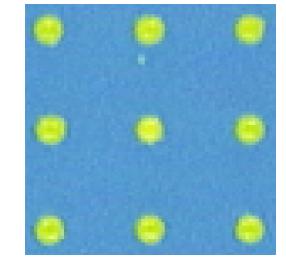
-N delayed
chlorosis



vps5a, arn0893

VPS5A, Cre06.g281050

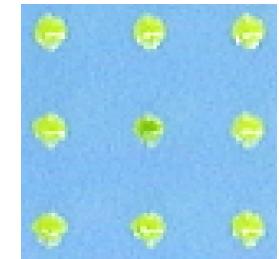
Subunit of Retromer complex VPS5A



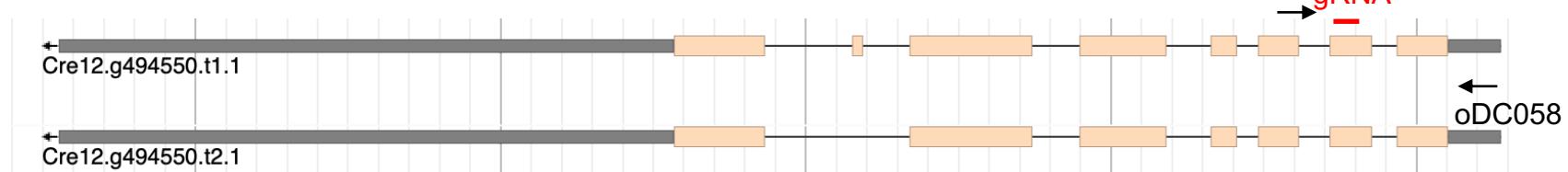
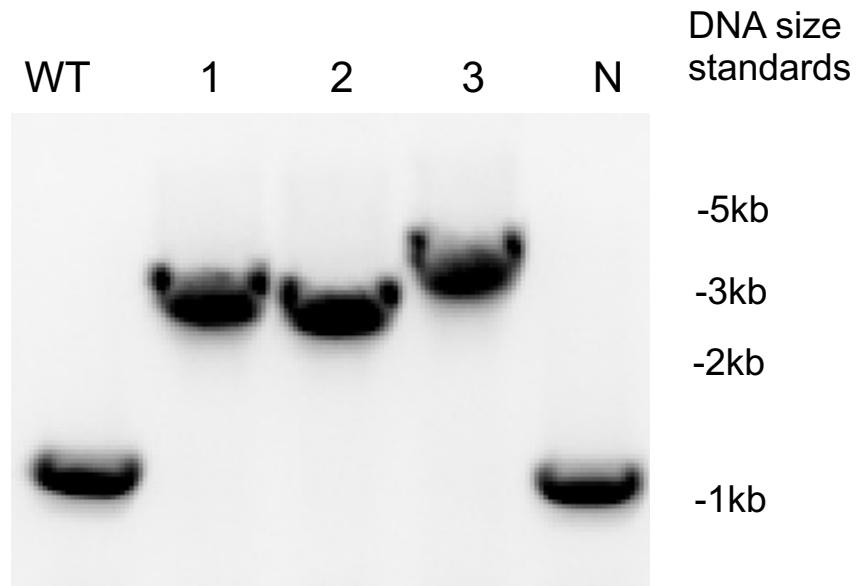
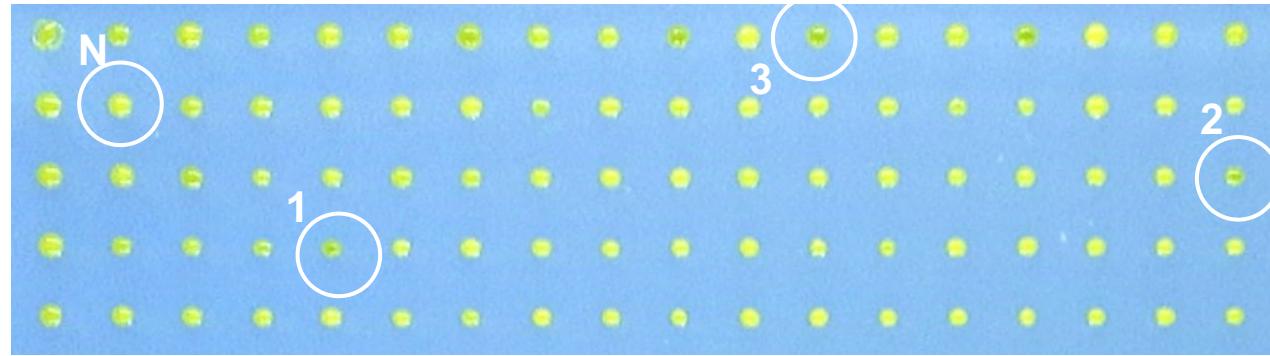
rnp10, arn0626

RNP10, Cre12.g494550

RNA binding protein, RNP10



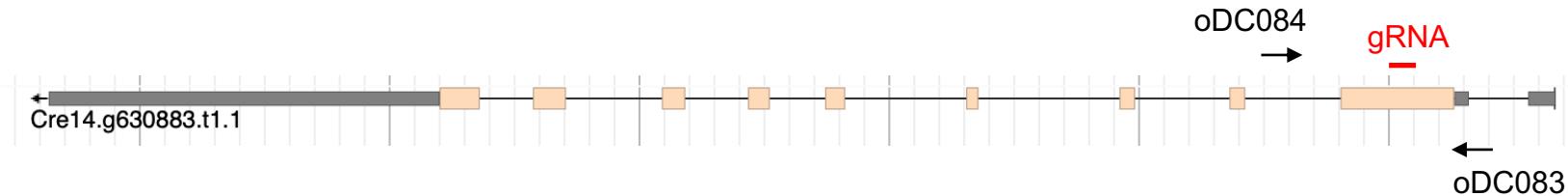
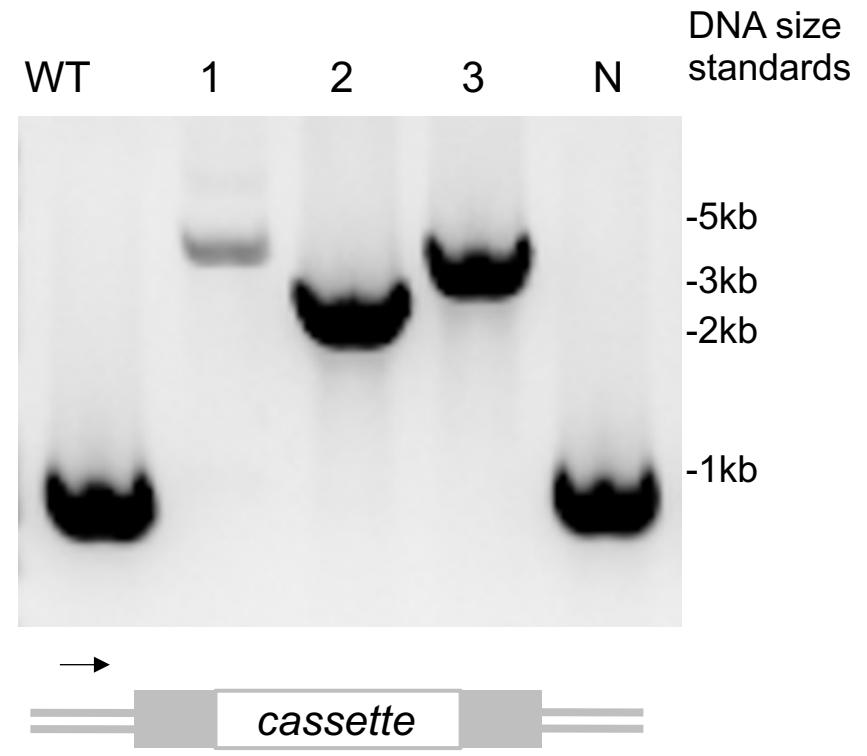
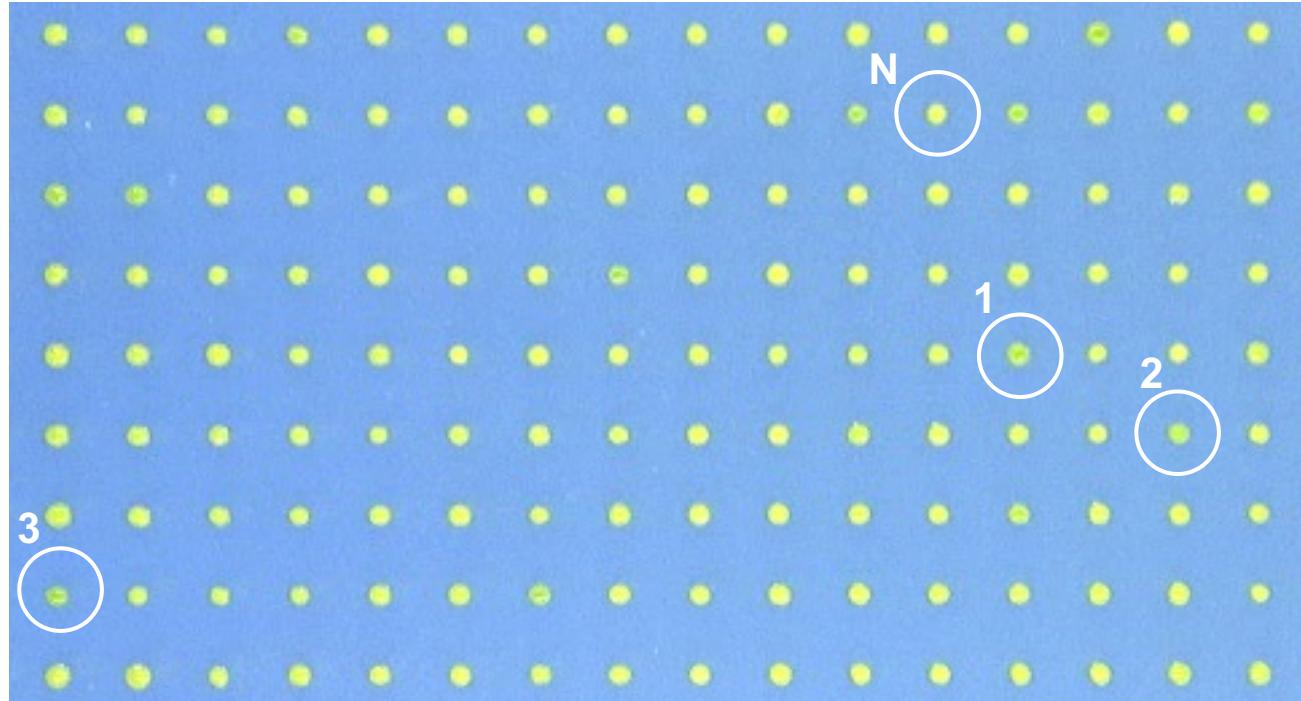
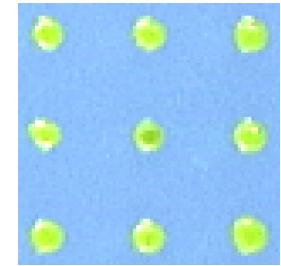
-N delayed chlorosis



desa1, arn0969

DESA1, Cre14.g630883

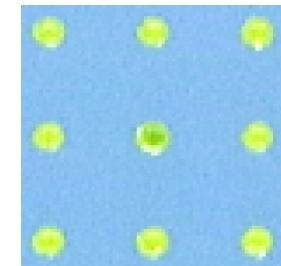
Acyl- (*DESA1*) interacts with acyl-carrier protein 2



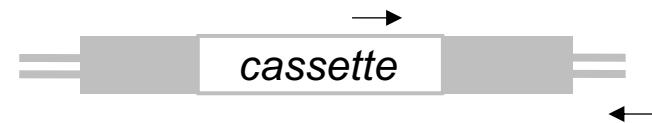
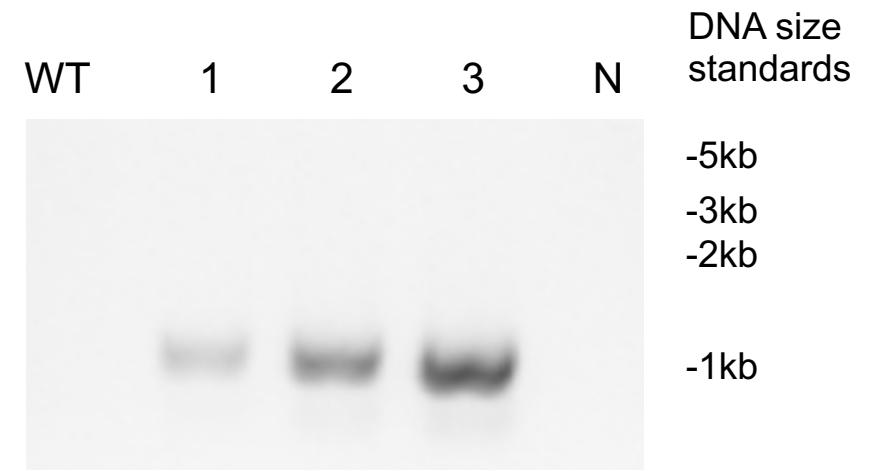
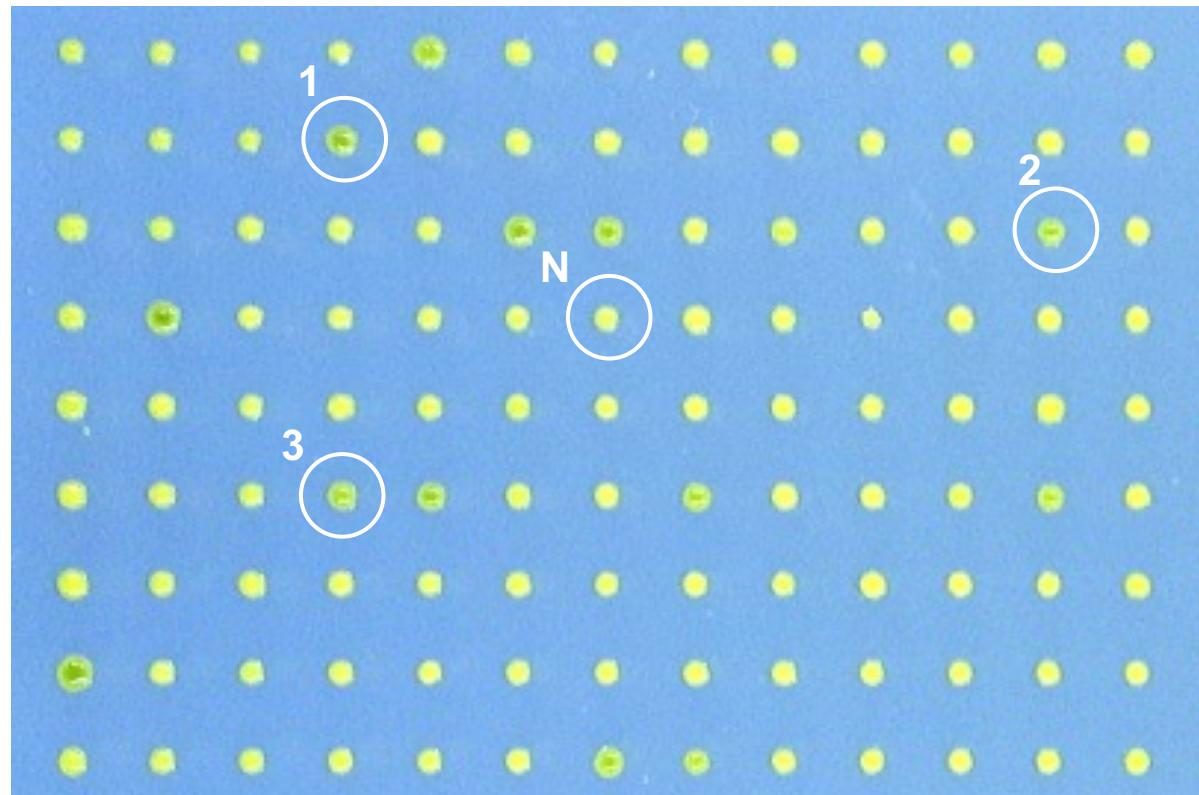
prmt5, arn0474

PRMT5, Cre03.g176550

Protein-/Histone-arginine N-methyltransferase, PRMT5

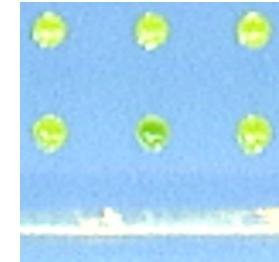


-N delayed
chlorosis



sdn1, arn0642

SDN1, Cre11.g478528



-N delayed
chlorosis

