

Cas3 (effector nuclease-helicase)

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Cas5 (Cascade/processing of the pre-crRNA transcripts)

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Cas8c-Csd1 (Cascade)

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LMG9322 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG
NCPPB3562 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG
CFBP2911 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG
JF90-2 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG
JK2-10 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG
JK48 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG
JM35 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG
JS581 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG
JS582 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG
JS584 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG
LB302 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG
LE20-1 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG
LG102 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG
LG115 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG
NCPPB3607 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG
NCPPB3608 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG
X2003-3218 CCCAGGCGCGCTTCGCCCGCAACAACGGCCAGGACGCCCCGACACCGCTTCCGAAGGAG

JJ238-24 AACCCACATGA
JK143-9 AACCCACATGA
JK143-11 AACCCACATGA
LD71a AACCCACATGA
C40 AACCCACATGA
NCPPB3612 AACCCACATGA
CFBP2852 AACCCACATGA
FDC217 AACCCACATGA
FDC1083 AACCCACATGA
JJ10-1 AACCCACATGA
JJ238-10 AACCCACATGA
JK4-1 AACCCACATGA
JW160-1 AACCCACATGA
LB100-1 AACCCACATGA
LC80 AACCCACATGA
LG117 AACCCACATGA
LH37-1 AACCCACATGA
LMG9322 AACCCACATGA
NCPPB3562 AACCCACATGA
CFBP2911 AACCCACATGA
JF90-2 AACCCACATGA
JK2-10 AACCCACATGA
JK48 AACCCACATGA
JM35 AACCCACATGA
JS581 AACCCACATGA
JS582 AACCCACATGA
JS584 AACCCACATGA
LB302 AACCCACATGA
LE20-1 AACCCACATGA
LG102 AACCCACATGA
LG115 AACCCACATGA
NCPPB3607 AACCCACATGA
NCPPB3608 AACCCACATGA
X2003-3218 AACCCACATGA

Cas7-Csd2 (Cascade)

C40	GGCGTAAGCGTGACCGAACTGTTCTGA
CFBP2852	GGCGTAAGCGTGACCGAACTGTTCTGA
CFBP2911	GGCGTAAGCGTGACCGAACTGTTCTGA
FDC217	GGCGTAAGCGTGACCGAACTGTTCTGA
FDC1083	GGCGTAAGCGTGACCGAACTGTTCTGA
JF90-2	GGCGTAAGCGTGACCGAACTGTTCTGA
JF90-8	GGCGTAAGCGTGACCGAACTGTTCTGA
JJ10-1	GGCGTAAGCGTGACCGAACTGTTCTGA
JJ238-10	GGCGTAAGCGTGACCGAACTGTTCTGA
JJ238-24	GGCGTAAGCGTGACCGAACTGTTCTGA
JK2-10	GGCGTAAGCGTGACCGAACTGTTCTGA
JK4-1	GGCGTAAGCGTGACCGAACTGTTCTGA
JK48	GGCGTAAGCGTGACCGAACTGTTCTGA
JK143-9	GGCGTAAGCGTGACCGAACTGTTCTGA
JK143-11	GGCGTAAGCGTGACCGAACTGTTCTGA
JM35	GGCGTAAGCGTGACCGAACTGTTCTGA
JS581	GGCGTAAGCGTGACCGAACTGTTCTGA
JS582	GGCGTAAGCGTGACCGAACTGTTCTGA
JS584	GGCGTAAGCGTGACCGAACTGTTCTGA
JW160-1	GGCGTAAGCGTGACCGAACTGTTCTGA
LB100-1	GGCGTAAGCGTGACCGAACTGTTCTGA
LB302	GGCGTAAGCGTGACCGAACTGTTCTGA
LC80	GGCGTAAGCGTGACCGAACTGTTCTGA
LD7-1	GGCGTAAGCGTGACCGAACTGTTCTGA
LD71a	GGCGTAAGCGTGACCGAACTGTTCTGA
LE3-1	GGCGTAAGCGTGACCGAACTGTTCTGA
LE20-1	GGCGTAAGCGTGACCGAACTGTTCTGA
LE116-1	GGCGTAAGCGTGACCGAACTGTTCTGA
LG97	GGCGTAAGCGTGACCGAACTGTTCTGA
LG102	GGCGTAAGCGTGACCGAACTGTTCTGA
LG115	GGCGTAAGCGTGACCGAACTGTTCTGA
LG117	GGCGTAAGCGTGACCGAACTGTTCTGA
LH37-1	GGCGTAAGCGTGACCGAACTGTTCTGA
LMG9322	GGCGTAAGCGTGACCGAACTGTTCTGA
NCPPB3562	GGCGTAAGCGTGACCGAACTGTTCTGA
NCPPB3607	GGCGTAAGCGTGACCGAACTGTTCTGA
NCPPB3608	GGCGTAAGCGTGACCGAACTGTTCTGA
NCPPB3610	GGCGTAAGCGTGACCGAACTGTTCTGA
NCPPB3612	GGCGTAAGCGTGACCGAACTGTTCTGA
NCPPB3615	GGCGTAAGCGTGACCGAACTGTTCTGA
X2003-3218	GGCGTAAGCGTGACCGAACTGTTCTGA

Cas4 (acquisition)

C40	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
CFBP2852	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
FDC217	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
FDC1083	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
JJ10-1	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
JJ238-10	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
JK4-1	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
JW160-1	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
LB100-1	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
LC80	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
LD7-1	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
LE116-1	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
LG117	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
LH37-1	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
LMG9322	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
NCPPB3562	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
NCPPB3610	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
NCPPB3612	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
CFBP2911	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
JF90-2	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
JF90-8	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
JJ238-24	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
JK2-10	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
JK48	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
JK143-9	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
JK143-11	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
JM35	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
JS581	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
JS582	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
JS584	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
LB302	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
LD71a	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
LE3-1	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
LE20-1	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
LG97	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
LG102	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
LG115	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
NCPPB3607	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
NCPPB3608	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
NCPPB3615	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA
X2003-3218	CTGCGTCGACAACCTCGATGCTGAAGAGGAATGA

Cas1 (acquisition endonucelase)

JF90-8 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
C40 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
CFBP2852 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
CFBP2911 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
FDC217 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
FDC1083 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
JF90-2 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
JJ10-1 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
JJ238-10 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
JJ238-24 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
JK2-10 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
JK4-1 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
JK48 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
JK143-9 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
JK143-11 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
JM35 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
JS581 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
JS582 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
JS584 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
JW160-1 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
LB100-1 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
LC80 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
LD7-1 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
LD71a TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
LE3-1 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
LE20-1 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
LE116-1 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
LG97 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
LG102 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
LG117 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
LH37-1 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
LMG9322 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
NCPPB3562 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
NCPPB3607 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
NCPPB3610 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
NCPPB3612 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
NCPPB3615 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
LB302 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
LG115 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
NCPPB3608 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC
X2003-3218 TTTGTGCAAGCACAGTTGATGGCACGGCACCTGCGTGGCGATCTGGATGGCTACCCCTCC

JF90-8 TTCTTCTGGAATGA
C40 TTCTTCTGGAATGA
CFBP2852 TTCTTCTGGAATGA
CFBP2911 TTCTTCTGGAATGA
FDC217 TTCTTCTGGAATGA
FDC1083 TTCTTCTGGAATGA
JF90-2 TTCTTCTGGAATGA
JJ10-1 TTCTTCTGGAATGA
JJ238-10 TTCTTCTGGAATGA
JJ238-24 TTCTTCTGGAATGA
JK2-10 TTCTTCTGGAATGA
JK4-1 TTCTTCTGGAATGA
JK48 TTCTTCTGGAATGA
JK143-9 TTCTTCTGGAATGA
JK143-11 TTCTTCTGGAATGA
JM35 TTCTTCTGGAATGA
JS581 TTCTTCTGGAATGA
JS582 TTCTTCTGGAATGA
JS584 TTCTTCTGGAATGA
JW160-1 TTCTTCTGGAATGA
LB100-1 TTCTTCTGGAATGA
LC80 TTCTTCTGGAATGA
LD7-1 TTCTTCTGGAATGA
LD71a TTCTTCTGGAATGA
LE3-1 TTCTTCTGGAATGA
LE20-1 TTCTTCTGGAATGA
LE116-1 TTCTTCTGGAATGA
LG97 TTCTTCTGGAATGA
LG102 TTCTTCTGGAATGA
LG117 TTCTTCTGGAATGA
LH37-1 TTCTTCTGGAATGA
LMG9322 TTCTTCTGGAATGA
NCPPB3562 TTCTTCTGGAATGA
NCPPB3607 TTCTTCTGGAATGA
NCPPB3610 TTCTTCTGGAATGA
NCPPB3612 TTCTTCTGGAATGA
NCPPB3615 TTCTTCTGGAATGA
LB302 TTCTTCTGGAATGA
LG115 TTCTTCTGGAATGA
NCPPB3608 TTCTTCTGGAATGA
X2003-3218 TTCTTCTGGAATGA

Cas2 (acquisition dsDNA endonuclease)

NCPFB3615	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
C40	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
CFBP2852	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
CFBP2911	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
FC217	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
FDC1083	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
JF90-2	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
JJ10-1	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
JJ238-10	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
JJ238-24	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
JK2-10	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
JK4-1	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
JK48	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
JK143-9	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
JK143-11	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
JM35	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
J5581	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
J5582	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
J5584	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
JW160-1	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
LB100-1	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
LC80	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
LD7-1	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
LD71a	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
LE3-1	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
LE20-1	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
LE116-1	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
LG117	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
LH37-1	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
LMG9322	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
NCPFB3562	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
NCPFB3607	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
NCPFB3610	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
NCPFB3612	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
LB302	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
LG115	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
NCPFB3608	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
X2003-3218	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
LG97	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
LG102	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
JF90-8	CACATCGGGCCCAAGCCAGCCTGAACCTCAAAGGCCCACTGATTTTTTGA
