Supplementary data

The 2-oxoglutarate-dependent dioxygenase superfamily participates in tanshinone production of *Salvia miltiorrhiza*

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Fig. S1. Phylogenetic tree of 2OGD genes from *S. miltiorrhiza*, *A. thaliana*, and *O. sativa*.

Fig. S2. Gene structure analysis of 2OGD genes in *S. miltiorrhiza*.

Fig. S3. Conserved motif analysis of 2OGD genes in *S. miltiorrhiza*.

Fig. S4. Ten conserved motif sequences of 2OGD genes in *S. miltiorrhiza*.

Fig. S5. Gene ontology (GO) annotation analysis of 2OGD genes in *S. miltiorrhiza*.

Table S1. The primers used for qPCR analysis, full-length cloning, and gateway clones of RNAi vectors.

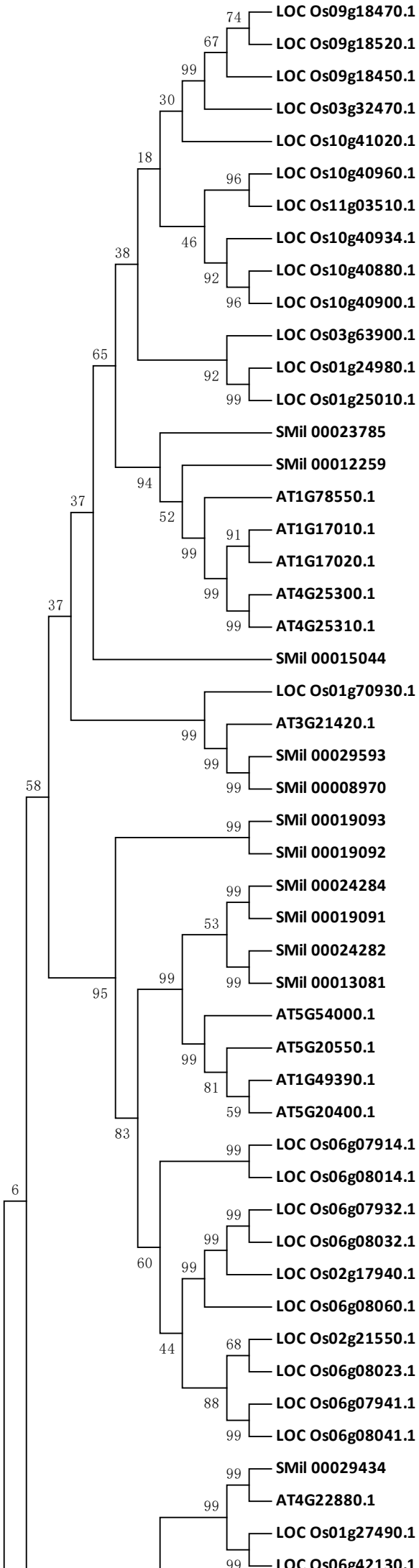
Table S2. The predicted cellular localization of 2OGD superfamily members in *S. miltiorrhiza*.

Table S3. The identification of homologous 2OGD members between *S. miltiorrhiza*, *A. thaliana*, and *O. sativa*.

Table S4. The gene expression of 2OGDs in different organs, tissues, and following MeJA treatment.

Table S5. Candidate 2OGDs related to tanshinone biosynthesis in *S. miltiorrhiza*.

Table S6. Different tanshinone metabolites analysed from 2OGD5-silencing lines and control lines.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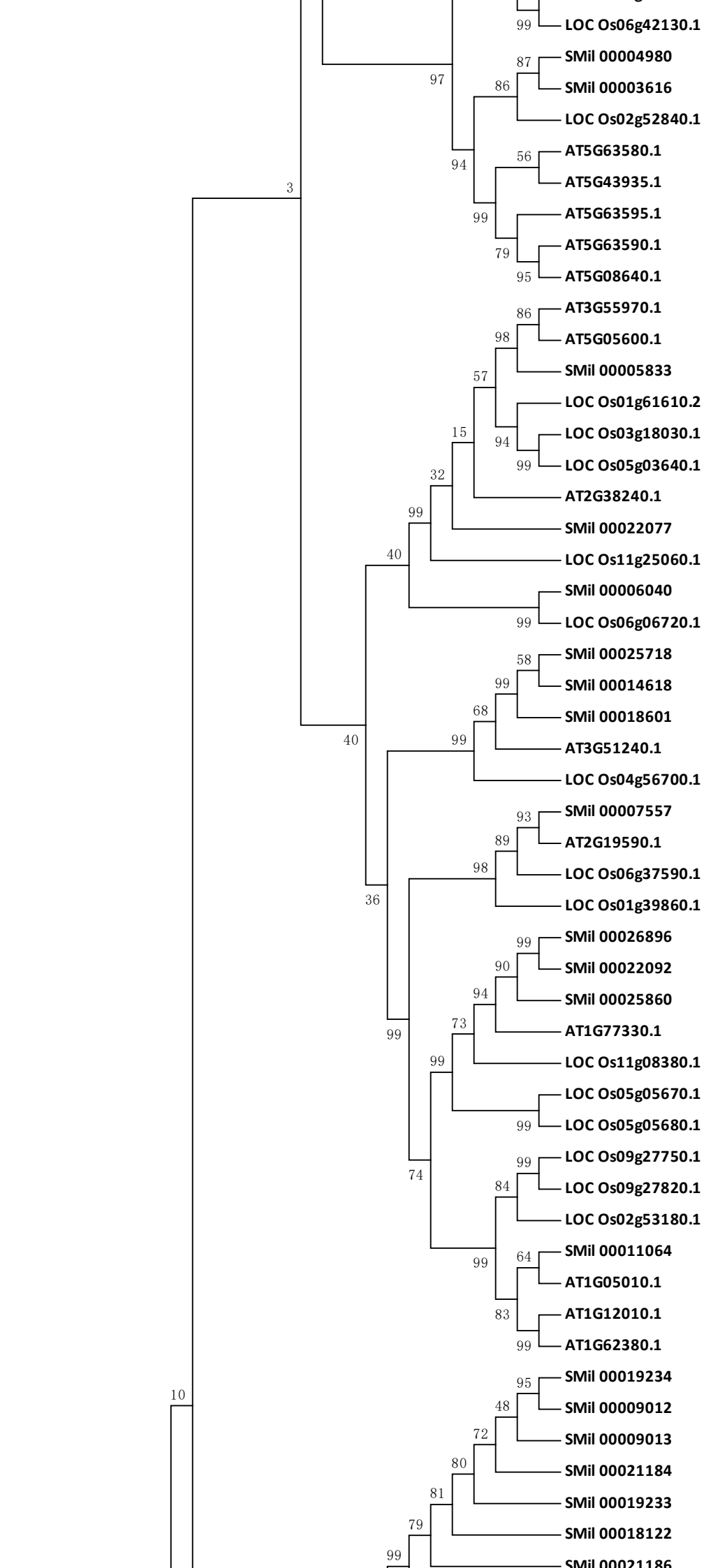
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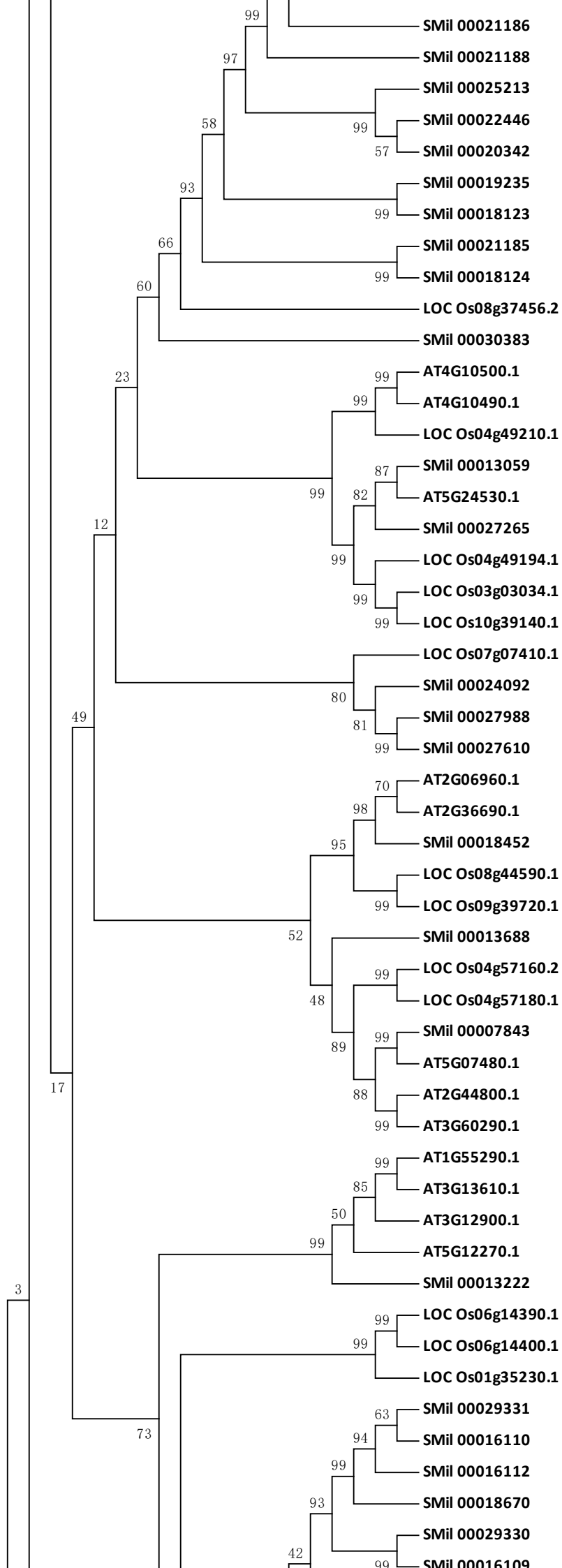
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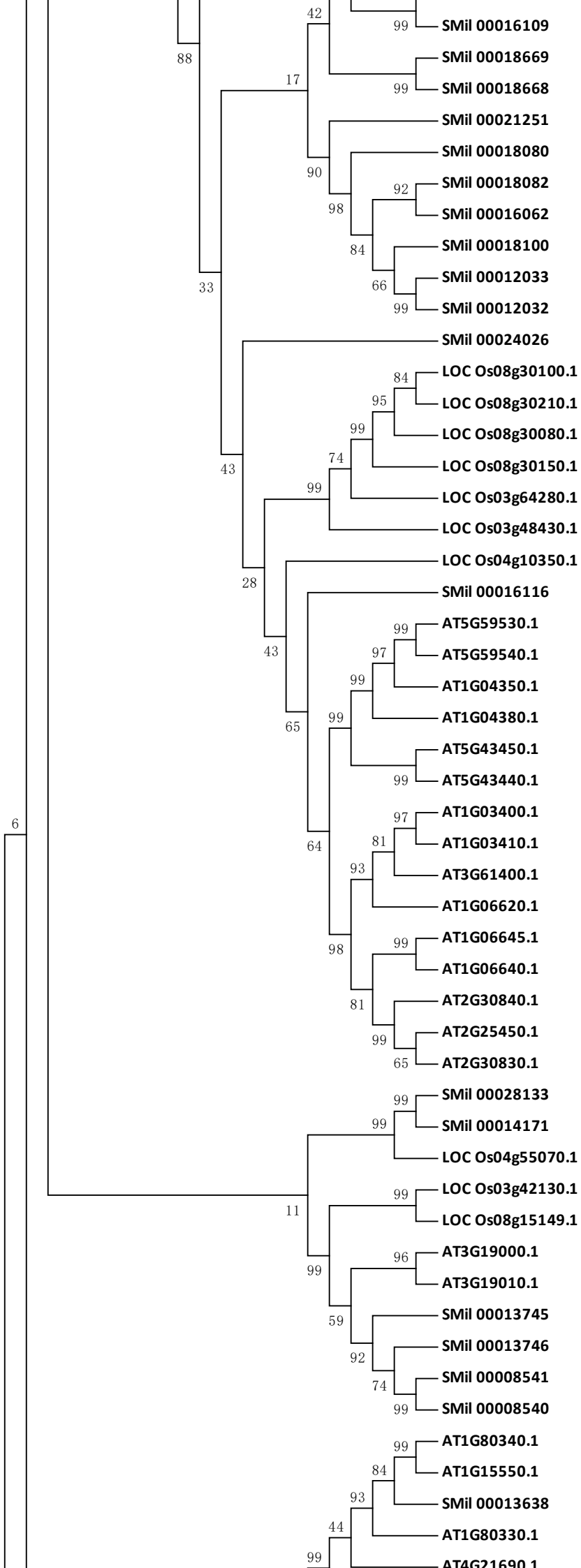
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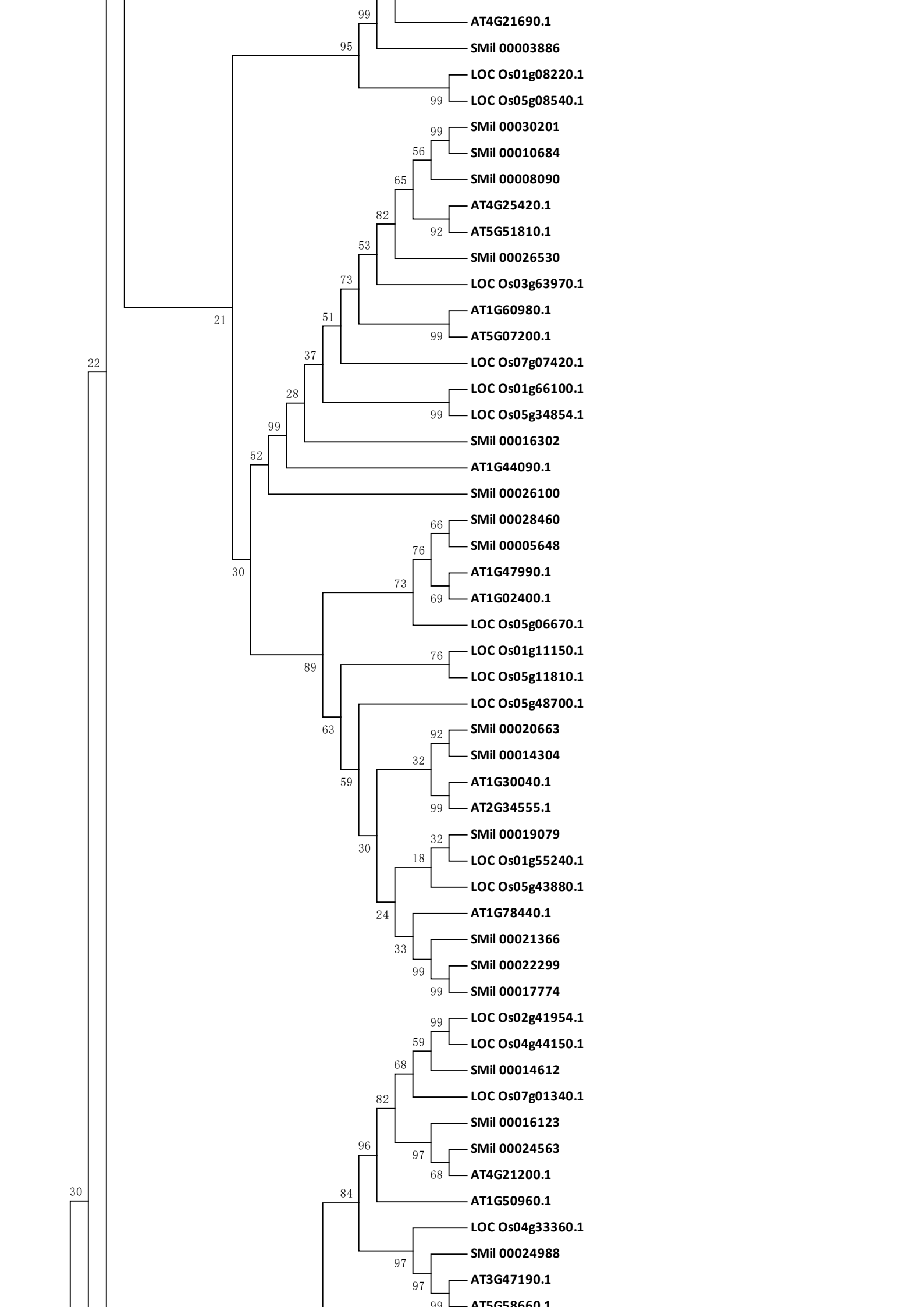
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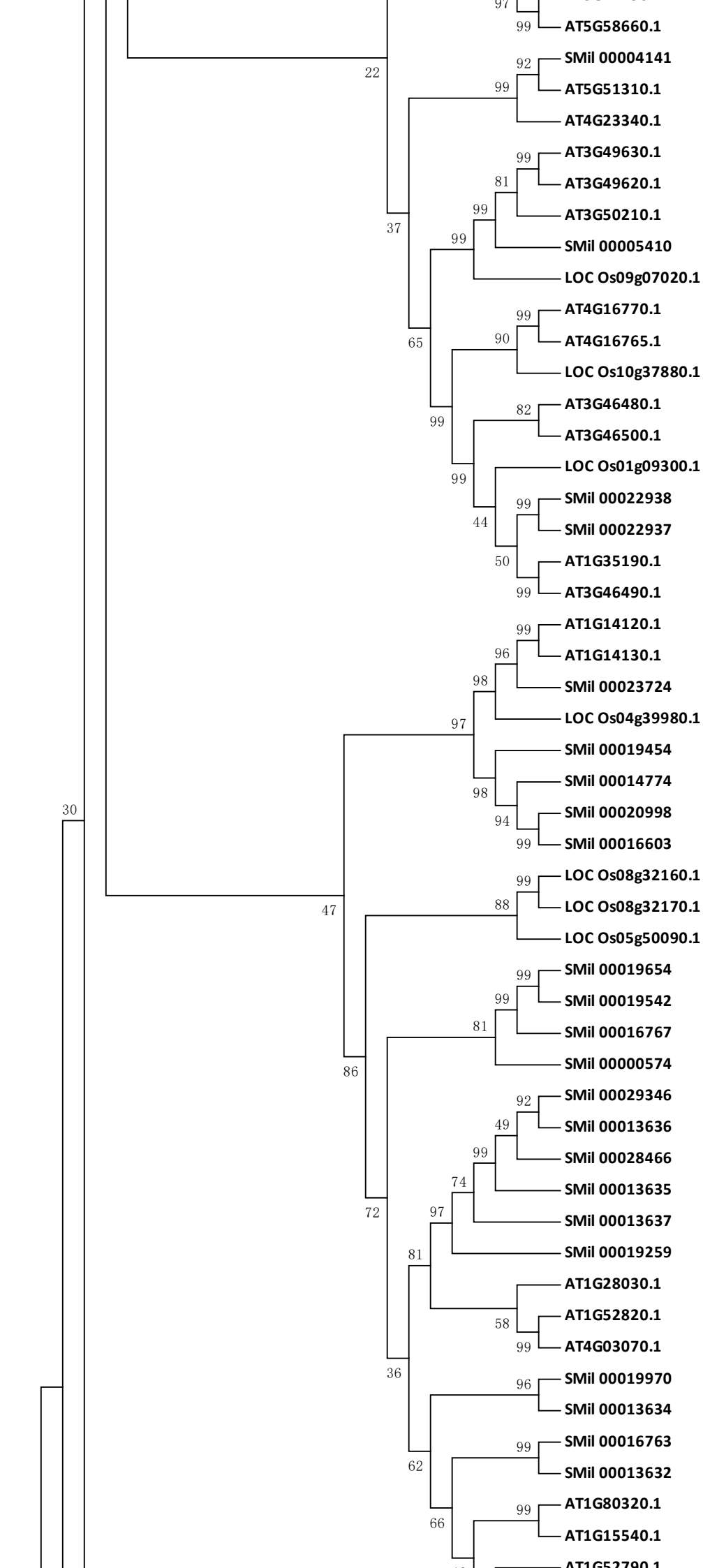
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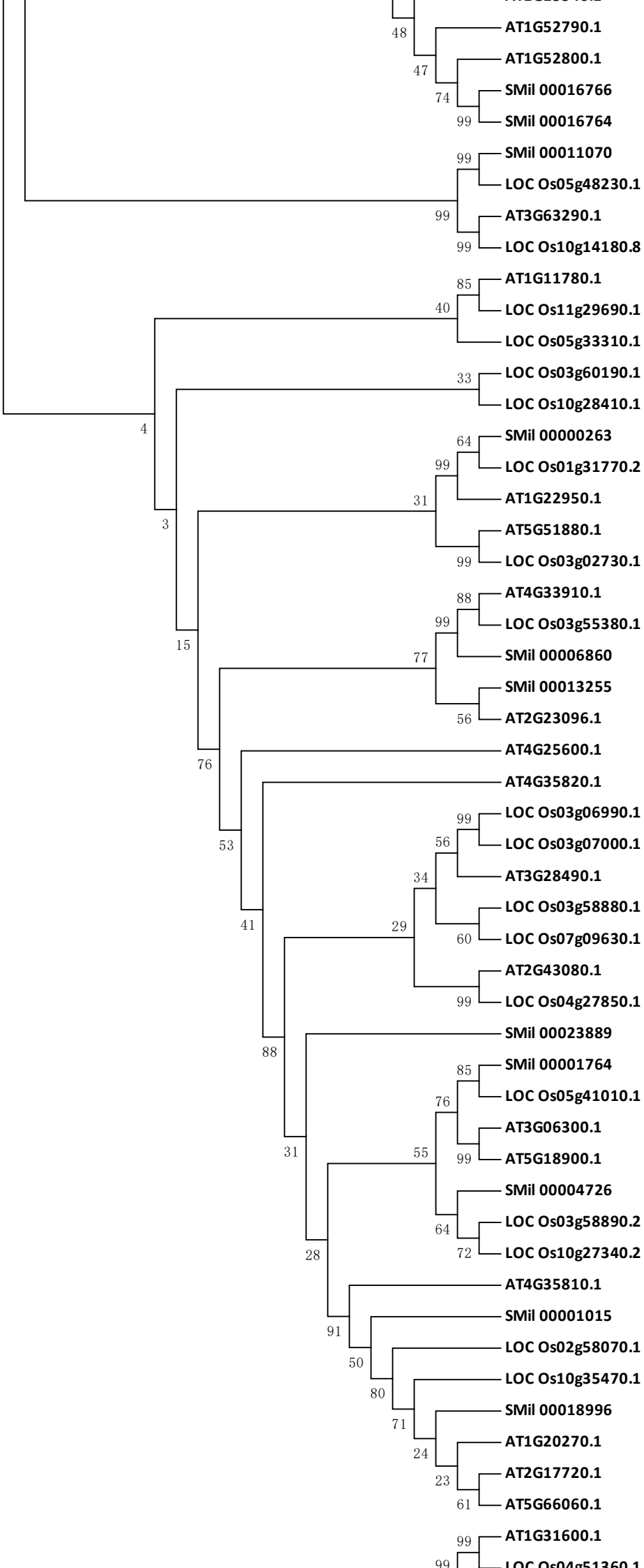
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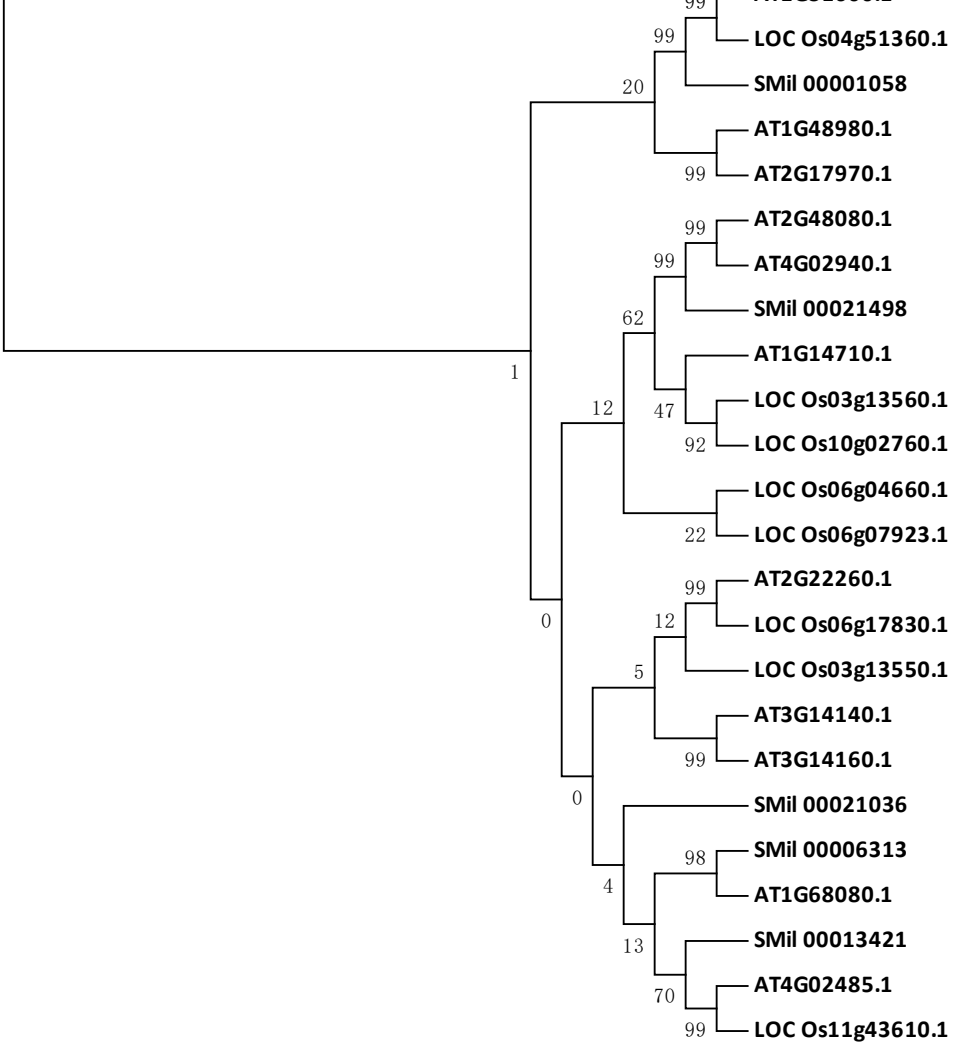
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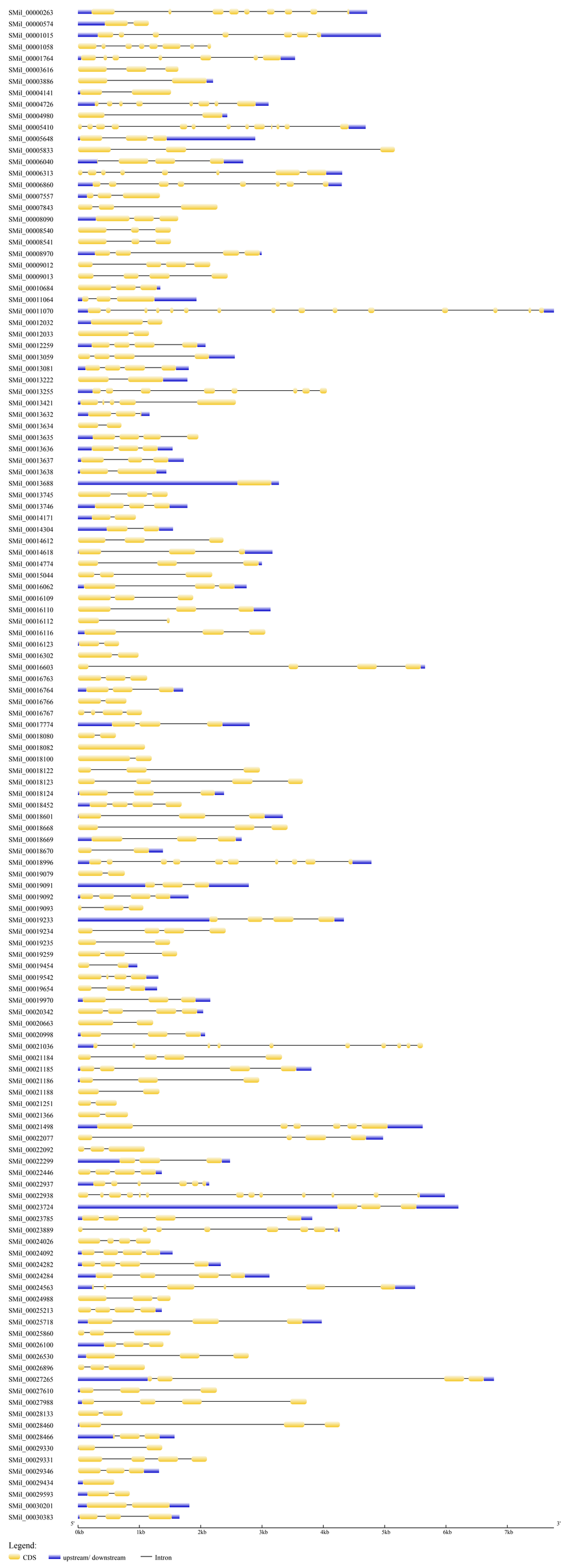
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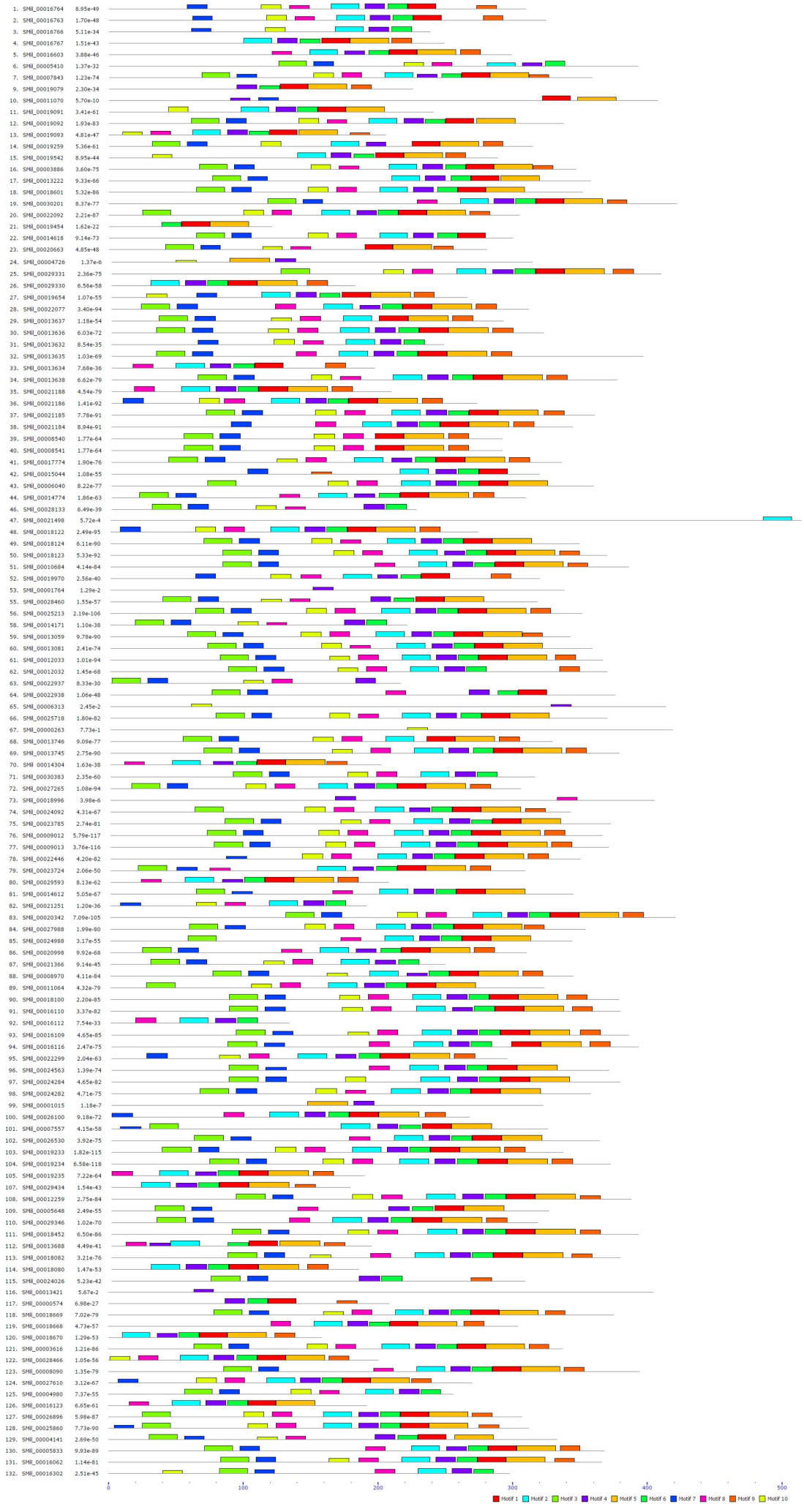
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122. SMII_00028466 1.05e-56
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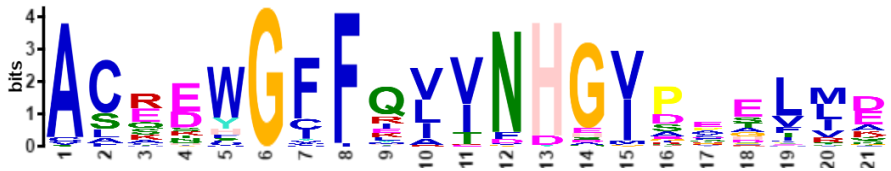
124. SMII_00027610 3.12e-67
125. SMII_00004980 7.37e-55
126. SMII_00016123 6.65e-61
127. SMII_00026896 5.98e-87
128. SMII_00025860 7.73e-90
129. SMII_00004141 2.69e-50
130. SMII_00005833 9.93e-89
131. SMII_00016062 1.14e-81
132. SMII_00016302 2.51e-45
0
100
200
300
400
500
Motif 1
Motif 2
Motif 3
Motif 4
Motif 5
Motif 6
Motif 7
Motif 8
Motif 9
Motif 10

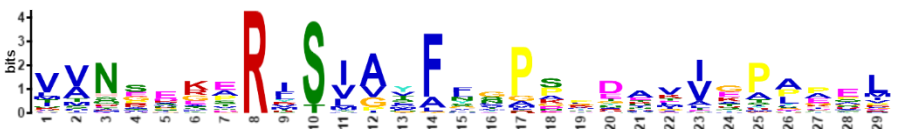
Motif 1

Motif 2

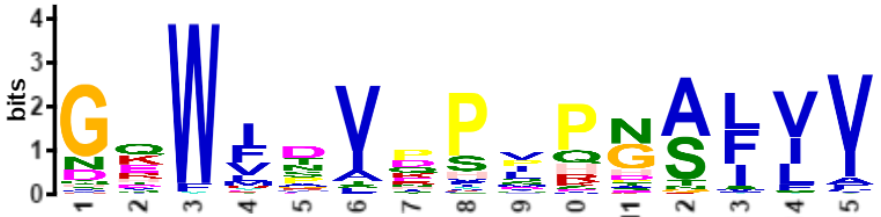


Motif 3

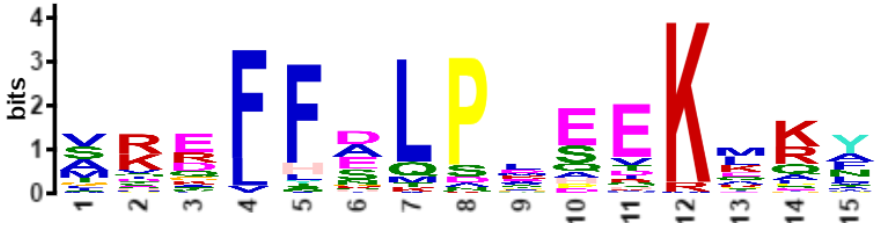
Motif 4



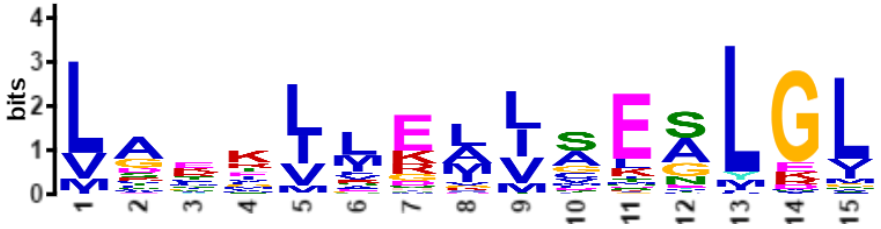
Motif 5



Motif 6

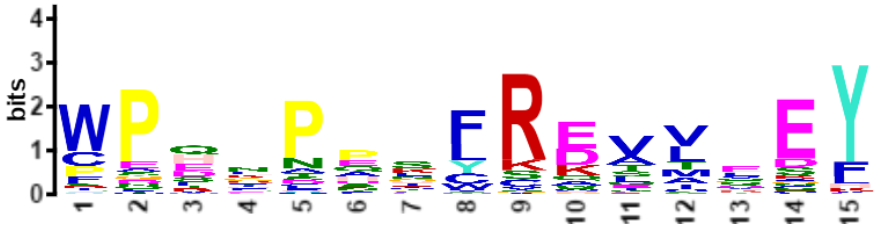


Motif 7

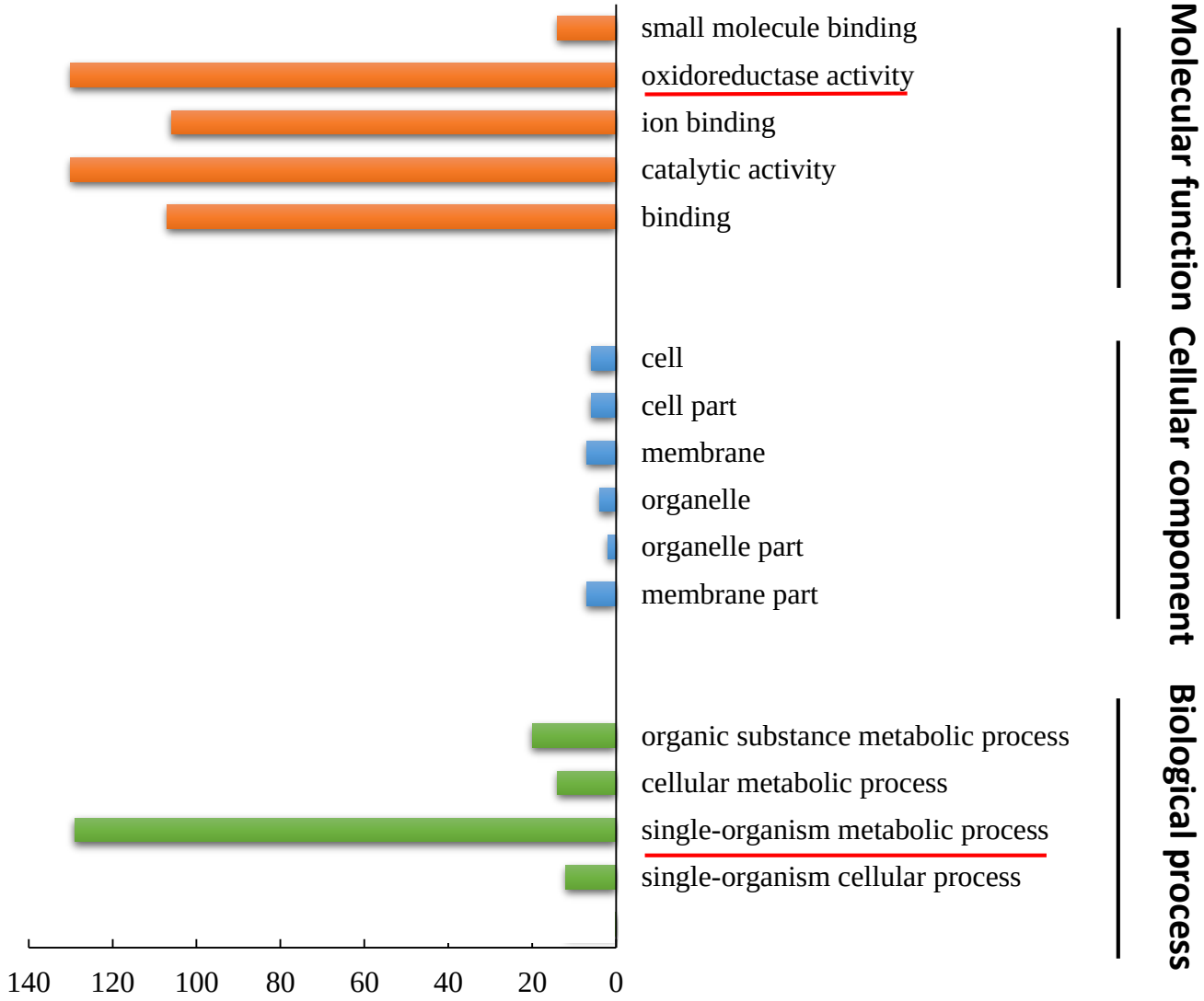


Motif 8

Motif 9



Motif 10


small molecule binding
oxidoreductase activity
ion binding
catalytic activity
binding
cell
cell part
membrane
organelle
organelle part
membrane part
organic substance metabolic process
cellular metabolic process
single-organism metabolic process
single-organism cellular process
140
120
100
80
60
40
20
0
Molecular function
Cellular component
Biological process

Supplementary Table1. The primers used for qPCR analysis, cloning full-length, and gateway clone of RNAi vectors.

Gene_name	**Use**	**Primer pairs (5'-3' Forward/Reverse)**
2OGD-5	qPCR	CGTGTCTCTATTACCCAGTCTG/CATTGACCGCCGTGAAGAA
SmActin	qPCR	AGGAACCACCGATCCAGACA/GGTGCCCTGAGGTCCTGTT
2OGD-5	Full-length	ATGGTGCTCTCTAGCAACGGTG/TCAAATCTTGTAATGAGGCAAAGCCG
2OGD-5	RNAi	GGGGACAAGTTTGTACAAAAAAGCAGGCTCCCTCGGAGACGATGGACG/ GGGGACCACTTTGTACAAGAAAGCTGGGTGTCGTCGCTGAAGACGCAC
PK-GFP	RNAi	CTCGTTGGGGTCTTTGCTC/ CACAAGTTCAGCGTGTCCG

Supplementary Table 2 The cellular localization prediction of 2OGD superfamily members in *S. miltiorrhiza*.

Name	Len	cTP	mTP	SP	other	Loc	RC
SMil_00030383	307	0.075	0.084	0.070	0.946	_	1
SMil_00030201	421	0.416	0.228	0.041	0.210	*	5
SMil_00029593	201	0.137	0.060	0.206	0.848	_	2
SMil_00029434	170	0.100	0.070	0.088	0.887	_	2
SMil_00029346	304	0.267	0.074	0.161	0.749	_	3
SMil_00029331	396	0.118	0.095	0.065	0.863	_	2
SMil_00029330	175	0.084	0.343	0.115	0.597	_	4
SMil_00028466	199	0.267	0.081	0.103	0.755	_	3
SMil_00028460	311	0.089	0.091	0.134	0.908	_	2
SMil_00028133	220	0.044	0.084	0.066	0.978	_	1
SMil_00027988	344	0.162	0.087	0.042	0.850	_	2
SMil_00027610	268	0.071	0.097	0.139	0.893	_	2
SMil_00027265	297	0.056	0.183	0.152	0.712	_	3
SMil_00026896	305	0.098	0.101	0.142	0.856	_	2
SMil_00026530	348	0.230	0.071	0.075	0.723	_	3
SMil_00026100	255	0.067	0.549	0.008	0.669	_	5
SMil_00025860	310	0.116	0.075	0.153	0.758	_	2
SMil_00025718	362	0.069	0.022	0.793	0.402	S	4
SMil_00025213	344	0.837	0.031	0.065	0.136	C	2
SMil_00024988	334	0.785	0.034	0.082	0.272	C	3
SMil_00024563	355	0.051	0.119	0.224	0.616	_	4
SMil_00024284	363	0.177	0.069	0.277	0.635	_	4
SMil_00024282	342	0.210	0.052	0.163	0.553	_	4
SMil_00024092	333	0.491	0.052	0.076	0.718	_	4
SMil_00024026	295	0.115	0.124	0.093	0.896	_	2
SMil_00023889	306	0.295	0.051	0.162	0.688	_	4
SMil_00023785	362	0.013	0.016	0.898	0.541	S	4
SMil_00023724	300	0.018	0.018	0.897	0.250	S	2
SMil_00022938	368	0.086	0.050	0.021	0.879	_	2
SMil_00022937	211	0.138	0.083	0.294	0.685	_	4
SMil_00022446	340	0.780	0.024	0.078	0.145	C	2
SMil_00022299	282	0.052	0.905	0.026	0.275	M	2
SMil_00022092	304	0.108	0.100	0.134	0.854	_	2
SMil_00022077	300	0.064	0.605	0.014	0.546	*	5
SMil_00021498	504	0.006	0.602	0.110	0.114	*	3
SMil_00021366	242	0.068	0.055	0.508	0.611	_	5
SMil_00021251	185	0.050	0.483	0.049	0.781	_	4
SMil_00021188	201	0.027	0.132	0.436	0.343	S	5
SMil_00021186	263	0.174	0.072	0.150	0.769	_	3

SMil_00021185	348	0.102	0.046	0.272	0.355	*	5
SMil_00021184	332	0.930	0.023	0.066	0.181	C	2
SMil_00021036	212	0.006	0.059	0.980	0.012	S	1
SMil_00020998	301	0.127	0.052	0.257	0.822	_	3
SMil_00020663	280	0.037	0.124	0.207	0.779	_	3
SMil_00020342	409	0.178	0.379	0.011	0.079	*	4
SMil_00019970	313	0.516	0.134	0.053	0.551	_	5
SMil_00019654	256	0.120	0.068	0.107	0.932	_	1
SMil_00019542	288	0.023	0.116	0.027	0.929	_	1
SMil_00019454	120	0.079	0.212	0.064	0.558	_	4
SMil_00019259	314	0.169	0.104	0.110	0.836	_	2
SMil_00019235	180	0.054	0.109	0.094	0.885	_	2
SMil_00019234	356	0.368	0.064	0.082	0.582	_	4
SMil_00019233	322	0.129	0.053	0.161	0.782	_	2
SMil_00019093	205	0.020	0.863	0.050	0.183	M	2
SMil_00019092	337	0.148	0.134	0.039	0.820	_	2
SMil_00019091	240	0.054	0.161	0.045	0.904	_	2
SMil_00019079	225	0.107	0.093	0.047	0.925	_	1
SMil_00018996	394	0.009	0.740	0.351	0.055	*	4
SMil_00018670	157	0.036	0.072	0.037	0.957	_	1
SMil_00018669	373	0.101	0.137	0.101	0.865	_	2
SMil_00018668	302	0.016	0.614	0.034	0.633	_	5
SMil_00018601	351	0.068	0.116	0.307	0.737	_	3
SMil_00018452	376	0.137	0.136	0.040	0.843	_	2
SMil_00018124	342	0.763	0.304	0.039	0.088	C	3
SMil_00018123	362	0.683	0.027	0.297	0.425	C	4
SMil_00018122	268	0.072	0.064	0.266	0.865	_	3
SMil_00018100	368	0.081	0.078	0.085	0.931	_	1
SMil_00018082	363	0.108	0.099	0.080	0.904	_	2
SMil_00018080	176	0.182	0.120	0.101	0.665	_	3
SMil_00017774	324	0.180	0.041	0.252	0.474	*	4
SMil_00016767	248	0.260	0.030	0.024	0.871	_	2
SMil_00016766	238	0.246	0.069	0.127	0.840	_	3
SMil_00016764	309	0.144	0.092	0.101	0.874	_	2
SMil_00016763	324	0.240	0.222	0.058	0.599	_	4
SMil_00016603	298	0.031	0.390	0.056	0.854	_	3
SMil_00016302	296	0.158	0.079	0.198	0.656	_	3
SMil_00016123	190	0.029	0.019	0.719	0.421	S	4
SMil_00016116	376	0.094	0.122	0.078	0.859	_	2
SMil_00016112	129	0.014	0.349	0.255	0.695	_	4
SMil_00016110	369	0.077	0.114	0.118	0.911	_	2
SMil_00016109	369	0.345	0.081	0.061	0.758	_	3
SMil_00016062	364	0.106	0.090	0.083	0.917	_	1
SMil_00015044	308	0.112	0.151	0.073	0.856	_	2

SMil_00014774	298	0.166	0.088	0.180	0.798	_	2
SMil_00014618	299	0.068	0.116	0.307	0.737	_	3
SMil_00014612	335	0.105	0.237	0.028	0.692	_	3
SMil_00014304	197	0.054	0.104	0.248	0.649	_	3
SMil_00014171	216	0.074	0.070	0.093	0.953	_	1
SMil_00013746	322	0.159	0.088	0.081	0.888	_	2
SMil_00013745	371	0.059	0.243	0.052	0.794	_	3
SMil_00013688	185	0.029	0.049	0.652	0.372	S	4
SMil_00013638	364	0.118	0.106	0.134	0.831	_	2
SMil_00013637	282	0.190	0.077	0.104	0.850	_	2
SMil_00013636	311	0.263	0.074	0.159	0.751	_	3
SMil_00013635	293	0.050	0.093	0.020	0.940	_	1
SMil_00013634	189	0.085	0.249	0.095	0.778	_	3
SMil_00013632	239	0.381	0.099	0.109	0.609	_	4
SMil_00013421	428	0.122	0.177	0.088	0.677	_	3
SMil_00013255	327	0.002	0.480	0.677	0.249	S	5
SMil_00013222	357	0.122	0.103	0.048	0.873	_	2
SMil_00013081	351	0.197	0.044	0.358	0.474	*	5
SMil_00013059	335	0.185	0.282	0.069	0.312	*	5
SMil_00012259	371	0.303	0.150	0.013	0.739	_	3
SMil_00012033	359	0.175	0.075	0.072	0.843	_	2
SMil_00012032	362	0.112	0.079	0.063	0.896	_	2
SMil_00011070	407	0.635	0.633	0.004	0.021	C	5
SMil_00011064	314	0.078	0.065	0.291	0.747	_	3
SMil_00010684	378	0.400	0.072	0.057	0.656	_	4
SMil_00009013	361	0.605	0.046	0.154	0.223	*	4
SMil_00009012	356	0.368	0.064	0.082	0.582	_	4
SMil_00008970	335	0.225	0.158	0.080	0.706	_	3
SMil_00008541	281	0.134	0.093	0.083	0.802	_	2
SMil_00008540	281	0.158	0.086	0.092	0.764	_	2
SMil_00008090	392	0.732	0.061	0.076	0.377	C	4
SMil_00007843	358	0.094	0.086	0.083	0.898	_	1
SMil_00007557	311	0.061	0.123	0.153	0.883	_	2
SMil_00006860	293	0.003	0.153	0.704	0.207	S	3
SMil_00006313	405	0.144	0.483	0.004	0.155	*	4
SMil_00006040	347	0.092	0.169	0.129	0.704	_	3
SMil_00005833	366	0.231	0.106	0.086	0.745	_	3
SMil_00005648	312	0.057	0.111	0.115	0.914	_	2
SMil_00005410	392	0.021	0.497	0.106	0.135	*	4
SMil_00004980	254	0.075	0.075	0.316	0.583	_	4
SMil_00004726	303	0.124	0.062	0.682	0.038	S	3
SMil_00004141	331	0.091	0.062	0.087	0.768	_	2
SMil_00003886	346	0.096	0.138	0.068	0.743	_	2
SMil_00003616	335	0.120	0.177	0.209	0.461	*	4

SMil_00001764	331	0.078	0.080	0.009	0.954	_	1
SMil_00001058	367	0.022	0.229	0.034	0.952	_	2
SMil_00001015	308	0.580	0.095	0.070	0.087	*	3
SMil_00000574	207	0.045	0.044	0.874	0.069	S	1
SMil_00000263	410	0.090	0.192	0.045	0.702	_	3

Supplementary Table 3. The identification of homologous 2OGD members between *S. miltiorrhiza, A. thaliana, and O. sativa*.

Sm2OGD_ID	At2OGD_ID	Class (*A. thaliana*)	Identity (*A. thaliana*)	E value (*A. thaliana*)	Bit score (*A. thaliana*)	Os2OGD_ID	Class (*O. sativa*)	Identity (*O. sativa*)	E value (*O. sativa*)	Bit score (*O. sativa*)
SMil_00001058	AT1G31600.1	DOXA	57.33	1.00E-144	410	Os04g51360	DOXA	55.18	2E-139	393
SMil_00013421	AT4G02485.1	DOXA	47.9	3.00E-31	112	Os11g43610	DOXA	43.85	3E-27	102
SMil_00021498	AT4G02940.1	DOXA	49.81	2.00E-141	412	Os05g33310	DOXA	48.49	7E-97	291
SMil_00001015	AT5G66060.1	DOXB	72.16	3.00E-152	421	Os02g58070	DOXB	75.68	3E-130	366
SMil_00001764	AT5G18900.1	DOXB	72.86	2.00E-150	418	Os05g41010	DOXB	67.54	5E-138	387
SMil_00004726	AT3G28480.1	DOXB	68.14	3.00E-162	447	Os10g27340	DOXB	69.78	2E-144	402
SMil_00006860	AT4G33910.1	DOXB	71.77	1.00E-139	389	Os03g55380	DOXB	74.22	1E-129	364
SMil_00013255	AT4G33910.1	DOXB	65.03	7.00E-135	378	Os03g55380	DOXB	58.73	8E-125	353
SMil_00018996	AT1G20270.1	DOXB	72.6	2.00E-141	397	Os02g58070	DOXB	82.43	7E-135	381
SMil_00021036	AT2G43080.1	DOXB	65.44	8.00E-104	294	Os04g27850	DOXB	65.57	1E-103	293
SMil_00023889	AT1G20270.1	DOXB	60.92	2.00E-122	345	Os02g58070	DOXB	64.14	1E-111	319
SMil_00000574	AT1G52800.1	DOXC	51.08	1.00E-69	208	Os08g32170	DOXC	31.09	4E-31	108
SMil_00003616	AT5G08640.1	DOXC	62.99	1.00E-132	375	Os02g52840	DOXC	56.42	5E-110	317
SMil_00003886	AT1G15550.1	DOXC	45.76	3.00E-103	301	Os01g08220	DOXC	39.37	5E-67	208
SMil_00004141	AT4G23340.1	DOXC	55	2.00E-108	312	Os03g63970	DOXC	31.21	7E-28	104
SMil_00004980	AT5G08640.1	DOXC	56.87	4.00E-98	283	Os02g52840	DOXC	50.38	5E-84	247
SMil_00005410	AT3G50210.1	DOXC	58.68	2.00E-142	402	Os09g07020	DOXC	56.46	5E-134	384
SMil_00005648	AT1G02400.1	DOXC	52.06	6.00E-103	298	Os05g06670	DOXC	42.26	9E-75	227
SMil_00005833	AT5G05600.1	DOXC	60.61	2.00E-162	452	Os05g03640	DOXC	55.71	4E-140	396
SMil_00006040	AT4G16330.1	DOXC	65.37	2.00E-127	358	Os06g06720	DOXC	57.76	3E-134	379

SMil_00007557	AT2G19590.1	DOXC	58.61	9.00E-134	375	Os06g37590	DOXC	48.5	3E-109	312
SMil_00007843	AT5G07480.1	DOXC	54.78	4.00E-139	393	Os04g57180	DOXC	44.12	4E-94	277
SMil_00008090	AT5G51810.1	DOXC	59.95	1.00E-162	455	Os03g63970	DOXC	56.2	1E-142	404
SMil_00008540	AT3G19010.1	DOXC	53.54	6.00E-55	174	Os08g15149	DOXC	47.12	2E-81	240
SMil_00008541	AT3G19010.1	DOXC	53.54	6.00E-55	174	Os08g15149	DOXC	47.12	3E-81	240
SMil_00008970	AT3G21420.1	DOXC	65.75	3.00E-165	458	Os01g70930	DOXC	58.47	6E-148	414
SMil_00009012	AT4G10500.1	DOXC	37.94	5.00E-65	203	Os08g37456	DOXC	43.23	2E-88	263
SMil_00009013	AT4G10490.1	DOXC	38.59	2.00E-64	201	Os08g37456	DOXC	43.91	4E-91	270
SMil_00010684	AT4G25420.1	DOXC	71.26	0	530	Os03g63970	DOXC	60.56	1E-161	451
SMil_00011064	AT1G05010.1	DOXC	72.14	2.00E-163	451	Os09g27820	DOXC	71.16	3E-152	423
SMil_00012032	AT1G04350.1	DOXC	41.9	3.00E-95	281	Os03g48430	DOXC	41.76	4E-86	258
SMil_00012033	AT1G06620.1	DOXC	46.89	1.00E-120	346	Os03g48430	DOXC	43.73	2E-98	290
SMil_00012259	AT1G17020.1	DOXC	53.07	1.00E-144	407	Os10g40880	DOXC	43.87	3E-100	294
SMil_00013059	AT5G24530.1	DOXC	65.79	3.00E-163	452	Os03g03034	DOXC	60.36	3E-152	424
SMil_00013081	AT1G49390.1	DOXC	51.62	2.00E-115	332	Os06g08032	DOXC	40.91	4E-79	239
SMil_00013222	AT3G13610.1	DOXC	47.14	3.00E-119	342	Os03g03034	DOXC	33.23	3E-55	177
SMil_00013632	AT1G52800.1	DOXC	45.53	4.00E-75	223	Os08g32170	DOXC	29.63	2E-30	107
SMil_00013634	AT1G52820.1	DOXC	42.63	1.00E-56	174	Os05g50090	DOXC	39.42	9E-35	119
SMil_00013635	AT1G52820.1	DOXC	48.73	5.00E-98	288	Os08g32160	DOXC	27.27	5E-40	137
SMil_00013636	AT1G52820.1	DOXC	59.49	6.00E-132	371	Os08g32170	DOXC	32.9	2E-58	183
SMil_00013637	AT1G52820.1	DOXC	50	2.00E-110	315	Os08g32170	DOXC	29.35	1E-44	147
SMil_00013638	AT1G15550.1	DOXC	59.88	8.00E-141	397	Os01g08220	DOXC	41.35	3E-87	261
SMil_00013688	AT5G07480.1	DOXC	45.88	3.00E-52	164	Os04g57160	DOXC	41.62	3E-45	145
SMil_00013745	AT3G19000.1	DOXC	57.46	2.00E-143	404	Os03g42130	DOXC	52.82	9E-133	377
SMil_00013746	AT3G19000.1	DOXC	52.96	2.00E-114	328	Os03g42130	DOXC	52.59	8E-106	306
SMil_00014171	AT4G10490.1	DOXC	33.94	2.00E-30	107	Os04g55070	DOXC	56.76	4E-89	258

SMil_00014304	AT1G78440.1	DOXC	56.57	4.00E-82	240	Os01g55240	DOXC	58.25	9E-81	236
SMil_00014612	AT4G21200.1	DOXC	52.52	4.00E-129	365	Os04g44150	DOXC	52.91	8E-124	353
SMil_00014618	AT3G51240.1	DOXC	70.55	4.00E-160	444	Os04g56700	DOXC	69.72	9E-153	426
SMil_00014774	AT1G14130.1	DOXC	44.52	1.00E-84	250	Os04g39980	DOXC	41.86	2E-81	241
SMil_00015044	AT1G17020.1	DOXC	38.13	7.00E-56	178	Os01g24980	DOXC	41.46	8E-62	192
SMil_00016062	AT1G06620.1	DOXC	45.79	2.00E-104	305	Os03g48430	DOXC	39.4	9E-85	254
SMil_00016109	AT1G06620.1	DOXC	49.44	8.00E-110	319	Os03g48430	DOXC	43.72	3E-90	269
SMil_00016110	AT1G06620.1	DOXC	46.8	8.00E-117	337	Os03g48430	DOXC	43.84	1E-101	298
SMil_00016112	AT5G43440.1	DOXC	58.56	3.00E-34	115	Os04g10350	DOXC	57.66	3E-34	115
SMil_00016116	AT1G06620.1	DOXC	52.02	4.00E-137	389	Os03g48430	DOXC	46.21	7E-107	312
SMil_00016123	AT4G21200.1	DOXC	60.99	5.00E-82	240	Os04g44150	DOXC	51.31	2E-66	201
SMil_00016302	AT5G51810.1	DOXC	48.34	3.00E-85	253	Os01g66100	DOXC	50.76	1E-77	234
SMil_00016603	AT1G14130.1	DOXC	45.78	2.00E-70	213	Os04g39980	DOXC	41.13	1E-63	196
SMil_00016763	AT1G52800.1	DOXC	44.13	2.00E-103	299	Os08g32170	DOXC	32.23	3E-53	170
SMil_00016764	AT1G52800.1	DOXC	55.71	5.00E-129	363	Os08g32160	DOXC	32.9	8E-52	166
SMil_00016766	AT1G52800.1	DOXC	48.11	2.00E-83	244	Os08g32170	DOXC	30.28	3E-37	125
SMil_00016767	AT1G52800.1	DOXC	47.28	2.00E-64	196	Os08g32170	DOXC	29.69	8E-29	103
SMil_00017774	AT1G30040.1	DOXC	60.13	1.00E-138	390	Os01g55240	DOXC	56.62	4E-129	365
SMil_00018080	AT1G04380.1	DOXC	52.91	5.00E-65	196	Os04g10350	DOXC	47.2	2E-52	164
SMil_00018082	AT1G06620.1	DOXC	45.38	8.00E-106	308	Os03g48430	DOXC	41.42	2E-84	254
SMil_00018100	AT1G06620.1	DOXC	47.75	6.00E-120	345	Os03g48430	DOXC	43.47	1E-97	288
SMil_00018122	AT4G10490.1	DOXC	39.76	2.00E-54	172	Os08g37456	DOXC	43.44	1E-67	206
SMil_00018123	AT4G10500.1	DOXC	37.36	2.00E-72	222	Os08g37456	DOXC	42.59	4E-83	249
SMil_00018124	AT2G36690.1	DOXC	40.65	1.00E-65	204	Os08g37456	DOXC	45.1	1E-79	239
SMil_00018452	AT2G36690.1	DOXC	61.93	6.00E-165	459	Os08g44590	DOXC	52.1	2E-132	377
SMil_00018601	AT3G51240.1	DOXC	74.48	0	537	Os04g56700	DOXC	73.42	0	504

SMil_00018668	AT1G04380.1	DOXC	49.72	5.00E-61	191	Os04g10350	DOXC	46.91	3E-56	179
SMil_00018669	AT5G59530.1	DOXC	49.72	4.00E-123	353	Os03g48430	DOXC	45.33	3E-107	313
SMil_00018670	AT5G43440.1	DOXC	47.13	8.00E-54	167	Os04g10350	DOXC	47.97	2E-52	163
SMil_00019079	AT1G30040.1	DOXC	71.54	3.00E-70	211	Os01g55240	DOXC	69.01	2E-67	204
SMil_00019091	AT5G20400.1	DOXC	53.68	1.00E-96	280	Os02g17940	DOXC	48.07	9E-81	239
SMil_00019092	AT5G20400.1	DOXC	45.32	5.00E-76	231	Os02g17940	DOXC	39.93	2E-62	196
SMil_00019093	AT5G20400.1	DOXC	47.64	3.00E-54	169	Os02g17940	DOXC	39.06	7E-39	129
SMil_00019233	AT4G10490.1	DOXC	39.57	6.00E-63	196	Os08g37456	DOXC	44.07	4E-89	263
SMil_00019234	AT4G10500.1	DOXC	37.94	4.00E-64	201	Os08g37456	DOXC	43.59	2E-90	268
SMil_00019235	AT1G78550.1	DOXC	44.44	4.00E-46	148	Os03g03034	DOXC	44	4E-50	158
SMil_00019259	AT1G52820.1	DOXC	52.66	2.00E-120	342	Os08g32170	DOXC	33.33	1E-60	189
SMil_00019454	AT1G14130.1	DOXC	47.22	3.00E-20	76.6	Os04g39980	DOXC	48.57	3E-22	82
SMil_00019542	AT1G52800.1	DOXC	46.41	6.00E-51	163	Os05g50090	DOXC	37.5	2E-27	102
SMil_00019654	AT1G52800.1	DOXC	48.65	5.00E-66	201	Os08g32170	DOXC	30.94	4E-29	105
SMil_00019970	AT1G52790.1	DOXC	38.19	6.00E-78	233	Os08g32170	DOXC	29.9	1E-47	155
SMil_00020342	AT2G44800.1	DOXC	35.56	5.00E-64	202	Os08g37456	DOXC	42.3	5E-87	261
SMil_00020663	AT1G30040.1	DOXC	46.41	8.00E-91	266	Os01g55240	DOXC	44.44	8E-85	250
SMil_00020998	AT1G14130.1	DOXC	44.86	5.00E-91	266	Os04g39980	DOXC	44.09	1E-83	247
SMil_00021184	AT4G10490.1	DOXC	35.49	4.00E-52	169	Os08g37456	DOXC	36.22	9E-62	193
SMil_00021185	AT2G36690.1	DOXC	35.88	5.00E-75	229	Os08g37456	DOXC	42.9	2E-92	273
SMil_00021186	AT4G10490.1	DOXC	36.15	1.00E-49	160	Os08g37456	DOXC	38	4E-58	181
SMil_00021188	AT4G10490.1	DOXC	42.63	5.00E-46	148	Os08g37456	DOXC	42.22	4E-47	150
SMil_00021251	AT1G04350.1	DOXC	45.45	2.00E-54	169	Os08g30080	DOXC	44.62	2E-47	152
SMil_00021366	AT1G30040.1	DOXC	56.05	3.00E-93	271	Os01g55240	DOXC	52.68	8E-78	231
SMil_00022077	AT5G05600.1	DOXC	58.61	7.00E-125	355	Os05g03640	DOXC	54.93	7E-115	329
SMil_00022092	AT1G77330.1	DOXC	67.42	3.00E-146	407	Os05g05680	DOXC	62.82	5E-126	355

SMil_00022299	AT1G30040.1	DOXC	61.11	4.00E-121	343	Os01g55240	DOXC	60.75	9E-112	319
SMil_00022446	AT2G36690.1	DOXC	34.3	1.00E-49	163	Os08g37456	DOXC	38.67	2E-68	211
SMil_00022937	AT1G35190.1	DOXC	64.29	3.00E-97	279	Os01g09300	DOXC	56.61	6E-104	297
SMil_00022938	AT1G35190.1	DOXC	57.02	7.00E-119	340	Os01g09300	DOXC	54.76	1E-125	359
SMil_00023724	AT1G14130.1	DOXC	53.77	7.00E-108	309	Os04g39980	DOXC	48.81	2E-95	277
SMil_00023785	AT1G17020.1	DOXC	51.59	6.00E-118	339	Os10g41020	DOXC	40	8E-86	257
SMil_00024026	AT2G30830.1	DOXC	38.1	1.00E-57	182	Os03g48430	DOXC	37.57	9E-49	159
SMil_00024092	AT4G10490.1	DOXC	35.69	2.00E-66	206	Os07g07410	DOXC	33.24	1E-66	207
SMil_00024282	AT1G49390.1	DOXC	48.96	2.00E-121	347	Os06g08023	DOXC	41.3	2E-92	274
SMil_00024284	AT5G20400.1	DOXC	52.05	2.00E-119	343	Os02g17940	DOXC	46.06	3E-98	288
SMil_00024563	AT4G21200.1	DOXC	56.85	3.00E-140	395	Os04g44150	DOXC	50.29	1E-116	335
SMil_00024988	AT5G58660.1	DOXC	47.78	7.00E-98	286	Os04g33360	DOXC	39.62	2E-64	201
SMil_00025213	AT2G44800.1	DOXC	35.49	3.00E-65	203	Os08g37456	DOXC	42.6	3E-87	259
SMil_00025718	AT3G51240.1	DOXC	75.96	0	546	Os04g56700	DOXC	73.85	0	513
SMil_00025860	AT1G77330.1	DOXC	69.21	2.00E-161	445	Os05g05680	DOXC	59.94	3E-134	376
SMil_00026100	AT5G07200.1	DOXC	39.43	2.00E-49	160	Os03g42130	DOXC	36.99	5E-43	142
SMil_00026530	AT5G51810.1	DOXC	59.88	1.00E-157	440	Os03g63970	DOXC	55.56	1E-136	387
SMil_00026896	AT1G77330.1	DOXC	67.74	2.00E-145	405	Os05g05680	DOXC	61.66	2E-123	348
SMil_00027265	AT5G24530.1	DOXC	63.85	2.00E-150	418	Os03g03034	DOXC	63.27	2E-149	416
SMil_00027610	AT5G24530.1	DOXC	39.62	2.00E-58	183	Os03g03034	DOXC	41.04	3E-59	184
SMil_00027988	AT5G24530.1	DOXC	39.76	2.00E-71	219	Os10g39140	DOXC	38.08	5E-70	215
SMil_00028133	AT4G10490.1	DOXC	33.04	2.00E-29	105	Os04g55070	DOXC	56.77	1E-93	270
SMil_00028460	AT1G47990.1	DOXC	49.52	2.00E-101	294	Os01g55240	DOXC	43.71	1E-76	230
SMil_00028466	AT1G52820.1	DOXC	62.12	7.00E-87	252	Os08g32170	DOXC	36.68	8E-43	139
SMil_00029330	AT1G04380.1	DOXC	54.94	3.00E-63	191	Os04g10350	DOXC	52.6	1E-59	183
SMil_00029331	AT1G06620.1	DOXC	46.41	5.00E-115	333	Os03g48430	DOXC	41.69	8E-96	284

SMil_00029346	AT1G52820.1	DOXC	58.23	6.00E-136	381	Os08g32170	DOXC	32.58	4E-61	190
SMil_00029434	AT4G22880.1	DOXC	86.93	2.00E-97	279	Os01g27490	DOXC	57.42	1E-66	201
SMil_00029593	AT3G21420.1	DOXC	73.58	6.00E-107	305	Os01g70930	DOXC	65.97	3E-93	270
SMil_00030201	AT4G25420.1	DOXC	67.14	7.00E-179	497	Os03g63970	DOXC	59.25	4E-160	449
SMil_00030383	AT3G60290.1	DOXC	41.83	4.00E-63	197	Os04g49210	DOXC	39.31	3E-62	194
SMil_00000263	AT1G22950.1	unclassified	63.58	9.00E-164	459	Os01g31770	unclassified	62.63	4E-177	493
SMil_00006313	AT1G68080.1	unclassified	49.75	2.00E-112	328	Os03g13550	unclassified	42.81	7E-76	231
SMil_00011070	AT3G63290.1	unclassified	25.32	2.00E-16	73.2	Os05g48230	unclassified	62.17	2E-164	461

Supplementary Table 4. The gene expression of 2OGDs in different organs, tissues, and following MeJA treatment.

Gene_ID	Clades	Classes	Periderm	Phloem	xylem	Flower	Stem	Leaf	Root	MeJA-0	MeJA-12
SMil_00011064	ACO	DOXC	26.63	55.38	30.69	2082.68	303.86	316.91	108.12	1159.81	2034.96
SMil_00022077	ACO	DOXC	10.04	4.58	1.92	20.42	51.19	1.09	44.51	3.00	182.02
SMil_00005833	ACO	DOXC	7.33	2.32	0.99	5.36	12.01	13.68	22.69	60.67	207.65
SMil_00006040	ACO	DOXC	10.95	6.98	7.69	58.06	25.26	8.19	11.20	9.34	13.41
SMil_00026896	ACO	DOXC	0.12	0.00	0.09	0.22	2.71	0.00	3.20	0.11	0.48
SMil_00022092	ACO	DOXC	0.76	0.42	0.30	0.20	1.14	0.25	1.69	0.35	0.55
SMil_00007557	ACO	DOXC	0.24	3.41	2.40	0.14	3.35	0.00	1.67	0.03	0.00
SMil_00025860	ACO	DOXC	2.83	1.33	0.26	0.00	0.03	0.00	0.34	0.04	0.00
SMil_00016766	AOP	DOXC	49.61	52.69	7.71	0.05	3.55	0.00	172.47	0.00	0.00
SMil_00019970	AOP	DOXC	34.78	18.96	24.66	0.17	0.22	0.18	63.96	0.15	0.20
SMil_00019654	AOP	DOXC	27.33	27.10	25.69	66.41	29.28	8.72	29.37	11.50	15.14
SMil_00013632	AOP	DOXC	9.59	8.36	0.47	0.04	0.82	0.00	11.16	0.00	0.00
SMil_00019259	AOP	DOXC	6.54	0.75	0.08	0.06	0.37	0.00	10.35	0.00	0.00
SMil_00029346	AOP	DOXC	15.45	17.89	14.95	0.02	3.80	0.63	8.41	0.66	0.68
SMil_00013636	AOP	DOXC	10.94	15.86	12.65	0.04	0.46	0.40	4.56	0.27	0.48
SMil_00028466	AOP	DOXC	0.59	0.72	0.57	0.00	0.90	0.00	3.83	0.00	0.02
SMil_00016763	AOP	DOXC	2.94	3.00	0.14	0.00	0.12	0.00	2.41	0.00	0.00
SMil_00013637	AOP	DOXC	1.36	0.20	0.00	3.68	3.74	1.89	1.62	2.04	3.12
SMil_00019542	AOP	DOXC	0.37	0.58	0.29	2.10	0.99	0.00	0.68	0.25	0.42
SMil_00000574	AOP	DOXC	13.17	4.86	2.38	1.35	1.69	11.17	0.53	5.66	0.07
SMil_00016767	AOP	DOXC	0.00	0.00	0.03	0.21	0.07	0.00	0.06	0.00	0.00
SMil_00013634	AOP	DOXC	0.38	0.06	0.05	0.00	0.10	0.00	0.00	0.00	0.00
SMil_00013635	AOP	DOXC	0.43	0.22	0.31	0.00	0.01	0.00	0.00	0.00	0.00

SMil_00016764	AOP	DOXC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SMil_00012259	CODM/NCS	DOXC	412.59	143.92	129.72	265.95	1.06	0.48	138.44	1.44	0.54
SMil_00024284	CODM/NCS	DOXC	30.30	20.98	18.39	70.31	22.97	12.27	14.92	9.81	10.18
SMil_00019091	CODM/NCS	DOXC	19.05	17.08	13.94	6.99	5.21	4.82	10.14	2.27	2.41
SMil_00013081	CODM/NCS	DOXC	124.36	36.50	24.41	37.57	6.93	2.40	7.29	4.38	29.65
SMil_00024282	CODM/NCS	DOXC	135.18	55.22	19.65	3.55	4.23	0.39	2.55	0.29	5.19
SMil_00019092	CODM/NCS	DOXC	1.55	4.33	0.25	9.57	0.35	0.00	0.19	0.00	0.00
SMil_00008970	CODM/NCS	DOXC	0.26	2.82	0.76	8.59	3.87	1.35	0.15	0.69	0.21
SMil_00019093	CODM/NCS	DOXC	1.13	0.62	0.08	1.02	0.00	0.00	0.14	0.00	0.00
SMil_00015044	CODM/NCS	DOXC	1.91	0.00	0.00	0.00	0.01	0.00	0.09	0.00	0.00
SMil_00029593	CODM/NCS	DOXC	0.10	1.19	0.41	0.78	0.85	0.00	0.08	0.06	0.16
SMil_00023785	CODM/NCS	DOXC	0.80	0.05	0.00	2.52	0.79	3.89	0.06	8.59	23.04
SMil_00012032	D4H/GSLOH/BX6	DOXC	45.90	24.78	8.29	5.37	114.20	0.81	270.35	5.60	79.07
SMil_00018668	D4H/GSLOH/BX6	DOXC	73.56	23.72	0.39	22.87	33.40	2.62	52.94	0.00	0.03
SMil_00018669	D4H/GSLOH/BX6	DOXC	27.87	16.58	16.02	22.87	33.40	2.62	52.94	11.53	7.06
SMil_00029331	D4H/GSLOH/BX6	DOXC	41.15	9.12	3.67	4.51	14.41	3.65	13.68	3.41	26.07
SMil_00018670	D4H/GSLOH/BX6	DOXC	8.61	4.37	3.10	9.53	38.55	40.09	12.84	24.42	42.15
SMil_00016110	D4H/GSLOH/BX6	DOXC	17.93	5.92	3.64	25.01	79.04	35.64	11.98	60.41	482.59
SMil_00029330	D4H/GSLOH/BX6	DOXC	16.04	1.74	0.13	4.13	13.12	4.81	3.80	8.93	25.21
SMil_00016116	D4H/GSLOH/BX6	DOXC	2.06	2.25	1.87	8.11	11.08	2.44	2.14	9.56	5.29
SMil_00024026	D4H/GSLOH/BX6	DOXC	9.99	6.99	5.76	3.26	1.19	0.24	1.76	0.59	8.18
SMil_00018100	D4H/GSLOH/BX6	DOXC	50.15	9.09	0.66	0.02	0.02	0.00	1.23	0.00	0.00
SMil_00018082	D4H/GSLOH/BX6	DOXC	0.21	0.03	0.00	0.00	0.04	0.00	0.50	0.00	0.00
SMil_00018080	D4H/GSLOH/BX6	DOXC	0.42	0.14	0.00	0.00	0.00	0.00	0.16	0.00	0.00
SMil_00016109	D4H/GSLOH/BX6	DOXC	0.27	0.00	0.00	0.14	0.81	0.26	0.11	0.26	0.79
SMil_00016062	D4H/GSLOH/BX6	DOXC	1.11	0.21	0.05	0.06	31.11	0.08	0.02	0.03	0.02

SMil_00021251	D4H/GSLOH/BX6	DOXC	0.53	0.13	0.00	0.28	0.20	0.00	0.00	0.41	0.72
SMil_00012033	D4H/GSLOH/BX6	DOXC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SMil_00016112	D4H/GSLOH/BX6	DOXC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SMil_00023724	DAO	DOXC	14.98	17.16	13.44	9.22	14.15	31.41	16.59	16.74	12.55
SMil_00014774	DAO	DOXC	0.80	0.12	0.20	0.33	0.13	0.31	0.16	0.18	0.14
SMil_00016603	DAO	DOXC	1.08	0.13	0.15	0.14	0.01	0.00	0.01	0.00	0.00
SMil_00020998	DAO	DOXC	3.57	0.81	0.19	0.10	0.02	0.00	0.00	0.03	0.05
SMil_00019454	DAO	DOXC	0.50	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SMil_00013746	F3H	DOXC	16.95	5.65	9.87	74.06	65.58	156.30	73.71	314.14	43.32
SMil_00022937	F3H	DOXC	69.50	58.53	58.63	31.66	43.89	78.95	60.90	9.78	9.35
SMil_00005410	F3H	DOXC	12.97	16.55	14.78	18.09	15.72	12.51	12.88	6.15	23.75
SMil_00008540	F3H	DOXC	22.65	18.19	16.25	10.55	6.50	2.62	8.02	9.50	3.40
SMil_00013745	F3H	DOXC	39.67	3.56	1.27	27.81	21.64	8.04	5.66	11.78	3.34
SMil_00028133	F3H	DOXC	4.37	2.92	3.25	0.31	3.46	0.00	1.99	0.26	1.06
SMil_00025718	F3H	DOXC	2.72	0.15	0.06	93.37	21.03	28.03	1.07	95.73	7.44
SMil_00014171	F3H	DOXC	7.07	1.30	1.38	0.39	0.59	0.00	0.57	0.05	0.35
SMil_00014618	F3H	DOXC	0.00	0.00	0.00	20.91	0.03	0.00	0.20	0.04	0.00
SMil_00008541	F3H	DOXC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SMil_00018601	F3H	DOXC	0.00	0.00	0.00	3.38	0.00	0.00	0.00	0.00	0.02
SMil_00022938	F3H	DOXC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.80	18.22
SMil_00029434	FLS/ANS	DOXC	0.00	0.00	0.00	570.96	0.50	0.00	2.08	0.33	0.00
SMil_00003616	FLS/ANS	DOXC	0.00	0.00	0.29	70.06	65.44	268.86	0.66	241.61	14.31
SMil_00004980	FLS/ANS	DOXC	0.24	0.00	0.04	2.91	0.30	0.32	0.20	2.54	0.83
SMil_00026530	GA20ox	DOXC	0.04	1.95	0.13	1.27	24.80	0.00	19.99	0.00	0.00
SMil_00008090	GA20ox	DOXC	1.50	1.94	2.27	45.86	6.58	2.03	2.28	0.67	0.38
SMil_00026100	GA20ox	DOXC	0.95	0.12	0.09	0.06	1.65	0.00	1.57	0.00	0.02

SMil_00030201	GA20ox	DOXC	3.34	1.96	2.37	2.63	2.46	0.44	0.67	2.21	3.44
SMil_00016302	GA20ox	DOXC	0.24	0.03	0.00	2.19	0.57	0.46	0.22	5.71	0.33
SMil_00010684	GA20ox	DOXC	0.23	0.04	0.10	0.15	0.33	0.00	0.00	0.00	0.00
SMil_00017774	GA2ox	DOXC	8.37	14.85	15.37	25.92	12.49	5.47	39.93	8.09	0.51
SMil_00022299	GA2ox	DOXC	10.03	11.15	13.89	10.67	7.92	6.82	28.91	5.38	0.61
SMil_00024988	GA2ox	DOXC	2.03	1.85	4.21	106.42	12.53	11.07	19.15	17.67	30.98
SMil_00004141	GA2ox	DOXC	2.78	3.16	2.81	3.08	8.13	0.28	14.54	3.93	1.24
SMil_00005648	GA2ox	DOXC	0.02	0.12	0.02	190.12	5.64	1.58	8.20	0.00	0.09
SMil_00024563	GA2ox	DOXC	0.09	0.54	0.34	1.46	7.77	1.29	1.62	3.46	0.33
SMil_00028460	GA2ox	DOXC	12.76	2.89	0.74	0.00	0.05	0.31	0.87	0.25	0.06
SMil_00016123	GA2ox	DOXC	0.36	0.00	0.13	0.26	0.42	0.00	0.48	0.12	0.00
SMil_00014304	GA2ox	DOXC	0.00	0.00	0.06	0.03	0.04	1.38	0.23	2.85	0.30
SMil_00020663	GA2ox	DOXC	0.00	0.00	0.00	0.00	0.03	0.54	0.19	3.11	0.30
SMil_00021366	GA2ox	DOXC	0.14	0.00	0.04	4.00	12.25	6.89	0.07	30.77	13.05
SMil_00014612	GA2ox	DOXC	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
SMil_00019079	GA2ox	DOXC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.13
SMil_00013638	GA3ox	DOXC	0.00	0.00	0.25	6.88	6.72	0.00	1.75	0.76	0.13
SMil_00003886	GA3ox	DOXC	5.83	2.94	3.42	1.16	0.00	0.00	0.41	0.20	0.13
SMil_00024092	H6H	DOXC	29.73	17.98	25.56	7.32	0.00	0.17	7.46	0.10	0.29
SMil_00027988	H6H	DOXC	3.22	3.44	0.70	0.31	0.13	0.00	0.50	0.03	0.39
SMil_00027610	H6H	DOXC	6.52	7.84	1.75	0.00	0.00	0.00	0.45	0.00	0.04
SMil_00001764	P4H	DOXB	77.07	58.74	53.39	41.30	63.39	58.63	40.01	59.01	51.78
SMil_00013421		DOXA	2.41	1.82	1.53	7.52	3.86	0.33	31.46	1.01	1.58
SMil_00001015	P4H	DOXB	84.84	46.27	36.29	27.27	43.79	64.03	29.74	21.18	25.44
SMil_00004726	P4H	DOXB	32.33	28.55	25.51	50.98	43.14	16.69	23.68	27.92	39.97
SMil_00018996	P4H	DOXB	27.22	19.76	19.76	16.51	17.73	32.92	19.14	14.63	15.65

SMil_00021498		DOXA	3.25	8.85	7.12	47.49	28.31	36.81	18.91	45.47	11.42
SMil_00000263		Unclassified	17.64	15.34	14.80	16.52	14.81	10.38	12.30	8.61	10.64
SMil_00021036	P4H	DOXB	30.83	26.30	33.99	13.84	18.96	22.58	10.80	6.15	4.54
SMil_00006860	P4H	DOXB	12.12	13.70	10.85	7.94	8.01	4.30	8.12	2.14	5.12
SMil_00001058		DOXA	7.31	6.11	6.37	4.90	4.41	1.82	6.89	1.91	2.04
SMil_00011070		Unclassified	10.03	7.86	7.33	5.90	2.13	3.60	3.72	1.29	2.67
SMil_00006313		Unclassified	3.58	3.38	4.45	4.38	5.83	7.24	2.92	2.89	3.87
SMil_00013255	P4H	DOXB	5.79	4.38	4.68	3.53	3.07	2.68	2.47	1.32	1.28
SMil_00023889	P4H	DOXB	0.00	0.00	0.01	0.01	0.53	0.25	0.13	0.05	0.00
SMil_00013059	S3H	DOXC	1.73	5.07	0.57	6.07	31.46	0.00	20.04	0.56	0.17
SMil_00027265	S3H	DOXC	11.65	13.36	7.14	1.96	2.62	2.18	2.33	1.05	4.12
SMil_00020342	Unknown	DOXC	109.93	69.27	19.83	15.58	297.68	0.96	146.22	9.13	21.44
SMil_00021188	Unknown	DOXC	0.15	0.13	14.54	55.69	109.70	18.64	40.98	23.90	4.41
SMil_00009012	Unknown	DOXC	3.18	0.60	0.50	16.18	16.59	5.36	39.26	0.03	0.31
SMil_00025213	Unknown	DOXC	0.45	0.12	0.06	0.17	14.16	0.00	29.19	0.03	3.92
SMil_00021185	Unknown	DOXC	24.86	24.24	21.97	72.98	47.18	6.79	23.53	29.89	13.76
SMil_00018122	Unknown	DOXC	0.06	0.04	0.50	49.92	37.22	19.89	8.72	34.06	4.17
SMil_00013688	Unknown	DOXC	21.13	17.71	19.66	14.21	9.32	12.23	8.31	5.28	7.46
SMil_00021184	Unknown	DOXC	0.82	0.50	1.53	7.99	16.69	1.37	4.95	2.80	2.08
SMil_00019234	Unknown	DOXC	0.29	0.18	0.03	0.00	1.49	0.00	3.40	0.00	0.10
SMil_00019233	Unknown	DOXC	0.20	0.15	0.12	0.02	0.07	0.00	2.31	0.02	0.02
SMil_00018452	Unknown	DOXC	7.28	8.47	5.57	0.70	1.24	0.36	1.67	2.76	0.90
SMil_00018124	Unknown	DOXC	9.41	4.10	3.01	28.31	0.04	0.00	0.23	0.00	31.42
SMil_00022446	Unknown	DOXC	0.00	0.02	0.00	0.00	0.11	0.00	0.18	0.00	0.00
SMil_00018123	Unknown	DOXC	17.80	3.00	0.00	0.08	0.02	0.00	0.12	0.00	0.00
SMil_00019235	Unknown	DOXC	0.00	0.00	0.00	0.00	0.05	0.00	0.10	0.00	0.00

SMil_00030383	Unknown	DOXC	0.09	0.10	0.13	1.80	1.73	9.52	0.03	3.99	1.51
SMil_00007843	Unknown	DOXC	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00
SMil_00009013	Unknown	DOXC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.30
SMil_00013222	Unknown	DOXC	0.00	0.00	0.00	0.04	0.00	0.15	0.00	0.18	0.57

Supplementary Table5. Candidate 2OGDs related to tanshinone biosynthesis in *S. miltiorrhiza*.

Gene_IDs	Gene_name	Clades	Classes	Periderm	Phloem	xylem	Flower	Stem	Leaf	Root	MeJA-0	MeJA-12
SMil_00024282	2OGD-1	CODM/NCS	DOXC	135.18	55.22	19.65	3.55	4.23	0.39	2.55	0.29	5.19
SMil_00020342	2OGD-2	Unknown	DOXC	109.93	69.27	19.83	15.58	297.68	0.96	146.22	9.13	21.44
SMil_00018668	2OGD-3	D4H/GSLOH/BX6	DOXC	73.56	23.72	0.39	22.87	33.40	2.62	52.94	0.00	0.03
SMil_00018100	2OGD-4	D4H/GSLOH/BX6	DOXC	50.15	9.09	0.66	0.02	0.02	0.00	1.23	0.00	0.00
SMil_00012032	2OGD-5	D4H/GSLOH/BX6	DOXC	45.90	24.78	8.29	5.37	114.20	0.81	270.35	5.60	79.07
SMil_00029331	2OGD-6	D4H/GSLOH/BX6	DOXC	41.15	9.12	3.67	4.51	14.41	3.65	13.68	3.41	26.07
SMil_00013745	2OGD-7	F3H	DOXC	39.67	3.56	1.27	27.81	21.64	8.04	5.66	11.78	3.34
SMil_00016110	2OGD-8	D4H/GSLOH/BX6	DOXC	17.93	5.92	3.64	25.01	79.04	35.64	11.98	60.41	482.59
SMil_00018123	2OGD-9	Unknown	DOXC	17.80	3.00	0.00	0.08	0.02	0.00	0.12	0.00	0.00
SMil_00029330	2OGD-10	D4H/GSLOH/BX6	DOXC	16.04	1.74	0.13	4.13	13.12	4.81	3.80	8.93	25.21
SMil_00000574	2OGD-11	AOP	DOXC	13.17	4.86	2.38	1.35	1.69	11.17	0.53	5.66	0.07
SMil_00028460	2OGD-12	GA2ox	DOXC	12.76	2.89	0.74	0.00	0.05	0.31	0.87	0.25	0.06
SMil_00022077	2OGD-13	ACO	DOXC	10.04	4.58	1.92	20.42	51.19	1.09	44.51	3.00	182.02

Supplementary Table6. Different tanshinone metabolites analysed from 2OGD5-silencing lines and control lines.

Compoud name	RT(min)	M+H	MS/MS	Molecular formula	Molecular weight	CAS	PK1	PK2	PK3	Average PK	Standard PK	2OGD-5	Difference ratio (2OGD5/
Salvisyrianone	9.07	313	313,295,277, 267,253,241, 227	C20H24O3	312	**250691-57-7**	6.77E+06	5.71E+06	7.69E+06	6.72E+06	9.91E+05	9.83E+06	1.46
Cryptojaponol	7.24	331	331,313,303, 301,295,285, 283	C21H30O3	330	-	1.05E+06	8.65E+05	1.06E+06	9.92E+05	1.10E+05	1.24E+06	1.25
Trijuganone B	8.38	281	281,263,248, 235,220,192	C18H16O3	280	**126979-84-8**	2.65E+05	2.38E+05	5.70E+05	3.58E+05	1.84E+05	3.91E+05	1.09

Danshenxinkun A	6.71	297	297,279,261, 251,233,205, 190	C18H16O4	296	**65907-75-7**	2.17E+06	3.12E+06	2.59E+06	2.63E+06	4.76E+05	2.86E+06	1.09
3α-Hydroxymethyl enetanshinquinone	5.66	295	295,277,267, 251,249,221	C18H14O4	294	**83145-47-5**	9.00E+05	7.09E+05	6.14E+05	7.41E+05	1.46E+05	7.79E+05	1.05
1, 2-Didehydrotanshinone V	6.13	313	313,295,280, 277,267,253, 249,225	C19H20O4	312	-	9.94E+05	9.35E+05	7.45E+05	8.91E+05	1.30E+05	8.41E+05	0.94

Tanshinol B	7.4	297	297,279,261, 233,218,205, 190	C18H16O4	296	**189290-30-0**	1.33E+07	1.04E+07	1.00E+07	1.12E+07	1.80E+06	1.02E+07	0.91
Hydroxytanshinone IIA	6.4	311	311,293,278, 247,219,204, 191	C19H18O4	310	**18887-18-8**	2.76E+05	4.74E+05	3.24E+05	3.58E+05	1.03E+05	3.13E+05	0.87
Methylenetanshinquinone	7.4	279	279,261,233, 205,201,190, 149	C18H14O3	278	**67656-29-5**	2.18E+05	2.87E+05	2.83E+05	2.63E+05	3.87E+04	2.24E+05	0.85

Tanshinone IIB	7.15	311	311,293,278, 275,265,251, 247	C19H18O4	310	**17397-93-2**	2.56E+06	3.45E+06	2.76E+06	2.92E+06	4.67E+05	2.35E+06	0.80
trijuganone C	7.53	341	341,281,263, 235	C20H20O5	340	**135247-94-8**	3.17E+06	2.54E+06	2.86E+06	2.86E+06	3.15E+05	2.29E+06	0.80
Tanshinone I	8.91	277	277,259,235, 249,221,193, 178	C18H12O3	276	**568-73-0**	1.11E+07	1.42E+07	1.09E+07	1.21E+07	1.85E+06	9.64E+06	0.80

1, 2-Didehydrotanshinone IIA	9.63	293	279,261,233,218,205,190,169	$C_{19}H_{16}O_3$	292	**119963-50-7**	1.62E+06	2.12E+06	1.66E+06	1.80E+06	2.78E+05	1.33E+06	0.74
15, 16-Dihydrotanshinone I	8.08	279	279,261,233,218,205,190,169	C18H14O3	278	**87205-99-0**	1.16E+07	1.20E+07	1.20E+07	1.19E+07	2.31E+05	8.62E+06	0.73
Methyltanshinonate	8.42	339	339,279,261,233,205,190,149	C20H18O5	338	**135355-72-5**	6.70E+06	7.88E+06	7.17E+06	7.25E+06	5.94E+05	4.77E+06	0.66

1R-hydroxymiltirone	7.77	299	299,281,266,263,253,221,193,178	C19H22O3	298	-	2.44E+05	1.54E+05	1.65E+05	1.88E+05	4.91E+04	1.06E+05	0.56
Cryptotanshinone	9.01	297	297,282,279,267,254,221,193	C19H20O3	296	**35825-57-1**	2.01E+07	1.38E+07	1.58E+07	1.66E+07	3.22E+06	9.26E+06	0.56
Tanshinone IIA	9.89	295	295,277,267,253,249,234,221,206	C19H18O3	294	**568-72-9**	2.71E+06	2.99E+06	2.71E+06	2.80E+06	1.62E+05	1.56E+06	0.56

Sibiriquinone A	7.1	281	281,263,253, 235,207,179	C19H20O2	280	**723300-08-1**	6.91E+04	6.78E+04	5.71E+04	6.47E+04	6.59E+03	3.51E+04	0.54
Tanshinone VI	4.7	297	297,279,261, 251,233,205, 190	C18H16O4	296	**121064-74-2**	5.80E+05	6.06E+05	5.29E+05	5.72E+05	3.92E+04	3.08E+05	0.54
1-Ketoisocryptotanshinone	7.99	311	311,293,283, 275,265,255, 227,221	C19H18O4	310	-	8.98E+04	8.07E+04	5.02E+04	7.36E+04	2.07E+04	3.18E+04	0.43

Tanshindiol B	7.04	313	313,295,277, 266,249,235	C18H16O5	312	**97465-70-8**	1.04E+06	7.53E+05	6.23E+05	8.05E+05	2.13E+05	3.36E+05	0.42
Tanshindiol C	7.14	313	313,295,277, 266,249,235	C18H16O5	312	**97465-71-9**	4.91E+05	5.32E+05	4.33E+05	4.85E+05	4.97E+04	1.83E+05	0.38
Miltirone	10.09	283	283,265,240, 223,208,195, 153	C19H22O2	282	**27210-57-7**	3.19E+06	1.28E+06	1.80E+06	2.09E+06	9.87E+05	3.39E+05	0.16