

Supplementary material

Table S1. Binding parameters for the interaction between MIR167A or its mutant alleles and DBD of MoCdc5, TvMyb2, or AtCdc5 by BLI.

Table S2. Binding parameters of the interaction between MoCdc5-DBD or its mutant alleles and U6 RNA by BLI.

Table S3. PCR primers used in this study.

Figure S1. DBDs of Myb and Cdc5 contact with distinct DNA sequences. (a) In Myb-DNA complex structures, several positively charged residues on the second and third helices, including R84, R87, R89, K138, and T143 in TvMyb2, and K128, E132, R133, N179, and T188 in c-Myb, contact with DNA directly. (b) DBDs of Cdc5 and Myb specifically interact with a CTCAGCG motif and a AAC(G/T)G motif, respectively, suggesting that Cdc5 is not a canonical Myb domain protein.

Figure S2. Circular dichroism (CD) spectra of MoCdc5-DBD and its mutant alleles show standard α -helix characteristics. CD spectra of MoCdc5-DBD and its mutated alleles were all nearly superimposable from 195 nm to 260 nm. The experiment was recorded at a concentration of 0.2 mg/mL proteins in 20 mM MES (pH 6.0) and 150 mM NaCl. CD wavelength scans were collected between 195 nm to 260 nm using a 1-mm quartz cuvette.

Figure S3. Six conserved aromatic residues of MoCdc5-DBD play important roles in maintaining its structural stability. (a) Schematic representation of the structure of the first HTH motif (containing $\alpha 1$ - $\alpha 3$) and second HTH motif (containing $\alpha 4$ - $\alpha 6$) showing the spatial locations of six conserved aromatic residues, W9, W29, W48, W61, W80, and Y98 in MoCdc5-DBD. These six aromatic amino acids are arranged regularly, forming the hydrophobic core and are responsible for the structure and stability of the two HTH motifs. (b) CD spectra of MoCdc5-DBD and its mutant alleles at six conserved aromatic residues, W9, W29, W48, W61, W80, and Y98.

Figure S4. Point mutations of the five amino acid residues involved in DNA binding do not abolish expression level and stability of AtCdc5. Protein expression levels of Myc-Cdc5 and heat shock protein Hsc70 (loading control) from different transgenic *cdc5-2* lines were detected by western blot analysis. The primary antibodies, anti-Myc and anti-Hsc70, were used for western blot analysis.

Figure S5. Sequence alignment of Cdc5 and Myb proteins at the 100th amino acid. The 100th amino acids in Cdc5 proteins are mainly those with long side chains, that is, lysine, phenylalanine and tyrosine, which is different from that of Myb proteins. Red dotted lines show the boundary of Cdc5 and Myb. The 100th amino acids in Cdc5 and Myb proteins are highlighted in yellow and green, respectively.

Figure S6. Model of MoCdc5-DBD with two distinct nucleic acid-binding surfaces.

Cdc5-DBD has two distinct nucleic acid-binding surfaces, one binding DNA similar to Myb-DBD and the other one participating in RNA binding.

Table S1. Binding parameters for the interaction between MIR167A or its mutated alleles and DBD of MoCdc5, TvMyb2, or AtCdc5 by BLI.

Name	DNA sequences					
MIR167A	TGTCTCAGCGGTGGAG					
MSE (167A)	TGTACAACGGGTGGAG					
MIR167A-1	TGTACAAGCGGTGGAG					
MIR167A-2	TGTCTTCACGGGTGGAG					
MIR167A-3	TGTCTCATATGTGGAG					

	MIR167A			MSE(167A)		
	KD* (M, e-08)	K _{on} (1/Ms, e+04)	K _{off} (1/s, e-03)	KD (M, e-08)	K _{on} (1/Ms, e+04)	K _{off} (1/s, e-03)
MoCdc5-DBD	5.17±2.13	7.23±1.96	3.12±0.75	63.82±17.39	1.27±0.67	7.14±3.38
Cdc5-DBD	8.98±0.9	25.93±0.82	23.27±2.08	27.73±0.24	26.28±0.32	72.88±1.5
TvMyb-DBD	66.76±3.44	1.6±0.039	10.74±0.41	70.81±3.32	1.62±0.042	11.51±0.45

	MIR167A-1			MIR167A-2			MIR167A-3		
	KD (M, e-08)	K _{on} (1/Ms, e+04)	K _{off} (1/s, e-03)	KD (M, e-08)	K _{on} (1/Ms, e+04)	K _{off} (1/s, e-03)	KD (M, e-08)	K _{on} (1/Ms, e+04)	K _{off} (1/s, e-03)
MoCdc5-DBD	17.01±4.71	11.43±2.73	17.86±2.11	19.05±5.08	9.58±0.39	18.19±4.76	20.89±5.15	8.83±0.75	17.99±3.37
AtCdc5-DBD	13.75±2.04	4.93±3.09	7.66±4.54	15.14±1.69	6.84±0.34	10.38±1.47	12.93±1.24	7.01±0.35	9.09±1.19
TvMyb-DBD	71.26±4.22	1.56±0.04	11.15±0.4	73.09±2.83	1.65±0.05	12.04±0.48	67.48±4.38	1.63±0.04	11.01±0.43

*KD, equilibrium dissociation constant. The experiments were repeated three times. Shown values are means ± s.d. of three experiments.

Table S2. Binding parameters of the interaction between MoCdc5-DBD or its mutated alleles and U6 RNA by BLI.

	KD* (M, e-08)	K_{on} (1/Ms, e+04)	K_{off} (1/s, e-03)
MoCdc5-DBD	1.38 ±0.05	3.85 ±0.03	0.53 ±0.02
MoCdc5-DBD ^{R31M}	#ND	#ND	#ND
MoCdc5-DBD ^{R38N}	4.10 ±0.06	6.92 ±0.08	2.84 ±0.02
MoCdc5-DBD ^{K42A}	2.80 ±0.07	5.51 ±0.08	1.54 ±0.03
MoCdc5-DBD ^{K100A}	1.63 ±0.05	5.20 ±0.07	0.84 ±0.02

*KD, equilibrium dissociation constant. The experiments were repeated three times. Shown values are means ± s.d. of three experiments. #ND, not determined due to the small binding affinity. Shown values are means ± s.d. of three experiments.

Table S3. PCR primers used in this study.

Primer name	Description	Sequence 5' to 3'
CDC5-TOPO-F	CDC5 CDS cloning	CACCATGAGGATTATGATTAAGGG
CDC5-TOPO-R	CDC5 CDS cloning	TGCAGAAGCTTCCATGGCTATGG
MoCDC5 -DBD -F1	MoCDC5 DBD cloning	CATGCCTGTCGTCAAAGGAGG
MoCDC5-DBD -F2	MoCDC5 DBD cloning	CCTGTCGTCAAAGGAGGAGTTT
MoCDC5-DBD -R1	MoCDC5 DBD cloning	GTCAGTGGTACCCATTAGTAAC
MoCDC5 -DBD -R2	MoCDC5 DBD cloning	TCGAGTCAGTGGTACCCATTAGT
MoCdc5_R31M_F	R31M mutation	TTGAATCAATGGGCAATGGTCTCGTCACTGCTG
MoCdc5_R31M_R	R31M mutation	CAGCAGTGACGAGACCATTGCCATTGATTCAA
MoCdc5_R38N_F	R38N mutation	TCGTCAGTCTGGCGAACAAGACGCCAAAGCAG
MoCdc5_R38N_R	R38N mutation	CTGCTTTGGCGTCTTGTTCGCCAGCAGTGACGA
MoCdc5_K42A_F	K42A mutation	GCGCGCAAGACGCCAGCGCAGTGCAAGGCGCGA
MoCdc5_K42A_R	K42A mutation	TCGCGCCTTGCACTGCGCTGGCGTCTTGCGCGC
MoCdc5_K45A_F	K45A mutation	ACGCCAAAGCAGTGCGGGCGCGATGGAACGAG
MoCdc5_K45A_R	K45A mutation	CTCGTTCCATCGCGCCGCGCACTGCTTTGGCGT
MoCdc5_R47A_F	R47A mutation	AAGCAGTGCAAGGCGGCTGGAACGAGTGGCTG
MoCdc5_R47A_R	R47A mutation	CAGCCACTCGTTCCACGCCGCTTGCACTGCTT
MoCdc5_N92A_F	N92A mutation	GTGGGCCGACGGCGGCCAGTGCCTTGAGCGC
MoCdc5_N92A_R	N92A mutation	GCGTCAAGGCACTGGGCCGCGTGCAGGCCAC
MoCdc5_K100A_F	K100A mutation	CTTGAGCGCTACCAGGCGCTTCTCGACGAGGCC
MoCdc5_K100A_R	K100A mutation	GGCCTCGTCGAGAAGCGCCTGGTAGCGCTCAAG

CDC5_R32M_F	R32M mutation	AACGAGAAGAGACGAGATCATAGCCATTGGTTCTTACCA
CDC5_R32M_R	R32M mutation	TGGTAAGAACCAATGGGCTATGATCTCGTCTCTTCTCGTT
CDC5_R39N_F	R39N mutation	TTACTACTGTTTAGCAGACTTATTAACGAGAAGAGACGAGATCCG
CDC5_R39N_R	R39N mutation	CGGATCTCGTCTCTTCTCGTTAATAAGTCTGCTAAACAGTGTA
CDC5_K43A_F	K43A mutation	CAGCGAGCTTTACTACTGTGCAGCAGACTTACGAACGAGAA
CDC5_K43A_R	K43A mutation	TTCTCGTTTCGTAAGTCTGCTGCACAGTGTAAGCTCGCTG
CDC5_K101A_F	K101A mutation	GCATGCTGCATCAAGGAGCGCCTCATACTCTCAAGACAT
CDC5_K101A_R	K101A mutation	ATGTCTTGAGAGGTATGAGGCGCTCCTTGATGCAGCATGC
CDC5_MoDBD_F	Mosaic CDC5	CACCATGCCTGTCTGTCAAAGGAGGGGTTTG
CDC5_MoDBD_R	Mosaic CDC5	ATAATTTTCATCCTTAGTGCAGGCCTCGTCGAGAAGCT
AtCDC5_infusion_F	Mosaic CDC5	AGCTTCTCGACGAGGCCTGCACTAAGGATGAAAATTATGATGC
AtCDC5_infusion_R	Mosaic CDC5	AGCTGGGTCGGCGCTGCAGAAAGCTTCCATGGC
MIR158a qF	Pri-MIR158a	GTGATGACGCCATTGCTCTTT
MIR158a qR	Pri-MIR158a	TGTGACTTTAGATGCCCTTGTTCA
MIR167a qF	Pri-MIR167a	TGTTGTGTTTCATGACGATGG
MIR167a qR	Pri-MIR167a	AGCTCACAAAATCAGACTGAAGA
MIR171a qF	Pri-MIR171a	CCGCGCCAATATCTCAGTA
MIR171a qR	Pri-MIR171a	TGTCTCCATTTCAACACACACA
MIR172b-F	Pri-MIR172b	TATTAAGGACTTGTAGGACTCA
MIR172b-R	Pri-MIR172b	TAATAGTACGTACACATAAATGG
miR156a stem loop RT	miR156a	GTTGGCTCTGGTGCAGGGTCCGAGGTATTCGCACCAGAGCCAACGTGC TC
miR156a forward	miR156a	GCGGCGGTGACAGAAGAGAGT
miR167a stem-loop RT	miR167a	GTTGGCTCTGGTGCAGGGTCCGAGGTATTCGCACCAGAGCCA ACTAGATC
miR167a Forward	miR167a	GGCGTC TGAAGCTGCCAGCAT
miR172a stem-loop RT	miR172a	GTTGGCTCTGGTGCAGGGTCCGAGGTATTCGCACCAGAGCAACATGCA G
miR172a forward	miR172a	GGCGTCAGAATCTTGATGATG
miR173 stem-loop RT	miR173	GTTGGCTCTGGTGCAGGGTCCGAGGTATTCGCACCAGAGCCAACGTGA TT
miR173 forward	miR173	GTTGGC TTCGCTTGCAGAGAG
U6 stem loop RT	U6	GTGCAGGGTCCGAGGTTTTGGACCATTCTCGAT
U6 forward	U6	GGAACGATACAGAGAAGATTAGCA
Universal		GTGCAGGGTCCGAGGT







