

(a) Acetoacetyl-CoA thiolase (AeACTH)

(b) 3-hydroxy-3-methylglutaryl-CoA synthase (AeHMGS)

Solanum	MAA P KNVGILAVEI Y FPPTCLQQEAL A HDGAS K GKY T IGLGQDCMG F CTE V ED V IS M S	60
Camptotheca	MA S E Q KNVGILAMEI Y FP S LFVQ Q EAM E VHDGAS K GKY T IGLGQDCMA F CTE V ED V IS M G	60
Ricinus	---MA K NVGILALDI Y FPPT C VQ Q EAL A HDGAS K GKY T IGLGQDCMG F CTE V ED V IS M S	57
Hevea	---MA K NVGILAMDI Y FPPT Y VQ Q EAL A HDGAS K GKY T IGLGQDCMA F CTE V ED V IS M S	57
Brassica	---MA E NVGILAMDI Y FPPT C VQ Q EAL A HDGAS K GKY T IGLGQDC L A F CTE L ED V IS M S	57
Arnebia	-----	
Solanum	LTAV T SLLE K YAID P K Q IGRL E VGS E TVID K SK S IK T FLMQ I FE K SG N TD I EG V DS T NA C	120
Camptotheca	LTAV T SL L T K Y G ID P K Q IGRL E VGS E TVID K SK S K T FLMQ I FE E CG N TD I EG V DS T NA C	120
Ricinus	LTAV T SL L D N Y N ID P K Q IGRL E VGS E TVID K SK S IK T FLMQ I FE K H G NT D IE G VDS S NA C	117

(c) 3-hydroxy-3-methylglutaryl-CoA reductase (AeHMGR)

Nicotiana	MDVRRRSSEKPAYPTKEF----AAGEKPLKPHKQQQQQDNSLLIASDALPLPLYLTNGLFF	56
Solanum	MDVRRRPVKPLYPSEHI----SSGB-PLKPHNQ----DSSVKASDALPLPLYLTNGLFF	50
Picrorhiza	MDFRRRPPRPSQIKHQQL---QSPASGASADHNNQ---SSSPKASDALPLPLYLTNGIFF	53
Antirrhinum	MDDIRR-----RRATTKSCNSGDV---VSWAKASDALPVPLYLTNGIFF	41
Oryza	MEVRRR-----APLPPPPG-----RVQAGDALPLPIRHTNLIFS	34
Arnebia	MEYS-KSMN-----KDDTSLKKQNVLEDFSKKASFAFSLPLRFANAIF	43
Camptotheca	MDVRRRSINSIHQIPSVGGTAPPMLKPKQPTKVDADVLDPSPKASDALPLPLYITNGVFF	60
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Nicotiana	TMFFSVMYLLSRWREKIRNSTPLHVVTFSELVAIVSLIASVIYLLGFFGIGFVQSFSV	116
Solanum	TMFFSVMYFLLHRWREKIRNGIPLHVLNFSELVAMVSLIASVIYLLGFFGIGFVQSFSV	110
Picrorhiza	TLLFSVAYFLLHRWRDKIRNSIPLHVLTVSELAAIICLIASFIYLLGFFGIGFVQSFTSK	103
Antirrhinum	CLFSSVAYFLLHQWRDKIRNSIPLHVLTVSELAAIICLIASFIYLLGFFGIGFVQSFTSK	111
Oryza	ALFAASLAYLMRRWREKIRNSTPLHVVGLEAMLAIFGLVASIYLLSFFSFIAFVQSIVSS	94
Arnebia	PLFFSVVYLLMRWREKIRNSTPLHVVSFHEILAIIVALVASSIYLLGFFSIGLVQ---L	99
Camptotheca	TLFTTVVYLLVRWREKIRNSTPLHVVTLSIAIAIFTFVASFIYLLGFFGIGLVQPTFS	120

Nicotiana DNNDDSWDVEDENDEQFLLEEDSRGPGATTLGCTAVPPPPARQVVMVPPQPAKVAAMSE 176
Solanum GNNDSWDVEDESPEQFIDR-----TVTPPPVRRNIPMKS-----VPVAE 149
Picrorhiza SENEDGFLHQD-----RSIHCPPIA----- 134
Antirrhinum SESDEDPPQIGD-----IHV-VPPVQ----- 121
Oryza SDDEEDFLVGPARGSS-----AAAAPAPRAPSSPAQCS-----LLGS 132
Arnebia SGEDEEEEEEVPLYDTKDVN-----KDIQVDRVTLMEEKCHVACIS-----T 142
Camptotheca SSHDDVWGVDDDEDVDEIVLK-----EDTRTVPCAAPVDCPLPPIKP-----KV 165
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Nicotiana KPAPLVTPAASEEDEEIIKSVVQGMKPSYSLESKLGDCKRAASIRKEALQRITGKSLLEGL 236
Solanum KTAQIITPFSSDEDEVVVKSVVEGRIPSYSLESKLGDCKRAAFIRKEALQRSSGKSLLEGL 209
Picrorhiza -PKPIVKMDLPQDDEEVVMSVVSSEVPVSYLSRLGDCFRAAKIRREALQRTVGRSVEGL 193
Antirrhinum -KEKEMEMEMDVVDSEMVRRVVCGEIPSYSLESKLGDCLKAARIRREAVQQVMGRSLEGL 180
Oryza PHDDAARERMPEDDEEIVSSVVGKVPVSYVLETKLGDCKRAAGIRREAVRRITGRQIEGL 192
Arnebia ASPKPMAYKCPEDDEEIVQSVVQGNTPSYSLESKLGDCKFRAAAIRREALQRLTGKSLLEGL 202
Camptotheca VDPVPISPSSSEDEEIIKSVVEGTTPSYALESKLGDHRAAAIRREALQRMTKKSLAGL 225
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Nicotiana PLEGFDYESILGQCCEMPVGYVQIPVGIAGPLLLDGREYSVPMATTEGCLVASTNRGCKA 296
Solanum PLDGFDDYESILGQCCEMPVGYVQIPVGIAGPLLLNGKEFSVPMATTEGCLVASTNRGCKA 269
Picrorhiza PLEGFDYESILGQCCEMPVGYVQIPVGIAGPLLLNGCEYSVPMATTEGCLVASTNRGCKA 253
Antirrhinum PLERFDDYESILGQCCEMPVGYVQIPVGIAGPLLLNGGEYSVPMATTEGCLVASTNRGCKA 240
Oryza PLDGFDDYESILGQCCELPVGYVQLPVGIAGPLLLDGRFYVPMATTEGCLVASTNRGCKA 252
Arnebia PLEHFDYDSILGQCCEMPVGYVQLPVGIAGPLLLDDKEYSVPMATTEGCLVASTNRGCKA 262
Camptotheca PLDGFDDYDSILGQCCEMPVGYVQIPVGIAGPLLLDGREYSVPMATTEGCLVASTNRGCKA 285
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Nicotiana IYASGGATSVLLRDGMTAPCVRFGTAKRAAELKFFVEDPVKFETLAAVFNQSSRFARLQ 356
Solanum IYVSGGATSVLFRDAMTRAPVVRFGSAKRAAELKFFVEDPMNFETLSVVFNKSSRFARLQ 329
Picrorhiza IYASGGATCVLLRDAMTRAPVVRFSVKRATDLKFFLEDPLNFDTLVVFNKSSRFARLQ 313
Antirrhinum IYVSGGATCVLLRDGMTAPVVRFSKARATDLKFFLENPLNFDTLVVFNKSSRFARLQ 300
Oryza IAESGGAVSVLLRDGMTAPVARLPTARRAAELKAFLEDSVNFNTLSMVFNRSRFRARLQ 312
Arnebia IYASGGATSVLLRDGMTAPVVRFGTAKRAAELKFFLEDPLNFDTLVVFNKSSRFARLQ 322
Camptotheca IFACGGATSVLLRDAMTRAPVVRFGSAKRAADLKFFLENPLNFDTLAAVFNSSSRFGKLQ 345
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Nicotiana RIQCAIAGKNLYMRFCVSTGDAMGMNMVSKGVQNVLDYLQNEYFDMDVIGISGNFCSDKK 416
Solanum NIQCAIAGKNLYMRFCSTGDAMGMNMVSKGVQNVLDYLQNEYFDMDIIGISGNFYCSDKK 389
Picrorhiza SIQCGIAGKNLYIRFCSTGDAMGMNMVSKGVQNVLDYLFQNDFFDMDVIGISGNFCSDKK 373
Antirrhinum SIQCAIAGKNLYIGFTCSTGDAMGMNMVSKGVQNVLDYLFQSDFFDMDVIGISGNFCSDKK 360
Oryza GVQCAMAGRKNLYMRFCSTGDAMGMNMVSKGVQNVLDYLFQDDFFDMDVIGISGNFCSDKK 372
Arnebia SIKCAIAGKNLYMRFCSTGDAMGMNMVSKGTQHVIEFLEKEFFDMDVIGISGNFYCSDKK 382
Camptotheca NIKCAIAGKNLYMRFCSTGDAMGMNMVSKGVQNVLDYLFQDDFFDMDVIGISGNFYCSDKK 405
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Nicotiana PAAVNWIEGRGKSVVCEAIITEEVVKKVLKTEVAALVEPNMLKNLTGSAMAGALGGFNAH 476
Solanum PAAVNWIEGRGKSVVCEAIKEDVVKVVLKTEVATLVELNMLKNLTGSAMAGALGGFNAH 449
Picrorhiza PAAVNWIEGRGKSVVCEAVISGDIIVTKVLKTNVASLVELNMLKNLAGSAIAGALGGFNAH 433
Antirrhinum PAAVNWIEGRGKSVVCEAVITEDVVTKVLKTTVPALVELNMLKNLTGSAMAGALGGFNAH 420
Oryza PAAVNWIEGRGKSVVCEAVIKEDVVKVVLKTNVQSLVELNVIKNLAGSAVAGALGGFNAH 432
Arnebia PAAVNWIEGRGKSVVCEAII-EDVVKVVLKT-MCSCGALHAQELLS---QWRGLWWINAH 437
Camptotheca PAAVNWIEGRGKSVVCEAVIKEEVVKVVLKTNVASLVELNMLKNLTGSAMAGALGGFNAH 465
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Nicotiana ASNIVSAVFIATGQDPAQNISSHCIITMMEAVNDGKDLHVSVTMPSEVGTVGGGTQLAS 536
Solanum ASNIVSAVFIATGQDPAQNISSHCIITMMEAVNDGKDLHVSVTMPSEVGTVGGGTQLAS 509
Picrorhiza AANIVSAIFFIATGQDPAQNISSHCIITMMEAVNDGKDLHVSVTMPSEVGTVGGGTQLAS 493
Antirrhinum AANIVSAIFFIATGQDPAQNISSHCIITMMEAVNDGKDLHVSVTMPSEVGTVGGGTQLAS 480
Oryza ASNIVTAIFFIATGQDPAQNVSSHCIITMLEAVNDGRDLHVSVTMPSEVGTVGGGTQLAS 492
Arnebia ASNIVSAIFFIATGQDPAQNISSHCIITMMEAVNEGKDLHVSVTMPSEVGTVGGGTQLAS 497
Camptotheca ASNIVSAVFIATGQDPAQNVSSHCIITMMEAVNDGKDLHVSVTMPSEVGTVGGGTQLAS 525
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Nicotiana QSACLNLGKVGKANREAPGSNARLLATIVAGSVLAGELSLMSAISAGQLVKSHMKYNRST 596
Solanum QSACLNLGKVGKANREAPGSNARLLATIVAGSVLAGELSLMSAISAGQLVKSHMKYNRSC 569
Picrorhiza QSACLNLGKVGKASKESPGSNSQLLATIVAGSVLAGELSLMSAISAGQLVKSHMKYNRSS 553
Antirrhinum QAAACLNLGKVGKASKESPGANSRLLATIVAGSVLAGELSLMSAISAGQLVKSHMKYNRSS 540
Oryza QAACLDLLGKVGKANRESPGSNARLLATVAGGVLAGELSLLSALRAGQLVKSHMKYNRSS 552
Arnebia QAAACLNLGKVGKANRECPGANARQLAAIVAGSVLAGELSLMSAIAAGQLVKSHMKYNRSS 557
Camptotheca QSACLNLGKVGKASKESAPGSNARLLATIVAGSVLAGELSLMSAIAAGQLVNSHMKYNRSN 585
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Nicotiana KDVTKASS 604
Solanum KDVTK--- 574
Picrorhiza RDIITNFSS 561
Antirrhinum RDVTKICS 548
Oryza KDMSKVIS 560

Arnebia KDVSK--- 562
 Camptotheca KDVTKASS 593
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(d) Mevalonate Kinase (AeMVK)

Arnebia -----ATVVINS~~ELPY~~GSGLGSSAALCV~~ALTA~~ALLA 31
 Arabidopsis QNLPKEKMWLS~~SGIST~~FLWLYTRIIGFNPATVVINS~~ELPY~~GSGLGSSAALCV~~ALTA~~ALLA 162
 Medicago LNIP~~EAKI~~GLASGVAAFLWLYSSIQGFKPATVVINS~~DLPL~~GSGLGSSA~~AF~~CV~~ALAA~~FLA 161
 Nicotiana -----LFFGCF~~TSIHGCK~~PAKAVVSS~~ELPL~~GSGLGSSA~~AF~~CV~~ALSA~~AILA 45
 Zea QE~~IPEAKI~~WLSAGLSAFLFLYASILGCRPGKAVVSS~~DLPM~~GAGLGSSA~~AF~~CV~~SM~~SGALLT 179
 Oryza HE~~IPEAKI~~WLSAGLSAFLFLY~~TSILGCRPGKVT~~VSS~~DLPM~~GSGLGSSA~~AF~~CV~~SM~~SGVLLT 163
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Arnebia S--SISEKTRGNG---WSSLDETNLELLN~~KWAFEGEKIIHGK~~PSGIDNTVSAYG~~GNMIK~~ 85
 Arabidopsis S--SISEKTRGNG---WSSLDETNLELLN~~KWAFEGEKIIHGK~~PSGIDNTVSAYG~~GNMIK~~ 215
 Medicago VTD~~SVSV~~VDVIRQG---WHSFGE~~KELDLVN~~KWAFEGEKIIHGKPSGIDNTVSSYG~~NIIS~~ 216
 Nicotiana LSDSVTMEF~~SHQG~~---WQVFGENELELVN~~KWAFEGEKIIHGK~~PSGIDNTVSTYG~~NMIK~~ 100
 Zea AAGAVS-VGARRG-AEGWEVLEKGALELVN~~QWAFQGEKIIHGK~~PSGIDNSVSTFG~~KMIK~~ 236
 Oryza AAGVVTAVGGISGEGMGWELVGD~~DDLELVN~~WAFQGEKIIHGKPSGIDNAVSTFG~~SMIK~~ 222
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Arnebia FCSGEITRLQSNMPLRMLITNTRVGRNTKALVSGVSQRAVRHPDAVKS~~VFN~~AVDSISKEL 145
 Arabidopsis FCSGEITRLQSNMPLRMLITNTRVGRNTKALVSGVSQRAVRHPDAVKS~~VFN~~AVDSISKEL 275
 Medicago FKSGNLTRMKSNASLKMLITNTRVGRNTKALVAGVSE~~RMLRHPD~~AMAFVFTAVDSISKEL 276
 Nicotiana FKSGDLRLKTNMPLKMLITNTKVGRNTKALVASVSE~~RTL~~RHPDAMASVFTAVDSISSEV 160
 Zea FKKGELTNLESWNPVKMLITDTRVGRNTKALVAGVSE~~RASRHPD~~AMASVFHAVNSISEEL 296
 Oryza FKKGELTNLKSSNPVKMLITDTRVGRNTKALVAGVSE~~RASRHPD~~AMASVFNANVNSISEEV 282
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Arnebia AAIQS--KDETSVT----- 158
 Arabidopsis AAIQS--KDETSVTEKEERIKELMEMNQGLLSMGVSHSSIEAVILTTVKH~~KLVS~~KL~~TG~~ 333
 Medicago TTVLQSPPTDELSVTTL~~EKVEEL~~MEMNQGLLSMGVSHAT~~IET~~VLRTTLKY~~KLSS~~KL~~TG~~ 336
 Nicotiana AAIQSPVPDDLAITEKEEKLEELMEMNQGLLQCMGVSHAS~~IET~~VLRTTLKY~~KLSS~~KL~~TG~~ 220
 Zea SSIVELAAEDEIAITSKEDKLAELMEMNQGLLQCMGVSHSSIE~~TVL~~RTTLKY~~SLVS~~KL~~TG~~ 356
 Oryza SSIVELAANDEIAITSKEEKLAELMEMNQGLLQCMGVSHSSIE~~TVL~~RTTLK~~FN~~LV~~SLVS~~KL~~TG~~ 342
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Arnebia -----
 Arabidopsis AGGGGCVL~~TLLP~~---TGTVV~~DKVVEE~~LESSGFQCF~~TALIGG~~NGAQICY--- 378
 Medicago AGGGGCVL~~TLLP~~TLLSPTV~~VDK~~VIAELESNGFQCF~~TAGIGG~~NGVEISFEHSS 388
 Nicotiana AGGGGCVL~~TLLP~~TLLSGTV~~VDK~~VIAELETGCFQCLLAGIGGN----- 262
 Zea AGGGGCVL~~TLLP~~TLSANTVLEKVTTELESHGY~~RCFK~~VEVGGLQVFRG--- 405
 Oryza AGGGGCVL~~TLLP~~TRSS-----SLP-----RRLLLF----- 367

(e) Phosphomevalonate Kinase (AePMVK)

Arnebia MAVVASAPGKVLM~~TGGYL~~VL~~ERP~~NAGIVLSTNARFYSVVKPIYDEVK~~PD~~SWAWAW~~DVKL~~ 60
 Arabidopsis MAVVASAPGKVLM~~TGGYL~~VL~~EKP~~NAGIVLSTNARFYAIVKPI~~NEEV~~K~~PE~~SWAWK~~WTDVKL~~ 60
 Hevea MAVVASAPGKVLM~~TGGYL~~LIL~~ERP~~NAGIVLSTNARFYAIVKPIYDEIK~~PD~~SWAWAW~~TDKL~~ 60
 Vitis -----MTGGYLIL~~ERP~~NAGIVLSTNARFYAIVKPLREDIE~~PD~~SWAWAW~~TD~~RN- 47
 Oryza -----
 Zea MEVVASAPGKVLIAGGYLVL~~ERP~~NAGIVLSTTARFYAVVRPL~~RD~~SLPAD~~SW~~TWAW~~TDVKV~~ 60

Arnebia TSPQMSREMTYKLSLKYLTLSQSVLS~~DSRN~~PFVEYAVQYVVA~~AYS~~R-LDSSGKDALT~~KL~~ 119
 Arabidopsis TSPQLSRESMYKLSLNHLTLQSV~~SAS~~DSRNPFVEHAIQY~~AAAA~~HLA-TEKD-KESL~~HLK~~ 118
 Hevea TSPQLARES~~LYKLS~~LN~~LAL~~QC~~VSS~~ASRNPFVEQAVQFAVA~~AHA~~T-LDKDKKNV~~LNKL~~ 119
 Vitis -----YVQNVTKKF~~NAPMYL~~SES~~RN~~PFVEQAVQY~~II~~AA~~AR~~AT-LDKNNND~~FLHTK~~ 96
 Oryza -----YKLSLK~~KSTL~~QLTSSRESANPFVEQAVQFSV~~AAAK~~VTVDKEGKEAL~~DKL~~ 50
 Zea TSPQLSRVATYKLSLNKTTLQLTSSRES~~TNPFVEQAIQF~~SV~~AAAK~~ATI~~IDK~~ERK~~KD~~V~~VDKL~~ 120
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Arnebia LLRGLDITILGCNEFYSYRNQIEARG~~LPLTPES~~LSSLP~~PFT~~SITFNKEESG----GQNSK 175
 Arabidopsis LLQGLDITILGSNDFYSYRNQIESAG~~LPLTPES~~LGLTAPFASITFNA~~ESN~~----GANSK 174
 Hevea LLQGLDITILGTNDFYSYRNIEAC~~LPLTPES~~LALP~~FS~~SITFNVEAN----GQNC~~K~~ 175
 Vitis LLQGLDITILGCNDFYSYRN~~YIE~~ARG~~LPLTPD~~VLAALP~~PFT~~PITFNA~~EESN~~----GENCK 152
 Oryza LLQGLHITILGCNDFYSYRKQIEARG~~LPLTP~~EVLLSLP~~PF~~CSITFNSEVANG~~MTG~~ENCK 110
 Zea LLQGLNITIIGHNDFYSYRKQIEARG~~LPLTP~~EVLLSLP~~PF~~SSITFNSEVANG~~MTG~~EKCK 180

Arnebia LLDELGIPTEDVPVDQFTPLGRILYKAPSDGKWGEHELDDYLLFIVRDVKVNPNDDEVADI 171
Adonis LLDELGIPAEDVPVDEFTPLGRILYKAPSDGKWGEHELDDYLLFIVRDVKYDNPDEVADA 234
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Nicotiana KYVNQEQLKELLRKADAGEDGLKLSPWFRLLVVDNFLFKWWDHVEKGTIQEADMKTIHKL 234
Solanum KYVNQEQLKELLRKADAGEEGLKLSPWFRLLVVDNFLFKWWDHVEKGTIQEADMKTIHKL 234
Pueraria KYVNRDQLKELLRKADAGEEGLKLSPWFRLLVVDNFLFKWWDHLEQGTLGVEVDMKTIHKL 300
Camptotheca KYVTRDQLKELLRKADAGEEGLKLSPWFRLLVVDNFLFKWWDHVEKGTMEHADMKSIHKL 234
Arnebia KYVNPAQLKELLTKADAGEDGLKLSPWFRLLVVDNFLFKWWDHVEKGNVHQVADMKTIHKL 231
Adonis KYVNREELKEILRKADAGEEGIKLSPWFRLLVVDNFLFKWWDHVEEGKIKDVADMKTIHKL 294
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Nicotiana T 235
Solanum T 235
Pueraria T 301
Camptotheca I 235
Arnebia T 232
Adonis T 295

(h) Geranyl diphosphate synthase (AeGDPS)

Antirrhinum -----MSLVNPITTWSTTTTSKSPKNVQTTTSSRSIILPHKIS-----LFPSNPKSK 47
Mentha -----MSALVNPVAKWPQTIGVKDVHGGRRRRSRSTLFQSHPLRTEM----PFSLYFSSP 51
Picrorhiza -----MSLVNSIT-WSQTSSILNIQSNISKKLTPFSILPHPLTNNL----PISLFPNPK 49
Humulus -----MSSVN--LTWVQTCSMFN-QAGRSRSSTFNLLHYHPLK-KV----PFSFQTPKQ 46
Arnebia -----MHNLRHVKKWIQLSSIFS-----CSSKSIYMSSRVN----- 32
Abies MAYSCMAASC-HGLHFMNIASQECNLKRGIIPSKRLHGISSSLWASN----GFQGHLEER 55
Picea MGYNGMVSSNLGLYYLNIASRECNLKRISIPSP-FHGVSTSLGSSTSXHLGLRHLKKE 59
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Antirrhinum S-KTHLRFSISSILTKNPQESSQK-TSKDPTFTLDFKTYMLEKASSVNKALEQAVLLKEP 105
Mentha L-KAPATFSVSAVYTKEGSEIRKDPAPSTSPAFDFDGYMLRKAKSVNKALEAAVQMKEP 110
Picrorhiza SNISNSNTPLSAILTKD-----QKPQNPPTTPTDFKSYMLQKADSVNKALDSDPLTEP 104
Humulus RRPTSSFSISSISAVLTEQ----EAVTEDEEQKSTFNFKSYMVQKANSVNQALDAVLLREP 102
Arnebia -----VFIEI-----EEPRSRFDFKSYMINKITSINEALDSAVPLIEP 70
Abies LSAYRHLVSSSRCLNTIAMLSNLSEQAKEKATEFDFKEYLHSKAISVNEALERAVPLRYP 115
Picea LLSHRLLLSSTRSSKALVQLADLSEQVKN-VVEFDFDKYMHSKAIADVNEALDKVIPPRYP 118
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Antirrhinum LKIHESMRYSLLAGGKRVRPMLCIAACELVGGLESTAMPACAVEMIHTMSLIHDDLPCM 165
Mentha LKIHESMRYSLLAGGKRVRPMLCIAACELVGGDESTAMPAACAVEMIHTMSLMHDDLPCM 170
Picrorhiza LKIQESMRYSLLAGGKRIRPMLCIAACELVGGDESTAMPAACAVEMHTMSLMHDDLPCM 164
Humulus QMIHEAMRYSLLAGGKRVRPVLCLSAACELVGGDESVAAPACAVEMIHTMSLIHDDLPCM 162
Arnebia IKLHEAMRYTLLSGGKRVRPIVCIAACELVGGHESTVMPACAEEMIHSMSVMLDDLPCM 130
Abies EKIHEAMRYSLLAGGKRIRPILTIAACELVGGSEELAMPACAEEMIHTMSLIHDDLPSM 175
Picea QKIYESMRYSLLAGGKRVRPILCIAACELMGGTEELAMPACAEEMIHTMSLIHDDLPHY 178
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Antirrhinum DNDDLRRGKPTNHHKIYGEDVAVLAGDALLAFSFEHVAKST-KGVSSDRIVRVIGELAKCI 224
Mentha DNDDLRRGKPTNHHMAFGESVAVLAGDALLSFAFEHVAAAT-KGAPPERIVRVIGELAVSI 229
Picrorhiza DNDDLRRGKPTNHHKVFTEDVAVLAGDALLAFSFEHVASLT-KGVCSERIVRVIGELAKCV 223
Humulus DNDDLRRGKPTNHHKVFGEDEVAVLAGDALLAYAFEHVAVST-VGVPAARIIRAIGELAKSI 221
Arnebia DNDDFRRGKLSNHRVYGEKITLLAVRSLQALAVDHVVAT-RGVPPERLVRALTEMAILT 189
Abies DNDDLRRGKLTNHHKVFGEDEVAVLAGDALLSFAFEHIAVSTRKTVASHRVLRVSVSELGKAI 235
Picea DNDDLRRGKPTNHHKVFGEDEVAVLAGDALLSFAFEHVAVSTRTLTGTDIILRLLEIGRAT 238
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Antirrhinum GSEGLVAGQVVDISSEG-MTEVGLHLEFIHVHKTAAALLEASVVLGAIVGGADDEDVEKL 283
Mentha GSEGLVAGQVVDVCSSEG-MAEVGLDHLFIHHHKTAAALQGSSVVLGAILGGGKEEVAKL 288
Picrorhiza GCEGLVAGQVVDICSEG-MDEVGLHLEFIHLNKTAAALLEGSSVVLGAILGGGSDEEVEKL 282
Humulus GSEGLVAGQVVDIDSEG-LANVGLLEQLEFIHLHKTAAALLEASVVLGAILGGGTDEQVEEL 280
Arnebia GSKGAAAGQIADLCSSGEDFNVSIEQLEHIHMQKTGTLCESVSVSGAIGGASEEEIEKL 249
Abies GSQGVAGQGVADITSEG-DPSVGLLETLEWIHIHKTAVLLECAVSVSGAIGGASENEIERT 294
Picea GSEGVGGQVVDIESEG-DPSIDLETLEWVHIHKTAVLLECSVVCAGIMGASEDDIERA 297
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Antirrhinum RKFARCIGLLFQVVDIILDVTKSSQELGKTAGKDLVADKTTYPKLLGIEKSREFAEKLNR 343
Mentha RKFANCIGLLFQVVDIILDVTKSSKELGKTAGKDLVADKTTYPKLIGVEKSKEFADRLNR 348
Picrorhiza RNFARCIGLLFQVVDIILDVTKSSKELGKTAGKDLVADKTTYPKLIGIEKSKEFAERLNR 342
Humulus RSFARCIGLLFQAVDDIILDVTKSSQELGKTAGKDLVADKATYPRLMGIEKSREFAEKLNR 340
Arnebia RKFSCICGLMFQIVDDVLDVTKSSMELGKPKAGKDVVAAKATYPRLIGIEKSRELALKLNS 309

(i) *p*-Hydroxybenzoic acid geranyltransferase (AePGT)

(j) Phenylalanine ammonia lyase (AePAL)

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|--------------|---|----|
| Arnebia | -M E T I V E K G --- N G K S M E F C M Q D P L N W E M A A E S M K G S H L D E V K R M V A E F R K P P V V Q L A G K | 55 |
| Lithospermum | -----M E N G ---- N G K - M E F C M K D P L N W G M A A E S M K G S H L D E V K K M V A E F R K P P V V Q L A G K | 50 |
| Nicotiana | M A S N G H V G - G E D F L C K K S S A T D P L N W E M A S E S L R G S H L D E V K K M V S E F R K P M V K L G G E | 59 |
| Capsicum | M A S T I A Q N G D I V A I D L C N K S - I H D P L N W E M A A E S L K G S H L D E V K K M V D E F R K P I V K L G G E | 59 |
| Catharanthus | M K N G S T E N G H I N N G E V L D F C L K D P L N W G M A A D S L K G S H L D E V K R M V A E F R K P P V V K L G G E | 60 |

| | | |
|--------------|--|-----|
| Camellia | -MDSTTAIGNGVGSGGSPGFCCLKDPLNWGVAAEAMKGSHLKEVKGMVEEFRKPPVRLGGE | 59 |
| Arnebia | TLTIGQVASIAAHDD---GVKVELAEAREGVKASSDWVMSMNKGTDSYGVTTGFGATS | 112 |
| Lithospermum | TLTTIAQVAIAAARD---GVTVELAEAREGVKASSDWVMSMNKGTDSYGVTTGFGATS | 107 |
| Nicotiana | TLTVAQVAIAVRDKSANGVKVELSEEDARAGVKASSDWVMSMNKGTDSYGVTTGFGATS | 119 |
| Capsicum | TLTVAQVASIANADNKTGCVKVELSEARAGVKASSDWVMSMCKGTDSYGVTTGFGATS | 119 |
| Catharanthus | TLTISQVAIAAARDY---NAVKVELSEEDARAGVKASSDWVMSMNKGTDSYGVTTGFGATS | 118 |
| Camellia | TLTISQVAIAAVRGS---EVAVELSEAREGVKASSDWVMSMNKGTDSYGVTTGFGATS | 116 |
| Arnebia | HRRTKQGGALQKELIRFLDAGIFNGTETSHTLPHSATRAAMLVRINTLLQGYSGIRFEI | 172 |
| Lithospermum | HRRTKQGGALQKELIRFLNAGIFNGTETSHTLPHSATRAAMLVRINTLLQGYSGIRFEI | 167 |
| Nicotiana | HRRTKNGGALQKELIRFLNAGVFGNGTETNHTLPHSATRAAMLVRINTLLQGYSGIRFEI | 171 |
| Capsicum | HRRTKNGGALQKELIRFLNAGVFGNGTGSCHTLPHSATRAAMLVRINTLLQGYSGIRFEI | 179 |
| Catharanthus | HRRTKQGGALQKELIRFLNAGIFNGTESSHTLPHSATRAAMLVRINTLLQGYSGIRFEI | 178 |
| Camellia | HRRTKQGGALQKELIRFLNAGIFNGTESCHTLPHSATRAAMLVRINTLLQGYSGIRFQI | 176 |
| Arnebia | LEAITKFLNSNITPFLPLRGITSSSGDLVPLSYIAGLLTGRPNs-RVGPKEKLNAAEEAF | 231 |
| Lithospermum | LEAITKFLNTNITPCLPLRGITIASGDLVPLSYIAGLLTGRPNsKAVGPTGEEKLNAAEEAF | 227 |
| Nicotiana | LEAITKFLNSNITPCLPLRGITIASGDLVPLSYIAGLLTGRPNsKAVGPNGETLNAAEEAF | 239 |
| Capsicum | LEAITKFLNSNITPCLPLRGITIASGDLVPLSYIAGLLTGRPNsKAVGNGEKLNAEEAF | 239 |
| Catharanthus | LEAITKFLNHNITPCLPLRGITIASGDLVPLSYIAGLLTGRPNsKAVGPNGEIVNPEQAF | 238 |
| Camellia | LETTSKFLNNNITPCLPLPGTITASGDLIPLSYIAGLLTGPPHSKAVGPTGKTFFPKEAF | 236 |
| Arnebia | RLAGISNGFFELQPKKEGLALVNGTAVGSGMASMVLVEATILAVLSEVISAIFAUEVMNGKP | 291 |
| Lithospermum | RLAGISSGFFELQPKKEGLALVNGTAVGSGMASMVLVEANILGVMSEVLsAVFAUEVMNGKP | 287 |
| Nicotiana | RVAGVSGFFELQPKKEGLALVNGTAVGSGMASMVLFDNILAVMSEVLsAIFAUEVMNGKP | 299 |
| Capsicum | RVAGVSGGFFELQPKKEGLALVNGTAVGSGMASMVLVESNILAVMSEVLsAIFAUEVMNGKP | 299 |
| Catharanthus | KMAGVNDGLFELQPKKEGLALVNGTAVGSGMASMVLFEANILAVLSEVLsAIFAUEVMNGKP | 298 |
| Camellia | PLTWNEGSGFFDLQPKKEGLALVNGTAVGSGLASMVLFEANILAVLSEVLsAIFAUEVMQGP | 296 |
| Arnebia | EFTDHLTHKLKHHPGQIEAAAIMHEHILDGSSYVKAQKLHEMDPLQPKPKQDRYALRTSPQ | 351 |
| Lithospermum | EFTDHLTHKLKHHPGQIEAAAIMHEHILDGSSYVKAQKLHEMDPLQPKPKQDRYALRTSPQ | 347 |
| Nicotiana | EFTDHLTHKLKHHPGQIEAAAIMHEHILDGSSYVKAQKLHEMDPLQPKPKQDRYALRTSPQ | 359 |
| Capsicum | EFTDHLTHKLKHHPGQIEAAAIMHEHILDGSSYVKAQKLHEMDPLQPKPKQDRYALRTSPQ | 359 |
| Catharanthus | EFTDHLTHKLKHHPGQIEAAAIMHEHILDGSSYVKAQKLHEMDPLQPKPKQDRYALRTSPQ | 358 |
| Camellia | EFTDHLTHKLKHHPGQIEAAAIMHEHILDGSSYVKAQKLHEMDPLQPKPKQDRYALRTSPQ | 356 |
| Arnebia | WLGPLIEVIRSATKMIEREINSVNDNPLIDVSRNKALHGGNFQGTPIGVAMDNTRLAIAS | 411 |
| Lithospermum | WLGPIQIEVIRSATKMIEREINSVNDNPLIDVSRNKALHGGNFQGTPIGVAMDNTRLAIAA | 407 |
| Nicotiana | WLGPIQIEVIRSATKMIEREINSVNDNPLIDVSRNKALHGGNFQGTPIGVSMNDNRLALAS | 419 |
| Capsicum | WLGPIQIEVIRAATKMIEREINSVNDNPLIDVSRNKALHGGNFQGTPIGVSMNDNRLALAS | 419 |
| Catharanthus | WLGPIQIEVIRSATKMIEREINSVNDNPLIDVSRNKALHGGNFQGTPIGVSMNDNRLAIAS | 418 |
| Camellia | WLGPLIEVIRSSTKSIEREINSVNDNPLINVS RNKALHGGNFQGTPIGVSMNDNTRLAVAS | 416 |
| Arnebia | IGKLLFAQFSELVNDYNNGLPSNLTGSRNPSLDYGFKGAEIAMASYCSELOFLANPVTN | 471 |
| Lithospermum | IGKLLFAQFSELVNDYNNGLPSNLTGSRNPSLDYGFKGAEIAMASYCSELOFLANPVTN | 467 |
| Nicotiana | IGKLMFAQFSELVNDYNNGLPSNLTAGSRNPSLDYGFKGAEIAMASYCSELOFLANPVTN | 479 |
| Capsicum | IGKLMFAQFSELVNDYNNGLPSNLTAGSRNPSLDYGFKGAEIAMASYCSELOFLANPVTN | 479 |
| Catharanthus | IGKLMFAQISELVNDFYNNGLPSNLGGRNPSLVYGFKGAEIAMASYCSELOFLANPVTN | 478 |
| Camellia | IGKLMFAQFSELVNDYNNGLPSNLGGRNPSLDYGFKGAEIAMASYCSELOFLANPVTN | 476 |
| Arnebia | HVQSAEQHNQDVNSLGLISSRKTS EAVEILKLMSSSFLVALFQAVDLRHIENVRLAVKN | 531 |
| Lithospermum | HVQSAEQHNQDVNSLGLISSRKTS EAVEILKLMSSSFLVALCQAVDLRHIENVRLAVKN | 527 |
| Nicotiana | HVQSAEQHNQDVNSLGLISARKTAEAVDILKLMSSSTYLVALCQAI DLRLHIENLNKNAVKN | 539 |
| Capsicum | HVQSAEQHNQDVNSLGLISSRKTA EAVDILKLMSSSTYLVALCQAI DLRLHIENLNKNAVKN | 539 |
| Catharanthus | HVQSAEQHNQDVNSLGLISSRKTA EAVEILKLMSSSTYLVALCQAI DLRLHIENLNKNAVKN | 538 |
| Camellia | HVQSAEQHNQDVNSLGLISSRKTA EAVDILKLMSSSTYLVALCQAVDLRHIENLNRTVKS | 536 |
| Arnebia | TVSQVAKRTLTTGVNGELHPSRFSEKDLLLVVDREYVFAYADDPCLATYPLMQKLRDVLV | 591 |
| Lithospermum | TVSQVAKRTLNI GVDGLHPSRFSEKELLRVVDREYVFAYADDPSCSATYPLMQKLRVLV | 587 |
| Nicotiana | TVSQVAKRTLTMGANGELHPSRFCEKELLRVVDREYLFAYADDPSCSNYPLMQKLRQVLV | 599 |
| Capsicum | TVSQVAKRTLTMGANGELHPSRFCEKELLRVVDREYLFAYADDPSCSTYPLMQKLRQVLV | 599 |
| Catharanthus | TVSQVAKRTLTVGVNGELHPSRFCEKDLIRVVDREYVFAYVDDPCSGTYPLMEKLRQVIV | 598 |
| Camellia | TVSQVAKRVLTMGVNGELHPSRFCEKDLLRVVDREYIFAYIDDPCSATYPLMQKLRQVLV | 596 |
| Arnebia | GHALANGENEKDVNTSIFHKIAIFEDELKAILPKVEENARASVENGT PAILNRIEECRSY | 651 |
| Lithospermum | SHALANSNGEKDASTSIFHKIGVFEELKGLLPKVEENARASVENGT PAIPNKIEECRSY | 641 |

| | | |
|--------------|--|-----|
| Nicotiana | DHAMKNGESEKVNSSIFQKIGAFEDELKAVLPKEVENARAALESGNPAIANRITTECRSY | 659 |
| Capsicum | DHALNNGESEKVNSSIFQKIAAFEDELKAVLPKEVESARITLESGNPSIPNRITTECRSY | 659 |
| Catharanthus | DHALQNGESEKVNNTSIFQKIAAFEDELKTVLPKEVESARTALENGNPAIPNRITTECRSY | 658 |
| Camellia | EHALKNGESEKLNSTSIFQKIRAFEEEEIKTLLPKVEVESTAAAIENGNSAIPNRITTECRSY | 656 |
| | ** : * . ** : . : ** : ** ** : * : * : * : * : * : * : * : * : * : * | |
| Arnebia | PLYKFVREELGTEFLTGEKVRSPGEELDQVFTALCEGKLVDPLLACLEAWNVAPLPIC | 709 |
| Lithospermum | PLYKFVRGELGTELLTGEKVRSPGEELDQVFNALCEGKLVDPLLACLEAWNVAPLPIC | 705 |
| Nicotiana | PLYRFVRKELGTELLTGERVRSPGEEDKVFATMCNGQIIDPMLECLKSWNGAPLPIC | 717 |
| Capsicum | PLYRLVRKELGTELLTGERVRSPGEEDKVFATMCNGQIIDPMLECLKSWNGAPLPIC | 717 |
| Catharanthus | PLYKFVREDVGAFLTGEKDRSPGEEDKVFATMCNEKIIDPMLECLKSWNGAPLPIC | 716 |
| Camellia | PLYKFVREELGTELLTGEKVRSPGEEDKVFATLCKGEMIDPLMDCLKSWNGAPLPIC | 714 |
| | *** : * : * : * : * : * : * : * : * : * : * : * : * : * : * : * | |

(k) Cinnamic acid 4-hydroxylase (AcC4H)

| | | |
|--------------|---|-----|
| Arnebia | MDLLLLLEKALLGLFFSVIIAIVISKLGKKFKLPPGPIPVPIFGNWLQVGDLLNHNLT | 60 |
| Lithospermum | MDLLLLLEKALLGLFFSVIIAIVISKLGKKFKLPPGPIPVPIFGNWLQVGDLLNHNLT | 60 |
| Solanum | MDLLLLLEKTLIGLFFAILIAIIVSKLSKRFKLPPGPIPVPIFGNWLQVGDLLNHNLT | 60 |
| Capsicum | MDLLLLLEKTLIGLFFAILIAIIVSKLSKRFKLPPGPIPVPIFGNWLQVGDLLNHNLT | 60 |
| Camellia | ----- | |
| Brassica | MDLLLLLEKSLIAVFAAVLATVISKLRGKKLKLPPGMPPIPIFGNWLQVGDLLNHNLT | 60 |
| Arabidopsis | MDLLLLLEKSLIAVFAVILATVISKLRGKKLKLPPGPIPIPIFGNWLQVGDLLNHNLT | 60 |
| Arnebia | YAKKFGEIFLLRMGQRNLVVVSSPDLAKEVLHTQGVFGSRTNRNVFDIFTGKGQDMVFT | 120 |
| Lithospermum | YAKKFGEIFLLRMGQRNLVVVSSPDLAKEVLHTQGVFGSRTNRNVFDIFTGKGQDMVFT | 120 |
| Solanum | YAKKFGDVFLLRMGQRNLVVVSSPELAKEVLHTQGVFGSRTNRNVFDIFTGKGQDMVFT | 120 |
| Capsicum | YAKKFGDIFLLRMGQRNLVVVSSPELAKEVLHTQGVFGSRTNRNVFDIFTGKGQDMVFT | 120 |
| Camellia | -----MVFT | 4 |
| Brassica | YAKKFGDLFLLRMGQRNLVVVSSPNLTKEVLHTQGVFGSRTNRNVFDIFTGKGQDMVFT | 120 |
| Arabidopsis | YAKKFGDLFLLRMGQRNLVVVSSPDLTKEVLHTQGVFGSRTNRNVFDIFTGKGQDMVFT | 120 |
| | *** | |
| Arnebia | VYGEHWRKMRRIMTVPFFTNNKVVQYRQGWFEFEVESAIEDVKKNPESETVGIVLRKRRLQ | 180 |
| Lithospermum | VYGEHWRKMRRIMTVPFFTNNKVVQYRQGWFEFEVESAIEDVKKNPESETVGIVLRKRRLQ | 180 |
| Solanum | VYGEHWRKMRRIMTVPFFTNNKVVQYRGGWESEASVVEDVKKNPESATNGIVLRKRRLQ | 180 |
| Capsicum | VYGEHWRKMRRIMTVPFFTNNKVVQYRGGWESEASVVEDVKKNPESATNGIVLRKRRLQ | 180 |
| Camellia | VYGEHWRKMRRIMTVPFFTNNKVVQYRFGWEDEAGRVEDVKKNPEAKTNGIVLRKRRLQ | 64 |
| Brassica | VYGEHWRKMRRIMTVPFFTNNKVVQQRREGWEFEASVVEDVKKNPDSATKGIVLRKRRLQ | 180 |
| Arabidopsis | VYGEHWRKMRRIMTVPFFTNNKVVQQRREGWEFEASVVEDVKKNPDSATKGIVLRKRRLQ | 180 |
| | ***** : ***** * * * * . : ***** : * : ***** : ***** | |
| Arnebia | MMYNNMFRIMFDRRFESEDDPLFKKLRLALNGERSRLAQSFEDYNYGDFIPILRPFLRGYLY | 240 |
| Lithospermum | MMYNNMFRIMFDRRFESEDDPLFMKLRLALNGERSRLAQSFEDYNYGDFIPILRPFLRGYLY | 240 |
| Solanum | MMYNNMFRIMFDRRFESEDDPLFVKLRLALNGERSRLAQSFEDYNYGDFIPILRPFLRGYLY | 240 |
| Capsicum | MMYNNMFRIMFDRRFESEDDPLFVKLRLALNGERSRLAQSFEDYNYGDFIPILRPFLRGYLY | 240 |
| Camellia | MMYNNMYRIMFDSRFSESEDDPLFVKLRLALNGERSRLAQSFEDYNYGDFIPILRPFLRGYLY | 124 |
| Brassica | MMYNNMFRIMFDRRFDSEDDPLFIRLALNGERSRLAQSFEDYNYGDFIPILRPFLRGYLY | 240 |
| Arabidopsis | MMYNNMFRIMFDRRFESEDDPLFLRLALNGERSRLAQSFEDYNYGDFIPILRPFLRGYLY | 240 |
| | ***** : ***** * : * : * : * : * : * : * : * : * : * : * : * : * : * : * | |
| Arnebia | ICKEVKETRLKLFKDYFVDERKKIAS-TKSTTSNGLKCAIDHILEAQKGEINEDNVLYI | 299 |
| Lithospermum | ICKEVKETRLKLFKDYFVEERKKIAS-TKSTTTNGLKCAIDHILEAQKGEINEDNVLYI | 299 |
| Solanum | ICKEVKEKRLKLFKDYFVDERKKLAN-TKSMDSNALKCAIDHILEAQKGEINEDNVLYI | 299 |
| Capsicum | ICKEVKEKRLQLFKDYFVDERKKLAN-TKSMDSNALKCAIDHILDAQKGEINEDNVLYI | 299 |
| Camellia | ICKEVKERRQLFKDYFVDERKKLAKPRAMDVTILKCAIDHILDAQKGEINEDNVLYI | 184 |
| Brassica | ICQDVKDRLALFKKYFVDERKQIAS-WKPTGSEGLKCAIDHILEAQKGEINEDNVLYI | 299 |
| Arabidopsis | ICQDVKDRIALFKKYFVDERKQIAS-SKPTGSEGLKCAIDHILEAQKGEINEDNVLYI | 299 |
| | ** : * : * : * : * : * : * : * : * : * : * : * : * : * : * : * | |
| Arnebia | VENINVAAIETTLWSIEWGIAELVNHPRIQKKLRDEIDAILGPGVQVTEPDTHKLPLYLA | 359 |
| Lithospermum | VENINVAAIETTLWSIEWGIAELVNHPRIQKKLRDEIDITILGPGVQVTEPDTHKLPLYLA | 359 |
| Solanum | VENINVAAIETTLWSIEWGIAELVNHPHIQKKLRDEIDITVLGPGMQVTEPDMPLPLYLA | 359 |
| Capsicum | VENINVAAIETTLWSIEWGIAELVNHPHIQKKLRDEIDAVLGPGVQVTEPDTHKLPLYLA | 359 |
| Camellia | VENINVAAIETTLWSIEWGIAELVNHPHIQKKLRHEDTMLGLGVITEPDTHKLPLYLA | 244 |
| Brassica | VENINVAAIETTLWSIEWGIAELVNHPHIQTKLRNEIDITVLGPGVQVTEPELHKLPLYLA | 359 |
| Arabidopsis | VENINVAAIETTLWSIEWGIAELVNHPHIQSKLRNEIDITVLGPGVQVTEPDHKLPLYLA | 359 |
| | ***** : ***** * * * * . * * * * : * : * : * : * : * : * : * | |
| Arnebia | VVKETLRLRMAIPLLVPHMNLHDAKLNQYDIPAESKILVNAWWLANNPEQKNPEEFRPE | 419 |
| Lithospermum | VIKETLRLRMAIPLLVPHMNLHDAKLNQYDIPAESKILVNAWWLANNPAQKNPEEFRPE | 419 |
| Solanum | VIKETLRLRMAIPLLVPHMNLHDAKLAGYDIPAESKILVNAWWLANNPAHWKKNPEEFRPE | 419 |
| Capsicum | VIKETLRLRMAIPLLVPHMNLHDAKLAGYDIPAESKILVNAWWLANNPAHWKKNPEEFRPE | 419 |
| Camellia | VVKETLRLRMAIPLLVPHMNLHDAKLSGYDIPAESKILVNAWWLANNPDNKNPEEFRPE | 304 |

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Brassica      VIKETLRLRMAIPLLVPHMNLNDAKLAGYDIPAESKILVNAWWLANNPESWKKPEEFRPE 419
Arabidopsis  VVKETLRLRMAIPLLVPHMNLHDAKLAGYDIPAESKILVNAWWLANNPNSWKKPEEFRPE 419
               *:*****:*** ***** **:*
Arnebia      RFLEEEAKVEANGNDFRYLPFGVGRSSCPGIILALPILGITLGRLVQNFELLPPPQSKL 479
Lithospermum RFLEEEAKVEANGNDFRYLPFGVGRSSCPGIILALPILGITLGRLVQNFELLPPPQSKL 479
Solanum      RFFEEEEKHVEANGNDFRFLPFGVGRSSCPGIILALPILGITLGRLVQNFELLPPPQSKL 479
Capsicum     RFLEEEKHVDANGNDFRFLPFGVGRSSCPGIILALPILGITLGRLVQNFELLPPPQSKL 479
Camellia     RFLEEEAKVEANGNDFRYLPFGVGRSSCPGIILALPILGITLGRLVQNFELLPPPQAKI 364
Brassica     RFFEEEAHVEANGNDFRYVPFGVGRSSCPGIILALPILGITIGRMVQNFELLPPPQSKL 479
Arabidopsis  RFFEEESHVEANGNDFRYVPFGVGRSSCPGIILALPILGITIGRMVQNFELLPPPQSKV 479
               **:*** :*:*****::*****:***:***:*****:
Arnebia      DTSEKGGQFSLHILKHSTIVMKPRA- 504
Lithospermum DTSEKGGQFSLHILKHSTIVMKPRSL 505
Solanum      DTSEKGGQFSLHILKHSTIVMKPRSF 505
Capsicum     DTSEKGGQFSLHILKHSTIVMKPRSF 505
Camellia     DTAEKGGQFSLHILKHSTIVLKPRSF 390
Brassica     DTSEKGGQFSLHILHHSTIVMKPRSF 505
Arabidopsis  DTSEKGGQFSLHILNHSIIVMKPRNC 505
               **:*****:*** **:*

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(I) 4-coumaric acid-CoA ligase (Ae4-CL)

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Arnebia      -----MDTQTKTDQKDIIFRSKLPDIYIPRHLPLHSYCFENISQFNS 42
Lithospermum -----MDTQTKTDQKDIIFRSKLPDIYIPKHLPLHSYCGENISQFSS 42
Capsicum     -----MPMENETR-----DLIFRSKLPDIYIPKHLPLHSYCFENISEFNS 40
Solanum      -----MPMDTEKQSG-DLIFRSKLPDIYIPKHLPLHSYCFENLSEFNS 43
Nicotiana    -----MEKDTKHG--DIIFRSKLPDIYIPNHLPLHSYCFENISEFSS 40
Paulownia    -----METTITKQE-DIIFRSKLPDIYIPKHLPLHSYCFENISKFT 41
Arabidopsis  -----MAPQEQAVSQVMEKQSNNNNSDVIFRSKLPDIYIPNHLSLHDYIFQNISEFAT 53
Camellia     MLSGASAETPKPEFSPPPPQNPQSSSQTHVFRSKLPHIPISNHLPLHTYRFQNLSQLFN 60
               :. :*****.*..**.* ** :*:**
Arnebia      RPCLINGSNDRVYTYAEVELTSRKVAAGLHKHGKIKQETIMLLLPNCPEVFVAFLGASYI 102
Lithospermum RPCLINGSNDRVYTYAEVEITSRKVAAGLHKHGKIKQETIMLLLPNCPEVFVAFLGASYI 102
Capsicum     RPCLIDGANDQIYTYAEVELTSRKVAVGLNKLGVQQKDTIMILLPNSPEVFVAFMGASYL 100
Solanum      RPCLIDGANDRIYTYAEVELTSRKVAVGLNKLGIQQKDTIMILLPNCPEVFVAFIGASYL 103
Nicotiana    RPCLINGANKQIYTYADVELSSRKVAAGLHKQGIQQKDTIMILLPNSPEVFVAFIGASYL 100
Paulownia    RPCLINGATNEVYTYEEVELIARKVATGLSKLGIQQGDTILLLPNSPEYVFAFLGASYI 101
Arabidopsis  KPCLINGPTGHVYTYSDVHVISRQIAANFHKLGVNQNDVVMLLLPNCPEVFLSFLAASF 113
Camellia     RPCLLIGSTGKSYSFSXTHLVSRKVASGLSLGKKGDVIMLLQNCAEFVFAFMGASMI 120
               :***: .. .*: ..: :*:*. : :***: :. :*:**.*..*:**.*
Arnebia      GAVSTTANPFFTSSSEIIKQAKASKTKLIITVASNVPKLKEFSQ-----ENGVKIMCIDEQ 157
Lithospermum GAVSTTANPFFTSSSEIIKQAKASKTKLIITVSTTVPKLKDFSQ-----ENHVKIMCIDDK 157
Capsicum     GAISTMANPLFTPAEVLKQAKASSAKIIITLACYIGKVVDYAT-----ENDVKLICIDSA 155
Solanum      GAISTMANPLFTPAEVLKQAKASSAKIIITQACFAGKVVDYAT-----ENDLKVICVDSA 158
Nicotiana    GAISTMANPLFTAAEVVKQVKASGAKIIVTQACHVNKVDYAL-----ENNVKIICIDSA 155
Paulownia    GAISTMANPFFTPAEVIKQAKASNAKLIITQACYVEKVRDYAL-----EKGVKVMCIDAP 156
Arabidopsis  GATATAANPFFTPAEIIAKQAKASNTKLIITEARVVDKIKPLQN-----DDGVVIVCIDDN 168
Camellia     GAVTTTANPFYTSAEVFKQFNASKSKLIITHSQYVDKLRDAGDNFPNWAKEFSVITIDDP 180
               ** :* ****:..*: ** :*:** :*:** : ** :. . :*:**
Arnebia      -----IEGCLHFSLDLENTDETT---LPEVEILPNDVVALPYSSGTTGLPKGVMLTHKGL 209
Lithospermum -----IDGCLHFSDDLNSDETT---LPDVEIRPDDVVALPYSSGTTGLPKGVMLTHKGL 209
Capsicum     -----PEGCIHFS-ELTQSEHE---IPDVKIQDDVVALPYSSGTTGLPKGVMLTHKGL 206
Solanum      -----PEGCVHFS-ELIQSEHE---IPDVKIQDDVVALPYSSGTTGLPKGVMLTHKGL 209
Nicotiana    -----PEGCLHFS-VLTQADEHD---IPEVEIQDDVVALPYSSGTTGLPKGVMLTHKGL 206
Paulownia    -----SADCLQFS-ELTSADERD---MPAVKIHPDDVVALPYSSGTTGLPKGVMLTHKGL 207
Arabidopsis  ESVPPIPEGCLRFT-ELTQSTTEASEVIDSVEISPDDVVALPYSSGTTGLPKGVMLTHKGL 227
Camellia     -----PENCLHFS-VLSEANESE---IPTVSDPDDVVALPFSSGTTGLPKGVILTHKSL 231
               .*:***: * : : *.* ** *****:*****:*****
Arnebia      VTSVAQQVDGENANLYMHQEDVVMCTLPPLFHIYSMNSILLCGLRVGAAILLMHKFDIAPF 269
Lithospermum VTSVAQQVDGDANANLYMHEDVVMCTLPPLFHIYSMNSILLCGLRVGAAILLMHKFEIVTF 269
Capsicum     VTSVAQQVDGENANLYMHSEDLVMCCPLPLFHIYSLNSVLLCGLRIGAAIILMQKFDIVHF 266
Solanum      VTSVAQQVDGENANLYMHSDDVLMCVLPPLFHIYSLNSVLLCALRVGAAILIMQKFDIAQF 269
Nicotiana    VTSVAQQVDGENRNLYIHSEDVLLCVLPPLFHIYSLNSVLLCGLRVGAAILIMQKFDIVPF 266
Paulownia    VTSVAQQVDGENPNLYIHSEDVMLCVLPPLFHIYSLNSVLLCGLRVGAAILIMQKFDIVPF 267
Arabidopsis  VTSVAQQVDGENPNLYFHSDDVILCVLPMFHIYALNSIMLCGLRVGAAILIMPKEFINLL 287
Camellia     ISSVAQQVDGENPNLRLKGEDMVLCLPLFHIYSLNSVLLCCLRAGTGVLMLHKFEIGAL 291
               ::*****:* ** :::***** *****:*****:*****:

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