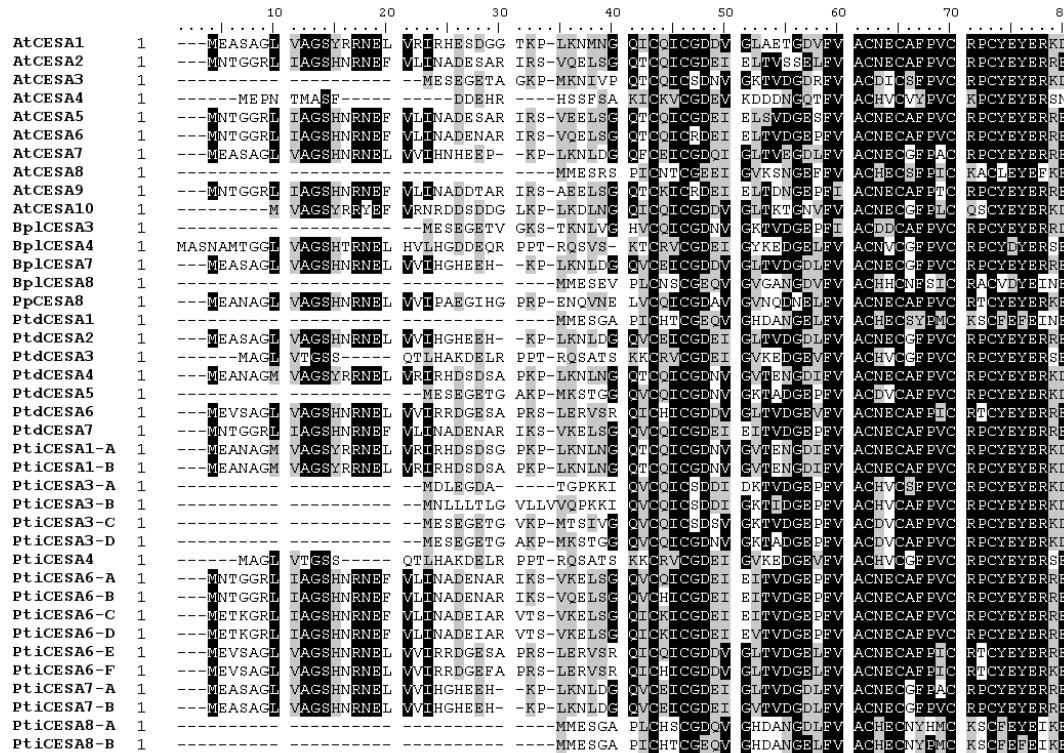


## Supplemental Materials

**Figure S1.** Multiple sequence alignment and main domains for the deduced amino acid sequences of 39 CESA proteins from *Physcomitrella paten*, *Arabidopsis thaliana*, *Betula platyphylla*, *Populus tremuloides* and *Populus trichocarpa*. The two hypervariable regions (HVRI and HVRII) of the selected CesA gene products were highly divergent and excluded for the alignment. Shown are the conserved processive glycosyltransferase motif (D, D, D, QVLRW, black triangles). The GenBank accession numbers are as follows: PpCESA8(DQ902549), AtCESA1(At4g32410), AtCESA2(At4g39350), AtCESA3(At5g05170), AtCESA4(At5g44030), AtCESA5 (At5g09870), AtCESA6(At5g64740), AtCESA7(At5g17420), AtCESA8(At4g18780), AtCESA9(At2g21770), AtCESA10(At2g25540), BplCESA8 (EU591529), BplCESA3 (EU591530), BplCESA7 (EU591531), BplCESA4 (EU591532), PtdCESA1 (AF072131), PtdCESA2 (AY095297), PtdCESA3 (AF527387), PtdCESA4 (AY162181), PtdCESA5 (AY055724), PtdCESA6 (AY196961), PtdCESA7 (AY162180), PtCESA1-A (Pt835809), PtCESA1-B (Pt763479), PtCESA3-A (Pt560520), PtCESA3-B (Pt576348), PtCESA3-C (Pt821409), PtCESA3-D (Pt706420), PtCESA4 (Pt553321), PtCESA6-A (Pt207792), PtCESA6-B (Pt819877), PtCESA6-C (Pt818594), PtCESA6-D (Pt551308), PtCESA6-E (Pt806784), PtCESA6-F (Pt784751), PtCESA7-A (Pt717644), PtCESA7-B (Pt262611), PtCESA8-A (Pt235238), PtCESA8-B (Pt555650).



	90	100	110	120	130	140	150	160
AtCESA1	77 GTCACCPQCTP YRMVIIHLRLI ILGIEFFHYRI THPVKNAYPL WLTSVICEIW PAFSWILDQF PKWYPIRERET YLDRSLRYE							
AtCESA2	77 GNQACPQCNP YRMVIIHLRLA ILGIEFFHYRI LHPVNDAYGL WLTSVICEIW PAVSWILDQF PKWYPIRERET YLDRSLRYE							
AtCESA3	58 GNOSCPQCNP YRMVIMHLRLV ILCIEFLHYRI TNPVPNAAEAL WLTSVICEIW FALSWILDQF PKWYPIRERET YLDRSLRYE							
AtCESA4	61 GNKCCPQCSNP YRMVIMHLRLV ILVEFFRERI LTPAKDAYPL WLTSVICEIW FALSWILDQF PKWYPIRERET YLDRSLRYE							
AtCESA5	77 GNQSCPQCNP YRMVIMHLRLV ILGIEFFHYRI LHPVNDAYAL WLTSVICEIW PAVSWILDQF PKWYPIRERET YLDRSLRYE							
AtCESA6	77 GNOACPQCNP YRMVIMHLRLV ILGIEFFHYRI LHPVNDAYAL WLTSVICEIW PAVSWILDQF PKWYPIRERET YLDRSLRYE							
AtCESA7	75 GTONCPQCNP YRMVIVARLV ILAFLFLYRI LNPVHDAGL WLTSVICEIW PAVSWILDQF PKWYPIRERET YLDRSLRYE							
AtCESA8	47 GRKVLCLRCTP YRMVIVIRLI ILAFLFFHYRI THPVDSAYGL WLTSVICEIW PAVSWILDQF PKWYPIRERET YLDRSLRYE							
AtCESA9	77 GNQACPQCNP YRMVIFCRRLA ILGIEFFHYRI LHPVNDABGL WLTSVICEIW PAVSWILDQF PKWYPIRERET YLDRSLRYE							
AtCESA10	71 GSOCCPQCTP YRMVIVLRLV ILGWFHYRT THPVKDAYAL WLTSVICEIW PAFSWILDQF PKWYPIRERET YLDRSLRYE							
BplCESA3	58 GNQSCPQCNP YRMVIVLRLV VLSIFLHYRL TNPVPNACAL WLTSVICEIW PAISWILDQF PKWLPVNRET YLDRSLRYE							
BplCESA4	79 GNOACPQCNP YRMVIVLRLV ILAFLFLYRI LTPAKDAYAL WLTSVICEIW PAVSWILDQF PKWYPIRERET YLDRSLRYE							
BplCESA7	75 GBLQCPQCNP YRMVIVARLV VLSIFLHYRI MNPVQDAEGL WLTSVICEIW FAISWILDQF PKWYPIRERET YLDRSLRYE							
BplCESA8	47 GRKVLCLRCTP YRMVIVIRLV ILGIEFFHYRI THPVDSAGL WLTSVICEIW PAVSWILDQF PKWLPVNRET YLDRSLRYE							
PpCESA8	77 GNGVCPHCNP YRMVIVIRLV VLAFLFLYRI LHPVCEAGL WLTSVICEIW PAVSWILDQF PKWLPVNRET YLDRSLRYE							
PtdCESA1	47 GRKVLCLRCTP YRMVIVIRLV ILGIEFFHYRI THPVDSAGL WLTSVICEIW FAISWILDQF PKWYPIRERET YLDRSLRYE							
PtdCESA2	75 GTONCPQCNP YRMVIVARLI ILAFLFLYRI LHPVHDAGL WLTSVICEIW PAISWILDQF PKWLPIDRET YLDRSLRYE							
PtdCESA3	69 GNOACPQCNP YRMVIVARLI ILGIEFFHYRI LTFSADAYAL GLHSVCEIW PGLSWILDQF PKWYPIRERET YLDRSLRYE							
PtdCESA4	77 GNOACPQCTP YRMVIVARLI ILGIEFFHYRI THPVKDAYAL WLTSVICEIW PAVSWILDQF PKWYPIRERET YLDRSLRYE							
PtdCESA5	58 GNOACPQCNP YRMVIVLRLG ILCIEFLHYRI TNPVRNAYAL GLYGINGMWDW FAISWILDQF PKWLPVNRET YLDRSLRYE							
PtdCESA6	77 GNOVCQCPQCNP YRMVIIHLRLV VVGFFHYRV THPVNDAYAL WLTSVICEIW PAVSWILDQF PKWLPIDRET YLDRSLRYE							
PtdCESA7	77 GNOACPQCNP YRMVIIHLRLV ILGIEFFHYRI LHPVNDAYGL WLTSVICEIW PAVSWILDQF PKWYPIRERET YLDRSLRYE							
PtICESA1-A	77 GTONCPQCTP YRMVIIHLRLI ILGIEFFHYRI THPVKDAYAL WLTSVICEIW PAISWILDQF PKWLPVNRET YLDRSLRYE							
PtICESA1-B	77 GTOACPQCTP YRMVIIHLRLI ILGIEFFHYRV THPVKDAYAL WLTSVICEIW PAVSWILDQF PKWYPIRERET YLDRSLRYE							
PtICESA3-A	54 GNOACPQCNP YRMVIIHLRLV VLGIFLHYRL TNPVRNAYAL WLTSVICEIW FAISWILDQF PKWLPVNRET YLDRSLRYE							
PtICESA3-B	59 GNOACPQCNP YRMVIIHLRLV VLGIFLHYRI TNPVRNAYAL WLTSVICEIW FAISWILDQF PKWLPVNRET YLDRSLRYE							
PtICESA3-C	58 GNOACPQCNP YRMVIIHLRLV ILGIEFFHYRI TNPVRNAYAL WLTSVICEIW FAISWILDQF PKWLPVNRET YLDRSLRYE							
PtICESA3-D	58 GNOACPQCNP YRMVIIHLRLV ILGIEFFHYRI TNPVRNAYAL WLTSVICEIW FAISWILDQF PKWLPVNRET YLDRSLRYE							
PtICESA4	69 GNOACPQCNP YRMVIIHLRLI ILGIEFFHYRI LTFSADAYAL WLTSVICEBVW EGLSWILDQF PKWYPIRERET YLDRSLRYE							
PtICESA6-A	77 GNOACPQCNP YRMVIIHLRLI ILGIEFFHYRI LHPVNDAYGL WLTSVICEIW PAVSWILDQF PKWYPIRERET YLDRSLRYE							
PtICESA6-B	77 GNOACPQCNP YRMVIIHLRLV VVGLFFHYRI LHPVNDAYGL WLTSVICEIW PAVSWILDQF PKWYPIRERET YLDRSLRYE							
PtICESA6-C	77 GNOACPQCNP YRMVIIHLRLV ILGIEFFHYRI LHPVNDAYGL WLTSVICEIW FAISWILDQF PKWLPVNRET YLDRSLRYE							
PtICESA6-D	77 GNOACPQCNP YRMVIIHLRLV ILGIEFFHYRI LHPVNDAYGL WLTSVICEIW PAVSWILDQF PKWYPIRERET YLDRSLRYE							
PtICESA6-E	77 GNOVCQCPQCNP YRMVIIHLRLV VVGFHFRV THPVNDABAL WLTSVICEIW PAVSWILDQF PKWLPIDRET YLDRSLRYE							
PtICESA6-F	77 GNOVCQCPQCNP YRMVIIHLRLV VLGFHFRV THPVNDABAL WLTSVICEIW PAVSWILDQF PKWLPIDRET YLDRSLRYE							
PtICESA7-A	75 GTONCPQCNP YRMVIVARLI ILAFLFLYRI LHPVHDAGL WLTSVICEIW PAISWILDQF PKWLPIDRET YLDRSLRYE							
PtICESA7-B	75 GTONCPQCNP YRMVIVARLI ILAFLFLYRI LHPVHDAGL WLTSVICEIW PAISWILDQF PKWLPIDRET YLDRSLRYE							
PtICESA8-A	47 GRKVLCLRCTP YRMVIVIRLI ILGIEFFHYRI TNPVDSAGL WLTSVICEIW FAISWILDQF PKWNEVNREB FIDRLSARYE							
PtICESA8-B	47 GRKVLCLRCTP YRMVIVIRLV ILGIEFFHYRI TNPVDSAGL WLTSVICEIW FAISWILDQF PKWNEVNRET YLERLSARYE							

	170	180	190	200	210	220	230	240
AtCESA1	157 RDGEPSOLVP VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVACYVS DDGAAMLTFE SLSETAEFAK KWVPPCKKFN							
AtCESA2	157 KECKPSLAP VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVACYVS DDGAAMLTFE ALSETAEFAK KWVPPCKKEN							
AtCESA3	138 REGEPSOLAP VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE SLAETSEFAR KWVPPCKKYS							
AtCESA4	141 RDGEKPNKLAP VDFVFVSTVDP LKEPPLVTAN TTSILAVDY PVDKVSCYVS DDGAAMLTFE TLSETSEFAR KWVPPCKKKN							
AtCESA5	157 KECKPSLAP VDFVFVSTVDP MKEPPLVTAN TVLSILAVDY PVDKVACYVS DDGAAMLTFE ALSETAEFAK KWVPPCKKYT							
AtCESA6	157 KECKPSLAP VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVACYVS DDGAAMLTFE ALSETAEFAK KWVPPCKKRF							
AtCESA7	155 REGEPNMLAP VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE SLSETAEFAK KWVPPCKKES							
AtCESA8	127 REGEPSOLAA VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE SLVETADFAK KWVPPCKKYS							
AtCESA9	157 KECKPSLAP VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVACYVS DDGAAMLTFE ALSYTAEFAR KWVPPCKKES							
AtCESA10	151 RDGEPSOLAP VDFVFVSTVDP MKEPPLVTAN TVLSILAVDY PVDKVACYVS DDGAAMLTFE ALSETAEFSK KWVPPCKKEN							
BplCESA3	138 REGEPSQLAA VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETSEFAR KWVPPSKKYN							
BplCESA4	159 REGEPNRLAP VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE TLSETAEFAK KWVPPCRKES							
BplCESA7	155 REGEPSNLAS VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETAEFAK KWVPPCKKES							
BplCESA8	127 REGEPSLAA VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE SLVETADFAK KWVPPCKKEA							
PpCESA8	157 KGEPSOLCN VDFVFVSTVDP LKEPPLVTAN TTSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETSEFAR KWVPPCKKET							
PtdCESA1	127 REGEPSOLAG VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE SLVETAEFAK KWVPPCKKES							
PtdCESA2	155 QEGGPENMLAP VDFVFVSTVDP MKEPPLVTAN TTSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETAEFAK KWVPPCKKEN							
PtdCESA3	149 REGEPNRLGP VDFVFVSTVDP LKEPPLVTAN TTSILAVDY PVDKVSCYVS DDGAAMLTFE SLAETAEFAK KWVPPCKKHN							
PtdCESA4	157 REGEPSQLAP VDFVFVSTVDP LKEPPLVTAN TTSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETAEFAK KWVPPCKKHN							
PtdCESA5	138 MEGEPSHLLV VDFPARSGHV LKEPPLVTAN AVLSILAQS PTDKVSYVS DDGAAMLTFE ALSETSEFAR KWVPPCKKYS							
PtdCESA6	157 KEGQPSLQLP VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETSEFAR KWVPPCKKES							
PtdCESA7	157 KECKPSLAP VDFVFVSTVDP MKEPPLVTAN TVLSILAVDY PVDKVACYVS DDGAAMLTFE ALSETSEFAR KWVPPCKKEN							
PtICESA1-A	157 REGEPSOLAP VDFVFVSTVDP MKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETAEFAK KWVPPCKKHS							
PtICESA1-B	157 RDGEPSQLAP VDFVFVSTVDP LKEPPLVTAN TTSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETAEFAK KWVPPCKKHN							
PtICESA3-A	134 KEGEPSOLAA VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETSEFAR KWVPPCKKJD							
PtICESA3-B	139 KEGEPSOLAA VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE TMSETSEFAR KWVPPCKRVD							
PtICESA3-C	138 HEGEPSOLAA VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETSEFAR KWVPPCKKYN							
PtICESA3-D	138 NEGEPSOLAA VDFVFVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETSEFAR KWVPPCKKYS							
PtICESA4	149 REGEPNRLGP VDFVFVSTVDP LKEPPLVTAN TTSILAVDY PVDKVSCYVS DDGAAMLTFE SLAETAEFAK KWVPPCKKHN							
PtICESA6-A	157 KEGPSLAP VDFVFVSTVDP MKEPPLVTAN TTSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETSEFAR KWVPPCKKEN							
PtICESA6-B	157 KECKPSLAP VDFVFVSTVDP MKEPPLVTAN TTSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETSEFAR KWVPPCKKEN							
PtICESA6-C	157 KECKPSLAP VDFVFVSTVDP MKEPPLVTAN TTSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETSEFAR KWVPPCKRPS							
PtICESA6-D	157 KECKPSLAP VDFVFVSTVDP MKEPPLVTAN TTSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETSEFAR KWVPPCKRPS							
PtICESA6-E	157 KEQOASOLCP VDFYVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETSEFAR KWVPPCKKES							
PtICESA6-F	157 KEGQPSLAP VDFYVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE ALSETSEFAR KWVPPCKKES							
PtICESA7-A	155 REGEPNMLAP VDFYVSTVDP MKEPPLVTAN TTSILAVDY PVDKVSCYVS DDGAAMLTFE ASSETAEFAR KWVPPCKKYS							
PtICESA7-B	155 KEGEPNMLAP VDFYVSTVDP MKEPPLVTAN TTSILAVDY PVDKVSCYVS DDGAAMLTFE ASSETAEFAR KWVPPCKKEN							
PtICESA8-A	127 REGEPSOLAA VDFYVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE SLVETAEFAR KWVPPCKKES							
PtICESA8-B	127 REGEPSQLAG VDFYVSTVDP LKEPPLVTAN TVLSILAVDY PVDKVSCYVS DDGAAMLTFE SLVETAEFAR KWVPPCKKYT							

	250	260	270	280	290	300	310	320	
AtCESA1	237	IEPRAPEFYF	AQKIDYLKDK	IQPSPVKERR	AMKRREYEEFK	VRINALVAKA	QKEPEEGWTM	QDGTWPWGN	TRDHGMIQ
AtCESA2	237	IEPRAPEMYF	SOKMDYLKDK	VHPEAVRERR	AMKRREYEEFK	VRINALVATA	QKVEEGWM	QDGTWPWGN	VRDHGMIQ
AtCESA3	218	IEPRAPEMYF	AQKIDYLKDK	VOTSPVKDRR	AMKRREYEEFK	IRINALVASKA	LKEPEEGWM	QDGTWPWGN	TRDHGMIQ
AtCESA4	221	IEPRAPEFYF	SEKIDYLKDK	VOTTFVKDRR	AMKRREYEEFK	VRINALVAKA	QKKPEEGWM	QDGTWPWGN	TRDHGMIQ
AtCESA5	237	IEPRAPEMYF	CHKMDYLKDK	VHPEAVRERR	AMKRREYEEFK	VRINALVATA	QKVEEGWM	QDGTWPWGN	VRDHGMIQ
AtCESA6	237	IEPRAPEMYF	CHKMDYLKDK	VHPEAVRERR	AMKRREYEEFK	VRINALVATA	QKVEEDGWTM	QDGTWPWGN	VRDHGMIQ
AtCESA7	235	IEPRAPEMYF	TILKVDYLQDK	MPTFVKERR	AMKRREYEEFK	VRINAQVAKA	SKVLEGWTM	QDGTWPWGN	TRDHGMIQ
AtCESA8	207	IEPRAPEFYF	SIKIDYLKDK	VQSPFVKERR	AMKRREYEEFK	VRINALVAKA	QKEPEEGWM	QDGTSPWGN	TRDHGMIQ
AtCESA9	237	IEPRAPEMYF	SOKMDYLKDK	VDPAFWERR	AMKRREYEEFK	VRINALVSVS	QKVEEDGWTM	QDGTWPWGN	VRDHGMIQ
AtCESA10	231	IEPRAPEFYF	SOKIDYLKDK	IOPSPVKERR	AMKRREYEEFK	VRINTVAKA	QKEPEEGWTM	EDGTSPWGN	ERDHGMIQ
BpCESA3	218	IEPRAPEMYF	AKKIDYLKDK	VQSPFVKERR	AMKRREYEEFK	VRINALVAKA	QKEPEEGWM	QDGTWPWGN	TRDHGMIQ
BpCESA4	239	IEPRAPEMYF	SEKMDYLKDK	VLESPVKERR	AMKRREYEEFK	VRINALVAKA	QKEPEEGWM	QDGTWPWGN	TRDHGMIQ
BpCESA7	235	IEPRAPEMYF	AEKIDYLKDK	VQPTFVKERR	AMKRREYEEFK	VRINALVAKA	TKVEPEGWM	QDGTWPWGN	TRDHGMIQ
BpCESA8	207	IEPRAPEFYF	AQKIDYLKDK	VQSPFVKERR	AMKRREYEEFK	VRINALVAKA	QKEPEEGWM	EDGTAWPWN	SRDHGMIQ
PpCESA8	237	IEPRAPEMYF	AQKIDYLKDK	VQPTFVKERR	AMKRREYEEFK	VRINALVAKA	LKEVEDGWTM	QDGTAWPWN	KSDRHGMIQ
PtdCESA1	207	IEPRAPEFYF	SOKIDYLKDK	VQSPFVKERR	AMKRREYEEFK	VRIALVAKA	QKEPEEGWM	QDGTWPWGN	TRDHGHDG
PtdCESA2	235	IEPRAPEFYF	TILKVDYLKDK	VQPTFVKERR	AMKRREYEEFK	VRINAQVAKA	QKVEETEGWM	QDGTWPWGN	TRDHGMIQ
PtdCESA3	229	IEPRAPEFYF	TOKIDYLKDK	WHEPFVKERR	AMKRREYEEFK	VRINALVASKA	QKEPEEGWM	QDGTWPWGN	TRDHGMIQ
PtdCESA4	237	IEPRAPEFYF	AQKIDYLKDK	IOPSPVKERR	AMKRREYEEFK	VRINALVAKA	QKVEETEGWM	QDGTWPWGN	ERDHGMIQ
PtdCESA5	218	IEPRAPEMYF	AQKIDYLKDK	VQSPFVKDRR	AMKRREYEEFK	IRINGLVAKA	QKVEEGWM	QDGTWPWGN	TRDHGMIQ
PtdCESA6	237	IEPRAPEFYF	SOKIDYLKDK	VQASPFVKERR	AMKRREYEEFK	IRINALVAKA	HKVEEDGWTM	QDGTWPWGN	VRDHGMIQ
PtdCESA7	237	IEPRAPEMYF	SOKIDYLKDK	VHPEAVRERR	AMKRREYEEFK	VRINGLVSATA	QKVEEDGWTM	QDGTWPWGN	VRDHGMIQ
PtICESA1-A	237	IEPRAPEFYF	AQKIDYLKDK	IOPSPVKERR	AMKRREYEEFK	VRINALVAKA	QKVEETEGWM	QDGTWPWGN	ERDHGMIQ
PtICESA1-B	237	IEPRAPEFYF	AQKIDYLKDK	IOPSPVKERR	AMKRREYEEFK	VRINALVAKA	QKEPEEGWM	QDGTWPWGN	ERDHGMIQ
PtICESA3-A	214	IEPRAPEMYF	AQKIDYLKDK	VHPEAVRERR	AMKRREYEEFK	VRINGLVSATA	QKVEDEGWM	QDGTWPWGN	TRDHGMIQ
PtICESA3-B	219	IEPRAPEFYF	SOKIDYLKDK	VQSPFVKERR	AMKRREYEEFK	VRINGLVSATA	QKVEDEGWM	QDGTWPWGN	TRDHGMIQ
PtICESA3-C	218	IEPRAPEFYF	SOKIDYLKDK	VQSPFVKDRR	AMKRREYEEFK	VRINGLVSATA	QKVEEGWM	QDGTWPWGN	TRDHGMIQ
PtICESA3-D	218	IEPRAPEMYF	AQKIDYLKDK	VQSPFVKDRR	AMKRREYEEFK	VRINGLVSATA	QKVEEGWM	QDGTWPWGN	TRDHGMIQ
PtICESA4	229	IEPRAPEFYF	TOKIDYLKDK	WHEPFVKERR	AMKRREYEEFK	VRINALVASKA	QKEPEEGWM	QDGTWPWGN	TRDHGMIQ
PtICESA6-A	237	IEPRAPEMYF	SOKIDYLKDK	VHPEAVRERR	AMKRREYEEFK	VRINGLVSATA	QKVEEDGWTM	QDGTWPWGN	VRDHGMIQ
PtICESA6-B	237	IEPRAPEMYF	SOKMDYLKDK	VHPEAVRERR	AMKRREYEEFK	VRINGLVSATA	QKVEEDGWTM	QDGTWPWGN	VRDHGMIQ
PtICESA6-C	237	IEPRAPEMYF	AKKVDYLKDK	VDPAFWERR	AMKRREYEEFK	VRINGLVSATA	QKVEEDGWTM	QDGTWPWGN	VRDHGMIQ
PtICESA6-D	237	IEPRAPEMYF	AKKVDYLKDK	VDPAFTRERR	AMKRREYEEFK	VRINGLVSATA	QKVEEDGWTM	QDGTWPWGN	VRDHGMIQ
PtICESA6-E	237	IEPRAPEFYF	AQKIDYLKDK	VQASPFVKERR	AMKRREYEEFK	VRINALVASKA	HKVEEDGWTM	QDGTWPWGN	VRDHGMIQ
PtICESA6-F	237	IEPRAPEFYF	AQKIDYLKDK	VDASEPVKERR	AMKRREYEEFK	VRINALVASKA	HKVEEDGWTM	QDGTWPWGN	VRDHGMIQ
PtICESA7-A	235	IEPRAPEFYF	AKKIDYLKDK	VQPTFVKERR	AMKRREYEEFK	VRINALVAKA	QKVEETEGWM	QDGTWPWGN	TRDHGMIQ
PtICESA7-B	235	IEPRAPEFYF	TILKVDYLKDK	VQPTFVKERR	AMKRREYEEFK	VRINALVAKA	QKVEETEGWM	QDGTWPWGN	TRDHGMIQ
PtICESA8-A	207	IEPRAPEFYF	SOKIDYLKDK	VQPSFVKERR	AMKRREYEEFK	VRINALVAKA	QKEPEEGWM	QDGTWPWGN	TRDHGMIQ
PtICESA8-B	207	IEPRAPEFYF	SOKIDYLKDK	VQPSFVKERR	AMKRREYEEFK	VRINALVAKA	QKEPEEGWM	QDGTWPWGN	TRDHGMIQ
	330	340	350	360	370	380	390	400	
AtCESA1	316	VFLGHSGGD	TIDGNELPRLV	YVSREKRPGF	QHHHKAGAMN	ALTRRSVAVLT	NGAYLLNVD	DHYINNSKAI	REAMCFMMDP
AtCESA2	316	VFLGHSGGD	TIDGNELPRLV	YVSREKRPGF	DHHHKAGAMN	SLLRVSASL	NAPYLLNVD	DHYINNSKAI	REAMCFMMDP
AtCESA3	297	VFLGSGGDD	AEGNELPRLV	YVSREKRPGF	QHHHKAGAMN	ALVRVSASL	NGCETLNLD	DHYINNSKAI	REAMCFMMDP
AtCESA4	300	VFLGREGAED	TIDGNELPRLV	YVSREKRPGF	AHHHKAGAMN	ATVRVSASL	NAPEMLNLD	DHYINNSKAI	REAMCFMMDP
AtCESA5	316	VFLGNGVRD	VENNELPRLV	YVSREKRPGF	DHHHKAGAMN	SLLRVSASL	NAPYLLNVD	DHYINNSKAI	REAMCFMMDP
AtCESA6	316	VFLCSGDE	VENNELPRLV	YVSREKRPGF	DHHHKAGAMN	SLLRVSASL	NAPYLLNVD	DHYINNSKAI	REAMCFMMDP
AtCESA7	314	VFLGHSGGD	VEGHNLPRLV	YVSREKRPGF	QHHHKAGAMN	ALVRVACVLT	NAPEMLNLD	DHYINNSKAV	REAMCFIMDP
AtCESA8	286	VFLGSGCGD	LEGNNELPRLV	YVSREKRPGF	QHHHKAGAEN	ALVRVSASL	NAPEIILNLD	DHYINNSKAV	REAMCFIMDP
AtCESA9	316	VFLGSGVCD	MDGNELPRLV	YVSREKRPGF	DHHHKAGAMN	SLLRVSASL	NAPYLLNVD	DHYINNSKAI	REAMCFMMDP
AtCESA10	310	VFLGHSGGD	TIDGNELPRLV	YVSREKRPGF	QHHHKAGAMN	ALVRVSASL	NGAYLLNVD	DHYINNSKAI	REAMCFMMDP
BpCESA3	297	VELGOSGGD	AEGNELPRLV	YVSREKRPGF	QHHHKAGAMN	ALVRVSASL	NGEELLNLD	DHYINNSKAI	REAMCFIMDP
BpCESA4	318	VIL-SEEAD	VEGRBLPRLV	YVSREKRPGF	QHHHKAGAMN	ALVRVSASL	NAPEITLNLD	DHYINNSKAI	REAMCFIMDP
BpCESA7	314	VELGHSGGD	AEGNELPRLV	YVSREKRPF-V	STTSQEAGAMN	ALVRVSASL	NAPEITLNLD	DHYINNSKAA	REAMCFIMDP
BpCESA8	286	VELGSTGHD	LEGNNELPRLV	YVSREKRPGF	QHHHKAGAEN	ALVRVSASL	NAPYIILNLD	DHYINNSKAV	REAMCFIMDP
PpCESA8	316	VELGOSGGD	TIDGNELPRLV	YVSREKRPGF	NHHHKAGAMN	ALVRVSASL	NAPYMLNLD	DHYINNSKAI	REAMCFMMDP
PtdCESA1	287	LPWEILGARD	TIDGNELPRLV	YVSREKRPGF	QHHHKAGAMN	ALVRVSASL	NAPEIILNLD	DHYINNSKAV	REAMCFIMDP
PtdCESA2	314	VELGHSGGD	VEGNELPRLV	YVSREKRPGF	SHHHKAGAMN	ALTRVLAILT	NAPEMLNLD	DHYINNSKAV	REAMCFIMDP
PtdCESA3	308	VFLGSEAD	VEGRBLPRLV	YVSREKRPF	NHHHKAGAMN	ALTRVSAVLT	NAPEMLNLD	DHYINNSKAV	REAMCFIMDP
PtdCESA4	316	VELGHSGGD	TIDGNELPRLV	YVSREKRPGF	QHHHKAGAMN	ALTRVSAVLT	NGAYLLNVD	DHYINNSKAI	REAMCFMMDP
PtdCESA5	297	VFLGSGGHD	SDGNELPRLV	YVSREKRPGF	QHHHKAGAMN	SLVRVSASL	NGPELLNLD	DHYINNSKAI	REAMCFMMDP
PtdCESA6	316	VFLGSGGHD	TIDGNELPRLV	YVSREKRPGF	NHHHKAGAMN	ALTRVSAVLT	NAPYLLNLD	DHYINNSKAI	REAMCFMMDP
PtdCESA7	316	VFLGSGVRD	VEGCELPRLV	YVSREKRPGF	BHHHKAGAMN	SLVRVSASL	NAPYLLNVD	DHYINNSKAI	REAMCFMMDP
PtICESA1-A	316	VFLGSGGHD	TIDGNELPRLV	YVSREKRPGF	QHHHKAGAMN	ALTRVSAVLT	NGAYLLNVD	DHYINNSKAI	REAMCFMMDP
PtICESA1-B	316	VFLGSGGHD	TIDGNELPRLV	YVSREKRPGF	QHHHKAGAMN	ALTRVSAVLT	NGAYLLNVD	DHYINNSKAI	REAMCFMMDP
PtICESA3-A	293	VFLGSGGHD	TEGNELPRLV	YVSREKRPGF	QHHHKAGAMN	ALVRVSASL	NGCETLNLD	DHYINNSKAI	REAMCFIMDP
PtICESA3-B	298	VFLGSGGHD	TEGNELPRLV	YVSREKRPGF	QHHHKAGAMN	ALVRVSASL	NGCETLNLD	DHYINNSKAI	REAMCFIMDP
PtICESA3-C	297	VFLGSGGHD	TIDGNELPRLV	YVSREKRPGF	QHHHKAGAMN	SLVRVSASL	NGPELLNLD	DHYINNSKAI	REAMCFIMDP
PtICESA3-D	297	VFLGSGGHD	SDGNELPRLV	YVSREKRPGF	QHHHKAGAMN	SLVRVSASL	NGPELLNLD	DHYINNSKAI	REAMCFIMDP
PtICESA4	308	VFLGSEAD	VEGRBLPRLV	YVSREKRPGF	NHHHKAGAMN	ALTRVSAVLT	NAPEMLNLD	DHYINNSKAV	REAMCFIMDP
PtICESA6-A	316	VFLGSGVRD	VEGCELPRLV	YVSREKRPGF	BHHHKAGAMN	ALVRVSASL	NAPYLLNVD	DHYINNSKAI	REAMCFMMDP
PtICESA6-B	316	VFLGSGVRD	VEGNELPRLV	YVSREKRPGF	EHHHKAGAMN	ALTRVNAVL	NAPYLLNVD	DHYINNSKAI	REAMCFIMDP
PtICESA6-C	316	VFLGNGVHD	VEGNELPRLV	YVSREKRPGF	DHHHKAGAMN	ALVRVSASL	NAPYMLNVD	DHYINNSKAI	REAMCFMMDP
PtICESA6-D	316	VFLGNGVHD	VEGNELPRLV	YVSREKRPGF	DHHHKAGAMN	SLVRVSASL	NAPYMLNVD	DHYINNSKAI	REAMCFMMDP
PtICESA6-E	316	VFLGSGGHD	TIDGNELPRLV	YVSREKRPGF	NHHHKAGAMN	ALVRVSASL	NAPYLLNLD	DHYINNSKAI	REAMCFIMDP
PtICESA6-F	316	VFLGSGGHD	TIDGNELPRLV	YVSREKRPGF	NHHHKAGAMN	ALVRVSASL	NAPYLLNLD	DHYINNSKAI	REAMCFMMDP
PtICESA7-A	314	VFLGHSGGD	TIDGNELPRLV	YVSREKRPGF	SHHHKAGAMN	ALVRVSASL	NAPEMLNLD	DHYINNSKAV	REAMCFIMDP
PtICESA7-B	314	VFLGHSGGD	VEGNELPRLV	YVSREKRPGF	SHHHKAGAMN	ALTRVSAVLT	NAPEMLNLD	DHYINNSKAV	REAMCFIMDP
PtICESA8-A	286	VFLGNTGARD	LEGNNELPRLV	YVSREKRPGF	QHHHKAGAEN	ALVRVSASL	NAPYIILNLD	DHYINNSKAV	REAMCFIMDP
PtICESA8-B	286	VFLGNTGARD	LEGNNELPRLV	YVSREKRPGF	QHHHKAGAEN	ALVRVSASL	NAPYIILNLD	DHYINNSKAV	REAMCFIMDP

		410	420	430	440	450	460	470	480
AtCESA1	396	AIGKCKCCYVQ	FPPQRFDGIDR	HDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCCPNRQALG	KEIGWIYGSV	TEDILTGFKM
AtCESA2	396	QSGKVKCYVQ	FPPQRFDGIDR	HDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFRRQALG	KEIGWIYGSV	TEDILTGFKM
AtCESA3	377	NLGKQVCYVQ	FPPQRFDGIDR	NDRYANRNV	FFDINLRGLD	GIQGPVYVGT	GCVFNRQALG	MEIGWIYGSV	TEDILTGFKM
AtCESA4	380	QIGKKECYVQ	FPPQRFDGIDR	NDRYANRNV	FFDINMRGLD	GIQGPVYVGT	GCVFNRQALG	KEIGWIYGSV	TEDILTGFKM
AtCESA5	396	QSGKKECYVQ	FPPQRFDGIDR	SDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFRRQALG	KEIGWIYGSV	TEDILTGFKM
AtCESA6	396	QSGKKECYVQ	FPPQRFDGIDR	HDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFRRQALG	KEIGWIYGSV	TEDILTGFKM
AtCESA7	394	QIGKVKCYVQ	FPPQRFDGIDR	NDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFRRQALG	TEIGWIYGSV	TEDILTGFKM
AtCESA8	366	VVGQDVVCYVQ	FPPQRFDGIDR	SDRYANRNV	FFDINMRGLD	GIQGPVYVGT	GCVFRRQALG	KEIGWIYGSV	TEDILTGFKM
AtCESA9	396	QSGKPKCYVQ	FPPQRFDGIDR	HDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFRRQALG	KEIGWIYGSV	TEDILTGFKM
AtCESA10	390	AIGKCKCCYVQ	FPPQRFDGIDR	HDRYANRNV	FFDINLRGLD	GIQGPVYVGT	GCCPNRQALG	KEIGWIYGSV	TEDILTGFKM
BpCESA3	377	NLGKQVCYVQ	FPPQRFDGIDR	NDRYANRNV	FFDINLRGLD	GIQGPVYVGT	GCVFNRQALG	BEIGWIYGSV	TEDILTGFKM
BpCESA4	397	QIGKKECYVQ	FPPQRFDGIDR	HDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFNRQALG	KEIGWIYGSV	TEDILTGFKM
BpCESA7	393	QTGKVKCYVQ	FPPQRFDGIDR	NDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFRRQALG	DELGIWYGSV	TEDILTSGFKM
BpCESA8	366	QIGPNICYVQ	FPPQRFDGIDR	SDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFNRQALG	KEIGWIYGSV	TEDILTGFKM
PpCESA8	396	NIGPKVCYVQ	FPPQRFDGIDR	NDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFRRQALG	KEIGWIYGSV	TEDILTGFKM
PtdCESA1	367	QVGRDVCYVQ	FPPQRFDGIDR	SDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFNRQALG	KOIGWIYGSV	TEDILISGFKM
PtdCESA2	394	QIGKRVVCYVQ	FPPQRFDGIDR	HDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFRRQALG	LELGWIYGSV	TEDILTGFKM
PtdCESA3	388	QIGKKECYVQ	FPPQRFDGIDR	HDRYANRNV	FFDINLRGLD	GIQGPVYVGT	GCVFNRQALG	KEVGWIYGSV	TEDILTGFKM
PtdCESA4	396	AIGKPKCYHQ	FPPQRFDGIDR	HDRYANRNV	FFDINLRGLD	GIQGPVYVGT	GCCPNRQALG	KEIGWIYGSV	TEDILTGFKM
PtdCESA5	377	NLGKHKVCYVQ	FPPQRFDGIDR	NDRYANRNV	FFDINLRGLD	GIQGPVYVGT	GCVFNRQALG	SEIGWIYGSV	TEDILTGFKM
PtdCESA6	396	LIGKRVVCYVQ	FPPQRFDGIDR	SDRYANRNV	FFDINMRGLD	GIQGPVYVGT	GCVFRRYALG	KEVGWIYGSV	TEDILTGFKM
PtdCESA7	396	TSGKVKCYVQ	FPPQRFDGIDR	HDRYANRNV	FFDINMKGLD	GLQGPVYVGT	GCVFRRQALG	KEVGWIYGSV	TEDILTGFKM
PtICESA1-A	396	AIGKPKCYVQ	FPPQRFDGIDR	HDRYANRNV	FFDINLRGLD	GIQGPVYVGT	GCCPNRQALG	KEIGWIYGSV	TEDILTGFKM
PtICESA1-B	396	AYGKPKCYHQ	FPPQRFDGIDR	HDRYANRNV	FFDINLRGLD	GIQGPVYVGT	GCCPNRQALG	KEIGWIYGSV	TEDILTGFKM
PtICESA3-A	373	NLGCRVVCYVQ	FPPQRFDGIDR	NDRYANRNV	FFDINLRGLD	GIQGPVYVGT	GCVFNRQALG	SEIGWIYGSV	TEDILTGFKM
PtICESA3-C	378	NLGCRVVCYVQ	FPPQRFDGIDR	NDRYANRNV	FFDINLRGLD	GIQGPVYVGT	GCVFNRQALG	SEIGWIYGSV	TEDILTGFKM
PtICESA3-D	377	NLGKHVKCYVQ	FPPQRFDGIDR	NDRYANRNV	FFDINLRGLD	GIQGPVYVGT	GCVFNRQALG	SEIGWIYGSV	TEDILTGFKM
PtICESA4	388	QIGKKECYVQ	FPPQRFDGIDR	HDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFNRQALG	KEVGWIYGSV	TEDILTGFKM
PtICESA6-A	396	TSGKVKCYVQ	FPPQRFDGIDR	HDRYANRNV	FFDINMKGLD	GLQGPVYVGT	GCVFRRQALG	KEVGWIYGSV	TEDILTGFKM
PtICESA6-B	396	TSGKVKCYVQ	FPPQRFDGIDR	HDRYANRNV	FFDINMKGLD	GLQGPVYVGT	GCVFRRQALG	KEVGWIYGSV	TEDILTGFKM
PtICESA6-D	396	TSGKVKCYVQ	FPPQRFDGIDR	HDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFRRQALG	KEIGWIYGSV	TEDILTGFKM
PtICESA6-E	396	LIGKRVVCYVQ	FPPQRFDGIDR	SDRYANRNV	FFDINMRGLD	GIQGPVYVGT	GCVFRRHALG	KEVGWIYGSV	TEDILTGFKM
PtICESA6-F	396	LIGKRVVCYVQ	FPPQRFDGIDR	NDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFRRHALG	KEVGWIYGSV	TEDILTGFKM
PtICESA7-A	394	QIGKRVVCYVQ	FPPQRFDGIDR	HDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFRRQALG	LELGWIYGSV	TEDILTGFKM
PtICESA7-B	394	QIGKVKCYVQ	FPPQRFDGIDT	HDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFRRQALG	LELGWIYGSV	TEDILTGFKM
PtICESA8-A	366	QVGRDVCYVQ	FPPQRFDGIDR	SDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFNRQALG	KEIGWIYGSV	TEDILISGFKM
PtICESA8-B	366	QVGRDVCYVQ	FPPQRFDGIDR	SDRYANRNV	FFDINMKGLD	GIQGPVYVGT	GCVFNRQALG	KEIGWIYGSV	TEDILISGFKM
		490	500	510	520	530	540	550	560
AtCESA1	476	HARGWISIYC	NPMPRAFPKGS	APINLSDRIN	QVLRWALGSI	EILSLRHCPI	WYGYHGR-LK	LLERAYINT	IVYPETSIPL
AtCESA2	476	HCGWRSVYC	MPPRAAFPKGS	APINLSDRIN	QVLRWALGSV	EIFLSRHCPI	WYGYGGG-LK	WLERESYINS	VVYPETSIPL
AtCESA3	457	HCGWRSIYC	MPPRAFPKGS	APINLSDRIN	QVLRWALGSV	EILSLRHCPI	WYGYNGR-LK	ELERRAYINT	IIYPETSIPL
AtCESA4	460	HCRGMWSVYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EIFPSRHCPI	WYANGC-KLK	LLERAYINT	IVYPETSIPL
AtCESA5	476	HSHGWRSVYC	TPKIPAFPKGS	APINLSDRIN	QVLRWALGSV	EIFLSRHCPI	WYGYGGG-LK	WLERESYINS	VVYPETSIPL
AtCESA6	476	HSHGWRSVYC	TPKIPAFPKGS	APINLSDRIN	QVLRWALGSV	EIFLSRHCPI	WYGYGGG-LK	WLERESYINS	VVYPETSIPL
AtCESA7	474	HCRGMWSIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EIFPSRHCPI	WYGYGGG-LK	WLERESYINT	IIYPETSIPL
AtCESA8	446	HCRGMWSIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EIFPSRHCPI	WYGYGGG-LK	LLQRDAYINT	IVYPETSIPL
AtCESA9	476	HCRGMWSIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EIFPSRHCPI	WYGYGGG-LK	WLERESYINS	VVYPETSIPL
AtCESA10	470	HARGWISIYC	VPMPRAFPKGS	APINLSDRIN	QVLRWALGSV	EILSLRHCPI	WYGVNCR-LK	LLERAYINT	IVYPETSIPL
BpCESA3	457	HARGWRSIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EILSLRHCPI	WYGYSGR-LK	WLERAYINT	IIYPETSIPL
BpCESA4	477	HCRGMWSVYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EIFLSRHCPI	WYGYSGR-LK	WLERAYINT	IVYPETSIPL
BpCESA7	473	HCRGMWSIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EIFPSRHCPI	WYGYKEGLK	WLERESYINT	IVYPETSIPL
BpCESA8	446	HCRGMWSVYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EIFPSRHCPI	WYGFAGERLK	WQRDAYINT	IVYPETSIPL
PpCESA8	476	HCRGMWSIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EISPSRHCPI	WYGYNGR-R-LK	CLERDAYINT	IIYPETSIPL
PtdCESA1	447	HCRGMWSIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EIFPSRHCPI	WYGGGGRLK	WLQRDAYINT	IVYPETSIPL
PtdCESA2	474	HCRGMWSIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EIFPSRHCPI	WYGYKKGKLK	WLERAYINT	IIYPETSIPL
PtdCESA3	468	HCRGMWSVYC	SPMPRAFPKGS	APINLSDRIN	QVLRWALGSV	EIFPSRHCPI	WYGYGGG-LK	WLERAYINT	IVYPETSIPL
PtdCESA4	476	HARGWISIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EIFPSRHCPI	WYGYGGG-LK	WLERAYINT	IVYPETSIPL
PtdCESA5	457	HARGWRSIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EILSLRHCPI	WYGYGGG-LK	WLERAYINT	IIYPETAIPL
PtdCESA6	476	HCHGWRSVYC	IPKIPAFPKGS	APINLSDRIN	QVLRWALGSV	EILSLRHCPI	WYGYGGG-LK	WLERESYINA	IVYPETSIPL
PtdCESA7	476	HCHGWRSVYC	IPKIPAFPKGS	APINLSDRIN	QVLRWALGSV	EIFPSRHCPI	WYGYGGG-LK	WLERESYINS	VVYPETSIPL
PtICESA1-A	476	HARGWISIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EILSLRHCPI	WYGYSGR-LK	LLERAYINT	IVYPETSIPL
PtICESA1-B	476	HARGWISIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EILSLRHCPI	WYGYSGR-LK	LLERAYINT	IVYPETSIPL
PtICESA3-A	453	HARGWRSIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EILSLRHCPI	WYGYSGR-LK	WLERESYINT	IIYPETAIPL
PtICESA3-B	458	HARGWRSIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EILSLRHCPI	WYGYSGR-LK	WLERESYINT	IIYPETSIPL
PtICESA3-C	457	HARGWRSIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EILSLRHCPI	WYGYSGR-LK	WLERESYINT	IIYPETAIPL
PtICESA3-D	457	HARGWRSIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EILSLRHCPI	WYGYSGR-LK	WLERESYINT	IIYPETAIPL
PtICESA4	468	HCRGMWSVYC	SPMPRAFPKGS	APINLSDRIN	QVLRWALGSV	EILSLRHCPI	WYGYSGR-LK	LLERAYINT	IVYPETSIPL
PtICESA6-A	476	HCRGMWSVYC	IPKIPAFPKGS	APINLSDRIN	QVLRWALGSV	EIPFSRHCPI	WYGYGGG-LK	WLERESYINS	VVYPETSIPL
PtICESA6-B	476	HCRGMWSVYC	IPKIPAFPKGS	APINLSDRIN	QVLRWALGSV	EIPFSRHCPI	WYGYGGG-LK	WLERESYINS	VVYPETSIPL
PtICESA6-C	476	HCRGMWSVYC	TPKIPAFPKGS	APINLSDRIN	QVLRWALGSV	EIPFSRHCPI	WYGYGGG-LK	WLERESYINS	VVYPETSIPL
PtICESA6-D	476	HCRGMWSVYC	MPKPLAAFPKGS	APINLSDRIN	QVLRWALGSV	EIPFSRHCPI	WYGYGGG-LK	WLERESYINS	VVYPETSIPL
PtICESA6-E	476	HCRGMWSIYC	IPKIPAFPKGS	APINLSDRIN	QVLRWALGSV	EIPFSRHCPI	WYGYGGG-LK	WLERESYINS	VVYPETSIPL
PtICESA6-F	476	HCRGMWSIYC	IPKIPAFPKGS	APINLSDRIN	QVLRWALGSV	EIPFSRHCPI	WYGYGGG-LK	WLERESYINA	IVYPETSIPL
PtICESA7-A	474	HCRGMWSIYC	MPKPLAAFPKGS	APINLSDRIN	QVLRWALGSV	EIPFSRHCPI	LYC4REGLK	WLERAYINT	IIYPETSIPL
PtICESA7-B	474	HCRGMWSIYC	MPKRAAFPKGS	APINLSDRIN	QVLRWALGSV	EIPFSRHCPI	LYC4REGLK	WLERAYINT	IIYPETSLAL
PtICESA8-A	446	HCRGMWSIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EIPFSRHCPI	WYGYGGGRLK	WLQRDAYINT	IVYPETSLAL
PtICESA8-B	446	HCRGMWSIYC	MPKPRPAFKGS	APINLSDRIN	QVLRWALGSV	EIPFSRHCPI	WYGYGGGRLK	WLQRDAYINT	IVYPETSLPL

	570	580	590	600	610	620	630	640
AtCESA1	555 IAYCILPAFC	LITDRTFIIPE	ISNYASWDFI	LLPFSIAVTG	IILEBRWSGVG	IEDDWWRNEQF	WVIGGTSIAHL	FAVFQGLLK
AtCESA2	555 IVYCSLPAVC	LITGKFIIVPE	ISNYAGILEM	LMFPSIAVTG	IILEMRWSGVG	IEDDWWRNEQF	WVIGGASSHL	FALFQGLLK
AtCESA3	536 LAYCTLPAVC	LTFNQFIIIPQ	ISNLASIMFL	SLFPSIATG	IILEMRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGIL
AtCESA4	539 LAYCTLPAVC	LITGKFIIPQ	INNEASIMFL	ALFPSIATA	IILEBRWSGVG	IENDWWRNEQF	WVIGGVS AHL	FAVFQGLLK
AtCESA5	555 IVYCSLPAIC	LITGKFIIVPE	ISNYASWDFM	ALFPSIAVTG	IILEMRWSGVG	IDDDWWRNEQF	WVIGGVS AHL	FALFQGLLK
AtCESA6	555 IVYCSLPAIC	LITGKFIIVPE	ISNYASWDFM	ALFPSIAVTG	IILEMRWSGVG	IDDDWWRNEQF	WVIGGVS AHL	FALFQGLLK
AtCESA7	554 LAYCILPAIC	LITDKFIMP	ISFEASLEFL	SLFPSIIVTG	IILEBRWSGVG	IEDDWWRNEQF	WVIGGTSIAHL	FAVFQGLLK
AtCESA8	526 VAYCTLPAPC	LITGKFIIPQ	LSNLASIMFL	GLFPSIILITS	VLEBRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGFLK
AtCESA9	555 IVYCSLPAIC	LITGKFIIVPE	ISNYAGILEM	LMFPSIAVTG	IILEMRWSGVG	IDDDWWRNEQF	WVIGGVS AHL	FALFQGLLK
AtCESA10	549 LAYCMLPAFC	LITNTFIIIPQ	ISNLASLCFM	LLFPSIASASA	IILELKWSDVA	IEDDWWRNEQF	WVIGGTSIAHL	FAVFQGLLK
BplCESA3	536 IVYCTLPAVC	LITMKFIIIPQ	ISNYASWDFI	SLFPSIATG	IILEMRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVCQGLLK
BplCESA4	556 LAYCILPAVC	LITGKFIIPQ	LNNAASWDFI	ALFPSIATG	VLEBRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGLLK
BplCESA7	553 LAYCTLPAPC	LITDKFIMP	ISFEASLYFI	ALFMSIITG	IILEBRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGLLK
BplCESA8	526 VAYCTLPAPC	LITGKFIIPQ	LSNLASIMFL	GLFPSIIVTG	VLEBRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGFLK
PpCESA8	554 VAYCTLPAPC	LITGKFIIPQ	ISNLASIMFL	GLFPSIIVTG	IILEMRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FALFQGLLK
PtdCESA1	527 LAYCTLPAVC	LITGKFIIPQ	LSNLASIMFL	GLFPSIIVTG	VLEBRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGFLK
PtdCESA2	554 VAYCCLPAIC	LITDKFIMP	ISFEASLEFI	ALFMSIFSTG	IILEBRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGLLK
PtdCESA3	547 LAYCTLPAPC	LITGKFIIPQ	LNNAASWDFI	CPFLHNHSNI	CWGTLSGVG	IQDWWRNEQF	WVIGGVS AHL	FAVFQGLLK
PtdCESA4	555 LAYCVPAPVC	LVSFKFIIIPQ	ISNYASWDFI	LLFPSIATG	IILEBRWSGVG	IEDDWWRNEQF	WVIGGTSIAHL	FAVFQGLLK
PtdCESA5	536 IVYCTLPAPC	LITDKFIIIPQ	ISNLASIMFL	SLFPSIATG	IILEMRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGLLK
PtdCESA6	555 LAYCTLPAPC	LITGKFIIPQ	LSNLASIMFL	SLFPCIFATS	IILEMRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGLLK
PtdCESA7	555 LAYCTLPAPC	LITGKFIIPQ	ISNYASWDFI	ALFPSIATG	IILEMRWSGVG	IDDDWWRNEQF	WVIGGVS AHL	FALFQGLLK
PtICESA1-A	555 LAYCILPAIC	LITGKFIIPQ	ISNYAGMWF	LLFPSIATG	IILEBRWSGVG	IEDDWWRNEQF	WVIGGTSIAHL	FAVFQGLLK
PtICESA1-B	555 LAYCVPAPVC	LIS-----	ISNYASWDFI	LLFPSIATG	IILEBRWSGVG	IEDDWWRNEQF	WVIGGTSIAHL	FAVFQGLLK
PtICESA3-A	532 LAYCTLPAVC	LITGKFIIPQ	ISNLASIMFL	SLFPSIATG	IILEMRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGLLK
PtICESA3-B	537 LAYCTLPAVC	LITGKFIIPQ	ISNLASIMFL	SLFPSIATG	IILEMRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGLLK
PtICESA3-C	536 LAYCTLPAPC	LITDKFIIIPQ	ISNLASIMFL	SLFPSIATG	IILEMRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGLLK
PtICESA3-D	536 LAYCTLPAPC	LITDKFIIIPQ	ISNLASIMFL	SLFPSIATG	IILEMRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGLLK
PtICESA4	547 LAYCTLPAPC	LITGKFIIPQ	LSNLASIMFL	ALFPSIATG	VLEBRWSGVG	IQDWWRNEQF	WVIGGVS AHL	FAVFQGLLK
PtICESA6-A	555 IVYCTLPAPC	LITGKFIIPQ	ISNYASWDFI	ALFPSIATG	IILEMRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FALFQGLLK
PtICESA6-B	555 IVYCTLPAPC	LITGKFIIPQ	ISNYASWDFM	ALFPSIATG	IILEMRWSGVG	IEDDWWRNEQF	WVIGGASAH	FALFQGLLK
PtICESA6-C	555 IVYCTLPAPC	LITGKFIIPQ	ISNYASWDFM	ALFPSIATG	IILEMRWSGVG	IHDWWWRNEQF	WVIGGASAH	FALFQGLLK
PtICESA6-D	555 IVYCTLPAPC	LITGKFIIPQ	ISNLASIMFL	SLFPSIATG	IILEMRWSGVG	IHDWWWRNEQF	WVIGGASAH	FALFQGLLK
PtICESA6-E	555 LAYCTLPAPC	LITGKFIIPQ	LSNLASIMFL	SLFPCIFATS	IILEMRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGLLK
PtICESA6-F	555 LAYCTLPAPC	LITGKFIIPQ	LSNLASIMFL	SLFPCIFATS	IILEMRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGLLK
PtICESA7-A	554 LAYCCLPAIC	LITDKFIMP	ISFEASLEFI	GLFMSIFSTG	IILEBRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGLLK
PtICESA7-B	554 VAYCCLPAIC	LITDKFIMP	ISTFASLFFI	GLFMSIFSTG	IILEBRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVWQGLLK
PtICESA8-A	526 IVYCTLPAPC	LITGKFIIPQ	LSNLASIMFL	GLFMSIIFAT	VLEBRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGFLK
PtICESA8-B	526 IVYCTLPAPC	LITGKFIIPQ	LSNLASIMFL	GLFMSIIFAT	VLEBRWSGVG	IEDDWWRNEQF	WVIGGVS AHL	FAVFQGFLK

	650	660	670	680	690	700	710	720
AtCESA1	635 LAGIDTNFTV	TSK-ATDEDG	DFAFELYFkw	TALLIPPTTV	LLVNVIGVVA	GVSKAVNSGY	QSWGPLFGL	FFALWVIAHL
AtCESA2	635 LAGDNFTV	TSK-AAD-DG	AFSELYFkw	TTLLIPPTTL	LIINIIIGVIV	GVSDAISNGY	D SWGPLFGL	FFALWVIVHL
AtCESA3	616 LAGIDTNFTV	TSK-ASDEDG	DFAFELYFkw	TTLLIPPTTL	LLVNVIGVVA	GVSKAVNSGY	QSWGPLFGL	FFAFWVIVHL
AtCESA4	619 LF-VDTNFTV	TSK-GASDEAD	EFGILYFkw	TTLLIPPTTL	LIINIIIGVIV	GVSDAISNGY	C SWGPLFGL	FFAFWVIVHL
AtCESA5	635 LAGDNFTV	TSK-AAD-DG	EFSELYFkw	TSLLIPPTTL	LIINIIIGVIV	GISDAISNGY	D SWGPLFGL	FFAFWVIVHL
AtCESA6	635 LAGVDTNFTV	TSK-AAD-DG	EFSELYFkw	TSLLIPPTTL	LIINIIIGVIV	GVSDAINNGY	D SWGPLFGL	FFAFWVIVHL
AtCESA7	634 LAGIDTNFTV	TSK-ATD-DD	DFGEELYFkw	TTLLIPPTTV	LIINIIIGVVA	GTSDAINNGY	QSWGPLFGL	FFAFWVIVHL
AtCESA8	606 LAGLDTNFTV	TSK-TADDL	EFGEELYFkw	TTLLIPPTTL	LIINIIIGVVA	GFSDAINNGY	EAWGPLFGKV	FFAFWVIAHL
AtCESA9	635 LAGVSNTFTV	TSK-AAD-DD	EFSELYFkw	TSLLIPPTTL	LIINIIIGVIV	GVSDAINNGY	D SWGPLFGL	FFAFWVIVHL
AtCESA10	629 FAGIDTNFTV	TSK-ASDEDG	DFAFELYFkw	TSLLIPPTTL	LLVNVIGVVA	GVSKAVNSGY	QSWGPLMGL	FFAFWVVAHL
BplCESA3	616 LAGIDTNFTV	TSK-ASDEDG	DFTELYFkw	TTLLIPPTTL	LIINIIIGVVA	GTSDAISNGY	QSWGPLFGL	FFAFWVIVHL
BplCESA4	636 LAGVDTNFTV	TSK-TADDA	EFGEELYFkw	TTLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	G SWGPLFGL	FFAFWVIVHL
BplCESA7	633 LAGIDTNFTV	TSK-ATD-DD	DFGEELYFkw	TTLLIPPTTL	LIINIIIGVVA	GTSDAINNGY	B SWGPLFGL	FFAFWVIVHL
BplCESA8	606 LAGVDTNFTV	TSK-TADDA	EFGEELYFkw	TTLLIPPTTL	LIINIIIGVVA	GFSDAINNGY	EAWGPLFGKV	FFAFWVIAHL
PpCESA8	634 FAGIDTNFTV	TSK-TGD-DD	DFGEELYFkw	TSLLIPPTTL	LLFNVGVVAA	GISDAINNGY	SAMGPLFGL	FFAFWVIVHL
PtdCESA1	607 LAGIDTNFTV	TAK--AAEDA	EFGEELYFkw	TTLLIPPTTL	LIINIIIGCA	GFSDAINNGY	EAWGPLFGKV	FFAFWVIAHL
PtdCESA2	634 LAGIDTNFTV	TSK-ATD-DD	DFGEELYFkw	TTLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	QSWGPLFGL	FFAFWVIVHL
PtdCESA3	627 LAGIDTNFTV	TSK-SADD	EFGEELYFkw	TTLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	G SWGPLFGL	FFAFWVIVHL
PtdCESA4	635 LAGIDTNFTV	TSK-ASDEDG	DFAFELYFkw	TTLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	QSWGPLFGL	FFAFWVIVHL
PtdCESA5	635 LAGIDTNFTV	TSK-ASDEDG	DSAFELYFkw	TTLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	QSWGPLFGL	FFAFWVIVHL
PtdCESA6	635 LAGVDTNFTV	TSK-GGD-DD	EFSELYFkw	TTLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	B SWGPLFGL	FFAFWVIVHL
PtdCESA7	635 LAGVSNTFTV	TSK-GAD-DG	EFSELYFkw	TSLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	D SWGPLFGL	FFAFWVIVHL
PtICESA1-A	635 LAGIDTNFTV	TSK-ASDEDG	DFAFELYFkw	TSLLIPPTTV	LIINIIIGVVA	GVSDAINNGY	QSWGPLFGL	FFAFWVIVHL
PtICESA1-B	626 LAGIDTNFTV	TSK-ASDEDG	DFAFELYFkw	TSLLIPPTTV	LIINIIIGVVA	GVSDAINNGY	QSWGPLFGL	FFAFWVIVHL
PtICESA3-A	612 LAGIDTNFTV	TSK-ASDEDG	DFAFELYFkw	TTLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	QSWGPLFGL	FFAFWVIVHL
PtICESA3-B	617 LAGIDTNFTV	TSK-ASDEDG	DFAFELYFkw	TTLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	QSWGPLFGL	FFAFWVIVHL
PtICESA3-C	616 LAGIDTNFTV	TSK-SSDEDG	DFAFELYFkw	TTLLIPPTTL	LIINIIIGVVA	GISDAINNGY	QSWGPLFGL	FFAFWVIVHL
PtICESA3-D	616 LAGIDTNFTV	TSK-ASDEDG	GFAFELYFkw	TTLLIPPTTL	LIINIIIGVVA	GISDAINNGY	QSWGPLFGL	FFAFWVIVHL
PtICESA4	627 LF-VDTNFTV	TSK-SADD	EFGEELYFkw	TTLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	G SWGPLFGL	FFAFWVIVHL
PtICESA6-A	635 LAGVSNTFTV	TSK-GAD-DG	EFSELYFkw	TTLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	QSWGPLFGL	FFAFWVIVHL
PtICESA6-B	635 LAGVSNTFTV	TSK-AAD-DG	EFSELYFkw	TTLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	QSWGPLFGL	FFAFWVIVHL
PtICESA6-C	635 LAGVNNTFTV	TSK-AAD-DG	EFSELYFkw	TSLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	ETWGPLFGL	FFAFWVIVHL
PtICESA6-D	635 LAGVNNTFTV	TSK-AAD-DG	EFSELYFkw	TSLLIPPTTL	LIINIIIGVVA	GISDAINNGY	ETWGPLFGL	FFAFWVIVHL
PtICESA6-E	635 LAGVDTNFTV	TSK-GGD-DD	EFSELYFkw	TTLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	EAWGPLFGKV	FFAFWVIVHL
PtICESA6-F	635 LAGVDTNFTV	TSK-GGD-DD	EFSELYFkw	TTLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	EAWGPLFGKV	FFAFWVIVHL
PtICESA7-A	634 LAGIDTNFTV	TSK-ATD-DD	DFGEELYFkw	TTLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	EAWGPLFGKV	FFAFWVIVHL
PtICESA7-B	634 LAGIDTNFTV	TSK-ATD-DD	DFGEELYFkw	TTLLIPPTTL	LIINIIIGVVA	GVSDAINNGY	QSWGPLFGL	FFAFWVIVHL
PtICESA8-A	606 LAGIDTNFTV	TAK--AAEDT	EFGEELYFkw	TTLLIPPTTL	LIINIIIGVVA	GFSDAINNGY	EAWGPLFGKV	FFAFWVIVHL
PtICESA8-B	606 LAGIDTNFTV	TAK--AAEDT	EFGEELYFkw	TTLLIPPTTL	LIINIIIGVVA	GFSDAINNGY	EAWGPLFGKV	FFAFWVIVHL

		730	740	750	760	770	780
AtCESA1	714	YPFPLKGLLGR	QNRTPTIVVIV	WSILLASIFS	LLWVRINPFPV	DAN-PNANNF	--NGKGGVP-
AtCESA2	713	YPFLKG-LIGK	QDKMPTIIVV	WSILLASILT	LLWVRVNPFPV	AK-GGPVLEI	--CGINCGN-
AtCESA3	695	YPFLKGLMGR	QNRTPTIVVV	WSILLASIFS	LLWVRIDPFT	SRVINGPDLIE	--CGINC---
AtCESA4	699	YPFLKGLMGR	QNRTPTIVVL	WSILLASIFS	LLWVRIDPFL	FKQKGPILLKQ	--CGVDC---
AtCESA5	713	YPFLKGLLGR	QDRMPPTIILV	WSILLASILT	LLWVRVNPFPV	AK-GGPVLEI	--CGGDCL--
AtCESA6	713	YPFLKGLLGR	QDRMPPTIIVV	WSILLASILT	LLWVRVNPFPV	AK-GGPVLEI	--CGGDCL--
AtCESA7	712	YPFLKGLMGR	QNRTPTIVV	WSILLASIFS	LLWVRIDPFT	LKTKGPDTSK	--CGINC---
AtCESA8	684	YPFLKGLMGR	QNRTPTIVIL	WSILLASVES	LLWVRINPFPV	SKTDTTSISL	NCLLIDC---
AtCESA9	713	YPFLKGLLGR	QDRMPPTIILV	WSILLASILT	LLWVRVNPFPV	SK-DGPVLEI	--CGLDCLK-
AtCESA10	708	YPFLKGLLGR	QNRTPTIVVIV	WSILLASIFS	LLWVRINPFPV	STTGVMNSNF	--MCE-----
BplCESA3	695	YPFLKGLMGR	QNRTPTIVVV	WSILLASIFS	LLWVRVDPFT	TTVINGPDVQL	--CGINC---
BplCESA4	714	YPFLKGLMGR	QNRTPTIVV	WSILLASIFS	LLWVRIDPFT	FKQKGPILLKQ	--CGVDC---
BplCESA7	711	YPFLKGLMGR	QNRTPTIVV	WSILLASIFS	LLWVRIDPFT	LKTKGPDTKN	--CGINC---
BplCESA8	684	YPFLKGLMGR	QNRTPTIVVL	WSILLASVFS	LLWVKINPFPV	SKVDSSTVAQ	SCISIDC---
PpCESA8	712	YPFLKGLMGR	QNRTPTIVV	WSILLASVFS	LLWVRIDPFL	EKSTGENLVR	--CGLTCL-
PtdCESA1	684	YPFLKGLMGR	QNRTPTIVV	WSILLASVFS	LLWVKINPFPV	NKVDTNLVAE	TCISIDC---
PtdCESA2	712	YPFLKGLMGR	QNRTPTIVVI	WSILLASVFS	LLWVRIDPFT	MKTGPDTKQ	--CGINC---
PtdCESA3	705	YPFLKGLMGR	QNRTPTIVV	WSILLASIFS	LLWVRIDPFT	FKQKGPILLKQ	--CGVEC---
PtdCESA4	714	YPFLKGLLGR	QNRTPTIVV	WSILLASIFS	LLWVRIDPFT	SDSTKAAA--	--NGCGINC
PtdCESA5	695	YPFLKGLMGR	QNRTPTIVVV	WSILLASIFS	LLWVRVDPFT	IRVINGPDVEQ	--CGINC---
PtdCESA6	713	YPFLKGLLGR	QNRTPTIVV	WSILLASIFS	LLWVRIDPFL	AKSNGPILLE	--CGDDCN--
PtdCESA7	713	YPFLKGLLGR	QDRMPPTIILV	WSILLSSILT	LLWVRINPFPV	SR-DGPVLEI	--CGINCD--
PtICESA1-A	714	YPFLKGLLGR	QNRTPTIVVIV	WSILLASIFS	LLWVRIDPFT	SGTTQTAAS--	--NGCGVNC
PtICESA1-B	705	YPFLKGLLGR	QNRTPTIVV	WSILLASIFS	LLWVRIDPFT	SDSTKAAA--	--NGCGINC
PtICESA3-A	691	YPFLKGLMGR	QNRTPTIVV	WSILLASIFS	LLWVRVDPFT	TRVINGPDVEQ	--CGINC---
PtICESA3-B	696	YPFLKGLMGR	QNRTPTIVVV	WSILLASVFS	LLWVRVDPFT	TKVINGPDVTQ	--CGINC---
PtICESA3-C	695	YPFLKGLMGR	QNRTPTIVVV	WSILLASIFS	LLWVRVDPFT	TRVINGPDVEQ	--CGINC---
PtICESA3-D	695	YPFLKGLMGR	QNRTPTIVVV	WSILLASIFS	LLWVRVDPFT	TRVINGPDVEQ	--CGINC---
PtICESA4	705	YPFLKGLMGR	QNRTPTIVVL	WSILLASVFS	LLWVRIDPFT	FKQKGPILLKQ	--CGVEC---
PtICESA6-A	713	YPFLKGLLGR	QDRMPPTIILV	WSILLASILT	LLWVRINPFPV	SE-DGPVLEL	--CGINC--
PtICESA6-B	713	YPFLKGLLGR	QDRMPPTIILV	WSILLASILT	LLWVRINPFPV	SK-GGPVLEL	--CGINCD--
PtICESA6-C	713	YPFLKGLLGR	QDRMPPTIIVV	WSILLASVLT	LLWVRINPFPV	SK-GGIVLEI	--CGINCD--
PtICESA6-D	713	YPFLKGMLGR	QDRMPPTIIVV	WSILLASVLT	LLWVRINPFPV	SK-GGIVLEV	--CGDDCN--
PtICESA6-E	713	YPFLKGLLGR	QNRTPTIIVV	WSILLASIFS	LLWVRIDPFL	AKSNGPILLE	--CGDDCN--
PtICESA6-F	713	YPFLKGLLGR	QNRTPTIIVV	WSILLASIFS	LLWVRIDPFL	AKSNGPILLE	--CGDDCN--
PtICESA7-A	712	YPFLKGLMGR	QNRTPTIVVI	WSILLASIFS	LLWVRIDPFT	MKTGPDTKQ	--CGINC--
PtICESA7-B	712	YPFLKGLMGR	QNRTPTIVVI	WSILLASIFS	LLWVRIDPFT	MKTGPDTKQ	--CGINC--
PtICESA8-A	684	YPFLKGLMGR	QNRTPTIVVL	WSILLASVFS	LLWVKINPFPV	NKVDTNLAGE	TCISIDC---
PtICESA8-B	684	YPFLKGLMGR	QNRTPTIVVL	WSILLASVFS	LLWVKINPFPV	NKVDTNLVAE	TCISIDC--

**Figure S2.** Gel electrophoresis result of *Bplactin* and *BplCesAs* RT-PCR products from different birch tissues. **a** showing the stable transcript expression abundance of *Bplactin* in leaves (Lanes 1–5) and stem (Lanes 6–10). **b** showing the specific amplification of four *BplCesAs* (in the order of *BplCesA1*, *BplCesA2*, *BplCesA3* and *BplCesA4*) in leaf (1–4) and stem (5–8) by specific primers.

