



**APPENDICES**

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

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## APPENDIX A

### Coding sequence of *ENAM* (Exon 3-10)

1 ggactgttat tatacgtaat aagagacttg acttgacagc tcctataata acacattcta  
61 aattttaaat tcgatgtgtg ttttttacct taaactcttg tgatggcaaa accattttcc  
121 tcaaagctga ttggttatgc aggtctacaa cagtgcctaa atggaacctt gctgtgcaa  
181 gctttctgac aaggaggaat ctttttattt tgagcctttt tgatactgaa catgatatct  
241 gagtgaagaa tttttgtttt attattaaga aataaatgta tcttgcttct tgagatctcc  
301 ctggcttcag caattttagt ttatttccac tatagaccat taagaatata tttcaaagac  
361 aagctaacaa agttcaagta aaaattattt tttatatatt acagcttcta attggcattg  
421 ggtgagtatt agagattatc aacataaatt acatatagtg tcaaataatg aatttaattc  
481 atagatgttg gttaattctc cttattgcat tccttcttgt tggttgtata atcattgtat  
541 gcagactaat cttctgataa aactttaaac tccttggttt atttggtgta tttgttttcc  
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661 catagtgaag tctagttttg tcaacatgac cctagaagta tctcaaaata cagtgcctgt  
721 gtcatttctc ctctgattta gctttcatcc tacttttaa gcaacagaag attaaacttg  
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901 cttctcaggt taaagctgta tttttcttaa aggcttataa aaattttgct gaaaaaatg  
Exon3 961 ttggtgcttc ggtgcaggct tggaaacctc tttcctaaac tagataactt ggtgagtact  
1021 ttcatttatt tttgccaata catacaggtt ctcaaactag atactgtcag aaatacactt  
1081 gagagggcca aacactactg aaatgtatca gaagactcaa agagcatctg ctttcacaga  
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 1681 caatthagga aaatgtccat tataaaaaatg ctaaagcgtc atttatgttg ctctataggg  
 1741 aagtaaacag aagggtgagc attggctcca attatgctag atagatttta tgtccagaaa  
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Exon8 7321 ctatcaacaa ccacatggc aaattccaca ggtgagaaat tttttttct ttacactgta

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Exon9 9241 tctcagaggt taccaccacc aggttatgga cgcccaccaa tcagcaatga agaagggggg

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 13441 caattatga tttccattt ctttctaca gaatccttac tttggatatt ttggatatca  
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 13561 acccaaagaa gaagatcctc ctaagcaga aagtccaggc acagaacca cagctaattc  
 13621 aacagtcact gagacgaatt ctaccaacc aaatcctaaa gggagtcagg gaggaaatga  
 13681 caccagcccc acaggaaca gtacccagg actaaacact ggaacaacc ctccagctca  
 13741 aatgggatt ggccactcc ctgcagtcaa cgcttcaggc caggagggc caggaagtca  
 13801 aatcccatg agaccaagtc agccaaatat tcgtgaaat catccatc ctaataaag  
 13861 aaatcttct tcaggaagac agtggatct cactggtact gtcattgggc acagacaga  
 13921 taggccttt tacagaaatc aacaagtca aaggggtcct cggtggaact tcttgcttg  
 13981 ggaacgtaa caagtagctc gtccaggaaa tccagttat cacaaagctt accctcctac  
 14041 ttcaagaggc aattatcca attatgcagg aaatccagca aatctcaga gaaagcctca  
 14101 ggggccaat aaacaccctg taggaactac tgttgccca ctgggtcca aacctggcc  
 14161 tgttgctgc aatgaaaaa tccaaaatc aaaggagaag ccctgggtc caaagaaca  
 14221 aataatagtt cctacaaaga atccaaccag ccctggaga aactctaac agtatgaagt  
 14281 taataaatca aattataaac tgcctcactc tgagggttat atgccagtcc caaatctaa  
 14341 ttctgttgat caacatgaaa actcctatta cccaagagga gattccagaa aagtccaaa  
 14401 ttctgatgga caaaccaaa gccagaattt gcccaaaggg attgttttag ggtcaagaag  
 14461 gatgcatat gaatcagaaa ctaatcagtc agaattaaag cacagctcat atcagcctgc  
 14521 tgtataacct gaggaaatcc cttctcctgc aaaagaacat tttctgctg gaagaatac  
 14581 ttgggaccac caagaaatct ctccacctt taaggaagat ccaggaggc aagaagaaca  
 14641 ttaccccat cttccatg gttctagagg aagtgtttc tacctgaat ataaccata  
 14701 tgatcccagg gaaaactc catacctag aggcaataca tgggatgaga gagatgattc  
 14761 tccaatact atggggcaaa aagaaagtcc actctacccc ataataacc cagaccaga  
 14821 ggagatagtc cttataatg aagaggacc agttgatcca actggagatg aagtcttcc  
 14881 tggacaaaat agatggggtg aagagttgag cttcaaagga ggccaacag ttaggacta

14941 tgaagtgaa caatatacct caaatcagcc aaaggaatat cttcctatt ctttagataa  
 15001 tccatcaaaa ccaagggagg atttttatta cagtgaattt tacccatgga gcccgatga  
 15061 gaattttcca tcatataata cagcttctac tatgccacca cctatagaga gcaggggcta  
 15121 ctacgttaat aatgccgctg gaccagaaga aagcactcta tttccttcac ggaattcctg  
 15181 ggaccacagg atacaagccc aagggcagag agaaagaagg ccgtatttta acagaaatat  
 15241 ctgggatcag gcaacacatt taaaaaacg cccagctagg ccaccagacc agaaaggtaa  
 15301 ccagccctat tacagtaaca ccccagctgg gcttcagaaa aatccaatat ggcgatgaagg  
 15361 tgagaatttg aactatggca tgcaaataac taggatgaat tctccagaga gagaacattc  
 15421 atctttccct aacttcatcc caccaagtta cccatcaggt caaaaagaag cacatttatt  
 15481 tcacctaagc cagagaggct cttgctgtgc tggtagctcc acagggccca aggacaatcc  
 15541 actagctcta caagactaca ctccatccta tggctctgca cctggggaga accaagacac  
 15601 cagtcctctg tatacagacg gtagtcatac caagcagaca agagatatca tctcccaac  
 15661 aagcatccta ccaggccaaa gaaacagctc agagaagagg gaaagccaaa acccttttag  
 15721 agatggtgtg tccacgctga ggaggaacac accatgttct ataaagaatc aactgggcca  
 15781 aaaggaaatt atgccctttc ctgaagccag ttcccttcaa tcaaagaata caccttgtct  
 15841 caaaaatgat cttggaggag atgggaacaa cattctggaa caagttttg aagacaacca  
 15901 gctcaatgaa agaactgttg accttactcc tgagcagctt gttattggta cacctgatga  
 15961 aggctccaat ccagaaggca tccaaagtca agtccaagaa aatgagagtg agaggcaaca  
 16021 gcaaagacca tctaacattc tgcatttggc atgctttggc tccaaattag caaagcatca  
 16081 ctcttccacc accggaactc catctagcga tgggaaggcaa agcccatttg atggggattc  
 16141 aattacgctc actgaaaatc ctaacacatt ggttgagtta gctactgagg aacaatttaa  
 16201 gagtataaat gtagaccac ttgatgcaga tgaacacagt ccatttgaat tccttcaaag  
 16261 agggaccaat gtacaggacc aggtacaaga ctgcttacta cttcagcctc aggggttacc  
 16321 caaccaagca ttcttgggga aagagaaatc actgacattc tataccaatg gttcccaaaa  
 16381 ttttttcccc aagacttaat taagtgtctg actgtcttgg tgatcettaa gttttctccc  
 16441 ctctcagcaa taggagtagc gaccaggtg gagctgagat taggcctctg gggatcacca  
 16501 gatctagcac tttcacagat tagtgagac cttaaaaaag caagaaggcc atgaccatcc  
 16561 ctgcctcgaa acttgcaagt cacttgtctg agttagtttc cttttgcttg atgacttctt  
 16621 ttgctctcaa agttccatac ttgcaaaatt ggtttttcaa gactgaaagg cagattaact  
 16681 ttccattcta cttatggaga tccacacatc agtatagtcc tgatgactg tacgtttttt  
 16741 gcttggtgtg atcttgcag gtttttttcc tactcaatat tctcttcaag catttttttt  
 16801 cttccactgc cactctctt acccttatca tttcttttcc ttagctttct tccttctttt

16861 ctctctccct caaccattct gatttagct ttctaactct catcttttcc tctctgtata  
 16921 tcacttctta catattaaat tagctatfff aaccatttct agtctcttct ttatgtctac  
 16981 ctctccatt atgtcttctg ctctccaac ctatctgttc tgtctccaa tgtaccactt  
 17041 atcaactaat ccctctctc tctgattcct ttcttccctt caatttatct ttttccctgt  
 17101 tacaccattt tcatcttaag actgcatgtc actctcttcc ttttgtatc cactctccaa  
 17161 atcgtaccct aaatttttct tgaccagct taaccatcat tacagaatat attttggaaa  
 17221 tggtagacac tgatagctac tttgttttta gttatcttag ggtctctacc aagtagacac  
 17281 agttcagtta gagagacgta ttttaaggaga agggaaggca ggataccag aactagcagc  
 17341 ctagggaaaa ggcttaggaa gatggagaat gaggaactga agaaactgcc gctctgagac  
 17401 tgcacatcca ggaaaaaaga ctaggacttg ccacacactg ccaattcata atccgcagga  
 17461 tctgtagaag acattttggg aaacactgtc ttaaataaaa actcaatggt tagttgtttt  
 17521 tttttttttt tactagtcca gcataaggga ttctaccagt atgtgctact actaacatcc  
 17581 ttcatgtcca tgcagaatta cttacagaca ctcttcttg gtatcttgaa taaattgtgt  
 17641 aaattatttt gaaaagtgga tatttctata tgccttgctt ataatacatc agggattatt  
 17701 attcttatta ataacatggt ggcctattat ctggatgtcc cttgcctaga gcaggaaaaa  
 17761 agtctcagaa ttacctaaa acatacttta taactttaag agatttctta ggatacatct  
 17821 tcaggggagc atttcataac aacatctcaa aaatttgggg aaacacaacg ttgaaaactt  
 17881 cctaagaaaa ggaatcttgc ccttgaatct tctgaagtac ctagcacagt gtcttcaaca  
 17941 tagaaggtac ccaataaata tatatcaatt cattttttaa tgactttcaa cactcccatg  
 18001 aaaacaccgt agtctgcttt tctgaaaagg tgactgtcta ggatgtgaa tgagccacca  
 18061 ctccgtagct ttatatattc agcaacattt ccatcataga atttcagcgt tagaagggat  
 18121 cttagaggta gattatccag gccatcccct actgettaca ttcccctccc cctggccagt  
 18181 tttatatttt aatcacacat tgaaaaattc attaaactat tctgtataaa actgtctttt  
 18241 aagaattatc ctttcaaat aaaaatgta ttgtttcact agtttatttt tccaaatgat  
 18301 tttttttgaa atctcaatat gagtactttc attacaagat actcaettca catttcacca  
 18361 aaatgcatgg gttcacataa ttgttttggc agatatgttg acatatctga atttataaga  
 18421 cactgctact taaactacca tctgagatcg

The shaded parts indicate the coding regions.

## APPENDIX B

### *ENAM* amino acid sequence

1 mlvlrclrgt sfpkldnlvp kgkkilllvf lgllgnsvam pmhmprmpgf sskseemmry  
61 nqfnfmngph mahlgpffgn glpqqfpvyq mpmwpqpppn twhprkssap krhnktdqtq  
121 etqkpnqtqs kkppqkrplk qpsnqppe eeaqppqafp pfgnglfpyq qppwqipqrl  
181 pppgygrppi sneeggnpyf gyfgyhfgg rppyyseemf eqdfekpee dppkaespqt  
241 eptanstvte tnstqpnpkg saggndtspt gnstpglntg nnpsarngig plpavnasgq  
301 gpggsqipwr psqpnirenh pypnirnfps grqwyftgtv mghrqnrpfy rnqqvqrgrpr  
361 wnffawerkq varpgnpvyh kaypptsrgn ypnaynpan lrrkpqgpnk hpvgttvap1  
421 gpkpgpvvrn ekiqnpkekp lgpkeqiivp tknptspwrn sqqyevnksn yklphsegym  
481 pvpnfnsvdq hensyyprgd srkvpnsdgq tqsqnlpki vlgsrrmpye setnqselkh  
541 ssyqavype eipsakehf pagrntwdhq eisppfkedp grqeehlphp shgsrgsvfy  
601 peynpydpre nspylrgntw derddsntm gqkesplypi ntpdqkeivp yneedpvdpt  
661 gdevfpgqnr wgeelsfkgg ptvrhyegeq ytsnqpkeyl pysldnpskp redfyysfey  
721 pwsndenfps yntastmppp iesrgyyvnn aagpeestlf psrnswdhri qaqqrerrp  
781 yfnrniwdqa thlqkaparp pdqkgnqpyy sntpaglqkn piwhegenln ygmqitrmns  
841 perehssfpn fippsypsgq keahlfhlsq rgscagsst gpkdnplalq dytpsyglap  
901 genqdtsply tdgshtkqtr diisptsilp gqrnssekre sqnpfrdgvsv tlrntpcsi  
961 knqlgqkeim pfpeasslqs kntpclkndl ggdgnnileq vfednqlner tvdltpeqlv  
1021 igtpdegshp egisqvqen eserqqqrps nilhlpfcgs klakhhsstt gtpssdgrqs  
1081 pfdgdsitpt enpntlvela teeqfksinv dpldadehsp feflqrgrtnv qdqvqdc111  
1141 qa



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