

**Table S1. Summary of VIGS lines generated for each construct**

	vigsAP3-1	vigsAP3-2	vigsAP3-D	vigsPI-1	vigsPI-2	vigsPI-D
Phenotype	27	19	13	12	0	4
Petal transformation	27	0	13	12	0	4
Stamen transformation	0	19	13	12	0	4

Approximately 500 plants were screened for each construct during the course of 30 independent VIGS experiments; the numbers of plants with visible phenotypes are indicated.

**Table S2. Genes used for phylogenetic analyses**

Gene (GenBank accession number)	Species
<i>AP3</i> (AAL49893); <i>PI</i> (BAA06465)	<i>Arabidopsis thaliana</i>
<i>PeaPI</i> (AAW29099)	<i>Pisum sativum</i>
<i>DEF</i> (CAA44629); <i>GLO</i> (CAA48725)	<i>Antirrhinum majus</i>
<i>PhDEF</i> (X69946); <i>PhTM6</i> (AAS46017); <i>PhFBP-1</i> (M91190), <i>PhMADS-2</i> (AY370521)	<i>Petunia hybrida</i>
<i>TAP3</i> (ABG73412); <i>TM6</i> (ABG48621); <i>TPI</i> (ABG73411)	<i>Solanum lycopersicon</i>
<i>PloAP3-1</i> (AAO26529); <i>PloAP3-2</i> (AAO26530)	<i>Platanus occidentalis</i>
<i>PpAP3-1</i> (ABF56135); <i>PpAP3-2</i> (ABF56136); <i>PpAP3-3</i> (ABF56137)	<i>Pachysandra procumbens</i>
<i>PtAP3-1</i> (AAC42585); <i>PtAP3-2</i> (AAC42586)	<i>Pachysandra terminalis</i>
<i>TraAP3</i> (DQ453774)	<i>Trochodendron aralioides</i>
<i>MdAP3-1</i> (AAR87670); <i>MdAP3-2</i> (AAR87671); <i>MdAP3-3</i> (AAR87672); <i>MdPI</i> (AAR87673)	<i>Meliosma dilleniifolia</i>
<i>NnAP3</i> (ABE11602)	<i>Nelumbo nucifera</i>
<i>PnAP3-1</i> (AAC42588); <i>PnAP3-2</i> (AAC42589); <i>PnPI-1</i> (AAC42570), <i>PnPI-2</i> (AAC42571)	<i>Papaver nudicaule</i>
<i>PapsAP3-1</i> (EF071992); <i>PapsAP3-2</i> (EF071993); <i>PapsPI-1</i> (EF071994), <i>PapsPI-2</i> (EF071995)	<i>Papaver somniferum</i>
<i>E5caDEF-1</i> ; <i>E5caDEF-2</i> ; <i>E5caGLO</i>	<i>Eschscholzia californica</i>
<i>ScAP3</i> (AAD31696); <i>ScPI</i> (AAD31699)	<i>Sanguinaria canadensis</i>
<i>DeAP3</i> (AAC42590); <i>DePI</i> (AAC42572)	<i>Dicentra eximia</i>
<i>AkqAP3-1</i> (AAT46097); <i>AkqAP3-2</i> (ABC02398); <i>AkqPI</i> (AAT46101)	<i>Akebia quinata</i>
<i>AqaAP3-1</i> (AAO26497); <i>AqaAP3-2</i> (AAO26498); <i>AqaAP3-3</i> (AAO26499); <i>AqaPI</i> (AAO26500)	<i>Aquilegia alpina</i>
<i>AnnAP3-1</i> (AAO26489); <i>AnnAP3-2</i> (AAO26490); <i>AnnAP3-3</i> (AAO26491); <i>AnnPI-1</i> (AAO26493); <i>AnnPI-2</i> (AAO26495)	<i>Anemone nemerosa</i>
<i>CliAP3-1</i> (AAO26518); <i>CliAP3-2</i> (AAO26519); <i>CliPI-1</i> (AAO26520), <i>CliPI-2</i> (AAO26521)	<i>Clematis integrifolia</i>
<i>CirAP3-1</i> (AAO26510); <i>CirAP3-2</i> (AAO26511); <i>CirAP3-3</i> (AAO26512); <i>CirPI-1</i> (AAO26513); <i>CirPI-2</i> (AAO26514)	<i>Cimicifuga racemosa</i>
<i>DaPI</i> (AAC42577)	<i>Delphinium ajacis</i>
<i>HoAP3-1</i> (AAO26522); <i>HoAP3-2</i> (AAO26523); <i>HoAP3-3a</i> (AAO26524); <i>HoAP3-3b</i> (AAO26525); <i>HoPI-1</i> (AAO26526), <i>HoPI-2</i> (AAO26527), <i>HoPI-3</i> (AAO26528)	<i>Helleborus orientalis</i>
<i>RbAP3-1</i> (AAC42591); <i>RbAP3-2</i> (AAD31697); <i>RbPI-1</i> (AAC42574); <i>RbPI-2</i> (AAC42575)	<i>Ranunculus bulbosus</i>
<i>RfAP3-1</i> (AAC42569); <i>RfAP3-2</i> (AAD31698); <i>RfAP3-3</i> (AAO26531); <i>RfPI-1</i> (AAC42573); <i>RfPI-2</i> (AAD31700)	<i>Ranunculus ficaria</i>
<i>ThdAP3-1</i> (AAW78033); <i>ThdAP3-2a</i> (AAW78034); <i>ThdAP3-2b</i> (AAW78035); <i>ThdPI-1</i> (AAW78031), <i>ThdPI-2</i> (AAW78032)	<i>Thalictrum dioicum</i>
<i>ThtAP3-1</i> (AAO26534); <i>ThtAP3-2a</i> (AAO26535); <i>ThtAP3-2b</i> (AAO26536); <i>ThtPI</i> (AAO26537)	<i>Thalictrum thalictroides</i>
<i>TrcAP3</i> (AY162904)	<i>Trautvetteria carolinensis</i>
<i>TriAP3-1</i> (AAO26538); <i>TriAP3-2</i> (AAO26540); <i>TriAP3-3</i> (AAO26542); <i>TriPI-1</i> (AAO26544), <i>TriPI-2</i> (AAO26546), <i>TriPI-3</i> (AAO26548), <i>TriPI-4</i> (AAO26550)	<i>Trollius laxus</i>
<i>BgAP3-1</i> (AAO26505); <i>BgAP3-2</i> (AAO26506); <i>BgPI-1</i> (AAO26508), <i>BgPI-2</i> (AAO26509)	<i>Berberis gilgiana</i>
<i>ZmGLO-1</i> (CAC33848), <i>ZmGLO-2</i> (CAC33849), <i>ZmGLO-3</i> (CAC33850)	<i>Zea mays</i>
<i>OsMADS-2</i> (Q40702), <i>OsMADS-4</i> (Q40703)	<i>Oryza sativa</i>
<i>TgDEFA</i> (AB094965); <i>TgDEFB</i> (AB094966)	<i>Tulipa gesneriana</i>
<i>TacAP3</i> (AAF73935); <i>TacPI</i> (AAF73942)	<i>Tacca chantieri</i>
<i>ChsAP3</i> (AAF73930); <i>ChsPI</i> (AAF73939)	<i>Chloranthus spicatus</i>
<i>MfAP3</i> (AAC42592); <i>MfPI-1</i> (AAC42578)	<i>Michelia figo</i>
<i>ArePI</i> (AAR87680)	<i>Aristolochia eriantha</i>
<i>AmAP3</i> (AAV65053)	<i>Aristolochia manshuriensis</i>
<i>AePI</i> (AAF73936)	<i>Asarum europaeum</i>
<i>SahPI</i> (AAR87679)	<i>Saruma henryii</i>
<i>NymAP3</i> (AAR87709)	<i>Nymphaea</i> sp.