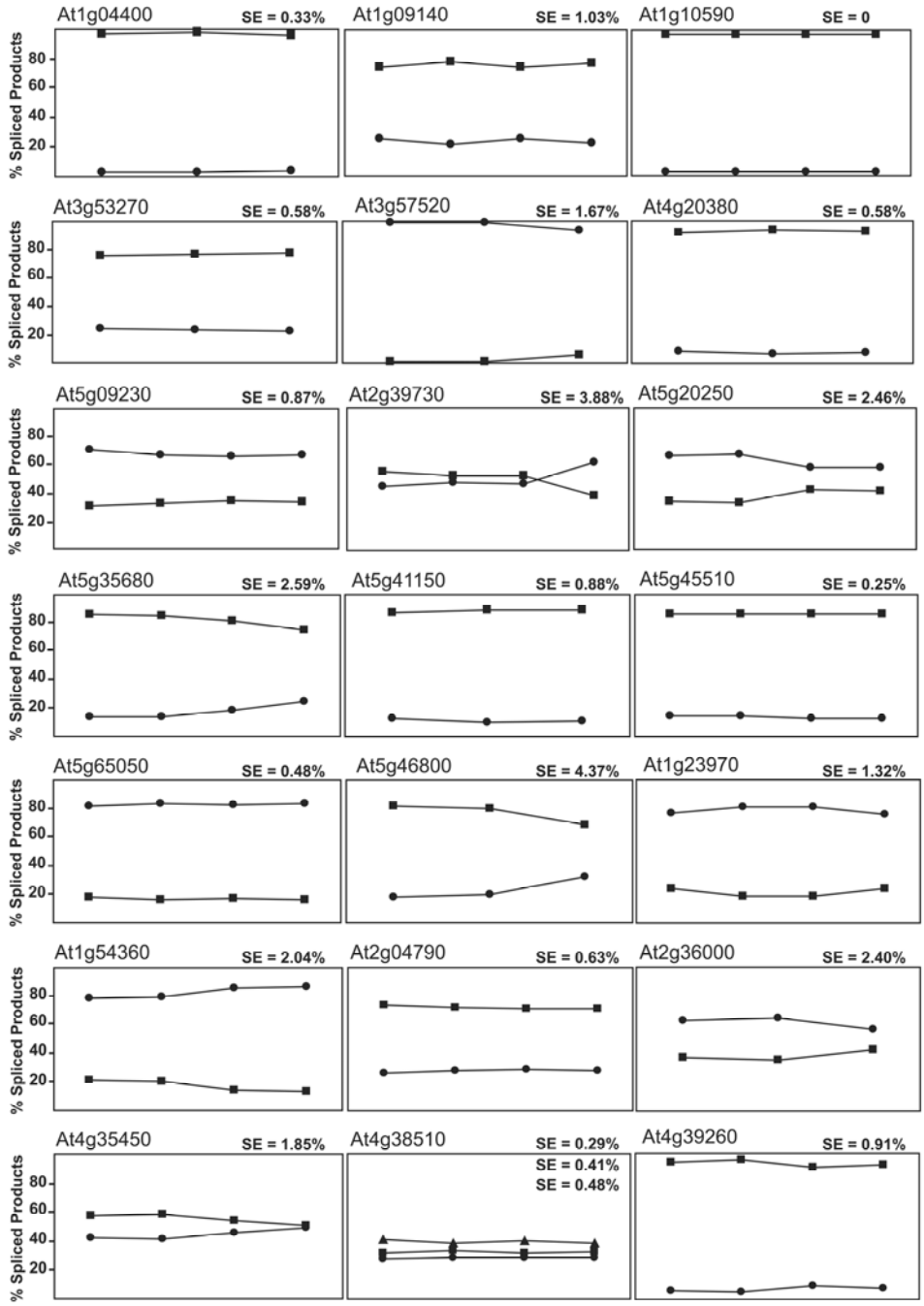
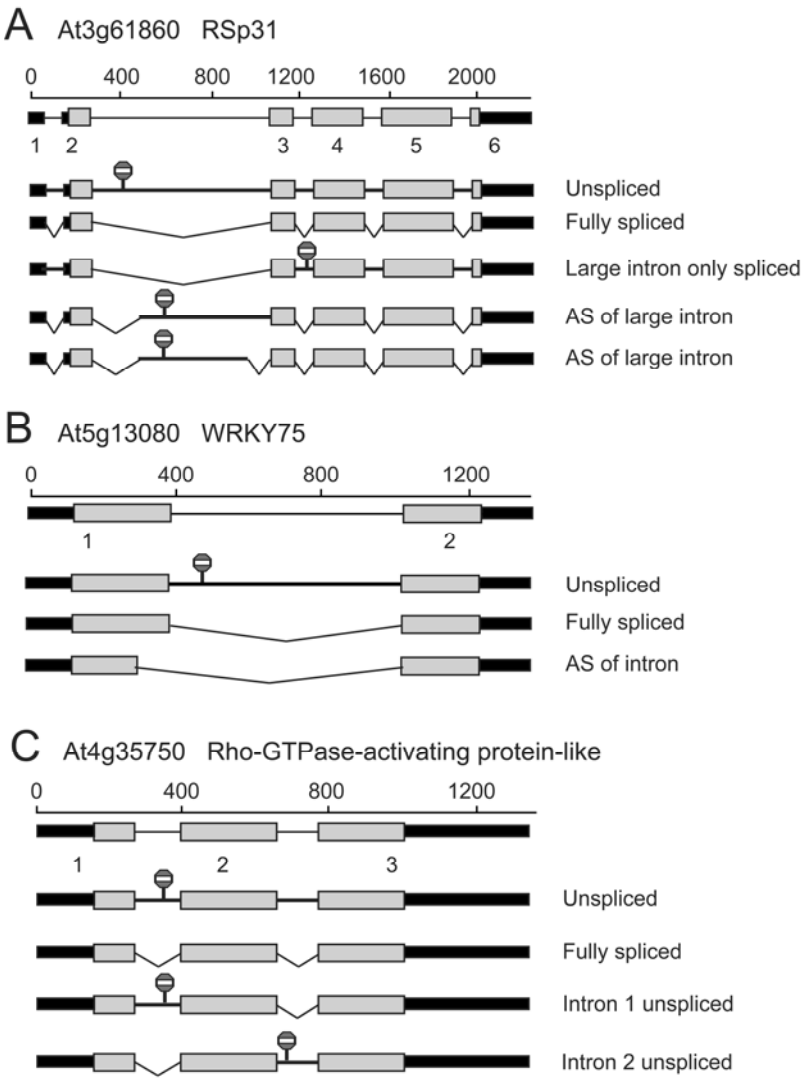
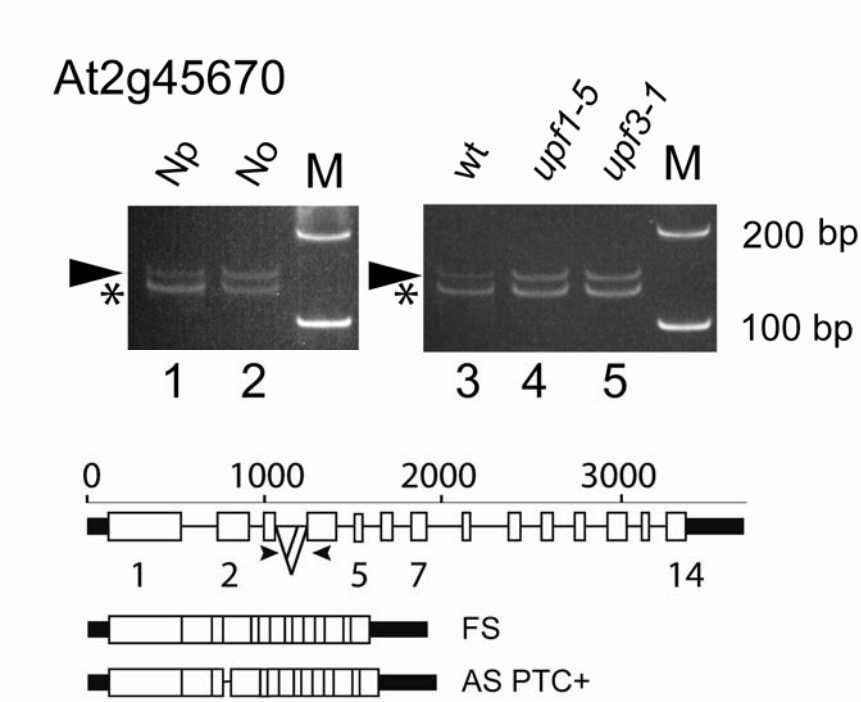
Supplemental Data. Kim et al. (2009) Aberrant mRNA transcripts and the nonsense-mediated decay proteins UPF2 and UPF3 are enriched in the Arabidopsis nucleolus



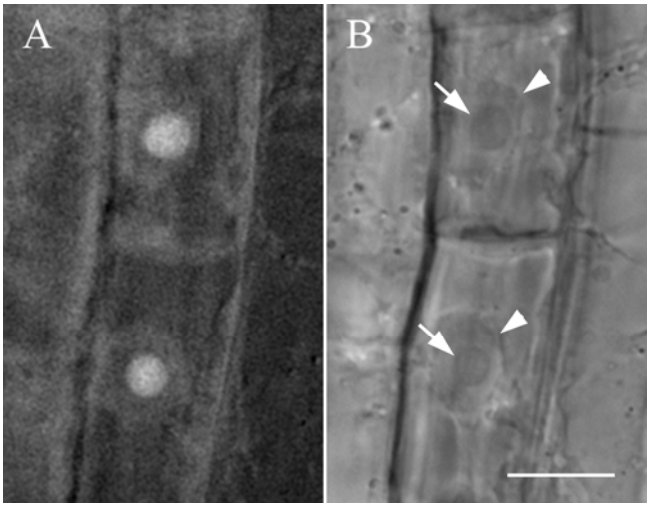
Supplemental Figure 1. RT-PCR conditions for comparison of relative abundance of aberrant and fully spliced mRNAs. Mean percentage abundance (3 experiments) of alternatively spliced transcripts are measured across different PCR cycle times (22, 24, 26 cycles or 20, 22, 24 26 cycles).



Supplemental Figure 2. Aberrantly spliced transcripts sequenced from RT-PCR reactions. Examples of cloned and sequenced transcripts are presented with descriptions for three genes: (**A**) At3g61860; (**B**) At5g13080; (**C**) At4g35750. Black boxes – UTRs; grey boxes – exons; black lines – intron sequences remaining in transcripts; diagonal lines – intron sequences removed from transcript; stop sign – premature termination codon.



Supplemental Figure 3. RT-PCR of mRNA transcripts of At2g45670 in nucleoplasmic and nucleolar RNA and RNA from *upf* mutants. RT-PCR with gene-specific primers for At2g45670 from RNA from nucleoplasmic (Np) and nucleolar (No) fractions of cell culture cells (lanes 1 and 2), and seedlings of wild type plants (lane 3), *upf1-5* (lane 4) and *upf3-1* (lane 5). Transcript structures are shown below the exon/intron structure of the genes based on TAIR. M – size markers; large arrowheads – RT-PCR products which are enriched in the nucleolus and in *upf* mutants; asterisk – fully spliced product; open boxes – exons; thick black lines – UTRs; solid lines – introns; diagonal lines – splicing events; small arrowheads – primer positions. RT-PCR controls without reverse transcriptase are not shown.



Supplemental Figure 4. Root epidermal cells from 5 day-old Arabidopsis seedling stably transformed with UPF-GFP. Root epidermal cells from 5 day-old Arabidopsis seedling stably transformed with upf-GFP. (**A**) GFP image, showing UPF3-GFP concentrated in the nucleoli. Deconvoluted wide-field fluorescence image. (**B**) bright field image of the same area. Nucleoli are indicated by arrows and nuclei by arrowheads. Bar=5µm.

Supplemental Table 1. Aberrant cDNA clones from nucleolar, nuclear and whole cell cDNA libraries.

Clone number	At number	Arabidopsis gene function (TAIR)	Exon No.	Mis-splicing type	Predicted fate of transcript	Known alternative splicing events
Nucleolar full-length cDNAs						
AtNo071	At1g14870	Expressed protein	4	Introns 1 and 3 unspliced	NMD	Intron retention of intron 2 - ASIP database
AtNo103	At1g19570	GSH-dependent dehydroascorbate reductase 1, putative	3	Intron 2 unspliced	Last intron unspliced	Intron retention of intron 1 and intron 2 - ASIP database
AtNo144	At1g25275	Expressed protein	3	Introns 1 and 2 unspliced	NMD	Intron retention of intron 1 and intron 2 - ASIP database
AtNo155	At1g32220	Expressed protein	7	Intron 1 unspliced	NMD	x
AtNo123	At1g49405	Integral membrane protein	3	Intron 2 unspliced	Last intron unspliced	x
AtNo1318	At1g54260	Histone H5/H1 family protein	7	Cryptic 5'ss in intron 4	NMD	x
AtNo317	At1g54260	Histone H1/H5 family protein	7	Intron 4 unspliced	NMD	x
AtNo028	At1g60030	Xanthine/uracil permease family protein	13	Intron 1 unspliced	NMD	x
AtNo1336	At1g61570	Mitochondrial import inner membrane translocase	2	Intron 1 unspliced	Only intron	x
AtNo029	At1g63290	Ribulose-phosphate 3-epimerase	8	Introns 3 and 5 unspliced	NMD	x
AtNo159	At1g66580	60S ribosomal protein L10	4	Intron 3 unspliced	Last intron unspliced	x
AtNo056	At1g67980	S-adenosyl-L-methionine:trans-caffeoyl-Coenzyme A	5	Introns 2 and 3 unspliced; cryptic 3' ss in intron 4	NMD	Intron retention of intron 3 (ASIP database) and Alt 5'ss used in intron 3 (ASIP and NASC)
AtNo1413	At1g70440	Hypothetical protein	4	Intron 1 unspliced	NMD	x
AtNo239	At1g70780	Expressed protein	2	Intron 1 unspliced	Only intron	Intron retention of intron 1 - ASIP database
AtNo164	At1g72640	Expressed protein	9	Cryptic 3' splice sites in exons 3 and 7	NMD	Alt 3'ss used in intron 2 (3nt distance only) - ASIP and NASC

AtNo069	At1g80840	WRKY family transcription factor 40	4	Introns 1 and 2 unspliced	NMD	x
AtNo194	At2g01540	Zinc finger and C2 domain containing protein	3	Intron 1 unspliced	NMD	x
AtNo130	At2g02100	Defensin fusion protein, putative	2	Intron 1 unspliced	Only intron	x
AtNo1418	At2g02390	Glutathione S-transferase zeta 1	10	Cryptic 3' ss in intron 3	21 nt in frame	Alt 3'ss used in intron 3 (distance 21 nt) - ASIP and NASC ; Intron retention of intron 4 - ASIP+NASC
AtNo283	At2g16060	Non-symbiotic hemoglobin 1	4	Introns 2 and 3 unspliced	NMD	Intron retention of intron 1 and intron 2 - ASIP database
AtNo1427	At2g20450	Ribosomal protein L14 (RPL14A)	5	Intron 1 unspliced	NMD	x
AtNo271	At2g21250	Mannose 6-phosphate reductase (NADPH-dependent)	6	Intron 3 unspliced	NMD	Intron retention of intron 5 - ASIP + NASC
AtNo156	At2g21660	Glycine-rich RNA-binding protein 7	2	Cryptic 5' splice site in intron 1	Only intron	Three Alt 5'ss used in intron 1 (removing intron fragments of 309, 147 or 143 nt long) - ASIP; Intron retention of intron 2 - ASIP + NASC
AtNo064	At2g24550	Unknown protein	2	Intron 1 unspliced	Only intron	x
AtNo190	At2g32190	Expressed protein	3	Intron 2 unspliced	Last intron unspliced	Intron retention of introns 1 and 2 - ASIP database
AtNo299	At2g32190	Expressed protein	3	Introns 1 and 2 unspliced	NMD	Intron retention of introns 1 and - ASIP database
AtNo052	At2g32200	Hypothetical protein	3	Cryptic 3' splice site in intron 1	In frame	x
AtNo300	At2g32210	Expressed protein	3	Intron 2 unspliced	Last intron unspliced	x
AtNo1282	At2g36530	Enolase	12	Intron 3 unspliced	NMD	x
AtNo273	At2g40095	Expressed protein	4	Intron 3 unspliced	Last intron unspliced	x
AtNo1382	At2g43510	Defensin-like/trypsin inhibitor	2	Intron 1 unspliced	Only intron	x
AtNo1449	At2g45070	Sec61 beta family protein	2	Intron 1 unspliced	Only intron	Intron retention of intron 1 - ASIP database
AtNo168	At2g45990	Expressed protein	9	Intron 2 unspliced	NMD	Alt 3'ss in intron 7, alt 5'ss in intron 8 - ASIP database, intron retention of intron 7 - ASIP+NASC
AtNo005	At3g05500	Rubber elongation factor	3	Intron 2 unspliced	Last intron unspliced	Intron retention of introns 1 and 2 - ASIP

		(REF) family protein				database
AtNo287	At3g09640	L-ascorbate peroxidase 1b	9	Intron 1 unspliced	NMD	x
AtNo1402	At3g11820	Syntaxin 121 (SYP121)	2	Cryptic intron spliced from exon 1	Only intron	Intron retention of cryptic intron from exon1 - ASIP + NASC
AtNo275	At3g16150	L-asparaginase, putative / L-asparagine amidohydrolase	4	Intron 3 unspliced	Last intron unspliced	Intron retention of intron 2 - ASIP database
AtNo018	At3g16990	TENA/THI-4 family protein; seed maturation protein	3	Sequence change in exon 1 (C instead of TT) causes frameshift in exon 1 giving PTC	NMD	x
AtNo295	At3g20270	Lipid-binding serum glycoprotein	11	Cryptic 5' and 3' splice sites used in intron 1; intron 5 unspliced	In frame	Exon Skipping of 21nt long exon 2 (in 5'UTR) - ASIP, Intron retention of intron 1 and intron 2 - ASIP + NASC
AtNo1298	At3g27930	Expressed protein	14	Intron 4 unspliced	NMD	x
AtNo227	At3g44300	Nitrilase 2	5	Cryptic 70 nt intron removed from exon 4	Frame change in last exon	x
AtNo141	At3g46010	Actin-depolymerizing factor 1 (ADF1)	3	Intron 2 unspliced	Last intron unspliced	x
AtNo108	At3g51530	F-box family protein	4	Cryptic intron spliced from exon 2	NMD	x
AtNo146	At3g51730	Saposin B-containing protein	6	Intron 2 unspliced	NMD	Intron retention of intron 5 - ASIP
AtNo320	At3g55170	60S ribosomal protein L35	4	Intron 3 unspliced	Last intron unspliced	x
AtNo170	At3g55280	60S ribosomal protein L23A (RPL23aB)	4	Cryptic 3' splice site in exon 4	Frame change in last exon	x
AtNo200	At3g60180	Uridinylate kinase	7	Intron 5 unspliced	NMD	x
AtNo007	At3g60210	Chloroplast chaperonin 10	7	Intron 5 unspliced	NMD	x
AtNo111	At3g61860	Arginine/serine-rich splicing factor RSp31	6	Cryptic 3'ss in intron 2	NMD	Alt 3'ss in intron 2 - ASIP database
AtNo193	At3g62190	DNAJ heat shock N-terminal domain-containing protein	6	Cryptic 3' splice site in intron 3	NMD	x
AtNo1433	At3g63520	9-cis-epoxycarotenoid dioxigenase / neoxanthin cleavage enzyme (NCED1) / carotenoid cleavage	14	Intron 5 unspliced	NMD	Alt 3'ss in intron 12 - ASIP database

		dioxygenase 1 (CCD1)				
AtNo307	At4g01026	Expressed protein	3	Intron 2 unspliced	Last intron unspliced	x
AtNo1445	At4g02430	Pre-mRNA splicing factor SF2 (SR1 protein)	13	Cryptic intron with part of intron 10 and exon 11; Cryptic 5'ss in intron 11	NMD	Alt 3'ss in intron 8 and intron 10, intron retention of intron 10 - ASIP database
AtNo297	At4g03510	zinc finger (C3HC4-type RING finger) family protein	3	Intron 1 unspliced	NMD	Intron retention of intron 1 - ASIP + NASC database
AtNo081	At4g10730	protein kinase	21	Intron 1 unspliced	NMD	x
AtNo1443	At4g21580	Oxidoreductase, zinc-binding dehydrogenase family protein	5	Intron 3 unspliced	NMD	Intron retention of intron 1 - NASC database
AtNo072	At4g23570	Phosphatase-related	11	Intron 1 unspliced	No effect	Intron retention of intron 1 - ASIP + NASC database
AtNo1285	At4g28360	Ribosomal protein L22 family	6	Intron 1 unspliced	NMD	x
AtNo1416	At4g32530	Vacuolar ATP synthase, putative	4	Intron 1 unspliced	NMD	x
AtNo026	At4g36690	U2 snRNP auxiliary factor large subunit, putative	13	Introns 1 and 2 unspliced	NMD	Alt 3'ss in intron 11; intron retention of intron 11 - ASIP + NASC database
AtNo169	At5g03360	DC1 domain-containing protein	8	Introns 2 and 3 unspliced	NMD	x
AtNo1438	At5g08790	No apical meristem (NAM) family protein	3	intron 1 unspliced	NMD	Intron retention of intron 2 - ASIP database
AtNo310	At5g09880	RNA recognition motif (RRM)-containing protein	13	Cryptic 5' splice site in intron 4	NMD	x
AtNo232	At5g11330	Monooxygenase family protein	4	Cryptic intron removed from exon 2, intron 2 unspliced	NMD	Cryptic intron (170nt) removed from exon 2, Intron retention of intron 2 and intron 3 - ASIP
AtNo270	At5g11840	Putative protein	4	Cryptic 5' splice site in intron 1	In frame	x
AtNo104	At5g19440	Cinnamyl-alcohol dehydrogenase-like protein (CAD)	6	Introns 1, 4 and 5 unspliced	NMD	x
AtNo306	At5g21940	Expressed protein	2	intron 1 unspliced	Only intron	Intron retention of intron 1 - ASIP

AtNo1332	At5g25770	Expressed protein	13	Intron 5 unspliced	NMD	Intron retention of intron 2,5,6 and 12 - ASIP
AtNo105	At5g27170	Hypothetical protein	2	Intron unspliced	Only intron	x
AtNo090	At5g27700	40S ribosomal protein S21 (RPS21C)	4	Introns 1 and 2 unspliced	NMD	x
AtNo294	At5g37260	Myb family transcription factor	5	Intron 1 unspliced	NMD	x
AtNo053	At5g41910	RNA polymerase II mediator complex protein-related	6	Intron 1 unspliced	NMD	x
AtNo043	At5g42790	20S proteasome alpha subunit F1 (PAF1)	2	PTC in exon (putative transcriptional error)	NMD	x
AtNo315	At5g45550	Mob1/phocein family protein	7	intron 5 unspliced	NMD	x
AtNo106	At5g53940	Yippee family protein/zinc-binding protein	5	Intron 4 unspliced	Last intron unspliced	x
AtNo1300	At5g59300	Ubiquitin-conjugating enzyme 7	6	Intron 5 unspliced; Cryptic 5'ss in exon 1 and cryptic 3'ss in intron 1 removes a cryptic intron	NMD	x
AtNo211	At5g59800	Methyl-CpG-binding domain-containing protein	6	Intron 2 unspliced	NMD	Intron retention of intron 2 - ASIP database
AtNo036	At5g64905	Expressed protein	1	PTC in exon (putative transcriptional error)	NMD	x
Nucleolar partial cDNAs						
AtNo235	At1g07590	Pentatricopeptide(PPR) repeat-containing	3	Intron 1 unspliced	NMD	Intron retention of intron 1 - ASIP
AtNo178	At1g48280	Hydroxyproline-rich glycoprotein family protein	7	Intron 6 unspliced	Last intron unspliced	x
AtNo191	At1g49870	Expressed protein; no hits to Blast X	5	Intron 1 unspliced	NMD	x
AtNo319	At1g49980	UMUC-like DNA repair family protein	14	Intron 12 unspliced	NMD	x
AtNo220	At1g51430	Expressed protein	7	Introns 1 and 2 unspliced	NMD	x

AtNo201	At1g64625	bHLH transcription factor	8	Exon skipping of exon 4; cryptic 3' splice site in exon 5	NMD	x
AtNo013	At1g66330	Senescence-associated family protein	13	Intron 9 unspliced	NMD	Intron retention of intron 5 - ASIP
AtNo1403	At4g02195	Syntaxin 42 (SYP42)	8	Intron 4 unspliced	NMD	x
AtNo1331	At4g02195	Syntaxin 42 (SYP42)	8	Intron 4 unspliced	NMD	x
AtNo1342	At5g09390	CD2-binding protein	9	Intron 8 unspliced	Last intron unspliced	Intron retention of intron 5 - ASIP, Alt 3'ss in intron 8 used - ASIP + NASC
AtNo	At5g09790	PHD finger family protein / SET domain-containing protein	5	Intron 3 unspliced; cryptic 5' and 3' splice sites in intron 1	NMD	Exon skipping of exon2; Alt3'ss used in intron 3 - ASIP
AtNo046	At5g12280	Hypothetical protein (similar to splicing factor SWAP)	5	Intron 4 unspliced	Last intron unspliced	x
AtNo016	At5g15030	Paired amphipathic helix repeat-containing protein	7	Introns 3 and 4 unspliced	NMD	x
Nuclear full-length cDNAs						
AtNu1276	At1g01100	60S acidic ribosomal protein P1 (RPP1A)	4	Cryptic 5'ss in intron 1 (5' UTR)	No effect	Alt 5'ss in intron 1 used - NASC database
AtNu1114	At1g43160	AP2 domain-containing protein	2	Intron 1 unspliced	Only intron	x
AtNu1002	At1g65980	peroxiredoxin type 2	3	Intron 1 unspliced	NMD	Intron retention of intron 3 - NASC database
AtNu1129	At1g80920	DNA J heat shock N-terminal domain-containing protein	3	Intron 1 unspliced	NMD	x
AtNu1035	At2g21195	Expressed protein	4	Intron 1 unspliced	NMD	Intron retention of intron 1 and intron 3 - ASIP + NASC database
AtNu1224	At2g32060	40S ribosomal protein S12 (RPS12C)	5	Cryptic 5'ss in intron 1 (5' UTR)	No effect	Alt 5'ss used in intron 1 - NASC + ASIP database
AtNu1235	At2g45360	Expressed protein	2	Intron 1 unspliced	Only intron	x
AtNu1375	At2g46390	Expressed protein	2	Intron unspliced	Only intron	x
AtNu1291	At3g24830	60S ribosomal protein L13A (RPL13aB)	4	Intron 2 unspliced	NMD	x

AtNu1927	At3g46460	ubiquitin-conjugating enzyme 13 (UBC13)	6	Cryptic 5'ss in intron 4, leaving 19 nt	NMD	x
AtNu1323	At3g53420	Plasma membrane intrinsin protein 2A	4	Intron 3 unspliced	Last intron	x
AtNu1246	At3g53470	Expressed protein ribosomal protein S25	2	Intron unspliced	Only intron	Alt 3'ss used in intron 1 - ASIP + NASC
AtNu1357	At4g05640	Hypothetical protein	2	Intron unspliced	Only intron	x
AtNu1145	At5g18800	NADH-ubiquinone oxidoreductase 19 kDa	3	Cryptic 3'ss used in intron 1 (5' UTR)	No effect	Alt 3'ss used in intron 1 - ASIP + NASC
AtNu1137	At5g22875	Expressed protein	3	Cryptic 5'ss in intron 1 (5' UTR)	No effect	Intron retention of intron 1 - ASIP, Alt5'ss used in intron 1 - NASC
AtNu1380	At5g45420	Myb family transcription factor	2	Cryptic 5'ss in intron 1	Only intron	x
AtNu1207	At5g57790	Unknown protein	3	Introns 1 and intron 2 unspliced	NMD	Intron retention of introns 1, 2 and 3 - ASIP, (and NASC for intron 3 only)
AtNu76	At5g59770	Expressed protein	6	Multiple cryptic splice sites used in intron 5 leaving 3 different fragments of 72nt, 49nt and 98nt	NMD	x
Nuclear Partial cDNAs						
AtNu1118	At3g59660	C2 domain-containing protein	18	Intron 16 unspliced	NMD	x
AtNu1052	At3g60300	RWD domain-containing protein	4	Intron 1 unspliced	NMD	Alt 3'ss used in intron 3 - ASIP
AtNu1008	At5g14550	Expressed protein	11	Intron 10 unspliced	Last intron	Intron retention of intron 9 - ASIP
AtNu1236	At5g26610	D111/G-patch domain-containing protein	8	Intron 4 unspliced	NMD	Intron retention of intron 4 - ASIP
Whole cell full-length cDNAs						
AtWC248	At2g03570	Hypothetical protein	2	Cryptic 5' and 3'splice sites in intron 1	Only intron	x
AtWC 1491	At5g16970	NADP-dependent oxidoreductase	5	Intron 1 unspliced	NMD	x

AtWC 1429	At1g70900	Expressed protein	7	Intron 1 unspliced	NMD	x
Whole cell partial cDNAs						
AtWC 1423	At5g41060	zinc finger (DHHC type) family protein	5	Cryptic 5' and 3' ss in intron 1	NMD	x
AtWC 1468	At1g58025	DNA-binding bromodomain-containing protein	10	Intron 9 unspliced	Last intron	x
AtWC252	At2g15580	zinc finger (C3HC4-type RING finger) protein	3	Intron 2 unspliced	Last intron	Alt 3'ss used in intron 2, intron retention of intron 2 - ASIP

Supplemental Table 2. Primers used in RT-PCR reactions.

Gene Identifier	Protein name	Accession Numbers	Forward primer	Reverse primer
Nucleolar-nucleoplasmic fractions				
At4g16190	Cysteine protease	NM_117715	ATGGATCGTGTGGTCTTCTTCTT	CTTGGGTGAGGTATGAACAGCA
At4g35750	Rho-GTPase-activating protein-like	NM_119741	ATGAGTTCTCAGATTTCGGAGATT	TGAGATACACCTCATGGAGAAACTT
At5g13080	WRKY75	NM_121311	ATGGAGGGATATGATAATGGGT	GAAAGAAGAGTAGATTTGCATTTGA
At4g39090	Cysteine proteinase	NM_120069	ATGGATCGTCTTAAGCTTTATTTCT	ATGGGCGGTGGTTGAGACGGTGGC
At1g31340	Ubiquitin-related protein	NM_102873	ATGCAGATCTTCGTCAAAACCCT	GAGAAGACCAAAACCACCCCTAA
At3g61860	SR protein, RSp31	NM_116051	ATGAGGCCAGTGTTCGTCGGCA	AGGTCTTCCTCTTGGGACTGGA
At4g29510	Arginine methyltransferase	NM_119096	ATGACTAAGAACAGTAACCACGACGA	ACGCATTTTGTAGTGTTGGGTCCT
At4g34135	Flavonol 7-O-glucosyl-transferase	NM_179161	AGTGCATAAACCACAGAAGAGA	GCTTGGTGGTCAAGTATCAGCA
At5g10980	Histone H3	NM_121136	ATGGCTCGTACCAAGCAAACCG	AGCACGTTCTCCACGAATTCTT
At2g21660	Glycine-rich protein 7	NM_179686	ATGGCGTCCGGTGATGTTGAGT	TTCCTCCGTAACCTCCTCCTT
At2g45670	Calcineurin B subunit-related	NM_130129	GTGAATAGATTCTCACAGACAT	GAACTTTCCCATTAGTCGTGGT
PCR Cycle number analysis				
At1g04400	Blue light receptor	NM_116961	GGAAGAAAGAAGAGTCAAG	GGATTATCCTCAATCCTTAGG
At1g09140	SR protein, SRP30	NM_148447	CCTGCTAGATCCATTTCCCC	GATCTTGATCTTGATTTTG
At1g10590	DNA-binding protein-related	NM_179301	CGCCTCCACAGATCTAATCGC	CCATCTTCGTGTTGACAAC
At3g53270	Unknown protein	NM_115187	CCAACATCATCATCTTCTC	CCACAAACTCGTCTATCAGC
At3g57520	Seed imbibition 2	NM_202722	GGTGGTAAGACTACCTAAAGG	GGTTATCGCTGAGCGCGGGAG
At4g20380	Lesion simulating disease 1	NM_179218	GTCTATCTCCTCAATTTGG	GCACATTAGATGCTCCTCTAGG
At5g09230	Histone deacetylase, SRT2	NM_203025	CATCCGCCATTAACGACCTC	CTCACAAACCGTCTGCATCC
At2g39730	Rubisco activase	NM_179989	CCTCCCGTGTTCGAGCAACCC	CCGTTGGATCAAAGTTTTCAGCC
At5g20250	Glycosyl hydrolase family 36	NM_122032	CCATTCAAATCTCACATTCCC	CCCGTCGGAAATACGAACCGCC
At5g35680	eIF-1A	NM_180764	CCTAATCACTTTCAACAACTC	CCGTCAATGCACATAACGTC
At5g41150	RAD1	NM_123480	CCATCCTGACATGGGTTTTGTC	CCAGTTCCTTTCTTCCGCCTGC
At5g45510	ATP binding protein	NM_123919	GGAGAAAGTTGTTGTAGGAG	GGTGGAGGTACATCACTGTGG
At5g65050	Agamous-like MADS-box protein 31	NM_125904	CAAAGATCATTGATCGTTAC	CTTCACTTCCCCCATCATTAGTTC
At5g46800	A bout de souffle	NM_124051	CTGGTTTCGCTGTTTCGTTCC	CTACATCCATTGGTCCACC
At1g23970	Unknown protein	NM_179371	CTTGCACATGATCCCGATCC	CCATCGCCCAATGCGCCACC

At1g54360	TBP-associated factor TAF6	NM_202295	CCTTCCATTCCACAGAATTC	CCAGATTGAGTCAAAGCCCAC
At2g04790	Unknown protein	NM_201690	CCCTGAAAGCATAGAAGCAGC	CCCATGACTTATTAAACTCC
At2g36000	Mitochondrial transcription termination factor-related	NM_179927	CTCGTTTAGTTTGGAGAATC	CTTCATCAGCATTCATTAC
At4g35450	Ankyrin repeat-containg protein 2	NM_119710	CCACCACAACATTGTCTTTTC	CCAGCGTTAGGAATAGATCTC
At4g38510	Vacuolar ATP synthase subunit B	NM_202978	CCTCTACACAGATCTTTGGATTC	CTTGACCACGTCGGGTAGTTCC
At4g39260	Glycine-rich protein 8	NM_179192	GGTGCTTTGTCGGCGGCCTTG	GGCTTTCTCGTCCTTGAAGG