

Figure S3. Alignment of Second Largest Subunits of RNA Polymerases.

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EcRpoB      1 -----
ScRPB2     1 -----
AtNRPA2    1 -----
OsNRPA2    1 -----
AtNRPC2    1 -----
OsNRPC2    1 -----MEKVRVLFYRTIAPQHPSSLHRTTE
AtNRPB2    1 -----MEYNEYE-----
OsNRPB2    1 -----MEDDEYEEGCMEMEMGGHHHPHHGG--CYCAEE----Y--GAVGGE
ZmNRPB2a   1 -----MEDDEYEDCMDMGYGGHHQ--RGGGHACYGAEDDEMCYEGEGCGDGD
ZmNRPB2b   1 -----MEDDEYEEGCMEMCYGGHHQ--HGGGHACYGAEDDEVGY--CGGCGE
AtNRPD2a   1 -----
AtNRPD2b   1 -----
OsNRPDa    1 -----MDVDRGCHSMDTT
ZmNRPD2/E2a 1 MEEPQKDSGQPSKSSDSELEAMVLDNNGACKSHSMEENRDSPIDVDCGQSSMDVDIKCKS
ZmNRPD2/E2b 1 MEELQKDSALPSNSSDSEPEAMELDDNNGACKSHSIEGNRDSPIDTDEGQPSMDVDIKCKS
OsNRPD2b   1 -----MDVDL-----
ZmNRPD2/E2c 1 MGKPKQTDGDQPVNSD TDVMDCLNFDGHGDVEDVAKGEQQQPSGEVDEQQSVMDVDLTCIT
                ZmNRPD2/E2c      ZmNRPD2/E2c
                1 aa deleted      3 aa deleted

EcRpoB      1 -----MVYSYTEKRIKRFCKRPQVLDVPYLLSIQLDSFQKFIHQDP
ScRPB2     1 -----MSDLANSKYYDEDPYGFEDSAPITAEDSIAVISAFFRERCLVSSQLDSFNQFQDYTL
AtNRPA2    1 -----MVVNAKDSTVPTMEDPK-----ELHMLVTHHIESFDYMTLRG--
OsNRPA2    1 -----
AtNRPC2    2 GIDQEDLDLTNDHFIDKEKLSAPIKSTADKFLQVPEFLKVRCLVQKHLDSFNFYFINVCCI
OsNRPC2    26 EEAPAAKDPMASLPSPTYRSLAAPVTKPVDRFALLPAFLKVRCLVQKHLDSFNFYFITKCI
AtNRPB2    8 -----PEPQYVED-----DDDEEIT-----QEDAAVISAYFEEKCLVRQQLDSFDEFIQNTM
OsNRPB2    38 EMEDEEADGDA-----PDEEIT-----QEDAAVISAYFEEKCLVRQQLDSFDEFIQNTM
ZmNRPB2a   46 EM-EEEADGDA-----EQQEDIT-----QDDAAVISAYFEEKCLVRQQLDSFDEFIQNTM
ZmNRPB2b   44 EM-DEDADGDA-----EQQEDIT-----QDDAAVISAYFEEKCLVRQQLDSFDEFIQNTM
AtNRPD2a   5 DDDVKDLEEFEATTGCEINLSLCEGFLQSFCKKAATSFFDKYGLISHQLNSYNYFIEHCL
AtNRPD2b   1 -----
OsNRPD2a   14 RSSLGDDGKGRDSSYAQIPVDMSSIPLEKFKCEASRSFFDEEGLISHQLNSYNEFVSHCL
ZmNRPD2/E2a 61 SLSDDVNGKSSSEPFYSNAPIDMSVESLEKFKCEASRSFFDEEWGLISHQLNSYNEFVSHCL
ZmNRPD2/E2b 61 SLDVDDVNGKSSSEPFNSNPPINMSVESLEKFKCEASRSFFDEEWGLISHQLNSYNEFVSHCL
OsNRPD2b   6 RWIPLSLKDGCHADPPVQVPVDKRIASLEKLCKEASRSFFRETLVLSHQINLSYNDFFVSHCL
ZmNRPD2/E2c 65 SVGDEGNCKASSDLPSSQVPVDFNVASLEKFKCEAARSFFSETGLVSHQLNSYNDHFFVSHCL
                ZmNRPD2/E2c
                21 aa deleted

EcRpoB      44 EGQYGLERAFRSVFPIQSYS-----GNSEIQVVSRYRLGEPWFD-----
ScRPB2     60 QDIICEDSTIILEQLAQHTT--ESDNISRKYELSEFKIYWRKPVWNESDGVTH---ALY
AtNRPA2    38 -----
OsNRPA2    1 -----
AtNRPC2    62 HKIVKANSRITST-----VDPSIYLRKRVRCGEPSSIINVN--TVE--NIN
OsNRPC2    86 RNIIVKANNRTEAR-----NNPSIFDRNSVRCGVPVSVQVQY--IAR--KIT
AtNRPB2    56 QEIVDESADIEIRPESQHNPQHQSDFARTIYKISFCQIYLSKPMMTES---DGE-TATLF
OsNRPB2    89 QEIVDESADIEIRPESQHNPGRQAEFAETLHKISFCQIYLSKPMMTTEA---DGE-TATLF
ZmNRPB2a   96 QEIVDESADIEIRPESQHNPGRQAEFAETLHKISFCQIYLSKPMMTTEA---DGE-TATLF
ZmNRPB2b   94 QEIVDESADIEIRPESQHNPGRQAEFAETLHKISFCQIYLSKPMMTTEA---DGE-TATLF
AtNRPD2a   65 QMVFQSFCEMLVE--PSFDVVKKNDMDWRYATRFCEVTVKRPVTFVSD---DRE--LEFL
AtNRPD2b   1 -----
OsNRPD2a   74 QELFDLSLCEVTVVE--PSYDPSNRCPGGWRHAIIRFCRVQLLEBPWFWSHGCDIDEQSLKLIK
ZmNRPD2/E2a 121 QELFDLSLCEVIVE--PCYDPSKKKSGGWKHAIIRFCRVKLEKPVFWTC---KDEGSVDFK
ZmNRPD2/E2b 121 QELFDLSLCEVIVE--PCYDPSKKKSGGWKHAIIRFCRVKLEKPVFWTC---KDEVSVDFK
OsNRPD2b   66 QRMFDSLDEWTVVE--PDYDPSKRVGPRHAIIRFCRVLELVYSLH-----
ZmNRPD2/E2c 146 QELFDLSLCEITVE--PDYDPSNKHCAWKHAIIRFCRVKLDLEBPWFMLENSDLEEQDLKPK

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EcRpoB 82 VQECQIRGVYYSAPLRKRLVLYER-----EAP-----EGTVKDIKEQEYGM  
 ScRPB2 114 EQBARLRNLTYSACLFDVWVKRRTYEADV-----PGRRLKYELIARESEDDSESSCKRFLI  
 AtNRPA2 38 -LDCRQAKISYTGTFMADWCFKYND-----GVV-----VRDKFDI  
 OsNRPA2 1 -----  
 AtNRPC2 104 PHMCRLADMTYRQPIFQNLRYVH-----GSH-----GNKAKSAKDNQIHI  
 OsNRPC2 128 PHFCRLTDRTYSAPVLADIEYTV-----GKQ-----YELKRRKPNFII  
 AtNRPB2 112 PKAARLRNLTYSAPLYVDVTKRWIKK-----GHD-----GEEVTEIQDFTKRFI  
 OsNRPB2 145 PKSARLRNLTYSAPLYVDVSYRVMKK-----GHD-----CEEVTEIMEYPKRFI  
 ZmNRPB2a 152 PKSARLRNLTYSAPLYVDVSYRVMKK-----GHD-----CEEVTEIAYPKRFI  
 ZmNRPB2b 150 PKSARLRNLTYSAPLYVDVSYRVMKK-----GHD-----CEEVTEIAYPKRFI  
 AtNRPD2a 118 PWHARLQNMITYSARIRQWVQVEWFKNTVVKSDKFKTGQD---NYVEKKILDVVKQDILLI  
 AtNRPD2b 1 -MACRLQNMITYSARIRQWVQVET-----GQD---EYVEKEILDVVKQDILLI  
 OsNRPD2a 132 PRHARLQNMITYSKRQVWVHFQVYSME--KSDKAKTGM---KFGYKRNIIMETYYDNI  
 ZmNRPD2/E2a 176 PWHARLQNMITYASRLIWEVTIQVYSLE--KSDKSKTGM---GFVQKRNFMMETHWIFI  
 ZmNRPD2/E2b 176 PWHARLQNMITYASRLIWEVTIQVYSLE--KSDKSKTGM---GFVQKRNFMMETHWIFI  
 OsNRPD2b 108 -----KSDKAKTGED---PYIQRKDIMRETQWTFI  
 ZmNRPD2/E2c 203 PRHARLQNMITYASRWVWVETVQVYIFD--TSDKAKTKD---THVHKREIMTETKQDNI

Conserved domain A

EcRpoB 125 GE-IPLMTDN-----CTFWINGTEBIVIVSQLHRSPGVFFDS  
 ScRPB2 168 GR-LPIMLRSMKCYLSEATESSDLYKLKRCPPDMGCCYFIINGSEKVLIAQERS---AGNIW  
 AtNRPA2 72 GQ-FPIMLMSKLCSLKGCADCRKLLKCKRSTSEMGCCYFIINGSEKVLIAQERS---AGNIW  
 OsNRPA2 1 -----MCCYFICGGMERLVRILILQKRNYPMGL  
 AtNRPC2 143 GR-MPIMLRSCRCVHLHGKDEEELARLCECPDPPCCYFIINGSEKVLIIQEQI---SKNRI  
 OsNRPC2 165 GY-LPIMLRSHACVNLGKDEEELARYGCECPDPPCCYFIVKGEKVLIIQEQI---SKNRI  
 AtNRPB2 156 GK-WPIMLRSSYCTLFQNSEKDLTELCECPYDQCCYFIINGSEKVLIAQEKI---STNHV  
 OsNRPB2 189 GKWPIMLRSSYCTLFQNSEKDLTELCECPYDQCCYFIINGSEKVLIAQEKI---STNHV  
 ZmNRPB2a 196 GK-WPIMLRSSYCTLYQNSEKDLTELCECPYDQCCYFIINGSEKVLIAQEKI---STNHV  
 ZmNRPB2b 194 GK-WPIMLRSSYCTLYQNSEKDLTELCECPYDQCCYFIINGSEKVLIAQEKI---STNHV  
 AtNRPD2a 174 GS-IPVMVRSILCKTSEKQ-KENCKKCDCAFDDGCCYFVIRKAEKVFIAQEQI---CTRRL  
 AtNRPD2b 43 GS-IPVMVRSVLCCKTSEKQ-KENCKKCMCAFDDGCCYFVIRKAEKVFIAQEQI---CTRRL  
 OsNRPD2a 186 GR-LPVMVRSMLCWLHLKLE-----SECLFDAGCYFLVKGMKRVFIAQEQI---CLRRL  
 ZmNRPD2/E2a 230 GL-LPVMVRSMLCLLHSLNE-----SECLFDAGCYFLVKGMKRVFIAQEQI---CLRRL  
 ZmNRPD2/E2b 230 GL-LPVMVRSMLCLLHSLKE-----SECLFDAGCYFLVKGMKRVFIAQELR---CLRRL  
 OsNRPD2b 135 GK-LPVMVRSMLCWLHLKLE-----SECEYDFCCYFLIRKAEKVFIAQEQI---CLSRIL  
 ZmNRPD2/E2c 257 GL-LPVMVRSMLCWLHLK-----SQKCDCEPFDGCCYFLIKGEKRVFIAQEQI---FLSRI

Conserved domain B

EcRpoB 160 DKGKTHSSGKVLNARIIPYRGSWLDFFDFPKDN-----LFRIDRRRK  
 ScRPB2 224 QVFKRAAP-SPISHVAEIRSALEKGSIFISTLQWKLYGREG---SSARTIKATLPHYIKQ  
 AtNRPA2 131 IRMSFRDRKCYSSKAVVTRCVRD-DQSSVTIKLYYLRNGS-----ARVGFWLVGR  
 OsNRPA2 29 IRGSFVNRGACVTDKAVVTRCVQD-DQSSVTIKLYYLRNGS-----ARVGFWLGR  
 AtNRPC2 199 IIDSDDK-----GNINASVTSSTEMTKSKTWIQMEKEK-----IYLFHRFVK  
 OsNRPC2 221 IIDTDSK-----GRIASVTSSTHEIKSKTWIFMEKEK-----IYQLNRFVK  
 AtNRPB2 212 YVFKRRQP-NRQAYVAEWRSMANQNRPSTMFVRMLSRAGARCGSSGQYIRATLPHYIRA  
 OsNRPB2 246 YVFKRRQP-NRQAYVAEWRSMANQNRPASSMFRMLSRAGARCGSSGQYIRATLPHYIRA  
 ZmNRPB2a 252 YVFKRRQP-NRQAYVAEWRSMANQNRPASSMFRMLSRAGARCGSSGQYIRATLPHYIRA  
 ZmNRPB2b 250 YVFKRRQP-NRQAYVAEWRSMANQNRPASSMFRMLSRAGARCGSSGQYIRATLPHYIRA  
 AtNRPD2a 229 WISNSP-WTVSFRSENKRRRFI---VRLSENEKAEDYKRR-----KVLTVYFLST  
 AtNRPD2b 98 WISNSP-WTVSFRSETKRRRFI---VRLSENEKAEDYKIME-----KVLTVYFLST  
 OsNRPD2a 236 WVEDRPPCWMVSELS-----PIRARRIYIKLIDSAN---NEDASGCKIISISFLYA  
 ZmNRPD2/E2a 280 WISDR-----PCWTISFMSEIKRRRIYIKLWVSTR---SEDFSESKIITISFLYA  
 ZmNRPD2/E2b 280 WISDRPPCWTISEMSEKRRRIY---ILVSTRSEDFSGSK-----IISISFLYA  
 OsNRPD2b 185 WINDSPTWEACYQRSQI-----PRRKISIKPVQSNDCG-----RKVDNLYFLGA  
 ZmNRPD2/E2c 307 WITDHPSWDAS--YLSQI-----PRRKINIKLVPSKSNE-----SKVIMNICFMGT

EcRpoB 106 aa deleted  
AtNRPA2 11 aa deleted  
OsNRPA2 11 aa deleted

EcRpoB 204 ---LPATILRLALNYTTEQILDLDFEKVIFETIRDNKLQCPYHSETLRDPTNDRLSALWE  
ScRPB2 279 D--IPITVILFRALCIPDGEILBHTCYDVNWCQMLEMLKPCWEDGFVVIQ-DRET---ALD  
AtNRPA2 181 EYLLPWGLWLKALTNSCDEEYIESLMLCCYSBYHYGRGDGKIIIDDEVRLGLFTREQ--CRK  
OsNRPA2 79 EFLLPWGLWLKALIDTSDREIFTSITCCYSBYHYGRGKQIILDEVRLSLFTRTE--CLL  
AtNRPC2 242 K--IPITVILFRALGMSDQREI---WQMVGRDPRFSASLLPSTBECVSECVMTQKQ--ALD  
OsNRPC2 264 P--IPITVILFRALGMSDQREV---AQMVGRDPRYGDLLYPSIQECAFERIYTTQKQ--ALQ  
AtNRPB2 271 E--IPITVILFRALCFVADKDLBHTCYDFAQTQMMELLRPSLEEAFFVIQ-NQLV---ALD  
OsNRPB2 305 D--IPITVILFRALCFVADKDLBHTCYDFSQTQMMELLRPSLEEAFFVIQ-NQV---ALD  
ZmNRPB2a 311 D--IPITVILFRALCFVADKDLBHTCYDFSQTQMMELLRPSLEEAFFVIQ-NQQV---ALD  
ZmNRPB2b 309 D--IPITVILFRALCFVADKDLBHTCYDFSQTQMMELLRPSLEEAFFVIQ-NQQV---ALD  
AtNRPD2a 276 E--IPWULLFFALCVSSDKEAMDLIAFDGDDASITNSLIASIHVADAVCEAFRCGNNAIT  
AtNRPD2b 145 E--IPWULLFFALCVSSDKEAMDLIAFDGDDASITNSLIASIHVADAVCEAFRCGNNAIT  
OsNRPD2a 283 N--MPIWMLFFALGISSDKDIFDVTNMMEDCDACVINTITATIKRESDELCEGFRKSDRQRQ  
ZmNRPD2/E2a 327 T--MPWULLFFALGISSDKVEFDMIDMQDCDASVINTISATIKRESDKLCEGFRKSDRQRQ  
ZmNRPD2/E2b 327 T--MPWULLFFALGISSDKAEFDMIDMQDCDASVINTISATIKRESDELCEGFRKSDRQRQ  
OsNRPD2b 229 T--IPITVILFRALCVSSDKEAFDIDIQECDASMANITISATITESHQCEGFRQREGRASE  
ZmNRPD2/E2c 351 I--MPIWMLFFALGIVSSDKEAFDIDILDCDADIVMLISLTIKRESHERFEGFRTPGDRARQ

EcRpoB 18aa deleted

EcRpoB 261 IYRM---MRPGEF---PTREAAESLIFENLFFSEDEIEEGSGILSKDDIIDVMKKLIDIRN  
ScRPB2 333 FIGRRGTALGIRKE--KRIQYAKDILQKEFLPHITQLEGFESRKAFFLCYIMNRLLCAL  
AtNRPA2 239 HLCQHFPQ-----VLDGVAAEAWLRDYLFWHL----DNDEDKFNLLIFLIQKLYSLVD  
OsNRPA2 137 HLCGYFRSVMGEFVKDDFETVAEAWLKYDFWHL----QNMEDKFNLLIFLMLQKLYAIVD  
AtNRPC2 295 YLEAKVKRISYGTTP--EKDGRALSLIRDLFLAHVVPVDPNPFQKCFYTCVMLRRMTIAML  
OsNRPC2 317 YMDDKV--MYPGAGN--QKEGRSKSLIRDFVVAHWPVESGNFEPKCIYTAWMLRRMIDAIL  
AtNRPB2 325 YIGKRGATGCVTKE--KRIKYAKDILQKEMLPHWGVGFCETRKAYYFCYLIHRLLCAL  
OsNRPB2 359 YIGKRGATGCVTKE--KRIKYAKDILQKEMLPHWGVGFCETRKAYYFCYLIHRLLCAL  
ZmNRPB2a 365 YIGKRGATGCVTKE--KRIKYAKDILQKEMLPHWGVGFCETRKAYYFCYLIHRLLCAL  
ZmNRPB2b 363 YIGKRGATGCVTKE--KRIKYAKDILQKEMLPHWGVGFCETRKAYYFCYLIHRLLCAL  
AtNRPD2a 334 YVEQQ---IKSTKF--PPAESVDEGLHLYLFCPL----QSLRKKAREFLCYMVKCLLSYA  
AtNRPD2b 203 YVEHQ---IKSTKF--PPAESVDDCLRLYLFCPL----QGLRKKAREFLCYMVKCLLSAYA  
OsNRPD2a 341 YVDEL---IKRSKF--PPAEPFDDYIARFLFCPI----SGNPKALFLCYMVKCLLNAFT  
ZmNRPD2/E2a 385 YVDEL---WKSSRF--PPAESFDDYIARFLFCPI----SGNPKALFLCYMVKCLLNAFT  
ZmNRPD2/E2b 385 YVDEL---WKSSRF--PPVESFDDYIARFLFCPI----SGNPKALFLCYMVKCLLNAFT  
OsNRPD2b 287 YIDKL---IRNTKF--PPKGSFDYIGRHMFDV----SGNPKALFLCYMVKCLLNAFT  
ZmNRPD2/E2c 409 YVDEL---IKRSKF--PPKESFDYICRYMFCV----NGRPSKALFLCYMVKCLLNAFT

OsNRPA2  
32 aa deleted

EcRpoB 315 GRGEVDDIDHLGNRRIRSVGEMAENQFRVGLVYVVERAKKERISL--GDLDTL-----M  
ScRPB2 391 DRRDQDDRDHFGRKRLDLACPLLAQLFRTLFKRLTRDIFRYMQR-TVEBHDHFD-----N  
AtNRPA2 287 QTSLPDNPDSLQMQEILWPCHVITTYLREKLEEWLRKCKSLDKDELONTMSKFSFESADV  
OsNRPA2 193 QTASPKADALQYQEWLLPCHLITVFLKDRLDQWLRKSKRLIWEATKNKSFDLNDFRDE  
AtNRPC2 354 NFDAMDDEYVGNKRLDLSQQLLSLLFEDLFRMLSEATIMQDHLNKPIRASRDFQC-  
OsNRPC2 374 NADTFDDRDYVGNKRLDLSQQLLSLLFEDLFRMNSNAVELMNRTESEKIHSPL-----D  
AtNRPB2 383 GRRPEDDRDHYGNKRLDLACPLLGCLFRMLFRRLTRDVRSYVQR-CVDNCKEV-----N  
OsNRPB2 417 GRRAEDDRHYGNKRLDLACPLLGCLFRMLFRRLTRDVRSYVQR-CVDNCKEV-----N  
ZmNRPB2a 423 SRRAEDDRHYGNKRLDLACPLLGCLFRMLFRRLTRDVRSYVQR-CVDNCKEV-----N  
ZmNRPB2b 421 SRRAEDDRHYGNKRLDLACPLLGCLFRMLFRRLTRDVRSYVQR-CVDNCKEV-----N  
AtNRPD2a 385 GRRKCDNRDSDFRNKRIELAGELLERETRVHLAFAARRKMTRAMQRKLSGCDLQ-----P  
AtNRPD2b 254 GRRKCDNRDSDFRNKRIELAGELLERETRVHLAFAARRKMTRAMQRKLSGCDLQ-----P  
OsNRPD2a 392 GRRKCDNRDSDFRNKRLDLAGELLGRELRAHLRAHREARLWVRAIQDRLNSDRELQ--EFD--  
ZmNRPD2/E2a 436 GRRKCDNRDSDFRNKRLDLAGELLGRELRAHLRAHREARLWVRAIQDRLNSDRELQ-----D  
ZmNRPD2/E2b 436 GRRKCDNRDSDFRNKRLDLAGELLGRELRAHLRAHREARLWVRAIQDRLNSDRELQ-----D  
OsNRPD2b 338 GRRKCDNRDSDFRNKRLDLAGELLGRELRAHLRAHREARLWVRAIQDRLNSDRELQ-----P  
ZmNRPD2/E2c 459 GRRKCDNRDSDLRNKRLDLAGELLGRELRAHLRAHREARLWVRAIQDRLNSDRELQ-----D

Conserved domain C

EcRpoB 366 PQDINAK---PIISAAVKEFFGSS-----QLSQFMDQMNPLSEITHKRRRISA  
 ScRPB2 444 MKLINAQ---TITSGLKYALATGNMGEGQ--KKAMSSRACVSVQLMRYTYSSSTLSHLRRTNT  
 AtNRPA2 347 KKLINKNPPRSIGTSTIETLTKTCAKLTQSGLDLQQRACGYTVQABRLMFLRFISFFRAVHR  
 OsNRPA2 253 WRELKSTSA-YWGKAIQSMIKVKVNSQSGLDLPQRDGMTHABRLMFHRYTSHFRSVHR  
 AtNRPC2 413 LMSDSRY---SISLGLERLSTGNDIDIK--RFRMRKRCMTQVLTRLSFGISMGFITKISF  
 OsNRPC2 429 LLHAIKEN---IITHGLERAISTGNMIDIK--RFRMRKRCVSVQLSRLSYMASLGYMTRITP  
 AtNRPB2 436 LQFIRAK---TITSGLKYSLATGNMGQA--NAAGTRACVSVQLMRLTYASTLSHLRRLNS  
 OsNRPB2 470 LQFIRAK---TITSGLKYSLATGNMGQA--NQACTRACVSVQLMRLTYASTLSHLRRLNS  
 ZmNRPB2a 476 LQFIRAK---TITSGLKYSLATGNMGQA--NQACTRACVSVQLMRLTYASTLSHLRRLNS  
 ZmNRPB2b 474 LQFIRAK---TITSGLKYSLATGNMGQA--NQACTRACVSVQ--Gap of unknown length -  
 AtNRPD2a 439 IEHLIDAS---VITNGLNRAFSTGAMSHPF-RKMERVSGVWANLGRAMPLQTLIDLRRTTQ  
 AtNRPD2b 308 IEHLIDAS---VITNGLNRAFSTGAMSHPF-RKMERVSGVWANLGRAMPLQTLIDLRRTTQ  
 OsNRPD2a 448 --HLIDAS---IITNGLNRAFSTGSMCHPY-KRNERCAGIVATLRRTNPLQMSDLRRTTQ  
 ZmNRPD2/E2a 490 LERIDAS---IWTNGLNRAFSTGSMCHPY-KRNERCAGIVATLRRTNPLQMSDLRRTTQ  
 ZmNRPD2/E2b 490 LERIDAS---IWTNGLNRAFSTGSMCHPY-KRNERCAGIVATLRRTNPLQMSDLRRTTQ  
 OsNRPD2b 392 LECWHAS---IWTNGLNRAFSTGSMCHPY-NKNERCAGIVATLRRTNPLQMSDMRRTTQ  
 ZmNRPD2/E2c 514 LERVDAS---IITNGLNRAFSTGSMRHP--YKNERCAGVATLRRTNPLQMSDVRRTTQ

ZmNRPD2/E2c  
 1 aa deleted

EcRpoB 409 LGPGCLTRERAGFEVDDWHPTHYGRVCPHETPEGPNICGLINLSLWYAQTNEY-----  
 ScRPB2 500 P----IGRDGRLAKPRLQHMTHOGLWCBAETPEGQACGLVKNLSLMSCHISVGTDPMPHIT  
 AtNRPA2 407 GA---SFAGLETTTVRKLLEESWGFLCPWHTPDGTPCC--LLMHTMRTSRIISQFDSKGNL  
 OsNRPA2 312 GS---SFAKMTTTSVRKLLEESWGFLCPWHTPDGEPCLLNHMTSTCRIS--FYNSEGAT  
 AtNRPC2 468 QF----EKSRVSGPRLQPSQWGMCLCPDTPGEGSCGLVKNLALMTHVITDREEGPLVA  
 OsNRPC2 484 Q----FEKTRTSGPRALQPSQWGMCLCPDTPGEGACGLTKNLALLTHVITDQREGPLMN  
 AtNRPB2 491 P----IGRECKLAKPRLQHMSQWGMCCPAETPEGQACGLVKNLALMVYITVCSAAYPILE  
 OsNRPB2 525 P----IGRECKLAKPRLQHMSHOGMCCPAETPEGQACGLVKNLALMVYITVCSAANPILE  
 ZmNRPB2a 531 P----IGRECKLAKPRLQHMSHOGMCCPAETPEGQACGLVKNLALMVYITVCSAANPILE  
 ZmNRPB2b 510 -----GRLAKPRLQHMSHOGMCCPAETPEGQACGLVKNLALMVYITVCSAANPILE  
 AtNRPD2a 495 Q----VLYTGRVCDARYPHPSHOGRCVCFDSTPDGEMCGLVKNLALGLVSTQGLSVVEK  
 AtNRPD2b 364 Q----VLYTGRVCDARHPHPSHOGRCVCFDSTPDGEMCGLVKNLALGLVSTQGLSVVEM  
 OsNRPD2a 502 R----VAYACRACDARYPNPSYWGKLCFMSTPDGEMCGLVKNLALVATVSSRVAPPLIDR  
 ZmNRPD2/E2a 546 R----VAYACRACDARYPNPSYWGKLCFMSTPDGEMCGLVKNLALVATVSSRVVQPLIES  
 ZmNRPD2/E2b 546 R----VAYACRACDARYPNPSYWGKLCFMSTPDGEMCGLVKNLALVATVSSRVVQPLIES  
 OsNRPD2b 448 W----VAYACRACDARYPNPSYWGKLCFVSTPDGERCGFVKNLALVATVSSCLAREPSDA  
 ZmNRPD2/E2c 570 W----FAYACTACDARYPNPSYWGKLCFVSTPDGERCGFVKNLALVATVSSVVRKPLIDT

Conserved domain D

AtNRPA2 11 aa deleted  
 OsNRPA2 11 aa deleted

EcRpoB 461 -----  
 ScRPB2 556 FLSSEWGMPELEDY--VPHQSPDATRVFVWCVVHCWH--RNPARDMETLRLTRKGDV---  
 AtNRPA2 463 RDFLKRKSVVDVKLVRAQPKVIHGLDLCQVVGTLSSNLVTRKWSYIRLLEVEAPSVIP  
 OsNRPA2 368 KDFQKIKMSLIARRIERTGPEVLHGMDDCCIVGS-----IASARIEEVI--P  
 AtNRPC2 524 MCKYKLGVTDLVLSABELHTPDSFLVILNGLILCKH--SRPQYFANSLRRLRRAKGI---  
 OsNRPC2 540 LCYSLGVEDLSLLSGEEIHASGSLFMFVCLILCKH--RQPQRFANARKLRSGI---  
 AtNRPB2 547 FLEEWGTENFBEI--SPAVLPQAAKIFVWCCWVGH--RNPDLWKTLLRRLRRQIDV---  
 OsNRPB2 581 FLEEWGTENFBEI--SPAVLPQAAKIFVWCCWVGH--RNPDLWKTLLRRLRRQIDV---  
 ZmNRPB2a 587 FLEEWGTENFBEI--SPAVLPQAAKIFVWCCWVGH--RNPDLWKTLLRRLRRQIDV---  
 ZmNRPB2b 561 FLEEWGTENFBEI--SPAVLPQAAKIFVWCCWVGH--RNPDLWKTLLRRLRRQIDV---  
 AtNRPD2a 551 LFACGMEELMD---TCTPDLFGKHKVLLNCDWVGC--ADSESPWAELESRRRQSEL---  
 AtNRPD2b 420 LFTCGMEELMD---TSTPDLGKHKVLLNCDWVGC--ADSESPWAELESRRRQSEL---  
 OsNRPD2a 558 FLSGGMKLEHBEI---PTEHQRMDKIFLNCWVGCSC--SDPASFWLRLRCHRRSGLI---  
 ZmNRPD2/E2a 602 FLSGGMKLEHBEI---PTEHQRMDKIFLNCWVGCSC--ENSASFWRRLRCHRRSGLI---  
 ZmNRPD2/E2b 602 FLSGGMKLEHBEI---PTEHQRMDKIFLNCWVGCSC--SDSASFWRRLRCHRRSGLI---  
 OsNRPD2b 504 FLSGGMKLEHBEI---LQLEHQRMDKIFLNCNLVGC--ADSVBFWLHLSRRRQI---  
 ZmNRPD2/E2c 626 FLSGGMKLEHBEI---SLQLEHQRMDKIFLNCNLVGC--ADPHLETLRLRSLRRSKLI---

ScRPB2 6 aa deleted

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EcRpoB      461 -----CFLETFYRRW-----
ScRPB2      609 ---NPEVSMI-RDIREKELKIFTDACRWRPLFIVEDKELKVRK-GHTAKIMATEYQDI
AtNRPA2     523 EDLEVGYPPTS-MGGSYPGLYLASCAPRFIRPW-----
OsNRPA2     414 EDLEVGYPPTS-HGCAYPGLYLFNPARFLRPAF-----
AtNRPC2     579 ----GEFVSTF-TNEKQHCWYVADWCRVCRPLVTDKGISRVKQ-HHMKEIQ----DCV
OsNRPC2     595 ----GEFVSTF-VNEKQHCWYVADWCRVCRPLVTDKGISRVKQ-HHMKEIQ----DCI
AtNRPB2     600 ----NTEVGVW-RDIREKELRLIYTDYCRCSRPLFIVDMQKLLIKK-RDHYALQQRESAEE
OsNRPB2     634 ----NTEVGVW-RDIREKELRLYTDYCRCSRPLFIVEMQRLLIKK-RHIRALQQRETPEE
ZmNRPB2a    640 ----NTEVGVW-RDIREKELRLYTDYCRCSRPLFIVEGQRLLIKK-AHIRALQQRETPDE
ZmNRPB2b    614 ----NTEVGVW-RDIREKELRLYTDYCRCSRPLFIVEGQRLLIKK-AHIRALQQRETPDE
AtNRPD2a    603 ----PREMETK-RDKDDNEVRIFTDAGRLLRPLLVVEN-----L-QKLRQEK----PSQ
AtNRPD2b    470 ----ELPLE-RDKDDNEVRIFTDAGRLLRPLLVVEN-----L-HKLRQDK----PTQ
OsNRPD2a    610 ----DPQVEIK-RDKKHREVRVFSFDAGRILRPLLVVEN-----LNKIR----RPK
ZmNRPD2/E2a 654 ----DPQVEIK-RDKKHREVRVFSFDAGRILRPLLVVEN-----LNKIR----KPK
ZmNRPD2/E2b 654 ----DPQVEIK-RDKKHREVRVFSFDAGRILRPLLVVEN-----LNKIR----KPK
OsNRPD2b    556 ----DAQVEIK-RDKQNEVRVFSDFGRILRPLLVVEN-----LRNIMNRK----NGS
ZmNRPD2/E2c 678 ----DPQVEIK-RDKKHREVRVFSDFGRIMRPLLVVEN-----L-RRITRPK----DGL

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ScRPB2 4 aa deleted

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EcRpoB      471 -----TDCVVTDEIHYLSAIEEGNYVLAQANSNLDEEGHFVEDLVTCSRKGES
ScRPB2      663 EGGFEDVWSSLLNEGLVEYIDAESEESILIAMQPEDLEPAEANEENDLDVDPAKRIRVSH
AtNRPA2     555 -----KNISIPSDNIELLIGPFEQVANPNIIFISTFP-----
OsNRPA2     447 -----MEIRCPDGGDGGRRNKLFP-----
AtNRPC2     629 RT----RDFFLRDGLIEYLDVNEBNMALVCLRAEAAKAD-----
OsNRPC2     645 RS----RDFFLRDGLIEYLDVNEBNMALLALYEHEDQDDVQRSS-----
AtNRPB2     654 DG----QHHLVAKCFIIEYIDTEEBETTMISMTLMDLQARLRPEAYTEN-----
OsNRPB2     688 G----QHHLVAKCFIIEYIDTEEBETTMISMTLMDLQARLRPEAYSET-----
ZmNRPB2a    694 G----QHHLVSKGYIEYIDTEEBETTMISMTLMDLQARLRPEAYSET-----
ZmNRPB2b    668 G----QHHLVSKGYIEYIDTEEBETTMISMTLMDLQARLRPEAYSET-----
AtNRPD2a    647 YP----FDHLLDHGIIEELIGIEEEDCCTAWGKQLLKEPKI-----
AtNRPD2b    512 YP----FKHLLDQGIIEELIGIEEEDCCTAWGKQLLKEPKI-----
OsNRPD2a    651 GSSYSFQQLMQQEIIIEFICVEEEDIRSAWGRNLFSEEEAPMVKMNKAEDVFNVKRKI
ZmNRPD2/E2a 695 GRSFS--FQELMQQEIIIEFICVEEEDIQCAWGRHRLFSEGAISS-----
ZmNRPD2/E2b 695 GRSFS--FQELMQQEIIIEFICVEEEDIQCAWGRHRLFSEGAISS-----
OsNRPD2b    600 YS----FQELMDQNIIEELIGVEEEDIRCAWGRHRLFAGDEKFNFSF-----
ZmNRPD2/E2c 722 YS----FQELLDQNIIEELIGVEEEDIQCAWGRHRLFSSREKEDWSSSG-----

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EcRpoB      519 SLFSRDQVDYMDVSTQQVWVGCASLIPFLEHDDANRALMGANMQR-QAVPT-----LRA
ScRPB2      723 HATT---FTHCEIHPSSLILGWCAASIIIPFDHNQSPRNTYQSAMGR-QAMGVFLTNYNVRM
AtNRPA2     587 -----ATHEEIHPTCMTISVWANLTPWSDHNQSPRNTYQCQMAR-QTMAYSTQALQFRA
OsNRPA2     465 -----ATHEEIHPTAILSVWANLTPWSDHNQSPRNTYQCQMAR-QTHCFCGQALKFRT
AtNRPC2     664 -----TTHEEIEPFTILGWVAGLIPYPHHNQSPRNTYQCAMGR-QAMGNLAYNQLNRM
OsNRPC2     685 -----ITHEEIEPLTILGWVAGLIPYPHHNQSPRNTYQCAMGR-QAMGNLAYNQLFRA
AtNRPB2     700 -----YTHCEIHPSSLILGWCAASIIIPFDHNQSPRNTYQSAMGR-QAMGIYVTNYQFRM
OsNRPB2     733 -----YTHCEIHPSSLILGWCAASIIIPFDHNQSPRNTYQSAMGR-QAMGIYVTNYQLRM
ZmNRPB2a    739 -----YTHCEIHPSSLILGWCAASIIIPFDHNQSPRNTYQSAMGR-QAMGIYVTNYQLRM
ZmNRPB2b    713 -----YTHCEIHPSSLILGWCAASIIIPFDHNQSPRNTYQSAMGR-QAMGIYVTNYQLRM
AtNRPD2a    685 -----YTHCELDLSFLLGWSCAVIPFRANHDHGRVWLYQSQKHCQQAICFSSTNPPIRC
AtNRPD2b    550 -----YTHCELDLSFLLGWSCAVIPFRANHDHGRVWLYQSQKHCQQAICFSSTNPPIRC
OsNRPD2a    711 GGEVSG-YTHCELDLSFLLGLSCGIIIPFRANHNFAFRVWLYQSEKHSQQAICYSTTMPHFRV
ZmNRPD2/E2a 739 -----YTHCELDPSFLLGLSCGIIIPFRANHNFAFRVWLYQSEKHSQQAICYSTTMPHFRV
ZmNRPD2/E2b 739 -----YTHCELDPSFLLGLSCGIIIPFRANHNFAFRVWLYQSEKHSQQAICYSTTMPHFRV
OsNRPD2b    643 -----YTHCELDPSFLLGLSCSIIIPFRANHDTAKRILMQAEKISQQAICYSTTMPFLFRV
ZmNRPD2/E2c 767 -----YTHCELDPSFLLGLSCSIIIPFGMHDNARRVWQMQAEKISQQAICYSTMNSQYRL

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Conserved domain E

EcRpoB 65 aa deleted

EcRpoB	572	D-----KPLWGTGMRERAGEPVERGDVLADGPDLDGELALGQMMRVAAMPDQMGYN
ScRPB2	779	DTMANILYYPQRPLCTTRAMEY-----DKFRELPAQGMVAIVATACYSGYN
AtNRPA2	639	DQKIYHLQTPQSPVVRTKTYTT-----YSIDENPTCTMAIVAVLAHTCFD
OsNRPA2	517	DVKAFHLQTPQTPIVRTATYSK-----YCMDEFPSCTMAIVAVLSYTGVD
AtNRPC2	716	DTLLYLWYYPQRPLLTTRTIEL-----WGYDKLGAGQMATVAVMSFSQYD
OsNRPC2	737	DELLYLWYQAQRPLLTTKTIEL-----WGYDKLGAGQMATVAVMSYSQYD
AtNRPB2	752	DTLAYVLYYPQRPLWTTTRAMEH-----LHFRQLPACTMAIVATSCYSGYN
OsNRPB2	785	DTLAYVLYYPQRPLWTTTRAMEH-----LHFRQLPACTMAIVATACYSGYN
ZmNRPB2a	791	DTLAYVLYYPQRPLWTTTRAMEH-----LHFRQLPACTMAIVATACYSGYN
ZmNRPB2b	765	DTLAYVLYYPQRPLWTTTRAMEH-----LHFRQLPACTMAIVATACYSGYN
AtNRPD2a	738	DTLSQQLFYYPQRPLFRTLASEC-----LKKKVLVFNCGQMAIVAVVWHLGYN
AtNRPD2b	603	DTLSQQLFYYPQRPLFRTLASEC-----LKKKVLVFNCGQMAIVAVVWHLGYN
OsNRPD2a	770	DTLSHQLYYPQRPLFRTVIAADCLGRSEY--TFGRKDDFARPEYFNGQMAIVAVVWVHQCFM
ZmNRPD2/E2a	792	DTLSHQLYYPQRPLFRTVIAADCLGRSDY-ASFGRKDDFARPEYFNGQMAIVAVVWVHQCFM
ZmNRPD2/E2b	792	DTLSHQLYYPQRPLFRTVIAADCLGRSDC-TTFGRKDDFTRPEYFNGQMAIVAVVWVHQCFM
OsNRPD2b	696	DTLSHQLYYPQRPLFRTVIAADCLGKRDY--TSGSKHDFARPEYFNGQMAIVSVVWVHQCFM
ZmNRPD2/E2c	820	DTLSHQMFYYPQRPLFRTVWVSYGLGEAKTDCSSGRKDDFNTPEYFNGQMAIVSVVWVHQCFM

Conserved domain F

Active center Metal B

EcRpoB	622	FEDSILVSEKRVQEDRFTTTHI--QELACVSDTKLGPKEITADIPNV-----GEBALS
ScRPB2	824	QEDSVIMNQSSIDRCFFRSLFFRSYMDQEKKYGMSITETFERPQRTNTRLR---KHGTYD
AtNRPA2	684	MEDAMILNKSSVRCMCHGQIQTENIDLSDQNSRFDSGSKSFRST-----MKAEHF
OsNRPA2	562	MEDAMILNKSAVDRCMFRCHIQTECIDLSASRDNVTEFFCKSNL-----SEDTTA
AtNRPC2	761	IEDAVVMNKSSLDRCFGRCIVMFKIVAMSQKYDNCTADPILIPQRTGP-----DAEKMQ
OsNRPC2	782	IEDAVVMNKSSLDRCFGRCIAMKRYTVTKKEYEGCYSDIIVKQQRDKDQAL---LQNMQR
AtNRPB2	797	QEDSVIMNQSSIDRCFFRSLFFRSYRDEEKKMGLVKEDFCRPPDRGSTMCM---RHGSYD
OsNRPB2	830	QEDSVIMNQSSIDRCFFRSLFFRSYRDEEKKMGLVKKEFCRPNRENTMCM---RHGSYD
ZmNRPB2a	836	QEDSVIMNQSSIDRCFFRSLFFRSYRDEEKKMGLTIKEFCRPNRENTMCM---RHGSYD
ZmNRPB2b	810	QEDSVIMNQSSIDRCFFRSLFFRSYRDEEKKMGLLVKEFCRPNRENTMCM---RHGSYD
AtNRPD2a	783	QEDSVVMNKASLERCMFRSEQIRSYKAEVDAFDSEKRRKMDDELVQFGKTHS---KIKKVD
AtNRPD2b	648	QEDSVVMNKASLERCMFRSEQIRSYKAEVDTEDSEKRRKMDDELVQFGKTY---SKIKKVD
OsNRPD2a	828	QEDSVVMNRASLERCMFRTEHFRMYKAEVENRGGPGGNSRLKMKDKIDFCKMQSKRGRVD
ZmNRPD2/E2a	851	QEDSVVMNRASLERCMFRTEHLRYSKADVENK---DGTFRLLKLEKIDFCKTESKRGVD
ZmNRPD2/E2b	851	QEDSVVMNRASLERCMFRTEHLRYSKADVENK---DGTFRLLKLEKIDFCKTESKRGVD
OsNRPD2b	754	QEDSVLNRASLERCMFRTPHFYSYKALLENK---EITFRLLKHENINFCKTSPSKRGLVD
ZmNRPD2/E2c	880	QEDSVVMNRASLERCMFRTEHLRYSYKAEVENK---EITFRLLKHRENINFCKVQSKRGRVD

Conserved domain F

Conserved domain G

EcRpoB	674	KLDESCLVYIGAEVTGGDILVCKRVPKGETQLTPEEKLLRAIFGEKASDVKDSLLRVPNG
ScRPB2	881	KLDDDCLIAPGVRVSGEDVIIICKRTTP---ISPDEEEL---GQRTAYHSKRDASTPLRST
AtNRPA2	737	RIDADGLPSVQQRKLYPDEPYCSIYDE-----VTMKTREHMRKGT
OsNRPA2	614	AIESDCLPRIGENIFPMEQYYSVCMN-----LTCTVRPKLEGS
AtNRPC2	815	ILDDDCLATPGEIIRPNDIYINRQVVPVDTVTKFTS-----ALSDSQYRPAEYFPGPEG
OsNRPC2	839	ALDEDCAAPGLIIRMHDIYINRQTPRNTRKRDSCA-----HLTD RDYKDSPAVYKGVDC
AtNRPB2	854	KLDDDCIAPPGTRVSGEDVIIICKRTTPISQDEA-----QGQSSRYTRRDHSTSLRHS
OsNRPB2	887	KLDDDCIAPPGTRVSGEDVIIICKRTSPIPQDDA-----QGQATRYTRRDHSTSLRHS
ZmNRPB2a	893	KLDDDCIAPPGTRVSGEDVIIICKRTSPIPQDDA-----QGQASRYSKRDHSTSLRHS
ZmNRPB2b	867	KLDDDCIAPPGTRVSGEDVIIICKRTSPIPQDDA-----QGQASRYSKRDHSTSLRHS
AtNRPD2a	840	SLEDDCFPFIFCANMSTGDIVICKRTE-----SGADHSIKLKHT
AtNRPD2b	705	SLEDDCFPFIFCANMSTGDIVICKRTE-----SGADHSIKLKHT
OsNRPD2a	888	NLDDDCLPYVGCASIQSGDIVICKRVSE-----SGEDHSIKLKHT
ZmNRPD2/E2a	908	NLDDDCLPYVGCASIQTNDIVICKRVSE-----SGEDHSIKLKHT
ZmNRPD2/E2b	908	NLDDDCLPYVGCASIQTNDIVICKRVSE-----SGEDHSIKLKHT
OsNRPD2b	811	SLDIDCLPYVGCASIQSMDIICKRVSD-----SGEDHSIKLLHT
ZmNRPD2/E2c	937	SLDSCLPYVGCASIQSGDIVICKRVTE-----SGEDHSIKLMHT

Conserved domain G

|EcRpoB 104 aa deleted

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EcRpoB      734 VSCTVLDVQVFTTRDGA PGVLKIVKRYLAVKRRIQPGDKMACRHCNKGVLSKINPIEDMPY
ScRPB2      934 EHCIVDQVLTITNQ---DGLKFWVWRVRRTRTRIPQIGDKFASRHCQKGTICLITYRREDMPF
AtNRPA2     776 DPVIVDFVSWDMKSK--KHPQRANIRFRHARNPIIGDKFSSRHCQKQVCSCQLWPDIDMPF
OsNRPA2     653 EPEAIDYKANGTN-FKRLQKANIIRLRVRNPIIGDKFSSRHCQKQVCSCQLWPDIDMPF
AtNRPC2     869 ETQVVDRTALCSDK---KGLQKIKYIIRHTRRPELGDKFSSRHCQKQVCCLIIQOEDFPF
OsNRPC2     893 BTTVVDRTVLCSDT---DEKLIIEKCIIRHTRRPEVGDKFSSRHCQKQVCCTIVQOEDFPF
AtNRPB2     905 ETCMVDQVLLTTMA---DGLRFVWRVRSVRIPQIGDKFSSRHCQKGTICMITYTQEDMPW
OsNRPB2     938 ETCMVDQVLLTTMA---DGLRFVWRVRSVRIPQIGDKFSSRHCQKGTICMITYTQEDMPW
ZmNRPB2a    944 ETCMVDQVLLTTMA---DGLRFVWRVRSVRIPQIGDKFSSRHCQKGTICMITYTQEDMPW
ZmNRPB2b    918 ETCMVDQVLLTTMA---DGLRFVWRVRSVRIPQIGDKFSSRHCQKGTICMITYTQEDMPW
AtNRPD2a    878 ERGIVQRVWVLSAMD---EGRNFAAVSLRQVRSVPCIGDKFSSMHCQKQVLCYLEEQQNFPP
AtNRPD2b    743 ERGIVQRVWVLSAMD---EGRNFAAVSLRQVRSVPCIGDKFSSMHCQKQVLCYLEEQQNFPP
OsNRPD2a    926 ERGIVQRVWVLSAMD---EGRNFAAVWTLRQVRSVPCIGDKFSSMHCQKQVLCYLEEQQNFPP
ZmNRPD2/E2a 946 ERGIVQRVWVLSAMD---EGRNFAAVWTLRQVRSVPCIGDKFSSMHCQKQVLCYLEEQQNFPP
ZmNRPD2/E2b 946 ERGIVQRVWVLSAMD---EGRNFAAVWTLRQVRSVPCIGDKFSSMHCQKQVLCYLEEQQNFPP
OsNRPD2b    849 ERGIVQRVWVLSAMD---DGTMSAFVWTLRQVRSVPCIGDKFSSMHCQKQVLCFLDSQENFPF
ZmNRPD2/E2c 975 ERGIVQRVWVLSAMD---DGVNFATVWTLRQVRSVPCIGDKFSSMHCQKQVLCFLDSQENFPF
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Conserved domain H

▼ZmNRPD2/E2a, G1026R, mop2-2

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EcRpoB      794 D-ENCTIPVDIVLNPVCPSPRMVIGQLLETHLGMARKGICGDKINAMLKQQQEVAKLREFIQ
ScRPB2      991 T-AEGIVPDLIINPHAFPSRMTVAHLIECLLSRVAAL-----SGNEGDASPTFT
AtNRPA2     834 NGVTGMRPDLIINPHAFPSRMTIAMLLESTAAKCCSL-----RCKFVDATPFR
OsNRPA2     712 SANTGMRPDLIINPHAFPSRMTIAMLLESTAAKCCSL-----RCKFIDATPFA
AtNRPC2     926 S-ELGICPDLIMNPHGFPSRMTVGRMIELLGSKAG-----VSCGRFHYCSAFG
OsNRPC2     950 S-ERGICPDLIMNPHGFPSRMTVGRMIELLGSKAG-----VSCGRFHYCSAFG
AtNRPB2     962 T-IEGIVPDLIIVNPHAFPSRMTIGQLIECINCRVAAH-----MCKEGDATPFT
OsNRPB2     995 T-IEGIVPDLIIVNPHAFPSRMTIGQLIECINCRVA-----AHMCKEGDATPFT
ZmNRPB2a    1001 T-IEGIVPDLIIVNPHAFPSRMTIGQLIECINCRVAHQ-----MCKEGDATPFT
ZmNRPB2b    975 T-IEGIVPDLIIVNPHAFPSRMTIGQLIECINCRVAHQ-----MCKEGDATPFT
AtNRPD2a    935 T-IQGIIVPDIIVNPHAFPSRQTGQLLEAALSKCIAC-PIQKRGSSAAYTKLTPHATPFS
AtNRPD2b    800 T-IQGIIVPDIIVNPHAFPSRQTGQLLEAALSKCIACPIQKRGSSAAYTKLTPHATPFS
OsNRPD2a    983 T-YQGIIVPDIIVNPHAFPTRQTGQLLEAALGKCIAC-----CCTMRYATPFT
ZmNRPD2/E2a 1003 T-HEGIVPDIIVNPHAFPTRQTGQLLEAALGKCIAC-----RCTMRYATPFT
ZmNRPD2/E2b 1003 T-HDGIIVPDIIVNPHAFPTRQTGQLLEAALGKCIAC-----RCTMRYATPFT
OsNRPD2b    906 T-HQGIIVPDIIVNPHCFPTRQTGQLLEAALGKCIAC-----CCATRYATPFT
ZmNRPD2/E2c 1032 T-SQGIIVPDMVINPHCFPTRQTGQLLEAALGKCIAC-----CCKVRYATPFT
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Conserved domain H

|EcRpoB 28 aa deleted

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EcRpoB      853 RAYDLGADVVRQKVDCAKEAEIKELKLGDLPTSCQIRLYDCATCEQFERPWTVGVMYMLR
ScRPB2      1038 D-----ITVEGISKLRHHCYQSRCFEVMYNGHTGKRLMAQIFFCPTYYQR
AtNRPA2     882 DAVRKTNGREESKSSLLWDDLCSMLRKKCFNHYCTETLYSCYLCVELKCBIFMCPVYYQR
OsNRPA2     760 SSVKERS-----NSIVDELCPMLASYCFNYHCTEILYSVVFCTEMKCBIFLCPVYYQR
AtNRPC2     973 ERSQH-----ADRVETISATLVERKCFYSYSCROLLYSCLISCEPVEAYIFMGPPIYYQR
OsNRPC2     997 EPSGN-----ADRVEDISRTLWRHCFYSYSCROLLYSCHLCHPCQAYIFMGPPIYYQR
AtNRPB2     1009 D-----VTWDMISKALHRCYQMRCFETMYNCHTGRPLTAMIFLGPITYYQR
OsNRPB2     1042 D-----VTWDMISKALHRCYQMRCFETMYNCHTGRKLTAMIFLGPITYYQR
ZmNRPB2a    1048 D-----VTWDMISKALHRCNYQMRCFETMYNCHTGRKLTAMIFLGPITYYQR
ZmNRPB2b    1022 D-----VTWDMISKALHRCNYQMRCFETMYNCHTGRKLTAMIFLGPITYYQR
AtNRPD2a    993 T-----PCWTEITLQHLRACFSRUCNERVYNGRSGEMMRSIIFMGPITYYQR
AtNRPD2b    859 T-----PCWTEITLQHLRACFSRUCNERVYNGRSGEMMRSIIFMGPITYYQR
OsNRPD2a    1030 T-----ASVDVIAEQHLRACFSRUCAESVNLNGRTGERMKSIIIFMGPITYYQR
ZmNRPD2/E2a 1050 T-----ASVDVIAEQHLRACFSRUCSENVNLNGRTGERVQSLVIFMGPITYYQR
ZmNRPD2/E2b 1050 T-----ASVDVIAEQHLRACFSRUCSENVNLNGRTGERMKSIIIFMGPITYYQR
OsNRPD2b    953 S-----PSWEVITLQHLRACFSRUCGESVNLNGRTGERRAASVIFMGPITYYQR
ZmNRPD2/E2c 1079 T-----PTWEVIAEQHLRACFSRUCGESVNLNGRTGERMKSIIIFMGPITYYQR
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Conserved domain I



EcRpoB	913	LNHLVDDKMEHARSTGCSYSLVTQOPLCGKAQFGGQRFCEMEVWALRAYCAAYTLQEMLTVK
ScRPB2	1084	LRLHMVDDKIHARARCPMQVLTROPVEGRSDCGLRFCEMERDCMLAHGAASFLKERLMEA
AtNRPA2	942	LRLHMVSDRFQVRSSTGQWDQLTHQPIKCRFRGCGLRFCEMERDCLLAHGASYLLHDLRLHLS
OsNRPA2	813	LRLHMVSDRFQVRSSTGQWDQLTRQPIKCRFRYCGGIRFCEMERDCLLAHGASYLLHDLRLHSC
AtNRPC2	1024	LRLHMVLDKMEHARSGCPVVMTRQPTTEGRSRNGGLRWFCEMERDCLLAIYCASMLTYERLMIS
OsNRPC2	1048	LRLHMVLDKMEHARSGCPVLLTRQPTTEGRSDCGLRFCEMERDCLLAIYCASMLTYERLLIS
AtNRPB2	1055	LRLHMVDDKIHSGRCGPVQILTRQPAECGRSDCGLRFCEMERDCMLAHGAAHFLKERLFDQ
OsNRPB2	1088	LRLHMVDDKIHSGRCGPVQILTRQPAECGRSDCGLRFCEMERDCMLAHGAAAFFLKERLFDQ
ZmNRPB2a	1094	LRLHMVDDKIHSGRCGPVQILTRQPAECGRSDCGLRFCEMERDCMLAHGAAAFFLKERLFDQ
ZmNRPB2b	1068	LRLHMVDDKIHSGRCGPVQILTRQPAECGRSDCGLRFCEMERDCMLAHGAAAFFLKERLFDQ
AtNRPD2a	1039	LRLHMSSEDKVRFEMTGPVHPLTRQPVADRFRFCCIRFCEMERDCLLAHGASANLHERLFTL
AtNRPD2b	905	LRLHMSSEDKVRFEMTGPVHPLTRQPVADRFRFCCIRFCEMERDCLLAHGASANLHERLFTL
OsNRPD2a	1076	LRLHMAEDKVRFRMTGPVHPLTRQPVADRFRFCCVRFCEMERDCLLAHGAAANLHERLFML
ZmNRPD2/E2a	1096	LRLHMSSEDKVRFEMTGPVHPLTRQPVADRFRFCCVRFCEMERDCLLAHGSAANLHERLFL
ZmNRPD2/E2b	1096	LRLHMSSEDKVRFEMTGPVHPLTRQPVADRFRFCCVRFCEMERDCLLAHGSAANLHERLFL
OsNRPD2b	999	LRLHMAEDKVRFRMTGPVHPLTRQPVADRFRFCCVRFCEMERDCLLAHGAAANLHERLFL
ZmNRPD2/E2c	1125	LRLHMAEDKVRFRMTGPVHPLTRQPVADRFRFCCVRFCEMERDCLLAHGAAANLHERLFTL

## Conserved domain I

AtNRPA2 8 aa deleted

OsNRPA2 7 aa deleted

EcRpoB	973	SDDVNGRTRKMYKNIVD-----GNHQMEP-GMPESFNV
ScRPB2	1144	SDAFR-VHICGICGLMTVIA-----KLNHNQFECKGCDM-KIDIIYQL-HIPYAAK
AtNRPA2	1002	SDHHI-ADVCSLCCSLLTSSLIQEIQKLPGRTPKVKTCYSCKT-SKGMETW-AMPYVFR
OsNRPA2	873	SDYHI-ADVCSLCCSLLTATAKRDMLGLPTVREPPNFACQACKT-SKGMETW-AMPYVFR
AtNRPC2	1084	SDPFE-VQVCRACGLLGYN-----YKLRKAVCTTCRN-GDNIAIHW-KLPPYCK
OsNRPC2	1108	SDPYQ-VQVCRRCGLLGYN-----HKLRASYCSCMCRN-GENMARM-RMPYACK
AtNRPB2	1115	SDAYR-VHVCEVCGLLAIAN-----LRKNSFECRCGRN-KTDIVQW-YIPYACK
OsNRPB2	1148	SDAYR-VHVCEKCCLLAIAN-----LRKNSFECRCGRN-KTDIVQW-HIPYACK
ZmNRPB2a	1154	SDAYR-VHVCEKCCLLAIAN-----LRKNSFECRCGRN-KTDIVQW-HIPYACK
ZmNRPB2b	1128	SDAYR-VHVCEKCCLLAIAN-----LRKNSFECRCGRN-KTDIVQW-HIPYACK
AtNRPD2a	1099	SDSSQ-MHICRCKKTYANVI---ERTPSSGRKIRGYPYCRVCS-SDHWVRW-YVPPYCK
AtNRPD2b	965	SDSSQ-MHICRCKKTYANVI---ERTPSSGRKIRGYPYCRVCS-SDHWVRW-YVPPYCK
OsNRPD2a	1136	SDFSQ-MHVCQTCERVANVI---MRPVPGGKIRGYPYCGFCKS-SENIWRI-NVPPYCK
ZmNRPD2/E2a	1156	SDFSQ-MHICQTCERVANVV---MRSVPGGKIRGYPYCGFCKS-SENIWRI-NVPPYCK
ZmNRPD2/E2b	1156	SDFSQ-MHICQTCERVANVV---MRSVPGGKIRGYPYCGFCKS-SENIWRI-NVPPYCK
OsNRPD2b	1059	SDWSR-LHVCRRQQRAAVVVSPAVAADGGGGRKVRGYPYCRFCKS-ABEVRWV-SVPPYCK
ZmNRPD2/E2c	1185	SDFSR-MHICQACERVANVI--VRAAEGCGGKVRGYPYCLFCKS-ABEVRWV-DVPPYCK

EcRpoB	1004	LLKEIRSLGINIELEDE-----
ScRPB2	1191	LLFQELMAMNITPRLYTDRSRDF-----
AtNRPA2	1059	YLAEELASMNIRKTLQLSDREGVTD-----
OsNRPA2	930	YLAEELASMNIRKELRLSNRTEHPTTSEES
AtNRPC2	1130	LLFQELQSMNVVPRKLKLEA-----
OsNRPC2	1154	LLFQELQAMNVVPRKLKLEA-----
AtNRPB2	1161	LLFQELMSMAIAPRMLTKHLKSAKGRQ----
OsNRPB2	1194	LLFQELMAMAIAAPRMLTQDMKTCKDQKQR--
ZmNRPB2a	1200	LLFQELMAMAIAAPRMLTQDMKTCKDQKQR--
ZmNRPB2b	1174	LLFQELMAMAIAAPRMLTQDMKTCKDQKQR--
AtNRPD2a	1152	LLCQELFSMCIITLNFDTRKLC-----
AtNRPD2b	1018	LLCQELFSMCIITLNFDTRKLC-----
OsNRPD2a	1189	LLYQELFSMCIICLRFETEVV-----
ZmNRPD2/E2a	1209	LLYQELFSMCIICLRFETQVC-----
ZmNRPD2/E2b	1209	LLYQELFSMCIICLRFETQVC-----
OsNRPD2b	1116	LLYQELFSMCIICLRFDTLFI-----
ZmNRPD2/E2c	1240	LLYQELFSMCIICLRFETEVV-----

Organisms designations:  
 Ec (*Escherichia coli*)  
 Sc (*Saccharomyces cerevisiae*)  
 At (*Arabidopsis thaliana*)  
 Os (*Oryza sativa*)  
 Zm (*Zea mays*)



### **Supplementary Figure 3. Alignment of Second Largest Subunits of RNA Polymerases.**

Alignment was performed using MUSCLE, edited using GENEDOC, and shaded using BOXSHADE. Identical amino acids are shaded in black, while similar amino acids are shaded in gray. Conserved domains are underlined and indicated A through I [72]. The active site (metal B) is indicated by asterisks [72]. Positions of *Mop2-1* and *mop2-2* mutations are indicated above the alignment in blue. Positions and number of amino acids removed from alignment are indicated in gray.