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Supplementary Data

Association analysis of important agronomical traits of maize inbred lines with SSRs

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Table S1. Pedigrees and Q values of the 94 inbred lines based on 204 pairs of SSRs.

Inbred line	Pedigree	group	Q1	Q2	Q3	Q4	Q5	group
3189	Shen5003×U8112	1	0.997	0.001	0.001	0.001	0.001	Reid
Ye478	U8112×Shen5003	1	0.997	0.001	0.001	0.001	0.001	Reid
4866-1	Tie9722×Ye478	1	0.546	0.445	0.004	0.003	0.002	Mix
Ye488	U8112×Shen5003	1	0.953	0.033	0.003	0.008	0.003	Reid
Shen5003	Recycled line from U.S. hybrid 3147	1	0.997	0.001	0.001	0.001	0.001	Reid
5005	Recycled line from U.S. hybrid 3147	1	0.995	0.001	0.001	0.002	0.001	Reid
65232-112	6237×Shen5003	1	0.574	0.036	0.375	0.01	0.005	Mix
8001-2	3189×Ye488	1	0.997	0.001	0.001	0.001	0.001	Reid
9418-2	Unavailable	1	0.849	0.144	0.004	0.001	0.002	Reid
D18-1-1*	Population 2004**	1	0.402	0.125	0.064	0.292	0.116	Mix
VT187-4	Unavailable	1	0.639	0.005	0.01	0.344	0.002	Mix
Y17-2	Unavailable	1	0.664	0.002	0.005	0.316	0.014	Mix
196-1	Dan340×Huangzao4	2	0.023	0.971	0.002	0.001	0.003	SPT
3841-22	MO17×Huobai	2	0.004	0.993	0.001	0.001	0.001	SPT
3904-71	Unavailable	2	0.073	0.922	0.001	0.002	0.001	SPT
502-1	Dan340×Huangzao4	2	0.014	0.968	0.009	0.007	0.002	SPT
5237	Dan340×Huangzao4	2	0.009	0.917	0.034	0.032	0.008	SPT
Lx9801	502×H21	2	0.001	0.996	0.002	0.001	0.001	SPT
B105-1*	Population 2004**	2	0.002	0.626	0.361	0.007	0.004	Mix
H21-12	Huangzao4×H84	2	0.004	0.839	0.005	0.15	0.001	SPT
K12-12	Derived fromHuangzao4	2	0.069	0.524	0.044	0.361	0.002	Mix
Chang7-2	(Huangzao4×Wei95)×S901	2	0.001	0.845	0.012	0.14	0.001	SPT
Danhuang212	D729×Huangzao4	2	0.004	0.738	0.232	0.016	0.009	SPT
Huangye4	(Yejihong×Huangzao4)×Dunzihuang	2	0.021	0.633	0.337	0.004	0.004	Mix
Huangzao4	Pollinated plant of inbred line Tangsipingtou	2	0.001	0.997	0.001	0.001	0.001	SPT
Ji853	Huangzao4×Zi330	2	0.002	0.991	0.002	0.002	0.003	SPT
Liao308-1	Liao85-308×foreign material	2	0.001	0.801	0.189	0.008	0.001	SPT
Qi310	Jin21× Huangzao4	2	0.099	0.863	0.023	0.014	0.002	SPT
4Zi4	(Huangzao4×Zi330)×Huangzao4	2	0.002	0.698	0.004	0.003	0.294	Mix
1029	Recycled line from hybrid XL80	3	0.046	0.009	0.588	0.015	0.343	Mix
52106	(Aijin525×Ye107)×106	3	0.185	0.14	0.626	0.003	0.046	Mix
543	Unavailable	3	0.01	0.015	0.754	0.22	0.001	LRC
8723	U8112×Ye107	3	0.464	0.005	0.524	0.005	0.001	Mix
A150*	Population 2004**	3	0.322	0.003	0.616	0.057	0.002	Mix
A183*	Population 2004**	3	0.143	0.008	0.647	0.199	0.003	Mix
A210*	Population 2004**	3	0.089	0.003	0.758	0.148	0.002	LRC
A22	Unavailable	3	0.008	0.337	0.649	0.001	0.004	Mix
A348-4-2*	Population 2004**	3	0.12	0.002	0.845	0.032	0.002	LRC
A386-1*	Population 2004**	3	0.004	0.021	0.969	0.004	0.002	LRC
zi330	Oh43×Keli67	3	0.005	0.012	0.979	0.001	0.002	LRC
B104-1-2*	Population 2004**	3	0.005	0.012	0.972	0.008	0.003	LRC
B117*	Population 2004**	3	0.001	0.071	0.924	0.002	0.002	LRC
B121*	Population 2004**	3	0.017	0.004	0.966	0.007	0.006	LRC
B178-1*	Population 2004**	3	0.052	0.254	0.388	0.014	0.292	Mix
B209*	Population 2004**	3	0.025	0.156	0.515	0.065	0.239	Mix
K14-1	5005×6917	3	0.299	0.002	0.41	0.287	0.002	Mix
V77-1	Unavailable	3	0.003	0.007	0.742	0.246	0.002	LRC
W618	Unavailable	3	0.002	0.01	0.539	0.448	0.001	Mix
Y36-1	Unavailable	3	0.002	0.282	0.583	0.132	0.001	Mix
ZH-2-1	Unavailable	3	0.18	0.021	0.646	0.15	0.003	Mix
Cai11-8	Menke B×Zi330	3	0.001	0.005	0.946	0.037	0.011	LRC
Dan340	Baigulv9×Pod corn	3	0.006	0.047	0.843	0.102	0.001	LRC
Danhuang02	Recycled line from E28 Synthetic	3	0.006	0.071	0.74	0.004	0.179	LRC
HuangC	(Huangxiao162×Zi330)×Tuxpeno	3	0.392	0.002	0.576	0.022	0.008	Mix
Ji842	Ji63×Mo17	3	0.005	0.138	0.843	0.012	0.002	LRC
Longkang11	Zi330×Mo17	3	0.011	0.068	0.914	0.005	0.002	LRC
Luyuan92	Yuanqi122×1137	3	0.006	0.114	0.871	0.004	0.005	LRC
Shen118-1	Chao23×Super sweet	3	0.017	0.016	0.855	0.022	0.09	LRC
Zheng22	Dan340×E28	3	0.002	0.02	0.574	0.029	0.375	Mix
Oh43	Oh40B/W8	3	0.001	0.003	0.988	0.004	0.003	LRC
Shen137	Recycled line from U.S. hybrid 6JK111	4	0.002	0.002	0.001	0.683	0.312	Mix
X178-1	Recycled line from hybrid 78599	4	0.003	0.002	0.001	0.752	0.242	PB
D25-2*	Population 2004**	4	0.043	0.01	0.267	0.606	0.073	Mix
D26-2*	Population 2004**	4	0.158	0.014	0.089	0.738	0.002	PB

D5-1-2*	Population 2004**	4	0.023	0.383	0.084	0.497	0.013	Mix
E4-2*	Population 2004**	4	0.076	0.056	0.205	0.658	0.006	Mix
F22-1*	Population 2004**	4	0.25	0.007	0.293	0.449	0.002	Mix
P138-1	Recycled line from hybrid 78599	4	0.002	0.002	0.001	0.994	0.001	PB
W518	Unavailable	4	0.002	0.001	0.001	0.996	0.001	PB
W616	Unavailable	4	0.001	0.001	0.002	0.995	0.001	PB
Y26-1-3	Unavailable	4	0.002	0.004	0.011	0.982	0.001	PB
Y3-2	Unavailable	4	0.001	0.001	0.003	0.993	0.001	PB
Y30-1-1	Unavailable	4	0.002	0.001	0.002	0.994	0.001	PB
Y32-1-1	Unavailable	4	0.001	0.001	0.001	0.996	0.001	PB
Qi318	Recycled line from hybrid 78599	4	0.002	0.011	0.004	0.808	0.175	PB
Qi319	Recycled line from hybrid 78599	4	0.002	0.002	0.003	0.821	0.172	PB
03Qun3-3*	Population 2003***	5	0.002	0.222	0.001	0.002	0.773	BSSS
04Qun-17*	Population 2004**	5	0.001	0.279	0.002	0.002	0.716	BSSS
04Qun-33*	Population 2004**	5	0.143	0.166	0.028	0.003	0.659	Mix
B283-1*	Population 2004**	5	0.194	0.234	0.04	0.215	0.318	Mix
B302*	Population 2004**	5	0.424	0.024	0.104	0.006	0.441	Mix
B358*	Population 2004**	5	0.069	0.004	0.238	0.21	0.478	Mix
B38-2	Recycled line from hybrid 0638	5	0.001	0.011	0.007	0.187	0.795	BSSS
B40-2	Recycled line from hybrid 0638	5	0.001	0.002	0.003	0.014	0.981	BSSS
B50-1-1*	Population 2004**	5	0.007	0.002	0.002	0.001	0.989	BSSS
B52-2*	Population 2004**	5	0.002	0.001	0.001	0.001	0.995	BSSS
B57*	Population 2004**	5	0.002	0.001	0.006	0.002	0.99	BSSS
B79-2-1*	Population 2004**	5	0.005	0.001	0.002	0.001	0.991	BSSS
Bjianba	(B73×Jianrui No.2)×U8112	5	0.002	0.002	0.003	0.009	0.984	BSSS
D10-2-2*	Population 2004**	5	0.001	0.002	0.001	0.25	0.745	BSSS
B73	Lowa Stiff Stalk Synthetic(BS13C5)	5	0.137	0.001	0.023	0.008	0.831	BSSS
B4-1*	Population 2004**	5	0.084	0.117	0.017	0.313	0.469	Mix
Zheng653	(5003×Zong31)×5003	5	0.403	0.002	0.008	0.002	0.585	Mix
Zhonghuang204	Derived from Mo17	5	0.003	0.478	0.005	0.002	0.513	Mix

Note: *indicates the inbred lines selected by our team; ** indicates the inbred lines selected from, open-pollinated maize population (Population 2004), which was composed of maize hybrids Nongda108, Nongda3138, Yedan2, Yedan13 and Nongdan5; *** indicates inbred lines selected from open-pollinated maize population (Population 2003), which was used for development of the five maize hybrids in USA (Xianyu335 and the names of other four were not known).

Table S2. Statistic summary of phenotypic diversity for inbred lines for 26 traits scored in 2010 and 2011.

Trait		Average	Max	Min	SD	CV%	r^a
Plant trait							
Plant height (PH, cm)	mean	169.10	219.00	127.90	19.91	11.77	
	2010	172.32	237.00	117.00	23.63	13.71	0.59**
	2011	166.40	218.00	124.00	18.83	11.32	
Ear height (EH, cm)	mean	65.74	107.50	31.00	14.41	21.92	
	2010	64.15	101.00	25.00	15.94	24.85	0.57**
	2011	67.15	146.00	37.00	16.78	24.99	
Leaf angle above ear (LA, °)	mean	31.27	69.10	16.20	7.85	25.12	
	2010	31.49	86.20	10.80	11.22	35.63	0.55**
	2011	31.35	52.00	20.00	6.15	19.63	
Leaf length at the ear (LL, cm)	mean	72.74	88.80	61.70	5.70	7.84	
	2010	72.49	89.00	60.40	5.69	7.85	0.69**
	2011	72.70	90.40	59.60	6.42	8.83	
Leaf width at the ear (LW, cm)	mean	8.52	11.30	6.10	0.92	10.85	
	2010	8.72	10.80	6.10	0.95	10.93	0.64**
	2011	8.30	11.80	6.00	1.09	13.18	
Bract leaf length (BYC, cm)	mean	27.90	36.70	18.20	3.15	11.28	
	2010	29.11	41.50	21.40	3.86	13.27	0.58**
	2011	26.60	36.20	15.00	3.22	12.09	
Leaf number (LN)	mean	17	21	14	1.33	7.78	
	2010	16	20	12	1.23	7.56	0.57**
	2011	18	22	16	1.25	7.25	
Number of green leaves	mean	5	9	2	1.39	25.46	
at mature (GLN)	2010	6	11	2	1.80	31.21	0.33**
	2011	5	9	1	1.62	31.23	
Days to tasseling (TD, day)	mean	59	60	43	2.51	4.49	
	2010	53	61	45	2.63	4.96	0.37**
	2011	64	70	56	2.57	3.99	
Days to anthesis (AD, day)	mean	62	64	46	2.78	4.71	
	2010	57	65	51	2.74	4.81	0.53**
	2011	67	72	60	2.52	3.74	
Tasseling to-anthesis internal (TAI)	mean	3	8	0.5	1.40	0.46	
	2010	3	9	-1	1.95	0.62	0.22*
	2011	3	13	0	1.50	0.50	
Days to Silking (SD, day)	mean	63	65	47	3.40	5.69	
	2010	57	65	52	3.30	5.79	0.58**
	2011	69	76	63	3.05	4.43	
Anthesis to-silking internal (ASI)	mean	1	6	-3.5	1.67	198.61	
	2010	0	6	-7	1.95	534.71	0.30**
	2011	1	6	-4	2.15	160.28	
Days to mature (MD, day)	mean	98	107	87	4.64	4.76	
	2010	94	107	81	5.94	6.33	0.26*

	2011	101	107	91	5.55	5.50	
Ear trait							
Number of kernel rows (KRN)	mean	14	20	10	1.79	12.82	
	2010	13	20	10	1.82	13.50	0.55**
	2011	14	20	9	2.02	14.78	
Number of kernels per row (RKN)	mean	18	28	10	3.11	17.35	
	2010	20	36	10	4.23	21.27	0.24*
	2011	16	29	8	3.27	20.23	
Ear length (EL, cm)	mean	12.42	16.70	6.65	2.26	18.24	
	2010	12.95	18.60	6.00	2.51	19.42	0.57**
	2011	11.70	18.00	6.20	2.46	21.00	
Ear diameter (ED, cm)	mean	4.09	5.45	3.20	0.42	10.18	
	2010	4.18	5.25	3.00	0.48	11.46	0.23*
	2011	4.05	7.00	3.00	0.57	14.17	
Bald length (BL, cm)	mean	1.34	3.72	0.00	0.79	58.95	
	2010	0.87	3.50	0.00	0.82	94.02	0.1800
	2011	1.86	5.30	0.00	1.22	65.74	
Cob diameter (CD, cm)	mean	2.75	3.84	1.96	0.38	13.77	
	2010	2.73	3.93	1.60	0.42	15.49	0.33**
	2011	2.80	4.70	1.30	0.51	18.11	
Ear weight (EW, g)	mean	78.00	142.28	24.22	24.30	31.15	
	2010	99.10	206.96	30.57	32.71	33.01	0.50**
	2011	57.40	124.13	18.76	20.16	35.12	
Cob weight (CW, g)	mean	23.97	48.37	7.56	9.08	37.88	
	2010	29.88	58.44	8.23	11.01	36.84	0.65**
	2011	17.77	40.32	6.52	8.03	45.21	
Grain weight per ear (GW, g)	mean	49.46	88.37	14.78	15.49	31.32	
	2010	58.54	127.70	21.91	19.73	33.70	0.35**
	2011	40.66	92.68	13.83	14.22	34.97	
Kernel ratio (KRO)	mean	0.72	0.87	0.61	0.06	8.92	
	2010	0.71	1.00	0.52	0.07	10.09	0.21*
	2011	0.75	0.89	0.54	0.07	8.87	
Hundred kernels weight (HKW, g)	mean	23.55	38.02	10.27	4.69	19.92	
	2010	25.40	40.49	11.12	5.33	20.99	0.52**
	2011	22.01	36.64	10.13	5.06	23.00	
Embryo length/Grain length (EL/GL)	mean	0.82	0.92	0.43	0.06	7.52	
	2010	0.80	0.95	0.10	0.09	11.55	0.24*
	2011	0.83	0.95	0.69	0.06	6.94	

a: The correlation coefficient of the 26 traits of 2010 and 2011 which indicated with asterisks, **P < 0.01, *P < 0.05. Mean: The average of each trait of the two years. CV: standard deviation/mean value.

Table S3. Marker-trait association results of the mean results of two years' at P < 0.01 level.

Trait	Locus	Bin	F_Maker	P_Maker	Trait	Bin	Locus	F_Maker	P_Maker
PH	umc1550	4.03	2.86	7.50E-03	AD	10.07	umc1196	4.89	5.60E-04
EH	umc1307	3.05	4.97	2.17E-04	TAI	2.09	bnlg1520	2.88	9.60E-03
LA	umc2165	6.07	2.45	7.40E-03	TAI	9.05	umc1231	3.41	7.50E-03
LL	umc1035	1.06	3.11	5.80E-03	SD	1.04	umc1917	5.70	4.70E-03
BYC	umc1147	1.07	3.30	9.00E-03	SD	2.02	bnlg1017	4.12	8.80E-03
BYC	bnlg2162	4.08	4.14	8.60E-03	SD	3.04	bnlg1904	2.45	9.20E-03
BYC	umc2066	5.04	5.05	2.90E-03	SD	4.02	umc1294	3.82	2.10E-03
BYC	umc1161	8.06	5.95	2.86E-04	SD	4.08	bnlg1444	3.01	3.80E-03
LN	bnlg1520	2.09	3.75	1.40E-03	SD	8.06	umc2218	5.58	1.50E-03
LN	umc1550	4.03	2.77	9.30E-03	SD	9.02	bnlg1401	3.73	6.40E-04
GLN	umc1681	1.11	3.55	9.90E-03	SD	10.06	bnlg2190	3.35	5.30E-03
GLN	phi098	2.02	2.94	2.70E-03	SD	10.07	umc1196	4.20	1.90E-03
GLN	bnlg198	2.08	4.54	1.40E-03	ASI	2.04	umc1454	5.08	8.20E-03
GLN	bnlg1118	5.07	4.40	6.61E-04	ASI	2.08	bnlg198	3.34	9.90E-03
TD	umc2215	1.01	8.56	7.68E-06	KRN	1.03	phi001	2.75	7.60E-03
TD	bnlg439	1.03	7.37	9.56E-06	KRN	2.03	umc1845	3.24	6.60E-03
TD	umc1917	1.04	6.19	3.10E-03	KRN	5.01	phi024	5.63	1.40E-03
TD	phi098	2.02	2.86	3.30E-03	KRN	7	umc1695	4.94	9.30E-03
TD	mmc0271	2.07	5.05	4.16E-05	RKN	1.01	bnlg1014	3.51	2.50E-03
TD	bnlg1045	2.07	6.18	3.28E-06	RKN	4.11	umc1058	3.25	9.90E-03
TD	phi053	3.05	5.24	1.41E-05	EL	4.08	bnlg2162	5.02	3.00E-03
TD	mmc0481	5.06	3.08	8.31E-04	EL	8.05	umc1562	3.30	5.90E-03
TD	phi048	5.07	4.79	7.72E-05	ED	2.03	umc1845	3.45	4.40E-03
TD	bnlg389	5.09	3.45	4.30E-03	ED	3.03	bnlg1447	3.79	7.00E-03
TD	umc1006	6.02	3.03	5.38E-04	ED	10.06	umc2122	5.46	1.80E-03
TD	nc010	6.04	7.18	2.35E-04	CD	1.03	umc1397	9.14	3.30E-03
TD	umc1457	8.04	3.11	3.00E-03	CD	1.05	umc2025	6.01	2.71E-04
TD	umc1867	9.01	5.98	3.12E-05	CD	6	phi075	3.04	4.90E-03
TD	bnlg1724	9.01	3.82	2.00E-03	CD	10.06	umc2122	4.27	7.40E-03
TD	bnlg1401	9.02	5.40	1.06E-05	CD	10.06	bnlg2190	3.50	3.90E-03
TD	umc1657	9.05	4.55	7.32E-06	EW	1.01	umc2215	4.14	4.20E-03

TD	bnlg2190	10.06	4.86	2.68E-04	EW	7	bnlg2132	3.03	3.70E-03
AD	umc2215	1.01	7.44	3.54E-05	EW	7.01	umc1066	5.55	5.40E-03
AD	umc2226	1.02	3.06	1.90E-03	EW	8.05	umc1562	3.58	3.40E-03
AD	bnlg439	1.03	7.08	1.52E-05	CW	1.06	umc1035	3.20	5.00E-03
AD	umc1917	1.04	8.12	5.83E-04	CW	4.08	bnlg2162	4.24	7.70E-03
AD	mmc0271	2.07	2.82	8.20E-03	CW	5.07	bnlg1118	3.06	9.50E-03
AD	bnlg1045	2.07	5.59	1.22E-05	CW	7.01	umc1066	5.52	5.60E-03
AD	umc1773	3.04	3.31	5.70E-03	GW	1.01	umc2215	4.44	2.70E-03
AD	phi053	3.05	3.63	7.90E-04	GW	8.05	umc1562	3.10	8.80E-03
AD	mmc0481	5.06	2.59	4.30E-03	GW	9.03	mmc0051	2.88	5.70E-03
AD	phi048	5.07	4.01	4.83E-04	GW	10.03	umc1381	4.17	4.00E-03
AD	bnlg389	5.09	4.03	1.40E-03	KRO	1.03	bnlg2180	2.42	8.80E-03
AD	bnlg161	6	3.45	4.30E-03	KRO	1.03	umc1397	9.28	3.10E-03
AD	umc1006	6.02	2.48	3.90E-03	KRO	2.02	umc1823	4.89	1.25E-04
AD	nc010	6.04	6.91	3.18E-04	KRO	2.03	umc1555	6.88	2.10E-05
AD	umc1457	8.04	2.69	8.70E-03	KRO	4.08	umc1808	4.25	6.57E-05
AD	umc1960	8.06	4.23	1.65E-04	KRO	5.04	umc1221	3.62	1.20E-03
AD	umc1867	9.01	5.53	7.32E-05	HKW	1.03	bnlg439	3.28	9.60E-03
AD	bnlg1724	9.01	3.46	4.20E-03	HKW	1.04	umc1917	8.50	4.50E-03
AD	bnlg1401	9.02	5.00	2.75E-05	HKW	7.03	bnlg1579	3.71	7.90E-03
AD	umc1657	9.05	3.02	1.00E-03	EL/GL	8.05	bnlg1812	3.80	8.38E-04
AD	bnlg2190	10.06	3.76	2.30E-03	EL/GL	10.04	umc2163	3.37	3.40E-03

Table S4. 204 pairs of SSR loci and its sequence.

Bin	SSR locus	Primer sequence	Bin	SSR locus	Primer sequence
1.01	bnlg1014	F-CACGCTGTTTCAGACAGGAA	5.06	mmc0481	F-GCACCTGCGAGACTAGG
		R-CGCCTGTGATTGCACTACAC			R-TGTTTGAGCCGTTCTAGACT
1.01	umc1071	F-AGGAAGACACGAGAGACACCGTAG	5.06	umc1752	F-ATCCTCCTCCATATTCTATCGCGT
		R-GTGGTTGTCGAGTTCGTCGTATT			R-GAAACAGAGCAGGAACCGGAG
1.01	umc2215	F-ATGCATGATGACGACATGATAAGC	5.06	umc1680	F-TTAATAAAGGAGAGGGTGGGAACC
		R-CATGGCACCATACATGTAAGCAC			R-GGGGCTTATATGTCCCTTGAACTC
1.02	umc1166	F-CGATCAGATCATACACAACCTTGC	5.07	phi048	F-GCAAACCTTGCATGAACCCGATTGT
		R-GAGGATCGATTCTTGGCGAGT			R-CAAGCGTCCAGCTCGATGATTTC
1.02	umc1976	F-TGCCGAGGCTTCTAGTAGACCAA	5.07	bnlg1118	F-CAGAGTTGATGAACTGAAAAAGG
		R-CGCTATATCTATCCCGCAGCAAC			R-CTCTTGCTTCCCCCCTAATC
1.02	umc2226	F-AGCTTCACGCTCTTCTAGACCAAA	5.08	umc1225	F-CTAGCTCCGTGTGAGTGAGTGAGT
		R-TGCTGTGCAGTTCTTGCTTCTTAC			R-TTCCTTCTTTCTTTCCTGTGCAAC
1.03	umc1397	F-GTTACACTTGCAGACAAACAACCG	5.09	bnlg389	F-GGTCACCCTCCCTTTGCAG
		R-GTCATGTGATCCGGGAGTAAATCT			R-ATTGCCTACACAGTTTGATTGG
1.03	umc1479	F-CTGGCTCTTCAAGTGTAAAGGAGG	6	phi075	F-GGAGGAGCTCACCGGCGCATAA
		R-GGCCTTTTTCTTAGCTTCCTCATC			R-AAAGGTTACTGGACAAATATGCGTAACTCA
1.03	bnlg439	F-TTGACATCGCCATCTTGGTGACCA	6.01	bnlg1371	F-TTGCCGATAAGAACCAAACA
		R-TCTTAATGCGATCGTACGAAGTTGTGGAA			R-ACGACCGGTGTGGTTACATT
1.03	phi001	F-TGACGGACGTGGATCGCTTCAC	6.01	umc1133	F-ATTCGATCTAGGGTTTGGGTTCAG
		R-AGCAGGCAGCAGGTCAGCAGCG			GATGCAGTAGCATGCTGGATGTAG
1.03	bnlg2180	F-ACAAGGGCGTACCAACCAC	6.01	bnlg1538	F-CAGCCGAAGACGAAGCC
		R-TGACCAGAGGCTTCCATACC			R-GTGGTGAACGAACGAGCAA
1.03	phi109275	F-CGGTTCATGCTAGCTCTGC	6.01	phi077	F-GAGAAGAGGATCAGGTTCGTTCCA
		R-GTTGTGGCTGTGGTGGTG			R-CGCGTTGTACATCTTGCCTGCTT
1.04	umc1917	F-ACTTCCACTTCACCAGCCTTTTC	6.02	umc1006	F-AATCGCTTACTTGTAACCCACTTG
		R-GGAAAGAAGAGCCGCTTGGT			R-AGTTTCCGAGCTGCTTTCTCT
1.05	umc2025	F-ACGCCGTAGTATTTGGTAGCAGAAG	6.02	umc1186	F-TCAAGAACATAATAGGAGGCCCAC
		R-TCTACCGCTCCTTCGTCCAGTA			R-AGCCAGCTTGATCTTTAGCATTTG
1.05	umc1124	F-GAAAGGAATCTTTCAGCTCACACC	6.02	umc1178	F-CTGTCGTAAGAGCGCCAACAG
		R-ACCTGGCGAGCAGTAGCAGTAG			R-GTCTGAACGATGAACAGTACACGC
1.05	umc1395	F-TGAATGAGTGGCATTCAAAATCTG	6.04	umc1857	F-TTCCTTGCCAACAAATACAAGGAT
		R-CAGATTGCATGTGTGAGTGTGTGT			R-GTTCATTGCTTCATCTTGGAACCT
1.06	umc1590	F-CAGAGTCTGATAGTCCGAACCCAG	6.04	nc010	F-TGAGCTGACGACGAGCAG
		R-GTAAAGCTCACAGCTTCCGACAG			R-CATTATCTGTTCGGCCCG
1.06	umc1035	F-CTGGCATGATCACGCTATGTATG	6.04	umc1014	F-GAAAGTCGATCGAGAGACCCTG
		R-TAACATCAGCAGGTTTGCTCATTC			R-CCCTCTCTTCACCCCTTCCTT
1.06	umc1122	F-CACAACTCCATCAGAGGACAGAGA	6.05	bnlg1617	F-CGTGCACGGTACAGAAAGAA
		R-CTGCTACGACATACGCAAGGC			R-AGAAAGCCACGTACCCCTTT
1.07	umc1147	F-GAGAAACCATCGACCCTTCCTAAC	6.05	umc1805	F-AGTGCACCAGCTTTTAATCACCTC
		R-TTCCTATGGTACAGTTCTCCCTCG			R-TGTGACCTGTGTGGTCTGTGG
1.07	bnlg1564	F-ACGGGAGAACAAAAGGAAGG	6.06	umc1859	F-ATATACATGTGAGCTGGTTGCCCT
		R-CTCTCCCTCACATCCGCC			R-GCATGCTATTACCAATCTCCAGGT
1.08	umc1446	F-GCGCTGCTGCTTCTTAAATTATCT	6.07	umc2165	F-AGAACACCAAATGGTGACGTTATGT
		R-GATGAGACCACCTACAAGTTCGCT			R-CTAGCTCGTCTTCCCTGTGGTCT
1.08	umc2240	F-CGGATGTTGCCAAGTACATCATATC	6.07	umc1653	F-GAGACATGGCAGACTCACTGACA

		R-CGCCTTTGTAACCCAGACTCATTA			R-GCCGCCCACGTACATCTATC
1.09	phi011	F-TGTTGCTCGGTCACCATACC	6.07	phi123	F-GGAGACGAGGTGCTACTTCTTCAA
		R-GCACACACACAGGACGACAGT			R-TGTGGCTGAGGCTAGGAATCTC
1.1	phi308707	F-GCAACAAGATCCAGCCGAT	7	umc2177	F-ACCATGCATGTCTCACGTCACT
		R-GTCGCCCTCATATGACCTTC			R-GGGTACGTGCTGTGGAGGAC
1.1	umc1774	F-ATGGGACTATGCATGGTATTTGG	7	umc1695	F-CAGGTAATAACGACGCAGCAGAA
		R-TACACCATACGTCACCAGGTTCAC			R-GTCCTAGGTTACATGCGTTGCTCT
1.11	phi120	F-GACTCTCACGGCGAGGTATGA	7	bnlg2132	F-GGCGAGAGAGGCAAAGTTAA
		R-TGATGTCCCAGCTCTGAACTGAC			R-GTCGCACAAGGGGATCAC
1.11	umc1681	F-GAGGACACTCGCAAAGTCGC	7.01	umc1066	F-ATGGAGCACGTCATCTCAATGG
		R-GCCTTTGTGGGGTCAGGAGTAG			R-AGCAGCAGCAACGTCTATGACACT
1.11	phi064	F-CCGAATTGAAATAGCTGCGAGAACCT	7.02	umc1016	F-GTGATACCGGGTAATCTGGTGC
		R-ACAATGAACGGTGGTTATCAACACGC			R-GATGATGGGTGATCATCGGTTC
2	umc1419	F-CTCATCACAACTAGCGCCACTCTA	7.02	bnlg1094	F-GTGAAGAACGATGACGCAGA
		R-ATAGTGCAGAGGTCATCGTGGC			R-CAGCAACGCTCTCACATTGT
2	umc2246	F-AGGCTCCAGCTCTAGGGGAGT	7.02	umc1983	F-ATGGATCAGGGGAAAGAGCAAG
		R-GTGAACTGTGTAGCGTGGAGTTGT			R-CTGAAGGCCTCCTCGTCCTC
2.01	phi96100	F-AGGAGGACCCCAACTCCTG	7.02	bnlg1808	F-CTTTTCTCTTCTAGTAATGAACAGTCA
		R-TTGCACGAGCCATCGTAT			R-GCATGATCGAACGAAGGC
2.02	phi098	F-GAGATCACCGGCTAGTTAGAGGA	7.03	umc1015	F-CAGACACAAGCAGCAAAGCAAG
		R-GTATGGTTGGGTACCCGTCTTTCTA			R-TCCGACTCCAAGAAGAGGAGAA
2.02	bnlg1017	F-ATTGGAAGGATCTGCGTGAC	7.03	bnlg1305	F-GCACGGGCATCAGAGAGAG
		R-CAGCTGGTGGACTGCATCTA			R-CATGGGTAAGTTGCTGAAAGTTT
2.02	umc1823	F-AAAGCCTTACTGTTATTAGGCTAGGCA	7.03	bnlg1579	F-CGGTTAAAAGGAGAGGTCCC
		R-AGAAAACCAGCCCCAGATGTTC			R-GACTTCAGGCACATCTTGCA
2.02	umc1756	F-ATCTCAGGTACTCTGCCTACGGG	7.03	umc1936	F-GAGCTCATGTGTATGTGGACGTTG
		R-AACAGAGGGTAGCTTGTGGCCT			R-AATAAACAGAGGTAGGTCAGGTCGC
2.03	umc1845	F-TGGTTGAACTGTTAAATCTGTCCTGA	7.04	umc1710	F-ACTTTGCAACTACCGTACATGGGT
		R-TGGTAACCAGATTCCCACAGATG			R-TTCGACTGCACGTGAAAATCTATC
2.03	umc1555	F-ATAAAACGAACGACTCTCTCACCG	7.04	umc1593	F-CATGTTGATCATATGCACGAGAGA
		R-ATATGTCTGACGAGCTTCGACACC			R-CAGCCTGGTGACTCATGGTTAAT
2.03	bnlg1621	F-CTCTTCGATCTTTAAGAGAGAGAGAG	7.04	umc1944	F-GAAGAAGGATCGCACACATGG
		R-ACACGAGGCACTGGTACTAACG			R-AGACTGTCGCGCTGTACTATACCC
2.04	umc1024	F-CCTTTTTCGCCTCGCTTTTTAT	7.04	umc1708	F-GATATGTCGAGCTTCGCTGGAG
		R-TCGTCGTCTCCAATCATACGTG			R-CGCACACTAAAGCATCCTTAACCT
2.04	umc1454	F-GAGTCTACAATTACCTGGCCGAGA	7.04	Dupssr13	F-TCGTTCGGTCCATGAAAT
		R-ATGTACCCCGCATTTGTGTACCT			R-CAAATATCTCTCATCTTTGCTGAC
2.06	bnlg1036	F-GGGAGTATGGTAGGGAACCC	7.06	phi116	F-GCATACGGCCATGGATGGGA
		R-AAACCCTTGGAGCATACCCT			R-TCCCTGCCGGGACTCCTG
2.06	nc003	F-ACCCTTGCCTTTACTGAAACACAACAGG	8	umc1359	F-GCAGAGCCAGAATTCGACCTT
		R-GCACACCGTGTGGCTGGTTC			R-CATCGTCATCATTCGAGCAGAG
2.07	mmc0271	F-CGTAATGCGTAGCAACATAG	8.01	umc1414	F-CGATCATCTCTCACTCTCTCGTCA
		R-CAACATCCTTTCCACCG			R-GTTGACGACGTCTGGCTCCT
2.07	bnlg1045	F-TCCCCGATAGCATATCGATC	8.03	bnlg1834	F-AAGGTTGGGTGTTGCTATGC
		R-GTGACTTTGGGGAGTTTGGA			R-TAGCTCTGCCACTGGACATG
2.08	bnlg198	F-GTTTGGTCTTGCTGAAAAATAAAA	8.03	bnlg1863	F-GGCGTTCGTTTTGCACTAAT
		R-GCTGGAGGCCTACATTATTATCTC			R-CGACACAGTTGACATCAGGG
2.09	bnlg1520	F-TCCTCTTGCTCTCCATGTCC	8.03	umc2366	F-CCTTCTTCCCGTCATTCTTCTTCT
		R-ACAGCTGCGTAGCTTCTTCC			R-ACATCGATCCAACCGTCATAAATC
3	umc2105	F-ACATACATAGGCTCCCTTTTTCCG	8.04	umc1457	F-CCCTAGGACACTGGAGGTTACAGA
		R-TCCCGTGACACTCTCTTTCTCTCT			R-GGCTAAGCGTTTTTACAAGTCCAA
3.01	umc2101	F-CCCGGCTAGAGCTATAAAGCAAGT	8.05	phi014	F-AGATGACCAGGGCCGTCAACGAC
		R-CTAGCTAGTTTGGTGCGTGGTGAT			R-CCAGCTTCACCAGCTTGCTCTTCGTG
3.01	umc1970	F-ACTGATGGTGTTCTTGGGTGTTTT	8.05	umc1562	F-CAAAGCAGTACAATATGACCCCAG
		R-TTTTTACCCGAAGGTTCATCGTTT			R-CGTACGTCCCATAAAGATGAGAAA
3.02	bnlg1144	F-TACTCGTCGTGTGGCGTTAG	8.05	bnlg1812	F-CGAGAAGACTTGCGTGAACA
		R-AGCCGAGGCTATCTAACGGT			R-TTACGTGCGTCGTCAGAATC
3.03	bnlg1447	F-GAGAGGAGAGGCTGAGCTGA	8.06	umc1960	F-CTGCTGGACTACATGGTGGACTT
		R-TCCTCCCACTGAATTTCCAC			R-GAGCTGTAGCACCCCCAAAAC
3.04	bnlg1904	F-AGGAGCATGCACTTGGTTCT	8.06	umc1161	F-GGTACCGCTACTGCTTGTTACTGC
		R-ACTCAACTGATGGCCGATCT			R-GCTCGCTGTTGGTAGCAAGTTTTA
3.04	phi036	F-CCGTGGAGAGACGTTTGACGT	8.06	umc2218	F-TATCCTCGGAAGCGAACGAA
		R-TCCATCACCACTCAGAATGTCAGTGA			R-CACGGTGCTGTACACAACTAAAGG
3.04	bnlg1452	F-CTCCTCTCCTCCACGATCAC	8.07	umc1268	F-ACGAACAACCTAGCACAGTCCTAAA
		R-CGCAAACGATCTCTGACCTT			R-CAAGGCGGTTACCAAGTTTACATC
3.04	umc1025	F-GCTCCACTTCCACCCTGATATG	8.08	phi015	F-GCAACGTACCGTACCTTTCCGA
		R-CGCTAATGTCCCCATTGATGAT			R-ACGCTGCATTCAATTACCGGGAAG
3.04	umc1773	F-GGATCACACTATCGAGTCAGCGAT	8.08	phi080	F-CACCCGATGCAACTTGCGTAGA
		R-CAAGGTAGCGTCGTCCTCCTC			R-TCGTCACGTTCCACGACATCAC
3.05	umc1750	F-CCACAACTCGCTGCTGTCAATA	8.09	umc1663	F-GCTTGCACTAGCTTTAGCTCCATC
		R-AGGAGGCTGCTGACCCTTCTACT			R-CGGGATCAGTCGTTACAAACATAG

3.05	phi053	F-CTGCCTCTCAGATTCAGAGATTGAC	9.01	bnlg1724	F-CTGACCCAGAGCATTGTGAA
		R-AACCCAACGTACTCCGGCAG			R-GATGAAGAGCTTGCAGTCCC
3.05	umc1102	F-AAAATTAAAGTCAAGAGCGGGGAG	9.01	umc2084	F-ATCGCGACGAGTTAATTCAAACAT
		R-TCTAGCCGTAGCTTTAGCTGCATT			R-TACGATGTCTTCAGTGTGACACCA
3.05	bnlg1035	F-TGCTTGCACTGTCAGGAATC	9	umc1647	F-TAAAGCCACAGGCACGAACTTAAT
		R-CAGCTCTGACACACCACACA			R-CTTCGCATTTGCACCCAAAC
3.05	umc1307	F-GTACGGGTGAAGAGAACAGGTCAA	9.01	umc1867	F-TGGTCTTCTTCGCCGCATTAT
		R-ATCTTCTCTGTTTTGGTCCCTTCC			R-ATAAGCTCGTTGATCTCCTCCTCC
3.08	bnlg1350	F-TGCTTCAGCGCATTAAACTG	9.01	phi028	F-TCTCGCTGTCCTTCGATTAGTACGG
		R-TGCTCGTGTGAGTTCCTACG			R-AATGCAGGCGATGGTTCTCCGGCCT
3.06	bnlg197	F-GCGAGAAGAAAGCGAGCAGA	9.02	bnlg244	F-GATGCTACTACTGGTCTAGTCCAGA
		R-CGCCAAGAAGAAACACATCACA			R-CTCCTCCACTCATCAGCCTTGA
3.07	umc1489	F-TTAATAGCTACCCGCAACCAAGAA	9.02	bnlg1401	F-CACTCGGTTTTTGCTTAGCC
		R-CTGAGCCACAGTACCTTGCTGTT			R-GTGTCGTCGAGTGCATGC
3.09	phi047	F-GGAGATGCTCGCACTGTTCTC	9.03	phi022	F-TGCGCACCAGCGACTGACC
		R-CTCCACCCTCTTTGACATGGTATG			R-GCGGGCGACGCTTCCAAAC
3.09	bnlg1496	F-CTGGGCAGACAGCAACAGTA	9.03	phi065	F-AGGGACAAATACGTGGAGACACAG
		R-AGCCAAAGACATGATGGTCC			R-CGATCTGCACAAAGTGGAGTAGTC
4.01	phi072	F-ACCGTGCATGATTAATTTCTCCAGCCTT	9.03	bnlg127	F-CATGTATACGAGAAGCACCCTAT
		R-GACAGCGCGCAAATGGATTGAACT			R-ATCGTAACTCAGCGGTTTGTG
4.01	umc2148	F-GGTAAGTCGTTTCAGCCTTTGCTA	9.03	mmc0051	F-ACGACTCTATCCCTGCCAACT
		R-AGACAGAAGAATGCTATGCGGTTC			R-TCTGGTTGTGAAAGCTATCCT
4.02	umc1288	F-ATCCGGACAAATTGAACTTTCATC	9.03	umc1267	F-TTACAACACGCATGCATCTAGCTT
		R-ATAGATTCAGTGTTGGACCGAGGA			R-AACAACAAAGAACTCACCAGCCTC
4.02	umc1294	F-GCCGTCAACGGGCTTAAACT	9.04	umc1107	F-TGAAAACTCTTTGCATTTTTGCTG
		R-GCCTCCAGCTCTCTCGTCTCTT			R-GAGATTTGGGAGTGAAATTGGTTG
4.03	umc2280	F-AAAAGAAGACGCTTTGTTTGTTGC	9.05	bnlg1270	F-TAGTTAACATGAGCAAATTAACAAGA
		R-TTTTCGTCAACTTGATGTTTATGAGAGT			R-TAGAAATGCAGAACCAGGGC
4.03	umc1550	F-CGGGGTAATTGGGTACATAACCTC	9.04	umc1519	F-CTCGAGACTCTGGTTCAATCCAAT
		R-GTGCCTCCAACGCCTAGTTTTT			R-CATGCACGTACTTCCCTGATTTTT
4.04	umc1652	F-GAGAGCAGTAGCACTGACCCTTTC	9.05	umc1094	F-GCTACTCTCGTGGACTGGTGGT
		R-CACTCGACCTCGATCGGAAC			R-TGAAGGCTTAGTGGTGATCCGT
4.05	umc1662	F-CCTTCTTCCTTCACGCCTCTTT	9.05	umc1357	F-TAGACATGTTGAAACCAGGACCG
		R-GACCACCTCATCTCTGACTCTGG			R-ACGACGTCAACAACAGCATGA
4.05	nc005	F-CCTCTACTCGCCAGTCGC	9.05	umc1231	F-CTGTAGGGCTGAGAAAAGAGAGGG
		R-TTTGGTCAGATTTGAGCACG			R-CGACAACTTAGGAGAACCATGGAG
4.05	phi079	F-TGGTGCTCGTTGCCAAATCTACGA	9.05	umc1657	F-ATGGATGAATATGATCCCACGG
		R-GCAGTGGTGGTTTCGAACAGACAA			R-GATCCGCACGTAGCTTTTCG
4.05	umc1896	F-CCAGGTATATGTTCTTTCCCCTCC	9.06	umc1366	F-GTCACTCGTCCGCATCGTCT
		R-ACGTCTCACTTATGATCCCTTGCT			R-CCTAACTCTGCAAAGACTGCATGA
4.06	umc1299	F-CTTGGGTTCTTCTCTCCTATGGGT	10	phi041	F-TTGGCTCCCAGCGCCGCAAA
		R-CGCTACAAACAAGTGGCGTTTAAT			R-GATCCAGAGCGATTTGACGGCA
4.08	umc1808	F-ATACACAGTGACAATGCGCCAC	10.01	umc1152	F-CCGAAGATAACCAAACAATAATAGTAGG
		R-AGCGAGTCATCAACATCATCAGG			R-ACTGTACGCCTCCCCTTCTC
4.08	Bnlg1444	F-GCATGGATGGAGAAAGAGGA	10.03	umc1367	F-TGGACGATCTGCTTCTTCAGG
		R-AGACGACGAAGCTTTTGCAT			R-GAAGGCTTCTTCCTCGAGTAGGTC
4.08	bnlg2162	F-GTCTGCTGCTAGTGGTGGTG	10.03	umc1381	F-CTCTAGCTACGAGCCTACGAGCA
		R-CACCGGCATTCGATATCTTT			R-CCGTCGAGTCAACTAGAGAAAGGA
4.08	umc1856	F-CATGCCTTTATTCTCACACAAACG	10.03	umc2016	F-ATTGCATTGCATTCAGCTGTTGT
		R-AGATCTGTTTTGCTTTGCTCTGCT			R-AGAGACGACATGTCTATCCTTGCC
4.08	umc2188	F-CGCCAACATGATTAACTTGCTATC	10.03	bnlg1712	F-CTCAGGCTTCACGTGGGTTT
		R-ATTTTCAGTCTGGGTACTTGAGCG			R-GTTACACTCCCCTGCCAAAA
4.11	phi076	F-TTCTTCCGCGGCTTCAATTTGACC	10.04	phi062	F-CCAACCCGCTAGGCTACTTCAA
		R-GCATCAGGACCCGCAGAGTC			R-ATGCCATGCGTTCGCTCTGTATC
4.11	umc1058	F-AGCAAGCAGTTCGAAACAAGGAT	10.04	umc2163	F-AAGCGGGAATCTGAATCTTTGTTC
		R-GACACCAGCACCACTTGAACG			R-GAAATTGCTGGGGTTCTCATTTCT
5	mmc0151	F-AAACCATGCATCCAACRAATG	10.04	umc1053	F-CTTGTATCATCAGCTAGGGCATGT
		R-AGACCCAGAGATGATTTAGG			R-TCAACTTATGTCAACTGCATGCTT
5.01	phi024	F-ACTGTTCCACCAAACCAAGCCGAGA	10.04	bnlg1526	F-ACGAGCGAGTGGAGAATAGG
		R-AGTAGGGGTTGGGGATCTCCTCC			R-AGCCCAGTACGTGGGGTC
5.01	umc1478	F-GAAGCTTCTCCTCTCGCGTCTC	10.04	umc1115	F-TGGAAGGGGATATCAGGATTTAGA
		R-CAGTCCCAGACCCTAGCTCAGTC			R-TGTGATGACCATGAATGTAAGCTG
5.03	umc1274	F-TTGAGTCTGGTACTGCGTATGAGG	10.04	bnlg1518	F-AGCTGTACACGCAGTAGGCA
		R-TAGCACTCCAACAGCAAGAGTTTG			R-GGCTCTGTTAATTCGATCGC
5.03	umc2296	F-GCTATACGCGTGCCAAGCTAAATA	10.05	bnlg1250	F-CCATATATTGCCGTGGAAGG
		R-TGCAGTGACTTGAGACCATACACA			R-TTCTTCATGCACACAGTTGC
5.03	phi109188	F-AAGCTCAGAAGCCGGAGC	10.05	umc1506	F-AAAAGAAACATGTTCAGTCGAGCG
		R-GGTCATCAAGCTCTCTGATCG			R-ATAAAGGTTGGCAAAACGTAGCCT
5.04	umc2066	F-ACATGGGCCGATGACTAAGAATAG	10.05	umc2043	F-GAGGCATACGGCATACCATACC
		R-CTGAGTACACACATGTCACACAGTTG			R-GTAGGAGAAACAGGTGCTGGTGTC
5.04	bnlg1287	F-GCCCTACCTGTTCTGTCTCG	10.06	umc2122	F-TTGACAAGCTAGTGTGCAACTGTG

		R-TGTCCCATACCTCAACGTGA			R-TGAAAGCCCACTGGACAAACTAAT
5.04	bnlg2323	F-ACCGTCTCAGCAAAATGGTC	10.06	umc1993	F-CTTTTCTGCTACTCCTGCCTGC
		R-CCGCCTTCACTATGGTCAAT			R-CTAGCTGATGGAGGCTGTAGCG
5.04	bnlg1074	F-CATGCTAATAGCCTACCGGG	10.06	bnlg2190	F-TCCTCCTTCATCCCCTTCTT
		R-TTTCCCCCTGATTCGTTATG			R-CCCAGTATCATTGCCCAATC
5.04	umc1221	F-GCAACAGCAACTGGCAACAG	10.07	umc1196	F-CGTGCTACTACTGCTACAAAGCGA
		R-AAACAGGCACAAAGCATGGATAG			R-AGTCGTTCGTGTCTTCCGAAACT
5.05	umc1482	F-GAACAAAGAATCACAACACGATGC	10.07	bnlg1677	F-GAGCAGAGCAGCTCCAAGAT
		R-CAGGTTCTGAGGAAAGCAAGGTT			R-AACAAGACGGGAGACAATGG
5.05	mmc0081	F-TGAAATAATTCACAGCACTCC	10.07	bnlg1839	F-AGCAGACGGAGGAAACAAGA
		R-TGATAGCACAACACAGCTATG			R-TCTCCCTCTCCCTCTTGACA
5.05	umc1822	F-GGTATAATTTTGCAAGCAGAAAGGG	10.07	bnlg1450	F-ACAGCTCTTCTTGGCATCGT
		R-GGTTTGCTCAGGAAGAGCATGT			R-GACTTTGCTGGTCAGCTGGT
5.05	umc2164	F-AGCACACAGACAAGAGAGACAACG	10.07	bnlg1185	F-CGGTCCAGGCAGGTTAATTA
		R-GACCGACAACAGAGATCGAGTACA			R-GACTCGAGGACACCGATTTC
5.06	umc1019	F-CCAGCCATGTCTTCTCGTTCTT	10.07	umc1645	F-CATCGTCATCAGTTCTTCCATGAG
		R-AAACAAAGCACCATCAATTCGG			R-GTGATTGACAGAGGACCATCAGAA