

1 J. I. a, a'R. a. La a. Mai&Dia'S, ,SaKLaa. H. R.,SJTU-U, , Aia A , u) u a Ha, S / L.S., a B. / , Sa a Ja T. U., , Sa a, C. a С 2 S 1 B

- C, Da Pia & E 3 D a a¦ S , . . , U , . . , C a , 1871, F , . .
- ¦.A.,u¦ul,FaW,,U,.,.A¦a,WaCaul,Ua,SulAula¦a 4 S
- 5 Fulu F B a a S / B, , , U, , N, a, LE12 5RD, UK
- 6 C a P¦a S, C , U, ... C a , 1871, F ... C, D a,

: a @ 4. 4. \*A'J

S all .

G.H., D.Z., S.P., a M.J.B. a ; G.H., H.H., A. . .M., J.Z., L.D., S.Z., a , F.Z. a ; G.H., H.H., J.Z., a L.D. a a, a, a a a, a a; a G.H., D.Z., S.P., W.L., N.S.B., a M.J.B. a u . T fi a, a u . a a a!! aul .

ala a " a al al fi ТаЦ () ......u., I. J. A.J. ( ://aa , J. / / //), :Da, Za (a @ J. J. ).

# Abstract

à 11. (S.), 41, a Ma al all , a a Ula,a, la la, l O ARF17 ILA1 U ILA1 a au al al , a all al, O ARF17 a a a || a | a a | , , , , a a.

Ma 19, 2021. A J**⊌** 28, 2021. A a a 🗸 🗸 juli 10, 2021 R

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ul, -N C ™, a,' , ://a/ a a,a a a Ca, CA a O A a I a'-N D . . I. ( а, - a/ ul, a Ц a/ a! -@ Ц. 4, /a a 4 a/. "

**Open Access** 

a, ILAI a , I Ula 🍾 ILAI | |a | a a | .

### Results

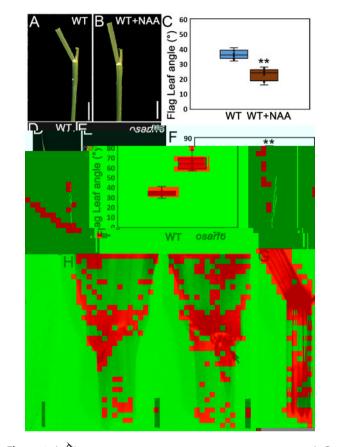
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 $Au^{\lambda}$ ,  $u_{|a|}$ , |a|, |a|, |a|, |a|, |a|, |a|, |a|, |u|, |a | a a | (Z a a, 2009; Du a, 2012; Z a a, 2013). W u v WT /a | a 1-a a a (NAA, a au ) a u a u /a | a a a ( a / a / a a / (F 4 1, D F) a 4-a / T-DNA 5'-4 a /a O A F6, a 6 (RMD\_04Z11MS49; a l Sul <sub>vy</sub>a/Ful S1A). U WT ja , O A F6 a 6 ja ja ja ja ja 

a /a a (F, U, 1, G, I). W la la alaa.

A a  $\frac{A}{Y_{y}}$  (Y2H)  $\frac{A}{Y_{y}}$  a O ARF6 a a O ARF17 (F  $\downarrow$  2A), (Y2H)  $\frac{A}{Y_{y}}$  a O ARF6 a a O ARF17 (F  $\downarrow$  2A), (Y2H)  $\frac{A}{Y_{y}}$  a O ARF6 a a  $\frac{A}{Y_{y}}$  a O ARF6 (S  $a_{\frac{A}{Y_{y}}}$  2010). T a  $\frac{A}{Y_{y}}$  a u , a, (C-IP) a , i u/a /u i a, (BFC) a a , N

 $\begin{bmatrix} a & (B + C) & a & N \\ A & (F + 2, B - K). T a & P & O & F17:G \\ a & O & F17 & a & A \\ a & a & a & a & A \\ a & a & a & a & A \\ \end{bmatrix}$ i a (E 4 2, L-N; S4 i ai E 4 S2, A a C), ia a O A F6. T a a a O ARF17 Aaj aj--U OAF17 Ua a a /a / a a / . T a w O ARF6 a O ARF17 4 4 , 1 4 a / . a 4 / 6



a ...., a ..., b ..., GUS a la la a PAF6:G a |a| a 65 a a |a| . Ba, 5 . H, I, GUS a a  $\lambda^{\lambda}$ a (H) a a a  $\stackrel{}{}_{a}$ 'a' (I) a ' a 'a a A F6::G a 'a a 80 a a 'a . Ba, 200  $\mu$  .

- 17 La (a a P aa a a'a , i **l**a **).** а (..a, a, |a | a a | ),
- 6. / U.a. (F. U. 2, O.a. P), /, a. Ua, OAF17 a la la al
- ₩ AF a T-DNA a 🌾 a 4 6, 17, a W. **4** a L CRISPR/Ca 9 L A A T

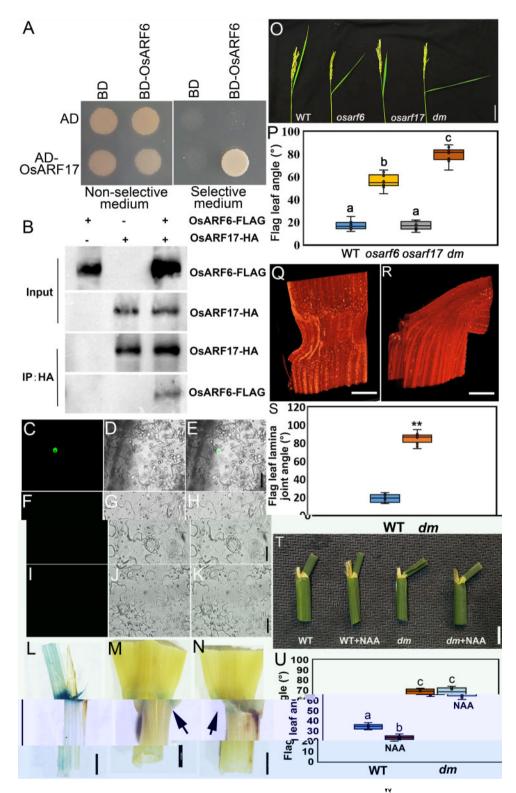


 Figure 2 B
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a a a 4-(S4 / a/F,4 S3A). a a " a " a " ". 11 T-DNA -a la la a l С Ца 6 (Sul / a/F, ul S3, B a C), a a |a | a a | CRISPR/Ca 9 | (Su | a| F u S3, D a E), a O ARF6 a O ARF17 U/a /a a | \_\_\_\_a | a.

T /a / a a / "a / a / a / a a  $u_{1}$  ( $\angle$   $u_{1}$ , 2017). T a a;  $a_{1}$  ( $a_{1}$   $a_{1}$   $a_{2}$ ,  $u_{1}$  X-a  $u_{1}$  (CT)  $u_{1}$  (3D,  $a_{1}$ WT a  $u_{1}$  (Ma  $a_{1}$ , 2013). M CT a -  $a_{1}$  a  $a_{2}$ W a O A F6 a O A F17 W a O A F6 a O A F17 a a a a a A F, ua O A F6, O A F12, O A F17, a O A F25, au a a aa a OAF6 a 17 a a WT (SU | a| FU S5C), a a | | O ARF17 |a | a |a -a | | .

al, al NAA WTa jajajaa. T ja luu ja WT 

### A 6 A 17

T la la a l a a/ Wa  $a_{i,2}^{\prime}$  2020). T WT  $a_{i,2}^{\prime}$   $a_{i,3}^{\prime}$   $a_{i,3}^{\prime\prime}$   $a_{i,3$ Su / a', M . S3 a S4), a a a -a' a' a' /a a . T S u la / a a /a / a a . (N a', 2011), a a ja ja a j Uj U a aj U Sa Outaaj U la l - . a <u>la</u> a al a la la la a WT /a a (F u 3H). 1 a viria, a ... (r. 4. 3H). S. /a, a ... a 

<sup>&</sup>lt; 0.01).

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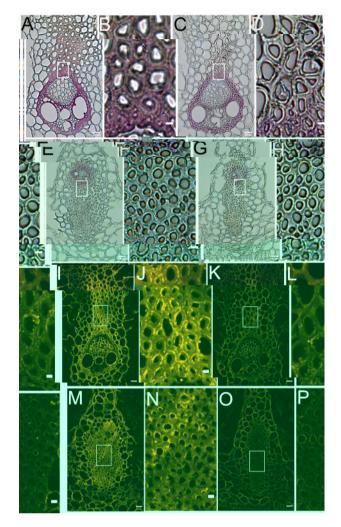


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ILA1, a 4 a 1, a 1 a a 1 la a (N a¦., 2011; Z a a¦., 2018). Ç /a/a a , U , (SU / a/F U S8; Z a a/., 2018), 1 /a (Su / a/F u S6). Fu , . -CT a a 11 а а S a , a// \_\_\_\_ la a a WT (SU / a/ F U S9), a w\_ а а ILA1 U/a /a / a a / a a `a a OAF6a OAF17.Ia , -a  $(17 \text{ A}^{1}\text{RE-L a} 1 \text{ A}^{1}\text{RE-L a})$ )" U 2,445- 😃 a 🛛 ILA1 a (F. 4. 5A), 1. a. ... l. 1 a a ARF .

", ILA1 a O ARF6/17, T a ILATA UANFOITZ, Laa - (Y1H), aa. Ya O A F17 DNA a 0 A F6 а -W. ILA1 1 u (F u 5B), a, a O ARF6 a O ARF17 a ILA1. O ARF6, O ARF17, a T a a, a uai-iu a (LUC) P ILA1:L C ILA1 , <u>\_</u> کې aa a 1 P 35 :0 A F6 a / P 35 :0 A F17 N. a.A., a. a. LUCa. a W\_ O ARF6 O ARF17 a 😃 🖉 a O ARF6 a O ARF17 S10A), a a O ARF6 a O ARF17 a a all a a ILA1 a .

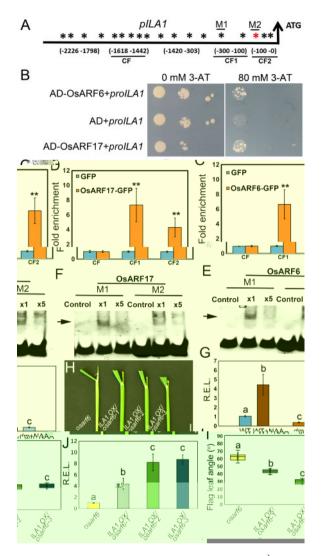


Figure 5 O ARF6 a O ARF17 l = 4/a lLA1  $\rightarrow$  , A, Da a ILA1 . R a  $:A^{U^{n}}$  R E/ ( $A^{U^{n}}$  RE; TGTCTC); /a a  $:A^{U^{n}}$  R E/ E' (All RE; IGICIC); a = a(All RE-L; TGTCNN). U a l / l /a ( $\Delta$  +1). B. Y1H a a a a a (A,  $\pm$ 1), b, 1 m a a a a O ARF6/17 a *ILA1*. C, D, C IP- PCR a a a a / a /a a O ARF6/17 a CF1/2 (A). CF1 a a Au<sup>A</sup> RE-L; CF2 Au<sup>A</sup> RE a Au<sup>A</sup> RE-L, R u/a a a  $\pm$  se a/u-/a / a D aa a a (S u ' D < 0.01) E C EASCA a (Sul ', P < 0.01). E, F, EMSA a OARE6/17 a Maria (Sul ' a  $(3 \times 1)^{1/2} \times 10^{1/2} \times 10$ R U/ a a a  $\pm$  se a/ U/a ... (S U a . D. aa a fi a ... (S U , P < 0.01). H, P 6 a ... ILA1 6 ! (ILA1 O / 6). Ba, 1 ... I, F/a ! a a !, a a! 6, a ILA1 6 ! ... 6 ! ... B ... la a 🙀 u, ., u a, . . a 61.T a¦a 6, a ILA1 λ. λ. a.Ta יין אי 

Т 🤐 🧃 а// 🖉 ILA1 a , , ula... ulC ula ILA1 а u LC (P1-P5, <mark>S4</mark> / a/ F. 😃 ] ja (Su | a| F, u S10C), | a P3 a all ARF , a U ILA1 a a . a, a, a, P4 Р (Su | a| F u S10C), a a 191-a . T P5 (Su ) a U, al a a LC al F 4 S10C).

T 14, ,<sup>v</sup> a, IP- 4a, a, / a, a, a, (C IP- PCR) 4, GFP a a a GFP-a O ARF6 a O ARF17  $(Su | a| F u S5D). Fa_{ry} = a L -$ RE-L; F  $\downarrow$  5A). E a CF1 a CF2 a O ARF6 a O ARF17 I (F  $\downarrow$ 5, C a D), a a ARF a all ILA1 W a / v, a // ILA1 /2) a a (EMSA) O ARF6 a O ARF17 . T (M1 a a Au<sup>A</sup> RE-L CF1, M2) 5A). Ou u a a O ARF6 a O ARF17 a M1 a M2 . . . . . (F. 4 5, E ula a a ILA1 a F). T U O ARF6 a O ARF17 а a a a , a A

ILA1 a a OARF6 a L O ARF17, au<sup>∧</sup>a.W WT Ja а ▶ | | ILA1, WT а la a a al u x NAA a . RT- PCR a a/ I I ILA1 a WT ja ja ja ja ja ji 🖌 🔰 , ILA1 а a u NAA / WT, u u, U O ARF6 a O ARF17. Ou u а а OARF6 a OARF17 a 4 a ILA1, a a 'a vy Ula la la al. T a а la ILA, 6 a 4 . A a la a l

<sup>&</sup>lt; 0.01). J, R /a (R.E.L) / (R.E.L.) /LA1 6 a /LA1 /LA1 6

6" × ILA1 a a (F, U, 5, H<sub>ry</sub>). T U, a allA1 a a v a -all, - , a a a ll all a'.

### A 6 A 17

a A a (Taa), la (Taa), la 4 Flalaal<sub>wy</sub>a a a u ~ ₩T<sup>™</sup> 2019). I a а a a <sub>ny</sub> / /a . T ана стана стан la WTa la v la Ala la v a , **u** a, 1 a, 1, WTa /a (F, 4, 6, A, a, B). F4 a // /a a // U a l a a WT a la -, U . 1 a (F, U, G, A, a, B), L, I, U, U, L, aa a a l a a WT ja (F 4 6, A a E). T 4j a O ARF6 a O ARF17 a a 4a a а . 1 u la , . . .

### Discussion

a, **u** , . , ./u , a , la la la la (EUI, D-FaEUZ, Oa P). au alla ja jaa jaa ala ja (Za a, 2009; Du a, 2012; Z a a, 2013). B O A F6a O A F17 a  $r_{1}$  (a | a | a a , a a // a// S /a a (F 4 3 a 4; S4 / a/ M S3 a S4). O ARF12, O ARF17, a O ARF25 U/a // a / (L a/., 2020). T / a a . S5A).

O ARF6 a O ARF17 U/a /a /a a / a a ILA1 (F 🖬 5, A-F; Şu | a| F. u S10). ILA1 | a || 

> 2018). /a a **4** a ∣ ||**u**| (Z a al., 2018), la L L  $(2 a a_{i}, 2018), (a a a)$   $(a a (SU | a' F U S6). A a MAPKKK (N a_{i}, 2011), ILA1 | a IIP4, (a a) (a a$ , (Z a a)., ILA1 a O ARF6 a O ARF17 /a a y ja ja a a a -a a a a la la la BR WT L (N a/., 2011), all, a BR a/ a a /a alaal , aa, a, a ll-, u a, (K U a a, 2010; C a, 2014; L U a, 2018), U la<sub>vy</sub>ala a. I la, a a all'- la a , O ARF6 a O ARF17, U/a /a a a / U U /a laal a al U U Ja la a al I Ja . M, U a UJa a. M O ARF6 a O ARF17 / a a ILA1 w U/a /a /a a / (F U 6F). OU U a U //a /a a / a U 

### Materials and methods

a O<sub>vy</sub> a a , a S a a  $(30^{\circ}N, 121^{\circ}E)$  , a S a a  $(18^{\circ}N, 109^{\circ}E)$  . T T-DNA 1 6 (RMD\_04Z11MS49) a 17 -

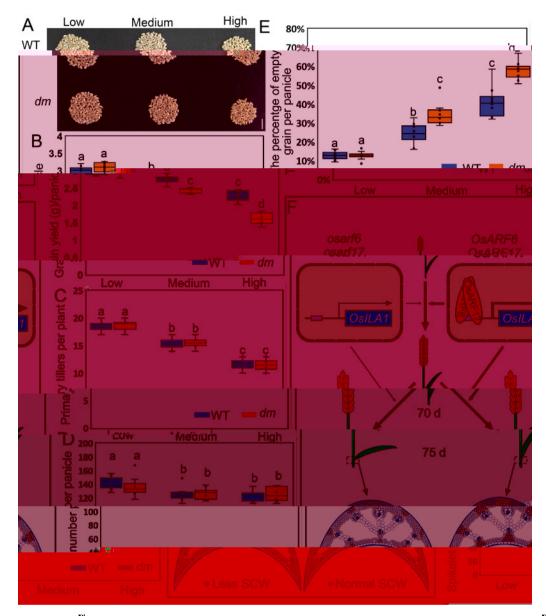
 PCR (Su | a| Ta | 1). P/a

 a/ 49 /a
 /2 (), 36 /a
 /2 (), a

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 /2 ()
 ). T CRISPR/Ca 9 u a
 O ARF6

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Α



٧V, WТ Figure 6 ⊤ .A,Ua (49 a . 1 а Ja а - 1 /a / <sup>2</sup>), ²), a , / /a / <sup>2</sup>) a<sub>w</sub> J. (36 Ja /a (25 . Ba, 1. B, Ga WT ц, 1 . 1 1 a .,, a / WTa a / ]a U. a l 1 . T a<sub>v</sub> a¦ λ, 0.75 a 0.25 u 1.5 а.Т а .1., Ι. T а 1 w\_ fi a<sub>vy</sub> (S 4 , P < 0.01). C, la l а U L а /a a a a  $\sim_1$ . 11 Ľ. ,a i' . B U Ρ а . II WT la 🛛 а IJ. /a 1 а w\_a la j WT a . T a/ a . T 0.75 a 0.25 L а W. W, w\_ , D .1., Ι.T 1.5 J, **u** 1 а 1 Цa .1 а а la fi l a WT (S 4 , P < 0.01). D, S U ц /a аa а а а , a . Т . B I ja 🚽 WT a L Ц 4 а а. w, λ, X. а . . 1 . . Т 0.75 a 0.25 / . T IJ. 1 1.5 а W, Ua l . D fi a (S 4 , P < 0.01). E, P а /a а a a а а W.  $\sim_1$ Ц,а . B a WT Ц а а ...1 а /a а , al, λ, WT a . T a.T 0.75 a 0.25 a \_ / l а \_ а w, w\_ w, λ. u – 1.5 IJa ,∣ **u** [ .1 / . T а 1 а a la . D a -' ny fi a (S 🖌 , P < 0.01). F, A 1. O ARF6 a O ARF17 а a a a/ а а la a w , OARF6 a OARF17 a . Du 1 alala, a а а а X ILA1, Ľ. a/ S 1 а U. | a a al а Dfi OAF6a OAF17 all all a 11 ILA1 a | a la alaa | a а a/ ۳¥, a a`a U.M. CT. a alala, a a 🌡 , a , . S. a 11 а U a U/a U / . T . . . U . . . . . a a a la . Ba, 20 μ .

# AA

L 0.5% (<sup>\*</sup>/) a a <sup>\*v</sup>a a <sub>\*v</sub>a a 10-µL1-MNAA <sup>\*</sup>a 100 40°C Α a¦ . I

 $a_{ry} = M_{1}^{1} a = M_{2} + H_{1}^{ry} = a_{ry}^{ry}$  $a_{ry}^{ry} a / a_{ry}^{ry} = a_{ry}^{ry}$  $a_{ry}^{ry} a / a_{ry}^{ry}$  (6-FAM) D 4 1 -(6-FAM) 5'-W. a/Ta/S1). Ty u/-u/u/u/u/a a. T (Su | а -a al EMSA a a al 10 μL μ (20- Μ HEPES-KOH, Η 14 7.9, 100- M KC/, 2- M DTT, a 20% / /) a 2-μL O ARF6/17 /μ , a 80- M1 M2 /a / (×1), 64- M1 M2 /a / a 16- "M1 M2 /a / (×5). EMSA a -Um a U U C 2 1 : a Т (460) la a 510-550 all a GE A a la 680.

# T BFC a C -IP

 a || a  $500^{g}$  3 F a||, || u 100- $\mu$ L a u a 100- $\mu$ L SDS u (250- M T, -HC/ [H 6.8], 10% SDS [/], 0.5% | |u [/], 50% |, | [/]), a a a 95°C 5 T a | u a  $500^{g}$  a 25°C 3 a u u aa aa' u a a' a a (a -HA, 314570, A a a a -FLAG, 304585, A a) |u 1:5,000, a a a a a a (a 6789, A a) u a a (HRP) a |u 1:20,000. HRP a a a a u a u u u (Su S a) W A, T F). T a a u GE I a Qua LAS4000 v

a | (Ha, a, 2007). F/a | a | a , a , a uu 50 , u 1% (<sup>\*</sup>/) a/ U 0.25 M 1 S 1 A  $1 \text{ H}_2 \text{ O}$   $1 \text{ H}_2 \text{ H}_2 \text{ O}$   $1 \text{ H}_2 \text$ a 4 / 4 . N4 / <sup>1</sup> a . 4 a 3,000<sup>g</sup> a a ~100- 300**u** a 3,000<sup>g</sup> a a DNA a , , a, ; , , a a Ula al UDNA -, IP a 4 a a', 4 DNA -, IP a 4, a a -GFP a , (a , /a/,a 32146,A a ) 4 P Gaa / a, DNA (16-201, S a). T IP a a a / ( , , , , , , , , , , , , , , , , SU / a/Ta / S1).

⊌a¦-LUC a , N. Т 1 a . P 35 :FLAG-A F6 a P 35 :HA-A F17 a Julia Tulia P P1:L C, P P2:L C, P P3:L C, P P4:L C, a P P5:L C la a GII-0800-LUC.E a la a N. la 48 a A a la a<sub>ng</sub> a a a 1<sup>2</sup>/a/a a a 4.1<sup>2</sup>/a/a a a 4.14. LUCa REN aа all la/-LUCaaa a) GLOMAX 20/20 /4 (P a u a u ' ' u (P a), a alua al LUC a -Р REN a

F CT a 4, /a a /a /a FAA (60% (/) a /, 6% (/) a a , a 5% (/) a/ ) 12 , a a a / (70%, 80%, 90%, a 100% /), a 15 , a , a / 4 a/ a/ Sa / a 4 a X-a (CT, X a a 520 V a, Z ).

vý Ša a 2020. F WT a Pa a/ , a ja aa laa.-(25 /a /  $^2$ ), 17.6 × 17.7 (36  $21.4 \times 21.4$ а (47 | a / <sup>2</sup>), Ea<sup>2</sup>), ny la  $15 \times 15$ а 1 a **y**a¦ а . F a  $3 \times 3$ а а la Ľ. а а a al а 111 a al la A а, a 1 15 a a 37°C a 🖁

### Α

S u u a v i a v a a (i/i) i i u u u/i) i a u i O A F6O 02 06910; O A F12 O 04 57610; O A F17 O 06 46410; O A F25 O 12 41950; ILA1 O 06 50920.

### Supplemental data

- T . II<sup>V</sup>, a .a' a a a la l . . . . . . . a . l .
- Supplemental Figure S1. C a a6 a17 T-DNA4 a
- Supplemental Figure S2. O A F6 a O A F17 a a a a' a a a a' a'
- supplemental Figure S3. K 4 4 a OAF6 a OAF17 a ja ja ja ja j.
- Supplemental Figure S4. T , / a a / , a , || a / a a/,
- SupplementalFigureS5.T $\sim$ a $O \land F$  $\downarrow$  $\downarrow$  $\downarrow$  $\downarrow$  $\downarrow$  $\downarrow$
- Supplemental Figure S7. F a a' WT a la la 60 90 a a la .
- wy Supplemental Figure S8. L a 1141
- y Supplemental Figure S9. S a II all uu a la a 1 la la .
- Supplemental Figure S10. C a aaP ILA1:L CUUN.I aV
- Supplemental Movie S2. P a al al a la a al al a la CT a
- Supplemențal Movie S3. S WT /a a a CT a a .
- Supplemental Movie S4. S /a a /a
- Supplemental Movie Legends.
- Supplemental File S1. Su a a a a a

## Acknowledgments

W a, P.L, X a Y, UaZ U. 1. ; M. JaC a Xa, C . a. a, ; a Z., LU . U, a, .

## Funding

T a ll Na a Na T T A Ll Na A Na A Na T Na Ll Na A Na A Na Ll Na L C a (31861163002 a 31700276), 1 а R.a. Ta, M., Ella, , a 111 P (B14016), C a P (2019M661486), II aj S, Fula, C, a P, a' S, (2019M661486), II = 5 a a P (2021T140446), a 5 a a P (2021C140446), s P. a Ial С Ц // (DP190101941), Улц Allala Ra l a (P ID: 25915), DNRF C a ล้อ (DNRF155), a N N Lau a (NNF19OC0056076) а.

C .⊤a⊌ /a .../a

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