

Additional File 7. Alignment and domain analysis of Triticeae MPKs. The amino acid sequences from multiple genomic copies, along with the accessions reported in Additional File 3, of all Triticeae MPKs identified were aligned in Clustal Omega (www.ebi.ac.uk/Tools/msa/clustalo/) under default settings. A lower case 'p' next to the gene name indicates that only a partial sequence was identified for the given gene. The PK domain is in black font, and the 'MAP kinase' signature (specific to MPKs) is bolded where 'MAP kinase' flanks (F and C) are in red font; N- and C-terminal extensions in teal font. Missing sequence information, namely 'X' residues, are shown in pink font. Highlighted sequences are the ATP binding signature (blue), the catalytic C-loop (red), the activation T-loop (black), CD domain (teal) and EF-hand CBP (pink). Sequence deviations from the T(E/D)Y activation loop of plant MPKs are marked in yellow font. Previously reported [1] conserved MPK domains are written in blue font above the alignment, including the conserved clade-specific docking domain found at the C-terminal end of the PK signature (highlighted grey; deviations from proposed sequence in a darker shade). Deviations from these sequences are highlighted in yellow; some of these deviations were observed in the ATP binding signature and are highlighted in a bright blue. Additional conserved sequences described as putative phosphorylation sites distinct from the T-loop [1] are marked with a box. An asterix indicates a stop codon.

Reference:

1. Mohanta TK, Arora PK, Mohanta N, Parida P, Bae H. Identification of new members of the MAPK gene family in plants shows diverse conserved domains and novel activation loop variants. *BMC Genomics*. 2015;16:1-

MPK3

		IGxGxYGxV	IKKIxxxF	DAxRxLRE	FxDIYxxxELM			
TuMPK3	MDGAPVAEFRPTMTHGGRFLLYNI FGNQFEITAKY	QPPIMP	IGRGAYGIVCSVMNFETREMVAIKKI	IANA	F	DNNMDAKRTLREIKLLRHL	DHENIVGLRDVIPP	PAIPQSFNDVYIATELM
HvMPK3 (4H)	MDGAPVAEFRPTMTHGGRFLLYNI FGNQFEITAKY	QPPIMP	IGRGAYGIVCSVMNFETREMVAIKKI	IANA	F	DNNMDAKRTLREIKLLKHL	DHENIVGLRDVIPP	PAIPQSFNDVYIATELM
Locus_5782	MDGAPVAEFRPTMTHGGRFLLYNI FGNQFEITAKY	QPPIMP	IGRGAYGIVCSVMNFETREMVAIKKI	IANA	F	DNNMDAKRTLREIKLLKHL	DHENIVGLRDVIPP	PAIPQSFNDVYIATELM
AetMPK3	MDGAPVAEFRPTMTHGGRFLLYNI FGNQFEITAKP	QPPIMP	IGRGAYGIVCSVMNFETREMVAIKKI	IANA	F	DNNMDAKRTLREIKLLRHL	DHENIVGLRDVIPP	PAIPQSFNDVYIATELM
AAC28850	MDGAPVAEFRPTMTHGGRFLLYNI FGNQFEITAKY	QPPIMP	IGRGAYGIVCSVMNFETREMVASKKI	IANA	F	DNNMDAKRTLREIKLLRHL	DHENIVGLRDVIPP	PAIPQSFNDVYIATELM
TaMPK3 (4AS)	MDGAPVAEFRPTMTHGGRFLLYNI FGNQFEITAKY	QPPIMP	IGRGAYGIVCSVMNFETREMVAIKKI	IANA	F	DNNMDAKRTLREIKLLRHL	DHENIVGLRDVIPP	PAIPQSFNDVYIATELM
TaMPK3 (4BL)	MDGAPVAEFRPTMTHGGRFLLYNI FGNQFEITAKY	QPPIMP	IGRGAYGIVCSVMNFETREMVAIKKI	IANA	F	DNNMDAKRTLREIKLLRHL	DHENIVGLRDVIPP	PAIPQSFNDVYIATELM
ScMPK3	MDGAPVAEFRPTMTHGGRFLLYNI FGNQFEITAKY	QPPIMP	IGRGAYGIVCSVMNFETREMVAIKKI	IANA	F	DNNMDAKRTLREIKLLRHL	DHENIVGLRDVIPP	PAIPQSFNDVYIATELM
TsMPK3 (R/A/B)	MDGAPVAEFRPTMTHGGRFLLYNI FGNQFEITAKY	QPPIMP	IGRGAYGIVCSVMNFETREMVAIKKI	IANA	F	DNNMDAKRTLREIKLLRHL	DHENIVGLRDVIPP	PAIPQSFNDVYIATELM
TaMPK3 (4DL)	MDGAPVAEFRPTMTHGGRFLLYNI FGNQFEITAKY	QPPIMP	IGRGAYGIVCSVMNFETREMVAIKKI	IANA	F	DNNMDAKRTLREIKLLRHL	DHENIVGLRDVIPP	ATPQSFNDVYIATELM

	DLxxVI	QxLRxLKYxH	HRDLKPxN LxNxNCxLKIxDFGLAR	TRWYRAPEL	IDxWS ^v GC				
TuMPK3	DTDLHHI	IRSNQELSEEHCQYFLYQLLRGLKYIHSAN	VIHRDLKPSNLLL	NANCDLKI	CDFGLARPSS	ESDMMTEYV	VTRWYRAPELLLN	STDY	SAAIDVWSVGCIFMEL-----PGR
HvMPK3 (4H)	DTDLHHI	IRSNQELSEEHCQYFLYQLLRGLKYIHSAN	VIHRDLKPSNLLL	NANCDLKI	CDFGLARPSS	ESDMMTEYV	VTRWYRAPELLLN	STDY	SAAIDVWSVGCIFMELINRAPLFPGR
Locus_5782	DTDLHHI	IRSNQELSEEHCQYFLYQLLRGLKYIHSAN	VIHRDLKPSNLLL	NANCDLKI	CDFGLARPSS	ESDMMTEYV	VTRWYRAPELLLN	STDY	SAAIDVWSVGCIFMELINRAPLFPGR
AetMPK3	DTDLHHI	IRSNQELSEEHCQYFLYQLLRGLKYIHSAN	VIHRDLKPSNLLL	NANCDLKI	CDFGLARPSS	ESDMMTEYV	VTRWYRAPELLLN	STDY	SAAIDVWSVGCIFMELINRAPLFPGR
AAC28850	DTDLHHI	IRSNQELSEEHCQYFLYQLLRGLKYIHSAN	VIHRDLKPSNLLL	NANCDLKI	CDFGLARPSS	ESDMMTEYV	VTRWYRAPELLLN	STDY	SAAIDVWSVGCIFMELINRAPLFPGR
TaMPK3 (4AS)	DTDLHHI	IRSNQELSEEHCQYFLYQLLRGLKYIHSAN	VIHRDLKPSNLLL	NANCDLKI	CDFGLARPSS	ESDMMTEYV	VTRWYRAPELLLN	STDY	SAAIDVWSVGCIFMELINRAPLFPGR
TaMPK3 (4BL)	DTDLHHI	IRSNQELSEEHCQYFLYQLLRGLKYIHSAN	VIHRDLKPSNLLL	NANCDLKI	CDFGLARPSS	ESDMMTEYV	VTRWYRAPELLLN	STDY	SAAIDVWSVGCIFMELINRAPLFPGR
ScMPK3	DTDLHHI	IRSNQELSEEHCQYFLYQLLRGLKYIHSAN	VIHRDLKPSNLLL	NANCDLKI	CDFGLARPSS	ESDMMTEYV	VTRWYRAPELLLN	STDY	SAAIDVWSVGCIFMELINRAPLFPGR
TsMPK3 (R/A/B)	DTDLHHI	IRSNQELSEEHCQYFLYQLLRGLKYIHSAN	VIHRDLKPSNLLL	NANCDLKI	CDFGLARPSS	ESDMMTEYV	VTRWYRAPELLLN	STDY	SAAIDVWSVGCIFMELINRAPLFPGR
TaMPK3 (4DL)	DTDLHHI	IRSNQELSEEHCQYFLYQLLRGLKYIHSAN	VIHRDLKPSNLLL	NANCDLKI	CDFGLARPSS	ESDMMTEYV	VTRWYRAPELLLN	STDY	SAAIDVWSVGCIFMELINRAPLFPGR

		KMLTFDP ^K _R RITVE ^D _{AL}
TuMPK3	DHMHQMRLLITEVIGTPTDDDLGFIRNEDARRYMRHLPQFPRRSFPGQFPKVQPAALDLIERMLTFNPLQRITVEEAEHPYLER	LHDVADEP ICTDPFSDFEQHPLTEDQMKQLIFNEALELNPFRY*
HvMPK3 (4H)	DHMHQMRLLITEVIGTPTDDDLGFIRNEDARRYMRHLPQFPRRSFPGQFPKVQPAALDLIERMLTFNPLQRITVEEAEHPYLER	LHDVADEP ICTDPFSDFEQHPLTEDQMKQLIFNEALELNPFRY*
Locus_5782	DHMHQMRLLITEVIGTPTDDDLGFIRNEDARRYMRHLPQFPRRSFPGQFPKVQPAALDLIERMLTFNPLQRITVEEAEHPYLER	LHDVADEP ICTDPFSDFEQHPLTEDQMKQLIFNEALELNPFRY*
AetMPK3	DHMHQMRLLITEVIGTPTDDDLGFIRNEDARRYMRHLPQFPRRSFPGQFPKVQPAALDLIERMLTFNPLQRITVEEAEHPYLER	LHDVADEP ICTDPFSDFEQHPLTEDQMKQLIFNEALELNPFRY*
AAC28850	DHMHQMRLLITEVIGTPTDDDLGFIRNEDARRYMRHLPQFPRRSFPGQFPKVQPAALDLIERMLTFNPLQRITVEEAEHPYLER	LHDVADEP ICTDPFSDFEQHPLTEDQMKQLIFNEALELNPFRY*
TaMPK3 (4AS)	DHMHQMRLLITEVIGTPTDDDLGFIRNEDARRYMRHLPQFPRRSFPGQFPKVQPAALDLIERMLTFNPLQRITVEEAEHPYLER	LHDVADEP ICTDPFSDFEQHPLTEDQMKQLIFNEALELNPFRY*
TaMPK3 (4BL)	DHMHQMRLLITEVIGTPTDDDLGFIRNEDARRYMRHLPQFPRRSFPGQFPKVQPAALDLIERMLTFNPLQRITVEEAEHPYLER	LHDVADEP ICTDPFSDFEQHPLTEDQMKQLIFNEALELNPFRY*
ScMPK3	DHMHQMRLLITEVIGTPTDDDLGFIRNEDARRYMRHLPQFPRRSFPGQFPKVQPAALDLIERMLTFNPLQRITVEEAEHPYLER	LHDVADEP ICTDPFSDFEQHPLTEDQMKQLIFNEALELNPFRY*
TsMPK3 (R/A/B)	DHMHQMRLLITEVIGTPTDDDLGFIRNEDARRYMRHLPQFPRRSFPGQFPKVQPAALDLIERMLTFNPLQRITVEEAEHPYLER	LHDVADEP ICTDPFSDFEQHPLTEDQMKQLIFNEALELNPFRY*
TaMPK3 (4DL)	DHMHQMRLLITEVIGTPTDDDLGFIRNEDARRYMRHLPQFPRRSFPGQFPKVQPAALDLIERMLTFNPLQRITVEEAEHPYLER	LHDVADEP ICTDPFSDFEQHPLTEDQMKQLIFNEALELNPFRY*

MPK4

		IGxGxYGxV	IKKIxxxF	DAxRxLRE	FxD
ScMPK4	MDTSGGGGGAAGGAAQIQGMATHGGRYVLYNVYGNLFEVASKYAPP	IRGAYGIVCAAVSSDTGEEVAIKK	IGNAFDNHIDAKRTLREIKLLRHMDHENILA	IKDLIRPPRRDDFKD	
HvMPK4 (1H)	MDTSGGGGGAAGGAAQIQGMATHGGRYVLYNVYGNLFEVASKYAPP	IRGAYGIVCAAVSSDTGEEVAIKK	IGNAFDNHIDAKRTLREIKLLRHMDHENILAMKDLIRPPRRDDFKD		
BAJ97968.1	MDTSGGGGGAAGGAAQIQGMATHGGRYVLYNVYGNLFEVASKYAPP	IRGAYGIVCAAVSSDTGEEVAIKK	IGNAFDNHIDAKRTLREIKLLRHMDHENILAMKDLIRPPRRDDFKD		
TaMPK4 (1AL)	MDTSGGGGGAAGGAAQIQGMATHGGRYVLYNVYGNLFEVASKYAPP	IRGAYGIVCAAVSSDTGEEVAIKK	IGNAFDNHIDAKRTLREIKLLRHMDHENILA	IKDLIRPPRRDDFKD	
TsMPK4 (R/A)	MDTSGGGGGAAGGAAQIQGMATHGGRYVLYNVYGNLFEVASKYAPP	IRGAYGIVCAAVSSDTGEEVAIKK	IGNAFDNHIDAKRTLREIKLLRHMDHENILA	IKDLIRPPRRDDFKD	
AetMPK4	MDN-SGGAATAGGAAQIQGMATHGGRYVLYNVYGNLFEVASKYAPP	IRGAYGIVCAAVSSDTGEEVAIKK	IGNAFDNHIDAKRTLREIKLLRHMDHENILA	IKDLIRPPRRDDFKD	
TaMPK4 (1BL)	MDT-SGGGTAAGGAAQIQGMATHGGRYVLYNVYGNLFEVASKYAPP	IRGAYGIVCAAVSSDTGEEVAIKK	IGNAFDNHIDAKRTLREIKLLRHMDHENILA	IKDLIRPPRRDDFKD	
TaMPK4 (1DL)	MDT-SGGGAAAGGAAQIQGMATHGGRYVLYNVYGNLFEVASKYAPP	IRGAYGIVCAAVSSDTGEEVAIKK	IGNAFDNHIDAKRTLREIKLLRHMDHENILA	IKDLIRPPRRDDFKD	
	** . . ** . :*****				

	IYxxxELM	DLxxVI	QxLRxLKYxH	HRDLKPxN	LxNxNCxLKIxDFGLAR	TRWYRAPEL	IDxWS^vGC
ScMPK4	VYIVTELMDTDLHQI	IRSNQSLTDDHCQYFLYQLLRGLKIVHSAN	VLHRDLKPSNLFNAN	CDLKIADFGLARTTSETDLM	TEYVVTRWYRAPELLLNCSQY	TAAIDVWSVGCILGEIIT	
HvMPK4 (1H)	VYIVTELMDTDLHQI	IRSNQSLTDDHCQYFLYQLLRGLKIVHSAN	VLHRDLKPSNLFNAN	CDLKIADFGLARTTSETDLM	TEYVVTRWYRAPELLLNCSQY	TAAIDVWSVGCILGEIIT	
BAJ97968.1	VYIVTELMDTDLHQI	IRSNQSLTDDHCQYFLYQLLRGLKIVHSAN	VLHRDLKPSNLFNAN	CDLKIADFGLARTTSETDLM	TEYVVTRWYRAPELLLNCSQY	TAAIDVWSVGCILGEIIT	
TaMPK4 (1AL)	VYIVTELMDTDLHQI	IRSNQSLTDDHCQYFLYQLLRGLKIVHSAN	VLHRDLKPSNLFNAN	CDLKIADFGLARTTSETDLM	TEYVVTRWYRAPELLLNCSQY	TAAIDVWSVGCILGEIIT	
TsMPK4 (R/A)	VYIVTELMDTDLHQI	IRSNQSLTDDHCQYFLYQLLRGLKIVHSAN	VLHRDLKPSNLFNAN	CDLKIADFGLARTTSETDLM	TEYVVTRWYRAPELLLNCSQY	TAAIDVWSVGCILGEIIT	
AetMPK4	VYIVTELMDTDLHQI	IRSNQSLTDDHCQYFLYQLLRGLKIVHSAN	VLHRDLKPSNLFNAN	CDLKIADFGLARTTSETDLM	TEYVVTRWYRAPELLLNCSQY	TAAIDVWSVGCILGEIIT	
TaMPK4 (1BL)	VYIVTELMDTDLHQI	IRSNQSLTDDHCQYFLYQLLRGLKIVHSAN	VLHRDLKPSNLFNAN	CDLKIADFGLARTTSETDLM	TEYVVTRWYRAPELLLNCSQY	TAAIDVWSVGCILGEIIT	
TaMPK4 (1DL)	VYIVTELMDTDLHQI	IRSNQSLTDDHCQYFLYQLLRGLKIVHSAN	VLHRDLKPSNLFNAN	CDLKIADFGLARTTSETDLM	TEYVVTRWYRAPELLLNCSQY	TAAIDVWSVGCILGEIIT	

		KML^vFDPxKRIIVDEAL
ScMPK4	RQPLFPGRDYIQQLKLITELIGSPDDSSLGFLRSDNARRYMKQLPQYPRQDFRLRFRNMSDGAVDLLERMLVFDPSRRITVDEALHHPYLAS	LHDINEEPTCPAPFSDFEQPSFTEEHMKELIWRETLAFNPDPPI*
HvMPK4 (1H)	RQPLFPGRDYIQQLKLITELIGSPDDSSLGFLRSDNARRYMKQLPQYPRQDFRLRFRNMSDGAVDLLERMLVFDPSRRITVDEALHHPYLAS	LHDINEEPTCPAPFSDFEQPSFTEEHMKELIWRETLAFNPDPPI*
BAJ97968.1	RQPLFPGRDYIQQLKLITELIGSPDDSSLGFLRSDNARRYMKQLPQYPRQDFRLRFRNMSDGAVDLLERMLVFDPSRRITVDEALHHPYLAS	LHDINEEPTCPAPFSDFEQPSFTEEHMKELIWRETLAFNPDPPI*
TaMPK4 (1AL)	RQPLFPGRDYIQQLKLITELIGSPDDSSLGFLRSDNARRYMKQLPQYPRQDFRLRFRNMSDGAVDLLERMLVFDPSRRITVDEALHHPYLAS	LHDINEEPTCPAPFSDFEQPSFTEEHMKELIWRETLAFNPDPPI*
TsMPK4 (R/A)	RQPLFPGRDYIQQLKLITELIGSPDDSSLGFLRSDNARRYMKQLPQYPRQDFRLRFRNMSDGAVDLLERMLVFDPSRRITVDEALHHPYLAS	LHDINEEPTCPAPFSDFEQPSFTEEHMKELIWRETLAFNPDPPI*
AetMPK4	RQPLFPGRDYIQQLKLITELIGSPDDSSLGFLRSDNARRYMKQLPQYPRQDFRLRFRNMSDGAVDLLERMLVFDPSRRITVDEALHHPYLAS	LHDINEEPTCPAPFSDFEQPSFTEEHMKELIWRETLAFNPDPPI*
TaMPK4 (1BL)	RQPLFPGRDYIQQLKLITELIGSPDDSSLGFLRSDNARRYMKQLPQYPRQDFRLRFRNMSDGAVDLLERMLVFDPSRRITVDEALHHPYLAS	LHDINEEPTCPAPFSDFEQPSFTEEHMKELIWRETLAFNPDPPI*
TaMPK4 (1DL)	RQPLFPGRDYIQQLKLITELIGSPDDSSLGFLRSDNARRYMKQLPQYPRQDFRLRFRNMSDGAVDLLERMLVFDPSRRITVDEALHHPYLAS	LHDINEEPTCPAPFSDFEQPSFTEEHMKELIWRETLAFNPDPPI*

MPK6

						IGxGxYGxV	IKKIxxxF	DAxRxLRE
AAO16560.1	MDAGGAQPPDSEMAEAGAGAA	---	AAAGTAPGGAMDNIQATLTHGGRFIQYNI	FGNVFEVTA	KYKPPILP	IGKGAYGIVCSALNSETGEQVAIKKIANA	F DNKIDAKRTLREIKLLRHMD	
TaMPK6 (7DS)	MDAGGAQPPDSEMAEAGAGA	---	AAAAGTAPGGAMDNIQATLTHGGRFIQYNI	FGNVFEVTA	KYKPPILP	IGKGAYGIVCSALNSETGEQVAIKKIANA	F DNKIDAKRTLREIKLLRHMD	
AK333212.1	MDAGGAQPPDSEMAEAGAGA	---	AAAAGTAPGGAMDNIQATLTHGGRFIQYNI	FGNVFEVTA	KYKPPILP	IGKGAYGIVCSALNSETGEQVAIKKIANA	F DNKIDAKRTLREIKLLRHMD	
RFL3769	MDAGGAQPPDSEMAEAGAGA	---	AAAAGTAPGGAMDNIQATLTHGGRFIQYNI	FGNVFEVTA	KYKPPILP	IGKGAYGIVCSALNSETGEQVAIKKIANA	F DNKIDAKRTLREIKLLRHMD	
AetMPK6p	-----					-----	SALNSETGEQVAIKKIANA	F DNKIDAKRTLREIKLLRHMD
ScMPK6	-----		MENIQATLTHGGRFIQYNI	FGNVFEVTA	KYKPPILP	IGKGAYGIVCSALNSETGEQVAIKKIANA	F DNKIDAKRTLREIKLLRHMD	
TsMPK6 (R)	-----		MENIQATLTHGGRFIQYNI	FGNVFEVTA	KYKPPILP	IGKGAYGIVCSALNSETGEQVAIKKIANA	F DNKIDAKRTLREIKLLRHMD	
BAJ90351.1	MDAGGAQPPDAEMA EAGGAAAA	--	AAAAGAPGGAMENIQATLSHGGRFIQYNI	FGNVFEVTA	KYKPPILP	IGKGAYGIVCSALNSETGEQVAIKKIANA	F DNKIDAKRTLREIKLLRHMD	
BAJ86277.1	MDAGGAQPPDAEMA EAGGAAAA	--	AAAAGAPGGAMENIQATLSHGGRFIQYNI	FGNVFEVTA	KYKPPILP	IGKGAYGIVCSALNSETGEQVAIKKIANA	F DNKIDAKRTLREIKLLRHMD	
BAK07440.1	MDAGGAQPPDAEMA EAGGAAAA	--	AAAAGAPGGAMENIQATLSHGGRFIQYNI	FGNVFEVTA	KYKPPILP	IGKGAYGIVCSALNSETGEQVAIKKIANA	F DNKIDAKRTLREIKLLRHMD	
TaMPK6 (7BS)	MDAGGAQPPDAEMA EAGGAAA	---	AAAAGSAPGGAMDNIQATLTHGGRFIQYNI	FGNIFEVTA	KYKPPILP	IGKGAYGIVCSALNSETGEQVAIKKIANA	F DNKIDAKRTLREIKLLRHMD	
TaMPK6 (7AS)	MDAGGAQPPDSEMAEAGAAAA	-----	AAAAGAPGGAMDNIQATLTHGGRFIQYNI	FGNVFEVTA	KYKPPILP	IGKGAYGIVCSALNSETGEQVAIKKIANA	F DNKIDAKRTLREIKLLRHMD	
HvMPK6 (7H)p	-----					-----		

		FxDIYxxxELM	DLxxVI		QxLRxLKYxH	HRDLKPxN	LxNxNCxLKIxDFGLAR	TRWYRAPEL
AAO16560.1	HENIVAIRDIIPPAQRTAFND	VYIAYELMDTDLHQI	IRSNQALSEEHCQYFLYQILRGLKYIHSAN	VLHRDLKPSNLLL	NANCDLKICDFGLARTTSETDFM	TEYVVTRWYRAPELLNS		
TaMPK6 (7DS)	HENIVAIRDIIPPAQRTAFND	VYIAYELMDTDLHQI	IRSNQALSEEHCQYFLYQILRGLKYIHSAN	VLHRDLKPSNLLL	NANCDLKICDFGLARTTSETDFM	TEYVVTRWYRAPELLNS		
AK333212.1	HENIVAIRDIIPPAQRTAFND	VYIAYELMDTDLHQI	IRSNQALSEEHCQYFLYQILRGLKYIHSAN	VLHRDLKPSNLLL	NANCDLKICDFGLARTTSETDFM	TEYVVTRWYRAPELLNS		
RFL3769	HENIVAIRDIIPPAQRTAFND	VYIAYELMDTDLHQI	IRSNQALSEEHCQYFLYQILRGLKYIHSAN	VLHRDLKPSNLLL	NANCDLKICDFGLARTTSETDFM	TEYVVTRWYRAPELLNS		
AetMPK6p	HENIVAIRDIIPPAQRTAFND	VYIAYELMDTDLHQI	IRSNQALSEEHCQYFLYQILRGLKYIHSAN	VLHRDLKPSNLLL	NANCDLKICDFGLARTTSETDFM	TEYVVTRWYRAPELLNS		
ScMPK6	HENIVAIRDIIPPAQRTAFND	VYIAYELMDTDLHQI	IRSNQALSEEHCQYFLYQILRGLKYIHSAN	VLHRDLKPSNLLL	NANCDLKICDFGLARTTSETDFM	TEYVVTRWYRAPELLNS		
TsMPK6 (R)	HENIVAIRDIIPPAQRTAFND	VYIAYELMDTDLHQI	IRSNQALSEEHCQYFLYQILRGLKYIHSAN	VLHRDLKPSNLLL	NANCDLKICDFGLARTTSETDFM	TEYVVTRWYRAPELLNS		
BAJ90351.1	HENIVAIRDIIPPAQRTAFND	VYIAYELMDTDLHQI	IRSNQALSEEHCQYFLYQILRGLKYIHSAN	VLHRDLKPSNLLL	NANCDLKICDFGLARTTSETDFM	TEYVVTRWYRAPELLNS		
BAJ86277.1	HENIVAIRDIIPPAQRTAFND	VYIAYELMDTDLHQI	IRSNQALSEEHCQYFLYQILRGLKYIHSAN	VLHRDLKPSNLLL	NANCDLKICDFGLARTTSETDFM	TEYVVTRWYRAPELLNS		
BAK07440.1	HENIVAIRDIIPPAQRTAFND	VYIAYELMDTDLHQI	IRSNQALSEEHCQYFLYQILRGLKYIHSAN	VLHRDLKPSNLLL	NANCDLKICDFGLARTTSETDFM	TEYVVTRWYRAPELLNS		
TaMPK6 (7BS)	HENIVAIRDIIPPAQRTAFND	VYIAYELMDTDLHQI	IRSNQALSEEHCQYFLYQILRGLKYIHSAN	VLHRDLKPSNLLL	NANCDLKICDFGLARTTSETDFM	TEYVVTRWYRAPELLNS		
TaMPK6 (7AS)	HENIVAIRDIIPPAQRTAFND	VYIAYELMDTDLHQI	IRSNQALSEEHCQYFLYQILRGLKYIHSAN	VLHRDLKPSNLLL	NANCDLKICDFGLARTTSETDFM	TEYVVTRWYRAPELLNS		
HvMPK6 (7H)p	-----		QYFLYQILRGLKYIHSAN	VLHRDLKPSNLLL	NANCDLKICDFGLARTTSETDFM	TEYVVTRWYRAPELLNS		

MPK6 continued

	IDxWS ^v _i GC	KMLTFDP ^K _R Q ^O KRITVE ^D _B AL
AAO16560.1	SEYTAADVWSVGCIFMELMDRKPLFPGRDHVHQLRLLMEVFPCGISSLQLIGTPNEADLDFVFNENARRYIRQLPRHARQSLSEKFPVHPSAIDLVEKMLTFDPRQRITVEGALAHPYL	
TaMPK6 (7DS)	SEYTAADVWSVGCIFMELMDRKPLFPGRDHVHQLRLLME-----LIGTPNEADLDFVFNENARRYIRQLPRHARQSLSEKFPVHPSAIDLVEKMLTFDPRQRITVEGALAHPYL	
AK333212.1	SEYTAADVWSVGCIFMELMDRKPLFPGRDHVHQLRLLME-----LIGTPNEADLDFVFNENARRYIRQLPRHARQSLSEKFPVHPSAIDLVEKMLTFDPRQRITVEGALAHPYL	
RFL3769	SEYTAADVWSVGCIFMELMDRKPLFPGRDHVHQLRLLME-----LIGTPNEADLDFVFNENARRYIRQLPRHARQSLSEKFPVHPSAIDLVEKMLTFDPRQRITVEGALAHPYL	
AetMPK6p	SEYTAADVWSVGCIFMELMDRKPLFPGRDHVHQLRLLME-----LIGTPNEADLDFVFNENARRYIRQLPRHARQSLSEKFPVHPSAIDLVEKMLTFDPRQRITVEGALAHPYL	
ScMPK6	SEYTAADVWSVGCIFMELMDRKPLFPGRDHVHQLRLLME-----LIGTPNEADLDFVFNENARRYIRQLPRHARQSLSEKFPVHPSAIDLVEKMLTFDPRQRITVEGALAHPYL	
TsMPK6 (R)	SEYTAADVWSVGCIFMELMDRKPLFPGRDHVHQLRLLME-----LIGTPNEADLDFVFNENARRYIRQLPRHARQSLSEKFPVHPSAIDLVEKMLTFDPRQRITVEGALAHPYL	
BAJ90351.1	SEYTAADVWSVGCIFMELMDRKPLFPGRDHVHQLRLLME-----LIGTPNEADLDFVFNENARRYIRQLPRHARQSLSEKFPVHPSAIDLVEKMLTFDPRQRITVEGALAHPYL	
BAJ86277.1	SEYTAADVWSVGCIFMELMDRKPLFPGRDHVHQLRLLME-----LIGTPNEADLDFVFNENARRYIRQLPRHARQSLSEKFPVHPSAIDLVEKMLTFDPRQRITVEGALAHPYL	
BAK07440.1	SEYTAADVWSVGCIFMELMDRKPLFPGRDHVHQLRLLME-----LIGTPNEADLDFVFNENARRYIRQLPRHARQSLSEKFPVHPSAIDLVEKMLTFDPRQRITVEGALAHPYL	
TaMPK6 (7BS)	SEYTAADVWSVGCIFMELMDRKPLFPGRDHVHQLRLLME-----LIGTPNEADLDFVFNENARRYIRQLPRHARQSLSEKFPVHPSAIDLVEKMLTFDPRQRITVEGALAHPYL	
TaMPK6 (7AS)	SEYTAADVWSVGCIFMELMDRKPLFPGRDHVHQLRLLME-----LIGTPNEADLDFVFNENARRYIRQLPRHARQSLSEKFPVHPSAIDLVEKMLTFDPRQRITVEGALAHPYL	
HvMPK6 (7H)p	SEYTAADVWSVGCIFMELMDRKPLFPGRDHVHQLRLLME-----LIGTPNEADLDFVFNENARRYIRQLPRHARQSLSEKFPVHPSAIDLVEKMLTFDPRQRITVEGALAHPYL	
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AAO16560.1	ASLHDISDEPVC	TMPFSDFEQHALSEEQMKDLIHQEGITFNPDYQ*
TaMPK6 (7DS)	ASLHDISDEPVC	TMPFSDFEQHALSEEQMKDLIHQEGITFNPDYQ*
AK333212.1	ASLHDISDEPVC	TMPFSDFEQHALSEEQMKDLIHQEGITFNPDYQ*
RFL3769	ASLHDISDEPVC	TMPFSDFEQHALSEEQMKDLIHQEGITFNPDYQ*
AetMPK6p	ASLHDISDEPVC	TMPFSDFEQHALSEEQMKDLIHQEGITFNPDYQ*
ScMPK6	ASLHDISDEPVC	TMPFSDFEQHALSEEQMKDLIHQEGIAFNPDYQ*
TsMPK6 (R)	ASLHDISDEPVC	TMPFSDFEQHALSEEQMKDLIHQEGIAFNPDYQ*
BAJ90351.1	ASLHDISDEPVC	TMPFSDFEQHALSEEQMKDLIHQEGIAFNPDYQ*
BAJ86277.1	ASLHDISDEPVC	TMPFSDFEQHALSEEQMKDLIHQEGIAFNPDYQ*
BAK07440.1	ASLHDISDEPVC	TMPFSDFEQHALSEEQMKDLIHQEGIAFNPDYQ*
TaMPK6 (7BS)	ASLHDISDEPVC	TMPFSDFEQHALSEEQMKDLIHQEGIAFNPDYQ*
TaMPK6 (7AS)	ASLHDISDEPVC	TMPFSDFEQHALSEEQMKDLIHQEGIAFNPDYQ*
HvMPK6 (7H)p	ASLHDISDEPVC	TMPFSDFEQHALSEEQMKDLIHQEGIAFNPDYQ*
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MPK7

		IGxGxYGxV	IKKIxxxF	DAxRxLRE	FxDIYxxxELM	DL
TaMPK7 (7DLc2)	MAMMVDPPNGMGNHGKHYITMWQTMFEIDTKYVPIKP	I	I	I	I	I
TuMPK7	MAMMVDPPNGMGNHGKHYITMWQTMFEIDTKYVPIKP	I	I	I	I	I
TsMPK7 (B)	MAMMVDPPNGMGNHGKHYITMWQTMFEIDTKYVPIKP	I	I	I	I	I
TaMPK7 (7BL)	MAMMVDPPNGMGNHGKHYITMWQTMFEIDTKYVPIKP	I	I	I	I	I
AET10457.1	MAMMVDPPNGMGNHGKHYITMWQTMFEIDTKYVPIKP	I	I	I	I	I
tplb0018e09	MAMMVDPPNGMGNHGKHYITMWQTMFEIDTKYVPIKP	I	I	I	I	I
HvMPK7 (7H)	MAMMVDPPNGMGNHGKHYITMWQTMFEIDTKYVPIKP	I	I	I	I	I
AK252980.1	MAMMVDPPNGMGNHGKHYITMWQTMFEIDTKYVPIKP	I	I	I	I	I
AetMPK7	MAMMVDPPNGMGNHGKHYITMWQTMFEIDTKYVPIKP	I	I	I	I	I
TaMPK7 (7DLc1)	MAMMVDPPNGMGNHGKHYITMWQTMFEIDTKYVPIKP	I	I	I	I	I
TaMPK7 (7AL)	MAMMVDPPNGMGNHGKHYITMWQTMFEIDTKYVPIKP	I	I	I	I	I
AET10456.1	MAMMVDPPNGMGNHGKHYITMWQTMFEIDTKYVPIKP	I	I	I	I	I
ScMPK7	MAMMVDPPNGMGNHGKHYITMWQTMFEIDTKYVPIKP	I	I	I	I	I

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	xxVI	QxLRxLKYxH	HRDLKPxN	LxNxNCxLKIxDFGLAR	TRWYRAPEL	IDxWS ^v GC
TaMPK7 (7DLc2)	HQIVKSSQPLSNDHCQYFLFQVLRGLKYLHSAG	I	I	I	I	I
TuMPK7	HQIVKSSQPLSNDHCQYFLFQVLRGLKYLHSAG	I	I	I	I	I
TsMPK7 (B)	HQIVKSSQPLSNDHCQYFLFQVLRGLKYLH-AG	I	I	I	I	I
TaMPK7 (7BL)	HQIVKSSQPLSNDHCQYFLFQVLRGLKYLHSAG	I	I	I	I	I
AET10457.1	HQIVKSSQPLSNDHCQYFLFQVLRGLKYLHSAG	I	I	I	I	I
tplb0018e09	HQIVKSSQPLSNDHCQYFLFQVLRGLKYLHSAG	I	I	I	I	I
HvMPK7 (7H)	HQIVKSSQPLSNDHCQYFLFQVLRGLKYLHSAG	I	I	I	I	I
AK252980.1	HQIVKSSQPLSNDHCQYFLFQVLRGLKYLHSAG	I	I	I	I	I
AetMPK7	HQIVKSSQPLSNDHCQYFLFQVLRGLKYLHSAG	I	I	I	I	I
TaMPK7 (7DLc1)	HQIVKSSQPLSNDHCQYFLFQVLRGLKYLHSAG	I	I	I	I	I
TaMPK7 (7AL)	HQIVKSSQPLSNDHCQYFLFQVLRGLKYLHSAG	I	I	I	I	I
AET10456.1	HQIVKSSQPLSNDHCQYFLFQVLRGLKYLHSAG	I	I	I	I	I
ScMPK7	HQIVKSSQPLSNDHCQYFLFQVLRGLKYLHSAG	I	I	I	I	I

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MPK7 continued

KMLIFDP^s KRISVTEAL

TaMPK7 (7DLc2) NQLKLIVNVLGTMKADLAFIDNPKAGNYIKSLPYTPGMPLSIMYPHAHPLAIDLLQKMLVFDPSKRISVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENIGTDMIREMLWQEMQLQYHPGAARMVNM*-
TuMPK7 NQLKLIVNVLGTMSEADLAFIDNPKARNYIKSLPYTPGIPLSSMYPQAHPLAIDLLQKMLVFDPSKRISVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENIGTDMIREMLWQEMQLQYHPQAARGVMNM*
TsMPK7 (B) NQLKLIVNVLGTMSETDLAFIDNPKARNYIKSLPYTPGMPLSIMYPHAHPLAIDLLQKMLVFDPSKRISVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENIGTDMIREMLWQEMQLQYHPEAARMVNM*-
TaMPK7 (7BL) NQLKLIVNVLGTMSETDLAFIDNPKARNYIKSLPYTPGMPLSIMYPHAHPLAIDLLQKMLVFDPSKRISVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENIGTDMIREMLWQEMQLQYHPEAARMVNM*-
AET10457.1 NQLKLIVNVLGTMSETDLAFIDNPKARNYIKSLPYTPGMPLSIMYPHAHPLAIDLLQKMLVFDPSKRISVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENIGTDMIREMLWQEMQLQYHPEAARMVNM*-
tp1b0018e09 NQLKLIVNVLGTMSETDLAFIDNPKARNYIKSLPYTPGMPLSIMYPHAHPLAIDLLQKMLVFDPSKRISVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENIGTDMIREMLWQEMQLQYHPEAARMVNM*-
HvMPK7 (7H) NQLKLIVNVLGTMSEADLAFIDNSKARKYIKSLPYTPGIPLSSMYPQAHPLAIDLLQKMLVFDPSKRISVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENIGTDMIREMLWQEMQLQYHPEAARMVNM*-
AK252980.1 NQLKLIVNVLGTMSEADLAFIDNSKARKYIKSLPYTPGIPLSSMYPQAHPLAIDLLQKMLVFDPSKRISVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENIGTDMIREMLWQEMQLQYHPEAARMVNM*-
AetMPK7 NQLKLIVNVLGTMSEADLAFIDNPKARNYIKSLPYTPGMPLSSMYPRAHPLAIDLLQKMLVFDPSKRISVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENIGTDMIREMLWQEMQLQYHPEAARMVNM*-
TaMPK7 (7DLc1) NQLKLIVNVLGTMSEADLAFIDNPKARNYIKSLPYTPGMPLSSMYPRAHPLAIDLLQKMLVFDPSKRISVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENIGTDMIREMLWQEMQLQYHPEAARMVNM*-
TaMPK7 (7AL) NQLKLIVNVLGTMSEADLAFIDNPKARNYIKSLPYTPGIPLSSMYPQAHPLAIDLLQKMLVFDPSKRISVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENIGTDMIREMLWQEMQLQYHPEAARMVNM*-
AET10456.1 NQLKLIVNVLGTMSEADLAFIDNPKARNYIKSLPYTPGIPLSSMYPQAHPLAIDLLQKMLVFDPSKRISVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENIGTDMIREMLWQEMQLQYHPEAARMVNM*-
ScMPK7 NQLKLIVNVLGTMSEADLAFIDNPKARNYIKSLPYTPGMPLSTMYPQAHPLAIDLLQKMLVFDPSKRISVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENIGTDMIREMLWQEMQLQYHPEAARMVNM*-
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MPK11

						IGxGxYGxV		IKKIxxxF	DAxRxLRE	
HvMPK11 (7H)	MRMEGGVGAGGGGGGGHGGGHGLGGEAQIKGTLTHGGRYVQYNVYGNLFEVSAKYVPPIRP	VGRGACGI	ICAAVNAHTREEVA	IKKI	IGNA	FDNQ	IDAKRTL	REVKLLRHMNHENVISIK		
BAJ95789.1	MRMEGGVGAGGGGGGGHGGGHGLGGEAQIKGTLTHGGRYVQYNVYGNLFEVSAKYVPPIRP	VGRGACGI	ICAAVNAQTREEVA	IKKI	IGNA	FDNQ	IDAKRTL	REVKLLRHMNHENVISIK		
ScMPK11	MRMEGGGAWA--GGGGGHGGGHGLGGEAQIKGTLTHGGRYVQYNVYGNLFEVSAKYVPPIRP	VGRGACGI	ICAAVNAQTREEVA	IKKI	IGNA	FDNQ	IDAKRTL	REVKLLRHMNHENVISIK		
TsMPK11 (U)	MRMEGGGAGA--GGGGGHGGGHGLGGEAQIKGTLTHGGRYVQYNVYGNLFEVSAKYVPPIRP	VGRGACGI	ICAAVNAQTREEVA	IKKI	IGNA	FDNQ	IDAKRTL	REVKLLRHMNHENVISIK		
TsMPK11 (A)	MRMEGGGAGA--GGGGGHGGGHGLGGEAQIKGTLTHGGRYVQYNVYGNLFEVSAKYVPPIRP	VGRGACGI	ICAAVNAQTREEVA	IKKI	IGNA	FDNQ	IDAKRTL	REVKLLRHMNHENVISIK		
TaMPK11 (7BL)	MRMEGGGAGA---GGG-----GLGGEAQIKGTLTHGGRYVQYNVYGNLFEVSAKYVPPIRP	VGRGACGI	ICAAVNAQTREEVA	IKKI	IGNA	FDNQ	IDAKRTL	REVKLLRHMNHENVISIK		
JV870088.1	MRMEGGGAGA---GGG-----GLGGEAQIKGTLTHGGRYVQYNVYGNLFEVSAKYVPPIRP	VGRGACGI	ICAAVNAQTREEVA	IKKI	IGNA	FDNQ	IDAKRTL	REVKLLRHMNHENVISIK		
TaMPK11 (7DL)	MRMEGGGAGA---GGGGHGGGHGLGGEAQIKGTLTHGGRYVQYNVYGNLFEVSAKYVPPIRP	VGRGACGI	ICAAVNAQTREEVA	IKKI	IGNA	FDNQ	IDAKRTL	REVKLLRHMNHENVISIK		
TaMPK11 (7AL)	MRMEGGGAGA---GGGGHGGGHGLGGEAQIKGTLTHGGRYVQYNVYGNLFEVSAKYVPPIRP	VGRGACGI	ICAAVNAQTREEVA	IKKI	IGNA	FDNQ	IDAKRTL	REVKLLRHMNHENVISIK		
HAAB01041577.1	MRMEGGGAGA---GGGGHGGGHGLGGEAQIKGTLTHGGRYVQYNVYGNLFEVSAKYVPPIRP	VGRGACGI	ICAAVNAQTREEVA	IKKI	IGNA	FDNQ	IDAKRTL	REVKLLRHMNHENVISIK		
TuMPK11	MRMEGGGAGA---GGGGHGGGHGLGGEAQIKGTLTHGGRYVQYNVYGNLFEVSAKYVPPIRP	VGRGACGI	ICAAVNAQTREEVA	IKKI	IGNA	FDNQ	IDAKRTL	REVKLLRHMNHENVISIK		
AetMPK11	MRMEGGGAGA---GGGGHGGGHGLGGEAQIKGTLTHGGRYVQYNVYGNLFEVSAKYVPPIRP	VGRGACGI	ICAAVNAQTREEVA	IKKI	IGNA	FDNQ	IDAKRTL	REVKLLRHMNHENVISIK		

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		FxDIYxxxELM	DLxxVI		QxLRxLKYxH	HRDLKPxN	LxNxNCxLKIxDFGLAR		TRWYRAPEL	ID
HvMPK11 (7H)	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN
BAJ95789.1	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN
ScMPK11	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN
TsMPK11 (U)	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN
TsMPK11 (A)	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN
TaMPK11 (7BL)	DIIRPTRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN
JV870088.1	DIIRPTRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN
TaMPK11 (7DL)	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN
TaMPK11 (7AL)	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN
HAAB01041577.1	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN
TuMPK11	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN
AetMPK11	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN	DIIRPPRENFN

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							KML^vFDPxKRIIVDEAL	
HvMPK11 (7H)	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP
BAJ95789.1	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP
ScMPK11	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP
TsMPK11 (U)	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP
TsMPK11 (A)	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP
TaMPK11 (7BL)	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP
JV870088.1	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP
TaMPK11 (7DL)	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP
TaMPK11 (7AL)	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP
HAAB01041577.1	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP
TuMPK11	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP
AetMPK11	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP	IWSVGCILGEIAMREPLFP

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MPK11 continued

HvMPK11(7H) SFD FEQPSFTEEDIKELIWREALKFNPEPIH*
BAJ95789.1 SFD FEQPSFTEEDIKELIWREALKFNPEPIH*
ScMPK11 SFD FEQPSFTEEDIKELIWREALKFNPEPIH*
TsMPK11(U) SFD FEQPSFTEEDIKELIWREALKFNPEPIH*
TsMPK11(A) SFD FEQPSFTEEDIKELIWREALKFNPEPIH*
TaMPK11(7BL) SFD FEQPSFTEEDIKELIWREALKFNPEPIH*
JV870088.1 SFD FEQPSFTEEDIKELIWREALKFNPEPIH*
TaMPK11(7DL) SFD FEQPSFTEEDIKELIWREALKFNPEPIH*
TaMPK11(7AL) SFD FEQPSFTEEDIKELIWREALKFNPEPIH*
HAAB01041577.1 SFD FEQPSFTEEDIKELIWREALKFNPEPIH*
TuMPK11 SFD FEQPSFTEEDIKELIWREALKFNPEPIH*
AetMPK11 SFD FEQPSFTEEDIKELIWREALKFNPEPIH*

MPK14

			IGxGxYGxV	IKKIxxxF	DaxRxLRE	FxDIYxxxELM				
AetMPK14	MAMLVDPNPMGNQGKHYYSMWQTLFEIDTKYVPIKP	I	IGRGAYGIVCSSINRETNEKVAIKKI	IHNV	F	DNRVDALRTLREL--KLLRHLRHENVI	SLKDIMPVQRRSFKD	VYLVYELMDT		
TsMPK14 (R/B)	MAMLVDPNPMGNQGKHYYSMWQTLFEIDTKYVPIKP	I	IGRGAYGIVCSSINRETNEKVAIKKI	IHNV	F	DNRVDALRTLREL--KLLRHLRHENVI	SLKDIMPVQRRSFKD	VYLVYELMDT		
TaMPK14 (6DS)	MAMLVDPNPMGNQGKHYYSMWQTLFEIDTKYVPIKP	I	IGRGAYGIVCSSINRETNEKVAIKKI	IHNV	F	DNRVDALRTLREL	X	KLLRHLRHENVI	SLKDIMPVQRRSFKD	VYLVYELMDT
AK332648.1	MAMLVDPNPMGNQGKHYYSMWQTLFEIDTKYVPIKP	I	IGRGAYGIVCSSINRETNEKVAIKKI	IHNV	F	DNRVDALRTLREL--KLLRHLRHENVI	SLKDIMPVQRRSFKD	VYLVYELMDT		
HvMPK14 (6H)	MAMLVDPNPMGNQGKHYYSMWQTLFEIDTKYVPIKP	I	IGRGAYGIVCSSINRETNEKVAIKKI	IHNV	F	DNRVDALRTLREL--KLLRHLRHENVI	SLKDIMPVQRRSFKD	VYLVYELMDT		
BAJ85436.1	MAMLVDPNPMGNQGKHYYSMWQTLFEIDTKYVPIKP	I	IGRGAYGIVCSSINRETNEKVAIKKI	IHNV	F	DNRVDALRTLREL--KLLRHLRHENVI	SLKDIMPVQRRSFKD	VYLVYELMDT		
BAJ84961.1	MAMLVDPNPMGNQGKHYYSMWQTLFEIDTKYVPIKP	I	IGRGAYGIVCSSINRETNEKVAIKKI	IHNV	F	DNRVDALRTLREL--KLLRHLRHENVI	SLKDIMPVQRRSFKD	VYLVYELMDT		
TaMPK14 (6AS)	MAMLVDPNPMGNQGKHYYSMWQTLFEIDTKYVPIKP	I	IGRGAYGIVCSSINRETNEKVAIKKI	IHNV	F	DNRVDALRTLREL--KLLRHLRHENVI	SLKDIMPVQRRSFKD	VYLVYELMDT		
TaMPK14 (6BS)	MAMLVDPNPMGNQGKHYYSMWQTLFEIDTKYVPIKP	I	IGRGAYGIVCSSINRETNEKVAIKKI	IHNV	F	DNRVDALRTLREL--KLLRHLRHENVI	SLKDIMPVQRRSFKD	VYLVYELMDT		
ScMPK14	MAMLVDPNPMGNQGKHYYSMWQTLFEIDTKYVPIKP	I	IGRGAYGIVCSSINRETNEKVAIKKI	IHNV	F	DNRVDALRTLREL--KLLRHLRHENVI	SLKDIMPVQRRSFKD	VYLVYELMDT		
TuMPK14	MAMLVDPNPMGNQGKHYYSMWQTLFEIDTKYVPIKP	I	IGRGAYGIVCSSINRETNEKVAIKKI	IHNV	F	DNRVDALRTLREL--KLLRHLRHENVI	SLKDIMPVQRRSFKD	VYLVYELMDT		
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	DLxxVI	QxLRxLKYxH	HRDLKPxN LxNxNCxLKIxDFLAR	TRWYRAPEL	IDxWS^yIGC		
AetMPK14	DLHQI	IKSPQGLSNDHCQYFLFQLLRGLKYLHSAE	ILHRDLKPGNLLVNAN	CDLKI	CDFGLARTNSSKGQFMTEYVVTRWYRAPELLLCCDNY	GTSIDVWSVGCIFAELLGRKPI	IFPGTE
TsMPK14 (R/B)	DLHQI	IKSPQGLSNDHCQYFLFQLLRGLKYLHSAE	ILHRDLKPGNLLVNAN	CDLKI	CDFGLARTNSSKGQFMTEYVVTRWYRAPELLLCCDNY	GTSIDVWSVGCIFAELLGRKPI	IFPGTE
TaMPK14 (6DS)	DLHQI	IKSPQGLSNDHCQYFLFQLLRGLKYLHSAE	ILHRDLKPGNLLVNAN	CDLKI	CDFGLARTNSSKGQFMTEYVVTRWYRAPELLLCCDNY	GTSIDVWSVGCIFAELLGRKPI	IFPGTE
AK332648.1	DLHQI	IKSPQGLSNDHCQYFLFQLLRGLKYLHSAE	ILHRDLKPGNLLVNAN	CDLKI	CDFGLARTNSSKGQFMTEYVVTRWYRAPELLLCCDNY	GTSIDVWSVGCIFAELLGRKPI	IFPGTE
HvMPK14 (6H)	DLHQI	IKSPQGLSNDHCQYFLFQLLRGLKYLHSAE	ILHRDLKPGNLLVNAN	CDLKI	CDFGLARTNSSKGQFMTEYVVTRWYRAPELLLCCDNY	GTSIDVWSVGCIFAELLGRKPI	IFPGTE
BAJ85436.1	DLHQI	IKSPQGLSNDHCQYFLFQLLRGLKYLHSAE	ILHRDLKPGNLLVNAN	CDLKI	CDFGLARTNSSKGQFMTEYVVTRWYRAPELLLCCDNY	GTSIDVWSVGCIFAELLGRKPI	IFPGTE
BAJ84961.1	DLHQI	IKSPQGLSNDHCQYFLFQLLRGLKYLHSAE	ILHRDLKPGNLLVNAN	CDLKI	CDFGLARTNSSKGQFMTEYVVTRWYRAPELLLCCDNY	GTSIDVWSVGCIFAELLGRKPI	IFPGTE
TaMPK14 (6AS)	DLHQI	IKSPQGLSNDHCQYFLFQLLRGLKYLHSAE	ILHRDLKPGNLLVNAN	CDLKI	CDFGLARTNSSKGQFMTEYVVTRWYRAPELLLCCDNY	GTSIDVWSVGCIFAELLGRKPI	IFPGTE
TaMPK14 (6BS)	DLHQI	IKSPQGLSNDHCQYFLFQLLRGLKYLHSAE	ILHRDLKPGNLLVNAN	CDLKI	CDFGLARTNSSKGQFMTEYVVTRWYRAPELLLCCDNY	GTSIDVWSVGCIFAELLGRKPI	IFPGTE
ScMPK14	DLHQI	IKSPQGLSNDHCQYFLFQLLRGLKYLHSAE	ILHRDLKPGNLLVNAN	CDLKI	CDFGLARTNSSKGQFMTEYVVTRWYRAPELLLCCDNY	GTSIDVWSVGCIFAELLGRKPI	IFPGTE
TuMPK14	DLHQI	IKSPQGLSNDHCQYFLFQLLRGLKYLHSAE	ILHRDLKPGNLLVNAN	CDLKI	CDFGLARTNSSKGQFMTEYVVTRWYRAPELLLCCDNY	GTSIDVWSVGCIFAELLGRKPI	IFPGTE
	*****		*****	*	*****		*****

	KMLIFDP^sKRISVTEAL
AetMPK14	CLNQLKLI VNVLGTMS ESDL EFDNPKARRY IIP---TLPVPLASMYPHAHPLAIDLLQKMLIFDPTKRI SVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENISSEMIREMMWQEMLHYHPEAAA AVNM*
TsMPK14 (R/B)	CLNQLKLI VNVLGTMS ESDL EFDNPKARRY IKTLPYTPGVPLASMYPHAHPLAIDLLQKMLIFDPTKRI SVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENISSEMIREMMWQEMLHYHPEAATAVNM*
TaMPK14 (6DS)	CLNQLKLI VNVLGTMS ESDL EFDNPKARRY IKTLPYTPGVPLASMYPHAHPLAIDLLQKMLIFDPTKRI SVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENISSEMIREMMWQEMLHYHPEAAA AVNM*
AK332648.1	CLNQLKLI VNVLGTMS ESDL EFDNPKARRY IKTLPYTPGVPLASMYPHAHPLAIDLLQKMLIFDPTKRI SVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENISSEMIREMMWQEMLHYHPEAAA AVNM*
HvMPK14 (6H)	CLNQLKLI VNVLGTMS ESDL EFDNPKARRY IKTLPYTPGVPLASMYPHAHPLAIDLLQKMLIFDPTKRI SVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENISSEMIREMMWQEMLHYHPEAAA AVNM*
BAJ85436.1	CLNQLKLI VNVLGTMS ESDL EFDNPKARRY IKTLPYTPGVPLASMYPHAHPLAIDLLQKMLIFDPTKRI SVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENISSEMIREMMWQEMLHYHPEAAA AVNM*
BAJ84961.1	CLNQLKLI VNVLGTMS ESDL EFDNPKARRY IKTLPYTPGVPLASMYPHAHPLAIDLLQKMLIFDPTKRI SVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENISSEMIREMMWQEMLHYHPEAAA AVNM*
TaMPK14 (6AS)	CLNQLKLI VNVLGTMS ESDL EFDNPKARRY IKTLPYTPGVPLASMYPHAHPLAIDLLQKMLIFDPTKRI SVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENISSEMIREMMWQEMLHYHPEAATAVNM*
TaMPK14 (6BS)	CLNQLKLI VNVLGTMS ESDL EFDNPKARRY IKTLPYTPGVPLASMYPHAHPLAIDLLQKMLIFDPTKRI SVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENISSEMIREMMWQEMLHYHPEAATAVNM*
ScMPK14	CLNQLKLI VNVLGTMS ESDL EFDNPKARRY IKTLPYTPGVPLASMYPHAHPLAIDLLQKMLIFDPTKRI SVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENISSEMIREMMWQEMLHYHPEAATAVNM*
TuMPK14	CLNQLKLI VNVLGTMS ESDL EFDNPKARRY IKTLPYTPGVPLASMYPHAHPLAIDLLQKMLIFDPTKRI SVTQALEHPYMSPLYDPSANPPAQVPIDLDIDENISSEMIREMMWQEMLHYHPEAATAVNM*
	***** * ***** ; ***** ; *****

MPK16 continued

TsMPK16(U1) PTNFMYPsAVDHFkkQFTFLeeHYAKGStAAPPERQHNSLPRPSVIYSDNRPQGSdSRPQGAANITDDLsRCIIRDNAQKPRRDPAsvGANRVPKELLsQGLVKWLVrHF-----
TsMPK16(U2) PTNFMYPsAVDHFkkQFTFLeeHYAKGStAAPPERQHNSLPRPSVIYSDNRPQGSdSRPQGAANITDDLsRCIIRDNAQKPRRDPAsvGANRVPKGAAVARPGKVVGSALRYGNCSTSGT
AK354221.1 PTGFMYPsAVDHFkkQFTFLeeHYAKGStAAPPERQHNSLPRPSVIFSDNRPQGSdSRPQGAANITDDLsRCIIRDNTQKPRRDtASvGANRVPQGAAVARPGKVVGSALRYGNCSTSGT
HvMPK16(1H) PTGFMYPsAVDHFkkQFTFLeeHYAKGStAAPPERQHNSLPRPSVIFSDNRPQGSdSRPQGAANITDDLsRCIIRDNTQKPRRDtASvGANRVPQGAAVARPGKVVGSALRYGNCSTSGT
AK251500.1 PTGFMYPsAVDHFkkQFTFLeeHYAKGStAAPPERQHNSLPRPSVIFSDNRPQGSdSRPQGAANITDDLsRCIIRDNTQKPRRDtASvGANRVPQGAAVARPGKVVGSALRYGNCSTSGT
BAJ88123.1 PTGFMYPsAVDHFkkQFTFLeeHYAKGStAAPPERQHNSLPRPSVIFSDNRPQGSdSRPQGAANITDDLsRCIIRDNTQKPRRDtASvGANRVPQGAAVARPGKVVGSALRYGNCSTSGT
TaMPK16(1BS) PTNFMYPsAVDHFkkQFTFLeeHYAKGStAAPPERQHNSLPRPSVIYSDNRPQGSdSRPQGAANITDDLsRCIIRDNAQKPRRDPAsvGANRVPKGAAVARPGKVVGSALRYGNCSTSGT
ABC54584.1 PTNFMYPsAVDHFkkQFTFLeeHYAKGStAAPPERQHNSLPRPSVIYSDNRPQGSdSRPQGAANITDDLsRCIIRDNAQKPRRDPAsvGANRVPKGAAVARPGKVVGSALRYGNCSTSGT
AetMPK16 PTNFMYPsAVDHFkkQFTFLeeHYAKGStAAPPERQHNSLPRPSVIYSDNRPQGSdSRPQGAANITDDLsRCIIRDNTQKPRRDPAsvGANRVPQGAAVARPGKVVGSALRYGNCSTPGT
TaMPK16(U) PTNFMYPsAVDHFkkQFTFLeeHYAKGStAAPPERQHNSLPRPSVIYSDNRPQGSdSRPQGAANITDDLsRCIIRDNTQKPRRDPAsvGANRVPQGAAVARPGKVVGSALRYGNCSTPGT
TuMPK16 PTNFMYPsAVDHFkkQFTFLeeHYAKGStAAPPERQHNSLPRPSVIYSDNRPQGSdSRPQGAANITDDLsRCIIRDNAQKPRRDPAsvGANRVPQGAAVARPGKVVGSALRYGNCSTSGT
TaMPK16(1AS) PTNFMYPsAVDHFkkQFTFLeeHYAKGStAAPPERQHNSLPRPSVIYSDNRPQGSdSRPQGAANITDDLsRCIIRDNAQKPRRDPAsvGANRVPQGAAVARPGKVVGSALRYGNCSTSGT
** .*****:***** *****:***** *****: * : :

TsMPK16(U1) -----VMVTVQHLVPSNMNSEGSSQAKELFQTVFLRAAHT---LEEITPARAKQVKL----KGST----
TsMPK16(U2) EQYEQRrvITSQGIVPNGVPSGSSYPrrNNTCKSETGEaERIDVSQAVPPKPYtGNKLPATVDGRNGHW*
AK354221.1 EQYEQRrvITGQGFIPNGVPSGSSYPrrNNTCKSETGEaERIDVSQAGPPKPYtGNKLPATVDGRNGHW*
HvMPK16(1H) EQYEQRrvITGQGFIVPNGVPSGSSYPrrNNTCKSETGEaERIDVSQAGPPKPYtGNKLPATVDGRNGHW*
AK251500.1 EQYEQRrvITGQGFIVPNGVPSGSSYPrrNNTCKSETGEaERIDVSQAGPPKPYtGNKLPATVDGRNGHW*
BAJ88123.1 EQYEQRrvITGQGFIVPNGVPSGSSYPrrNNTCKSETGEaERIDVSQAGPPKPYtGNKLPATVDGRNGHW*
TaMPK16(1BS) EQYEQRrvITSQGIVPNGVPSGSSYPrrNNTCKSETGEaERIDVSQAVPPKPYtGNKLPATVDGRNGHW*
ABC54584.1 EQYEQRrvITSQGIVPNGVPSGSSYPrrNNTCKSETGEaERIDVSQAVPPKPYtGNKLPATVDGRNGHW*
AetMPK16 EQYEQRrvITSQGVVPNGVPSGSSYPrrNNTCKSETGEaERIDVSQAGPPKPYtGNKLPATVDGRNGHW*
TaMPK16(U) EQYEQRrvITSQGVVPNGVPSGSSYPrrNNTCKSETGEaERIDVSQAGPPKPYtGNKLPATVDGRNGHW*
TuMPK16 EQYEQRrvVTSQGIVPNGVPSGSSYPrrNNTCKSETGEaERIDVSQAGPPKPYtGNKLPATVDGRNGHW*
TaMPK16(1AS) EQYEQRrvVTSQGIVPNGVPSGSSYPrrNNTCKSETGEaERIDVSQAGPPKPYtGNKLAATVDGRNGHW*
::* * :.*.: * .* :: . * . ** .* .

MPK17 continued

	TRWYRAPEL	IDxWS^v_iGC	LLE^R_kLLA
TaMPK17(U)	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP
TsMPK17(Ub)	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP
ABD97883.1	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP
AetMPK17	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP
TaMPK17(7DL)	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP
AAx20165.1	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP
AAx20166.1	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP
TsMPK17(R)	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP
ScMPK17	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP
HvMPK17(7H)	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP
BAK07695.1	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP
AK252439.1	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP
ABC65848.1*	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP
TuMPK17p	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLF
TaMPK17(7AL)	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP
TsMPK17(A)	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP
ABC54587.1	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP
AK333198.1*	DAPSAIFWTDYVATR	WYRAPEL	CGSFFSKYTPAIDIWSIGCIFAELLTGRPLFP

FDPKDRPTAEAL

TaMPK17(U)	FDPKDRPSAEEALADPYFASLANVERE	PSRHPISKLEFEFERRKVTKDDVRELIYREILEYHPQMLEEYMKGGDQISFLYPSGVDRFKRQFAHLEEHY	SKGERGSPLQRKHASLPRQVRG
TsMPK17(Ub)	FDPKDRPSAEEALADPYFASLANVERE	PSRHPISKLEFEFERRKVTKDDVRELIYREILEYHPQMLEEYMKGGDQISFLYPSGVDRFKRQFAHLEEHY	SKGERGSPLQRKHASLPRQVRG
ABD97883.1	FDPKDRPSAEEALADPYFASLANVERE	PSRHPISKLEFEFERRKVTKDDVRELIYREILEYHPQMLEEYMKGGDQISFLYPSGVDRFKRQFAHLEEHY	SKGERGSPLQRKHASLPRQVRG
AetMPK17	FDPKDRPSAEEALADPYFASLANVERE	PSRHPISKLEFEFERRKVTKDDVRELIYREILEYHPQMLEEYMKGGDQISFLYPSGVDRFKRQFAHLEEHY	SKGERGSPLQRKHASLPRQVRG
TaMPK17(7DL)	FDPKDRPSAEEALADPYFASLANVERE	PSRHPISKLEFEFERRKVTKDDVRELIYREILEYHPQMLEEYMKGGDQISFLYPSGVDRFKRQFAHLEEHY	SKGERGSPLQRKHASLPRQVRG
AAx20165.1	FDPKDRPSAEEALADPYFASLANVERE	PSRHPISKLEFEFERRKVTKDDVRELIYREILEYHPQMLEEYMKGGDQISFLYPSGVDRFKRQFAHLEEHY	SKGERGSPLQRKHASLPRQVRG
AAx20166.1	FDPKDRPSAEEALADPYFASLANVERE	PSRHPISKLEFEFERRKVTKDDVRELIYREILEYHPQMLEEYMKGGDQISFLYPSGVDRFKRQFAHLEEHY	SKGERGSPLQRKHASLPRQVRG
TsMPK17(R)	FDPKDRPSAEEALADPYFASLANVERE	PSRHPISKLEFEFERRKVTKDDVRELIYREILEYHPQMLEEYMKGGDQISFLYPSGVDRFKRQFAHLEEHY	SKGERGSPLQRKHASLPRQVRG
ScMPK17	FDPKDRPSAEEALADPYFASLANVERE	PSRHPISKLEFEFERRKVTKDDVRELIYREILEYHPQMLEEYMKGGDQISFLYPSGVDRFKRQFAHLEEHY	SKGERGSPLQRKHASLPRQVRG
HvMPK17(7H)	FDPKDRPSAEEALADPYFASLANVERE	PSRHPISKLEFEFERRKVTKDDVRELIYREILEYHPQMLEEYMKGGDQISFLYPSGVDRFKRQFAHLEEHY	SKGERGSPLQRKHASLPRQVRG
BAK07695.1	FDPKDRPSAEEALADPYFASLANVERE	PSRHPISKLEFEFERRKVTKDDVRELIYREILEYHPQMLEEYMKGGDQISFLYPSGVDRFKRQFAHLEEHY	SKGERGSPLQRKHASLPRQVRG
AK252439.1	FDPKDRPSAEEALADPYFASLANVERE	PSRHPISKLEFEFERRKVTKDDVRELIYREILEYHPQMLEEYMKGGDQISFLYPSGVDRFKRQFAHLEEHY	SKGERGSPLQRKHASLPRQVRG
ABC65848.1*	FDPKDRPSAEEVNSSTFV		
TuMPK17p			
TaMPK17(7AL)	FDPKDRPSAEEALADPYFASLANVERE	PSRHPISKLEFEFERRKVTKDDVRELIYREILEYHPQMLEEYMKGGDQISFLYPSGVDRFKRQFAHLEEHY	SKGERGSPLQRKHASLPRQVRG
TsMPK17(A)	FDPKDRPSAEEALADPYFASLANVERE	PSRHPISKLEFEFERRKVTKDDVRELIYREILEYHPQMLEEYMKGGDQISFLYPSGVDRFKRQFAHLEEHY	SKGERGSPLQRKHASLPRQVRG
ABC54587.1	FDPKDRPSAEEALADPYFASLANVERE	PSRHPISKLEFEFERRKVTKDDVRELIYREILEYHPQMLEEYMKGGDQISFLYPSGVDRFKRQFAHLEEHY	SKGERGSPLQRKHASLPRQVRG
AK333198.1*	FDPKDRPSAEEALADPYFASLANVERE	PSRHPISKLEFEFERRKVTKDDVRELIYREILEYHPQMLEEYMKGGDQISFLYPSGVDRFKRQFAHLEEHY	SKGERGSPLQRKHASLPRQVRG

MPK17 continued

TaMPK17(U) ASNDGNNEQHISDQEMSAEPDAHGAVSPQKSQDAPSVGPNGLSPTSLSSRITYLKSASISASKCVVNPKNKQPEYDDAISEETEGAVDGLSEKVS KMHA*
TsMPK17(Ub) ASNDGNNEQHISDQEMSAEPDAHGAVSPQKSQDAPSVGPNGLSPTSLSSRITYLKSASISASKCVVNPKNKQPEYDDAISEETEGAVDGLSEKVS KMHA*
ABD97883.1 ASNDGNNEQHISDQEMSAEPDAHGTVSPQKSQDAPSVGPNGLSPTSLSSRITYLKSASISASKCVVNPKNKQPEYDDAISEETEGAVDGLSEKVS KMHA*
AetMPK17 ASNDGNNEQHISDQEMSAEPDAHGTVSPQKSQDAAGVGQNGLSPTSLSSRITYLKSASISASKCVVNPKNKQPEYDDAISEETEGAVDGLSEKVS KMHA*
TaMPK17(7DL) ASNDGNNEQHISDQEMSAEPDAHGTVSPQKSQDAAGVGQNGLSPTSLSSRITYLKSASISASKCVVNPKNKQPEYDDAISEETEGAVDGLSEKVS KMHA*
AAX20165.1 ASNDGNNEQHISDQEMSAEPDAHGTVSPQKSQDAAGVGQNGLSPTSLSSRITYLKSASISASKCVVNPKNKQPEYDDAISEETEGAVDGLSEKVS KMHA*
AAX20166.1 ASNDGNNEQHISDQEMSAEPDAHGAVSPQKSQDAPGVGQNGLSPTSLSSRITYLKSASISASKCVVNPKNKQPEYDDAISEETEGAVDGLSEKVS KMHA*
TsMPK17(R) ASNDGNNEQHISDQEMSAEPDAHGTE SPQKAQDAPGVGQNGLSPTSLSSRITYLKSASISASKCVVNPKNKQPEYDDAISEEAEGAVDGLSEKVS KMHA*
ScMPK17 ASNDGNNEQHISDQEMSAEPDAHGTE SPQKAQDAPGVGQNGLSPTSLSSRITYLKSASISASKCVVNPKNKQPEYDDAISEEAEGAVDGLSEKVS KMHA*
HvMPK17(7H) -----
BAK07695.1 -----
AK252439.1 ASNDGNNEQHISDQEMSAEPDARGAVSPQKPQDAPGVGQNGLSPTSLSSRITYLKSASISASKCVVNPKNKQPEYDDAISEETEGAVDGLSEKVS KMHA*
ABC65848.1* -----
TuMPK17p -----
TaMPK17(7AL) ASNDGNNEQHISDQEMSAEPDAHGAVSPQKSQDAPGVGQNGLSPTSLSSRITYLKSASISASKCVVNPKNKQPEYDDAISEETEGAVDGLSEKVS KMHA*
TsMPK17(A) ASNDGNNEQHISDQEMSAEPDAHGAVSPQKSQDAPGVGQNGLSPTSLSSRITYLKSASISASKCVVNPKNKQPEYDDAISEETEGAVDGLSEKVS KMHA*
ABC54587.1 ASNDGNNEQHISDQEMSAEPDAHGAVSPQKSQDAPGVGQNGLSPTSLSSRITYLKSASISASKCVVNPKNKQPEYDDAISEETEGAVDGLSEKVS KMHA*
AK333198.1* ASNDGNNEQHISDQEMSAEPDAHGAVSPQKSQDAPGVGQNGLSPTSLSSRITYLKSASISASKCVVNPKNKQPEYDDAISEETEGAVDGLSEKVS KMHA*

MPK20-1

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AK252802.1p
TaMPK20-1(3B)
TsMPK20-1(U2)p*
TsMPK20-1(U1)
ScMPK20-1
TsMPK20-1(U3)
AetMPK20-1
TaMPK20-1(3AL)
AKS50324.1
TuMPK20-1
TaMPK20-1(3DL)

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-----MQQDQRKKSSAEAEFFTEYGDASRYKIQEI
VHGGPRKRIVAVAFPCRWAKLLAFLVGFSTWGCTTT*LTSGACHHFNFATNTRSFCFSRKFL*STCTAVEFGINSLILVVASQ*LLILHVVH*KYLESSAEAEFFTEYGDASRYKIQEI
-----MQQDQRKKSSAEAEFFTEYGDASRYKIQEI
-----MISVILFQSSAEAEFFTEYGDASRYKIQEI
-----MQQDQRKKSSAEAEFFTEYGDASRYKIQEI
-----MQQDQRKKSSAEAEFFTEYGDASRYKIQEI
-----MQQDQRKKSSAEAEFFTEYGDASRYKIQEI
-----MQQDQRKKSSAEAEFFTEYGDASRYKIQEI
-----MQQDQRKKSSAEAEFFTEYGDASRYKIQEI
-----MQQDQRKKSSAEAEFFTEYGDASRYKIQEI

IGxGxYGxV **IKKIxxxF** **DAxRxLRE** **FxDIYxxxELM** **DLxxVI** **QxLRxLKYxH** **HR**

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AK252802.1p
TaMPK20-1(3B)
TsMPK20-1(U2)p*
TsMPK20-1(U1)
ScMPK20-1
TsMPK20-1(U3)
AetMPK20-1
TaMPK20-1(3AL)
AKS50324.1
TuMPK20-1
TaMPK20-1(3DL)

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VGKGSYGVVCSAIDVHTGEKVAIKKIHDIFEHISDAARILREIKLLRLLRHPDIVEIKHIMLPPSRDFKDIYVVFELMESDLHQVIKANDDLTKEHYQFFLYQLLRALKYIHTANVYHR
VGKGSYGVVCSAIDVHTGEKVAIKKIHDIFEHISDAARILREIKLLRLLRHPDIVEIKHIMLPPSRDFKDIYVVFELMESDLHQVIKANDDLTKEHYQFFLYQLLRALKYIHTANVYHR
VGKGSYGVVCSAIDVHTGEKVAIKKIHDIFEHISDAARILREIKLLRLLRHPDIVEIKHIMLPPSRDFKDIYVVFELMESDLHQVIKANDDLTKEHYQFFLYQLLRALKYIHTANVYHR
VGKGSYGVVCSAIDVHTGEKVAIKKIHDIFEHISDAARILREIKLLRLLRHPDIVEIKHIMLPPSRDFKDIYVVFELMESDLHQVIKANDDLTKEHYQFFLYQLLRALKYIHTANVYHR
VGKGSYGVVCSAIDVHTGEKVAIKKIHDIFEHISDAARILREIKLLRLLRHPDIVEIKHIMLPPSRDFKDIYVVFELMESDLHQVIKANDDLTKEHYQFFLYQLLRALKYIHTANVYHR
VGKGSYGVVCSAIDVHTGEKVAIKKIHDIFEHISDAARILREIKLLRLLRHPDIVEIKHIMLPPSRDFKDIYVVFELMESDLHQVIKANDDLTKEHYQFFLYQLLRALKYIHTANVYHR
VGKGSYGVVCSAIDVHTGEKVAIKKIHDIFEHISDAARILREIKLLRLLRHPDIVEIKHIMLPPSRDFKDIYVVFELMESDLHQVIKANDDLTKEHYQFFLYQLLRALKYIHTANVYHR
VGKGSYGVVCSAIDVHTGEKVAIKKIHDIFEHISDAARILREIKLLRLLRHPDIVEIKHIMLPPSRDFKDIYVVFELMESDLHQVIKANDDLTKEHYQFFLYQLLRALKYIHTANVYHR

DLKPxN **LxNxNCxLKIxDGLAR** **TRWYRAPEL** **IDxWS^vGC**

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AK252802.1p
TaMPK20-1(3B)
TsMPK20-1(U2)p*
TsMPK20-1(U1)
ScMPK20-1
TsMPK20-1(U3)
AetMPK20-1
TaMPK20-1(3AL)
AKS50324.1
TuMPK20-1
TaMPK20-1(3DL)

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DLKPKNILANSNCKLKICDFGLARVAFNDTPTTIFWTDYVATRWRAPPELPGSFFSKYTPAIDVWSIGCIFAELVTGKPLFPKGNVVHQLDLMTDLLGTPSMDTISRVRNEKARRYLSSM
DLKPKNILANSNCKLKICDFGLARVAFNDTPTTIFWTDYVATRWRAPPELPGSFFSKYTPAIDVWSIGCIFAELVTGKPLFPKGNVVHQLDLMTDLLGTPSMDTISRVRNEKARRYLSSM
DLKPKNILANSNCKLKICDFGLARVAFNDTPTTIFWTDYVATRWRAPPELPGSFFSKYTPAIDVWSIGCIFAELVTGKPLFPKGNVVHQLDLMTDLLGTPSMDTISRVRNEKARRYLSSM
DLKPKNILANSNCKLKICDFGLARVAFNDTPTTIFWTDYVATRWRAPPELPGSFFSKYTPAIDVWSIGCIFAELVTGKPLFPKGNVVHQLDLMTDLLGTPSMDTISRVRNEKARRYLSSM
DLKPKNILANSNCKLKICDFGLARVAFNDTPTTIFWTDYVATRWRAPPELPGSFFSKYTPAIDVWSIGCIFAELVTGKPLFPKGNVVHQLDLMTDLLGTPSMDTISRVRNEKARRYLSSM
DLKPKNILANSNCKLKICDFGLARVAFNDTPTTIFWTDYVATRWRAPPELPGSFFSKYTPAIDVWSIGCIFAELVTGKPLFPKGNVVHQLDLMTDLLGTPSMDTISRVRNEKARRYLSSM
DLKPKNILANSNCKLKICDFGLARVAFNDTPTTIFWTDYVATRWRAPPELPGSFFSKYTPAIDVWSIGCIFAELVTGKPLFPKGNVVHQLDLMTDLLGTPSMDTISRVRNEKARRYLSSM
DLKPKNILANSNCKLKICDFGLARVAFNDTPTTIFWTDYVATRWRAPPELPGSFFSKYTPAIDVWSIGCIFAELVTGKPLFPKGNVVHQLDLMTDLLGTPSMDTISRVRNEKARRYLSSM

MPK20-1 continued

LE^RLLAFDPKDRPTAEEAL

AK252802.1p
TaMPK20-1(3B)
TsMPK20-1(U2)p*
TsMPK20-1(U1)
ScMPK20-1
TsMPK20-1(U3)
AetMPK20-1
TaMPK20-1(3AL)
AKS50324.1
TuMPK20-1
TaMPK20-1(3DL)
RKKELISFSHKFPNADPLALDLLQRLLA...

AK252802.1p
TaMPK20-1(3B)
TsMPK20-1(U2)p*
TsMPK20-1(U1)
ScMPK20-1
TsMPK20-1(U3)
AetMPK20-1
TaMPK20-1(3AL)
AKS50324.1
TuMPK20-1
TaMPK20-1(3DL)
HLEENTENGPVVPMDRKHTSLPRSTIVHSAP...

AK252802.1p
TaMPK20-1(3B)
TsMPK20-1(U2)p*
TsMPK20-1(U1)
ScMPK20-1
TsMPK20-1(U3)
AetMPK20-1
TaMPK20-1(3AL)
AKS50324.1
TuMPK20-1
TaMPK20-1(3DL)
QIPQIYGYQTTPAKSACSEPSQAEMYTLHQ...

MPK20-2 continued

LE^RLLAFDPKDRPTAEEAL

BAJ92365.1 DLMTDLLGTPSMDTISRVRNEKARRYLTSMRKKDPVPPFSQKFPNADPLGVKLLLEKLLAFDPKDRPTAEEALTDPYFRGLSKPEREPSCQPIRKMEFDFEHSRVSKDDIRELIFQEILEYH
AK361419.1 DLMTDLLGTPSMDTISRVRNEKARRYLTSMRKKDPVPPFSQKFPNADPLGVKLLLEKLLAFDPKDRPTAEEALTDPYFRGLSKPEREPSCQPIRKMEFDFEHSRVSKDDIRELIFQEILEYH
HvMPK20-2(1H) DLMTDLLGTPSMDTISRVRNEKARRYLTSMRKKDPVPPFSQKFPNADPLGVKLLLEKLLAFDPKDRPTAEEALTDPYFRGLSKPEREPSCQPIRKMEFDFEHSRVSKDDIRELIFQEILEYH
ScMPK20-2 DLMTDLLGTPSMDTISRVRNEKARRYLSMRKKDPVPPFSQKFPNADPLGVKLLLEKLLAFDPKDRPTAEEALTDPYFRGLSKPEREPSCQPIRKLEFDFEHSRVSKDDIRELIFQEILEYH
TsMPK20-2(U1) DLMTDLLGTPSMDTISRVRNEKARRYLSMRKKDPVPPFSQKFPNADPLGVKLLLEKLLAFDPKDRPTAEEALTDPYFRGLSKPEREPSCQPIRKMEFDFEHSRVSKDDIRELIFQEILEYH
TsMPK20-2(U2) DLMTDLLGTPSMDTISRVRNEKARRYLSMRKKDPVPPFSQKFPNADPLGVKLLLEKLLAFDPKDRPTAEEALTDPYFRGLSKPEREPSCQPIRKMEFDFEHSRVSKDDIRELIFQEILEYH
AetMPK20-2p DLMTDLLGTPSMDTISRVRNEKARRYLSMRKKDPVPPFSQKFPNADPLGVKLLLEKLLAFDPKDRPTAEEALTDPYFRGLSKPEREPSCQPIRKMEFDFEHSRVSKDDIRELIFQEILEYH
TaMPK20-2(1DL) DLMTDLLGTPSMDTISRVRNEKARRYLSMRKKDPVPPFSQKFPNADPLGVKLLLEKLLAFDPKDRPTAEEALTDPYFRGLSKPEREPSCQPIRKMEFDFEHSRVSKDDIRELIFQEILEYH
tplb0059e09 DLMTDLLGTPSMDTISRVRNEKARRYLSMRKKDPVPPFSQKFPNADPLGVKLLLEKLLAFDPKDRPTAEEALTDPYFRGLSKPEREPSCQPIRKMEFDFEHSRVSKDDIRELIFQEILEYH
TaMPK20-2(1BL) DLMTDLLGTPSMDTISRVRNEKARRYLSMRKKDPVPPFSQKFPNADPLGVKLLLEKLLAFDPKDRPTAEEALTDPYFRGLSKPEREPSCQPIRKMEFDFEHSRVSKDDIRELIFQEILEYH
TuMPK20-2p DLMTDLLGTPSMDTISRVRNEKARRYLSMRKKDPVPPFSQKFPNADPLGVKLLLEKLLAFDPKDRPTAEEALTDPYFRGLSKPEREPSCQPIRKMEFDFEHSRVSKDDIRELIFQEILEYH
TaMPK20-2(1AL) DLMTDLLGTPSMDTISRVRNEKARRYLSMRKKDPVPPFSQKFPNADPLGVKLLLEKLLAFDPKDRPTAEEALTDPYFRGLSKPEREPSCQPIRKMEFDFEHSRVSKDDIRELIFQEILEYH
AK331818.1 DLMTDLLGTPSMDTISRVRNEKARRYLSMRKKDPVPPFSQKFPNADPLGVKLLLEKLLAFDPKDRPTAEEALTDPYFRGLSKPEREPSCQPIRKMEFDFEHSRVSKDDIRELIFQEILEYH
*****:*****:*****

BAJ92365.1 PQLLKSVIDGTERTTFLYPSAVDHFKKQFSHLEESDGS GPVVPADRKHASLPRSTIVHSTPIPAKDTRPLFGKPCSKTSSETGRYAGNGHGASQASHAAQAVVSRRRAAGSALPYEGGSGK
AK361419.1 PQLLKSVIDGTERTTFLYPSAVDHFKKQFSHLEESDGS GPVVPADRKHASLPRSTIVHSTPIPAKDTRPLFGKPCSKTSSETGRYAGNGHGASQASHAAQAVVSRRRAAGSALPYEGGSGK
HvMPK20-2(1H) PQLLKSVIDGTERTTFLYPSAVDHFKKQFSHLEESDGS GPVVPADRKHASLPRSTIVHSTPIPAKDTRPLFGKPCSKTSSETGRYAGNGHGASQASHAAQAVVSRRRAAGSALPYEGGSGK
ScMPK20-2 PQLLKSVIDGTERTTFLYPSAVDHFKKQFSHLEESDGS GPVVPADRKHASLPRSTIVHSTPIPAKDTRPLFGKPCSKTSSETGRYAGNGHGASQASHAAQAVVSRRRAAGSALPSEAGVGR
TsMPK20-2(U1) PQLLKSVIDGTERTTFLYPSAVDHFKKQFSHLEESDGS GPVVPADRKHASLPRSTIVHSTPIPAKDTRPLFGKPCSKTSSETGRYAGNGHGASQASHAAQAVVSRRRAAGSALPSEAGVGR
TsMPK20-2(U2) PQLLKSVIDGTERTTFLYPSAVDHFKKQFSHLEESDGS GPVVPADRKHASLPRSTIVHSAPIPAKDTRPLFGKPCSKTSSETGRYAGNGRGASQASHAAQAVVSRRRAAGSAL-----
AetMPK20-2p PQLLKSVIDGTERTTFLYPSAVDHFKKQFSHLEESDGS GPVVPADRKHASLPRSTIVHSTPIPAKDTRPLFGKPCNKTSSSETGRYAGNGHGASQASHAAQAVVSRRRAAGSAL-----
TaMPK20-2(1DL) PQLLKSVIDGTERTTFLYPSAVDHFKKQFSHLEESDGS GPVVPADRKHASLPRSTIVHSTPIPAKDTRPLFGKPCNKTSSSETGRYAGNGHSASQASHAAQAVVSRRRAAGSAL-----
tplb0059e09 PQLLKSVIDGTERTTFLYPSAVDHFKKQFSHLEESDGS GPVVPADRKHASLPRSTIVHSTPIPAKDTRPLFGKPCNKTSSSETGRYAGNGHSASQASHAAQAVVSRRRAAGSAL-----
TaMPK20-2(1BL) PQLLKSVIDGTERTTFLYPSAVDHFKKQFSHLEESDGS GPVVPADRKHASLPRSTIVHSTPIPAKDTRPLFGKPCNKTSSSETGRYAGNGHGASQASHAAQAVISRRRAAGSAL-----
TuMPK20-2p PQLLKSVIDGTERTTFLYPSAVDHFKKQFSHLEESDGS GPVVPADRKHASLPRSTIVHSAPIPAKDTRPLFGKPCSKTSSETGRYAGNGHGASQASHAAQAVVSRRRAAGSAL-----
TaMPK20-2(1AL) PQLLKSVIDGTERTTFLYPSAVDHFKKQFSHLEESDGS GPVVPADRKHASLPRSTIVHSAPIPAKDTRPLFGKPCSKTSSETGRYAGNGRGASQASHAAQAVVSRRRAAGSAL-----
AK331818.1 PQLLKSVIDGTERTTFLYPSAVDHFKKQFSHLEESDGS GPVVPADRKHASLPRSTIVHSAPIPAKDTRPLFGKPCSKTSSETGRYAGNGRGASQASHAAQAVVSRRRAAGSAL-----
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MPK20-2 continued

BAJ92365.1 HPYDVASRPAMSTGCPPQQQIPQMYGQYQHQAAPAGAGAGAGAGIPQAMGGYACGGYAKGTAP----APAMRAPTYRHVPAGQKNGRLDRLAVETTDIYTRSLNGIVAAAAASAGTASAHRKVGTVPFGMPTTY*
AK361419.1 HPYDVASRPAMSTGCPPQQQIPQMYGQYQHQAAPAGAGAGAGAGIPQAMGGYACGGYAKGTAP----APAMRAPTYRHVPAGQKNGRLDRLAVETTDIYTRSLNGIVAAAAASAGTASAHRKVGTVPFGMPTTY*
HvMPK20-2(1H) HPYDVASRPAMSTGCPPQQQIPQMYGQYQHQAAPAGAGAGAGAGIPQAMGGYACGGYAKGTAP----APAMRAPTYRHVPAGQKNGRLDRLAVETTDIYTRSLNGIVAAAAASAGTASAHRKVGTVPFGMPTTY*
ScMPK20-2 YPYDAASRPAMSSGCPPQQQIPQLYGQYQHQAAPGA---GAGIPQTMGGYACGGYTKGTAPNAAAAAPAMRAPPYRHLPGVQKNGPLDRLAVETTDIYTRSLNGIVAAAAASAGTAGAHRKVGAVPFGMPTTY*
TsMPK20-2(U1) YPYDAASRPAMSSGCPPQQQIPQLYGQYQHQAAPGA---GAGIPQTMGGYACGGYTKGTAPNAAAAAPAMRAPPYRHLPGVQKNGPLDRLAVETTDIYTRSLNGIVAAAAASAGTASAHRKVGAVPFGMPTTY*
TsMPK20-2(U2) -PYDAASRPTISPGCPPQQQIPQMYGQYQHQAAPA-----GAGIPQAMGGYACGGYTKGTAPNAAAAAPAMRAPPYRHLPGVQKNGPLDRLAVETTDIYTRSLNGIVAAAAASAGTASAHRKVGAVPFGMPTTY*
AetMPK20-2p -PYDAASRPAMSPGCP-QQQIPQMYGQYQHQAAPGA---GAGIPQAMGGYACGAYTKGTAPNAAAAAPAMRAPPYRHLPGVQKNGPLDRLAVETTDIYTRSLNGIVAAAAASAGATSahrKVGAVPFGMPTTY*
TaMPK20-2(1DL) -PYDAASRPTISPGCP-QQQIPQMYGQYQHQAAPGA---GAGIPQTMGGYACGGYTKGTAPNAA-AAPAMRAPPYRHLPGVQKNGPLDRLAVETTDIYTRSLNGIVAAAAASAGATSahrKVGAVPFGMPTTY*
tp1b0059e09 -PYDAASRPTISPGCP-QQQIPQMYGQYQHQAAPGA---GAGIPQTMGGYACGGYTKGTAPNAA-AAPAMRAPPYRHLPGVQKNGPLDRLAVETTDIYTRSLNGIVAAAAASAGATSahrKVGAVPFGMPTTY*
TaMPK20-2(1BL) -PYDAASRPTISPGCPPQQQIPQMYGQYQHQAAPGA--GAGAGIPQAMGGYACGGYTKGTAPNAAAAAPAMRAPPYRHLPTGQKNGPLDRLAVETTDIYTRSLNGIVAAAAASAGATGAHRKVGAVPFGMPTTY*
TuMPK20-2p -PYDAASRPTISPGCPPQQQIPQMYGQYQHQAAPA-----GAGIPQAMGGYACGGYTKGTAPDAA-RG-----
TaMPK20-2(1AL) -PYDAASRPTISPGCPPQQQIPQMYGQYQHQAAPA-----GAGIPQAMGGYACGGYTKGTAPNAA-AAPAMRAPPYRHLPGVQKNGPLDRLAVETTDIYTRSLNGIVAAAAASAGTASAHRKVGAVPFGMPTTY*
AK331818.1 -PYDAASRPTISPGCPPQQQIPQMYGQYQHQAAPA-----GAGIPQAMGGYACGGYTKGTAPNAA-AAPAMRAPPYRHLPGVQKNGPLDRLAVETTDIYTRSLNGIVAAAAASAGTASAHRKVGAVPFGMPTTY*
.*:;* *** *****:***** *****:****:*.*:*****

MPK20-4

HvMPK20-4 (3H) MQPDQQQ--HQRRKGSSEMDFFSEYGDANRYKIQEVI**IGxGxYGxV** IKKI**IxxxF** DAxRxLRE FxDIYxxxELM DL
 BAJ97013.1 MQPDQQQ--HQRRKGSSEMDFFSEYGDANRYKIQEVI**IGKSGYGVVCSAIDQHNGDKVAIKK**IHNI**FEHLSDAARILREIKLLRLLRHPDIVEIRHIMLPPSRRDFKDIYVVFELMDTDL**
 BAJ96852.1 MQPDQQQ--HQRRKGSSEMDFFSEYGDANRYKIQEVI**IGKSGYGVVCSAIDQHNGDKVAIKK**IHNI**FEHLSDAARILREIKLLRLLRHPDIVEIRHIMLPPSRRDFKDIYVVFELMDTDL**
 ScMPK20-4 MQPDQQ--QQQRRKGSPEMDFFSEYGDANRYKIQEVI**IGKSGYGVVCSAIDQHTGDKVAIKK**IHNI**FEHLSDAARILREIKLLRLLRHPDIVEIRHIMLPPSRRDFKDIYVVFELMDTDL**
 TsMPK20-4 (U) MQPDQQ--QQQRRKGSPEMDFFSEYGDANRYKIQEVI**IGKSGYGVVCSAIDQHTGDKVAIKK**IHNI**FEHLSDAARILREIKLLRLLRHPDIVEIRHIMLPPSRRDFKDIYVVFELMDTDL**
 TuMPK20-4 ----MQPDQHQQRRKGSSEMDFFSEYGDANRYKIQEVI**IGKSGYGVVCSAIDQHTGDKVAIKK**IHNI**FEHLSDAARILREIKLLRLLRHPDIVEIRHIMLPPSRRDFKDIYVVFELMDTDL**
 TaMPK20-4 (3AL) ----MQPDQNQQRRKGSSEMDFFSEYGDANRYKIQEVI**IGKSGYGVVCSAIDQHTGDKVAIKK**IHNI**FEHLSDAARILREIKLLRLLRHPDIVEIRHIMLPPSRRDFKDIYVVFELMDTDL**
 AetMPK20-4 MQPD--QHQQQRRKGSSEMDFFSEYGDANRYKIQEVI**IGKSGYGVVCSAIDQHTGDKVAIKK**IHNI**FEHLSDAARILREIKLLRLLRHPDIVEIRHIMLPPSRRDFKDIYVVFELMDTDL**
 TaMPK20-4 (3DL) MQPD--QHQQQRRKGSSEMDFFSEYGDANRYKIQEVI**IGKSGYGVVCSAIDQHTGDKVAIKK**IHNI**FEHLSDAARILREIKLLRLLRHPDIVEIRHIMLPPSRRDFKDIYVVFELMDTDL**
 TaMPK20-4 (3B) MQPDQQQHQQRRKGSSEMDFFSEYGDANRYKIQEVI**IGKSGYGVVCSAIDQHTGDKVAIKK**IHNI**FEHLSDAARILREIKLLRLLRHPDIVEIRHIMLPPSRRDFKDIYVVFELMDTDL**
 AK333309.1p MQPDQQQHQQRRKGSSEMDFFSEYGDANRYKIQEVI**IGKSGYGVVCSAIDQHTGDKVAIKK**IHNI**FEHLSDAARILREIKLLRLLRHPDIVEIRHIMLPPSRRDFKDIYVVFELMDTDL**
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xxVI **QxLRxLKYxH** **HRDLKPxN LxNxNCxLKIxDGLAR** **TRWYRAPEL** **IDxWS^viGC**
 HvMPK20-4 (3H) HQVIKANDDLTKEHHQFFLYQMLRALKYIHTAN**VYHRDLKPKNILANAN**CKLKICDFGLARVAFNDTPTTVF**WTDYV**ATRWYRAPEL**CGSFF**TKYSPAIDIWSIGCIFAELT**GKPL**FPG
 BAJ97013.1 HQVIKANDDLTKEHHQFFLYQMLRALKYIHTAN**VYHRDLKPKNILANAN**CKLKICDFGLARVAFNDTPTTVF**WTDYV**ATRWYRAPEL**CGSFF**TKYSPAIDIWSIGCIFAELT**GKPL**FPG
 BAJ96852.1 HQVIKANDDLTKEHHQFFLYQMLRALKYIHTAN**VYHRDLKPKNILANAN**CKLKICDFGLARVAFNDTPTTVF**WTDYV**ATRWYRAPEL**CGSFF**TKYSPAIDIWSIGCIFAELT**GKPL**FPG
 ScMPK20-4 HQVIKANDDLTKEHHQFFLYQMLRALKYIHTAN**VYHRDLKPKNILANAN**CKLKICDFGLARVAFNDTPTTVF**WTDYV**ATRWYRAPEL**CGSFF**TKYSPAIDIWSIGCIFAELT**GKPL**FPG
 TsMPK20-4 (U) HQVIKANDDLTKEHHQFFLYQMLRALKYIHTAN**VYHRDLKPKNILANAN**CKLKICDFGLARVAFNDTPTTVF**WTDYV**ATRWYRAPEL**CGSFF**TKYSPAIDIWSIGCIFAELT**GKPL**FPG
 TuMPK20-4 HQVIKANDDLTKEHHQFFLYQMLRALKYIHTAN**VYHRDLKPKNILANAN**CKLKICDFGLARVAFNDTPTTVF**WTDYV**ATRWYRAPEL**CGSFF**TKYSPAIDIWSIGCIFAELT**GKPL**FPG
 TaMPK20-4 (3AL) HQVIKANDDLTKEHHQFFLYQMLRALKYIHTAN**VYHRDLKPKNILANAN**CKLKICDFGLARVAFNDTPTTVF**WTDYV**ATRWYRAPEL**CGSFF**TKYSPAIDIWSIGCIFAELT**GKPL**FPG
 AetMPK20-4 HQVIKANDDLTKEHHQFFLYQMLRALKYIHTAN**VYHRDLKPKNILANAN**CKLKICDFGLARVAFNDTPTTVF**WTDYV**ATRWYRAPEL**CGSFF**TKYSPAIDIWSIGCIFAELT**GKPL**FPG
 TaMPK20-4 (3DL) HQVIKANDDLTKEHHQFFLYQMLRALKYIHTAN**VYHRDLKPKNILANAN**CKLKICDFGLARVAFNDTPTTVF**WTDYV**ATRWYRAPEL**CGSFF**TKYSPAIDIWSIGCIFAELT**GKPL**FPG
 TaMPK20-4 (3B) HQVIKANDDLTKEHHQFFLYQMLRALKYIHTAN**VYHRDLKPKNILANAN**CKLKICDFGLARVAFNDTPTTVF**WTDYV**ATRWYRAPEL**CGSFF**TKYSPAIDIWSIGCIFAELT**GKPL**FPG
 AK333309.1p HQVIKANDDLTKEHHQFFLYQMLRALKYIHTAN**VYHRDLKPKNILANAN**CKLKICDFGLARVAFNDTPTTVF**WTDYV**ATRWYRAPEL**CGSFF**TKYSPAIDIWSIGCIFAELT**GKPL**FPG

LE^RLLAFDPKDRPTAEEL
 HvMPK20-4 (3H) KNVVHQLDLMTDLLGTPSLDTSRIRNEKARRYLSMRKKQTVCFSERFPKADPAALK**MQRLLAFDPKDRPTAEEL**ADPYFKGLGKVEREPSCQPI**SKFEF**EFERKKVTKEDVKELIF
 BAJ97013.1 KNVVHQLDLMTDLLGTPSLDTSRIRNEKARRYLSMRKKQTVCFSERFPKADPAALK**MQRLLAFDPKDRPTAEEL**ADPYFKGLGKVEREPSCQPI**SKFEF**EFERKKVTKEDVKELIF
 BAJ96852.1 KNVVHQLDLMTDLLGTPSLDTSRIRNEKARRYLSMRKKQTVCFSERFPKADPAALK**MQRLLAFDPKDRPTAEEL**ADPYFKGLGKVEREPSCQPI**SKFEF**EFERKKVTKEDVKELIF
 ScMPK20-4 KNVVHQLDLMTDLLGTPSLDTSRIRNEKARRYLSMRKKQVCFSERFPKADAAALK**MQRLLAFDPKDRPTAEEL**ADPYFKGLGKVEREPSCQPI**SKFEF**EFERKKVTKEDVKELIF
 TsMPK20-4 (U) KNVVHQLDLMTDLLGTPSLDTSRIRNEKARRYLSMRKKQVCFSERFPKADAAALK**MQRLLAFDPKDRPTAEEL**ADPYFKGLGKVEREPSCQPI**SKFEF**EFERKKVTKEDVKELIF
 TuMPK20-4 KNVVHQLDLMTDLLGTPSLDTSRIRNEKARRYLSMRKKQVCFSERFPKADPAALK**MQRLLAFDPKDRPTAEEL**ADPYFKGLGKVEREPSCQPI**SKFEF**EFERKKVTKEDVKELIF
 TaMPK20-4 (3AL) KNVVHQLDLMTDLLGTPSLDTSRIRNEKARRYLSMRKKQVCFSERFPKADPAALK**MQRLLAFDPKDRPTAEEL**ADPYFKGLGKVEREPSCQPI**SKFEF**EFERKKVTKEDVKELIF
 AetMPK20-4 KNVVHQLDLMTDLLGTPSLDTSRIRNEKARRYLSMRKKQVCFSERFPKADPAALK**MQRLLAFDPKDRPTAEEL**ADPYFKGLGKVEREPSCQPI**SKFEF**EFERKKVTKEDVKELIF
 TaMPK20-4 (3DL) KNVVHQLDLMTDLLGTPSLDTSRIRNEKARRYLSMRKKQVCFSERFPKADPAALK**MQRLLAFDPKDRPTAEEL**ADPYFKGLGKVEREPSCQPI**SKFEF**EFERKKVTKEDVKELIF
 TaMPK20-4 (3B) KNVVHQLDLMTDLLGTPSLDTSRIRNEKARRYLSMRKKQVCFSERFPKADPA**AFKLMQRLLAFDPKDRPTAEEL**ADPYFKGLGKVEREPSCQPI**SKFEF**EFERKKVTKEDVKELIF
 AK333309.1p KNVVHQLDLMTDLLGTPSLDTSV-----

MPK20-4 continued

HvMPK20-4 (3H) REILEYHPQLLKDYMNGTEKTNFLYPS-----AVDNFRRQFANLEENGGKGGAVVPSDRKHVSLP-----
BAJ97013.1 REILEYHPQLLKDYMNGTEKTNFLYPS-----AVDNFRRQFANLEENGGKGGAVVPSDRKHVSLP-----
BAJ96852.1 REILEYHPQLLKDYMNGTEKTNFLYPS-----AVDNFRRQFANLEENGGKGGAVVPSDRKHVSLP-----
ScMPK20-4 REILEYHPQLLKDYMNGTEKTNFLYPGFYHKISSIFFHYMPIFITDPFLVPMLLSAVDNFRRQFANLEENGGKGGAIIVPSDRKHVSLPFFGDL-----MVLWNR
TsMPK20-4 (U) REILEYHPQLLKDYMNGTEKTNFLYPS-----AVDNFRRQFANLEENGGKGGAIIVPSDRKHVSLPVLSHGTMESLYMTKDGQVVRNFSSSLMIWHD
TuMPK20-4 REILEYHPQLLKDYMNGTEKSNFLYPS-----AVDNFRRQFANLEENGGKGGAIIVPSDRKHVSLP-----
TaMPK20-4 (3AL) REILEYHPQLLKDYMNGTEKTNFLYPS-----AVDNFRRQFANLEENGGKGGAIIVPSDRKHVSLP-----
AetMPK20-4 REILEYHPQLLKDYMNGTEKTNFLYPS-----AVDNFRRQFANLEENGGKGGAIIVPSDRKHVSLP-----
TaMPK20-4 (3DL) REILEYHPQLLKDYMNGTEKTNFLYPS-----AVDNFRRQFANLEENGGKGGAIIVPSDRKHVSLP-----
TaMPK20-4 (3B) REILEYHPQLLKDYMNGTEKTNFLYPS-----AVDNFRRQFANLEENGGKGGAIIVPSDRKHVSLP-----
AK333309.1p -----

HvMPK20-4 (3H) -----RTTTVHSTPIPPKDQKPSQVPQRIPTGRPGRVVGVPVPIFENSCAMPYSQRRVARNPVLPAATNLSAYAYHRKSDNTERELQQELEKDRMQYQPMQRFMDAK
BAJ97013.1 -----RTTTVHSTPIPPKDQKPSQVPQRIPTGRPGRVVGVPVPIFENSCAMPYSQRRVARNPVLPAATNLSAYAYHRKSDNTERELQQELEKDRMQYQPMQRFMDAK
BAJ96852.1 -----RTTTVHSTPIPPKDQKPSQVPQRIPTGRPGRVVGVPVPIFENSCAMPYSQRRVARNPVLPAATNLSAYAYHRKSDNTERELQQELEKDRMQYQPMQRFMDAK
ScMPK20-4 FT-----QKMVRTTTTVHSTSIIPKEQKSSQVPQRIPTGRPGRVVGVPVPIFENSCAMPYSQRRVARNPVLPAATNLSAYAYHRKSDSSERELQQELEKDRMQYQPMQRFMDAK
TsMPK20-4 (U) NFRDCHSTLLADIFAFDRTTTVHSTPIPPKDQKSSQVPQRIPTGRPGRVVGVPVPIFENSCAMPYSQRRVARNPVLPAATNLSAYAYHRKSDSSERELQQELEKDRMQYQPMQRFMDAK
TuMPK20-4 -----RTTTVHSTPIPPKDQKSSQVPQRIPTGRPGRVVGVPVPIFENSCAMPYSQRRVARNPVLPAATNLSAYAYHRKSDSSERELQQELEKDRMQYQPMQRFMDAK
TaMPK20-4 (3AL) -----RTTTVHSTPIPPKDQKSSQVPQRIPTGRPGRVVGVPVPIFENSCAMPYSQRRVARNPVLPAATNLSAYAYHRKSDSSERELQQELEKDRMQYQPMQRFMDAK
AetMPK20-4 -----RTTTVHSTPIPPKDQKSSQVPQRIPTGRPGRVVGVPVPIFENSCAMPYSQRRVARNPVLPAATNLSAYAYHRKSDSSERELQQELEKDRMQYQPMQRFMDAK
TaMPK20-4 (3DL) -----RTTTVHSTPIPPKDQKSSQVPQRIPTGRPGRVVGVPVPIFENSCAMPYSQRRVARNPVLPAATNLSAYAYHRKSDSSERELQQELEKDRMQYQPMQRFMDAK
TaMPK20-4 (3B) -----RTTTVHSTPIPPKDQKSSQVPQRIPTGRPGRVVGVPVPIFENSCAMPYSQRRVARNPVLPAATNLSAYAYHRKSDSSERELQQELEKDRMQYQPMQRFMDAK
AK333309.1p -----

HvMPK20-4 (3H) MVSPDLRSSSYMPKGVPKADVAERTALQPNNMQGIAPFNGLIAAVGGSYNKASAVQYGVSRMY*
BAJ97013.1 MVSPDLRSSSYMPKGVPKADVAERTALQPNNMQGIAPFNGLIAAVGGSYNKASAVQYGVSRMY*
BAJ96852.1 MVSPDLRSSSYMPKGVPKADVAERTALQPNNMQGIAPFNGLIAAVGGSYNKASAVQYGVSRMY*
ScMPK20-4 MVSPDLRSTSYMPKGVPKADVAERTGLQPNNMQGIAPFNGLIAAVGGSYNKASAVQYGVSRMY*
TsMPK20-4 (U) MVSPDLRSTSYMPKGVPKADVAERTGLQPNNMQGIAPFNGLIAAVGGSYNKASAVQYGVSRMY*
TuMPK20-4 MVSPDLRSTSYMPKGVPKADVAERTGLQPNNMQGIAPFNGLIAAVGGSYNKASAVQYGVSRMY*
TaMPK20-4 (3AL) MVSPDLRSTSYMPKGVPKADVAERTGLQPNNMQGIAPFNGLIAAVGGSYNKASAVQYGVSRMY*
AetMPK20-4 MVSPDLRSTSYMPKGVPKADVAERTGLQPNNMQGIAPFNGLIAAVGGSYNKASAVQYGVSRMY*
TaMPK20-4 (3DL) MVSPDLRSTSYMPKGVPKADVAERTGLQPNNMQGIAPFNGLIAAVGGSYNKASAVQYGVSRMY*
TaMPK20-4 (3B) MVSPDLRSTSYMPKGVPKADVAERTGLQPNNMQGIAPFNGLIAAVGGSYNKASAVQYGVSRMY*
AK333309.1p -----

MPK21-1

BAK08351.1 -----MDPGKKTSESEFFTEYGELN
TsMPK21-1(U)p MPSPPLVLKPQPLLLPTSPAPTHSAEKQQQPQRAHTRSSIAMAAAAAAGTREEMVYMAKLAEQAERYEEMVEFMGEAGRLRVALPRAPARTNPPPRMMDPGKKTSESEFFTEYGELN
TaMPK21-1(1DL) -----MHTHSHTSESEFFTEYGELN
AetMPK21-1 -----MHTHSHTSESEFFTEYGELN
ScMPK21 -----MDPGKKTSESEFFTEYGELN
HvMPK21(1H) -----MDPGKKTSESEFFTEYGELN
TaMPK21-1(1BL) -----MDPGKKTSESEFFTEYGELN
TaMPK21-1(1AL) -----MDPGKKTSESEFFTEYGELN
TuMPK21-1 -----MDPGKKTSESEFFTEYGELN
AKL80629.1 -----MDPGKKTSESEFFTEYGELN
tplb0009k03 -----MDPGKKTSESEFFTEYGELN
* . : * *****

IGxGxYGxV IKKIxxxF DAxRxLRE FxDIYxxxELM DLxxVI QxLRxLKYxH
BAK08351.1 RYQVSEVIGKGSYGVVAAAIDTQTGERVAIKKINDVFDHVSDATRILREIKLLRLLRHPDIVQIKHIMLPPSRREFRDIYVVFELMESDLHQVIKANDDLTPEHHQFFLYQLLRGMKYIH
TsMPK21-1(U)p RYQVSEVIGKGSYGVVAAAIDTQTGERVAIKKINDVFDHVSDATRILREIKLLRLLRHPDIVQIKHIMLPPSRREFRDIYVVFELMESDLHQVIKANDDLTPEHHQFFLYQLLRGMKYIH
TaMPK21-1(1DL) RYQVSEVIGKGSYGVVAAAIDTQTGERVAIKKINDVFDHVSDATRILREIKLLRLLRHPDIVQIKHIMLPPSRREFRDIYVVFELMESDLHQVIKANDDLTPEHHQFFLYQLLRGMKYIH
AetMPK21-1 RYQVSEVIGKGSYGVVAAAIDTQTGERVAIKKINDVFDHVSDATRILREIKLLRLLRHPDIVQIKHIMLPPSRREFRDIYVVFELMESDLHQVIKANDDLTPEHHQFFLYQLLRGMKYIH
ScMPK21 RYQVSEVIGKGSYGVVAAAIDTQTGERVAIKKINDVFDHVSDATRILREIKLLRLLRHPDIVQIKHIMLPPSRREFRDIYVVFELMESDLHQVIKANDDLTPEHHQFFLYQLLRGMKYIH
HvMPK21(1H) RYQVSEVIGKGSYGVVAAAIDTQTGERVAIKKINDVFDHVSDATRILREIKLLRLLRHPDIVQIKHIMLPPSRREFRDIYVVFELMESDLHQVIKANDDLTPEHHQFFLYQLLRGMKYIH
TaMPK21-1(1BL) RYQVSEVIGKGSYGVVAAAIDTQTGERVAIKKINDVFDHVSDATRILREIKLLRLLRHPDIVQIKHIMLPPSRREFRDIYVVFELMESDLHQVIKANDDLTPEHHQFFLYQLLRGMKYIH
TaMPK21-1(1AL) RYQVSEVIGKGSYGVVAAAIDTQTGERVAIKKINDVFDHVSDATRILREIKLLRLLRHPDIVQIKHIMLPPSRREFRDIYVVFELMESDLHQVIKANDDLTPEHHQFFLYQLLRGMKYIH
TuMPK21-1 RYQVSEVIGKGSYGVVAAAIDTQTGERVAIKKINDVFDHVSDATRILREIKLLRLLRHPDIVQIKHIMLPPSRREFRDIYVVFELMESDLHQVIKANDDLTPEHHQFFLYQLLRGMKYIH
AKL80629.1 RYQVSEVIGKGSYGVVAAAIDTQTGERVAIKKINDVFDHVSDATRILREIKLLRLLRHPDIVQIKHIMLPPSRREFRDIYVVFELMESDLHQVIKANDDLTPEHHQFFLYQLLRGMKYIH
tplb0009k03 RYQVSEVIGKGSYGVVAAAIDTQTGERVAIKKINDVFDHVSDATRILREIKLLRLLRHPDIVQIKHIMLPPSRREFRDIYVVFELMESDLHQVGNKANDDLTPEHHQFFLYQLLRGMKYIH

HRDLKPxN LxNxNCxLKIxDFGLAR TRWYRAPEL IDxWSvGC
BAK08351.1 AASVFHRDLKPKNILANADCKLKICDFGLARVSFNDGAPSAIFWTDYVATRWYRAPELCSFFSKYTPAIDIWSVGCIFAEMLTGKPLFPGKNVVHQLDLMTDVLGTTPSAESLAKIRNEK
TsMPK21-1(U)p AASVFHRDLKPKNILANADCKLKICDFGLARVSFNDGAPSAIFWTDYVATRWYRAPELCSFFSKYTPAIDIWSVGCIFAEMLTGKPLFPGKNVVHQLDLMTDVLGTTPSAESLAKIRNEK
TaMPK21-1(1DL) AASVFHRDLKPKNILANADCKLKICDFGLARVSFNDGAPSAIFWTDYVATRWYRAPELCSFFSKYTPAIDIWSVGCIFAEMLTGKPLFPGKNVVHQLDLMTDVLGTTPSAESLAKIRNEK
AetMPK21-1 AASVFHRDLKPKNILANADCKLKICDFGLARVSFNDGAPSAIFWTDYVATRWYRAPELCSFFSKYTPAIDIWSVGCIFAEMLTGKPLFPGKNVVHQLDLMTDVLGTTPSAESLAKIRNEK
ScMPK21 AASVFHRDLKPKNILANADCKLKICDFGLARVSFNDGAPSAIFWTDYVATRWYRAPELCSFFSKYTPAIDIWSVGCIFAEMLTGKPLFPGKNVVHQLDLMTDVLGTTPSAESLAKIRNEK
HvMPK21(1H) AASVFHRDLKPKNILANADCKLKICDFGLARVSFNDGAPSAIFWTDYVATRWYRAPELCSFFSKYTPAIDIWSVGCIFAEMLTGKPLFPGKNVVHQLDLMTDVLGTTPSAESLAKIRNEK
TaMPK21-1(1BL) AASVFHRDLKPKNILANADCKLKICDFGLARVSFNDGAPSAIFWTDYVATRWYRAPELCSFFSKYTPAIDIWSVGCIFAEMLTGKPLFPGKNVVHQLDLMTDVLGTTPSAESLAKIRNEK
TaMPK21-1(1AL) AASVFHRDLKPKNILANADCKLKICDFGLARVSFNDGAPSAIFWTDYVATRWYRAPELCSFFSKYTPAIDIWSVGCIFAEMLTGKPLFPGKNVVHQLDLMTDVLGTTPSAESLAKIRNEK
TuMPK21-1 AASVFHRDLKPKNILANADCKLKICDFGLARVSFNDGAPSAIFWTDYVATRWYRAPELCSFFSKYTPAIDIWSVGCIFAEMLTGKPLFPGKNVVHQLDLMTDVLGTTPSAESLAKIRNEK
AKL80629.1 AASVFHRDLKPKNILANADCKLKICDFGLARVSFNDGAPSAIFWTDYVATRWYRAPELCSFFSKYTPAIDIWSVGCIFAEMLTGKPLFPGKNVVHQLDLMTDVLGTTPSAESLAKIRNEK
tplb0009k03 AASVFHRDLKPKNILANADCKLKICDFGLARVSFNDGAPSAIFWTDYVATRWYRAPELCSFFSKYTPAIDIWSVGCIFAEMLTGKPLFPGKNVVHQLDLMTDVLGTTPSAESLAKIRNEK

MPK21-1 continued

LE^RLLAFDPKDRPTAEAL

BAK08351.1 ARRYLSNMRRKKPKVPLTKKFPIDPMALHLLERLLAFDPKDRPTADEALTDPYFTGLANSEREP...
TsMPK21-1(U)p ARRYLSNMRRKKPKVPLTKKFPIDPMALHLLERLLAFDPKDRPTADEALTDPYFNGLANSEREP...
TaMPK21-1(1DL) ARRYLSNMRRKKPKVPLTKKFPIDPMALHLLERLLAFDPKDRPTADEALTDPYFTGLANSEREP...
AetMPK21-1 ARRYLSNMRRKKPKVPLTKKFPIDPMALHLLERLLAFDPKDRPTADEALTDPYFTGLANSEREP...
ScMPK21 ARRYLSNMRRKKPKVPLTKKFPIDPMALHLLERLLAFDPKDRPTADEALTDPYFNGLANSEREP...
HvMPK21(1H) ARRYLSNMRRKKPKVPLTKKFPIDPMALHLLERLLAFDPKDRPTADEALTDPYFTGLANSEREP...
TaMPK21-1(1BL) ARRYLSNMRRKKPKVPLTKKFPIDPMALHLLERLLAFDPKDRPTADEALTDPYFTGLANSEREP...
TaMPK21-1(1AL) ARRYLSNMRRKKPKVPLTKKFPIDPMALHLLERLLAFDPKDRPTADEALTDPYFNGLANSEREP...
TuMPK21-1 ARRYLSNMRRKKPKVPLTKKFPIDPMALHLLERLLAFDPKDRPTADEALTDPYFNGLANSEREP...
AKL80629.1 ARRYLSNMRRKKPKVPLTKKFPIDPMALHLLERLLAFDPKDRPTADEALTDPYFTGLANSEREP...
tplb0009k03 ARRYLSNMRRKKPKVPLTKKFPIDPMALHLLERLLAFDPKDRPTADEALTDPYFTGLANSEREP...
*****:*****:***:***** . . :

BAK08351.1 ANRWAASRGRWRYPAFRRRSHRHRWRWPQEALRTQGKSRSPRTADRRPAPHRWARKARSTGASLAARQRHRRRSRSSRSSSSSTRSPAGRSVSRTAWARRGRSSPSRASLPSP
TsMPK21-1(U)p
TaMPK21-1(1DL) SF-----MYPGVDVDFKQ--QFAHLEK--GGAKGEKSSP-QLRQNASLPRERA-----IGNKHGSD-----YQVKLNTGKPVHASV-----TDGISKPLMSA-----
AetMPK21-1 SF-----MYPGVDVDFKQ--QFAHLEK--GGAKGEKSSP-QLRQNASLPR--A-----IGNKHGSD-----YQVKLNTGKPVHASV-----TDGISKPLMSA-----
ScMPK21 SF-----MYPGVDVDFKQ--QFAHLEK--GGAKGEKSSP-QLRQNASLPRERA-----IGNKHGSD-----YQVKLNTGKPVHASV-----TDGISKPLMSA-----
HvMPK21(1H) SF-----MYPGVDVDFKQ--QFAHLEK--GGAKGDKSSP-QLRQNASLPRERA-----IGNKHGSD-----YQVKLNTGKPVHASV-----TDGISKPLMSA-----
TaMPK21-1(1BL) SF-----MYPGVDVDFKQ--QFAHLEK--GGAKGEKASP-QLRQNASLPRERA-----IGNKHGSD-----YQVKLNTGKPVHASV-----TDGISKPLMSA-----
TaMPK21-1(1AL) SF-----MYPGVDVDFKQ--QFAHLEK--GGAKGEKSSP-QLRQNASLPRERA-----IGNKHGSD-----YQVKLNAGEKPVHASV-----TDGISKPLMSA-----
TuMPK21-1 SF-----MYPGVDVDFKQ--QFAHLEK--GGAKGEKSSP-QLRQNASLPRERA-----IGNKHGSD-----YQVKLNAGEKPVHASV-----TDGISKPLMSA-----
AKL80629.1 SF-----MYPGVDVDFKQ--QFAHLEK--GGAKGEKSSP-QLRQNASLPRERA-----IGNKHGSD-----YQVKLNTGKPVHASV-----TDGISKPLMSA-----
tplb0009k03 SF-----MYPGVDVDFKQ--QFAHLEK--GGAKGEKSSP-QLRQNASLPRERA-----IGNKHGSD-----YQVKLNTGKPVHASV-----TDGISKPLMSA-----

BAK08351.1 SSGASRRPSSRRSWAPCSRRTAATSCGWPRRSAPTGGSSRAG*----
TsMPK21-1(U)p
TaMPK21-1(1DL) ---RSLKSETMSASKCIGEIKNKDDEYESVDAADGVSQKVAQLKT*
AetMPK21-1 ---RSLKSETMSASKCIGEIKNKDDEYESVDAADGVSQKVAQLKT*
ScMPK21 ---RSLKSETMSASKCIGEIKNKDDEYESVDAADGVSQKIAQLKT*
HvMPK21(1H) ---RSLKSETMSASKCIGEIKNKDDEYESVDAADGVSQKIAQLKT*
TaMPK21-1(1BL) ---RSLKSETMSASKCIGEVKNKDDEYESVDAADGVSQKVAQLKT*
TaMPK21-1(1AL) ---RSLKSETMSASKCIGEIKNKDDEYESVDAADGVSQKIAQLKT*
TuMPK21-1 ---RSLKSETMSASKCIGEIKNKDDEYESVDAADGVSQKIAQLKT*
AKL80629.1 ---RSLKSETMSASKCIGEIKNKDDEYESVDAADGVSQKVAQLKT*
tplb0009k03 ---RSLKSETMSASKCIGEVKNKDDEYESVDAADGVSQKVAQLKT*

MPK24

HvMPK24 (6H) MEFFTEYGEASQYQIKEI **IGxGxYGxV** **IKKIxxxF** **DAxRxLRE** **FxDIYxxxELM** **DLxxVI** IHGKSGFVVAADVDTQTGEVVAIKKIHDMEFEHASDGTRILREIKLLRLLRHPNIVEIKHILLPPARREFRDIYVVFELMESDLQKVIQVNDNLTKGHHRFFL
 TaMPK24 (6BS) MEFFTEYGEASQYQIEEI IGQGSFGVVAADVDTQTGERVAIKKIHDMEFEHADPDGTRILREIKLLRLLRHPNIVGVKHILLPPARREFRDIYVVFELMESDLQKVIQVNEENLTAGHHRFFL
 AK334728.1 MEFFTEYGEASQYQIEEI IGQGSFGVVAADVDTQTGERVAIKKIHDMEFEHADPDGTRILREIKLLRLLRHPNIVGVKHILLPPARREFRDIYVVFELMESDLQKVIQVNEENLTAGHHRFFL
 ScMPK24 MEFFTEYGEASQYQIKEI IGRGSFGVVAADVDTQTGERVAIKKIHDMEFEHASDGTRILREIKLLRLLRHPNIVEIKHILLPPARREFRDIYVVFELMESDLQKVMQVNEENLSADHHRFFL
 TaMPK24 (U) MEFFTEYGEASQYQIEEI IKGSGFVVAADVDTQTGERVAIKKIHDMEFEHASNGTRILREIKLLRLLRHPNIVETKHILLPPARREFRDIYVVFELMESDLQKVIQANENLTAGHHRFFL
 TsMPK24 (U) MEFFTEYGEASQYQIEEI IGRGSFGVVAADVDTQTGERVAIKKIHDMEFEHASDGTRILWEIKLLRLLRHPNIVEIKHILLPPARREFRDIYVVFELMESDLQKVIQVNEENLTAGHHRFFL
 TuMPK24 MEFFTEYGEASQYQIEEI IKGSGFVVAADVDTQTGERVAIKKIHDMEFEHASNGTRILREIKLLRLLRHPNIVETKHILLPPARREFRDIYVVFELMESDLQKVIQANENLTAGHHRFFL
 TaMPK24 (6DS) MEFFTEYGEASQYQIEEI IGRGSFGVVAADVDTQTGERVAIKKIHDMEFEHASDGTRILWEIKLLRLLRHPNIVEIKHILLPPARREFRDIYVVFELMESDLQKVMQVNEENLTAGHHRFFL
 AetMPK24 MEFFTEYGEASQYQIEEI IGRGSFGVVAADVDTQTGERVAIKKIHDMEFEHASDGTRILWEIKLLRLLRHPNIVEIKHILLPPARREFRDIYVVFELMESDLQKVMQVNEENLTAGHHRFFL
 *****:****:***** ***** ***** *****:*****:****:*****

QxLRxLKYxH **HRDLKPxN** **LxNxNCxLKIxDFGLAR** **TRWYRAPEL** **IDxWS^vGC**
 HvMPK24 (6H) YQLLHALKYIHAAN **VFHRDLKPSNILANSN**CKLKI CDFGLARASRDDVPSAIFWTDYVATRWYRAPEL CGSFFSKYTPAIDIWSIGCIFAEVLTNRNPLFPGTNVTHQLDLITDVLGTPSH
 TaMPK24 (6BS) YQLLHALKYIHAAN **VFHRDLKPSNILANSN**CKLKI CDFGLARALRDDAPLAIFWTDYVATRWYRAPEL CGSFFSKYTPAIDIWSIGCIFAEVLTGKPLFPGMNVTHQLDLITNVLGTPSY
 AK334728.1 YQLLHALKYIHAAN **VFHRDLKPSNILANSN**CKLKI CDFGLARALRDDAPLAIFWTDYVATRWYRAPEL CGSFFSKYTPAIDIWSIGCIFAEVLTGKPLFPGMNVTHQLDLITNVLGTPSY
 ScMPK24 YQLLAALKYIHAAN **VFHRDLKPSNILVNSN**CKLKI CDFGLARPLCDDAPLAIFWTDYVATRWYRAPEL CGSFFSKYTPAIDIWSIGCIFAEVLTRKPLFPGRNGTHQLDLI-TILGNPSC
 TaMPK24 (U) YQLLHALKYIHAAN **VFHRDLKPSNILVNSN**CKLKI CDFGLARASRDDPPLAIFWTDYVATRWYRAPEL CGSFFSKYTPAIDIWSIGCIFAEVLTGKPLFPGRNGTHQLDLITDVLGTPSY
 TsMPK24 (U) YQLLHALKYIHAAN **VFHRDLKPSNILVNSN**CKLKI CDFGLARPL-DDAPLAIFWTDYVATRWYRAPEL CGSFFSKYTPAIDIWSIGCIFAEVLTGKPLFPGRNGTHQLDLITDVLGNPSC
 TuMPK24 YQLLHALKYIHAAN **VFHRDLKPSNILVNSN**CKLKI CDFGLARASRDDPPLAIFWTDYVATRWYRAPEL CGSFFSKYTPAIDIWSIGCIFAEVLTRKPLFPGTNVKHQLDLITDVLGTPSY
 TaMPK24 (6DS) YQLLHALKYIHAAN **VFHRDLKPSNILVNSN**CKLKI CDFGLARASRDDPPLAIFWTDYVATRWYRAPEL CGSFFSKYTPAIDIWSIGCIFAEVLTRKPLFPGTNVKHQLDLITDVLGTPSH
 AetMPK24 YQLLHALKYIHAAN **VFHRDLKPSNILVNSN**CKLKI CDFGLARASRDDPPLAIFWTDYVATRWYRAPEL CGSFFSKYTPAIDIWSIGCIFAEVLTRKPLFPGTNVKHQLDLITDVLGTPSH
 ***** *****:****:***** ***** ***** *****:*****:****:*****

LE^RLLAFDPKDRPTAEAL
 HvMPK24 (6H) ETLSQIRNEKARYLTGMKRKHP I PFPRMFC SADPQAVRLLERLLAFDPKDRPTAEALADPYFEGFLPKLEHEPSYPFSKLDFFERWKL SKDGI RDLIYQEILEYHPQMLQDYIRGGG
 TaMPK24 (6BS) ETLSQIRNEKARYLTGMKRKHP I PFPSIFCNADPQAVRLLERLLAFDPKDRPTAEALADPYFEGFPNLEHEPSHPF SKLEFEFERWKLTKDGV RDLIYREILEYHPQMLQDYIRAGG
 AK334728.1 ETLSQIRNEKARYLTGMKRKHP I PFPSIFCNADPQAVRLLERLLAFDPKDRPTAEALADPYFEGFPNLEHEPSHPF SKLEFEFERWKLTKDGV RDLIYREILEYHPQMLQDYIRAGG
 ScMPK24 ETLSQIRNEKARYLTGMKRKHP I PFASMF CNADPKAVRLLERLLAFDPKDRPTAEALADPYFEGFLRKL EHEPLPHPF SKLEFEFERLKLTKGGV RDLIYREILEYHPQMLQDYIRAGG
 TaMPK24 (U) ETLSQIRNEKARIYLTGMKRKHP I PFASMF CNADPQAVRLLERLLAFDPKDRPTAEALADPYFEGFPNLEHEPSHPF SKLEFEFERWKLTKDGI RDLIYREILEYHPQMLQDYIGAGG
 TsMPK24 (U) ETLSQIRNEKARYLTGMKRKHP I PFASVFCNADPKAVRLLERLLAFDPKDRPTAEALADPYFEGFLRKL EHEPLPHPF SKLEFEFERLKLTKGGV RDLIYREILEYHPQMLQDYIRAGG
 TuMPK24 ETLSQIRNEKARIYLTGMKRKHP I PFPSMF CNADPQAVRLLERLLAFDPKDRPTAEALADPYFEGFPNLEHEPSHPF SKLEFEFERWKLTKDGI RDLIYREILEYHPQMLQDYIGAGG
 TaMPK24 (6DS) ETLSQIRNEKARYLTGMKRKHP I PFPSMF CNADPQAVRLLERLLAFDPKDRPTAEALADPYFEGFPNLEHEPSHPF SKLEFEFERWKLTKDGI RDLIYREILEYHPQMLQDYIRAGG
 AetMPK24 ETLSQIRNEKARYLTGMKRKHP I PFPSMF CNADPQAVRLLERLLAFDPKDRPTAEALADPYFEGFPNLEHEPSHPF SKLEFEFERWKLTKDGI RDLIYREILEYHPQMLQDYIRAGG
 ***** *****:****:***** ***** ***** *****:*****:****:*****

MPK24 continued

HvMPK24 (6H) QTSFVYPSGVDGMRLQFAHAEDKYLRGERGT-PLRRRHASLPRERFRAPMGSDNQDCNNENRRTASSAGQIIIRPQQVGMTHAYVYQNGTGIPDFCSGYLQNGGTSASSCAIGENEGPK
TaMPK24 (6BS) QTSFVYPSGVDGMRLQFVHLEENHLRGERGT-PLRRRHASLPRERVCAPMGIDNQDCNNERR-TASSAAQITIRSQQEGLTHAYVYQNGTGIPDFCSGYLQNGGTSASSCVIEENEGPK
AK334728.1 QTSFVYPSGVDGMRLQFVHLEENHLRGERGT-PLRRRHASLPRERVCAPMGIDNQDCNNERR-TASSAAQITIRSQQEGLTHAYVYQNGTGIPDFCSGYLQNGGTSASSCVIEENEGPK
ScMPK24 QTSFVYPSGVDGMRLQFVHLEENHLRGERGTTTPPQRRHASLPRERVCTPMGSDKHDCNNENRRTASSAAQTIIRSQQGGLTHAYVNQNGTSPNFCSGYLQNGSASASSCVIEENEGPK
TaMPK24 (U) QTSFVYPSGVDGMRLQFVHLEENHLRGERGT-PLRRRHASLPRERVCAPKGSNDQDCNNENRRTASSAAQTTIRSQQEGLTHAYVYQNGTSPNFCSGYLQNGGTSASSCVIEENEGLE
TsMPK24 (U) QTSFVYPSGVDGMRLQFVHLEENHLRGERGT-PLRRRHASLPRERVCAPKGSNDQDCNNENRRTASSAAQTTIRSQQEGLTHAYVYQNGTSPNFCSGYLQNGGTSASSCVIEENEGLE
TuMPK24 QTSFVYPSGVDDMRLQFVHLEENHLRGERGT-PLRRRHASLPRERVCAPKGSNDQDCNNENRRTASSAAQTTIRSQQEGLTHAYVYQNGTSPNFCSGYLQNGGTSASSCVIEENEGLE
TaMPK24 (6DS) QTSFVYPSGVDDMRLQFVHLEENHLRGERGT-PLRRRHASLPRERVCAPKGSNDQDCNNENRRTASSAAQTTIRSQQEGLTHAYVYQNGTSPNFCSGYLQNGGTSASSCVIEENEGLE
AetMPK24 QTSFVYPSGVDDMRLQFVHLEENHLRGERGI-----DRERVCAPKGSNDQDCNNENRRTASSAAQTTIRSQQEGLTHAYVYQNGTSPNFCSGYLQNGGTSASSCVIEENEGLE
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HvMPK24 (6H) ENGVSEEEKVAYEPSELLAKI *
TaMPK24 (6BS) ENGVSA-EKVAYELSERLARI *
AK334728.1 ENGVSA-EKVAYELSERLARI *
ScMPK24 ENGVPEEEKVAYELSERLARI *
TaMPK24 (U) ENGVSEEEKVAYELSQC FARI *
TsMPK24 (U) ENGVSEEEKVAYELSERLARI *
TuMPK24 ENGVSEEEKVAYELSQC FARI *
TaMPK24 (6DS) ENGVSEEEKVAYELSQC FARI *
AetMPK24 ENGVSEEEKVAYELSQC FARI *
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