

Supporting Information S1. The test dataset \mathcal{S} consists of 217 voltage-gated potassium channels classified into six subfamilies.

(1) The subset \mathcal{S}_1 contains 82 Kv1 subfamily proteins

>40KV1

MEAMAGFKSGMGESMFDQHTRCENHHRTFPSSRSYLVRHGDFAFFPTAGSPTDKLLDHTSEHGCCERVI INVSGLRFETQMKTLSQFPDILL
GNRDKRMFEFYDPLRNEYFFDRNRPFDAILYYYQSGGRLRRPVNPIDVFTEEIKFYQLGEMALEKYKADEGYIKEKERPLPLIEPQRSIWL
LFEYPESAAAARGIAIMSVSVILLSIISFCLETLPAPERKNYFHTLATNAESSTIGNNPQGDITAVENSTAPIVLVYDMVNNPFWV IET
ICICWFSLVETVRFLLCCPSKCMFFKDMNII DFVAIAPYFITLATDL SKDNTSDATSNKGMSLA ILRVIRLVRFIRFKLSRHSKGLQILAQ
TLKASRELGLLIFFLFIGIILFSSAVYFAEIDEIETGRTQFTSIPFAFWAVVMTTVGYGDMKPIITFGGKVVGSLCAITGVLCIALPVPV
IVSNFNFYFHRESNNEEPSQYSHVKTCPYLPFRGKTHSSSTLMDSPNRGSKTSLNIAEGATMLMSLTQARNDMIGNKSHYQSHNSHRETI
SKTELIEAPGNNTNHHYAEDLPLRSHVETDV

>45KV1

MSTLSGTASTLLPHGTLAYCNRKINQNL EETGIDQLTSEIFRPEIESERLVI INVSGLRFETQAQTVNQFPDILLGNPNKRNHYYDPLRN
EYFFDRNRSSFDGILYFYQSGGRLRRPVNPIDVFNEEIKFYELGEEALAKYREEEGFIKEPKILPRNRFQRKVWLLFEYPESLAARILA
IGSVFVILLSIIFCLETLPHFRRYKIINLNSTLCYEELTFEEDDLPTIDQPFPIIETFCIVWFSCCELLVRFASSPKKFEFFKVMNVIDV
VSIIPYFITLGAVIDDPKQINQTTSLAVLRVIRLVRFIRFKLSRHSKGLQILGQTLRASVRELGLLVFLLICVILFSSAVYFAEADADT
SLFRSIPDGFVAVVMTTVGYGDMRPVTVWGLIGSLCAIAGVLTIALPVPVIVSNFNFYFHRETESDDISHSISSELETDDDDIITNKEQH
INTKVRISITYNINSSGSSKSIKTMHSHNESIVNSQYDITTSALKQNSITIKK

>47KV1

MAASTYGSSMRVRTKTSRADNWSKWMKTMRESRYFSVSSRGDLEVSERNSDWRGCLKECCLPSIPPSIKNECPCSRSKSAERILINVSGQQF
EISSELLDRHPSTLLGNQASRSKFYDKRKKKEYFFDRHRPTFEIVFAYFYQGGKLRPDYIPDDVFLNEIEYYQLEPEVIEDYKISEGYTVEN
VTFPKNKTLLKIIWLAMEYPETSATAYAVAFISVIMTTISII LFCVETLERFAKSHCVADEAPNFDPPFI IETICTAWFTFEAIVRFISCPN
KIMFWFGFQNLIDVAVVPPYVTLFNVVSTMSCSTAKSSASLAFLRVIRLVRFVFKLTKHSTGLQVLLITIKASSEELGLFLVLLVCMVLVYS
SAIYYAELGVPKSNHSIPDAFWAIIITMTTVGYGDTFPVPGFKVIGAACAISGVLTLAMPVPIITGHFNKFYAHTGRCKYI

>48KV1

MMFVATNRRKKEGENKDDDEMAGFEDNADIANDEEQGYSADQIIDINVGGKRFQTYNKTLERFPLSLLGDTERRNQFYNPNTGELFFDRHR
PTFESILYYYQSGGIMARPPNPIIHIFVNELIFFDIDGKLEIKLQIDNGLKELQVVEDLPNYEPFKALWQFLENPSSNAAKIFAILLSVVI
VVSLIMFVIETLPVFAPKELLTNNGTIYKTVYSEHATWMFTVNTAVICWFTIEFILRLICCPNKIKFFLNTGNIIDFLSILPYLVLVSS
SKGSFMSLRVIRLVRFKLSRHSRGLQILGNTLKASFNELMMLAFFLVMILIFGSCVYAYEYKEPGTKFISIPSSFWAIVTMTTVGYGDM
HPVTFWQQIVGSMVAVCGVLTIALPVPVVVSNFEYFYTKERNRRTKEARKEQAKSKQEMVSRENVTKIVLLKNYAKSIKHSSTKFRSRN
REGKTQYSPNVSLNLKDRRQARVLL

>49KV1

MLPVLTSNRTTSEQSLYNTKTNKSSPFRNGEPCVNPVSSPVKPNIDNNNKKVI INVSGKKFETYLTTLMKFPDSSLGDPKRNFLNK
QTGEYFFDRHRKAFNGILYYYQNGVLECPFLSESIFIQEVLFEEIDNTALLESSQEEENSHLPSNPYLCKIIVLFEQSSSIYAKIV
AIIISVLVILISIVVFCLETIPSLNPKPEGSHMRVTFWIIINTICNSWFTLEYLLRLIASPNKLFVKSTLNIIVDLSIIPYVTVATVGENDS
GSIAVLRVVRVIRVIRFKLTRHSRGLHILANTISASHELCLMLVFLAIGVVLFSAAAYAESANSQTGFKSIPHGFWAVVMTTVGYGD
LFPSTYFGKMGALCAISGVLVIALPVPVIVSNFEYFYKQNRQREHELQKKELLDGLNPIRDSIRMMTEASII LAGGTDNEEGDRQTP
DNNINAMLKTQNKYQNFITLIKSTQDDEMADYVNLCHVVKMTIKTKNTS

>50KV1

MIQQIASGSTSMAACERENSVDNQPRASIDRRSSNKNYDEDVESRMIPVDRPSHKGSI RDNTPDSILRLNIGGSSYRIRTRSIIKFGPKTL
LGRFVRMNHEHRRQWADWYFEEQDEYFFERVPRYFDPIDYFYATGKLHVPKDLCFDKFMAELRFWAVSKSRMDECCSPFTQYCVTMGGDPKC
TEKDHFIGVRCANIRRLWLILEGHSQSKWKAFEIISTAFVVLISALILGSIPEFQVPQKSEGDQLVYATATYPTYPNGGGMTIESRTVV
REGSDNSTGDLMAEETVPTPRNTGKIEMTEHPVFTWVENVCVIYFSIEYAMRFIVAPRKLAFARQILNVIDLISAPFYFELLWICGISGE
NVRKVRWAFLTVRLRLVIRIAKLRFSPLANFALTIRKSKQMQMVGVMVTVI IFFSTLIYFLERDEPGTKFTSIPATFWVCVVTMA
TVGYGDLVPVTVAGKLVGSAIVCGVMVLPITIMVNNFMQVVKLREEEIVKKYAQGDQV

>51KV1

MSHQASHFGVKKKWKANGSSGGGLSAFARMKPVLDPSADRIWTIGQIIYQRHQAFNRNSAIKSDNGSFDYIDMVSQSSLDLDRSTEEERTV
QTDDVAEIGMQRPDYQMYCGEEIESEQFVKLVGGQRFMLRKDITRRRGVGRLLDLINKPVADSNADAFFSSTSEFYFERPPSLFHIVYQFY
LNGVIHQPSNLCPVDIEELEYWRIIPDQYLASCCCAQQIDDDDEEVEEQDKPNLFKTLRFGEIRRCVWNIIEEPASSGKAQAFVCSVVV
LISISGLVLGSLPELQVATKQRNLTGEEFTEMEPMPILGYIEYVCIWVFTMEYGLKMLVSAERSKTFRQLLNIIDLLAILPFI IEMLLIF
GISTEQLRDLKGAFLVIRILRVLVIRVILKGRYSSGLQMFGKTLKASFRQLGMMAMVMTGV IFFSTLVYFLEKDEPASKFHSIPAACWWC
IVTMTTVGYGDLTPVTVPGKLVATGAIACGVLVLPITIIIVDNFMKVAETERPAGGNRYRTSQYPKATKSEQMILKVT

>53KV1

MNEEVPLIESPVAGVPPNGSVVRPPDIVFVNVGGRRARLNSDIIIRRLATSRLAVFCEKSHVERLTDCAFFESTSEYFFERSPIIFEVVID
FYVTGKLRHPMDICPIRLRYELDYWRIPPFMSPPCILEENNNIAGKMSTEKAFVDSSLPSSCFDKVVLGPQRLLKLYRLMENPRSSGAKIF
SVGSALFVLLSLLGLILSSMPELQDENKEPHYLLHWELECCMVYFTFEYLARLLVNPKAEFIR SPLNVIDLTLVLPFMI EAFNELQWMEK
RGAMLVVRMRLARVARIFKLARYSTGLRAFGETMKKSAEELSMLGMFLVTGIMLFSITAIYFFERDEPNKSFYSIPAACWWCVITMTTVGYG

DLVPITAGGKVAALASVCGIIVLAFPIISMIIDKFAESTGGWSGGDGEEQGHMIVHRTVHPLNNGAPAAQPVKKKSKRYVGF
>54KV1
MEVAMVSADSSGCSNHLPGYGAQARARERERQAHSRAAAAAASGEGNSGGGAGVNARRAPQNVPEQQEEKSSQKKKSARRRYWPLSGCN
RWRSRHNECSGGAGRRAGGEDDGTFFSELGLCGSEEMMLREEVAEEDQKFYICEEDDKEANSLHRRRSPTEDGYHPVYSEFECCERRSPT
DGYHPVYSEFECCERVVINVSGMRYETQLKTLSSQFPETLLGDPEKRTYFDPLRNEYFFDRNRLSFDLSILYYYQSGGRLKRPVNVPPDFSE
EVKFYELGEEALLKYREDEGFVKEEEKQLPENEFKKQVWLLFEYPESGAARGIAIVSVLVILISTVIFCLETLPEFRDDKDNLLSPLGMGD
DDGAGEDGEGGAYNATFLSTDSGHTAFNDPFFIVETVCIVWFSFEFVAVRLFACPSKPEFFKNIMNIDIVSILPYFITLGTTELGGQHPQQQ
QHLALATGQQLPQGTGQQQAMSFALIRIRLVRVFRIFKLSRHSKGLQILGHTLRASMRELGLLIFFLFIGVILFSSAVYFAEADEPTTHF
QSIPTAFWWAVVTMTTVGYGDMKPIIVGGKIVGSLCAIAGVLTIALPVPVIVSNFNFYHRETDNDEQTQLSQSSSSCPYLPTILLKLRSS
TSSSLQDKSEYLEMEEGLKESLCVKDKASEGTWNGNETIKYCNVNLKILETDV
>64KV1
MRFGGQRRCIESSDDNDSIDSMSTQQKNKEKEEKWAQSLARRLEQVLNVHPEKYQNGCSSQRPSRQPSPEQLAPIRSHSADFGRAAEMAS
GNSEEGKMLLRNGDDRIRLPSQQRGTPDTSSTQGHYPYTDQIVTINVSGMRQTFESTLSRYPNLLGDRNKRQHFFVSDTNEFFDRHRTT
SSSFTFEIRNYLFESILYIYQSGGRVVRPEIIVPIDIFLKEMRFQMGDDLEEFWIAEGYEKPKVEMPNKTKRQIWELEMEYDSSLSARI
IAFISIAVIALSISFCWETVPDIEEKPINNSATAELLEDMEDEKHYSPPFWIELMCILWFTIELILRFISCPCKVTFATSVLNIIDFVAIA
PPFVNVFFADTSKSNSSMSFAVLRVLRVFRVFKLSRHSVGLQILGKTRSSVQEFCLLIFFMALVLFASGMYFAEQGEPNSKFTSIP
ASFVFLVTMTTVGYGDLVPLSPFGKVVGGMCAMIGVLTALPVIIVANFKHFYRQENRLASMKSKGDDADDIA
>65KV1
MSTERLMLDLNKGNIAMVIPSTRKGAASRDNFNSNHGDEIVHRLNNGRRSEIDEVDPDLVSGAGDTVIKLVGGTSFRIRKSSIFAR
SADEKLSAFAQLNHEQRLQACDAFLMPQEEYLLERSAALFDSIFKYISGQLHRPLDVCPTFATELAYWKINDGLTSNCCWRGYNMSPSLE
ELVAPKEKKIELHDSRMSRIHQFCEGDGSLFSTLFTFGSITFVLISVIGLVLSIHEFQVPIYKGGKSERISNWSIVENENIWEHPHIF
GYVETVCIWFTVEFIVRLAVTPNRFQFLVGMNIVDMIAPFYLELGLALFGIDVASLSDIKGALLVVRVLRVPRVRIKLGRYSSGMR
TFALTLRSSARQLGMMGMVLTSTGVVFFSTLLYFVEKDEKDPFTSIPAAFVVAIVTMTTVGYGDYVVPVTPGKLIASGAIISGVLVLPIT
IIVDNFMKVSNGVNNANIFSSANQRPIDVAE
>85KV1
MEIALVTLENGGAISSVEYATAGSTSGSTRARRQSELHTAGSTFVPRLSGKEGTPPPSPPPQVDEERERLPPTPRGGGRRCSSEGS
INGRAASGPQPAPHAPRSGPAEEMDPPEEGGHRQGMTMAAAGDEEGMAASRSAMHHQRVLRINISGLHFETQLGTLNQFPDILLGDPDKRMR
YFDPLRNEYFFDRNRPFDGILYFYQSGGKLRPVNVSIDVFADEIRFYQLGKEAMERFQDEDEGFIREQEKPLPHSEFQRQVWVIFEYPSS
SSARAIIVSVLVILISITFCLETLPEFRDEREIPMSLPPQSGGLNATAGDSPMQSPSSISDPFFIETTCVWFTFELLVRFVFTCPSPK
EFSRNIMNIDIVAIIPYFITLGTLEAHEQQQPGGSSNNGSGSQQAAMSLAIRVIRLVRVFRIFKLSRHSKGLQILGQTLKASMRGLLI
FFLFIGVILFSSAAVFAEADDPESHSSIPDAFWWAVVTMTTVGYGDMRPIIVGGKIVGSLCAIAGVLTIALPVPVIVSNFNFYHRETDHE
EQAMLKEEHSSAQSSITGVDGKRRSSKNSLNSVHLENNEGFKSASPLEKTNIAKSNVDLRKSLYALCLDSSRETDL
>118KV1
MHQSAQSPFLDRLPLGSMKMFERRNGIVVELSLANDFGQFLHQKQVQIVSSSLGGDCNLADSSSPCNYSFNGFDVVSEATVQRTIKESPFKS
YQVREQEDAPQEEAPRQKKKVRALGLACHFPAGTNLGPQDPGLLTTIRIQSHALEPLTDKVQFQSLELGMTRIQLQEQPIKYNMLKADLIE
RWGLNPAWSRNNRQNRSGRSNPKASLEAPSAASPRMEAMAGLEAASGNPYASTPRHYGRMSHTPSGGNISGAMSNCRSLPRLEQGD
DSSDSDGEMASEDPGWVWVIVSGLHYETHLKTLLNQFPNTLLGNPERRIRYFDPVIRNEYFFDRNRPFDAILYYYQSGGRLRRPVNVPIDV
FTEEIKFYELGDEAMLKYREDEGFQDEEKVLPNTPLQKKMWLLFEYPESSRMARVAVISVTVILISIVIFCMETMPEFKDARNRTLSEE
ADAAIKSAELAAAYFRHPFFVETCCIVWFTFEILVRFLSSPSKFTFTKNVMNIDIIAVLPYFIQVGTMAQSSTDTNSQATSLAIRVIRL
VRVFRIFKLSRHSRGLQILGRTLKASMRGLLIFFLCIGVVLVSSAVYFADADSSDENGEPFKSIPDAFWWAVVTMTTVGYGDMKPKSTG
AKIVGSLCAITGVLTIAPVPVIVSNFNFYHREADSEDSSNSHVSSCPFPQAPSIDDKSEGNSELQHDVFEMEEGLESS
>119KV1
MHQSAQSPFLDRLPLGSMKMFERRNGIVVELSLANDFGQFLHQKQVQIVSSSLGGDCNLADSSSPCNYSFNGFDVVSEATVQRTIKESPFKS
YQVREQEDAPQEEAPRQKKKVRALGLACHFPAGTNLGPQDPGLLTTIRIQSHALEPLTDKVQFQSLELGMTRIQLQEQPIKYNMLKADLIE
RWGLNPAWSRNNRQNRSGRSNPKASLEAPSAASPRMEAMAGLEAASGWVWVIVSGLHYETHLKTLLNQFPNTLLGNPERRIRYFDPVIR
NEYFFDRNRPFDAILYYYQSGGRLRRPVNVPIDVFTTEEIKFYELGDEAMLKYREDEGFQDEEKVLPNTPLQKKMWLLFEYPESSRMARV
VAVISVTVILISIVIFCMETMPEFKDARKPGESGSGAPCGTMASTTVPTATQSGNRTLSEEADAAIKSAELAAAYFRHPFFVETCCIVW
FTFEILVRFLSSPSKFTFTKNVMNIDIIAVLPYFIQVGTMAQSSTDTNSQATSLAIRVIRLVRVFRIFKLSRHSRGLQILGRTLKASMR
ELGLLIFFLCIGVVLVSSAVYFADADSSDENGEPFKSIPDAFWWAVVTMTTVGYGDMKPKSTGAKIVGSLCAITGVLTIAPVPVIVSNFN
FYHREADSEDSSNSHVSSCPFPQAPSIDDKSEGNSELQHDVFEMEEGLESSSRKSNHNGNSRPNVQGCIRNNLKMLSIETDV
>125KV1
MLELSTARVNLNKYIKDLYFSSRLELSDPKNWSGSKSRRHQKHSRGAKMSRENQDDGDVHVALLDICEMEQQDQECCELVINISGLRF
ETQLKTLARYPNTLLGDPKRMRFDPDRNEFFDRNRPFDAILYYYQSGGRLRRPINVPDMFLDEIKFYEIGDDVIKHFQDEGLKED
ERPLPSNEFKRQIWLLEFHPDSSGAARIIAIVSVMVILISIIIFCIEITLPEFREDDRVFDNHLPANSTTSVQRLSAYTDPFFLETTICIVWF
CFELFIRFLACPSKPTFFKDIMNTIDIVAIMPYFITLSLELGEVQSNQQQTTSLAIRVIRLVRVFRIFKLSRHSKGLQILGQTLRASMREL
GLLIFFLIGIILFSSAVYFAEAADDPETSFTSIPDAFWWAVVTMTTVGYGDMYPVITGGKIVGSMCAIAGVLTIALPVPVIVSNFNFYHRE
HNEADQVEYTHVTCGRSLPMQCDRNKSDSKSSLMISEHNSDDACTISSILNFGPSEDTYTKGLTDV
>129KV1
MTVQAGRIEVALVDFETMEGTDIGVDFNDPDPNEMTTLTVEMPDFGPGTTYCNASAKVSPFKTPQNLDPQSPILTSHARGGRASCASLIS

NWKLNVNSEGTSQSEIFSRITKDCYEDLFVDKRALDDGDKVIINIAGLRFETRLRDLQFPDILLGDFMCRMGYFDPMRNEYFFDRNRPSF
DGLILYQSGGKIRRPANVPLDVFADEIFYELGQDAMDQFREEEGFKDVEIPLPSNEFHRQFWLLFEYPSSNAARGVALVSIFVIVISI
IIFCMETLPEFREDLEIFPTAVLSFNETYHSGSPLSPSTPKTISSTFSDPFFIETACIWWFFELSVRFLVCPKREFFNIMNMIDIVSI
VPYFVTLITEIVTTNKSNTGQNMSLAILRIIRLVRVFRIFKLSRHSKGLQILGQTLKASRELGLLFFFLIGVILFSSAIYFAEVDPNT
QFVSPDGFVAVVMTTGVGYDMCPIITLGKIVGTLCATAGVLTIALPVPVIVSNFNFYHRETEQEEKQPIAESTEKALKSGNNTKHGSS
SSLNKVNGNWQTEKKC

>131KV1

MAGLNHQSGSPRQRATGQDSLTVQGRPGGTGARAPAAVGGKRRAPAAVGGNPEVRGVRRARAKLGECAGRREGERSEARRGEGRARSELA
VCLWRSRGERGRPRRSLAAAAATGCGLGCGGSEPAGGGRRRLMDEHLSLLHSPPPSARHRAHPSAQPPQPGSGGGGGGAHTLVNPGYIE
AAAGAAAGPELHPGMTVVPGDHLLLEPEASGPQGGCGGGCDRDRYEPLPPGPPAGAVAGAEQDCCGERVINISGLRFETQLKTLQFPET
LLGDPKRRMYFDPLRNEYFFDRNRPSFDAILYQSGGRIRRPVNPVIDIFSEIRFYQLGEEAMEKFREDEGLREERPLPRRDFQRQV
WLLFEYPSSGPARGIAIVSVLVILISIVIFCLETLPEFRDEKDYAPLSPETLEATNNGTSGSQAGVSSSDPFFVETLCIIFWSEFLLV
RFFACPSKATFSRNIMNLDIVAIIPYFITLGTLEAERQNGQQAMSLAILRVIRLVRVFRIFKLSRHSKGLQILGQTLKASRELGLLFF
LFIGVILFSSAVYFAEADDPSGSSIPDAFWAVVMTTGVGYDMHPVTGGKIVGSLCAIAGVLTIALPVPVIVSNFNFYHRETEGEEQ
AQYMHVGSQCQLSSVEELRKARSNTLSKSEYVIEEAGMNHSTFPAPFKTGNSTATCTNNPNNSCVNIKKIFTDV

>132KV1

MVRQGPVSYQTDVELKSQKPELAPGSEALDCQKQDQRMCGQSLAGLGVCFGGVGGGRGRGQTRHYASVVREEQSHAAAAAVTAAETRA
LGLRVPALRGSTEGLDGAGHSEPMGRGHGEEASLAATSARRESCNRLREAAEATAGGEGGGASCASGPGITVDESEAPSGRWEVLNQPEGDP
GVLAPTPKKSENVKIKEKGYQEPKPRVKEARSSTPHLSVQTRLRVVGAGGRAHVVGGMREETLALAARGEVRGPEEEQGGGDFPGSAG
GGGGCCSSERLVINISGLRFETQLRSLFPDILLGDPGRVRFDPDLRNEYFFDRNRPSFDAILYQSGGRLRRPVNPLDIFLEEIRFY
QLGEEALEAFREDEGLPEGGEHQKPLPSQPFKRQVWLLFEYESSGPARGIAIVSVLVILISIVIFCLETLQFPRDPRSRSDGGRVSSGG
PASRGSQEEDGDHVSVKLLNPSVIVQGGVVSQVSGPSNQLIPLGGPESASFPTDPPFLVETLCIVWTFELLVRFVRFVRFVRFVRFVRFV
IDLVAIFPYFITLGTLELVQQEQQPGSTGGSSQNGQQAMSLAILRVIRLVRVFRIFKLSRHSKGLQILGKTLQASRELGLLFFFLIGV
LFSAVYFAEADDDSLFSSIPDAFWAVVMTTGVGYDMYPMPTVGGKIVGSLCAIAGVLTIALPVPVIVSNFNFYHRETEQEEQGQYTHV
TCGQVPVPLKVGGLGKPDFSEVAPERPSYLSSTPHRAYAEKRMLETEV

>143KV1

MFVPMQRDRDLGSEMDITNMAENKFNRSRSLPPGDFDSSGYDPNDEIININVSGQLFQTYKTLNRFNSSLGDSERRNKFKNLSTGELF
FDRYRPAFESILYQSDGIMARPPNIPIHVFIKELVFFDIGSDVIDQIQIENGLKEPTKTIELPSYLPFRIIWNFLEYPETSRAKLFVAV
SVFIVISLVMFVMTLPSFAPVVHLNNGTLETPNENESWMFMVSTAVIAWTFSEFMLRLICCPKIKFFINLSNIIDLSSIPIVYVVSFA
LSSTSKHQGLAVLVRVIRLVRVFKLSRHSRGLQILGDTLKASHELLMLAFFLLIMILLFGSCVYVYAEYQVEGTKFTSIPAASWVAIVTMTT
VGYGDMYPTTLGKLGIVAVVCGVLTIALPVPVIVSNFNFYHRETEQEEKQLEERKSSNMFRKMICRKSRRKERSGKNSI
KLNICEPENEEVSGQHISAV

>149KV1

MKTFPINTLNDQKYSNGKTHSNSDVIIFPPSIIPQSSSFDVSSNMPSYLVQRGLRRLAGAAGWPVSLHFRFLPPGNPSWVCLSTPHHL
VPGVVVVRNRLSLWRNATSSPSLPWCLETPFCQGEISCPGPCSLFAISSCVDVKIQGVNYFQRNKVAKTAMMFLPKVKVSQCSIRRDT
PECLLHGSQQAAKTEGLHAAPPTLKWMCVAGKKWLLWSIFDNSDEIQEESAYATNFDPASPRGRPGSGTFPNWKILVSDNTTHETFSK
LPGDYDPPGPEVALNEGNQRVIINIAGLRFETQLRNLNQPETLLGAREKRMQFFDSMRNEYFFDRNRPSFDGILYQSGGKIRRPANV
PIDVFADEISFYELAVRPWTSSGKTASSKTLRIPLPTNDFHRQFWLLFEYPVKGAPHAARTVAVVSVLVVVISITIFCLVTLARVGGQGA
EGSSETPASATNKATFPQMTFTDPFFMVESTCIVWFTLELVRFVVCPSKTAFYRNIMNIDIISIIPYFATLITELVQETEPSAQNM
SLAILRIIRLVRVFRIFKLSRHSKGLQILGQTLKASRELGLLFFFLIGVILFSSAVYFAEADDDSHFSSIPDAFWAVVMTTGVGYDMRPV
TVGGKIVGSLCAIAGVLTIALPVPVIVSNFNFYHRETEQEEKQIPGEIDKILNSVGSRMGSTDSLKTNCGCSPEKPRK

>153KV1

MGQSGVVRSPRNLRFPLGGVPMRRLRGRLLPSGNREFQLSQPRILGEPGLAWGKPDVSTWRGADEDSVSHQDLRTNSPKMHTFPREEEKALP
ARPLRQVWLLFEYPSSGPARGIAIVSVLVILISIVTFCLTELQFREDGELPGPPAANATPGGVLLPPGRPGPPPPRPSLLADPFFLV
ETTCVWFVWFELVARFSTCPSKAEFSDVMNDIVVSIFPYFITLGTLELQPPPPPPPPRQSSGGGNGQPPQAMSLAILRVIRLVRVFR
IKLSRHSKGLQILGQTLKASRELGLLFFFLIGVILFSSAVYFAEADDDSHFSSIPDAFWAVVMTTGVGYDMRPVTVGGKIVGSLCAI
AGVLTIALPVPVIVSNFNFYHRETEPDDGQPALVEPPPPGAGVDAGGAPQASRSRGLGPPAGAPPDVEIPRPGGRLEKGLLAKASNVLD
KKSVALCLDTRRETDL

>162KV1

MDDRVRINVSGTTFETRLSTLRFPRLLGSHSKRQKHYNQTLQEFYFNRHRLAFESILFYQSNGLILPDEVFPFRVFTEVEFFELGEDA
LNSISQGLMPLNTIRKEPDRVVMRKIWNLFHPDTSMLARIAIALFSVFMIIASVLSVSSVETLPQWGRDCGKSCRNQTSGDLLKDCNSTFEKY
EKCSKTKEIFMFLETICYSWFLFEYVIRFATAPDRSKFVISPMLNVDLLAICPFFILLIRSERVSVLAVLRIRLVRVFRVLRVLRVFRV
RVLCYTLRSSLKELEAMFLVCMIVVLSSAVYVYDGLGHPKSFSSIPDAFWCATTVTTVGYGDIPTASGRFVCICAVLGLVAFSLPV
MAFATNFNAYLKCEPVRKLDPARERTESINRYRKSFRVSVHLLQFRLRSKRINFYRMTLSRIALSRIALSRIALSRIALSRIALSRIALS
RIALSRIALSRIALSRIALSRIALSRIALSRIALSRIALSRIALSRIALSRIALSRIALSRIALSRIALSRIALSRIALSRIALSRIALSRIALS

>163KV1

MAHPEAYESVSFCNLDLNDRIVINISGERYETLESTLMRYPNLLGSPIKRSQYFDQRQCEYFFNRNRQAFDAILFYQSCGRLIKPELLPE
NIFVEEVRFPEIPSDLITAREELEEKLMGKNAVLPKNDHQKILWAFVSPESSFLARVIALWSVMVLISVIIPCVESSLEFNETSIGNSN
VLATNVYVVIEMACYIWFTELIFRLASAPEKIKFCKQPLNVVDILTVPYIVLAVEKSRTGSLVMMRAARMLRVLIRIFKLSRYSSGMRVL

LYTFLMSLNELWMFMLFAGMSVLLSSAAAYYAETAHGRQTFESIPGAFWWSISTVTTVGYGDQYPLTASGKIVGSILSVFGLVVALPVFLF
VSNFKKVLSTKCTVVEDDSRRDQESIRRHLKGIKNFNTVSRHSLVERSLSIPRANLRIK

>164KV1

MESLWVLRKAVFTTVMGTVDYCCDPRRIVLNRGERFETFERTLEQFPETLLGSENRRMPYFRPDLREYYFDRDKVSFDAILFYYQSNGLA
RPESVSEAVFEKELEFYDIHIEKEESPDKKSHNIEDLPKMKWQRKMWLFDFDKPNSRYATWFANMSMLVIIFSVTFCVETLDVDAYARFDK
STHSQNSTANALGSKSSKPLLWFVIDTCIITWFTSEYIARLISAPHKLFVFPSTLALIDLIAIPYFISLGLDADQTHAITFTVLRIFRLLR
VIRLLKLTRYVAALRILGYTIQSCQDQLTALMFLLLISIIILFSSLMYLENEENPTEFYSIPAAFWWCIITMTTVGYGDTCPRTPFGRLVGA
CCAVFGVIVMCLPTPVFVILHFNNIYCRFLGIKLRDKLGSMDRTPISTTLKVVRRERRNSLTVHIDTPNHPLLSQA

>165KV1

MRYETHEETLSNYPETLLGSPERRRTHYDETTDEYYFERDKQLFDAILFYYQSRGILAKPEGVEEEVFMREVQFWGLQEKPEEAKEGNEVVL
PECPFKRRFVWFEYPRSSRIAKGLALWSVFIITLSTVFCVETLPQFQHDKIEKIRHATSHAHNKTILQRVNVTKGNTTVEVLVNKTIRGE
STTWSTEMVDHYFTDYWFVIEAYCVAWFTVEFVVRMVASPCTWLFVKSWSFGVLDVAIVPFYITLALKESTYGVRSFAVIRALRFRVIRIF
KLSRYS DALKLLVKTLYSSSEQLRSLFCFLVAIILFSSIIYYVDDKDNIPSPHAFWWSVITMTSVGYGDVVPSTIAGKLVGSLCAMSGLI
LFCCLPTPVLVSNFIKYYLCHYELEG

>166KV1

MAIHATAGLAPFQTTDFSRSSWTPRPGTGESNCHPSTPLL YDSPRRLSTAHAQCYHRASIPSVATLDISQGGGQSLYDALFSSASEED
RIIIVRGTKFETFRITLDQFPETLLGSPGGGRFYDPTANALVFRDPASFDAILFFYQSKGRVLRPGSVDEDTFSDEIKFYGLGDDNME
DIAETVSHPELFGHFAALRLLWSMLENPGDSRTGKFLARFMSLIIILSVIAFCLDTPDFEFIDNKYDKDDTKDILERPQTLWFAIDTA
FVIFFTVEYLLRFLASPDREFKIRSF LAVVDFIAISPYIISLLEEGTSNVKSFNVVRAIRLFRVVRFLKLYRYSNGLKLLGRALLQSKEKM
GTLILCVLMAVVLFSALFYIEGFGIAGSPFESIPASFWWAIIITMTSVGYGDIVPVTSLGKLVAAVCAFSGIILLYILPVPVFSHFNKIYG
KWKQRKRDVRNSVFNLTNLKRAAPW

>168KV1

MAAAIQATDKGEERIVVINVGGRKFETYEHTLNKYPNTLLGSQERRQSYDPIKKEFFFERHRSSTAILYYYQSGGILEKPLNVPEHIFLE
EIEFFQLTDVMQMQNEEEKEIEQLKEEGKIELPHNKVMKLIWVTFEDPNSYFAKGLAIFALFVILLSIAVFCVETLPSLDDSMPTTIS
PNGSTITHPAKNFNTNIFILNAVCTAWFTFEYVLRFLVSPNKIEFLKSTLNILDLLSILPFYITVILARTGDFGLRVMRVIRVARVFKLT
RHSRGLYILGKTLHASMNELMLFLFLMGVILFASAAYAEFQENPKMFRSIPHGFWAVVMTTVGYGDLYPIITFAGKIVGTMCALSGVL
AIALPVPVIVSNFEYKYKEEMLRKEAANKKLEDAEAIENSVSFKSLNQLMPPKSPFLERKEDNRVCVETKMLKALLANACISIKSKNGR
WAIIVCFKSLVSNCLIAQ

>176KV1

MAAVAGLYGLGEDRQHRKKQQQQQHQKEQLEQKEEQKIAERKQLREQQLQRNSLDGYGSLPKLSSQDEEGGAGHGFGGGPQHFEPIPHD
HDFCERVVINVSGLRFETQLRNLNQFPDITLLGDPARRLRVDFPLRNEYFFDRSRPSFDAILYYYQSGGRLRRPVNPLDVFSEEIKFYELGD
QAINKFREDEGFIKEERLPDNEKQRKVWLLFEYPSSQAARVVAISVVFILLSIVIFCLELPEFKHYKVFNTTNGTKIEDEVPDIT
DPFFLIETLCIITWTFELTVRFLACPNKLNFCRDMNVIDI IAIIPYFITLATVVAEEEDTLNLPKAPVSPQDKSSNQAMSLAILRVLVR
VFRIFKLSRHSKGLQILGRITLAKSMRELGLLIFFLFVGVVLFSSAVYFAEAGSENSFFKSPDADFVAVVMTTVGYGDMTPVGVWGKIVGS
LCAIAGVLTIALPVPVIVSNFNFYHRETDQEEMQSNFNHVTSCPYLPGTLGQHMKKSSLSSESSDMMDDDGVESTPGLTETHPGRSAVA
PFLGAQQQQQQQPVASSLSMSIDKQLQHPLQQLTQTLYQQQQQQQNGFKQQQQQTQQQQQLQQQSHTINASAAAATSGSGSSGLTM
RHNNALAVSIETDV

>188KV1

ERVAINVSGLRFETYEHTL I KHPNTLLGNRARRDRYDYERKEYFFDRHRQSF EAILYYYQSEGRLNRPSTVPWDIFYEELCFFQIEPEVLS
HLRKEVEGMEEDPAPLLPQNKIKRRIWLLFEYPTDSMMAKCVAFPSMAIILLSVAVFCLETVDGFNVNFRNKSNTVEQNRATRNADALYNV
ETMCVWFTFELIIRFLACPSKWKVISPMMNIDFLAIMPYYITLIMRTNGNPNVTVEALRVLRLARVLRIFKLSRHSGLQLGKTFKSS
MNELFMLGCILVICILFSSVYFFFEYERNGKEFQSIPHAFWWAVITMTTVGYGDISPRTGLGQIIGSLCAVTGVLICALPVPVIVSNFTYY
Y

>189KV1

MFNDTSSAKQLERNLITINVSGLRFQTYESTLERYPLTLLGNSFKRNRFDWPKNEEYFFDRHRTSFESILYAYQSGGIMKRPEVSPIDIWGE
ELLEKFWISEGYEKPKEIQMPQNLQRQLWELVEYDPSSLFARIFALLSIFVISISISIFCLETLPMSKENPGDVRDWSNPFYIELFCIITW
FTIELLRIFISCPNKFSLRSLVNIIDFVAIAPFFGNLMWMDSTKSSSSMSFAVLRVLRVFRIFKLSRHSVGLQILGKTFRASIQEFCL
LIFFMVIALVLFSSGVYFAEQNEPNTKFTSIPASFWYGDLTPTGVYKLVGGLCALIGVLTALPVPVIVANFKHFYRQETRLAQMRASAE
DETNSEHSSKSP

>190KV1

VLRKTIKFPSSRLFYLMKAKSHDEIAELCDDYDLVKGEFYFDRNPNTFSCILDYRTGKHLPAERCSAILEEELNYWKIDWELEPCCRD
RYQKEEIEKEDVEAESNHSQDKIKNRFKRYQNKIWTLEKPNSSMARIMAVSVTFIILSTVVMCISTISDFMNSAIEVIEVICIVWFT
FEYVVRFLSSPNKQWFLKGLLNIIDLIAILPFYINLAIINERRQTDVNSTEDFKGIEGIAKSLLLIRMLRVLRLKLARHSSGLQILGLTL
KKSWARELFLNLFITIGVIFSGFVYVAERDVNGTQFKSIPGTFWWGYITMTTVGYGDHPTTIPGQIIGILCCITGVLI

>193KV1

MDHSEFVVEVGLADPAAHQDQDHRQSGHVRSIMTPGRKLVLDIKEAVEFPLQAYAAVHPQRVPVDEIDL CYMDGTCLDLSQEAADLRVLR
VLATDILRARGLPICLLVKGSESWSDQVLSAVPEYLGTSAPPVARDTTTTPLTPAGYLLVEASVKAERVREEHAKRVVDGPRVSNF
AQEPRRTAVTTFPVAIGEAPSTTLEAETAATGDDDLAPVFPSPSEGDGDNISDVLTRSSAFDFDNPFLSDEELALRSVDDDDDRNSDCIWW
LKHNPISRFFEISTMIVILISVCGVFETLPAYRLGDDGEPRTDNHPTFTTIESVCIWFTIEYGMRFYAAGPTRLTKMWEPMNLIDLIA

ILPYYIGLGLNSSGASSVAVRILRLTRISRLKFSRHSEGLQDMIVCISKSSKELVLLFLITIVAATLFGSAIFYCEQDADSGFISIEPEGM
WWAVVMTTVGYGDISPTTTQGKIVGSLVASIGVVLMAIPAGIFISEFMRLHQERQLSDAKLLKHEVILQRLRNRMDVNHISISAYVLAREE
HSKRMQIYYRNKLADQAAANASTGSESRRRSSAKPNKYEGQLYQLDMDDIQVSNSGPGTYRGTMTFTSGGDDQAS

>199KV1

MHHLVLSSTEHI VSHLTA FYFFYRNVGVSRPPSNHHAEGTATLLIPSPKSKLSESCRNSGRSTPVSSQNGCAISSERITINVSGLKYETQDK
TLKTFPETLLGDQNR IQHFDP IRNEYFFDRNRPSFDA ILYYYQSGGRLRRPVNVP IDIFTEE IKFYQLGATALGKFEDEGYIKEKIKPLP
KSDFKQDVWLLFEYPESSAARVVAIISVSVILLSIISFCLLETLPYQQPIRVGPTFAPNFTTLGATTRSQNP AHMISDERRFSPNFWIIE
TICICWFMSMEVTVRFLCSPDKLRFWKNIMNI IDIVAIAFYFISLGTDQQT NEDGKMSLA ILRVIRLVRVFRIFKLSRHSGKLQILGQTLK
ASMRELGLLIFFLF IGVVLFSSAVYFAEIDNQKSDFKS IPEAFWWAVVMTTVGYGDMKPI TVAGKIVGSLCAIVGVLFIALPVPVIVSNFN
FYFHRETDTDEANKHTYVSTCPYLSSWKKKTRRSSITSSICSSRRS INVDDTEGTAPSTRNGTDRTRPVESNSEWVKVRDKLNNNVTVQVE
TDV

>202KV1

MNNQELSERDDNMRDMHADRADQNNSPKVI SHRENGSHLSSGSLGNPSVVRGKDRHRSYHGSDSRTESPPESLKVQDQSRSDIKKGSSTTL
GKYPSELKEYEGVPRRHKSDGDVEASHETIKDTTTTLEAPTDPMLLGYSCGHLNNGVDDEEPNYPNGYACVCCSRVS INVSGQIYETQLRT
LEQFPETLLGHADKRRKFYDRIRDQYFFDRNRRAFDA ILLHYQSGGRLRRPMDISVDVFADEIKFFQLGTEAMAKYQIEGYVFDAMYEKRR
KKLPKNKYQRTVWLLFEKPESSNPARVAVMSISVIFLSIICFCLLETVPSLQHA WIDNSPNVTGISSKRWVPHFTQNPFWI IETICICWFT
IELSCRFLSCPTKTSFCFDVNLNIDLVAIVPYFVTASLATATDEAEDTQNSSKGISLAFIRVVRLVRVFRIFKLSRHSTGLQILGQTLKSS
FRELGLLFFVLIGVILFSSAVYFAEIDAQLPEGKQTYFKSIPDAFWVAIVTMTTVGYGDMHPITVAGKMGVSVCAITGILCLALPVPVIVS
NFMFYQRAVANKTRDDMK

>203KV1

MAMHIPMDVMAGVPAYRTRKRFAQTPFSSRQQSLSRQESWEENPETPGGLDASHLEEVARKLLTLDEV SANQEAGHTEGNTIPLTHHQGRP
CGQAGHDICKRIV INVSGLKFETQRGTLCRYPTLLGNADRMKKYDSARQEYFFDRHRPSFEAILSYFQTGGKLNRPADVVDIFLEELK
FYDMGASLIRQIREKGLGGIMRPRLPNRNFRRIWLLFEYPESSQWAKIVAGVSAAVFLAIGIFCLLETVPLQDFAMDLVASEPEEVR
FAQPPFALETICVAWFIFELITRFVVCPSKLDIFKALNI IDLLSIVPYFVDVTVSLTSDPGAPDNSLIPTLRVVRLARVFRILKVARHSRG
MQVLGKTFKASWELGLLFFLLVGVILFSSAIFYVEYDLEDSHFTSIPSAFWAVITMVTVGYGDMYPQSLGGKVVGGMCALSGVLTVSLV
MPVFTNFNRYYYQDKNAQSFRRATGSRMVGHWLFQVTQPSIGMVRPNVDVSI ALEEAQPPKLRKGGIKRRKAGKETTSA

>205KV1

MKKRLGARIKINVSGLKFETKDG VFLQHPD TLMG DVARRQEYNEEKDEFFDRHRPSFEAIFRYYQTNLVRPTNIPVDIFADELRFDFLG
DDLILDFLDSEGYVDRPLMDLLPETEPKRTI WLLFDYDSSVWAKIVGFISISVILISIAQFCIETLPQYKSSQALSFPFNATATEVLETS
GFFQVETACVWVFCFELLIRFYASPSKVEFVKDVMNIMDLISIVPYFVTLGILIGDIDISGNQVTVAFVRVLKVVVRVFRIFKLSRHFTGMQI
LGKTLHASMSELGMLLFFLSVMTVFYASGVYAEFGHPKTYYSIPEGFWWAVVMTTVGYGQYVPVSLPGKIVGSMCVVTGLLVIALPVPI
IVENFNHFYKKEKRELKEKD

>207KV1

MEALISSMDVTGGEQKGSPPWAQPRRARPREAPRWSDYQRDLTEDRRRAEYDHRRRCRV INVSGLKLETQPETLARFPNTLLGDPVRRQQY
YDAERREYFFDRHRPSAEAILAFYQTGGKLRHPSEVPLDVFTDELRFQGLDDVIEKYREKEGFSVASSQLSLNRDGCFCGLWFLFELPGSS
VWAKLYAVLCVCFILLSISSLCLLETLPGFSERAQNEVEFTTEFFWIE TVCVAWFTLEVLRVACPSKKDYFRSVLNVFDILAIVPYFITV
SVVLASKGETSGLYRKASLTLRLMRLVRVLRIFKLSRYSEGLKMMGSTLAGSGSDIGMLLVFMVILVILFASAIYFVEQLQPEDSESHFSSI
PDAFWVAIVTMTVLYGDTYPTGAGKFGVSLCAGALITISLPVPIVITQFDRLYNQRMEKDWEERTKKNVQGTVEVD

>209KV1

MSSHKHILRINVSGLKFAICCCKLDQYPATLLGSPKRRAKYDPPARREYFLDRHRPTAEAVFHFYHSSGTLQKPEEVPMDTFIEELKFYDLG
KDVMEEYLRGGYVPPKQHPLPPESQKLRITWLLFEHSNSSKAATFIAVVSITFVLVSIIGLCLLETLPVPHKDKHKPATPSDDRTNSTSSP
HQA WGRLEEEEMETGDPYKDDPFFLETVICWFTIELILRFYSCPNRRVFFKSLLNVDLLSILPYYVTLVIAGLAGHDQDIDLRFVLRV
LRTFKLSRYNRGFKVLGKTLARSLSDIGMLMVFLSIVVLFSSIMYFVEASDPATKFSIPDGFWWAIIITIVTVGYGDMYPTTVGKLGAL
CVISGLLSIALPVPVIVSNFEMFYNQQVIEDDEGEVVKKEPEEIGTSLSDIHSADRQSDVDSGLGRSPLHSISGNRDLNDVIVTSETGPG
QSLGQRIDFGSYVWPRVGGGRQAGSYRSRMTQFAVPTSPDSEQDAVLPPTTVLPSTAPSPPQIVAYHRRWVIVGTFCLLGIAQGA VWNWCWP
ISDSAKLVYRWTDGKIAMLANWGCI AFILFAPGLMYINADNNDYLLVQSGTMANVSAPDRSVLYRRRWYLVAVFSLGIAQGA VWNWSWGPV
SVSAKLVFGKDTDI ALLENWDNITYVAFTIVAMWILVVKGLRFSVLTALLI AVGTGLRCIPASADIATILINAGQFLNGVAGIMLMAAPP
LISSTWFPPNQRTTATAISSIFNYVGTSGYLIGPLFVSQPHLMPNSTLHYNQKQSVLPSTGAYLSMFVFPVAVVEDISGQIMRLMYVECGYC
TAVFLAILIYFSPKPTPPSLSAAMDRLDFRTGLKLLFRHGQFWLVCLAYCVPGGVIGGWTAVLDVILSPHGISQIDAGWLGFGYNIAGCGV
GLLGRFADYFAGHLRLIIVMMCCATGSLTWFTIMLFGALPLTQVSLYFSFILT MVSVNASIPLFLELVMETTYP IEEAVSAGVMTWGNL
FALIFLLVPLPKVGVWMMNAAALGGVACSVPLLCVFRENYRRLHLDGAVSEGNDETQHLINESSIEDRKG

>211KV1

MHIIVSGNHKRTNSTDRPRWRRGVSASVVDQETT VSKTGSKRRRCEPPGFTSMSAELQWPNPAQRVTFNVAGMTFEVTARVLD RYPKTL
LGCPRRLQQFWDPTREEYFLDRHRPSAEAI VDFYRTGRLRRPEEVEIEVFTDEIRFYQLGDDVMRRFRASEGFQRRKRVRLPQKHLAPVWL
MFEYKSSIAWAAMLA FVSVSIFILLSIASICTESFPQFRLTKTKADQLDRSNLSGHLAKRYANRANVNTHTSSNDSCGTNSTLTVAGTNVS
CYHKSKTAREKRSSVKFHDPPFVIDTVCTAWFTLEILVRFFSCLPDRVKFCKGKMNVIDVSVVYFILLLEIPGVSTTTGLEYPKLVRLT
RVLRLVLSRYSNGLQTMGKTVLKLSLQIGSLLVFLSILMILFSTLIYFAGQIFVPEPKFSIPDGFWWSLITMLTVGYGDIAPRTLPGKLV
GTLCAFAGMLAIALPVPIIVSNFELLYNIQPDDEDLYGSEEEVDPVVSSTSDGGYQSGSVCTEQLLESKRFVPCSNHIEADDISVIRSEE
QQIGRLQFETVI

>212KV1

QRVVINISGLRFETCLRTLNRYPNTLLGSPMRRMEFWDESREDEFFDRNRPSFDAILDYQTTGGKINRPLCVPLDVFEELKFFDLGEEALS
RLRRNEGYLDAEETVLPNNVILRHLWLLFECPDSSIAARVASLSVWVIVVSLAVLCLESIPSWKPKHVTKSSLEDLLKAFHEPFFLTESI
CIGWFLIEFLIRALSCPSKRKFFSQAMNIDLLAILPYFIEILVIVVDWLGWMSDKIEAVFRVARLVRVFRIFKLRHSAAMKVLAKTLQS
SLGELALLSFFLVLATLLFSTCVYLVVEEGKEDSDFESIPSAFWWTIVTMVTVGYGDMIPKTPGGKIVIGTVCTIAGVLALALPVPVIVANFTR
FYHTQGNIEDL

>213KV1

MQARLTAASTQLNDGGEEAREFPEKDDSKLSLGNALRTGWSRQSSRTRRSKPPAGVTGLLPQIVTHGLTDPGRADRRVRINISGMKFDTRE
RVLLRYPQTLGDDVRRQRFRVPEEEEEFFDRHRPSFEGIFRYQTTGKIERPRNVQDVFAAELAYFDMGKLVINKFLKDEGYDVENVLPE
KEPQRTVWILFESHDLAKFVGLITVLFILLSVGTSCAETLPRFRNLTDQTFAHAGDVKANLNIASFNIFFQIETACIVWFCIELAMRFYA
SPRKRFRVVDIMNILDVVLIPYFVDLILIVANVDPTGSNIIPATIVRVLRLVRVFRIFKLSRHMALQMLAATLRASAPQLIMLVFFMAIL
VVLYSSIIYFMEMDHPDHFPSIPAFAFWAIIITLTVGYGDIYPKTPWGKAFACIVISGLVIAAMPPIITKNFEKFKKNGNPNFKALP
NNGHEERDDNSSEHRKRYAVRLTDIETEEHESFLKDEDESSGFLSSV

>214KV1

MSAELQWPNPAQRVTFNVAGMTFEVTARVLDTRYPKTLGCLRLQQFWDPTREEYFLDRHRPSAEAVDFYRTGRLRRPEEVEPIEVFTDEIR
FYQLGDDVMRRFRASEGFQRKRVRVLPQKHLAPVWLMFEYPDSSIWAAMLAFVSVSFILLSIASICTESFPQFRMLKTKADQLDRNSLGS
HLAKREKRSSMKFHPFFVIDTVCTAWFTLEILVRFSPDRVKFCCKGMNVIDVIVSVVPYFILLTEIPGVSTTGLEIFLKVLRRLRVLR
VLKLSRYSNGLQTMGKTVLKSLSQIGSLLVFLSILMILFSTLIYFAGQIFVPEPKFQSIDPQGFVWSLITMLTVGYGDIAPRTLPGKLVGTLC
AFAGMLAIALPVPVIVSNFELLYNIQPDDEDLYGSEEEVEPDVVSSTSDGGYQSGSLCTEQLESFKRVVPCSNHSEADDISVIRSEEEQQIG
RLQFETVI

>215KV1

MAAYTRDGTDAQLSLPAPYVHDVQRNVRVTEDDTSKKNHGKSTEAADKGEQSLPWQRSSLEKKVKQVQTKGQAQNGGNTKT IENHV IRMN
VSGMHFFTHENILSRYPDTLLGDASRRKKFYCKDYDEYFFDRHRPSFEGILFYQTTGIMKRPRNVPEIFVMELKYFDMGDSV IKDLLKNEG
CYPDEELEPNRIKRIIWDLFEQPESSAGARIVAVLSFLILISVAETCVETLPQFRTTDADLLNISDMLTNSTEPPTNTTASKSLEETIS
QLQSAFQNPFFCVETACVWFTLELAMRFYACPSKAFAFKLLNIIDFAAILPFFVTLVLIIVFATSRERAALSLVLRILRLRVLRILKLS
RHVKAMRLAVTVYESRHALGSLFLFLMIGVTFATGIYVTEEYVPETFFTSIPDSFWWAIITMTTVGYGDTYPQGGAGKLVAVSFFFGL
IMAMLPIFVDKFNAMYVYEMTNPYRAINDLKPEPEDTPENTEKIEQRETSL

>217KV1

VVVNVSGLRFATRARVFNRLPETLLGNLEKRDLYDPETREIFFDRHRPSFEAIFDYLRGGRLKCPYQVPLDVFLVEEVEFFLGSHPVEDN
LHLSTCAEPEPKHLKKKIWHVLEKPAESIVGRAVGAFIVAVLLSTISFCVETIPMSDSQPPREVVNSNTTENDSTSNIAythFAFFWIE
TVCIAFFTAETARYVVPKTKTEKFNITNIIDIVAIIPYFLTLITIGLANGIAATASQQGPVYVFLRIFRLFRVVRVFKLSRHSKGLRIL
GKTLRASMNEFVILSFFMIVAMVFFSSVMYVTEASHPRNTYTSIPDGFVAVVMTTVGYGDNTPLVGGKIVGAVCAVTLGLVIALPVPVI
VSNFNFYRTE

>219KV1

MSDKIADSFLSVVPSSSSSSSVQYRDLTSSRDNDPSSETASVDKQLRLYELNMRPNPPLTRKSSDDDDACELKARYFRTRKANGRRSLA
KRKLVNSTSSVNCNSPYPSSSTASSGKESSESSETLSPDGNEDRCMIFGGLNNEIANHVLEREFDCISNRSVSIIRISLTHFMLTIKVLNA
TIVIVSRMPFGRNIECSDIKQSEIKWALGKIKSSEHKDGLTGTGSSYEGSNSYNFPIIPEQFKIIFNVSGKIFESDQRQLDRYPNTML
GDHNSRMEHYDWRREYFFDRHRDVFEALDFYSNSGTLIRPDHIPIDIFVNEIRFYAFDYKTLLEDFLRDEGLLTVKSKPMPGTGKIKRTVW
QLFEDPESSWCSKVIITVVALVITVSVVVFLETLPAFLSLSHNVTEAIQPSVNACQHSINNPRFYGGNRTLQPTAQLKANSHETRIEIGN
ILDYKLDALVRIKSTLEKCVESPDLPVLYRYTAARCLIEVDDERKQLEQSLSHLKLIRNIPNKSEESNLHRKQRKTERYAERSIVNLINT
GETHANQTGFKNLQSPDILARLLIRTKQLDENSTRSPYAWFLEAKMGSPAGILFLTETSCIVWVLELGLRFLTCPDRKAFCKSFLNIV
DASAILPYFITLIVTSIEIKTHLRPQTATILRTIRLVRMLRILKLSRYSRGRILGLTLVRSTRVFLLVCFQMVLAIFSSIVYFVEYDAP
GTQFKSIPDSFWWALITMTTVGYGDVVPITVFGKIAGAGCAIMGILCISFPVVPVIVSNFNLYLNDKDDCKLPEDIMGDNHIFEQKDFKT
DKFQ

>220KV1

MARFVTTIPVIPVISKHQYQDEQSEDIYEETFPFLHPTDPVHGNPREESGIVDMNRQICLNVSGLMFETREYILQRYPDILLGDKERRQGF
YQDNDEYFIDRHRPSFEAIFRYQTTGKMRPHSVPMDFVFNELKYFDMGQDVIQNFLETGDCSQKVDPLEVDVLPESQRAIWAFAEYYPQ
TSLAARIVAFISISVIFVSIAAFCVETIPTYSEQNVLFKQDDTLSDRLTTAYSSSFFRVETACIIWFCFELVIRFYACDPRTFLKDILNI
LDLVAIILPYFATNILIVANIETSGSGALIMRILRVVRVFRICKLTRHITGMRLIILTLASMGSVIMLVFFMSILMILFGSIVYFADMNAE
TDFQSIPTFYWAVFTMTTVGYGDVYPRSLGGKLGGLMVCGLFVLAIPSPATVANFNRFYLRKRVNLLSDEDIREKEREMRKHSTLWDRF
IKRFSNKDTQEERAT

>221KV1

MTECSPTRQRCESLKLKINISGLKFLARERVLHRYPETLLGDVTRRKEFYCPDIDDYFFDRHRPSFEAIFNFYQTTGKLVRPPIVVDIFFA
ELKFFGIDNQA INMVLKDEGYRQKSESCPKLPEAEPKRTIWLFEYPETSVWARIIVAILSVCAIIISIASCAETIPQYQEDKIFDFPQAT
RSSRLKAMYGSTFYQVETACIVWFCFELFIRFYASPDRIAFIKDIMNIDMIAIVPYFLTLIFLLGNVQGSRAAVFMRVLRIRVSRILKL
RSHMTALRILGRTLILSAGSIGLLFLSLFGSMVLFQTFVYFADLETQNTDFDSVPATFWAVITMTTVGYGDEHRSPLGLAGGVCVLSGI
MFLLVVPGIVANFNRLYTRQRNVLSDDFIKTQDETEKVPKPL

>223KV1

MTADRARAALHLRRRVVINVAGLRFEPETLARFPNTLLGSSENRRKFFYPYRDEYFFDRHRPSAEAI IAFYQTTGRLDRPDEVPVDVFT

DELKFFKLGDDVIQRYREKEGFHRVAEQPLPRSKLVKDLWVLATKPRSSHWAMLFAFFSVFAILLSVAAVCTETLPMQYSRNEKSPFVDPY
FLIETVCTGWFVLELLLVVTCPNRKRKYFKSTLNIYDIAVTPWFITITVMMVEPMMYAGWAMRVTRLLRATRALKLARYSRGLRMIGLAL
TASLPDIGNLGVFMGICILFSSAIFIEFGYESTHFESIPDGFWWALITMVTVGYGDHYPTTGGGKFLGSCALAGILTIALPVPVIVTKF
DELYDRQTEKDEEDEDHNGKNKDDIEDSEDETLSEAPTKETIV

>225KV1

DDYETVQRKDRHIRLNVSGMMFETWESTLHQYPTLLGDHARRQRYPCPETDEYFFDRHRPSFEAIFRFYQRGLKRKSKHQENRNVPRKNVP
VEIFYLEMKFFGLGSDVIKQCLEHDYSEPEETEVELPEQDVQRAIWLLDFPESSPWAKFVGVISITFIMISIAVFAETLPEFAQSVPEF
SPNGTISNHLSLYQPLFQAETACIWFCFELVIRFYACPNKCRFWKDLNIFDFLAIVPYFVDVVMVLANYHPSKTSVTITFVRLRLFR
IVRIFKLSRHVKGLRVLGKSMVDSIGPFALLVFLIMIAMTLFGSCVYFAELEHPETDWESIPATFWWWIITMTTVGYGDHFLTAAGKLVGS
VCVVSGLTLALPSPAIVANFD

>228KV1

MPQGLKPLSLANGSAHQMHPSNERLITINVSGLHFQTKESVLSKYPNTLLGDRKRRLPFYHKDLDEFFDRHRPSFDGIFEFYKTGKIRRP
NVPLDVFMLMELTNFDMGETVINQVLKQEGCKHTRHGKAPNSEPRRTIWLFERPESSILAGIVATLSCVITLLSVAGTCFQTLPPYRQKAN
NVTSDPLRFHAAQDSFFCIETGCVSWFAFELGIRFYASTNKIKFVKDILNILDFLAILPYVTVLVLLSNTRGKSEVSLVVVIRVRLVRL
RVFKLTRHVTAMKILLTTIYRCRSALGKLLFLLTGTVLFAGLAYVAESNVVSGKFPSSIPESFWWAVVMTTVGYGDVIPVTAGGKIAACAC
ALFGLLEVSMICPIFIEEFENVLRSYSQDSVKILCQNEERTEKLLRRPSLQSLVEKETS

>229KV1

MEISAACGTGDEDTAEHPEPSRTPNVRVLVHTNKTEALKACGKETMGTLTKCAKQSNQTNKLSKRDRILTCRVSVGIRVEDGNAEPRENH
VIRMNVS GMHFSSTRESVLCRYPTLLGDIRRRKKFYCKDLDEYFFDRHRPSFEGILYYQTGVLKRPEDVPLDVFMELHFFDMGENVITQL
LIKEGYFVPKKEKLPQTRIKRVIWDLFERPGTSTWAKVITVSSLFILLSVTTSCVETLPPQFHKSHHSQSNSDTQVNATEGLANVTSGNII
SRQDVASQNPFLCIETVCVWVFAELGLRFYACPSKAEPFRNALNVIDFVAIILPYFVTVVLLILTETSEEQAALSLGALRILRVRVRLILQL
TRHVKAIRLLWITVYDSRYALLTLLVMAIGIVTSATGLYITEQRHPDAAPPSVPHSFWSVITMTTVGYGETDVISLGGKIVAVVCAVYGI
LIMAILPTFVDRFGALYMEIVNPNYGEVLELTQKEKLPKRRKLRRRETLY

>230KV1

MAAALVAMGQASQSVDIATPRTLRRQMSWPFKSRSPNWKDFDRDLTEEWRAEFLSHKKRVIINVSGLRFETQLETLSRFPDILLGNPKLS
KYYPDVRMEYFFDRHRPSAEAILTYTQGGVLRKPMAPVDVTFDELRFEMGEDNIVSFRYEEGYVKKQPVHKPKGDLRKKIWRITEDPKS
SWIAKHFSYTSVFFILLSTCVASLETLSDYIGELSMEDSRFTNPFFILEIGVTVWFVIEIALRLTGIVNKRAYGRSCLGLVDIMSLPLFFN
VIAMLAIRDAQTLHTVLRCTRMIRALRILKLSRHSRGLKMGKTLAGLSDIAMLLGFMAILIVLFAAGIFFAEESDPDSHFHSIPEAFWWA
LVTMVTLYGDMYPQTPGGKFFVGSVCAVAGILTVALPVPVIVTNFDTMYNLRDEPTEEDKED

>231KV1

MEAIWSGAGGLGVPPTYGDVPLTPTTLRRNYSAWFRSQPPRRWDVSPVRRRLPQRLLLAHRNRVIINVSGLRIETQLDTLNRYPNTLLGN
KEKRQKYDDPKREYFFDRHRPSAEAILSFYQTHGTLTRPFVPLDVTFDELKFFEIDPESIAEIRAHEGFVKGVKRIKQNTQKNIWEMT
DGSPEEFFKAKVFSYLCMFFTLSTGAVCAETNPYLSNVLTAEQTRFKNPFVIEALSAAFFAIEVSLRFLSSPDVLYHYVRTKGLIDLFSI
VPVVNAIVLSKVQDVATAARVLRVIRSLRVFKLSRYSRGLRIIGQALANSSGDIAMLLFFMAILIVLFAAGMYFVEVNVPGTAYTSIP
DGFWWALVTMVTLYGDMYPTTGLGKFIGSLLALAGILTI SLPVIIVTRFDAIYNTEEDPPEEEEEEDTGEELMEEMEEELRMPESMSKSSDR
LIPEIITDCG

>234KV1

EDRHLRLNVSGMIFETWESTLNRYPNTLLGDPVRRETFYCPDRDEYFFDRHRPSFEGIFLIFYQRDKKATADKPGKMEKPLSVVDIFYAEMK
FFDIDEAVIKQCLEEEWYSLEEDPYAELPTREPQRSIWLLFDYPESSLWAKI IAVFSVSMIFLSIAVFCVGTMPGFDVPLDSAMFNSGTML
DKLDRAYEDHLFGVETACIWFCFELIRFYASPNKCSFMKDIMNIFDVAIIVPFFVDFMIVGVSKLEKGSSTSVFVRLRFRIFRILKL
SRHVKGLQVLGKALFESIGSFILLSFFLVCVSMTLFGSVLYFAEPNDSNGWNSIPGTFWYIIVTMTTVGYGDVYPSLGGKIGGVTVVCGIM
TSMPSPAIVTNFN

>237KV1

MSRYDTSTDDGMNLNVGGRKFLKPKQLDRLPRSLAKLYKTSRTPASLALLCDDVRFYDVKNNDVKDSVGTGEYFFDRDPESFLYIMAA
RGASIHAPKSVCAMRLSEEMKYWEIDLCLLDACCTERLETATTLTGLNMKNISQKMEQYLLKQEEIKFLPKMTSDDVTVNHLTLRLRAWSV
VEDPSSSIIAKIWTLTSVAFIISLVCFVTGTVPYEEKDAHGQEHIEESLATIEKVMVWFTIEYITRILVIAPEKVVYFIRQILNVIDLLTI
IPFFIQQFKPEAANGIQTWQHLTQVFRIMRVLIRLGRHSNGLKLLCVTLYQSSNELIMLSIFLMIGIVMLATLVFSFESHDLFPNLGEAL
WFAAVTITTVGYGDVIVPETIAGKVVTSTSLVGVIAIAMP IHP IISNFSNCRYRTQREMENAFKRALKVQKQDQERDKQRKSKTSLVALTPQA
LLSECDATTTDITDMDVLTNFHKAERERRYFAAIGENRSLSRCKSGKRLSLARKKRQSCVGSVANSVFSVAGLDLSDHDKKEDVVCYICF
CTDADDE

>238KV1

MLSRGQASRSRGAASRRRRWRREDNPPAPRRSALDGPVQKVVINVSGLRFVTTMATLETYPDSSLGDRRRKWFYDPNKNEYFFDRHRPSFE
AILQYYQTGGMLQRPEEVAEVLDELEFYDVGEEITLRRYREEEGMELPPPDLPPEDERLKKIWLFLNEPKSSILAKIVTTICVIMILMS
VVVTCMETVPEVQEWLHTPAQGSNETGPLVTRNPFVAETIYVAVFTLELVLGFSVSCADRCRFVKDYVNVLDFIGIALYFVLEGLMRRV
IAVRLDPLLIGSNLPTDQINRIVNAMWIARLVRMLRIVKVTYSGDMQLFWKAMTNSMTAILLFFMTTVLMLLFCVYVYTEIDDPDTKF
TSIPETFWAIVTMINIGDYYPRTIVGKIVGSVAIAGIVALCLGIPFMECYIHLYEARYHKRYSQRKNFDMASFKGAISSKSRRL
NLSRNRDKNRTFKLVL

>245KV1

MTNLNMFYEGKSRNNLDPIIEMLENEHTANEVKEIIDINVAGQLFQTYRRTTLERYPDTLLGDPKQRHFKNPKTKELFFDRHRESFQCILY
YYQSGGVMEKSPGIPIDIFVNELIFYELDSKLEIKMQLDNGLKEIDTKENLPLFKPFRIWFEFYEYEPSSKAAKVFASLFLVIVYSLILFV
IETLPSFQPHVVIISDNSTMTIPSVNAVWTKYSNTAVIVWFTIEFLIRLISCPNKLMMFFLNGGNIIDFLSILPFYLSLISSNRTEITSILRV
MRVFRVFKLARHSRGLQILGNTLKASFNELMMLVFFLVMILFFGSLIYYAEKDVPGTFTSIPDSFWWWIVTMTATVGYGDMVPIITFWGKLI
GSVTIIFGLLLVALVPVPIIVSNFEFYKQDQNRKKVEKEKIIKEKEKNRYFKTYRFLLRDFTKNIKKAHIRRYSMSQNPDLSTKLDSP
NLNDNCLSKNNISYAEK

>247KV1

MPKTLNTISQRVTINVSGLKYETFLKTKLEQYPESSLGDQLKRAPYYDEHDNEYFFDRNRPAFDAILFYYQSCGKLRPPNVPMDVFTDEIRF
YELGEHVHKKIEREEGYIEDEEPVYPKGGKWRKIWELFEFDPDTSMLAKIVAIMSISIIITLSIVTFCVETLPQFRYEKICINGTHSCVTREIN
NEKAMPWFAIESACIIVWFTFEYIMRFISSPDKCIFVRSFLNIIDI IAIVPPYVTLPMESSNVSSLGVLVIRLVRVFRIFKLSRHSRGLQIL
GHTLKASLRELGLLIFLLIGVILFSSAVVYAEKDKETFKSIPDAFWAVVMTTVGYGDMKPTTPWGKIVGSLCAISGVLTIALPVPVIV
SNFNFYHRENELRAADANKKEKKKREEEKKKEYKELKNSSAENDELNKDKLNLGLHVKILFEDDHEEVKGSATPLLNLASNVLL
NNSNTTDDQIDNNATNQTINENEVSNSIYSSSIINKV

>249KV1

MPEENVIVINISGKKYETYLTTIERFPNTLLGNPEKRKHYYNPITREYFFDRHRKAFNGILNYYQSSGLLEKPEAVSEKIFTQEVMPFELGE
MALQFENDCNAVNCPEGELNFPNSPLFRITWIMFEYKSSRLAQLTILSISIIILLSIVVFCIETIPSLDPDHKEGHEMKTTLVLSNICNF
FTLEYLIRFIVAPDRFFFARSILNIIDLVSIMPFYLGAFDASKASYIIFLKVIRILRIVRIFKLSRHARGHLVLAISKASVEELVMLVMF
LAIGAILFASAVVYFAESTRENSNFQSIHSLWWAIVTMTTVGYGDVPTTLVGKIIIGTFCASGVLVIAIPVPVIVSNFEHYKEEHDRRAR
EEEISKRESLTKKMSPMKDTLRILKTTSVLLSDKEKNSNGKQNNISLITKS

>250KV1

MAAVMHNIGPYEDDGTADALAKDFGPDYDHEHVKAIIIQRLYRGWVIRHDIATALEEQLGPSVLLVRKGRPLKFAHEWQRTLYTYVEEGDN
AVNTAVSYAVVVLIFIATVGFILETVPEWARRKSVSDLFKTTETVCIALFTLEIACKVASQPCCGPIKGEESYWRGVWAMKRPMPNQDVVA
VLPWYLELAVSGGGGLAVLRAIRLVRVFRVFKLGRYNTSAMIFKRALERSAQLSLLFYFMLIANILFASAIYYAEAMGPNANPSDNDNF
DPLPAFPFDSIPRAMYWCMTMTTVGYGDMYPITLIGRIVAVITMLSGIVVLAMPITLIGSNFVEEYRKSQANELKEKRRKESNAKAIIEEIR
KEATLRVMLRDPSSKALQRLALANVSGAVSGADAGDASQPTTPGGARRLAGGRVAGDDVLSGGERIVSTIARREERERRRRIREDEEAAG
LGGAPWDTQVTPTRPQRSDGSDGSGRGGGGGGGLDDEAERLREMEQLARMEAMLTRIMNPT

>252KV1

MDDTNIKDELVIINVSSTFITTTLLNFPSSLLGNKENRNLQKTKNGEYILNRHPKVFESILTFYRYGILEQPSRVNQLIFLNDVKYYG
LTAEALEVGKGFCEKQVYHQRKQTYIWNILEYDSSLSARIFSLFSLTIIILLSIVVFCMETLPTYKDNKNKMSDDTLFVNKILDDLEK
FCIIYFTIEIGIRFLISPSKLEFLKFLNIIDIISILPFYVITILNKTGYTSYIFLRAMRLVRVFRIFKLSRHSNEMIILGVAMKESFREL
VLVFFILLGVLFFSSAIYYAEDGADTTFTSIPRSFWSIVTMTTVGYGDEYPKSQLGKLVGAVCAMTGLLVIAMPPIIVNFTQQYVLRP
GSKYWDVFLQKDEAKIKNIAEFQFRNRKIRYFISLRTMALK

>254KV1

MITVDACVSSSQNNENSIPLLTSTRLNRLKEDPHKNINCSTKNLAQNLETRESNLKNCCIPLLRKSXYLNCCCILRNLGNKMSPSDSPKI
DPIITDCQIDRRRVCNVIAGKKYETFESTLAKYPETLLALPQRELFFDSLNGEYFFDRNRKAFGAILTYCQTGVLVKPPNDDRIFAELRF
FGFEASEAHLPNVNLHSENTLYPTNSYLKYIWELFEAPDTSGLARLISLFSMSVIVLSIVMFCIETLPDFKPKVYVNDPLTGSSISSFQT
KDEYETAFFAIECACILWFTAAYLLRLISSPKFLFLRQPLNIIDIVAIFPYITIFLRSTANVASLSILRVLRLIRVFRIFKLSRYSKGL
KILGYTFKASLQELALLVFLAIGVVLFSAAAYFCEEREQNTQFQSIHGFWWAIVTMTTVGYGDIPTTLGKIVGSLCVLGVLTIAFPV
PVIIVNFTYYYTLEQDTPLEDEDYLETPLGNRNRIYSSFASIVTESNYQIVPSNNDKQNKTSRQSLKTESFKANGSTQTKVRSDCSEI
EYHLESPV

>256KV1

MKYTNSKNTNSKDELIYINVSQQLFITTAQVLNFPNSLLGNKEKRDQIQKINGELYFNHRHPKVFESILNFYRYGILEQPSQVNLIFVNDI
KFYGLFDEALEVGTGLHFREKYLSSCKTDNNRRIHNRNWKIYNQRNWKTYIWSVLECTDSSFFAQTFSSFLFVILSTVVFCMETMPI
YKNEISNKNITIKNTLLNLEKFCIVFFTVESVTRFFTSFNKLSFKIKNSNIIDVISIIPFYITLILNDSETVSAYVLRAIRLTRVFRIFKL
SRYSSEMIVLGITIKESFLELRVFLFMFVGVLFSSAVYIADGDPETHFSSIPDAFWWSIVTLTVGYGDVYPKSQTKGLVGAFCAITSI
LVVAIPVPIIVNFTQNYQFLKPVSKYWDILQQKKNMCEGFGKISLNVNQDKGHKCTTQMVPNLRILTSRTVMKNLDEKFENIEEGLD
RVIKGAQSPMPVRHKTSLSKIQKEMTSENSETNRAPFDLTEGELELSSGYNVEYSSMSSMLLYFFLGTNASSILLPEVPMPGSIL
LAGILFKLEGYDIVYGALTTCPHKDIKRLTVYSSVSHMLVIGIFSYPIEELNGSILMMIAHGLSSSVLVGDKIRILIAFTIKVRLPEKDV

>261KV1

MAAAAASLSTKMEFKTIREAHEDEARNREHMLQHSFEIRAAIQIRAWRKYQIHLLAEQREGGDDVFLVVRTNDEPVSFRYHWQLTYTY
FEERDRPSATTKAVNFVSVLVIFFIVIVATVVIVETIPTVARDDDAMYALSILEGVCIAMFTLEISVRMSSVPLEDGKYARGLKKWKNP
MNVVDIIAVIPWYLEIVGGGTGAFVVRVRLIRVFRVFKINRYNASADLFSRALQRSVQLTLLFYFMLIANILFSSAIYYAENLGNHN
PSDETNDISGGAAPFDSIPRSMYCAVMTTVGYGDMFPITLYGRFIAVLTLAGIIVIAAMPITLIGSNFVDEYRKSQMAQWREKKRLEAL
AKAKEEMKVLPLLTEMGLSRSRSRSDYDLARKSTEMEGKKKEGAGGGAGVGTEDVEVLPTAEFAALQPSPWDAPPRPGARLEARTPATGD
DAARLARLIERLDAMQDIASLEETIVRMTIG

>263KV1

MTANIQCISNQLTDEENLTHNISNLIMNPINSSSYIHEPEIIRINVCGMFFETYEYTLMRFPNTLLGDRTRREKHYSRDIYFFDRNRD
AFEAILFYYQSDGVLIRPQNPALFAKDVFFELGEEVFFKLEDEGYITDRKPIEPKREWQKLVNLFHEHPETSAAKILSFWVSVFVITL
SICVFCIETLPAFSMHSNKTNHKIVMTNENRFREPWFTFELSCIVVFSFEYVIRLISPCPMMFLKSILNFIDLLAILPYFITLSFADFNTA

PLSVLRVVRVRAFRIFKLSRHSGLRILGYTLKSSSELGMLCFFLILGIILFSSAIFYAEHGHNDQFESIPDTFWFSLVTMTTVGYGDKV
PKTFVGLKLLGSLCAIVGLMIALPVPVIVSNFEFFYKRDVINYETESCKKDKRDFKRSGFNYSSPVDWSS

>264KV1

METLRKAAGVSSEVHIFLATGNRMKRVKQKSGTFADLLAAHKAFYDEGREFPDAVKLDERSFMLRDREYGVAYEGFAIGEVDNGRVVEV
RDPVMEAEAEVAAAEARMLQADLQLGPEYFVTPASARTAKFTTNDVDDKSDENESEPVVDEKLQKESIEWAKKMLGKGSPELDFREKTWR
FLDDPSSSPWALRFTMFMLALIVFSTATFCIETLPQYYEHMAFTSKWFIMEASCIACFTLEFLRLWSTPKRNEYFNDTMNCVDLVAIILPF
WLELILAGVAIPGLSVFRVRLVRVFRFKVSRGSLTVFATTMSRSSRPLYMLVFFTSIATIIIFSSLIYYVERGKWNDLKMWMREYYCYCP
VKADASVGPVAVKGPWPWTLATSNWTLDSGLAEPCKWIDPATYAPGEASYPAAEAWFSCPYSYKSGTCETVYEQSPYDSIPTSFWWCLVTMTT
VGYGDVVPQPLGKILAAIVMIFGIVVIALPITVIGSNFSSIIYAKFTEEAGMNASDLEAEKLEGLEDEDEDEDVDPKPT

>265KV1

MAGFADGRLVRVRLACKTEHVSIDWDGTYADLAREFAEAFVADTNAPRGLELLEDEDEECRARAKRAFRLRDRTTGMFHENFDPSDVCRHVV
TVNYESFHLAMAALARRRDEIREEKRREREKDGTKRRTLSDGTTSVATPSAVADAESDRKSPRSPRGDASVKQFGIVARLSARLRRFSLR
SIRDEIREEKRREREKDGTKRRTLSDGTTSVATPSAVADAESDRKSPRSPRGDASVKQFGIVARLSARLRRFSLRSMYARKDHRDGGGET
APRTPTERRRPPHSHSTMRAAVWDLMDNPGSSERAAVAAFVFLFIVYSTVTFVETVHGVDNLPYASFVYVSEAIACIAFFTIEIALRV
WACPDRKFFQVNLNLVAVVPFYVDLVVAASGGDEEVGLSVVRVRLVRVFRLLKGGGALAMFGRMTVDSKPLGTLFFLVALAIVV
SSSILYFLERGRWNEDMLFWRPVAIYWCVHVSSTAMSSASTYSAGATSDCKFKTLGDTAFSAVFCPYRYKKNPCSGEYMQSPFDSIV
VSFWAWTMTSVGYGDIYPLSIAGKCVGGLTMFCGVLVIALPITIGANFTQAFNAKQNALRLKRAERGAAYHRGKKRAAWTQGVVERAS
SGRESVDARSVRLSLESSKEGEAPTTPPTTTE

>266KV1

MDEGLWELEEMVLKEFNPLEMMHVRSKDLPGGYVLNHSYRDFVASEPLAFPGKLELDGSSVSVRDPVWQAMLCMSMPVVRVRRPDGL
ASPSSKALSSSEYVPRGRTLTVKLYEQLKVKSEKLRNENLPRDRIDQLLNDPTSSPAMIIGILMLVLIIVISTFTFVLETAPWFYRED
PPLDGAFFIIESICVCIFTIEFGLRLGVCRRKAFWNNSLNVIDFIALIPYWLDIARGVDIPGLSVLRVTRLARVFRLLKMSRDNMVLVQ
TMSKSAKALNILVFLFVVALIYSAVLYYAERGSYDLTQLKWMRTVGNWCAITCTKESMKLIAPFLDCVNEGDQLTMTARFTHGYPADVCE
RVTEESPFQSI PHAIWVAIVTMAVYGYGDMYPRTVAGQILASLSMLCGILVIALPVTVIGQNFSTIYSAMEKRPRLGEEVAPTRSVYPRRL
HAHSGATAKPIKHWLHDLAQPWDIDVAYKEFLPKPPVRTAVADAGVVALPQRMSSKAERAAFIAGEDLVAAGTRASSATIQTGRPIAA
KQSTRAMLEERRECLEIFARGALKVAERKVDVQARLRQRFKQMRMMSKPASASSPRKPDNSPSNAATGGSS

>267KV1

MTDAPPKTPGVAAQVRTFFTGCKEIFIASAFYTSEARELPAGLKLPPHFVMLRDPTYGVAYEGFDLKDVKESVIEVRDPVLEGEAEAAAAA
ARSLQADHNVGPASYFTVDAASAFDFKRDREKDDREDDVDDGGGGGAAGGEDGTSTADAGGDAAPAAAAPPKDEALDAALLWAKTKYGW
HVELPLTFKEKTWQFLDDPKSSKEARYFTAFTLFIIVSTLTFCLELTPQYYSHDVTSSSWFVIEAICVTFIETAEVVARVASTPDVLYFK
QVMNQIDIVAALPFYLELMAQASIPGLSVFRVRLVRVFRMFKVSRSSVTLFVNTMAKSSKALYMLIFFTAIATIIICSSLVYEAERTYNT
ELEMWMPYLYFCDFVDANTGPATKSTATYTLSEGLSEPCVWIDPATYATSYPSVNYPSEAMFSCPYYTKRSDCCSTTYEQSPFDSIPSTF
WWCLVTMTTVGYGDMYPTQALGKALAGCVMLGIIIVIALPITVIGSNFALTFKRMVLEDEAAKQAAAEENEENSDDGSDDDLDTVDEDEGVY
RSLDGATATSTRVSGTT

>268KV1

MTLTPPVNPNKHPGPNHVKVQLNNDLIECNTALHFHALQLGSLILNERRIKISVRGTIFETFERTLETYPNTLLGNIKRQDFFDKGL
GIYVLDRCVYFSDVLFYQSKGTAKPPIVPREQFYELNFYIEGFIDERHIEDLQFLKQNNKIGDLPNGNYRSNINLAVTILSIIAYC
LETVPSLKNNKTIWQIEIITGILFSFEFIIITAYSSPNLKEFRCSLNIILDFMSIIFCVLHVTFYFSALKNFVAIQQFVRVIRIFKLTKFSV
ALRLFIYTYLKSQSLQVFFIAGVTFCFVNAALMFLIENEFNPDLKQNFQSIILDSMWYSIITATAVGYGDVVPVTTSLGKCFGSFVAVTGI
VFCIQQPVLVNHFISIIYLPVEMSKVDTLRKRAIIQMRQLLGTV

>269KV1

MFVRTGTVKISRSLSNVSQNSPEKFLFNQKQKQKESFQCSFLAHHINAIRIGGLVLHQQRVKICVRGTLFETFESTLGNFPNTLLGNISKRN
TYFDELRGAYVDFRCVNSFDAVLFYQSKGTAKPPLVTRQFYELNFYIEIDGVIDERHEDLYFLKQNDKNGDLPKGCFRSTVWKFVNF
FNDNFLTAYTYVNLITLLSITAFCLETEPSLQFAKIWIYIEIGTIFFGIEFIFVYSCPNIFQLRRLSNALIDLASVIVNVYIFLYFL
VGNKVTVLRIRFRVIRVFKLTKFSMALRLFIYTYLKSQSLQVFFIAGVTFCFVNAALMFLIENEFNPDLKQNFQSIILDSMWYSIITATAVGYGDVVPVTTSLGKCFGSFVAVTGI
GYGDIHPTTALGKVCAGFLLVTGILLFCLPQVPLVNFISVYVYLPVEMSKVDTLRKRAIIQMRQLLGTV

>270KV1

MDLLVNRKRCFNISGKVFETFLNRYPTLLGNDKSRAGYFNASKNIYFIDRSPLAFEAALFFYQSGCLIRPPFMSLELFEEECMFYNLG
NDVIKSMKARDNNYKSRKSTMKPVTKLEKIWEFLEVPESSMLAQIFAVISVILAFILVVVDCIVTLDIYQPKMTILNRFITLFSNIFFAL
EFIARIISTPGKSKFIKSKRNLDFFITLNPFLITLFEQYAGEVNNILLIRFSRMFKILWIRLIRYSKSFVLIAATLEILAKCSKDLFT
LLFCVLITCTCGNLIIYFAELDDKTSVVSAPGEMWLVIIQITLITIGYGDVVPITVVGRFLTALTAIIGITVTFPLLSFCGKFFHAYSKIYKA
TNIK

>271KV1

MCVQVSKRICFNVSGYTFVTFEFLNRYPTLLGNDKSRAGYFNASKNIYFIDRSPLAFEAALFFYQSGCLIRPPFMSLELFEEECMFYNLG
GKVAIESMKALDGEFILTLEKTPITQNRTLNKIWFYIEMPESSTPAQIYACISMLILFVVTIDCVSTVDAYKNSILLKLNKANFYLNIF
AAEFIIRLLSSPSKWKFMTSIGNALEIFSIFPSFLTIVEEKHTGGIIFVRVRLRLRLMRLSKNFHLSVVLVILVDFKDIIMLVFIM
IVLSVFFGSIYHAELESKDTPISSILEGMWFALQITVTLGYGDVVPVTFFGKISSAFTAVIGALLMIPLLYLGGNYFTKYAKACGNFANA

>272KV1

MLGIQAPRRVRVFNIAGTIYETFLETFLRFPSTLLGDSLRRVDFDSNTNTYYINHSIAIFDAILFFYQSGCLIRPPFMSLELFEEECMFYNLG

LGTKAIGNMKAKEGYEFDDETTLTDFRKLTKFQKLWQFFEEPSSSLAAQIYLLITLIITTTVMIDCFVTLAVYGHSDTFRVLDYVSNYTN
FIFLAEFFARLITSPKPKFFKSTRNIVDILAILPLITFIAITDERLQNVLFHKVFRFRVLRLLTLWARYFRSLKMWLEILSNVSDILMLI
LFIAIASTLLGTITYAELEDKNSPVSSVPGMWLAVQITVTLGYGDIIPVTVIGKLTALTAAVGALTVILPLLSLEEKYIDIYTKMFRIK
AIHLDPLKPFKSKLRMSDRK

>273KV1

MNKKKILINVSIGHTFETLECTLNRYPDTLGDELKRNKFFCHKSKQIFFDRNRISFEAILFFYQSQGRSLSCPPELSIDAFVKECRYFEISDK
VIKRMIKKAGYLEQKKIHTFPNIPFSRKIWNFIYNDTSTSALIFALTSSFMIVMSVVMCLDSVPSIRNYSWSRHIWVIGEGITNAWFL
IELLVRFCFCPNKKKFLKWLNIIDAITVICYLLMLALKDYRISYEYLHTLRRLARVLRVLRITKHSKRLQIATIIKSSMRDLRSLFLCI
QFKSIPHSLWAIQTIVTLGYGDIVPMTIPGKIFAASFMSFGALTISLPVLSIVTKFSAAYTKNLKSEP

>274KV1

MVYQSRVRFNAGSFYETFLETNLRYPNTLLGDSSRRMNYFDSNNEAYFFNRSSAAFEAILFFYQSNGLIRPSNLPMELECECKFYGLEE
KFVKSMLKREGFDCEQNEHDEKCKCYTFLQKLEFLDEPSSSLQAKIFASVSVIAIFIVTVDCFSTLEKFRSGPVSVVMNAVSTFNFIF
FAFEIARFVSAPSKLKFKFSIANALDFFSIFISLPFLAVEDRNGAIFSRCLRMVRVFRIRVSTSCPTLLTVFNILKMCIKEFTALFFYMV
VSFTIFGSI IYLAELDDKKSPVTSVPEGMWLAQTMITLGYGDIVPVTLLGKLATGFSAAIGVVAIPLISLGEKYL SLYSKTFKISLANQK
S

>307KV1

MNYGTRPRGKDRGRPRGKDRGSPQGLVSGPAPGKATQSHSPAARRPPRPSDGPPEARGGSGPSAADTPALAPTPAASASLSLCPPSARTR
PQLTSPRGLSGRQGGVGTASNPSAVRKAHALRQSITTHSQGPWRRRHRCARAKPLPPPSGVLDAFAAAAEGVRELIPRSLDVQSPPLPSKL
NRWGYFYPVSLDTGGWKAIVGLSFGPFEEAAAARRKGRGRRAALCPAGVTAPPPPLAGRAAGLFLRVDTHGQAGAAAAAGPHVRPRVAG
AARAMEPGCPPPCGCCERVVLNAGLRFETRARTLGRFPDITLLGDPVRRSRFYD GARREYFFDRHRPSF DAVLYYYQSGGRLRRPAHVPLDV
FLEEVAFYGLGGAALARLEDEGCPLTERPLRPHAFARQLWLLFEFPESQAARVAVSVLVILVSVVFCLETLPDFRDRDRNPGLAAV
AAAGPPARLNGSSPVGPLRPLPFDDPFVVTLCICWFSFELLVRLAACPSKTAFFKNVMNLIDFVAIILPYFVALGTELARQRGVGGPAM
SLAILRVRIRLVRVFRIFKLSRHSKGLQILGQTLRASMRELGLLIFFLFLGVVLFSSAVYFAEVDRADSHFTSIPESFWAVVTMTTVGYGDM
APVTVGKIVGSLCAIAGVLTISLPVPIVSNFSYFYHRET DDEEAGMYSHVDTQPCGPLEGKVNGLVDEPEVSELPPPLWAPPKHMVTEV

>311KV1

MCRCVTDQVKTFNFGCSHGQLKVRMTDQRIVINVSLGRFETHDTLNRFPNTLLGCPFRRSRYDSLRENYFFDRNRPSFDAILYFYQSGGR
LRRPVNVPIDVFTTEEIKFYDLGEEIFERYREDEGFTKEDIHILPKNFQRKVVLLFEYEPESSTAARCIIVSLLVILISIIIFCVETLPHFR
HYELQFIEDSNELPIISAVDTPQATGTLFILESICVVWYTFELLIRFAACPQLAFFRQVMNLIDVVSIIPIYAIISIGALLAEANKGQQA
LAAILRVRIRLVRVFRIFKLSRHSKGLQVLRGTLKASFRELCLLFFLVCVLFSAAVYFAEVDASEEQFPSIIDAFWWAVVTMTTVGYGDMR
PVTMWGKIVGSMCAIAGVLTIALPVPVIVSNFNFYHRESESELTYYVHVSDQKGFNYPDNKALGNFDDTLEDRNEEKYKGGKAAVILR
QSFSQPSDRERITVLSDDLKNHEVEHEEESCIDSLGELGNLCMEARNSQIRSLKNMHDLT

>315KV1

MPHFQTNFLHSRTRSLFVEEPHSGSPVQLLWPAQQFCRRLGTAALHAELEDGFLAPAALPLHATQLLVFHLLVASGLASCPGTASGAGTVLA
VYNLALVDLSGYIWEVMATPLLANSYFCQPEDYSWSKCGMRVWQAGAFFMGLNSSVHVFMYYGLARLWPLMWPYLWWKRLTTLQLH
LNKCVFGLDPTVAVITLVKNRAGSMKEVKECLSKEASGRFLSLVPEYSLGKMLVTKEMGSLNGAFEIQTLLNGIEDLPVDNGKNDGNGATH
DRGLWDLRYFSRIVNPGVETFESEGRKDGQEKRRDQDDSAAVPSSLLRQVWLIFEYPESSGSARAIAIVSVLVILISIIIFCLETLPFRD
ERELLRHPAPHQPAPASGANGSGVVGQPSGPTVAPLLPRTLADPFFIVETTCVWFTFELLVRFFACPSKAGFSRNIMNIDVVAIPFPYF
ITLGTAEQQPGGGGGGQNGQAMSLAILRVRVFRIFKLSRHSKGLQILGKTLQASMRELGLLIFFLFVIGVILFSSAVYFAEADNQG
THPSSIPDAFWAVVTMTTVGYGDMRPIVGGKIVGSLCAIAGVLTIALPVPVIVSNFNFYHRET DHEEPAVLKEEQG IQSQGPGDRGVQ
RKVSGSRGFCAGVTLENADNAQRGSCPLEKCNVKAASNVDLRRSLYALCLDASRETDL

>321KV1

MAEYLFSQLGTFDLITFTLEFENKEILIRLITLILTVKMLYTTSLMKVIPQSPKNIESDKFIFSSTPEILHETNRSRDFGLIKRRTTHEK
SIYSRHPHYHAPHCHHQHRRYHSHIRKECPYLCTHHPSTSKSQTIIHKSISKQLSLPVDYTDQKSFYSSSGLLQTNISILDDDIESGL
NIHDDDLHSYVSMPCNITSERPKSYLSGSSSLTSLCRLCLNSDHTVSSHTKAIDEINYDSEPQCSSHSSVINSKLYFDDTDASNLFDE
QKDTLKDRLLYPPTISNQLLNTNPTRRPFNSNHNSDEIEKYDTSVIDAKFSLPKKELKFAVPEFLMPIIDRRTSSQIVNLKQISVSTLNI
ENKLLKRRKTIKERFKQLHSDYDGSKFWNKLNKFNKVEVQNLSSSTRSRSSMAISMDYTHNKDSVSRSSNTSCDDCRRITINVSGLKPFETW
TVLERHPPTLLGDYKRNKPFYDEYRKEYFFDRHRPSFEAIFNYQYGGRLKRPATVSDIFL TELEFFQIESEALDVYKKNEGYVPIIVLP
ENLIKRLWMLFEYFETSILAFTFSMASFIFTVISIILFCIETLPVYAQTHCEPGAKPNFRDPPFIETLCTFWFTIEIFIRFISCPQKIF
IKDIKNLIDLAAIVPYYITLNFVLTIFSCGAKNSASLAFLRVRIRLIRVFKLTKHSSGLQVLVTFKESIEGLSFLVAFIVCIVLVSSTIY
YVEIDRKGSIIESIPDAFWAVITMCTVGYGDKVPKGLGKVVGSVCAVAGVTLAIPVPIITENFNKFYAHKTGRGR

>340KV1

MLSYRLKRTCASQVRSRYQNYRHLSAPESFHIPGESSPNLSHISTLDLYLAECGIQEPHYGKRLQAEENAQVAAASMERRVAFRPPPIG
ESRSTTIHDSGNSADTYMRLNVGGKSYVRAELYTSEWTRMHELLDSHEERLKMVDGFDKTEGYYLERNAKLTDHVMDFVFTGSLHKPQ
NVCVERFKEELEYWKIKPDQLSTCCQIPSEHVRKLSRGTSFNEDDYVDFDGACFAGPRLAMWKFLQSSVFAAVFALLSVFVFAVSVV
GLILGSMPEFQADSSNAATYHVMHVRSRPNDYGNKFGNDDVAPNELLKDFVYKPTDSPNLPLTILEYICIGWFTFEYLVRFTIYPRKRQFV
KKTNIIDLSTILPYLEICLPLFGVESRLKEFTGAMLVVRVLRVLRMARVFKLARYSTSLQTFGHTLQSSI TELSMLSMFLITGIVFPSTI
MYLEKDEPHTDFYSIPAGCWCVVMTATVGYGDAKPVTLGKLVATSTSCIGIIVLAFPISMIVEKFATAQQAIEDQQIQQAQMSAVANN
ALLRRFPTRRKRRTTVSVNNI

>345KV1

MAIAISQAVLAHRNSAATFTVPGSTEQLKFHNYRVGTGNMISGAAQQHKKRLIPLRRTDAMTLAERRNYQILDDIFRSGGSDCFQVQTANSSN
ESGNPQFLRLNIGGTSFMILIDAILRAESTTFLSRFIQLTHTARLKVADAYISSDDAYYFQRSPTSFEAIFQYYATGVVHRPSEICPASFLS
ELDFWRISHQHVSGCCADVIPQKREEEKKEEKVDDTTFDKLMCGKLRMRMTFLERPSSMQAKAFELSSTLFVAIVSMGLSFGTIPDFQVT
HLMPPHNETIVLNGTVTVVQKVEQMRVEHPAFVFTERICIAFFTVEYCLRFFAAPRKLRFALKPLNLVDLLAIVPFYLELLTLGCVDDRK
LRDLRWAFLVVRILRVLVIRIKLGRFSSGLQTFGMTLQRSQKQLQMMTIVLLTGVVFFSTMIYFLEKDEEGTPFTSIPAAAYWCIVTMTT
VGYGDAVPATMGKIIASAAIMCGVLVLALEPITIIVDNFIVKVAQDEQQAQEQKIDQHEQLALEAMLNAHD

(2) The subset S_2 contains 16 Kv2 subfamily proteins

>6KV2

MMLPVNDRRASVAVPSWSSGPFSLGAGSDRGSDLTSATSLAASRNASLRHQRRQHPSSVGIARRRDPSSLANTSASDHHRHFPHRHRHRHR
HPPPLSSTTAASTRDPASATSGSVRKQSGRSEVKIAPGPIVSGGGGSIQLAASPAVVQPTGSIVAGNNPLQGGGGGGGGVGGGGV
VGVGVDMSALRRPFYAASSIGSPDPASILRSGEVSRVILNVGGVKHEVLWRTLDRVPHTRLGKLDKCNTHDAIVDLRDDYLAENEYF
FDRHRSFASILNFYRTGKHLHVEEMCVLAFSEDELYWGVDELYLESCCQHYHQKKEHVFEERKEAESLRKGEDEDFGTGSFAKWRQVW
DLLEKPTTSMARVLAIVSILFVVLSTVALTLNIPGLKGEHEGADNPQLAIVEAVCIWFTEYLRGFWASPNKWKFFKGPLNIDLLA
ILPYFISLGLTETNKSTTEQFQNVRRVVRFRIMRILRILKLARHSTGLQSLGYTLQRSYKELGLMMFLAIGILLFSSLAYFAEKDEPGTK
YVSIPETFWWAAITMTTVGYGDIPTTILGKVVGGVCCICGVLVVALPIPIVNNFAEFYKQMRREKALKRKEALERAKRNGSIVSFHVN
LRDAFAKSVLMDVASEVPRNDWDTNSVETRSMSSPPCVMRGNSNPNTKLSGGGTPNFDCENQENPSNTNLLDIDEESLHRMTTQASN
EPLSNQFEPFSDAMTDLDCDNKGCIEKMLPRQESTASTDYASCFTHPQSSPITGRPNASQANICVNPLEEPSYQQLPSYESVIQS
DFINCPNSHENGNIYQKAPPLGRAVCQSFSGSVNRPSDQIVQKIEDGLTATWPGIQSFPSPRLIATTRLKSPVCPTIYP

>11KV2

MPGWMNKHGSRSTSLPPDPMDIRSKACSRVKNVGGLAHEVLWRTLDRLPRTLGLKLDKCNTECLMEICDDYNLEENEYFFDRHPGAF
TSILNFYRTGKHLHMEEMCALSFQELDYWGIDEIYLESCCQARYHQKKEQMNELKREAEATLREKEGDEFDNTCCADKRRKLDLLEKPN
SVAAKILAIISILFIVLSTIALSLNTPDLQAIDFEGQTTDNAQLAHVEAVCIWFTEYLLRFLSSPNKWKFFKGPLNVIDLLAILPYVT
IFLTSNKSVLQFQNVRRVQIFRIMRILRILKLARHSTGLQSLGFTLRRSYNELGLLILFLAMGIMIFSSLVFAEKDEDDTKFKSIPAS
WWATITMTTVGYGDIYPKTLGKIVGGLCCIAGVLVIALPIPIVNNSEFYKQKRQEKAVKRRREALERAKRNGSIVSMNKDAFARSVEL
MDVVVEKTDETSGRDKVQDNHLSRWRKWKRTLSETSSNKSFDAKEQGSPEKTRSGSSPQNLNVQQLIEDIYNMAKTSQPIILNSKDLN
PSKPAEELEMGSIPTVPLATHREGFIDMRSMSSIDSFISCTAEFPESGRFSSHPLAIPYRNMVNSGQNTSHGYKESRVRPLSSDVSRE
SFTVHPKTDLSRHATYILESPKTLVKVKNPLMLRSLKVNLEGETSSLLPAPNVLSPTSHRQEGPSNQDTSFIYEHSVQSPETSLYTTASA
RTPSKSPEKHMADFTFDHANVHYIDADTDEGQLLDGLDSSPSKELLGTMSPKYNITKSGHRTQRDNVHRGDKNHLEGAPFLSSRYVGG
NCIYATEGMRGQNLLETVKMENHISPVHVLPGGGGGHSNKHNPIS

>12KV2

MRKKDSGGGSSRGPSPPSSADACRELAPLSTLRDPREASPTAAQGVPTTPSSATSAPPSGSLRSRGDQKREVKIASHAPSAPTSS
AGSLISMGGAGAPVDHPHHHGGGGPPPGQAPPLPLPAQGRYYPNDPQPPDAYAIARSRQRSRVILNVGGVKHEVLWRTLRLMRPHTRLG
KLRDCTCHEALMELCDDYNLGENEFFDRHRSFSSILNFYRTGRLHLVEEMCVLSEDELYWGVDELYLESCCQHYHQKKEHVYEEIRK
EAESIRQREDEDFGTGCVSHWRQKVVWDLLEKPTTSMARVVAIISILFIVLSTIALTLNIPALQDRADPSLNQDNEDLAVVEAVCIWFTE
EYLARFWASPNKWKFFKGPLNVIDLLAIMPYFISLGLTETNKSTTEQFQNVRRVQIFRIMRILRILKLARHSTGLQSLGYTLQRSYKELG
LLMFLAIFILLFSSLAYFAEKDEPETKYKSIPETFWWAAITMTTVGYGDIYPKTVLGVVGSVCCICGVLVIALPIPIVNNFAEFYKQMR
REKAFKRREALKAKRTGSIVSFHINLRDAFARSVDLMEVNSPSHKAHAHSGSVGGGVCVGGVIGVGGGGGGPGGSDSCSIDSKSHA
AVLCSGQALLAAHDPNPHALQHQQQQHQLPHHHHHHHHHHPHRLRGTSADEEAGLLTPGVVSGSCENLVANCSNTNLLDADEESLKRMT
SSQPLNSYDQGRMDVTRPERLSPDKSCIEMQQLPRQSSNASSDTSYSSCMTHPHGSPRSSGGHSSGDRHKQNLVYNLDDPASVEEQDVVQ
SPGGTLTYDVTYKESSSSTSSSAQPPHPLPQPQLFHHLQSYHLLVKKWQQTERTIVFKQSWLNKPSDDMMKWLSP

>17KV2

MNTVSTLLRFVHLLCMLIVLVRMPSNIHNQCFHCRKRKSAAPAVTDSNMSYATADSHVLRIMQQRPRVKNVGGVVHEARWIILDKLP
NTRLGRLRHCSSVSTLMEFIDDFDEEKEEMFFDRHPGAFPTVLFYRTGKHLMPEDICALAFSQELEYWIEDIYIESCCQGRYHQKKEQIL
EELRREADALRERQGFDEFEGMCCAQKRKLDLLEKPGTSLAAKVLAIISILFIVLSTVALSLNTPDLRGENDKDNEDLAVHVESVCIWFTE
MEYLLRLVSAPNKWKFFKGPLNIDLLAVLPPYVTVFLTESNSQILQFQNVRRVQIFRIMRILRILKLARHSTGLQSLGYTLRRSYNELGL
LMLFLAMGIMVSSLAYFAEKMEAMFNIPASFWWAITMTTVGYGDIYPKTVLGLVATCCITGVLVIALPIPIVNNSEFYKQKR
QEKAIKRREALENAKANGEIVNMNRDVYAKSLELVDVTKSNEKLDREKKEKDDDESALIAETLNADGKEVETQSSSENNTNFISDR
QSSIKEGRKGEVFTSPNIAWAPKDHSAEFPLSRSHYLSDDSDIVFADKVVPGNSKEGRRNSNTNQNSHERRYDREYKISLPPYPEYDEEH
EPDYRERFSYRDALDSVTFYKEHNDYDDWLSISCASFVPETDGMADHSSYNEDRRDSKGGDYSSMTSSVYSGKHDLNVSSTSSGISVDAG
SIQSPTLDSNLKGGDSGIFNDQCSFASSTKAPLGSIKEGGSIDSTNSVQTVVINSIGTLEDAGGSEYSSNTHESVNKTRNLQQLAPAAV
SPTEYIDQVNCRIAKKYIDYPELLPRASSGNTRTPYRRQKRLNEMDCDNCDTLAQQDEVTKVRRNRNSNNSNTIDIELLDTTPFLLSR
DKLSNPLREENQDNCSESETDDLCSNKNHLLDLSLNDTR

>39KV2

MAEKAPPLNRKTSRSTLSLPPPEVEIRSKSCSRVKNVGGVLAHEVLWRTLDRLPRTLGLKLDKCNTEHLLVLEDDYNLEENEYFFDRH
PGAFTSILNFYRTGKHLHMEEMCALSFQELDYWGIDEIYLESCCQARYHQKKEQMNELRREAEATMREREGEEDFNTCCPEKRRKLDLLE
KPNSSVAAKILAIIVSILFIVLSTIALSLNTPDLQEMDSEGPNDNRELAHVEAVCIWFTEYLLRFLSSPNKWKFFKGPLNVIDLLAILP
YYVTIFLTSNKSVLQFQNVRRVQIFRIMRILRILKLARHSTGLQSLGFTLRRSYNELGLLILFLAMGIMIFSSLVFAEKDEDATKFTSI
PASFWAATITMTTVGYGDIYPKTLGKIVGGLCCIAGVLVIALPIPIVNNSEFYKQKRQEKAIKRREALERAKRNGSIVSMNLKDAFAR

SVELIDVAVEKAGDSANTKDDNHLSPSRWKWARKALSETSSNKSYENKYQEVSKQDSHEQLNNTSSSPQHLSAHKLEMLYNEITKTTQP
HSHLNASDYQEAQKPPVYKEEIEMEEVVCPEQLAVAQTEVIMDMRSTSSIDSFTSCATDFTETERSPLPPYASTHLQMRFPDPTGAEHH
QRAKGLPFLTLTREKSSAPRDATEYTPIDTTGSPDSVPPPLGLHGLOFDSATESPKSSLKGSNPLKRSRLKVNFKESRGSAPQTPPSTAR
PLPVTTMADFTLTPQHISTILLEENSPQGERPLLGTEVSGLCQGPTKSSPLFPKQKLPFSSRERRSFTEIDTGEDEDLFLHGASEDRQ
PDPSTNCCGDKQSDGRDPLREETSALSSPQNTSHNCRQDIYQAVGEVKKDNNQEGYKMENYLFAPEIHSNPGETGYCPTRETSM

>40KV2

MSSDGADEASGSKSPSSAAPTAVGPMSSSDGAGAEKGDDEGSSFLKPLSGHKIMSSPPPGFPTPEILRLRSLRVRVNVGVRHEVMW
RTLRLPRSRGLRECTHETIMAIICDDYVIDNEYFFDRHPGFSFCSILNFRFTGKHLIEDVCPVSFSEDELEYWIDELYMECCQHXYH
AKKEQQLDEQRRIDDSLRLRDEEEFGSGCMSNRRRQVWDLMEKPNSSAAKI IAIISILFIIILSTIALSLNTERLQKRDAQNNPIDNDKLA
LIESICIAWFTLEYLLRLISAPNKWFFKGVNLNIDLVAIIPYVTLFLESRESVMQFQNMRRVQIFRVMRIMRILKLARHSTGLQSLGF
TLRTSYKELGILLFLAIGIMLFSSLAYFAEKDVPFTEFTSIPASFWWAAITMTTVGYGDISPITVLGKIIGSVCCVCGVFLIALPIPIV
NFSEYYREQRQEKALKRYEALNRAKRDGSLVSLMDRDLHFIELSEMGYGLKPLNPVQTRMRSSSPLRCKDKQAQAEPMVGLNRRYHS
HDEGKDNVTGWRANDRAHSGMYPHERDRYSSSTYTDHANRQSSSLSADAFGESHDHHELPRILRTIGNVGLAGQSGIGYQDGRPHSE
DRTQSSGYDGGIHTISSPSKQSKVEMQLPDRFGGSHRDDSQGGFRQMSPRDTSSETEPLGPRQGHGKETPSPVSDCAAGDMGVIVQK
LDDGFTTTWKAPEPGRPGQPVKPSLKHTMSSGDEPMLRSLTRKSSSESQSYQGGHPKRVTIDGRRGMSSTSDGSSGAAPHRCLKKA
GTKPKSRKQKHRPGLAGIGSITAGIKLGRQSSKGDSTRPNPSSSRKPGDSGNGSKARNRSKAGLLNFHKKQRDTSGPVPMQTTIS
AEDAGSNGSHDDKPGDIIDLMTSNTSDVQVENG DANPNRHHEPSSNSQELVNIIDSNSKPALRMVSSNGIPKSAPSLVDELLNGDMQALS
TTPSNLNRSMPIKQLSLDGVPRAPKPPDLMSRSTPNSDHTGVPSANHKAWGYPFSETLPDSKQDEKQVDMSSNDCHSSHSDTREGSIK
C

>42KV2

MAERANFGAQRVSRPQGLPPEPIDIIRTKARRRVRINVGGVHEVLWRTLDRLPRTLGLKLRDCNTHETLMEICDDYSLNDNEYFFDRHP
GAPSSILNFYRTGKLMHEEMCALSFQQLDYWGIDEIYLESCQARYHQKKEQMNEELRREAETLREKEDQVDTGCCPKRQKLDLLEK
PSSSVAAKVLAIIISILFIIILSTIALSLNTPQLQVIDEFGQSNPNLAHVEAVCIAWFTMEYLLRFLSSPNKWKFFKGPLNVIDLLAILPY
YVTFLESNKSVLQFNVRVQIFRIMRILRILKLARHSTGLQSLGFTLRRSYNELGILLFLAMGIMIFSSLVFAEKDEDEATKFTSIP
ASFWWAITMTTVGYGDIYPTLLGKIVGGLCCIAGVLVIALPIPIVNNFSEFYKEQKRQEKAIKRREALERAKRNGSIVSMNLKDAFARN
MELLDVVIEKNEDKAADNHLSPSRWNYQKNPNSELGSKGDFSKYQEVGGLASPERVFRSTPSPQRLNAKSLQMYNQMTAASSMSSGSPAS
KVSTVVGREEEMEMVQCEPRLKEKPVTEIRLSVSDSFASCATDISEVERSALLPNFAGRHPRAPPLDLSQITSLEKRAKQPTIIEKGL
YEFVPCSDGSSMSQGEENQSFQSDENVRSPQGNQVKLGLKVNFTESAEEGASNLHLVVTDDVATLTPKVPVSDPLLAGSPRQSPRA
TEGDGATSSPGFSLSSSESQRGRNHVDRAAVTPTSPKSAQNCASATAGAVGAEDNIQSGQKVDNHLSPDILKSSGDGGRSPPCETSM

>47KV2

MTTRWLTKESWLSFGRGGAASVSINVGVKHEVLWRTLRLPHTLRLGLRDCNSHEAIVELCDDYSLIDNEYFFDRHPKSFSSILNFYRTG
KLHIVDEMCVLAFFSDDLEYWVDELYLESCQHXYHQKKEHVEEMRKEAESLRQRDEEEFGDGKCAQWQKYLWDLLEKPTTSMFARVIAVI
SILFIVLSTIALTLNTPSMQSGDKDGNIDNPQLAMVEAVCIWFTLEYVLRFSASPKWKFFKGLNVIDLLAIMPYYVSLFVETNKNA
TDQFQDVRVQIFRIMRILRILKLARHSTGLQSLGFTLRNSYKELGILLFLAMGVLIFSSLAYFAEKEPQTKFISIPETFWWAGITMTT
VGYGDIYPTTALGKIVGVCICGVLVIALPIPIVNNFAEFYKQMRREKALKRREALERAKREGSIVSFHHINLRDAFAKSMIDLIVD
TGHNMVGVDGNSTEGESACGRPAQTGPGCYRSYEHYGPSKHRNSNSSCFPNLQNDLNTPDSPNRRLLDFAQNISSNQADNYDQVPAQQ
NQSITTPSEYKEYRDAEDIMPLATSDFKSTVCQELKSLRGESSFDQSTIFSEMQLQLMQQQFQQHQHQYQQQLQLHQQPLMIAAPPQQ
QHKNYNERGSDSSDYASCQTHPFYSENDLTEEADSNLYVNPLEGSADKGRSSSVKKSASGEIAHV ALNVS P SAE SLKEINTPAKATGKA
NANAIPKHRKSRIQQSVVRPRAQFITSGTSSGSSTIREDLAGSKEDNNQQYLYCTSSGSSSIVGVLQNVGSGSGSGGGGGGGGCGCN
TGGGGRLRGRASHFAPVNSLASATRIINHHLFGT IASSKHNTGKTAGSKLSADSIDSEATPFIERQNRISKSILKKESSNNYNSAGG
DSDTEKLIASDNTSCTTAMCDNDGGLTLMGDAFPNVEEKQARDETTQENKNKRAFEELRALKLKPRFKEPTDQRDASNQSILLSSLRPQR
PSKCLTVQIDKRNQQTPARPSPLPPDYRPAS

>48KV2

MLPLICASGTYRRVGTARTEDAPRGVDFPGGPAADESSEVVPCGGPERVEDGEGRPAAALLGQDHIHQRLNAEVPADVFDKDFDDLITR
LDSFRPARVSRGRLGFLDLSIPGDPGERLSLDGRALSFISVRELSRHEPRGAVHLMKPPQASDPSRPEPPFAMGRRGPPPTTRDGTTEL
SGAAQRVEPGSRKDVGSNSGATSLPNAIFRWGKGEDESLPFCVKGDGPRCIRINLEESRNDLTQQSRVGRRVSHLGRITISSFSPKLAPG
AESGRAAGPGRILAIIVSILFIVLSTVALSLNTPQLQVIDEFGQPNDRQLAHVEAVCIAWFTMEYLLRFLSSPNKWKFFKGPLNVIDLLAI
LPYVTLFLESNKSVLQFNVRVQIFRIMRILRILKLARHSTGLQSLGFTLRRSYNELGILLFLAMGIMIFSSLVFAEKDEDEATKFT
SIPASFWWAITMTTVGYGDIYPKTLGKIVGGLCCIAGVLVIALPIPIVNNFSEFYKEQKRQEKALKRREALERAKRNGSIVSMNLKDAF
ARGAELLDVAADKAGEPARAPAADGQPSRWRARRALAESGPADGYREVAQRDPREPLNNTAAGQPPLSAHRLQMLYNEIVKSRPPPGWR
LGNADW

>49KV2

MRQSRKRSFAQVRIGKTFDCLVPSRDSFQEMQQIGDRPRKETSATCSNSAVCSSGSSRSTRSREPRRVFPRCFVADPSRPSASRNAERL
TGCVPDVRRLPLGSPRDGPASREALTWLSPSFLAIISIMFIVLSTIALSLNTPQLQVIDEFGQTTDNPQLAHVEAVCIAWFTMEYLL
RFLSSPKKWKFFKGPLNAIDLLAILPYVTLFLESNKSVLQFNVRVQIFRIMRILRILKLARHSTGLQSLGFTLRRSYNELGILLFL
AMGIMIFSSLVFAEKDEDETKFKSIPASFWWAITMTTVGYGDIYPKTLGKIVGGLCCIAGVLVIALPIPIVNNFSEFYKEQKRQEKAI
KRREALERAKRNGSIVSMNMDAFARSLEMMDIVVDKNGETPGKKDKAQDNHLSPSKWKWAKRTLSETSSKSFEMKEPGSPEKARSSSPQ
HLNVQQLEDMYQMAKTQSQPNLITKEPAQPGKAKEELEMDSLPGPAGPALPARAEGVIDMRSMSSIDSFISCATDFPDASRFSHSPLASLP
CPAAGGRAQDPGRGPEAGLEPGPHATPDGRRSGFFIESPRSSLKAGNPLKLRALKVNFLEGDGPPPPAPAGLVAANPLGRGAAAAAV

AGLDGARRGKSVPGYIDADTDEGQGLYGPDPGVPTALPGAASPRYAVPNSGYPRRRDGGYRAENHLESSPLTPSPSTFLGQNCVYSMEAL
TGTSRGGQEKLEKLNHISPEVRVLPGGHRADRSQLPRDDLAAADYRHEAFLRARGIPVLHHRHLHRLRASALSTSDGDTSRVPEGLSG
TDGHGPELSSSNEQDGFVARFPEPGDRTAKPGPPPETVRSKFMILTNAEGEGTPFGILSTFGTEMGRAGRGAPRPSLSGGTVQHAQL
WGRSGVINRFLGGMGEGTPGVCRRHTVLLQADPEETRDPAARGDPETERRTVSSTLRSLRRETTARGGGRFLSAFFS

>50KV2

MPKSDAVALDLNNAQLNISGVRFELLWSSIKEFPFTRLGKVFYWEHGDNWQELCDGVKMGKTAEVFFQRDPEIFKTIMCYRNGKFHFP
RTICIEHFQRELKYWGISIKNMGDCCYNHFHQENEAVENLMIKEAFKDLNMKEQDEVDLLEVESRSKLARLKRKMWDLFENPHSSFMA
KIVYLLSSFFVMLSTVALCLNTIDSLRIKLDNGETADNAVLAGIEAGCIAWFTVEYLIRLLSAPRIVPFLKSMNTIDLLAILPYYFELLSL
AFDNQLDYRFVEMRRILQILRILRIVRIFKMARHSVGLQLTAYTFKQSTAELGLLGTLLIMGMTLFSLLVYFAEEAEPNMFKSIPEAFWWS
IITMTTVGYGDVYPVPTLGLKLVGSLCCISGIIIFIALPIPTIVSNFSQFYKQQRKSVEVRRR

>54KV2

MVGERDRDREAVRWATGETTPLQNNNGVLQMVGLHGGQAAGQQQQQQQQQQQQQQQQQQQQQQQQQSKQQQKQLQKQKLPQHPFELFYQQHETAARG
LQLAGAADGGDNQPYDTSNVDWERAMGTGGASSYGLGGTVAAGGAAAYNGAAAAGGAVILNNRHMDYADGVG IAGPSAAAAATHTTAA
ALGLGAAAGSLSGSGATQIAGTAAAAGSSTGAIKGEVRYAPPVPTSPHNSPTTSQQTLALQQQQQQQMALSGGAGGGGAGSGIGGSGIG
GPTGSLGGGIGGASGVGGVGVVMLPPGAGSNAGISHSNTTALQRTHSRSMSSIPPEPFMIAQSRQMSNRVSNVGGVKEHVLWRTL
ERLPHTRLGRLKECTTHEAIEELCDDYSLVDNEYFFDRHPKFSFSLNFYRTGKLIHIVDEMCVLAFSDDLEYWGVDELYLESCCQHKYHQRK
ENVHEEMRKEAESLRQRDEEEFEGEKCAEYQKYLWELLEKPNFSFAARVIAVISILFIVLSTIALTLNTPQLQHIDNGSPQDNPQLAMVEA
VCITWFTLEYILRFSASPDKWKFFKGLNIDLLAILPYFVSLFLETKNATDQFQDVRVVQVFRIMRILRILKLARHSTGLQSLGFTLR
NSYKELGLLMLFLAMGVLIFSSLAYFAEKDEKDKTFVSIPTFFWWAGITMTTVGYGDIYPTTLPGLKVIPTVCCICGVLVIALPIPIVNNFA
EFYKNQMRREKALKRREALDRAKREGSIVSFHHINLKDAFAKSMIDLIDVIDTGKQTNVHPKGRQSTPNIGRQLDVSAPGEKNTLIEP
PPLPSFGTPRRRALSARIQELNRSLEERDTQQQNSSSDNEDSRHNSQTDGDNSTEGESTSGRNPATTGTGCYKNYEHVANLRNSNMQHR
RGSSEQDAVPPYSFDNPNARQTSMMAMESYRREQALLTQQQQQQQQQQQQQKLPAAQLPAVGAVNNLAMVAASSAATAVATSSSAAQD
SGGAASSQGEDAVTIASNQGLPIQMMITPGEVAELRRQVALENLQNRQMDNLEQDVPVEFECFCCTKGLPGCGGECIPLRANSV

>55KV2

MVGERDRDREAVRWATGESTPLQTNNGVLQMVGLQCGQAAGQQQQQQQATQQQQLSKQQQQQQQHQQQQLKQKQQQQQQQQQDILYQQ
HNEAIAIARGLQAATPADIGDNQPYDTSNVDWERAMGTGGAGAYGGIGIGSLPAAGGAAHYLGPANTAGLVSRLDYADGGHLAGPSAGL
PAGAVSGAGAGTASAGASVTGSGAGAGSGATGTGTGTGAGSGSGGGAAGKEVRYAPPVVASPTHSIPTTSQQIVGVSVGGGAGGASSQ
SISGGVPTHSQNTTALQRTHSRSMSSIPPEPFMIAQSKAVNSRVSNVGGVRHEVLWRTLERLPHTRLGRLRECTTHEAIEVELCDDYSL
ADNEYFFDRHPKFSFSLNFYRTGKLIHIVDEMCVLAFSDDLEYWGVDELYLESCCQHKYHQRKENVHEEMRKEAESLRQRDEEEFEGEKCAE
YQKYLWELLEKPNFSFAARVIAVISILFIVLSTIALTLNTPQLQHIDNGTPQDNPQLAMVEAVCITWFTLEYILRFSASPDKWKFFKGLN
IDLLAILPYFVSLFLETKNATDQFQDVRVVQVFRIMRILRILKLARHSTGLQSLGFTLRNSYKELGLLMLFLAMGVLIFSSLAYFAEK
DEKDKTFVSIPTFFWWAGITMTTVGYGDIYPTTALGKVIPTVCCICGVLVIALPIPIVNNFAEFYKNQMRREKALKRREALDRAKREGSIV
SFHHINLKDAFAKSMIDLIDVIDTGKQTNVHPKGRQSTPNIGRQLDVSAPGHNSQTDGDNSTEGESTSGRNPATTGTGCYKNYDHVAN
LRNSNLHNRGSSSEQDAVPPYSFDNPNARQTSMMAMESYRREQALLLQQQQQQQQQMLQMQQIQKAPNGNGGATGGGVANNLAMVAAS
SAATAVATATNASNASNTAPGTEGAEGGGDGGVDDNLSQAKGLPIQMMITPGEVAELRRQVALENLQNRQMDNLEQDVPVEFECFCCT
TKGLPGCHGECIPLRANSV

>62KV2

MEEKQKRRQRVRLNVGGYIHEVRWGTLEQLPHTRLGKLRRECETRCEIMGLADDHPTSNEYFFDRHPGAFTPILNFYRTGKLHMPEDICALA
FSAELDYWIDDYIESCCQARYHQKKEQILEELRREADAIRERQGGDFRGMCCAERRKLVWDLMEKPNSSLAAKVIAIVSVLIVLSTVAL
TLNTPVPLGQKDGDFNPQLAHIESVCIWFTMEYLLRFMSSPNKWKFFKGLNIDLLAILPYIITLFLTKNSQILQFQVNRRIIQIFRIM
RIMRILKLARHSTGLQSLGFTLRSSYNELGLLMLFLAIGIMFSSLAYFAEKNDNPKQFSSIPASFWWATITMTTVGYGDIPTTLLGKLVG
GICCITGVLVIALPIPIVNNFSEFYKEQKREKALKRREALSAKRNISIVTMNLRDVFASIELNEAS IENQGNQITKFAEITDGRVTGS
KHTSPEHVAYLSHAEMASENEKNNSGMCLVDVGDTSAEVLGKPEYNTMEVGNVTSKPHNGLENSNQNGAHDKNHEFDIENPSFTSRD
DELYVGENSSSRDLTHVICDTVVGHAHARRRGTVMEPEKRSEFDSGYDIGSVKEYCSNQTTSKDPTKLFIRSTSVESNAVLNGDLPRETDTPD
SANSFQETPKFLDHSHPHFRNRTTGDSDVDFVSLDASTSASDDTGVVLSAPPGTADDIICHGSHSYKEQSIDSGGTPTSPHNFPNSNL
FPKAPMLAMIKERSFELQTSPPMPVPGAIEDSVGTGNDVPLISSRDLIDRRNIQNVHGVKGSWSDHEFSVPTSIDKDGGEHNSNVNG
QVYSVSSALSRSCEETKPLCKSQSDNRPKGLNEYSKPEKSKKFSKRESPPSGYVFDIDVDIDDDAIRDILKTSSEIDRVMQHTS
EVINIVLEDDAGKQNTTV

>65KV2

MAHVGFVENNSAVQKTSSTRISNLLTVNISGQRFLIRNLYIHRSTRLGRLVTQPFVEDNLFYDELLDEYFFQRDPTCFPMILAYYTS
QLHLSCLFLCLEFLQNEMLYWGIPFSLQGCCTNKRLIGLASIENKKNCTNSDKVNEQSRLESKVSSTQKEKIWNFLENEDSSTIAMVFSKL
SLIMTIVFIITLCLSTFPELNTLTPNGKKEVSSKLNFDAACFVWFTEYIARFLSCPNKLIFKSFLSAIDLLAITSTFTNLIVTASLGRN
SLYNVAARFIKALQILCFRIFKLGRYFPGFQVLGHTILQCVSELVLFMLVIVDMVFFSALVYHVEEHVQDTKFTSIVESFWAIAIIST
VGYGDIYPRTTVGLLGGMCLSGMMFITLPIPIANSFFNSYKHLIESRKQNKSK

>75KV2

MEIAWNNITNSSTVTTNSSAPNITETVFTNNNTVGPTDTPNIPNSDSNILINDRVSGNVKVTENGGGVNGLRKRPRKTTTHSHLLKLRTFC
KTLNRFLLGQNLPLKQLTHAYKSHSASNNQLASVSHISIRSHDSITDILEKSVYIPAFLRARKHHCVRVLNVGGERHEVMWKTLLRRLPLSRLG
RLSISNPAELAQLFDSYSNEKELYFDQYARSGSILGVYRTGHLHFLEDICVVAFKNDLFYWGINEYQLETCCYKYKYLKKEQVQEELEK
TREISLSQAEQEGTGRWATLQKYMWDLVEKQTSMVARIFAVISIAFIILSIIGLNLSTMPELRGNSSGIHYDNHANNNTDYVNEHLETL

ELICTIWFTEYALRLSVAPNKCTFIKSPMNLIDVIAILPYFYSVIFEVWLHSPDLSVSMRKIVQMFRIILRILRVFKLARHSQGLQALGYT
LKQSYKELGLLMLFVVLVLLFSSLAYFAEKDDNKNEFQSIPTATFWWAIITMTTVGYGDIPTKTALGKVIIGSCICGVLVVGPIPIVNN
FAAFYHDMRREKVLKRQEAHDEGCQLGNTNFKKSIINQKALYNKRSFNIIRDYSLGSIKSENTIERGYHSNCNSCNKLTQKGIHFINK
EIGIINPSDNLIRYKQVSLSVNDVNSMACGEYCS

(3) The subset S_3 contains 37 Kv3 subfamily proteins

>9KV3

MLSSVCVWFSGRQGRKQHSQPAPTPQPPESSPPPLPPPQQCAQPGTAASPAGAPLSCGPGGRRAEPCSGLPVAVAMGRHGGGGDSGKI
VINVGGVRHETRYSTLRTPGLRAGLTEPEAAARFDYDPTDEFFDRHPGVFAYVLNYYRTGKLCPADVCGPLFEEELGFWGIDETDVE
ACCWMTYRQHRDAEEALDSFEAPDSSGNANANAGGAHDAGLDDEAGAGGGGLDAGGELKRLCFQDAGGGAGGAGGGAGGTTWRRWQPR
VWALFEDPYSSRAARYVAFASLFFILISITTFCLETHEGFIHISNKTVTQASPIPGAPPENITNVEVETEPFLTYVEGVCVWVTFEFLMRV
TFCPDKVEFLKSSSLNIDCVAAILPFYLEVGLSGLSSKAAKDVLFGLRVVRFVIRLIRIFKLRHFVGLRVLGHTRASTNEFLLLIIFLALGV
LIFATMIYYAERIGADPDDILGSNHTYFKNIPIGFWWAVVMTTLGYGDMYPKTWSGMLVGALCALAGVLTIAAMPVPIVNNFMYSLAMA
KQKLPKKNKHIPRPPQPGSPNYCKPDPPIPPPHHGGSGISPPPIITPPSMGVTVAGAYPPGPHTHPGLRGGAGGLIMGLPPLPAPG
EPCPLAQEEVETNRAGNDLVLEEGDPRPNDPAAAAAHEDCPAIDQPAMSPEDKSPITPGSRGRYSRDRACFLVTDYAPSPDGSIRKAT
GAPPLPHAGVVSQAPPASCTSTPTQQPGYPPSGRAPSPQATPEAIAFDVWLPFFHRSHQPPGKHQRGRHPGVSPSPQQRACVGEPPSA
SHPQSLTLCISVPSSCHRLRPRETLGFPLSLPRLATGNGGRECPDRPGLPFPSSRHSSPAV

>11KV3

MLDACSFRNFDNSRRSARRFSRRGSDYFGDKGISMDERIVLVGGVRHETYQATLKKIPATRLSRLTPSLANFDPLLNEYFFDRHPAVFAMI
LNYRTGKLYHTDVCGLFEEELQYWGDLASDTEPCCWMLLHAKDTQETLAVLDRMDADHEDDQLREQDMMKFGWEEDYFQGRTRWM
KLKPMWLSLDFEYSSQAALVAGISVLFIFISIFSFCLKTHQSFRLPVLIGQNIITMPGGVVQPSIERVSTEPLPIFGQIEMLCNIWFTLEL
IIRFVFCPSKIRFFKSPLNMDLVAITLSFYADAMVVRVVEDEPKDVVEFLSMIRIFRLFKLTQHHQGLQILHTFRASAKELILLVFFLILG
IVIFAALVYAAEKMEANPNQFQSIPLGLWWAICTMTTVGYGDMTPHTSFGRLVGLCAVMGVLTIALPVPVIVSNFAMFYSHNQARDKLPK
RRRRLVPEQIRLQARRHAAVLEPSASQGGGGQAIRRRNMPILIDQNCDEENHNHKKHREKSENSDEGTSSSTTGVDTVVVLGPSETAI
TTTIIIS

>18KV3

MSTPAVDCQSDRIPLTRPRTGAVPTLRARVKKRQATSSYLGSAGCENTPTRLEQADVFEDEGGDERILLNVGGVRHETHVSTLRTPNSRLSR
LAETHLENGGGRQYFFDRHPSVFNISIDFYRTRELHVPLEVCVAVKREDFWQINELEIKACCRWHYRSYIENQHILDSFNHSLLSQAVD
VDLNLITGWKKLQWRVWLVLEYPRTSRLAMIYGVTSFLFVVTISAGFCLELPELRLKFLNVTTECEGGHSRELGRVMTSHEALNTLDIICT
VFFTLLELILRFIFAPDKRKFIFSLMNVIDLLALVPLVYVQVIFTKSDNMQACYLNERFVIEIMFILRIIRMFRIHFLVKHYQALKVLYAIIKA
SIQELMLFIFLLIGMLIFSTMIYYAERKNTTEGGDMFSTIPMGFWWSIITMTTVGYGDVYPTTPVGYIVGTACSVSGVLLVALTIPVISNN
FTLFYRHVQSRAAIPRSRGGDSSECDNSNFSEFERSVTRKTSNDSNVLTFVNGHVTGIFHSGSKRSQQSGGRWSQTGESASSVSKKSASD
YMFQRNRSFRAYSDDGVMYKGETVV

>40KV3

MHVPLDRVMEDEDEGESAVERLVSMRAAQAQDNKVRINVGGIRHETYKSTLRNIPDTRLAWMTTISTSTTADYDPTICEFFDRHPTMFE
AVLNYRTGKLYHAPTNCVCPAFEEELTFWIDEKQIEPCWWSHYTQHRDAQETLHKLQGGGFESEDEEEDVARIFGIEEACETEKNQWYRK
WQPRIWTLLEEPYSSRAALLTASISFIFVMSIMSFCMETSFNVIINTMGEISEPIAALFIEGICVTFPTIELIVRLVFCPNKIKFPL
EALNIDIVACIPFYVDVAVKIAADTHLTGQWNEILGFIIRIVRIFRIFKLARHLSGLQILVHTLKASAKELVLLIVFLGLVLISSSLVYAA
RWWAGDDQKNDFNIPVGFVWAVVMTTVGYGDLVPRTWLGMIVGAIITAIIGVLTALPVPVIVNNFALYYTHAQARSKLPKRRRILVGA
DALKTQGAISSISGYSTQSTTEDDASIRSDMPLKTVSGSIQGGDMNKDTPHTLFTAASAKGEKTSISVTFDECAETFASPKKRSRSP
TSPSGKESAGEGKPRRMVVRMSLMPQARRRESFMPNGNARTRSLPNGRRSRMPSPMEVET

>46KV3

MDTEHRVILNVGGIRHETYSHVLKIPATRLSRLTPNTANYDPLNEYFFDRHPGVFMSIMNYRTGKLYHTNVCGLFEEELVWGLDAN
QVEPCCWMTYTQHRDTQETLAVIESLDLDGDPSPQEEIAKKFGWEDDFHSGLSQWQRLKPRVWVSLFDEPYSSKYARAISCISVAFILVSTC
SFILKTDPSFQIPDIDVFYSLRVVDENGFKNYHKTIGTDKPVTSHPNFFYVDLICIWFTFELFIRSFIFCPSFHKFRVRSPLTIIDVVSTGA
FFFESLHAILIQTGSLVTLDFLSMICVLRFLKLTQHFSGLKILIQTFKASAQELSLLVFFVLAIVIFAALVYAAERSQLNKDNQFTSIPL
GLWWSLVTISTVGFDMVPKTYLGMVGLCALMGVLTIALPVPVIVSNFSLYSHSQARGKLPKRRRVLVSLVNIIFVVISIVFCCLKTH
PNYRIPDIDISTHMGNLSIGNPSKIQLNTIYVGKMATRAHPAFFYVELFCNIWFSAEFLVRMVFPCNLGRFLKTPVNIIDFIATVSFYIDW
ALDRALSGSNRDSVEFFSIRILRFLKLTQHSTGLKILIQTFKASAQELFLLVFFVLLGIVIFAALVYAAERVERNENQFSSIPVPQTSLG
RVVGSVCALMGVLTIALPVPVIVSNFAMFYSHAQARSKLPKRRRVLQANEAKVGRGTAAVMINAFTPRGPVGGGNSPDSGNPLSAFSKTP
LLVCTPDGTDKPRRLSQNKNGNVPPVTQNNCKANKLI

>53KV3

MSSKSLPNYDRTSDDVDASKEVDTPIQTISSHSVFIQITDTPVPSMDYLSIHEDDTSMSSEERTIERGFSRYGRKRSSVRMLLDEVNMTDR
KTSWMDTEHRVILNVGGIRHETYSHVLKIPATRLSRLTPNLANYDPLNEYFFDRHPGVFMSILNYRTGKLYHTNVCGLFEEELVWGLDAN
LDANQVEPCCWMTYTQHRDTQETLAVIESLDLDGDPPTQEEIAKKFGWEDDYTGNSQWQRLKPRVWVSLFDEPWSKYARVIVVNIIFVI
ISIVFCCLKTHPSFRIPDIDISTMGNSAPLNGVQMNIIYVGKATRAHPSFFYVELLSNIWFSGEFLTRMVFPCNVATFLRTPVNLIDFI
ATVSFYIDWALDRTLSGSNRDSVEFFSIRILRFLKLTQHSTGLKILIQTFKASAQELFLLVFFVLLGIVIFAALVYAAERVEHNEENQFSS
IPVGLWVAVITICTIGFDLVPQTSGLRVLGVCALMGVLTIALPVPVIVSNFAMFYSHAQARSKLPKRRRVLQPHIEIKPVVGRSTTAVMI
SALTQRGPVSGGNSPDSGGLSAFNSNTPLLVCPDGTGPKPKLSQNKNGGTTPIQNGGSKASKLI

>59KV3

MYQPSRTVIDCDNRVVLNIGGIRFETYKATLKKIPATRLSRLTEALANYDPVLENEYFFDRHPGVFAQILNYYRTGKLYHTNVCGPLFEEEL
EFWGLDANQVEPCCWMTYTVHRDQTSTLAILDNLDAEKPSDEELARKFGVEEQYLAGKMSCWQRKIPRIWLLFDEPASSIAAKVAVVSV
FFICVSVTFLCKTHPNMRVPVIVNRTIHQPPNGTALWTLDKTKTEAHEAFFYVESVCNAWFSFEIASRFLVSPKMEFMTAPINI IDFIAT
MSFYSDDLRLKTRHSRGLKILHTFQASAKELFLLVFFLVGLVIFASLVYEAERLQANPTNDFTSIPEGLWWAIVTMTTVGYGDMV
PRTYVGMVGLCALAGVLTIALPVPVIVSNFTMFYSHTQAREKLPKQRRRVLVPEQVVRPLRPPGVQGGGLQHRMNAIKHHHPAALKDY
SNKTGANNGMNLPGISRLGGSNPGAFVAVGAVMSGLPLASAAANGLCLPGASPTLSRRASSEAPPSSEDIIPRVRFSSAADLLQPPPC
SSKPPSRSSALSPAIHVTPVDGVLTSL

>61KV3

MDGENRIILNVGGIRYETYKATLKKIPATRLSRLTEALANYDPILENEYFFDRHPGVFAQILNYYRTGKLYHTNVCGPLFEEELFWGLDSN
QVEPCCWSTYSVHRDQTATLAILDKLIDTERPSDEEVARMFYEEAYFNGLTTWQKFKPKIWFALFDEPYSSAAKIVAGASVFFICASV
SFLCKTHHGHVHDCDKIRRVNTDANCTDHPHYFLVEHICNAWFTFEFVRLIVAPNVVEFVKSPVNIIDFAATLSFYVDMILIFEKKSQ
LDFFSIRIRFLFKLTRHSPGLKILHTFKASATELGLLVFFLVGLVIVFASLIFYAEKLEENPKNNFKSIPEGLWWAIVTMTTVGYGDMV
KTYAGMVFVGLCALAGVLTIALPVPVIVSNFMSFYHTQARSKLPKRRRVLVPEQPRRKKVETATNRRMNAIKHHHPAVFKDAFGGAKLGN
VNGVNVIGLALQGPSVPSIAVLHNGPNYLNQGGEPVPSLPLQPRPATGSDMLPLQPKYLPNFDRESRSEPREIPRPPDASPLKSTEAETG
LASVPAMAIGSSTEVLFSIVENQAGFRNSFLAPKSPDCEVVKSPSTEMTTSMESNGSDRK

>79KV3

MISYVLAYISPYRAKQPQHTEDVYRGVPPQPPAHLCPPLSRSRPAHRGGGAGGLRGAALPPPRAELRPRPGFGSRSALGSPRSVPERRGL
RCPFAVRDGRGVSTRAAGAASPPAGFFDRHPGVFAVYLVNYYRTGKLYHCPADVCGPLFEEELAFWGLIDETDVEPCCWMTYRQHRDAEALDI
FEAPDLTGEPPPDGDDDDMAAKRLGIEDVAAAEGKGRWRRLQPRVWALFEDPYSSRAARFIAFASLFFILVSIITFCLETHEAFNTIIN
KTEQVNGTETVPQYIEITDPALTYVEGCVVWFTFEFLVRFVIFSPNKLEFIKLNLIIDFVAIILPFYLEVGLSGLSSKAAKDVGLFRVVR
FVIRILRIFKLRHFVGLRVLGHTLRASSTNEFLLIIFLALGVLIFATMIYYAERVGAQPNPDSASEHTQFKNIPIGFWWAVVTMTTLGYGDM
YPRVWGLVGLCALAGVLTIAIMPVPIVNNFGMYSLAMAKQKLPKRRKKHIPPAPQASSPTFCKTDLNMACNSTQGDICLQKDNQMEH
NRSSVLSGEDSAGSEHPLSPGERLPIRRSSTRDKNRRGGTCFLLTGDYTCATDGGIRKGYEKSRLNNAIAGLTGNALRLSPVTSYSSPC
PLRRSRSPISIL

>83KV3

MTKFDKTEKIVLVGGVGHKHTLRTTLMSPGSRLAELVNTSEKSPSEFFDRHPEVFAHVLQYYRSGLKHCPSNLGLLLEEEFTFWGISSAD
VEPCCWETFQKNETKALAGIKPSVMKKEEESGQKQSSSSRGWRKIWALFDKPYSSVCARIIAIISLFFILLSIIAFSLWTLPSINSHQ
FLNAWASNSTDDFSRTRPPEAQALDAVEIVCSIWVFEFAIRAGSCPSKLWFFINVMNIVDLLALFPWFFRWSNNFVSVFALGLHAMRCIR
LLRVFKLMQHVFGVRVLTHTLRASLTSCLIVPLLSICTLIFGTMFYFAELTHKDSYISSSSGLDGFWWALVLTITTVGYGDMPLVTRQKVC
AFLCAMVGVLLIVLPVPIIVNNFLKFSLSVKTKHSMRPMNEKRSVDVGPSYST

>90KV3

MMAERVVINVSGRQFETIFSTLERFPETRLSSVSLKENDESFDASRKEYFFDRHPGVFASILNYYRTEELHLDNSVCGNVVKEFDWGMQ
EQDIEPCCWGSFRASECKATLAAIDNTFMPDPFVTEEAWNKERSAWRQFKIKAWRFLHPETSMPAKIYVSI SMLFV IISIVSVFV IETWGP
LREPLHNANKTKQTCETTCCGVYDHLATEYDPPDKPKPFLIYIDIAICYCFITEMVLRILFTCSYKRFKDWLWIDILCNLHISISIL
LILETDQAMFISASSVNRLSSAIRTGLRLIRVLRMFKLMKHYSAFRILLYSIVASARELILMIAFLMGSILFGSIVYIDKKNFTSIPY
GLWWALVTMTTVGYGDYVPREPLGYIVGSVCVIFGVLMIIFTVPIVSNFMSMYEHAQSRKRPRSYWTKRVRPGQTPRSTLSSSTERTVLT
DVDNSRSTMEKGTKEVTVQKLLNLDLPDKFRASFRYPFAEPNVGLPDTQEKEADKEKSRRLKQLREAQHKLEQEKRRQALAMVKKDR
AKSRRVNPDMTPRDVEVECDTASVPENI

>100KV3

MTSRLAFQNSRFAGHMQGVFLAGRKTSCFRDRQPVEESDEDDLEEDPHSEDRQLVRIINVGGSLFLTRQRTIKKMPNSRLGRLRTTGPHYL
QEMYFFDRDPEIFRVVLYNYHRLGELHLPLHVCGPSLEKELQYWGPEELIEKCCWVSYVQLKSQKYSLLDFERFFDRMSPRKGPRCPRCY
RFLDAMWTFLDKPSKGAFLYGVIVAVFVFLSLFVIAETHPAFQLPLNSTNETSTSDVGDHYERQWPWGLETLDYVCVAFVTFDILLRVC
VTPQKVTFLISPMTYIEIIAVIPYYIDFVSHFIHARYGHKPNKYLDVIVFRIFGILRVFKILRHYSGLQVLIYTLRSTLKDLLMLTFIGI
ATLFFSTLIYFSDDRTKFSSIPASFWSIITMTTVGYGDFYTPRWGYLVGSACALIGVLVAVFTVPILVNSFMLFYSHSQSILSVKREERL
SRYHGRGVYDQPPKILKELQLKHLVPSFELGRTRNSGNDVASKTSANDGESVVMEDCPRVHIDMDGCGSEDAISPRTSQESVLDMPRLEEHR
CSLDPHLLSV

>101KV3

MWHMSHKQSDSPWEEPPHVGNCVSPGKLPPLGLQHLPIFWRCRLMALSQPSLLMGHGIGWVCLYTYGGVVLRESDNVQEIKEHLSTLLGT
SHQRALQREGMALTIGLVATRQLHITCAVLEEFILGKTPILKIDQHLEDIHWKASSTVLLCCGHEASRTDNLISLADSIGSQITWHSQRS
HWKLEQEPRTDCTACQDAMLAVAGLSKLPPELVKESEFLHPCFQSVLPLVLESPEKHSMLTNPPIQVLYKQTMHTLDQVLQGL
FKTPSPGEVQYILEQMVAVMDSSELPHERQRAVKSSTALLKFVVEQFRPKSQMKFTRMGYLVGMFGMFCNDPNEDTRVLAMDGVFYLTYILLQ
QKGHSLAEDTKLEKRMQLFQHPNKASILDNMTSLGNSFQIVKAFADHFEVSQLNELMMTMVDGLKKNFSQSARTAAQMLSVIFKCYGTQL
TEVRRQLDPAIPASEGLLPAEAGAQRWVADIGKKIYLQLSLIESIAVKAALKAISLLVQHHTQELVFTFLEFVLMNRDAVDLWRAMGSNP
QVCPKVLHFLKKNLNRPSLTELKLEGTYSSELAAMNTLYEIIFAPEYKNAKLVFPQLFFAMVTQIHYMFEFNKQDEDDHYAYFKGDFEFTSV
HTTKLSPQSTSVAVKSLFSGKNGFWQEFAYLELQDAWIQLATPISFCQGVSMLSRAMVDYDCPYIPGIMCHSMKMSRNEEERQRIVAMIFFT
EFLRSLGSRMVTREVLNRLRKGIKDPCVMVRVIFSHGFSNVAYSLEKGSLLQGQLLAFNLALYDPKEKVVLASLYSLTNVLYQIDKRDLI
PLCVDVALSLRPFDDRAIIRSNSIYVFGSLVGRMESKDPQLKQVCRSLIPLLFHFMQEEEDVVKKAKFAFFRCASFLQWAELEKLFHR
IAWEGLRALHSIWKCFMENMFHKMDLFLSQALSYSYTRSKQWNIRIAAVLYIAFAQLEEDQEKFIQHMAAAHISLKRVLVHLPKTKWTSQESGR

VMEGSGERLVLNVGGVRYETYHSTLRAFPGTRLYQLTEPPMGSPLEAREVFFDRSPHLFGYVLYGYYRTRQLHCPPDICRAVLEEELAFWGLAD
APLAPCCWLKLSGGDGRAEDFHAWESELGEEQGLGPIESPSTRAGTQWKPWLWTLNQCSSLAGKCAALLSMLFLLGLVLIFFQETSV
QLEYFTSNFRPLEPWDGKDGPPQAPTGLVYQRAPHLLYLELLCVLWFGAELLARSISCPNKVKFLRSPMTLVDLASLFPVLVAVGR
RAERHPRCLVLGALRVLVYLKGRLLGLVEKPLALRVLHAHLRSSWREAGLLLLLWAGEILLFGSLFLYGELLGTGHGQQQSEVHFADILT
CFWWTVITLTTVGYGDIYPMALGQVTAAITAMAGMLTSVLLVPILLVRFQRCYAVALARQKLRPKKRVNSVDLPG

>104KV3

MEETHSVLEEQTNAGDRVVINVGGQKHETYIGTLKNIPTDRLYWITENGTQLPEFDPNTSEFFDRHPGVFAQVLFNFYRTGKLGHPNDVCGP
LFEDELAFWGIDELQVEPCCWLNKQHREAQANLDPFDHSDNESVGDMDMSVYGLVADSIQRNRRTWKKYQPRIWTMFEOPYSSIPAQV
LAFITMFLIISVCLFLETVPKFDNPKTSEGFLVYILEAVCVAWFTLEFLFRLIFCPDKLSFFKPMNWIDLGAILPFYLTIVRESNFKT
IVVLRVRLIRVFRIFKLSRHSYGLQILGHLRSSCSELFLVFFLTIGVVIFSSVIFYAEKDTKGTHFTTIPHTFWAVVTMTTLGYGDMV
PITWQQQIVGSLCAVCGVLMIALPVPVIVSNFSLYSHAKARMKLPKRR

>105KV3

METENRVVLNVGGIRHETYKATLKKIPATRLSRLTEAVVNDPILNEYFFDRHPGVFGQVLYNYRTGKLGHPNDVCGPLFEEELFWGLDSN
QVEPCCWSTYSVYRDTQSTLAILDKLDVDERQHNETQLFSSYEEYVVRGQLTRWQRLKPRIWALFDEPYSSNAKLLASLSILFICLSVL
SFCLKTLDAPLKRDAAENVDRSAAQNGQSYRTNGMLYLEHTCNAWFTLEIAIRCIVSPLRRFAASPVNMDLAATLSFYAEFLAQGSP
SVQLGLYLELLSIVRVLRFKLRHSLGLRILMHTFKASAKVLALLVFFLILGIVLFASLIYYAERLQDNPDNDFKSI PAGLWWALVTMTV
GYGDMTPKTFPGMFIGGLCALAGVLTIALPVPVIVSNFMSFYSHYQARSKLPKQRRKVLPAEVPRSSRYKCLSHHVQEAQGHLLAPLGS
SPTRTVLMPRPATIGLEDSLYHQARLGSAMDLSPTFGVNEEKHSSSSSAPTETTANSTKPSPEQ

>115KV3

MDFAATDCQTKIADSSRIINVGGFRHETSSTLQNIPTDRLSWIAENSTVNEDNKREYFFDRHPTAFQVLFNFYRTGKLGHPTEMCGPMFE
EELIFWGIIDEKQMEPCCWGTYTQHREAENLKAFVGPFGNDLDEPAENHMGSYGSINELNCWKRIQPQLWETLDEPHSSKMAKIFSYTSCL
FIALSIAATFCATTMPAIRKNNIMGSREGLDHIEMFCSIFFSFLFMRLISCPKHLHFCRGINMWIDFVAIPFYVNIIFYPNPIVRMFLVIRI
MRLFRFIKLSYGLQIMIQLKASSHELVLMLMVLIPVMVFSIIVYVEVIEGRGAQFTSVPEFVWCLITMTTVGYGDMTPQTPWPGKIG
GACAI CGVLIVALPISVIGSNFNLYYAHQAARLKL PVKQRR

>116KV3

MRKTEVSHGIYTPGDRRLVINVGRRYETFQSTLASIPDTRLAWIAGRPHETPEYDTSHNEYFFDRHSAIFEDILNYRTGKLGHPGVC
AVFEEELSWGIDEEQMEPCCWPEYTRQRTAIEDLRIFNNGASDESLSNENTLNNADCVLPGRKASEDRKGLRGFYRLVQPIIWRTEEPFS
SCTAKITAIISLAFILLSVLDVFMSSVVPVYQSTPSVIEYVCGSWFTFEFILRTAFSPSLRRQFKKPMTWVDIGALLPFYLFQFFIDVGDME
RIKIFIMFRLRVRFRFRSYRLQIMALALKGSHELGLLLLILVISVIFSTLVFYTDGDNKRKSKFNIPKSFWWAIITLTTVGYGDDTPV
SWSGRIVGSACALWGLMITLPIVSNFSLYAHAKAMLRLPKVKETFSPTGKRYLSYLSALNSDINFDDGYPLAGLAGAILP

>117KV3

MPQVDDTQKRITLNVGGQKHETYLSTIRNYPDRLYWVENVTKAIDYHSEKIELFFDRHPKIFDQVLYNYRTGKLGHPNDVCGPLFEEEL
AYWGIIDEKEMEPCCWTTTYTQHREAENLKSFNVDSTFDIDSDRQEEETTTSKAKGLHPFVWVYQPRIWAILLEPRSSRTAKAFWILSVLLI
VLSVATACAITLQFATEGGSVSESSAYVAFTVIEYICGVWFTIELGLRLLFCPNKRTFFKSYFWDVLSVIPFYVRLIFPHEHLADAL
QVIRLLRFRFRLLYGLQVIMHTLKASSYELFLLLILLIPVLFSSIIYYVEKNIDGKTKFRSIPESFVWWSLITMTTVGYGDMTPRTWE
GKIIIGGACAI FGLMVALPISVIGSNFSLYAHQAARLKL PKKTKIHFDTLATAMPQVCHLMHKDRRY

>118KV3

MDAKPCIVENPFDSDLTERITINVGGFRHNTFMSTLKNIPDTRLSWLAENHTNCVEYDQVLGEYFFDRHPRIFAEVLYNYRTGKLGHPGDVC
STLQFEELSYWGINDRDMEQCCWAHYKRQINTEETLKSFLHDSARKMDGKEKSGKRKSLTIFAKEESFKRGLKRWNRFRPKVWAFLDPPH
SSKASWVIMISCLMILVSVTQFCLGTVPSLREDSFTMKVLYWLDSTSIWFTVEFVLRVFCPSTKEFAKNPMNVWDLTALPFYFRFLK
QDQISWLVVMRLRIFRIFSLSLSFQILFRSLISSKNELFLVFSVMVPIILFSSMIYFAEKDANDKNFQSIPESFVWWSLITMTTVGYGDMV
PVTKLGVIGAVCAICGVVIVALPVSIVGNSFYIYIARTRVQQPRRAN

>120KV3

VSASAKERITINCGGTRHETYWATLKKLPDTRLSWLCDTNSKNTDYDPEKNEYFFDRHPHVFAAILNYRTGKLGHPNSVCGPLFEEELNY
WGIDENQIEACCWLSYREHRDAKDTLRNIEFYETDDLEERDVEETFFDRIQNRRTWQKLPKPKLWLVDDPYSSRSKILAI FSLFLILVS
ILVFCLETMQPDTNIYEEENISILTTNASRIKQLFPSSLILVVDYICNAFFTLEFIVHFVAVCPDPRYFFRSFMNLIDLLALIPFYINLALS
RVIQVLFSEVIRFFRLVRLFRILKLSKHLTGLKILYHLRSSWKELLLLIVFVTIQVLFSTIIYYTEKGSYHNKFSIPEGFVWAIATMT
TVGYGDIAPKTTMGKIVGVSVAIFGLVLTIALPVPVIVNNFSLYNAHAQAQAKLPKMK

>135KV3

MSSRKRDFSASAPVSPRLPGDEPRFVAASFLLQHKLASQKALVQVVAFTSLFFILVSIITFCLETHEAFNIDRNVTEIHRVGNNTSVRFR
REVETEPILTYIEGCVLWFTLEFLVRIVCCPDTLDFVKNLLNIDFVAILPFYLEVGLSGLSSKAARDVGLFLRVVRFVRLIRIFKLRH
VGLRVLGHLTRASTNEFLLLIIFLALGVLIFATMIYYAERIGARPSDPRGNDHTDFKNIPIGFWAVVTMTTLGYGDMYPKTWSGMLV
ALAGVLTIAMPPVIVNNFNGMYSLAMAKQLPKKRRKHHVPRPQLESPIYCKSQETSPRDSTYSDASPPAPEEGLVERKRADSKQNGDANA
VLSDEEAGLTLQPLASVPTPEERRALRRSGTRDRNKAAAACFLLSAGDYACADGSRKEGAVTPEDCVSGPCLAIRVPPSSQPMYFHSSGPF
HQGPNLPLNCLSVCSHTEISLE

>137KV3

MSAVQSRNVWDDIATLQESHDRRETNMVAEPEGKEYVAFGSLFILISISTFCLETHEAFNTIYKNTENVTGNTVREEVVFVTDN
LTYVEGCVVWFTIEVFTVRIFCPDKAEFFKSSLNIDFVAILPFYLEMALSGLSSKAARDVGLFLRVVRFVRLIRIFKLRHVFGLRVLGH
TLRASTNEFLLLIIFLALGVLIFATMIYYAERIGADPDDPTASAHTAFKNIPIGFWAVVTMTTLGYGDMYPETWSGMLV
GALCALAGVLT

AMPVPIVNNFGMYSLAMAKQKLPKKKNKHIPRAPQPGSPNYCKPDALAMATASPHRIMGVLSMVVSGSMAGDCPLAQEEIIEINRADS
KQNGDAANAALANEDCPTIDQVLGPDDRSPTGGLGTGTGRERYPHDRACFLSTGEFRITDSNVRKDIPIRSIILSEQLEDLMQLESLMPI
FDHKNEDAGLRKLMELCV

>138KV3

MPDPEDGRKTKGLHYPTDVCGLPFEEELSFVWGLDSNQVEPCWMTYTQHRNTQETLAVLDRLDLDETEKPTDEEVAKKFGFEDAYNKGVNWW
QHLKPQMWSLFDEPYSSNAAKSLKEIDWRKNRRRPSAPKEGSLGRILEVYVTAIGIISVFFICVSIISFCLKTHPDMRVPYIRNITVKTAS
QNTSWLDDKTQNAHVAFYIECVNAWFTFEIMVRFISSPSKLRFITSSVNIIDYIATLSFFIDLILQRFASHLENADILEFFSIRIMRL
FKLTRHSSGLKILIQTFRASAKELTLLVYVAERIQINPHNFNSIPLGLWWALVTMTTVGYGDMTPKTYIGMFVGCALCALAGVLTIALPVPV
IVSNFTMYYSHTQARAKLPKRRRRVCPIELTQPRRVPGQGGPGQCVNAGSGKLPSSNAPSTGSMDDQTIIRMNANRTITKDVILPKMGIR

>141KV3

MANANSDNLVNNNYGLYCRYETYKATLKKIPATRLSRLTEALANYDPVLNEYFFDRHPGVFTQILNYYRTGKGLHYPTDVCGLPFEEELFWG
LDSNQVEPCWSTYSIHRDTQNTLAILDKLDIENEKPTTEEIARLFGFEEALSNGELNCWQRIKPKIWAMFDEPSSSTGAKIVAGMSVFFIF
VSVISFCLKTHPGRVLDPSGAHDAHGPGAGGPPHGHDPMPGEPPTQHYHQHSITPPSGSIGPTFRVTNYTSYSSGNFTASGQATPIATIKG
GQRQLKRNINGSILNEFIEEKLGNHGRKKGWIEYGGPHEAFFYVELVCNVWFFIEVIRLIVSNLWQFIKSPVNIIDFTATLSFYTD
VMQRMGEYTGLEAFSIVRIMRFLKLRHSPGLRILIHFKASAKELTLLVFFLVGIVFFASLAYYAEKLDQNDPNQFKSIPLGLWWAIVT
MTTVGYGDVAPKTYPGMFVGCALCALAGVLTIALPVPVIVSNFMYYSHTQARSKLPKRRRRVLPVEQPRRKRREPTAPHRGTNAIKQTPPTG
PGLVAGGVVPGAGGPGGLGHAVGHSAAAGAMPFKDAFGGAKIGTVNVNGVNVIGLHPAQRTTTMAMAMNEADPTMSALTYQVPMQLPTPT
PAHSHGHAHGHAGLGPASAAMTSSASLTGSAASAATAAAAAAPAGPSFISDYLSPAVQSLQPRAAATGHDFMLPLQPKLLGLPLERKQD
HPLQLTAHNLASDTHQLMYSGHAHSQHKVGGAAVLNVPPTLSMSHTQMPPIASMGQRTPNLSFRPAHGASSQVATVQQPIPHSHACHAST
NCNIKISVASAGLSVGCDEFRTPKVTLDDLDSDVNSSTDDCGDCCLVDDSDTYEGTTINNGPSGQENGTEAIGLDDGLDNDGEDEEDGE
SGVGGDSGDSLGGIYIGPRH

>151KV3

MALTNAIIAATRAEQNFDEDSGRMREIGAAREARGEGLAKPGGGGGYSSGGGFGIVHARTASEVASTGPSQWALLQERITAAQGSVPDP
ASDDVARLMRSIFMQHLSGAPEYSKYFKNDIRMMQQAELQKQAAKEAEASASGHRMSSTAGGSAGGASDAAGSPYSASAGRTASQPQLRP
DHHHNDPPPNIASFALYRCKHALARYRASPLRAKIYLTLSHPEYNAVAFTFGIFVMLVILLNTAVFCIESVPRWENTPLYDRLVIVDYVCLG
IFTVEFVARLVTCSSLTHFWLNNAMNIDFFAIAPFYLELMIVGPDAGNQAASQTRIRVLRLLRVLRLMRASTRFRNLQVVDALVASGDVL
GMLVFLLLVLLVVSATIIFYVEQALVEGWSWFDIPLTIYYMHVTLTTGYGDFYPVSAWGRFIAGVFMLLCMVTLSLPISVIGGNFSNMWGR
YTHIRDGIERSGVAWSNFIKLRGTATKHCAAMDDLIDIINRVKCALEDGTRGGGAVGQPGADGLKALVDDLAGLQFELEAINTRRSGNGGA
GSAHGPGGGGQGGQGGAPDEVRLAQLRGVAASLQKRVESARQAELQALLHVSGLRVSQDVTEKLDKHLGHEMAGWALDGGFIAGHA
GLLLSDLRALREVQEHSAHGDQLEGDGHEGHEAVDTNGRSRLFGVWGGKSERADGDGDGPRQLDPESEEEEEARAAGKPPKAIKV

>153KV3

MVPERVAQSRARGSTGTPPLPKGGLVTAAGSREVIVPQYLFRRSGHKDQLFRNYSEIAPGAWPPLWSSGAAAAAADPERLTPDGGGAAPG
ATATGIASERPRGSESPDGLAACRACLDESATCLIRDEMGGQDESRIVINVGGRHQTYRSTLRTLPGTRLAWIAEPDAHSHFDYDPRTD
EFFDRHPGVFAHILNYYRTGKLCPADVCGPLYEELAFWIDETDVEPCWMTYRQHRDAEALDSFGGAPLDSAEEDGIDGTGDSGDG
EDELEMTKRLALSDSPDGRSGGFWRRWQPRIWALFEDPYSSRYARYVAFASLFFILVSIITFCLETFHERFNPVINKTETEFIGNDTQVRHYR
EAETEAFITYIBGVVWFTFEFLMRVTFPCPNKVEFIKNSLNIIDFVAILPFYLEVGLSGLSSKAAKDVGLFGLRVRFVIRILRIFKLRHFV
GLRVLGHTLRASNEFLLLIIFLALGVLIFATMIYEAERIGAKPNPDASEHTHFKNPIIGFVWAVVTMTTLGYGDMYPQVWSGMLVGCALCA
LAGVLTAMPVPIVNNFGMYSLAMAKQKLPKKKKKHIPRPPQLGSPNYCKSVVNSPHHSTQSDTCLAQEEIIEINRADSKLNGEVAKAA
LANEDCPHIDQAITPDEGLPFTRSGTRERYGPCFLSTGEYPCPPDGGIRKDLCKESPVIAKYMPTEAVRVT

>154KV3

MYEINNETTFREQQIELLQKKNHKEFMKPECLKKNIDRVVINVGGSRHECYISTIQNFPDTRLFWIAETALAMENNVVEASEFFDRHPGC
FENILNYCRTGRLHCPKDVCGPLFQEELEFWGDELMMQPCWPNYSEYREVKNLKIHFVVEEHEHYSTENELDEFFKERESQKNISKKIWD
FLETPKNSYANIVAGVNIIFVLSIATFCLSTEKLFNSHNELFASFEKFCYTFFTLDLVLRLILCCPSKIKLFDYLTWFDIVSLLPFYCEL
AFNLEEIRFLPFRIFRILRLLRYVKNLRGMIVIGETLKASFEQLLLILVLTIPMVVFATMVVYAEKNTIDSKFESIPRSFWWAIITLTTV
GYGDMSPVSLAGKIIGGCATFGLMSALPISVIGSNFSFYYSYAKAKMELPKHELKMLVNADQTLKGTGDELKTLNRKRHRALNAYDSTL
EYRDHSEIKSVLNQTVSLAKKPETLNSKANDYSNEKCIETSLQNNIHENGFEHNVGLRRKRSRNLSTCIDINAENQRGINGGNLNERIT
KARSFTTIEHSNDPIKNDNLVSDLNKLNHENKRTIHLDIGYQYQPKLSNRDRADIRRKISHTHFQKNNPQINEIKHRSLSIRQETVNE
VLVWCDELKEISCK

>157KV3

MKGKSSITMKTITGINIFIVLLSIVTFCLSTEPLFKKQEKLFNSFEIFYCIFFSLDLILRIGCCPSMVNLKFEYLTWFDIISILPFYEFV
KKREIGFLLLRLLRIFRIPRYFKGFRGMIVIGETLKASFEQLLLILVLTIPMVVFATMVVYAEKNRKNSGNSFNESIPRSFWWAIITLTTV
GYGDMSPVSLAGKIIGGCATFGLMSALPISVIGSNFSFYYSYAKAKMELPKHESKVLNQNQNQRKKEKLDGDLFNSVYKQLQSVTTTNE
ENNAQNLAHTNNSYNFLNFSSETAKSGNTASSENKVIDNCTQTKFNEEYEETSFQLTNNKPSNDELVDDEYIISINAKSESSHKEKSHKHS
KNEHNEIESSKIENEDSKVEIIVPNRNNQMKFTKLTSHANLEEPYNFELDERSVIKFDNQINTRPIRNRSFTTFDQSSVNCNLKHNRSF
TTDETTCSDSTNHHPRCSVELNKLHNENKQVIHLDIVQYQPKITNRDRANIRKLVYRNTIHR

>158KV3

MTYIPKMKQHYAHAAMNLNMDSENRVVLNVGGIRHETYKATLKKIPATRLSRLTEALANYDPIVNEYFFDRHPGVFAQVNLNYYRTGKGLHY
TDVCGPLFEEELFWGLDSNQVEPCWMTYTQHRDTQETLAVLDRLDLDETEKPTDEEELARKFGFEEDYKGTISWWQEMKPRIWSLFDPEYS
SNAAKTIGVSVFFICISILSFCLKTHPDMRVPVIRNITVKTANGSNWFLDKTQNAHIAFFYIECVNAWFTFEILVRFISSPNKWEFIK

SSVNI IDYIATLSFYIDLVLQRFASHLENADILEFFSIIRIMRLFKLTRHSSGLKILIQTFRASAKELTLLVFFLVLGIVIFASLVVYAERI
QPNPHNFNSIPLGLWWALVTMTTVGYGDMAPKTYIGMFGALCALAGVLTIALPVPVIVSNFAMYYSHQARAKLPKRRRRLPVEQPRQP
RLPGAPGGVSGCGTPGSGPHSGPMGSGGTGPRRMNNKTKDLVSPKVAQLFAGPLGASIVAMSPRTMLDLNPLALAMGKPTFQPRIPTPLAAT
PPPPVSSAGGMTASIGTTSATGATSAPQATPLPSIAVSTTASVKGDLGISTTTTAAQETSCKAFL

>161KV3

MHKQEEVYDCNKQNVDRVF INVGGTRHECFIKTLQNFDPTRLFWIAEMAIKMANFGEDVDEFFDRHPGCFQNILNYCRTGKLHCPKDCVCGP
IFAEELAFWGVDELMMQPCWPSYSEFNDAKSNLKAHDFPMNHYRKKKKQVHKFESKQTKKCSKKTQFYKLLKALWNLTEIPQKNWLTIV
ASIQVFTLLSILTFCLATEPKLTKYDIVFNYFEKSYCLIFTVDLLKVLCCPSFKLLKDFLIWVDVVSLLPFYFEFLNANNEFLQSLR
LLRIFRILRFRFRNLRGMMITVFGETLKASFEPLMLLGLVLFIPMVLFAAMVYAEKNFSTNSQFKSIPKSCWVAITLTTVGYGDIIPSSV
VGKIVGVFCATFVGLVVALPISVIGNNFTFYYSYAKSMKLPKNRSKLLIDQDILNFNEKCDNERNKSRRYGLPSLYFDSPKINTKVKLQD
ELSKSILLPKILLSPHSDSNIIEAALFQTKDSTLKGFAETNSGINKIYKTSLNKITNSPIYITNNYDNLNENKGNLKRYSYVNEPI
PFMLPFNISNDCSSSSQISLKTSEERKVIHADITQYVPRKLSARVRAEICRKLNVYNNY

>163KV3

MTKRSNAHD IYLQRKRTNDRVI INVGGVKHECFIETIKAFPDRLYWIAEAMQNKDFDYESNEFFDRHPGCFQNILNYFRTGKLHCPNDV
CGPLFQQELEFVGVDELMMPECCWGNVTQHRDAHKNLKMFDMMVKSTNLKEELNMRKVSCNVNGYENESCWNSTIEMRPKIWAALLDKPFSS
KYAQIAAFFSLMVIASLVTFMCMQTVPRFFKYARTFDLLEYIYCGIFTEVEIIRLICCPSYKSFRRSALTYIDFLSTIQFYISFIMKTKDFD
FLFVTRLIRIFRFRFFKQLSGMQVIAQTLVASMNELMLLMLVTIPMIFSTLIHYAEKSDSNNDKNYTISPEYFVWSIVTMTTVGYGDVI
PNSFSAKIVGALCACGLLIVALPVSVIGSNFTLFYSYAQARMKPLRKNLNVDKGLVANNQDRTSSAESVQITSTAADETQSSRSVSN
TIAFFQRASTQVSLREILQRKELWQLDNPKAQAITKIGEMICLDLQPYCIVEDKGFTRLL

>183KV3

MDSENRLVILNNGGIRHETYKATLKKIPATRLSKL TEAVANYDPIILNEYFFDRHPGVFNQILNYRTGKLHYPTDVCGLPFEELVWGLDAN
QVEPCCWMTYTSHRETQETLQILNDLDTERRTEELYSKFGWDDAYQSGKLTWQRYKPKIWMFLDECYSSLGAKIIAVISVFFIVLSIL
CFCLKTSSNLRIPILYNDTTIQIQSKHISTNYKTSLHYIPYSTLSSSSPPSPSSVYRHINTHHIPQSFNHDHNDNDNVWTIRKR
MIKSHILFSYIESISNGWTFEILIRFIVTPSKLQFIKSPINIIDLALLSFYIDLCLTKIML TEVNYELESFFSIIRIMRLFKLTRHIAGL
KILIHTRFRASLKEILLVFFLIVFIVIFAALMYAERFQYNPQNDSSIPIGLWVAIVTMTTVGYGDQVPKTYLGMIVGAMCAITGVMTISL
PVPVIVSNFSRFYTHQQAQSKLPKRRRRLPVEAVRPKTCGAPQLSSSVLKNLGLVPPGIARNFNTSNDSPMRLPLNGERKSPFLDTNS
KV TENPSNEQTTLRPLIPRREEITLLPGDNLQYKGSVNWSKSLIKDTSNTSETNRLMNC EEKAPFVQSKHQLFDNVVIDNTAVNHI
DEENSYNTEDMKEDMKNQNLPI SNICPNLLIDKNFKSKNTTNDLSRQIGNDEISYSINPKLSYINYKTPCFSEHHDHNNIEENFLPDS
SLNQLLEELLTLRNHNYEITPPRLSCVSGDKLDMKFITGSQAPT

>185KV3

MLSSVCVSSFRGRQGASKQQPAPPQPPEPPPPPLPPQQQPAQPGPAASPAGPPAPRPGGRHAEPGLPAAAMGRHGGGGDSGKIVI
NVGGVRHETYRSTLRLPGTRLAGLTEPEAAARFDYDGADEFFDRHPGVFAYVLNYYRTGKLHCPADVCGPLFKEELGFWGIDETDVEGA
EVRGGMKLEFFCDDGPEPLRLTAAGELSAVLAARVPAPRPGWPAAPTAVPQLEPRARLGGGEPGMRSAKASGLKPLQRSEALHLSEVKPRA
QPLWRKGAQRDSAGPWTPKSKVFSVAFIKTHITVWQDSGYPHLEMAQDPSFILCPFGKCPNFSALALPPTASRPYVAFASLFFILIS
ITTFCLETHEGFIHISNKITVTQASPIGAPPENITNVEVETEPFLTYVEGCVVWTFEFLMRI TFCPDKVEFLKSSLNIDCVAILPFYLE
VGLSGLSSAKAADVGLFRVVRVRIILRIFKLRHFVGLRVLGHTLRASNEFLLLIIFLALGVLIFATMIYYAERIGADPDDILGSNHTYF
KNIPIGFWAVVTMTLGYGDMYPKTWSGMLV GALCALAGVLT IAMPVPVIVNFMGMYSLAMAKQKLPKKNKHIPRPPQPGSPNYCKPDP
PPPPPHPHHSGGSI PPPPIPPSLGVTVAGAYPAGPHTHPGLLRGGAGGLGIMGLPPLPAPGEPCLAQEEVIEINRADPRPNGDAAAA
LAHEDCAIDQ PAMSPEDKSPI TPGSRGRYRDRACFLLDYAPSPDGSIRKGYEKSRSLSIAGLSVSLRLAPLATPPGSPRAARRAPPT
LPSIL

>186KV3

MSASSSRHNEHGPPSGVSSNTDGTQVSVPKRHDNKIY INVGGVKHETYKSTLRNIPDTRL SWLTQTANNADYDPVTKEFFDRHPGVFL
AILNYYRTGKLHCPNDVCGPLFEELQFWGIDEKQIEPCWSTYQHRDAQETLAKLNGPDWEENDEEEDVAKRFIEESGGFEKDTWW
ERWQPRMWTLEEPYSSRWATLAVISLMFVCSITTFCLETVDLQEPVYSENAETNTEIIDYKPRDELFIYEAVCVTFFTVEIIVRFIF
SPSKLDFYKTAQNIIDFLAIVPFYVDAICKIANVNSGTANDILSFARIVRIFRIGKLRHFSGLKILVHTIRASAKELLLIIFLGLGVLV
FASLEYAELWLAEEGQTNDFTDIPIGFWAVVTMTTVGYGDMVPRTPSGMLVGA IAGVFGVLTIALPVPVIVNMFALYYTHAARAKLPK
RKRVLVGAADALKTQGGTFSSISGYSTQSTNEAEA IHDSVSESSEDSGVKTRNPKTANGQSTGISVTFTEVTDSPKTRRKSPTGKRGTG
RRESFVPLNGLVGRRESFRPNGSIAGRSKSLHGPKGPPARRRSLPSMTEIDV

>190KV3

MEGATRPKPERVAWGLHEHQEVRTDKIKVRTNSKIFSHVSVSTKESSTCTQEPDPYASWGQESHPTTFLCRSKSSQTSLEHELFMEEAY
NSAICFKMLRDI GTSDLLQTKYLTKKIKRMAQRCPNLV METIHDYFKDNPEISCRHRLRLEFVLTIVIGTLNVLEETWQKCFMQLALEHMTK
STELDDIYQDAASNVLALCRHWPVAVAKHLETTELTGVFPHRSLLYVMGILFSQEKFLKEDRESWKDLSQMTRKSVPLNTDVSKELL
WAITKAGRTQEQEHAPEKAFLVVYGLILQAEENSTVTRHLKTLLETSHQWDKQREGIALTVGLVAVRHLDDAWAILEQFGRSTPLRWSLQ
LSLSKSNKDLRWKASSTMLLSYGGMAAWAKSHILPWVDNLSRMIFYFRFSSWDET LKQSF LTSISMLVGAISRSEGAHSYEFQSSELLEC
LMTLMEKEPQD TLLTSVHQVIRIVSSLCALRPPIDVERKSRLSICFRSILALPQLDALEKQACLLLEQPNIQGLYSQMEALDHMLQCFM
VQNPTVNEPHFLSHLYIWL TSEKTHEQRAVHRCTALFKFLNHKQCLDSTKENFIRVQGLVAMLGILCQDSDSTIQCVSLEALGHLYQLLMH
QKAQETPEVERESPRELFGPDADGAVRWSSGDQKGCPIIPQGMASKDPSIFYMSSDQALQAITNHLEMAELTDLIWTIDGLGSTSSWVQA
AADLLLLVIQEHGDSLATVGMGQA IHQHLCAIQMPQAKDSALRVITLLARNHIPELVAAFLDFSTPLDSQAFRLWRALGAEQPASYLILT
LLAWLQKRPLPPSVGDGSSYPKEKSYLRSLAAMNTIHELQFAREFKAVRDPVFPQLFLAHLAQMHYILELSQPTPEQEVEQEVAVLNPQS

LASLLGCSTSLKSLSTTGHWHDFAHLELQSAWEYFTSIHTYPQAVGLLARAMVQNHCTQIKAVLGYLLPNLQSQQERERKTAILLVE
FLYSPALLEVLKQAAALTVLAQSLQDPSSSEIRVASLQGLGNLPHPEKESLLQSQLPAPLNGFFQKSEAVVVGIMGMVSDVLHRLGMQGAGA
QTLISIAINTRYFFDDEQDKVRAAAMALFGDLVATVADRNLRLRGTQVCQSMVPLLLHLKDCQPAVVTQAKFTFYRCAVLLRWQPRHTLFLCTL
AWENGLSARHFLWTCLMTHSQEEFHSIHLQAINYLHSHHRHIKTWAALFIGYTTTCYQPAVVSQMLSDKDIKLLSSSTFKDLKKDPEPGIREFA
TRQLLFFWKSARPNQ

>194KV3

MDSENRVILNVGGIRHETYKATLKKIPATRLSKLTEALANYDVLNEYFYDRHPGVFSQILNYYRTGKLVHPVDVCGPLFEEELFWGLDAN
QVEVRFLLFFVCRDNRWRPRNFVDDYIDTTTINTLSSTSTGTTSSSISSSTVSSIIYDKFNSNYTIIMNNKQYKKNIFIYIEICINIWFTI
ELIIRFTVTINHKKFVKNLINLIDIAALFSFYIQVILLHNHSHYHGNNNNNNINGDNGSYHSDNDVTLISIEFFSILRVMRLFKLTRHI
SGLKILILTFKASAKESFLLIFFLAVFIVLFAALIYYAERLSNTNTRNDFTSIPIGLWVAIVTMTTVGYGDMVPRSYAGMIVGAMCAVTGVL
TISLPPVIVSNFMSFYSHTLARSKLPKRRRILPVEAIRPKHKSNIIGSGTGHGIMHHCSTGSDTINLSNLAGKIVPNSIQPIAKAKYS
NFSHIKENYQNRKYPNSNEFPLNEQYKCAYGITHRRAAVIDASNSSLEQMNDDNDCESLGKSLKSELQYTERLRKSFPIPKLLMNDAIK
QNNCTHTNCSNLPNQTEDYSIHKIGIMFTVKPLIQFLTNPVIGPITNRIGYSIPMFTGFLLLFASTVVFVAFETNFYVLLVARAIQGVGSA
CSSVSVSSYLTTDVLNSTGHCFSELELDDILLEVTIGAPYGGITYQFISRQAPFLILASLTVIDGLLQLLALKPRVQRESQEGSGLIELLKD
PYILIAAGSITFGNLGMSVLEPTLPLWMKTTMNSTEWQQGVAFLPSSLSYLVGTNIFGPISHRIGRGYSAGLGLLITTCGLIIGLFPKRM
LIAPMFGLGFAVGMVDSMMPIMGYLVDLRHVAVYGSVYAIADVAFCFSFVIGPIVGSVLVKYLGFWMMWITAIICFIYSPLTLFLKNPPQ
KEPKSEALQLRVNDQRICSSVKRPGKDIRRYISPSAKAWNINETVKDDICLTKTNNPDEIENPPQIICEKSADEGLGETLEKKSILKIFYE
QAKIVKFPKSLKFRGNSQVIECSATGFPDLYVWRKNGSILKQSHQSNSSVSRNIRLINPLELSNIRSDQHGDVYVCEAGINSAVNQN
PVIKELMLEVNLYPKIHMTDNVIYTDIGVEERFNILVTGYPTPLTCLNDLPVSDPHMLSNKPQGGTWAYRVVLSQITSQHLHEYLCANNL
GSVYQKLEVTVAPAPPKILSNPLTEFADYLLHWTNSRAPLKNVTVTISETSTNTESNTGSSIVPRSPILHERVFNLEDDKIDTTSTVIQH
IQSDSNNSKQIWHHLTNLSSDTRHDISLNVCNTYACSKSSTLRSRGSGSPRFTIKTPEFDGSKINPSSLQRSPKDLLSLDADETKSPRNG
NSANLKPQYQWIIILFIVTLLLRSLI

>196KV3

MEETFELSEEEIVGTVKDRVIVNGVGRHECYISTIQNFPDTRLYWIAETALKMADFDPDGNFDFDRHPGCFQNILNYCRTGKLVHCPNDVC
GPLFEEELQFWGVSELMMPECCWGYYTQHREASKNLQIIDEFLHAGNNVMQKKEINSSINQIKFKIWMLLDNPQDSFAAQI IAMVTILMIVA
SLITFCLYTMPFSKSYRHEFDQIEIFYCFFFTMDFLLRICCPRRLLFFKNILTWDFCSTLQFYLGFI IQTDSLDFLSMFRLRCFRLIRF
FKDLTGMLVIGQTLKASAKELLLGMIFFVPMIFSTMVYAEKVTGTGQFTSIPASFWWAITLSTVGYGDVTPKTVLKGFIGAACSYIGV
LMVALPISVIGNNFSVYYSYAQARMRLPKRADNFLSADKALLNVAEKNMEPLDNPDEESSPDNEFENPKRSRRHAIIRNSFGPISLLQKQK
KEFLSANLPLIKTDDVNNENDVNDESNDVNEDITINNNKQIPSSSLNNDNNVKNLLPNKDMFERNRRSVITNDVNKI VQSQEKLEEN
IYSKKRVLHLDISRYQPQKLTQNYEQRRRKSCHYLSQSLLRDEQCFVNDQQHENLSKQRKYSALRGRHSGDLLVCLENDSNILKGSNI

(4) The subset S_4 contains 32 Kv4 subfamily proteins

>30KV4

MASGVAAWLPFARAAAIGWMPVANCPMLAPADKNKKQDEVIILNVSGRRFQWRTTLERYPDNLLGRPEKEFFNEETKEYFFDRDPEVFR
SILNFYRTGKLVHPRYIYISAYDEELSFYGLPEIIGDCCYEYKDRKRENAERLMDNEFENKQEA MP SNLRET MWRAFENPHTSTLALV
FYVYTGFFIAVSVIANVETVPCGTVPGNKELPCGERYQVAFCLDTACVMIFTVEYLLRLFAAPSRYRFRMSVMSVMSIDVVAIMPYYIG
LVMTNINEDVSGAFVTLRVFRVFRIFKFSRHSQGLRILGYTLKSCASELGFLLFSLTMAIIFATVMFYAEKGSTSSKFTSIPASFWYITV
MTTLGYGDMVPKTIAGKIFEFHLTSLGVLVIALPDPVMVSNFSRIYHQNRADKRRRAQKARLARIRVAKTGSSTAYLHSKRNGLLNEALE
LMGSTEEPPIGKSASLIESQHHLHLHLEKTTGLSYLVDDPLL SVRTSDHEEPCSLWMSQMFQNCRENSCKNYPSTATASLSSHGLTTSC
CSRRNKKTTHLPNSNVPATRLRMTQELSTIHIQCSDDQPSLTASRSSLNLKSEDEMRSNCKASQITTAIISIPTPALTPEGETRPGSPGRS
TNIHSTSNIVKVSAL

>31KV4

MNGDIGAWISCARTAGIGWVPISSKEPSAYLNKQVCNENEKNAKLTINVSGRRYQTYSHLTRKFKETLLGSGQERYDYFDESLEEYFFDRDP
DLFRHILNYYRTGKLVHPPKNECVSSFEDELTFFGIKGFNINCCWDDYDHKRETERL NESDVMLTSE INEKSDTMGIDVQMNNHQAKNF
RQKVHGLFENPQSTFLARILYYITGFFIAVSVGSTI IETIDCSANRCPGEVYNKIFFNIEAVCVVFTIEYLARLYSAPCRFRHARISLSII
DVIAILPFYIGLAMTKTSISGAFVSLRVFRVFRIFKFSRHSQGLRILGSLTSCASELGFLLFSLTMAIIFATVVFYVEKDVNDSDFTSIP
ASFWYITVMTTLGYGDMVPKTIIPGKLVGSI CSLGVLVIALPVPVIVSNFSRIYLNQNRADKRRANQKLRNKCEEKKEKKESSETVTRF
IISNQMYTIFSMKFALTR

>32KV4

MYSVTSTATYFLTRKVKNRHRTNVTRNKSIIVDPTGNELRLNVSGFMYRLHESFLNRFDPDTLLGSNEKDFYDEKLGEYFFDRDPHIFRLIL
KFYKTGQLHCSNDNCHEFADELMFFGIMPEDVAACCGDNFFYISQSSKEKSKKIVSPKTFREKCVIFCEDPTFSLAAKCFYFVSLVIT
LSIVVNTVETVECRTSVNNAVFQRCSDAHPIFFVLDSACVTFFALEYMFRFYSTDNRYNLYKNVMSIIDILAILPFFVDLILFHLNVGTN
VVISNILVAFRSVRIIRVFKLARHSQRLRVLSSSIYRSTSELGILFMYINVVVFATCFIYAENSSAGMKSASFSSIPEAMWYTVVTTTLG
YGDVVPVTIQKLGSMCCLMGVLVIALPVPV I IQMKASED

>73KV4

MATAVAAWLPFARAAAIGWVPVATNNLPPIPFNRRKTKDITLITLNSGRRFQWKNLTKLEKFPDTMLGSGEKEFFYDDDRKEYFFDRDPEIFR
HILSFYRTGMHFPRTCEISSIDDELAFFGILPEMIADCCYEDYRDRKRENDERLVDASDAPGGPALGKAPPALSLRKRMRWFENPHTS
TPALVFYVYTGFFIAVSVFANIVETVPCGAMPGTLEVKQCGERYQLTFCLDTACVMIFTVEYFMRLFASP NRCKFLRSVMSIIDVVAILPY
YIGLIITDNEDVSGAFVTLRVFRVFRIFKFSRHSQGLRILGYTLKSCASELGFLLFSLTMAIIFATVMFYAEKMEGTTFTSIPAAFYWTI

VTMTTLGYGDMVPKTIAGKIFGVCSSLGVLVIALPVPVIVSNFGRISYQNRQDKRRAQKRARLARIRAGKPTSAMTYCQNKGDHDFEQDP
PPDVSEAEATSSNNINATFEKNHFHLHCLERTTDHEITENQMCNSSSVAIRGGDNESESLISTHSANQNSNIYHQMSLQRGRRETST
CSLQRHNDVSSSSVSHTSQHDNACELDDDSFLSNEKTNFGFSGTKDVTPPPFSLNQSPCATSFVADNLRSMDDVESDVIIPSIAPDV
TDQFCNIPSRFTNYVTTPSSTRNLQADNLSVPMTSLSSDSSSTSGVSGSSDYRYGGSDDDERIPNLIPHTESRSQHRRESEPGIDAFRRS
SRTRNYDGRKSSPKSPSTVTCVAPPHADAAQRHRVSAEKGILPANVDGSSNSVIRISSL

>75KV4

MAAAWLPFARAAAIGWVPVAPNPMPVLPERRRNEHFGRVCINISGRKFETWRHMLDKYPDTLLGSSEKEYFYDEESNQYFFDRDPDLFRHIL
TFYRTGTMHFPREECIAAFDEELAFFGLMPEIIGDCCYEDYRDKRDNQERLMDERISEMTDNEPLANREKMWRFENPTTGTTPATVFYVY
TGFFIAVSVIANIVETVPCSPLPGVTMLACGVYERSFFCLDTACVMIFTVEYLLRLYAAPSRLKFARSVMSVIDVVAILPYYIGLFFKDD
SLSGMFVTLRVFRVFRIFKFSRHSQGLRILGYTLKSCASELGFLLFSMAIIIFATIMFYAEKYSKNTKFCYIPAAFWYITVTMTTLGYGD
IVPQSIIGKIVGGVICALSGVLVIALPVPVIVSNFSRIYHQSRADKRAQKRARLARIRLAKNASGNFVSRKKEADRLQRSGVSSDDMNLK
YSPYEAQHHLLSCLERTTNRQYVETEYTYNGIPFSRSMQSGSAQVSPSPSATSSTQDKNSQPTGCCSRWAQGRRYEAAGTEDEDNNLKEVR
VNETHTRKPSPKNTSHKRNDLTLVLPENMCNT
STVSASSPQGSRGSPQGSAGSSNVVQVSAL

>77KV4

MAQALSEEFQRMQALLELRTQNYQLSDELKNGVELTSLRQRVVFLDKELARAQKALS KSKKAQEVEGLLENQMLQGLKHSQEDDFRLQ
NSTLLQELSKLCAQIEQLEQENQQLKEGSLGPGPNTASSPVDGELLRLQARENTALQRNV TALQERYEKEQTSPPPQ PETAGEDESKGCGDP
PGGPVAPSLLAETELKWEVEKEEKRLRLERLQGLESSKQAEAKLQEEVAKLSEKLKKQESFLRLQTEKEALYNDSRNKIEELRQHQEADL
KAQLLRQKQLQELQANQSLAELREQCQTERQDHASALRTLQDQAACQSADSQEQVQALLAENDALRTNLALEQIQ TAKTQELCVLREQT
AGLVTELQQRQAEFEALAGQRDDLSSQLQESQRANERILEQLQVLGQEKHESTSRELEEARSAEKRKALLDEVAEALQEKSRLKEELGSAR
LQAEDVLAVRARYERELRQLHDGRRRQEEELRAQITREEKARTRELESLQQMVEELRAQLQSMGAKGWFERRKEAEEALEEQHQHEENL
RAEEERHKAELQRMEEEVQAVEGQLREAEALRAGHLDIAQLQEQEVKDVADGQRILEKKGASLKD LKRQLQLERKRADKLQERLQELLTNS
KNRSGFEELVLSSESPSRAQTDSSS ISSFSYREILREKEGSAAPARSSSGSPGPAPRAELSD EEAELFERLAETQQEKMWLEEKVKHL
EVSSASMAEDLCRKS AIIETYVMDSRIDVSGPSGHTDRSGLGSVLRDLVKPGDENLREMNKQLQNMLEEQLTKNLHLHKDMEVLSQEI VRLS
KECVGGAEAAPS SVSGEARWGHGTGGAGRGGGGGGGGQPGCEYFFDRDPDLFRHILNFYRTGRLHCPRQECIQAFDEELAFYGVIPPELIGDCC
LEEYRDRKKEAERLAEEDEAEELGGPGGAGTDWALPDPSPFRQLRWRRAFENPHTSTMALVFYVYTGFFIAVSVIANVETIPCAAGGRAGWR
EPCGERFLPAFFCMDTACVLI FTGEYLLRLFAAPS RGRFLRSVMSLIDAVAILPYYIGLFPKNEGLSGAFVTLRVFRVFRIFKFSRHSQG
LRILGYTLKSCASELGFLLFSLTMAIIIFATVMFYAEKGTSKNTFTSIPAAFWYITVTMTTLGYGDMVPSTIAGKIFGVCSSLGVLVIALP
VPVIVSNFSRIYHQNRADKRAQKQVRLARIRMAKSGTTAF LQYKRNGLQDSTRPALSTRCSAFEQHHHLHLCLEKTT SHEFTD
ESTFSEALGVVSLGGRTSRSTSVSSQAVMGSSARASSL ISSCCPRTKQRRAIRLANSTASVSRGSMQELDTLAGHHSPGQSRASLNKTH
DSLTLNCASRDVAAIISIPTPANTPDES RPHSPASDNGEGLGRPSGGGGGGSSGGGSDSVGSSSRNRTLRNSNLGPSYLLHNTVK
ISSLSHSLGGLLGGPSPSPLM TYKAI AQLLAGPAPRLLALSIRSLPDLRVLLTAYAVGACSGHKKRRWQAGPGGNGPGPPGGVGVGP
GAGGSPDRDEGGAGYNS EYD TAAARVEAMPATVEQEHWF EKALRD KGF I IKQMKEDGACLFRAVDPHGLE

>88KV4

MTSEDVETIHYWTPMAQAGYFGMAPLATSRSSLLVRPSTRDNRRLVNLISGRKFETWETTL EKYPETLLGGKGD SFYDKEKQEYFFDRDP
VFPRHVLNYYRKGKGLHFSLEECGFYKEELKFFKISPDNDVLCFEFEESVSLNFRKPRPPGESRDCDSVQKVRKSLRQRVWDLFENPYNS
SLGKITAVTGIAIIVSILTTITETIPCSTTRTCGELHASAFFIVDGVCGVIFTLEYLVRLLSAPERWPFVKNFQS IDVASVMPFYLDILF
EQISGGSSGAELTILRVFRVFRVVKMSRHSKRLQSLGASIKNSSSELGILFSPSLGVVIFATVIYYCEKDELNTSFLSIPDGMWYAI VTM
TTTGYGDMTPETAI GQLMGSFCCIVGTLVIALPVPIL

>89KV4

MARRKTALQEREKAKEKARNRNFTTINVSRRFLVDIEI FSRFPD TLLGSTMKQHFYDPSKKEYFFDRDPEVFKYIITFYKTGKLHYPEEE
CACCFETECAYFGLADIMSDCCHEPYGEQKEDFDYLKRNKPALGLTDPDSLKGAARFRCKMWQLFEEPSGNI FGLMLHYISAVFIAVSVV
TSVVETVPCGITTCGKKEYLFFVLEAICVLCFST EYACRLYSAPERWLFMKFLSIIDLVAILPFYAGLIVPEASSGPFTVLRVFRVFRIV
KMSRHSTKVRAGSS LKDSFSELSFVFLAALIILFSSVIYSESVDPN SNFTSIPATFWYITVTMTTLGYGDLVPESLVGRLTGALCSLS
GILVVALPAPVLEKNMKKARKGENDDRIPLTYQTPARKKKNSTRFQSSSTSSNARTSSVTRSQA IGGTRNL

>90KV4

MTLQSVRNRTRKNDKRVTLNVSGRRFCTWESTLKKYPNTLLGSDALNLYFDKEKREYFLDRDPHIFRYILNYYKVGKHLHSYEDCFDSFHQEL
LFFGISLDQVNDCCWEDCSNYVDRIRECNEAPRTKANNGKIYTKRVIWNILENTNTRLGKIVQTLIAIL IYVVAASIVETLQCSL GKTC
EETHPTIFFALDAFCMITFTLEYILRLFAENMREFLTNKNILDLVAVAPFYILLCVREIELSQMLENANSLVILRLRMFRIFKLSRHS
RKMRKMGHALKSAFSDLGFLIFAFLLANVLFASVLYFIERTDSPQQFTSIPDSMWYTIITMMTVGYGDAVPVTVLGVVGSVCALLGIIMLA
LPILQEGAAEEQRQAQRNSHSRRRREENGQETEQRQYNR

>91KV4

MASVAAWLPFARAAAIGWVPIATHPLPPPVPKDRRRIDDEKLLINVSRRFPETWRNTEKYPDTLLGSNEREFFYDEDECKEYFFDRDPDIF
RHILNYYRTGKLYPKHVELTSYDEELAFFGLPDVIGDCCYEDYRDKRENAERLMDDKLSENGDQNLPLQTNIRQKMWRAFNGPHTSTAA
LVFYVYVYTGFFIAVSVMANVETVPCGHRPGRVGTLP CGERYKIVFCLDTACVMIFTTEYLLRLFAAPDRCKFMRSVMSI IDVVAILPYYIG
LGI TDNDVSGAFVTLRVFRVFRIFKFSRHSQGLRILGYTLKSCASELGFVLSLAMAIIIFATVMFYAEKNVDGTNFTSIPAAFWYITVTM
TTLGYGDMVPETIAGKIVGGVICALSGVLVIALPVPVIVSNFSRIYHQNRADKRAQKRARLARIRIAKASSGAAFVSKKKAEEARMAAQES
GLELDENYREEDIFELQHHLRLCLEKTTDREFVELEVYNGQSKRPCSPSLLSPHSALSRVNFLSSCCTRCCNQRYQKHKRESSPDSIG
EPINEEELIEVQMKQRHTSAAAAAPGGKSSNSLDYNSCDMPASAGHKSSAAGSPSSASASAAATTA VAGSSSGAAGGGSGPAGGSTVMSV

QGCNNPNSSTSSVVNLPTSYPNSEMDYGSASYPSPSLSSNNDKQSRWYIFREKCI SKGRHEGSEGVKSIGGLKVYVKIVLNSSQIKIF
AETTANSVTPKINQAEIDSIDGNKLNVDLYDSIGSKANDVLNMAKKSSNLQSNQNTTQNPLLLKHEHIYQWNINGFYKLSDDINNN
NNYPTRHNIANGTFSVIDLSNTNSNLASLFEWKILTSYKR

>109KV4

QNDKRVVINVSGIKFETWRTNLSQHPTLLGSCEIDYFFDERNNEYFFDRDPLHFRYILNYYSTGELHFPKYECHVAFENELKFYRIVPDMI
QDCCFEDYQDYKDAEKETLYPERHSPSTKEKDPETEDTKRTFRENLWQMFEDPEKSGMPQVAPAFNYIIGFFVMISILANI IETVPVQETDG
AKISSTPMGDKYNLIFSLDTACVAIFTVEYVLRVYAAPKRAQFVSSGMSIDLIAILPFYIGLCLDTGNVNAIFVTLRVFRVFRVLFKFSR
DSTGLRLLGYTIRNCMKELGFLVFSMLIAVVIFSTFMFYIEKGVENTKYTSIPATFWYITVMTTLGYGDMVPKTWLTKTLTGICLSGVLL
ITLPVTVIVTNFNHVIQKAEREKLETMDK

>111KV4

MAATAASWSSSRKSSVNLGLIFSRPERPKFVSHAGEKKVIFNVSGQKFITWQSHLNKFPSTLLGGDKKENYLDEKNNEYFFDRDPEVFRIV
LQFYQTGKLYHNAICVTSFNEELAFWGLPDLLEQCCFEDYEHHELENRFQEKVLPVAPKPKTFREKIWLMFDRPQLTLLGPAIYYVVG
ICIVTSIFSSVLETVYGGSRDQLPLGEKYALTFATAIESACIVFTLEYTLRFLSAPNRCQFVTSLSMVVDVLAAMPYIIGLFLVIQIGTKSL
MTRLRVFRVFRIFKQWYSRGLRILLHTLRRCYGEFTLLFALFMGVVSSSTMMYAEERDEPDSVFTSVPRSFWYSIVTMTTLGYGDMVNTI
QGVIAIGVICALSGVLLITLPTTVVVSFNFAIYRSHKLSKSLKHKQAKVVKMLKPRRPHRLPIEIPLSDDDETRECECRHIFCCCLSGACCT
RRSGYKAAKGTASISSEEQERRFKLRWLLCCNDLCSERGINLECSYNNVPCWRATFPPQPKPPPYTRRENVQYYRMTIDHHRQCAV
SYVEQEMEEIEKLSDDQSDEGNIETVHVFR

>112KV4

MTRSAGSVVLYTAACQPVVYVPLPLKRRRAGAERLALNVGGTRFEIWRHLLERYPDTLLGSDEKDYFFDDGKGEYFFDRDPLFRYILSFYR
TGRHLHYPESESVSAYDEELRFFGIPNDADSIGPCCREAYIDKKEAHEASVSAARDAQVPEPATFREKIWRIVENPDETTLGLVFFVYVTF
FIAVSVFANVETLNCAPFPKMPVEKMPGCLRYSLFSFCLETACVIFTAEYVLRFAAPDRARFVKSAMSVIDIVSILPFYIGLCPANNS
VNLGFLVTLRVFRVFRIFKLSRSPGLRLLGDTLKGCDLGLFALFSAVIFAATMVFYAERNHPNSFFSSIEPEGFYIIVTMTTLGYGDM
TPRTIPGKLVAFCSITSVILLTLPLTVIVSNFTNVIQSKKGGDR

>113KV4

MADALASPRPISLTRENNRRRAFLAKLSSKSPDEPEQKSPSLSAFLRKFSGKFGPDLGEKTQPSQRSIAPPRIKPRLLGDVRLVFNVS
RRFETWKSTLDKLPDTFLGSTEKEAYFDDDTKEYHFNRDPEIFRYILNRYRTGQLHYPKCECIDAYDAELNFFGLSEFSISECCYEDYSEHK
KQRHEQLQELLLPVLNVPTKATTLRQKMSILDGNSGHPLAPLCYTTGFFIAVSVLANIAETIQCGALPGTTKILHCADRYPKVFFTID
TVCVVMFTVEYVTRLYSTPDRVFRVRSMPGLVDLVAAILPYIIGLFLMSSKTEHGGFDSLFTLRLRVFRVFKISRPSQGLRILAQTIKSCV
DELGFLLSFMLAVVMFSTFMFYAEKLMKAPVDFKSIPEGFWFILVMTTLGYGDMPLVTLGKVMAGICLSLGVILITLPTTVIVSNFNR
LYCQNNPDIKASPEATLLG

>114KV4

PAMKMQFVRRDHRVKINVGGTLFVTSRKFIDRFPDSSLGSDEKDYFYNAETDEYVDFDRDPDIFRYILTYRTGHLHYPENESVKDYDNELIF
FRLMAEDIVGACCRETMEKKEALEQIESEVATGTGSKEASTLSTVRARLWSILDDPLSGIVAQVAFYVVTGSMIVASIVANVETIWCNRNG
GQDEWLRCGDRYRITFSVVEITCVTYFTIEYSLRFAAPNRREYVKSPLSVIDLVSIVPFYIALCIPENKELNGVFTLVRVFRVFRIFKLSR
SSSGMQLGQTLKACMRDLGFLFALAMTVVIFATMMYCYCERGPESNFTSIPAGFWYIIVTMTTLGYGDMVNTIVGMLVTAFCCLSSVLL
LTLPTTVIVSNFNAIY

>116KV4

MSFNVSQTVFVTS AFLFENHPDTLLGC DERDYFFDPHREYVDFDRDPKVFYRILMYRTGSLHFPQHETAQAFEDLSFFGIRPDLIAPCCR
ELYTDNKEAEEKYRQDIQRPKVPRSGPRAKLWQILEDPYDCVAATVIFSVTGLFIVLSILANAVETIWCARDYDLVSFVRGGERYKVTFSVI
EVASVGFVTFEYILRLIATPDRREFIKSPLSIVDLVSILPFYIALCIPENKELNGFFVTLRIFRFRVFRVFKLSRSSANMRLGNTLTAQLDL
SFLFALAVMVTIFATVMYCYCDKGPDMTFHSHIPGIWVIVTMTTVGYGDTVPETLAGKLVTVCCSSIVLLTLPTTVIVSNFSAIYAQE
VEALKRK

>117KV4

IILNVGGTIFEVSKFVLDRYPETLLGSEERDYFYDES VNEYRFDPEVFRYILNFYRTGKLHYPETETLGTYYEELMFFRLGHEGLPDIIS
PCCRESYLDKKEALNQLRQEAEKALKLKTNPEDIRAVIWAGIENPTGSCMSAAFFVYIMFFIAIS IATNTIETLYCGATDKDVPIYCGER
YPHLFYVYIETSCAMLFVSEYCVRLFAAPDRWL FVKSPMAIDLLSILPFYALILPKNSNLGVSFVTLRVFRVFRVFKLSRSTNLKLLGLT
LKSCLRDL SFLFALAMTVILFSTVIYAEKGVNPRGFTSIPQTSWYVVVMTTLGYGEIVANTVFGKIVTAVCCVSSVILLTLPTTVIVSN
FNNLYRPDKLKD

>119KV4

MASAAASFVPPVAASYDPSVLRYSRPTSLRSPPTQIKSSPRPRRPSVLDKRVKVINIGGRRYITRRGYLDKYPQTLGSSEREFFYDSDA
QEYTFETADPDIFRYILNFYRTDVLHFPKACWTTYNEEMFYGIPELYMGDCCYEDYRHCMSMRHNEEDFVRRKLLDRVGNPHLSVRQRM
WVNLQNRKGSSTLGPVVNYVTGYFIAVSVISNIVETVKCGPPDGPTCGERYSWAFRCLDTVCVALFTIEFFARFFSAPDRMKFLKSFMTIDI
LAIMPFFYGLFIKQDKIKRAFMTLRVCRSFRILRFSAA SPGLRCLLYTLKCKIGEMFLLLAVFMVALIFATLLYTTTEKQNTASTFSSVPE
AFWFVIVTMTTLGYGDMVPRNTMGKLVAAACSVCGVILMTPVTIIVTSFSRVYKKSQKAKKHGRQYDGGKNDDDDDDDDEIG

>121KV4

PVDRRKSQDITLIFNLIGGCKYEVWQSTLDQYPTVLGSKLRDRFYDEKKNNEFFDRDPLFRYILNFYLTGTLHAPVVEDTSAFDEIGYFQ
INPDFYMGCCYEGYLDKRGFDIKTGRVRSNDFDEEKTPEKKGPLTIRENLWETVENPQSSQAKIFFYVVTGFFIALSVGATI IETVFCQET
VNPTFEDELRLARCVIFMCIETACVVFVTFSEYCVRLYASPERVKYARFSMVVDVISIFPFYAGLCLPESNLQGVFDTRVFRVFRVFKL
CRSSPGMILLGKTLKCCASDLSLVMALSLLILVFTTMLYMEKNYDGLTFTSIPAGFWFTIVTMTTVGYGDMYPSGLGKLLTAVWAVSSV

IVLALPLTILVDFTFNIRESMKPTRRR

>122KV4

MYAVRGGASTPEPTHRTSKLQEALTRAPLETFRKEAKRIARCRSDKVVLRVGGARFQVSRHILEFHPDITLLGSEERERFFDKDCQEYVFPDR
DPEIFRYILNYYQTGMLHFPFEEELLDYQQLSSFGFELDQLKEVISSCCLFEYEDKQEALEKLPFLKKKMARPTPTFRERLYHMIENPK
QSTFGAVFFWLTSAFIALSVTANVVENSIYSLGKKEGEPVYVGGQIFTTFFSVLEVAVAIVFTLEYIIRLYAAPNRCKHVRQFMSVVDLVSIL
PFYISLVLPPKSTVTSAFVTLRVLRFVFKLARHSEKLRKLGYYVKNLSDKDLGFLVFTMLITVVLFSIIVYQAERGVDPSPFISVPHTFWY
IIVTMVTLGYGDMVAVTIFGKVVGTICMISSVILLTLPVTVVIGNYNELCRSSQDMVYMKRKGCRCLAPEPKAPQTRDTCTGSDEVLNQPT
RTESHGNERGTEEYESTPLLTWASSV

>123KV4

MAAFLGLVPTEFAQKYSRHRKFSVLLKRKDLPTTEQRKNAGDERILLNVGGTKFEVWRATLEEYPETLLGSDGKERYFNATTGQYCFDRDP
MIFRTILNFYLTSTLHFPHSENVHFGTYEDELSTFFQIDPDIYLGCCCFENYMDRKSDDMNKTGKTDHEPRSLREKLWIVVENPKANSAG
QVFFYVTFGFIAMSAATVETISCRGPTSPDPVPTVFRNRKHIFFAIESACVALFTCEYLMRLYAAPVRLQYVLSFMSVVDLISIFPFYL
GLCVPEDSAFQGFDTLRFVRFVFKLRCSSPGMRILGTLLKCAANLSSLCFALSMLGLVFTTMVYMEKGRNESLTSIPAGFWFTIVTM
TTVGYGDIVPSAFVSRCLTGVWSISSVVILALPLTILVDFTQTIRESYAAKEKIALRTPKPDGRGEDEKKNHKQSTSDSDFVALPPEGLGEE
VLEMTVLAQRVSVAEAGNSTTPAAQQEPTVAKKCVTFNSGLTAYLSSEGNIPFIDEEDIAQHYKVTH

>124KV4

DKKIRLVGGAHFETRLSTLKRHPNTLLGSEEREYFYNDTNEYFFDRDPDIFRLVGYQTGKLVHVNQECISMYDDELTFFRIPASEIGD
CCYADYENRELKLRMTMIDSFHRCHFNPMLMSMRERLWRKLSYDVTVTFWMSPPPTVIMTFVVLICTILAIMETVPCGTFDGRPDSKRCG
EYKLNLFYLDTSVTFITCEYLLRLYAAPNRATAKSCRSLIDIVAVMPPYLGNIIGSKSLLGSFQTVRVRFLRVFYYSKGLYILFRTLQ
SVAMEMGFLLISLVTIILFSTIMYMEKAFAGFTFSPATFWFAIETMTTGYGDLVPSYMGKFIGGVCISGILLITLPSVITVSNFS
RLYHQ

>125KV4

MMAAFIPHQGRVRSRLPSIVGRYSPIRRPFCTTEQRKVAGDERLVFNVS GHKYEVRGALDAHPDITLLGRFDREKFFNPDTNEYDLSTTP
EMFKYILRFYNTGVLHFPKSDDIHFHTYLEEIEFFEIDPDEHMSHCCFEDYIDRKIQWDIAHRPKTVFVPETLREKLWQMVESPKANMSAQV
FFYITCFISLSVTATVMETLACEDVSNIGDPFKIARARHCRHVFFCIESACVVLFTAIEYIIRLYASPNRSLYARFMSVVDLVSIFPFYV
LCISEESNVQAVFDLRFVRFVFKLRCSSPGMIMLAKTLKISANLSSLCFALSMLICLVFTTMMYMEKTHNPEKFSIPAVFWFTIITM
TTVGYGDIPTIGFIGKVLTAWSIICVVILSFPLTILVDFTFAIRESAKARKEKMKQSHEEQTDESDDDES

>127KV4

MPDQEFAYVGSVCEESLGEDPNAEKRRIRRKCSISHRLSVFADGGPSRSVRRLVFNVS GTRFVAVEDQDKFPRTLLGSFAFHRAVYFSK
TKEYRFRDRCPKVFKHILMYNTGVLHFSNEVCLSTFIQDVDFGISPDSHLSGCCYDRFVDEKNNLPCPVVDNDTSSSSTLSNPSYVIQR
IWKVFRDVS SVYGHAFSLVVGFFITIAVITNIIETVPCNSRHNTSFGEEYPIWIFECIDTTCVIIFTVEFSLFCSAPNCKDFKFNMTLVD
LMAILPFYLSLIGKNSITPLFRSFRGFRILRLGASTQRLKLLLLTLKECIRQLLDILFAMMLFVAVGSTLMFYVENSTNDSFSSIPDVFW
YVITMMSVGYGDAVPTTIGMFLGALCSISGVLVAIPLTIIGTTFSRVCKRSQVSA

>129KV4

MAGLSFFEYDIDQEQKGEVVLPEKQRLQRSSIATSLTKRLLSFGANGRVSSIRRVFNVS GTRFVAVEDQDFRFPHTLLGSVSHRQV
YYDANTKEYTFDRCPKVKHILMYRTGVLHLSGDVCLSTFVEDLEFRISLDES LGTCCYETQYQIRDDSRKDPIDEVNPDRSRCHGPTT
LRQRMWQAFHDVPGSAYGS AFHMVVG YFIAVTVISNIVETVSCGNRCDSCHKVYPWIFACIDTACVSI FTLEFLMMLFAAPNRWDFLKS FV
TLIDVFAILPFYLNPFVVGSEGSSTVLRSLRAFRIIRFGASSRGLRMLVMTLKECISQLAVLFFAMFIFGIVCSTLIYYVESPENMAFSSIP
ATFWYVIVTMASVGYGDLVLPKSTVGMTLGAFCSVFGVLLTIPLTIVGTTFSRMYKVKVIA

>132KV4

MSTRTACEDVRLVFNVNGVRFEAWSVLERHPETLLGGEKEGFYNIFTGEYMFEDQDPDLFRYILSYRRTDKLHFPPTGCVRSYNQQLSFF
GIMPELIDDCCYEHWQRKNARELTRSKLRPGELALNGVLDRTCRMVNDLLQVAVRNQTATDVLRYLGCYFVLSAVICTIVESLQATENKR
FREMYFVFDVDPFFTAIFSAEYLLRLLAQSSLQFVRSVTGVIDLVILSYILNFLRGVNSTVRSILSLTRIFRTLKILQYAKVSHGVRC
LYHTLSTLAGELVYLMFGIALVSVTFATIFYYFEKQVNPSSYNSIPSSFWFTIVTMTTLGYGDLIPMTPQKGLLAGICALAGVILMSVPVTI
IVTTFNRY

>135KV4

MSAEDIGAWLMCARTAAISWAPLSHNKLDGLPTVPPPKVVINVSGRRYETYDYTLFNHKQTLGGSEKKYFYDEKNQYFFDCDPLFRF
ILNYYRTGKLGKPKKECAEYFEKELEFFGKSSNIAECCNSYWRKNDMKMLQKNVLDKNVDMKIKNKQITFRERIKWYLENPQLTWIG
KLFYITGVFITLSVSTVFETVECEKGLNCGKKYDLFFV IETCCAVFTAIEYFARLYGAPNRLHARSVASIIDAAVLPYFIFITKT
VFGGAFISLRFVRFRIKFSRHSKGLRILGCTLLSCASELGFLLSLSLAVVIFSTIIYYIEKDEHHTHFTSIPAGFWYTVVMTTLGYGD
MVPKTVLGLKVGSCSLCGVLVIALPVPVIVNNYFVVKQLRDQPVKKKGPSTSDQRVPLGNENAKYKVPILISFRIGSQLFHLLDQNTKVL
LYKDLHFVEARLNAKTQGVLSLNDFESFNDSIEGFRHVLKNDLTDKYFSSVQE

>136KV4

MAAGVAAWLPFARAAAIGWMPVANCMPPLAPTEKNRQDELIILNVSGRRFQWRTTLERYPDTLLGSTEKEFFFNEDTKEYFFDRDPEVFK
CILNFYRTGKLGKHYRYECISAYDEELAFYGLPEIIGDCCYEEYKDRKRENAERLMDNDSENQEGSMPSLSFRQTMWRAFENPHTSTLAL
VFYVYVTFGFIASVITNVETVPCGTVPKSKELPCGERYAVAFCLD TACVMIFTVEYLLRFLAAPSRYRFRIRSVMSIIDVVAIMPYYIGLV
MTNEDVSGAFVTLRFVRFRIKFSRHSQGLRILGYTLKSCASELGFLLS LTMALII FATVMFYAEKGSSASKFTSIPASFYWTIVTMTT
LGYGDMVPKTIAGKIFGICSLSGVLVIALPVPVIVSNFSRIYHQNRADKRRRAQKQQLLLLLGKDNFEHVSALLSRKTHYGMVPKTIAG
KIFGICSLSGVLI IALPVPVIVSNFSRIYHQNRADKRRRAQKGSTEEEQHMTKGTSLIESQHHLHLHCLEKTGLSYLVDDPLLSVRTSTI

KNHEFIDEQLFEQNCLEGSMDQNYPSSRSPSLASARGLGTSCSRRHKKSTHLPNSSVPATRLRSMQELSTIHIQCSEQPSLSARSEALPCTT
RHLCNLISTGTE

>138KV4

MHSPCTARYIAKKKASIRSCILNENKQLLVDPIAYIVGNELTINVSAGAKFRLHESYMKQHPETLLGSDERLIFYFDEEENEFFDRDPHIF
RFIYKFKYKTGELHFSFNDCYEAFTDELLFFRIPTELAFCCGDYFQYKSVQKKDEVNKNIDTNQNKPKTFREKWCWFCEVPTYSLPAKAFYI
VSCLVIIFTMITMSAETVQCEKMLNNTVVQDKCGAVFTQLFFKLDSCFVCSFFILEYLLRVYSAPNRLSYIKSPIISFIDVLAIAFPFILLVQS
YINIKNKTANNILALPSIRIVRVFKLARYSQQLRQLIAALVHSIKELGFIIVFVYCVVVVLFATIIYYAENFRQSKVFYSIPEAMWFTVVT
TTTLGYGDVVPETIQGRLLIGALCCLMGVLVIALPVPPIQMKLKLNARKVKKSTSEMQTKQEQHFKFGGNNVMVWGCMSASGVGKIEFIDEKMD
QHLYRSILERNLVAAGKLGTEFIFQHDNDPKHKAGSVTRYLAANGINVLDWIAQSPDLNPIEHLWSVVEKRMKDRAPKNKNEKLLVLD
VWPSINQEITSKLVSSMKNRCRAVIEADVILSVKRGYSLTMTGAINAGGGYMPKLLIFPYKNFKFKGVPEFTGGTNASGWSSEKLFGLFMK
HFVKHTRSNNKENPSILSLDNHSHKSIPIKIQLAFYNNKMKDWMLKTVNTGKPATIYDVSEIGQEVGQDFPIKIVSAGTFLRQKQNGVKN

>145KV4

MAQICDMAQASAWLPLVRASAIWVPIAQHRLPKNVCTKDDSNQDIYEKKAIVNSGQRFEVLTSSLNQYPHTLLGSDERDYFYDENSGEYY
FDRDPEIFRHLITYYRCGHLHYPKKECVMEYEDLAYFRIASEALGCCYEDYHDSKRENSERLLEERSSTKENAEVPKDFRNRLWQAFENP
EFSTTAIVIYVVTGFFIAVSVFANITETIPCGPEPLSKQRACGDYIDAFSCLDTACVIFTVEYCARMYAAPNRWKFISVMSIIDVVAI
LPFYIGLLMPDNKSVSGVFTTLRVFRVFRVFKFSRHSVGLRILGYTLKSCASELGFLLFSLTMVIFATVMYAEKSVETGTFSSIPSSFW
YITVMTTLGYGDMVPETIVGKIVGGMCSLGVLVIALPVPVIVSNFSRIYNSQSRSDKRAQKRAQARIRLAQLMATVNACAEKSGSPEL
SCDEDYDGNETKKSSTYSEVKTTTSYASNSPPSINANQSTGKDRSYETSRNSTGSDLTISHHSNLTRSGSLTLLKNKMYLVNDPCVKIDH
SELDNMNQFENLSTSSQLFSGVEKDTSPGSSHIISMKDKLYETNNLSGRNHHLVRQTQGVHLHSSFSKSNKRKTINRFTSLNDGRQSQ
HRKVQRIIVEDKNNKPSFLPIYIHPASQSSFSDDSMKRRKHSNEQQKPTTKGQKTNKCKSSHAKLTFEDLILLQQKHLMDCLNVVTARAI
NEPRESNSHLNVNPLISVLEHGKFKHRRRLTSEISKISRFLRVRSISKDSYENRRSTSNLDCDSTENNTEVGSDDHISNVDKLTERQ
SAVHRSESNPFRHLQVFRHLHSGRQPSDDRCSAVHLTFPSKRKLNLHKFKHNGYRNFYKKNCTINYETDDNNNQKLMNIKVANSSQIP
DKVDIIDIDENSRNDNSTVDNSIYPCSETKPLLDNSRLTYSDELGLNDLVKEKSFTRDPGFASSPTWPSFRFNSFSQFKNFTFTDKSS
NNGKSRNPSDIDSCDLCSWNEHNLVNAIIPKSSFSVADYDPSVIFCTSSNTKANVSSQSSSFVQSNPIYSSLEENLTFASASQSHISITS
TSHPNSSSNTTNNFNKMIHSHQHCPKLSFPTDKDLYKSHINYAKLSPRLSYSPHELYRNVSPDLIKECYNPLKNSPSKLVKNTDNLAD
IHSSDASVHSDRPVLSLSPKQKE

>150KV4

MVSEISWQLLKQATILGLAPVLCNEVDLLDLSRQTKVSDKKIIVNSGVHVELTESLVKRYPSTLLGSVEREYFYDSINNEYFFDRDPFLFR
YILTYQHGLHFPKNICISAFENELKYFSLSDNLSDCCYESFIDHSDIEQRLEDDKKTFTQYKSLTINSNVKREKLWTFENPEENST
AYMIYTTGFFIIVSVLSNMAETIPYNDNKLKNVYPLRTYGDYANIFFCIDTACVLIIFTIEYISRLYASPSRCKYMRVMAVIDLTAVLPY
YISLIVPAGLQFSGSLVTLRVFRVFRIFKFSRHSQGLRILGYTLKSCAEELGFLLFSLTLVVIIFATVIYIEKFDENSSFYSPDASWYTI
VTMTTLG

>161KV4

MAQALSEEFQRMQAQLLELRTNNYQLSDELKNGVELTSLRQKVAYLDKEFSKAQKALS KSKKAQEVEVLLSENEMLQAKLHSQEEDFRLQ
NSTLMAEFSKLSQMEQLEQENQQLKEGAAGAGVAQAGPLVDGELLRLQANTALQKNVAALQERYGKEAGKFSAVSEGQDPPGGPAPTIVL
APMPLAEVELKWEKKEERLLWEQLDLESSKQAEISRLQEELAKLSEKLLKQESFCRLQTEKETLFNDSRNKIEELQRKEADHKAQLA
RTQKLQEQELEANQIQTAKTQELNMLREQTGLAAELQQRQAEYEDLMGQKDDLNSQLQESLQQQQEQEEALKQCREQHAELKQKEEELQ
DVRDQLQQAQEERDCHLKTISSLKQEVKDTVDGQRILEKKGSAALKDLKRQLHLERKRADKLQERLQDILTNSKSRSGLEELVSEMNSPSR
TQTDSSSISFSYREILREKESAVPARSLSSSPQAQPPRPAELDDEVAELFQRLAETQQEKWMLLEEKVHLEVSSASMAEDLCKSAI
EYVMDSRIDVVAAGHTDRSGLGSVLRDLVKPGDENLREMNKLLQNMLEEQLTKNMHLHKDMEVLSQEIIVRLSKECVGPPDPLEPGETS

(5) The subset \mathcal{S}_5 contains 10 Kv6 subfamily proteins

>30KV6

MRTREPAGLSSQLLAGTPQTPALGRITLAGPRRGLGLRAARGRRVPSPTPPPSRPPGTATGAVRSGAPGAAAPASGARILRGRWAPERS
PPPSFLLLLPPARRRALRAEPGPGQLPPAAARSPALPALLRPAQAMNFRGPAVVLNVGGTRYFSREVLKDFPLRRVSRHLGCLSEQDV
LEVCDYDRERNEYFFDRHSEAFGIMLYVRHGLRFVPHMCELSFYNELIYWGLEGSHLDYCCQRRLDDRMSETCTIYSAEPPGDSGAGP
RGKARRAAAAAEGGKWLERMRRTFEETSSLAAQVLATVSVILFVIVSMVVLCASTLPEWRAPENRSVEEQSRYTAESVREPSGIIIEAICIG
WFTAECIVRFIVSKNKECFVRRPLNIDLLAITPYISVLMVFTGENSQLQRAGVTLRVLMMRIFWVIKLARHFIGLQTLGLTLKRCYRE
MVMLLVFICVAMAFSALSQLEENGLDGLTKNKDYASIPAACWVVIISMTTVGYGDMCPIVTPGRILGGICVVSIVLLALPITFIYHSFVQ
CYHELKFRSARYGRSLSAEFLN

>32KV6

MLPAGAEAGAPQDVRAGGSSPIPAKPNFMFQVAEVLADLSSGDLVDVILSLHDAGENAPRAVDPTKTPAHSPLHSYLAVLPGRNLRPDDGRR
PPRGHFRFLGGGHLTRLFLGGPHWLSPWDSVQSLPLKHGLPLPCAERQLEIGSLRQEGETSASISMPSRDRGLHAGHHFRSCSPLSPF
LSGPVEPPSIKGIYRRARKVAGALDASPTADLKKEMLVNNGRRYLLPWSTLDEFPLSRLSKLRFCSQEEIAQLCDDYEDNQEFFFDSP
SAFGVIVSFLAAGKLVLLREMCVLSFQEEITYWIEEANLEKCLRTLRLKLDLAEELRQEEALQRQREAGRPTVHTSRWGLFMSRLREME
NPQSGLPKGVFACLSILFVATTAVSLCVSTMPDLRAEEDKGECSQKYYIFIVETVCVAVFSLEFCLRFVQAQKNCQFFQGPLNIDILAI
PYVYSLAVSDEPQEDGERPGSSYLEKVGALRVLRLRILYLMRLARHSLGLQTLGLTVRRCTREFGLLLFLCVAITLFSPLVYVAENES
GRVLEFSTIPASYWVAVISMVTVGYGDMVPSVPGQMVALLSSILSGILIMAPPATSIFHTFSSHYLELKEQEELQARLRLQNAKASEHE
LLRDVSDLSLEGPALPIAYI

>34KV6

MP I ISNANHDFS NLSVSDSSLDHIFTE IPETET IKG VVYQRAQF IRRPEDLNLVDHGLQAL INVGGNRYTFP WSTLEQFPLTRLGRLKPCS
SPEE IARV CDDYDEARHEFFDRSPNAFRVILNFLAAGKLRLLREMCALSLHEELNYGWVEMTYMERCCKRMYTRLEEVAELEERREERRQ
RNLQLRPP I VETRYRKF MNQLRDMVENPQSGVPGKVFACF SVLMAVITV ISLCISTMPDLREEENRGVCSQKQHMFIETVVCVAFSLEFL
LRFVQARSKLQFLRGLPLNI IDAMA I L P Y Y V S L V D E K P N D E N E R P S G G K G Y L D K L G L V L R I L R A L R I L Y V M R L A R H S L G L Q T L G L T V R R S T R
E F G L L L L F L C V A V T L F S P L V H L A E S E L T G V Q D F S S I P A S Y W W A I I S M T T V G Y G D M V P R S I P G Q V V A L S S I L S G I L I M A F P A T S I F H M F S R S Y
Q E L K Q E H D R L F K E E C A A A A A A T T G L E E E Q D G G W A F P P P R L V L T P D T E T A G S C E D L S L L G N G G E T S G N N K H P L P A G A F

>35KV6

MYQEVAFLAGSTDHQFTSFHFNPLENKHEISSKKG VYKRAQVQRKATAQEDEVHRNRGAGADEGSLFDRTAI INVGGIRYRIPWSTLEEFPL
LTRLGRLHNCNNAE I L D L C D D Y D A R C N E F F D R S P S A F R S I V T F L A A G K L R L L R E M C A L S F Q E E L S Y W G V E E A S L E W C C L R K L R L R Q E E Q R
E R L R L E E E E A E L T S P H S C E E A P A V G S P E E G R L S G C M H S L R D M V E N P H S G I P G K I F A C L S V V F V A I T A V T L C V S T M P D L R E E E E R G E C S Q R C Y
N I F V L E T V C V G W F S L E F L L R F I Q T Q S K C T F L R T P L N I I D V V A I L P Y Y I T L I V D S M S V G D R P A G S G N N Y L E K V G L V L R V L R A L R I F Y V M R L A R
H S L G L Q T L G L T V R R C T R E F G L L L F L C V A M A L F S P L V F L A E S E L G A K Q E F T S I P G S Y W W A V I S M T T V G Y G D M V P R S I P G Q V V A L S S I L S G I L
L M A F P V T S I F H T F S R S Y L E L K E E Q N R A T R H K P D S Q D S T K S Q N S E D S Q D T D S S I H G I T E T T A V S A L H R R S V A V A S Q G A P Q L R R S L K S

>47KV6

MEPWPCSPGGGGGTRARHVI INVGGCRVRLAWAALARCPLARLERLRACRGHDDL RVCQSWSTAPSQFFFHKIPPRSPVSLAAVQPCRA
GVIRLLQGPCMLSPSPRGYWGVARAEQGC V H E T R T R R H E K G T E A R K Q P T R T A T A G A R S I P P R P L G P R G R A R L C A N R L Q T P E K V P S P H L G L
A G I I G A C H H T Q L I F V F L V E T G F C R A S L P P T R V G T G Q E E G G E C S P K C R S L F V L E T V C V A W F S F E F L L R S L Q A E S K C A F L R A P L N I I D I L A L L P
F Y V S L L L G L A A G P G G T K L L E R A G L V L R L L R A L R V L Y V M R L A R H S L G L R S L G L T M R R C A R E F G L L L F L C V A M A L F A P L V H L A E R E L G A R R D F
S S V P A S Y W W A V I S M T T V G Y G D M V P R S L P G Q V V A L S S I L S G I L L M A F P V T S I F H T F S R S Y S E L K E Q Q R A A S P E P A L Q E D S T H S A T A T E D S S Q
G P D S A G L A D D S A D A L W V R A G R

>56KV6

MKAGEVREKRLSLSRCKLGIQLLRRNRLSPLTGYSLSAEAIHRHSSTTTGEVGARGRSPSHWGSDDRCDRALTEAKPPRAKGGGPNFSPPA
TLNCSGLSFTAGESSTTERS SRPSGAFSAHRPRIGRSPRPAALSQVVS GPPLWGGSRCQRPDLLTFVSFLLLLLGRRRWPAGARLKGPS
DAPGREPSAMPAGARESTEQGI ESPEFSGSGEAPT LKGLYYQRARKVWPEDEGGTAADPQQEILVNVGGIRYLLPWSTLDQFPLTRLRSL
LKSCRSHHEEIIQLCDDYDEARGEFFDRSPGAFGTIVSFLAAGKLVLFREMCALAFGEELSYWIEEARLERCCFRLLRKAEEAEEAGREE
ELRRQREGGGPGGHQTRWDLFRSRLRDVDDPRSPGAGKVFACLSVLFVATTAVSLCVSTMPDLRAEEDRGECSQKCYLFI VESVVCVAVF
SLEFCLRFI QARSKCQFFRGLPLNI IDILAISPYYVSLVSDDEPGAGKEKASANSYLEKVG L V L R I L R A L R I L Y V M R L A R H S L G L Q T L G L T V R
R C T R E F G L L L F L C V A V T L F S P L V Y V A E N E S G R V L E F T S I P A S Y W W A I I S M T T V G Y G D M V P R S V P G Q M V A L S S I L S G I L I M A F P A T S I F H T F
S H S Y L E L K K E Q E R L Q V R L N R L N A S R A S E N E M L G E M D N L I S E G P A S P V T S S S Y L K T T H S F F R R R L F K R V E V K K Q N S L P H N D V A L S C C H

>58KV6

MVSRDSGVTEGSPSPSPDPGEDVKAQNLLPGDNSDYDYSALSCASDASFHRTFFPQRQSLKGAFYRRAQRLRPQDEPRQGGQPEDRRRI
I INVGGIKYSLPWTLEEFPLTRLGQLKACTNFDDILNVCDDYDVTCEFFDRHPGAFGTIL TFLRAGKLRLLREMCALSFQEELLYWGA
EDRLDGCKRRYLRKMEEF AEMVEREDEDALDSED R D S E D L A E G K G R L G R C M R R L R D M V E R P H S G L P G K V F A C L S V L F V T V T A I N L S V S T L
P S L R E E E K G Q C S Q M C H N I F I V E S V C V G W F S L E F V L R L I Q A P S K F A F L R S P L T L I D M V A I L P Y Y I T L L V D G A A G R R K S G A G N N Y L D K V G L V
L R V L R A L R I L Y V M R L A R H S L G L Q T L G L T A R R C T R E F G L L L F L C V A I A L F A P L L Y V I E N E M A D S P E F T S I P A C Y W W A V I T M T T V G Y G D M V P R
S T P G Q V A L S S I L S G I L L M A F P V T S I F H T F S R S Y L E L K Q E Q E R V V F R R A Q F L I K T K S Q L S M S Q D S D I L F G S A S S D T R D N S

>60KV6

MSVCTFIT SAPLDIHPREKRMSAQICAASAASCFAIAPDWKALMHTPADGGKQEHHPQSVSNEGEQTAMPQTAIGLRGCQAGRARLKGYVW
CAHPVQASECVCEKLEIEGRHQGPLHAWCPVVDVKVCCTAQHPMSTSVIAQTQHS DRAAGLEAKQPPWDICVLPKPPSPEPSLFTLSAD
AR P A P M E A G P L P A F P P A Y I S P Y S P C C L F L P E S S F P A G S V M L E L L R P K P G Q Q E A P A G S H P G P S A R G S E A Q S I S A G R R S C N L T G L A G H R A T P G
P I S H C S E Q E I N W C P A W E Q P L E Y S H L H T L R A L T L V L P S K G L L M T T C S W L E A P V H F L S P T L I L A V L L G V K W G L Q G E C S P K C R N L F V L E T V C V A W
F S F E F L L R S L Q A E S K C A F L R T P L N I I D I L A I L P F Y V S L L V G L A A R P G A G N K L L E R A G L V L R L L R A L R V L Y V M R L A R H S L G L R S L G L T V R R C
A R E F G L L L L F L C V A M A L F A P L V H L A E R E L G A R R D F S S V P A S Y W W A V I S M T T V G Y G D M V P R S L P G Q V V P L T S I L S G I L L M A F P V T S I F H T F S R
S Y S E L K E Q Q Q R A A S P E P A L R E D S T R S A S A T A T E D S S Q G P D G A G P G G D S E D G P W A Q A G P A

>76KV6

MTKKKPSLPRNRWKGIELGHSLESAESKPVTTRRPRDSRASHPGPAAKPTASAWSPPGFTD GAPPLL VQPCSEPVQRGRVAETHPASE
GPASRRRVGCQGVSSSEVVI TEPELLESEQLRRRPGDLRCWPSPDLQGPQCPQNLVLEPGLQPFVSGGDTLVHTTPAPTAPPETAEGGRGGG
RDSFPFPFAEVS V A P S R T K V C S K T Q C L Q E G D L S S Q Q R S P N I G G G P P T K D E P D A G K P A G G Q P P W S L D P E I W R G F S S F Q G A G R S S T K V P S F
G S I R D F H T Y I P A V L S A L G W V S C A C T V W S H G T L A F F P P D A S G E L S Y L V M T P K I I P G L P D A P G G R A Q P P D P G A A H G A M A L L P G A E R R G G G G A
R A R H V I I N V G G C R V R L A W A A L A R C P L A R L E R L R T C R G H D E L L R V C D D Y D V S R D E F F D R S P C A F R P G G R L A R G R R R L R D V D D P R S G P A G K L
F A C V S V A F V A V T A V G L C L S T M P D I R A E E E R G E C S P K C R N L F V L E T V C V A W F S F E F L L R S L Q A E S K C A F L R T P L N I I D I L A I L P F Y V S L L V G L
A A R P G A G N K L L E R A G L V L R L L R A L R V L Y V M R L A R H S L G L R S L G L T V R R C A R E F G L L L F L C V A M A L F A P L V H L A E R E L G A R R D F S S V P A S Y
W W A V I S M T T V G Y G D M V P R S L P G Q V V A L S S I L S G I L L M A F P V T S I F H T F S R S Y S E L K E Q Q Q R A A S P E P A L R E D S T R S A S A T A T E D D G S Q S P
D G A G S A G A S A E G P W A P A G P T

>84KV6

MALLLGHAEPPVGGRCRRLERLRALPRHDELLRVCDRLEPRRVFRRLAARAPFRAIVALLRAGKLRLLRGPCALFRDELAYWIDEARM
ERCCMRLLRREEEAAEGLRQRGRRLRDVVDNPHSGLAGKLFACVSVSVAVTAVGLCLSTMPDIRAEERHFSSVANHSDLKFLSMHKAQ
EAFNQGLVFDHPDVRPYIGCPGKKQSPSAWGLVTRVPVLQLLQLTKGLSCGQLLEEATPPLCSQARPPHRCPMNIWTGSLASAAIGPNSHR

IIGGEQCLLRNWMWPGDTHLEDLDTVERWAPAAVSVPTHELHAPSVPGAAVQLGWCEHPRAGWRPEQAVRPPAGDLPAGPPAVRGASKWAVQD
QPVALPHSRNLLCVPSVSTQGGQERVGQAAAVTPWQSRFCRLHPISLDICSAEGISRSIRITQETVSSSWTLLGCCSVHVPVAHMAGLQRHS
SCPPPQPPQILRVATGPSEHIQAHAWSEELQFGKQEPWRKAGEAAEPPWLELATTVSAELPSTAPGAPSVQHHGAQTAPGLPQSNTEHRR
PRGSLSPIPWSTDALGLPQSNPTEHRRPGAPSVQHHRQAQMAPGAPSVQHHGAQTPVGLPQSNPTEHRQPRGSLSPTRSTDGPRGSLSPIPQ
STDGPGAPSVQHHRQMPQGLPQSNPTEHRRPRASLSPTPRSTDAPGGSLSPTRSTDSPGAPSVQHHRQAQTPPGLPQSNTEHRRPRGSL
PTPRSTDSPGGSLSTPWSTDGPGGSLSPTRSTIDDPVGGPPWKQNALYLQAQDRHELTRVGRKLTGMSASVQIIQMSTFSFHAKDCGCFGTA
CSLARI

(6) The subset S_6 contains 40 Kv7 subfamily proteins

>39KV7

MSQASQEDNDGGDLLSPESPMTDGMILARMPWHPGLIGNWNTVKSVCMSLNGDETDQAAPSDEQQEAGSSSAIGQESRKTVVFEQPDIGF
PSEHDQLTTLHDSEEGNRKMSLVGKPLTYKNYRTDQRFRRMKNMHNFLERPRGWAATYHLAVLFMVLMLCLALSVFSTMPDFEVNATIVLY
YLEIVFVIWLATEYICRVWSAGCRSRYRGISGRIRFATSAYCVIDIIVILASITVLCIGATGQVFAASAIRGLRFFQILRMLRIDRRAGTWK
LLGSVVAHRQELLTTVYIGFGLIFSSFLVYLCEKNTNDKYQTFADALWWGVITLSTVGYGDKTPETWPGKIIAFCALLGISFFALPAGI
LGSFALKVQHQKHLIRRRVPAAKLIQCLWRHYSAAPESTSLATWKIHLARELPPIVKLTNGSNATGLINRLRQSKRTPNLNQNL
AVNSQATSKNLSVPRVHDTISLVSSTISEIEQLGALGFSLGWSKSKYGGSKKATDDSVLQSRMLAPSNAHLDEEEAVGYQPQTEEFPA
LKNCVRAIRRIQLLVARKKFKEALKPYDVKDVIEQYSAGHVDLQSRVKTVAKLDIFCGKNIKIEPKISMFTRIATLETTVGKMDKDLDM
VEMLMGRQASQRFVSNQTSRPFGEFSEPTARSQDLTRSRSMVSTDMEMYTARSHSPGYHGDARPIIAQIDADDDEDENVFDDSTPLNNGP
TSSC

>51KV7

MVNSERRDSQPLAWYAAQTGDLRVPAAWEECRSRALPSTPACASVSALGAQNSASSRWRPPLGRALSLPEQHAGLNMSIRGMQPVLSDEGG
VPPAIAYLIFNVLNKPVLLILYLPRLMALLLLEVRSAAGMTLTRGSPGIRPPKPRPPAACAVAVSLLPGSSEPTDRPGLMISVCGEKDG
EDPGARSEDRLHLSTVRGVSRCFTFAASITWTEKLELGGVTVGAETGVHPDATATTSKLGPAVWAEACGVQNLDRRVEGLERCEPPSSR
MSSKRSACWFSSLLGVQVHTPQCDLGTGGRDSGASDTNEPCVPPIHLETKGLAPPAGGFVQLAGFSFLIVLVCLIFSVLSTIEQYVALAT
GTLFWMEIVLVVFFGTEYVRLWSAGCRSKYVGIWGRLEFARKPISIDLIIVVLAASMVLCVGSKGQVFATSAIRGIRFLQILRMLHVDROG
GTWRLGSGVFIHRQELITTYIGFGLIFSSYFVYLAEKDAVNDSGQVEFGSYADALWWGVVTVTTIGYGDVQPTWVGKTIASCFVSFAI
SFFALPAGILGSGFALKVQKQKQKHFNRQIPAAASLIQTAWRCYAAENPDSSTWKIYVRKPARSHALLSPSPKPKKSVMKRKKFKQDKDN
GVSPGEKMLTVPHITCEPVEERRPDHFSVDNCDSSVKKSPMLEVSTAHEMRTNSFAEDLDLEGETLLAPITHVSQLEHHRATIKVIRRM
QYFVAKKKFQARKPYDVRDIEQYSQGHNLNMRVRIKELQRRLDQSIGKPSLFSVSEKSKDRGNTIGARLNVRVEDKVTQLDQRLVLTDM
LHQLLSLYHGGPPGRRPSSGSGVQVVPCCSSINPELFLPSNTLPTYEQLTVPRRGPPEEGS

>53KV7

MAAASSPPRAERKRWGWRLPGARRGSAGLAKKCPFSLELAEGGPAGGALYAPIAPGAPGPAPPASPAAPAAPPVADLGPVPPVSLDPRVS
IYSTRPVLARTHVQGRVYVFLERPTGKCFVYHFAVFLIVLVCLIFSVLSTIEQYAAALATGTLFWMEIVLVVFFGTEYVRLWSAGCRSKY
VGLWGRLEFARKPISIDLIIVVASMVLCVGSKGQVFATSAIRGIRFLQILRMLHVDROGGTWRLLGSGVFIHRQELITTYIGFGLIFS
SYFVYLAEKDAVNESGRVEFGSYADALWWGVVTVTTIGYGDVQPTWVGKTIASCFVSFAISFFALPATAWRCYAAENPDSSTWKIYR
RSHTLLSPSPKPKKSVVKKKFKLKDNGVTPGEKMLTVPHITCDPPEERRLDHFSVDGYDSSVRKSPTLLEVSMPHFMRNTNSFAEDLD
GETLLPTITHISQLEHHRATIKVIRRMQYFVAKKKFQARKPYDVRDIEQYSQGHNLNMRVRIKELQRRLDQSIGKPSLFSVSEKSKDRG
SNTIGARLNVRVEDKVTQLDQRLALITDMLHQLLSLHGGSTPGSGGPPREGGAHITQPCGSGGSVDPELFLPSNTLPTYEQLTVPRRGPDEGS

>60KV7

MTPGGVWWAGPGRGPHHTCFVALGREPWTRPSASALCPRDPPSDSPSRPPGWRVARGPLPLPETRGPVVRPPCPPGGLVAEARRRSR
RPLQREARAWFLVFSCLVLSVFSSTIKEYEKSEGALYILEIVTVVFGVEYFVRIWAAGCCCRYRGRWGRLEFARKPFCVIDIMVLIASIAV
LAAGSQGNVFATSALRSLRFLQILRMRDRRGGTWKLLGSVVAHSELVTAWYIGFCLILASFLVYLAEKGENDHFDYADALWWGLIT
LTTIGYGDVQPTWNGRLLAATFTLIGVSFFALPAGILGSGFALKVQEQHQKHFERRNPAAGLIQSAWRFYATNLSRTDLHSTWQYYERT
VTVPMYRKEPQPEPSPSKVSLKDRVFSRPGVAAKGGKSPQAQSVRRSPSADQSLSDSPSKVPSKWSFGDRSRARQAFRIKGAASRQNSEG
SLPGEDVAEDNKSCNCFVTEDLTPGLKVSIRAVCMRFLVSKRKFESLRPYDVMVIEQYSAGHLDMSRIKLNQSRIDMIVGPPPSTP
RHKKYPTKGTAPPRESQYSPSGRGEGERALGGESAEANFGGPPPPWDDSDGGDLSPVGSRSRSLVHESMQLLEHEAVAWLTREPLFCF
TQQPEQSPEPCSPPEADGRVPGPPISRPLDLLGAADLVQVPLQVLSMEKKLDFLVNIYMRMGIPPTETEAYFGAKDPEPAPPYHSPEDSR
EHGDRNGCIIKLRSSGGQKNFSAPPAGPPAQCPCPSTSWQQQCHPRQGHGTSVPGDPSGLVRIPPPAAHERLSAYGGGHRASTEFLRPEG
ALRSDSTISIPVDHEELERSFSGFSISQSKENLDALNSCYAAVAPCAKVRPYIAEGESDSDSLCTPCGPPRSATGEGPFGDVGWAGRP
K

>61KV7

MVQKSRNGGVYPGSGEKKLVGFVGLDPGAPDSTRDGALLIAGSEAPKRGSIKPRAGGAGAGKPPKRNAYFRKLQNFVLYNLERPRGWA
FIYHAYVFLCISCVCLVTSTAGDWESVENREGRLLEIVTVVFGVEYFVRIWAAGCCCRYRGRWGRLEFARKPFCVIDIMVLIASIAV
LAAGSQGNVFATSALRSLRFLQILRMRDRRGGTWKLLGSVVAHSELVTAWYIGFCLILASFLVYLAEKGENDHFDYADALWWGLIT
LTTIGYGDVQPTWNGRLLAATFTLIGVSFFALPAGILGSGFALKVQEQHQKHFERRNPAAGLIQSAWRFYATNLSRTDLHSTWQYYERT
VTVPMYSSQTQTYGASRLIPPLNQLLELRNLKSKSLAFRDKPPPEPSPSKGSPCRGPLCGCCPGRSSQKVSLLKDRVFSRPGVAAKGGKSP
QAQTVRRSPSADQSLSDSPSKVPSKWSFGDRSRARQAFRIKGAASRQNSEEASLPGEDIVDDKSCPCFVTEDLTPGLKVSIRAVCVRRLP
GARHRAFLPPRDYSDGGSLSGKSDWLRGRSVPRVDQIVGRGPAITDKDRTKGPAEAELEPEDPSMMGRLGKVEKQVLSMEKKLDFLVN
IYMRMGIPPTETEAYFGAKEPEPAPPYHSPEDSREHVDHRGCIKIVRSSSTGQKNFSAPPAPPVQPCPSTSWQPQSHPRQGHGTSVPG

DHGS LVRIPPPAHERSLSAYGGN RASMEFLRQEDTPGCRPEGLRDS DTSISIPSDHEELERSFSGFSISQSKENLDALNSCYAAVAP
CAKVRPYIAEGESD TSD LCTPCGPPRSATGEGPFGDVGWAGPRK

>66KV7

MVQKSRNGGVYPGSGEKKLKPPKRN AFYRKLQNF LYNVLERPRGWAFIYHAYVFLLVF SCLVLSVFSTIKEYEKSSEGALYILEIVTIVVF
GVEYFVRIWAAGCCCR YRGRWGR LKFKARKPFCVIDIMVLIASIAVLAAGSQGNVFATSALRSLRFLQILRMIRMDRRGGTWKLLGSVVAHS
KELVTAWYIGFLCLILASFLVYLAEK GENDHFDTYADALWWGLITLTTIGYGD KYPQTWNGRLLAATFTLIGVSFFALPAGILGSGFALKVQ
EQHRQKHFEKRRNPAAGLIQSAWRFYATNLSRTDLHSTWQYYERTVTVPMYSSQTQTYGASRLIPPLNQLLELRNLKSKSLAFRDKPPPEP
SPRSVPPAATLVSAVCTAVWSLSHTCAQPVMEIKGSPCRGPLCGCCPRSSPRGVAAGKKGSPQAQTVRRSPSADQSL EDSPSKVPKSWSG
DRSRARQAFRIKGAASRQNSEEASLPGEDIVDDKSCPEFVTEDLTPGLKVSIRAVCVMRFLVSKRKFESL RPYDVMVIEQYSAGHLDML
SRIKSLQSRQEPRLPVQQTTRTGIDMIVGPPPPSTPRHKKYPTKGTAPPRESPQYSPRVDQIVGRGPAITDKDRTKGPAEALPEDPSMMG
RLGKVEKQVLSMEKKLDFLVNIYQRMGIPPTETEAYFGAKEPEPAPPYHSPEDSREHVDRHGCIVKIPQSHPRQGHGTSVPGDHGSLVRIP
PPPAHERSLSAYGGN RASMEFLRQEDTPGCRPEGLRDS DTSISIPSDHEELERSFSGFSISQSKENLDALNSCYAAVAPCAKVRPYIA
EGESD TSD LCTPCGPPRSATGEGPFGDVGWAGPRK

>89KV7

MPLSKIRKCPQLACMPFKPSVLILHFLFICFLPEEGTPVSQPELVPKIQTHSSMWSKIGVVFSSSESGFPHPSPDFSPDLLRASPV SADGD
LRFLGPHPLKLYLQGLPMSFGDACIWPSP TQLNGLEHPPFPQHNRSADQPSWAFRFRSPYLLQEVFPNPSFLLVFGCLILSVFSTIPE
HTKLASSCLLILEFVMI VVFGLEFIIRIWSAGCCCR YRGRWGR LKFKARKPFCVIDITVLIASIAVVS AKTQGNIFATSALRSLRFLQILRMV
RMDRRGGTWKLLGSVVAHSKELITAWYIGFLVLI FSSFLVYLVEK DANKEPSTYADALWWGTITLTTIGYGD KPTLTLWGRLLSAGFALLG
ISFFALPAGILGSGFALKVQEQHRQKHFEKRRNPAANLIQCWRSYAADEKSVSVATWPKHLKALHTCSPTKKEQGEASSQKLSFKERVLM
ASPRGQSVKSRQASLGDRRSPSTDITAE GSPTKVQKSWSFNDRTRFRPSRLKSSQPKPVVDADTALGTDVYDDKGCQCDVSVEDLTPPLK
TVIRAIRIMKFHVAKRKFETLRPYDVKDVIEQYSAGHLDMLCRIKSLQTRVDQILGKGQITSDKKSREKITAEHEATDDL SMLGRVVKVEK
QVQSIEAKLDCLLDIYQQVLRKGSAPALALAPFPSPPFCEQTSQDYQSPGDGRDLSGPAPGGGLPRSASAGLARGLLILAPSELGAQALYA
FSPAPTAPGSPGDGPAAPRGLAPPAASALRVQPPLVGLQPHGAPAGEALPELSARLAPAKDRLPARERALRQSLDLGGAALLSVRPA
VPQDPGRSVSAQNLARSTEDLDVQLSGSESSGRSGSQEFYPKWRESKLFISDEEAA SPEDTGTDALDAVPPAREPAPADSLRTRGRSRSSQS
SCPAAGGADALGRPHVRLK

>90KV7

MRVLLGTGLPLLPREYAQQAAALVGLAVGSGVAPPFRPPSMGTROHLHTFRLARCSPPFRPQRFQLLIWKRKKK PAGRGRPQGGTTPSPPEEP
RLLSASSVSRSEPKSFCNPSE RDSSEPDCLQAAL ESYGAEGTLAVTEMSPTFSVQTGKLRPHGGFTPSPEPQHRPLAQRSGGRSSPGKLA
GSFLLSTSTALSALDPSLPVALQTFLLVFSCLVLSVLSSTIEHQEFANEFLLILEFVMI VVFGLEYIIRVWSAGCCCR YRGRWGR LKFKARKPFC
VIDIFV FVASAVIAAGTQGNIFATSALRSMRFLQILRMV RMDRRGGTWKLLGSVVAHSKELITAWYIGFLVLI FASFLVYLAEKDANSDF
SSYADSLWWGTITLTTIGYGD KPTLTLWGRVLAAGFALLGISFFALPAGILGSGFALKVQEQHRQKHFEKRRNPAANLIQAAWRLYSTDASR
AYLTATWYYDSLLPSFRELALLFEHVQRARNGGLRPLEVRRAPVPD GAPSRYPPVATCHRPGSASF CGESSRMG IKDRIRMGSSQRRTGP
SKQHLAPPPMPTSPSSEQVGEASSPTKVQKSWSFNDRTRFRASLRKPRTSAE EGPSEEV AEEKSYQCELTVDDVMPAVKVMVIRSVRILKFL
VAKRKFETLRPYDVKDVIEQYSAGHLDMLGRIKSLQARVDQIVGRGPGDRKAREKGDKGPSDTEAVDEISIMGRVVKVEKQVQSIEHKL DL
LLGFYSRCLRS GTSVSLGTVQVPLFDPDITS DYHSPVDHEDISVSAQTLSISRVSSTNMD

>92KV7

MPKYVALSVDFQHPNVCYQLTRLNGNKVTLGAHIVAISMHSLTIDDAEDSETEVSDNIRRRSTINLGNQRQRNLRIRLKVYNFLEKPLNAA
SAPYHFFIFGLVIANIILGAATNDNDSTVSKIHFFLEIFMIVFFILEFAVRLWSVRADAKYRKYGRLYL FHTVTLIDILIPATILLV F
KGHDV DGS TDLTRFIQILRLFHVDRQMATWKLRRMIILGKWL MATYIITLVVGLSLATIVYSTEALAQIQDNGYGLIVPEGTNATFPT
MAHSWFTAVTVMTVGYGDIYPV GALTKFLVCVLGFI AFCTFQAANTQISVGLTLMMEENKNQQTNRNLRLNLAASTIQCWWR YHLATNWKPP
RRYTYFVHV CYKLYTEERINQNRVLA KKLREKLEKRRPKKKSLTHQNSVTAELKFGFGMAKPMLEKQDSFDKAERKISLRTRKRVL F
AEARNSSVETSMSSSDVSELETQFEITNFLEQNVDELSSKEVDISLLIKYRPLRFYFVVMFRFIMNKFHTQRIAGQLLMIEAEIAERENQ
RNQKMKLEAAILELTGKPTVSPFDDSGQKLSIERLEFCEKRMEDLERKTALNEITIKCLNLMMDTQEAASRTKDEQLP KPPSANNK
KQRTIGPRRQVTIVDQYDTLDDCETVSLDRV

>93KV7

MNHEPEGRGSHQLRHPRAGAFVRSALANPTTWILPLKPRIRGEAPTPTQARGAGLCGR LAHCLAVTGTAAAQEIRGPQTRGGGRWEEAGR
RRPGLP RRGGMGPHPGDAAAAGDEERKVLAPGDVEQVTLALGAGADKDGTLLEGGGRDEGQRRTPOGIGLLAKTPLTRPVKRNNAKYR
RIQTLIYDALERPRGWALYHALVFLIVLGLCLILAVLTTFK EYETVSGDWLLETF AIFIFGAEFALRIWAAGCCCR YKGRWGR LKFKARKP
LCMLDIFVLIASVPVAVGNQGNV LATSRLSLRFLQILRMLRMDRRGGTWKLLGSAICAHSKELITAWYIGFLTLILSFLVYLVEKDVPEV
DAQGEEMKEEFETYADALWWGLITLATIGYGD KPTKPTWEGRLI AATFSLIGVSFFALPAGILGSGLALKVQEQHRQKHFEKRRKPAELIQA
AWRYATNP NRIDL VTRWFYEVSVFPFRKEQLEAASSQKGLLDRVRLSNRGSNTKGLFTPLNVDAIEESPSKEPKPVGLNNKERFR
TAFRMKAYAFWQSS EDAGTGDPTAEDRGYGNDFPIEDMIPTLKAATRAVRILQFRLYKFKFKETLRPYDVKDVIEQYSAGHLDMLSRIKYLQ
TRIDMIFTGPPSTPKHKKSKQGS AFTFSPQSPRNEPYVARPSTSEIEDQSMGKFKVVERQVDMGKLDLFLVDMHMQHMERLQVQVTEY
YPTKGTSSPAEAKKEDNRYSDLKTICNYSETGPPPEPPYSFHQVPIDKVSPYGF AHDPVNLRGGPSTGKVAAPPSSATTYAERP TLVLP
ILTLLDSRVSCHSQADLQGPYSDRIS PQQRRI TRSDTPLSLMSVNH EELERSPSGFSISQDRDDYVFGPNGGSSWMREKRYLAEGE TDTD
TDPFTPSGSMPLSS TGDGIDS SVWTPSNKPI

>98KV7

MKNKGLLASLAASSKLSQIADNIQKDLRSKARGIALLATETRAWLHVNYGMALARPVDGSKPPPNDGADGEVKASWRSIISHYRQALWLL
MTESDSSNAAYAVSMLVMGAILLSTVAFCLETVPAYSEDRNRAADQTFMI IETVTVQIFAADYLLRLISSPNVQFI IAPLNIIDLVSIVPV

YIEKLSGSALQGTAVFRVLRLLRVFRVLKLGARYRKLIVTTAFKSLDMLLLMSFFVGLIVVVAATLLFFAERGDYDEALGYVVRTHEKY
TQADGDPVSPFESIPSGFWAIVTLMTVGYGDVPLSVGGRFVACATMLCGLLAIALPVAVIGTNFASEWESYKRRRGGSGQTTSPHDEL
TEALDAHVSTVTDVEDMLESVAKLADMQSEVRERGERLRISEMEALLRQRGASMTVKQVEAVREVVSCLCRLGMEPQSQLFHQYSMRPHGS
GTGSGGMEQQQPKPHQNEGDVLEMPQAQQQDLQSKTSGDQNPVSSRSVFAVDASSAGRTGTGDGMDPSTGGVIGRHTSGVHGAAS
LRVLRSMNVAAVTGAAPHAADASVRPNAAAAGVDTAAADTSVRSAAAGTVPPGVYNGLGGVGVHGWKDSGAAAGADPRLPEPRAALANKIKEC
LDLLVDTPMYERMIEELNEALALEEEVYGLWSQLVKVLRVAVALLTGGLLPEELDMRSQYRQLVTLGKEVSY

>99KV7

MVNNIETGLPNGDPSHAFAARQSAKAVGRSGEDANGLDEEHPGATDAQSQKRLALKQAVESLSVPTRKYLHVNVQGGKIPVWMDWDKQPE
LNKWNYYKDRHLTMTDASSVWALVVSVMVITILVSTTSFCLETIPSFSEDRNPSAARTFTLIETVTIQIFALDYLLRFFSAPVVKLFLI
EPFNIIDIISIVPWYIITFVGADFNGTTFVRVARLFRVFRVFKLGGRYGKLLVVLGALRKSMDMLFLMVFFISLCIVFFSTLEYAERGDWD
EELGYVVRPLETQFYDTPPTPKSPFSSIVQGFWWAIVTLMTVGYGDVIPVSAAGKFIASVAMICGVLALPISVVGTFSDNWEAHVAD
ERRRMAVTHRKSLVVTSPALLRLHKLRLHNLHVVDVGLDNRASELALDDAASSIHGRVKATKKHLHTEAKADLRLRKAQKQVDPDTLEYDR
QYGYLPAEHVQCRYREPLPHMADAADQLSRRAFHVMRMSVNAALLDPVLAATVARLAKKHADLQFLLSKFEEKVDPALILEAELSYLQSGV
REAHELNAAVGLMPPPTLTAGASRKVSTDALLTPRR

>101KV7

MDPDNDIYAFYDIREYKKGCRPARPNSNRLVEPRMSLLGKPLQYNRGTRRDVRYRRLQSRLYNFLERPRGLHAIFYHVMVFLMVFTCLALS
FSTIREYEDAVYILFRMEILVVIWFTLEFGARLWSSGCRSRYQGCLGRLKFKRPFICIIDIVTILASIVVLGMDTSGQVAFATSALRGLRFF
QILRMVMDRRGGTWKLLGSVVYAHQELITTMYIGFLGLIFASFLVYMWEKDVNDKFSNFAQALWWGVIITLCTVGYGDMVPIWQGLKIAS
CCALLGISFFALPAGILGSGFALKVQQQQRQKHMIRRRQPAATLIQAVWRCYAADEHSVSATWKIHQVALPSPASRASSFKHNTSFVAR
LPTIRRHKSQTIQQPPGGTPGGSGGGGGGLVKKPSSRASTRYTRTIRDNASVENLEVQNGKSMNPSFSEDSVAETTCLKNIKNSDAK
LRSSAGSLAHYPKRDIEQQQQEIELKEQEKSEDEQPKSMAVSSRTLIPVVLGFLHGDFFGSSLSLRNPRVAPEPEPEPDVEAAELKPYDVKD
QQPPSPSPHSPGGGRTGRFFAAASHFLETGFMPNPQAATSDGARAANEEDEPRCTQLTNRHKTARFIRKLYFVARRKFKALKPYDVKD
VMEQYAAAGHVLLGRVKMLHLRLDQILGKQSGKGDVYASKISLASRVVVERQVADIEEKLDVLIKAYMEDRDRFLALPLPPTAAGVVTAK
ATGNKIHSISPNNKPLATAHHHHLGLNHTMIDVWKRTAQLSVHPEQVAVGAAATAEMALSTQTATTTDAIATQTQMPQPHTQHTATN
TKSSMLNSYQQHNDVFMVDLENRTKKRVTLSLHRSTSEPYKKEQRINIPPEAGGAESLDSSASVKTMPMPDSSIIILIDEYEDFEEDL
NCEGEIDHFPSEIDSDIGAVDDVLMVDADADGDCEDETTALQCATRITAVITPISPVSSAHLNQLSLNDQQTTLNKSNLLPPDSG

>108KV7

MTSGTSSPTDPSLSQRPLLTATIPKKTVEFETMPAKRSDAAAKDPESLTLRQKRGRLTQPRMSLLGRPLNYRASRRDARYRRIQSRV
YNFLERPRGVAIFYHMIIVFLMVFTCLTSVSTIETYEDMTVQVLYTMEFVVIWFAIEFSLRLWSSGCRSRYQYIGRLKFLRRPFCIIDV
ITIVASIVVLVMSRQGLVATSALRGLRFFQILRMVMDRRGGTWKLLGSVVYAHQELITTLTYIGFLGLIFASFLVFLAEKDVKNKNSNFA
QALWWGITLCTVGYGDMVETWQKIIASFALLGISFFALPAGILGSGFALKVQQQQRQKHMIRRRQPAAMLISLWRCYAADEHSLSVAT
WKIHQVPLPSPSRVSSSFKNASVFSRLPTIRRHKSTSLHSPSMHKGPPRSRGSFVDLNASAEINDEDEPRYIQLTNQHGKAIRAIRKMK
YFVARRKFKALKPYDVKDVEQYSAGHVLLGRVKNVQARLDQILGKQSGKAKDVYASKISLASRVVVERQVDDIESKIDQLELYMEDR
KRFLSLPYIQSAEKNTSSSTVNLCSSNMTNPSSTILKPKPILVEKQSSPESSPITKSFKEHSTAATVTKRPMHRGSDLGNRIKKRVTLR
FWLFLHKSAPISPICSSISSNYVCPDGMYSYDGEVVIVVPPINNTPTVSTGASAEQEPDLGSPKATATESSVVTGDHSEIAVWRRGERVMSQD
VDDVAFLTGNEBPAGATKKSLEYENNGVAACSHNRALCIATVVFALLFTIAVIAFTGPQSDCTCAGEKPPNFVDERWNVTKAFPPRATNGQI
FPWNNIRLPTFVRPTRYNITIHPLNLTLEVKQVSEIEFVHEKTRFIVLHKNLTIIGDKMVQDRKGHNLKVVKMLEYTGAAQQLYIEIKDAFR
KRHNYTINFRFTSKLGRFEGFYISSYINKDGERRYLATTHFEPTYARAAPCFDEPNFKAKFKMSIFRDRFHIALFNTPTVINTEDVGFYMG
TGLLRDDFEESVEMSTYLVAFIICDYTHLSRQTRQGVSVSVYTPPPYISQASFALNTTTHILDYFEDFFGVYPLPKQDLAAIPDFATGAME
NWGLITYRETAIYDPIETSTVAHQYVAIVIAHELAHQWFGNLTVMKWWNDLWLNNEGFASYLEYLGVNDLFPWEKMMEQFILDKTQPALALD
ALSSHPISVAVHDPAEIEAIFDTSYSGKAAIYMLSKFLQETLQNLNDYLSYKYSNADTKDLWNIIFSRTNQSLVVRTIMDTWTQQM
GFPLITISREDNEVLVTQERFLLTVESANSSIRNSPKSFYDQWYVFPYTYITNNDTQTVYVWMMNMTDVRFELDPDITWIKANVNSGQFYRV
MYDEAMWRSLVNVLRTNHTVFNPADRANLIDDAFTLCRAGLLNASIPLELSLYLSKERDYVPWATAIEHFQSWSRRLSESLAYKLFKLYMRQ
LLTPVAKYIGWNGKSHLEKLMRTEILSTAICELNETVTRAKQEFQRWMMHNESTPDLKEVVYSAGIKYGGMAEQHWCNLYNSTTIPSE
RKLLKALGVASDPWLLQRYLLETLDNRNMVQKQVIVLAVVAANPEGRLLAWRHLKAYWPTMHSFLGNATFMMGLISAVTAHLSTPYDY
EVSTYFNGMNVGSATRALESLETIKLNINWVSQNEADITYTLRNYVK

>110KV7

MPRNHSDEAGSGLWMNTSPGHHAESYGLHNVECDNRMKNNSRPGDGLLSASHAGTGASGTERDRGKQCARLSLLGKPLVYGTQSGRRNAR
YRRIQNYLVNLERPRSWAFIYHAFVFLVFGCLVLSVFSTIPDHQEMASQSLILEFVMIIVFGLLEYIRIWSAGCCCRYRGWQGRFLRFAR
KPCVIDIIVLIASVAVSAGSQSNIFATSALRSLRFLQILRMVMDRRGGTWKLLGSVVYAHKSELVTAWYIGFLVIFSSFLVYLVEKEF
NKDFATYADALWWGITLTTIGYGDKTPKTWTGRMLSAGFALLGISFFTLGAGILGSGFALKVQEQHRQKHFKERKNPAACLIQCVWRSYAA
DENSVSATWPKHLKALHTCSPTKQDQGESATSQKLSFKDRVMASPRGQSIKSRQTSVTDRRSPGAEISTDGSAPKQKSWSFNDRTRFR
PSLRKLSQSRSTPEGEANTVDEAFDEKGCCHDMSVEDLPSALKTIVIRAVRIMKHFVAKKFKETLRPYDVKDVEQYSAGHLDMLCRIKSL
QTRVDQILGRGQMPVQKVKREKLLSDGDILEDVSMGRVCKVERQVQIESKLDLSDIYRQVLQKGSSTALTFSSLPFGLEENSQYDQSTV
LSKDLSCASQVSQSIGNHPRALQLILAPNELMNLNQNNSSTSSPGLNPASAPFNLSFTFQVPSPTSLECPAQGSPQILNANSFHCSIGH
FVSGVQPPPLSSTTSKYQLSTVPSQAGHARSMPTRSDPADYAKSCFRGVGIDLGLNSSMIKQLQKRNPSAKEDSSWRRHISLDSEVEM
DPLAPVSPVQGGQCSGDRGLGKSLVQDLIQPALEGVGDVTHSSQASFTSISSSQSSAGIEMGAGGWGEADLFISDRDLDTSTKAHN
QGFDFLQAPIDASYSELLRTSTAAGASHSLASGHTSNTGNETINMPHVRLK

>114KV7

MDPENDVYAFYDIRGFKRKCRPAGPNKSQKFLQPRMSLLGKPLNNGRTHRRDARYRRMQSRLYNFLERPRGLHAIFYHVMVFLMVFTCLAL
SVFSTIKEYEEDAVYILFRMEIIVVIWFTMEFGARLWSSGCRSRYQGLGRKFQKPFCCIIDIITILASIVVLGMGTSGQVFATSALRGLR
FFQILRMVRMDRRGGTWKLLGSVVYHRQELITTMYIGFLGLIFASFLVYMWEKDVNEKFSNFAQALWWGITLCTVGYGDMVPIWQGLIA
SCCALLGISFFALPAVKVIRKRLKQKKRQKYSQQIQKAKCFQMQLMFRFIFFIQGDHDDHHAHAHAQARTAGKLTQRQSGQSRVQRGAI
QGRGQLQYANHTRCPLRLSARRFLWLHIFVAQSAHHAHTGPGGGPHERRAVENQLERHSACQSGQCQPQHKSRSYGSFLCGR IAYSAGGQ
RAGIQCGKSCGSIGSRQNAAFASGSDPGQTRLQGGGCLCFKNQLSLACGQSRATVILIDEYEDFEEEDLNCEGEMEHFSPWEIDSDIGADV
VDADGDCDESTEDTALLQCATRTAIVITPISPVSALNLQSLNDQTTTLNKNLLPPDSG

>118KV7

MTSPAHSSTATEASWTAGAADLQMTALHLRNDGVRFPSSVVDPAVITQHPPSHLHPRMSVYSATRPTLSRSFLQGRVYNFLERPTGWKCFV
YHFTVFLIVLSCLILSVLSTIDEYQALANKTLFWMELVLMVFFGVEYVVRVLSAGCRSKYVGLGRFRFARKPISVIDLIVVVASIIVLAFG
SNGQVFATSAVRGRVFLQILRMLHVDROGGTWRLGSSVFIHRQELITTYIGFLGLIFSSYFVYLAEKDAVDDHNGSGFGSYADALWWGVV
TVTTIGYGDQVPTWIGKTIASCFSVFAISFFALPAGILGSGFALKVQQKQRQKHFNRQIPAAAALIQAASWRCFALLNPD SATYKLFVKNL
SSSGSSPKLVKMMRRKMKISDRNNGQNSPAVPSITYDSFDDGRSDRQETLSLQQSVISDGTNTRRYERAPSWNLSLSSFFQFSTPPATKPGV
FEVSSRPTLQRSSSIADMETEPEREIVLIPVAHVSQLRDSHRAAIRVIRMYFVARKKFQARKPYDVRDVEIQYSQGHNLMMVRIKELQ
RRLDHSLGKQSLFQTSSERLKDGTNTIGSRLNRMDEKITHMDRTLNSIAESLNLMLARERRGLDARGKEQRSTMRQSATFSLVLDSSQE
LSTTTAIHEDS

>123KV7

YRRIQLYCYNFLERPRGLAIVYHVALCILVIVSLILTALSTVNIYEALDTPIFIVEIVLVTVFIVEYGLRLWSAGCRSTYVGLRGLNFAK
KTYAILDVLIFFSSIAGLALSTNGSSITVRLVRFPLLRVLRFRDQGSTWKLASVYIHRKELLTTLYLGLIFSLIFASFLVYMVEKDENVK
FDSWPNFVWGWIVTLTIGYGDKTPITWYGRLCASIFAVCGISFFALPAGILGSGFALKVTQQQRQKHFHRRRRPAAILLQVSVRVSCFLTF
IDCRFSSR

>128KV7

MIGPDARTLKAIDKLKTKTTHRHFQQQAYNFLERTGVKCFVYHVLVFMVLIICLIFSVLSTIEGQERNVVKPLLVMEALVIVVFTIEYFV
RLWSAGSIGKYRGLRGLRFARKPICVIDL MVVSASVVILLVGRNGNVFAASAIRGIRFLQILRMLHVDROGGTWRLGSSVYIHRQELIT
LYIGFLALIFSSYFVYLAEPAPESFKNGTSPTGKFRSYADALWWGVVTVTTIGYGDHVPITWLGKVIASCFSIFAISSFFALPAGILGSGFA
LKVQQKQRQKQFNRIIPAAAALIQAATWRCYATSVGTNCSATWRLFKAIGNHRNSDVTNCDEVFIEETQPRPNTTKKSRCALSRHLDIPFR
TRPPLSKEDKQSIPFEIGIDVDENPADGMPESYKNVVRATRRLIYFLAKKRFQSRKPYDVRDVEIQYSQGHANVMRIKELQRRLDLTLG
KSSFTDCQFTAGELGSNSPVNDRQLTTGGRLRLLEKWTETTRDKLDAIFKLEKLEK

>131KV7

MARTDAAYRPRKMSNISALSDADSPFVLPRAQLTVPETTSRMSMDTETEFLLFPKLSISEAEDDISLNMGDGAGRQEPGRCSIGPDT
AETGAKEVTGLLTPEPRRMDGAGRQEPGRCSIGPDTAETGAKEVTGLLTPEPRRNVGNCA PARRSVKQVEF IGLRQLTVEEEYQAA
VARKQGTVGRYALPRMSLLGKPIGYRATRAARYRHFQMMVYNFLERPAGCKTLAYHIIIPDQPGAGGVTHDWGETPQQDSTRTPCDEEWS
NLLTGREAVKTSDDWEDLAPTPKTGAHCWKENIPSKVWFLRGRKRKARKVQSATSAAIPDITVTMAGKRVNWEDSVSQETSNSAETISM
EDMVSERVGGESRASPGSPPPGYDTLLAVKGPQAVEDVVSIGSHSSDQVFADSLTDDVHLCNNVKVDVDPETQLRRRGM LDAEGPGGPPR
MTLLGKPIPHVYHSNKNRRTLYIKTQIFNFVEVPKQLLSKDSSTRTPCDEEWSNLLTGREAVKTSDDWEDLAPTPKTGAHCWKENIPSKV
WFLRGRKRKARKVQSATSAAIPDITVTMAGKRVNWEDSVSQETSNSAETISMEDMVSERVDRVESRASPGSPPPGYDTLLAVKGPQAVED
VVSIGSHSSDQVFADSLTDDVHLCNNVKVDVDPETQLRRRGM LDAEGPGGPPRMTLLGKPIPHVYHSNKNRRTLYIKTQIFNFVEVPKQLL
SKCENGTNATDNSQHNCPKTEEQDKLPNQUALYVMCENGTNATDNSQHNCPKTEEQDKLPNQUALYVMEIIVIVFGMEYILRMWAAGCRSRYQ
TWRGRLRFARRPFVIVLSLGSNGVFAASALRGLRFLQILRMVRMDRRGGTWKLLGSSVVAHRQELTTAYIGFLALIFASFLYLIEKDE
NPEDFGNAKALYWGVIITLLTVGYGDATPDTWLGKLVAVGFSLLGISFFMLPAITMTTVGYGDATPDSWQGLLTVVFLCGISFFALPAGI
LGSFGALKCLWRCYAGDKNSRSIATWPLHRAVPDRKDAAKKSKFSQLSRFSTSSPLARPTVSRLLQGLEVDGVDQQTQVSAESSGST
GRQMSVADSGKPLSGKPKAGVWRRETVNAVMTSYESPGSDKSGLRDKYRVRYTVEDMAGYALSEEYHQPWGLARLSPAHKNAIRAIRKIKY
FVARRKFREALRPYDVKDVEIQYSAGHVDLLARVHLQSRLEILGSSSRSPGHAKDKYANDPKMPLQNRVIRLEKQVHNIDQKLDVILNLM
HQKPPDPGSHGDKIEGDHGNKANSDPVSHGDGANTACHSNQISLIPDSTRSKDCVELQQAPQSGRTRALPRQSATVISESDPSEGDAEETS
CQQDGKEAQDCVETGEETAGNGHQTGNGRAKLSSDSDSLRMLGRETDIV

>132KV7

MTENGHTIDEVSPLGNRPQEYSTGNQQFPETNGGEMAERSDVSRRHFLRKLNSHWIPSPWDVTSVVSEPILKSPGHPTTRTAKSHHKS
SRQARSLKRRVFLCLTEPDTSIASAVFFVVLVISITLNMVMMQTMQAFQFTPTDCRTECGGPVTYLFDNFIAMPDTGAVVECVCPPTPL
GWTVTVLNAMVYFFLTLEWTLRVLTFEPPLNEKAPHGWGFLQWLGHLTSTSTMMDALAIFPYMELTFETNGLMSLRLLRFRVFLVRLGQ
YNSTFTSLINVLQSLLYLKLLGLVLLFGAAFFGSMLYWLEKGDWEYFEGAQSYQFVRYDRNHEPEVSPFTSIPETFWWFLVTATSVGYGDT
VPTTAGKWGVFAMLTSLVLIAPFVSVFSELWQKELRKTGALQALEDDDDDEEDLDPMTLASSRANTFSDSDIKLSVIPETYPPEYRR
QPQGSLESMDNSSSLFCNDGYVRIHKDDLADLLSHVQSIRESRQIRTLMRKYSPKATRR

>134KV7

MSLLGKPLNNGRTHRRDARYRRMQSRLYNFLERPRGLHAIFYHVMVFLMVFTCLALS VFSTIKEYEEDAVYILFRMEIIVVIWFTMEFGARL
WSSGCRSRYQGLGRKFQKPFCCIIDIITILASIVVLGMGTSGQVFATSALRGLRFFQILRMVRMDRRGGTWKLLGSSVYHRQELITTM
YIGFLGLIFASFLVYMWEKDVNDKFSNFAQALWWGVITLCTVGYGDMVPIWQGLIASCALLGISFFALPAGILGSGFALKVQQQRQKHM
IRRRQPAATLIQAVWRCYAADEHSVSVATWN IHRVALPSPASRASSFKHNTSFVARLPTIRRHKSQTIQTPGGGDDGGVSKPPGSSRAST
RYTRTIRDINASVENLDEDEPRCTQLTNRHKAIRFIRKLYFVARKFKKALPKYDVKDVEQYAAAGHVLLGRVKMLHLRLDQILGKQG
SKAKDVYASKISLASRVVVERQVADIEEKLDILIKAYMEDRRFLALPLPAKPKIHSISPSHKPLHHAHNLAMIDVWKRTAALS VHPEQVT

TTPLLNPSAPDSELSRLTATQTPTTTTDAIATQTPMPPHVQHTATNTKSSVLSYQLGSEKQQHNDVFMTELENRTKKRVTLSLHRSTSEP
YSKQEQRITIPDEGADSLSSAKPTPPDSSIILIDEYEDFEEDLNCEGEMDHPPTWEIDSDIGVEVDVDADADGDCDESTEDTALLQCATR
TAIVITPISPSSAHLQLNDQTTTLNKSLLPPDSG

>138KV7

MVKKSSANGEVYLPAGEKKPKVGFVGLDPGAAETS RDGALLIAGSESTKRGSI LCRPRSSI SRGSI AHKRNARYRRLQNFLYNALERPRGWA
FIYHAYVFLVFSCLVLSVFATIKKEYKSSSEALYILEIVTIVVFGVEYIVRIWAAGCCCRYRGRWRGLRFARKPFCIIDIMVLFASVSVLA
AGSQGNVFATSAIRSLRFLQILRMLRMDRRGGTWKLLGSVYVYAHSKELITAWYIGFLCLILASFLVYSVEKDDNAEMFETYADALWWGLVTL
TTIGYGDKFPVTWNGRLIAATFSLIGVAFFALPAGILGSGFALKVQEQRKHFEKRRNPAAGLIQAARWFHATNLSRTDLFSTWDFYAQTV
SVPMYSRNTLLSNLWQLIPPVNLQDILRSLKKGSAFRKDSQIDVTPSSEISHKDTLCCGCPRTNSRKPSVKEKGSPTSSTGGKEARTDGVKE
SPSKVTKSLSFTDRNKAKHAFKMKDGASRQNSEEASLPEDLGDDRGYNCEFLPHLSPGLKVTIRSI CVMRFLLSKRRFKESLRPYDVMVIE
QYSAGHLDMLSRIKNLQIDLIVGPPPPSTPRHKYVNIHQWPSQTRWLYYTALQVDQIVGKGASAGEKDKPKSDTEVPEDPSMMGRNLKME
KEVGAMDKLNFLVSIYTAQMGIPRSETEALLGFKIAYPAPPYHSPDEKSEKVPDEDENKKGKSPSPINPGNGTLTESQCRPSTSWHQQDEH
PLSVPLWNSRGRVSPIGTDDPSLYRLLPPPFHESMDNSRSRRRPVQQAAVESDTSLSIPSDHEELDERSFSGFSISQAREEDYVPPVSL
GPFGGGGTLCTRIRPYLAEGESDTSLSYTPGAPSLSFTGEGTFGDRMWPGMK

>139KV7

MENISTYSRNKKWYKQKFFVYNLLDKPRTKLAYTYHIVILLIIIGNMFLSFASTIPEIKLKFEVQLLLFVYEFVLLIIFIVEYFIRLSVCS
NVMYRGLSGKLIYIRSFYVIDIIVISSIIIVFSNVKSPNLSFLRYVRIFLILRLLRMDRTRGDLHTMWHAIYSHRSELLTCYFSCIVVLL
LGSYAVFLIESNRVPSDGRINMITGLYWGII FTFTTIGYGDYPTHTWYGLITSLMSVGCAPFALPAGILGSGFALQVSKQKKEKGSIKIK
NPAALLIQCAWRGYAVRNPNLATWSYFLMKKVAEKEAEANQKVYASNFIALVPDKEVIEVANQQIKKSKTKALNKPSNDKIMGIKLKN
PKPYSGFEDLIDIFQKNRGSNNWSMDIQIKYKLVYSFMTILKILASKFSFSDTRYPVVNIQVLQTNNTLSCSLSHLREMKSVTGMILSEL
NDLKEIRELKGFKNSQRRLTRCNSENIVS

>141KV7

MSDVQNPGGTPKVARVTFHDVTESSDATERQEPMPQGILRPSNFPFSLKMPFQSLHEDNKSNDSDSIHSLGESEINRRRPSLAVQII
TAPVRVVPNHNHHQEYRKRKMSLHGKPIYFTVPSKRKSRMLQMRIEAYNFLERPFPKPYIFYHTFTFLLVFGCLVLSVLTIPNHMEKAN
KILFIVEVLILILFLELGVRIWSAGCRCRYQGFLGRMRFCKKPLCVIDIIVMSSFFVLCIGSNGHMF AATAMRSLRFLQILRMRMDRRG
GSWKLSSVVRAHSELITAWYIGFLALIFASFLVYQAEKDENSEKETFADALWWGLITLTTIGYGEKVPITWLGRLLIASVFAILGISFFA
LPAGILGSGFALKVQEQRKHFAARRMPAAYLLQCMWRCAADKNSRSVATWPKPLRPQNTGKKSIRDKLSNPSRRLSRRQTFKSRRGGS
SKTTVVSPGGVSEPIPTMLPGYSTSRNEIVKSQSLAERLTDRI SRQNSIRVPWREKVTGADSDSTSSITNLVETGLTELTEQHKVAIRAI
RMMKFFVARRKFKEALRPYDVKDVIEQYSAGHVDMLSRIKLLQNRVDCILGIGTDGGAVGNTRGTRTGEHRGNFPKSPSINSRLHSVEID
VKKVDQKLDQVIQLLTSDDKNGKVRKATVFTQPEIDLEDNAKIKDHRNGKSSAPKWPANTHNKALKATMKPARSWGILPMNDSPDNEACD
ETKESIVISEEPPVATSLLEENKILSEKGRSTSSFSNEPKIKTSDENTLETEEKDNKNTNSNVEGLKKEKKSPPSDCDSFTDNDSCLEH
VEKRETGNTPDGYVSPESIKLLKKHFSKNLLNRRKMGLSKKDRRSVDGVAKFSTNPRLLCDALDRRSWSCDAGDEESKSLVFPFIESP
DWLKFQIKDESSTIVVDELVPVNGELCFWEPLTGSGVDKVEKNHITNNGNLLKDGPNGF TKPHNFAENYP

>144KV7

MSCAGAETAAYPVCNHRGDDQGSTLQLSTLSSGSSKSAVLEVRRLNMQYSPVAVNPSMDKGGPIQSPGEGKKAACSDSAGRTRSTEC
FQSQYLTKTSTQGVYNFLERPSSGWKCFIYHFAVLLVLI CLIPSVLSTIEHYSEFAIGTLFWMEIVLVVFFGAEYVRLWSAGCRSKYIGF
QGRMRFARKPISIDLIVVVASIVLSIGSNGQLFATSAIRGIRFLQILRMLHVDROGGTWRLLGVSFVIFHRQELITTLTYIGFLGIFSSYF
VYLAEKDAVEDGKTFSSYADALWWGVVTVTTIGYGDVPTWIGKTIASCFSVFAISFFALPAGILGSGFALKVQKQKQKHFNRQIPAA
ASLIQTLWRCYAAEKPTSSGTWKIYVVALAQNPKKPPAPSSPRLRQKARRYRRKGLGSGNGSAPVINPEANSLSVPQIYDHDIEQEDRK
DVSFYIDEPKGSVIRMTRVYQALRHL

>147KV7

MKKYFLIVSRKDNWIKIFLLYNILDKTGKSSFIYNIIVFLFLAGAVILHIVSTVNILEENFNLRFAIFVYDFFVLIFFGFEFVIRLFCVSA
NVRYCGIRGLIYIKKVTYLDLILVIVSSVVIIVLHYNESYRGTMHYANYFQILRLVRIIDRTKGHLETMWQAIYSHRSELLTCYFSCISILV
LGTIYIFLMESQSEPTDHSIDNMMNGLYWIVTFTTIGYGDYAPQTWYGLITGLLCMIGCAFFALPAGILGSGFALQVSKKKKKEKGSIKVK
NPAAILIQCAWRNYAVKNLSKATWKYVVISKIAAEKEKANAQKLSRVTTFNSLNTDDHINSAGIIQSSNLTKPKRKDHKEKSKTNGAGQP
NYDTSNYRGISLIRSSDTRIVKSYDNIDHVVSAGIIESSCENLRNRYQIAKFNEKTANKKVTISIDHVNSVDLRLKVENLNIVAVNVKI
EGESENCE

>148KV7

MYLHKFRLKVFYFMERPSSRYAVLYHTLVLLSIMCNALIGIISTIDVYEKSTTVQMLFWKYEIFMLAIFVAELAVRLIVCGVISNYSGFGR
LVFMKNIYMLADIFILSTITSIVIKSNDASLDLRFKFFQCFQMFRI LRDRRRGDILTMLNIREHKKELLSYFVCLNILLFGSYIY
AVEKTHNQSENQIDNMANGLYWGVI FTTSVGYGDYLPKTWAGKILTGFFSAFGCAFFSLPAGIIGSGLAIHVSQRKREQRSMIEKHPACTV
IQTAWRIYAINNLSKSIKIQD

>152KV7

MPRHHAGGEEGGAAGLWVKSAAAAAEGGGRLGSGMKDVESGRGRVLLNSAAARGDGLLLGTRAAATLGGGGGLRESRRKQKGARMSLLGK
PLSYTSSQSCRNVKYYRRVQNYLYNVLERPRGWAFIYHAFVLLVFGCLILSVFSTIPEHTKLASSCLLILEFVMIIVVFGLEFIRIWSAGC
CCRYRQWQGRLLRFARKPFCVIDTIVLIAIAVVSAKTQGNIFATSALRSLRFLQILRMLRMDRRGGTWKLLGSVYVYAHSKELITAWYIGFLV
LIFSSFLVYLVEKDANKEPSTYADALWWGTITLTTIGYGDKPTLTLWGRLLSAGFALLGISFFALPAGILGSGFALKVQEQRKHFEKRRN
PAANLIQCVWRSYAADEKSVSIATWPKHLKALHTCSPTNQKLSFKERVMASPRGQSIKSRQASVGDRRSPSTDITAEGSPTKVQKSWSFND
RTRFRPSRLKSSQPKPVIDADTALGTDVYDEKGCQCDVSVEDLTPPLKTVIRAIRIMKHFVAKRKFKETLRYDVKDVIEQYSAGHLDM

CRIKSLQTRVDQILGKGQITSDKKSREKITA EHEHETDDLSMLGRVVKVEKQVQSIESKLDCLLDIYQQVLRKGSASALALASFQIPPFCEQ
TSDYQSPVDSKDLGSGTQNSGCLSRSTSANISRGLQFILTPNEFSAQTFYALSPTMHSQATQVPMSSQDGSVAATNTVANQINTAPKPAAP
TTLQIPPLPAIKHLPRPETLHPNAGLQESISDVTTCVLASKENVQVAQSNLAKDRSMRKSFDMMGGETLLSVCMPVPKDLGKSLSVQNLIR
STEELNIQLSGSESSGRSGSQDFYPKWRESKLFITDEEVGPEETETDFTDAAPQAPAREAAAFASDSLRTGRSRSSQSIKAGESTDALSLPHV
KLK

>162KV7

MPRHAGGEEGAAGLWVRSGAAAAAGAGGGRPGSGMKDVESGRGRVLLNSAAARGDGLLLGTRAAALGGGGGGLRESRRGKQGARMSLLG
KPLSYTSSQSCRNVKYRRVQNYLYNVLERPRGWAFVYHAFVFLVFGCLILSVFSTIPEHTKLASSCLLILEFVMIIVFVGFLEFIIRIWSAG
CCCRYRGWQGRRLRFARKPFCVIDTIVL IASIAVVS AKTQGNIFATSALRSLRFLQILRMVRMDRRGGTWKLLGSVVYAHSKELITAWYIGFL
VLIFSSFLVYLVEKDANKEFSTYADALWWGTITLTTIGYGDKTPTLWGRLLSAGFALLGISFFALPAGILGSGFALKVQEHRQKHFEKRR
NPAANLIQCVWRSYAADEKSVSIATWPKHLKALHTCSPTKKEQGEASSKFKCSNKQKFFRVYTSRKQSQKLSFKERVMASPRGQSISKRQA
SVGDRRSPSTDI TAE GSP TKVQKSWSFNDRTRFRPSLRLLKSSQPKPIDADTALGIDDVYDEKGCQCDVSVEDLTPPLKTVIRAIRIMKFHV
AKRKFKETLPRPYDVKDVEIQYSAGHLDMLCRIKSLQTRVDQILGKGQMTSDKKSREKITA EHEHETDDPSMLARVVKVEKQVQSIESKLDCLL
DIYQQVLRKGSASALTLASFQIPPFCEQTSDYQSPVDSKDLGSAQNSGCLTRSASANISRGLQFILTPNEFSAQTFYALSPTMHSQATQV
PMSQNDGSSVATNNIANQISAAPKPAAPTTLQIPPLSAIKHLRPELNSNPTGLQESISDVTTCVLASKESVQFAQSNLTKDRSLRKSF
DMGGETLLSVRPMVPKDLGKSLSVQNLIRSTEELNIQLSGSESSGRSGSQDFYPKWRESKLFITDEEVGAEETETDFTDGTTPPPAGEAAFFS
DSLRTGRSRSSQNICTGDSTDALSLPHVKLN

>166KV7

MLAIKVQWKFVKRKGAPAPGFRAQRSPRSVAQHQAAGLGGCEGLRHGYPAQRMVPSDPQNGAAGFGISGGRMVEGFSAQMVPAHSQCCSS
CKLWMTLAALVTQALLVGGKPSLPAMVCAGATVPPSRLQGGQWEKPGQTRAAGGRSPCGSLSAGVGETKRGLWGQMNWPRSAGAASPGSAAF
MFSGRLVQPSDVRWGGLEVTSL E E IREWAGLAGSGERTVLEVLKGGQPCGIRCHPGRLGEDRLSPPELGATPNLGSVALTSNLRLLPQ
EGLRTARALPRDTGYGDKQRRQPACEGRCRGAFLLLCTDVLSLPEHTGLVPPPLKTERNRSLGQAHFMLVITAHVWAQRQGGGGERAPEC
ALACVGFVGLDPGAPDSTRDGALLIAGSEAPKRGSI LSKPRAGGAGAGKPPKRNAFYRKLQNFLYNVLERPRGWAFINHAIVVFLVFSCLVL
SVFSTIKEYEKSSEGALYILEIVTIVVFGVEYFVRIWAAGCCCRYRGRWRGLKFARKPFCVIDIMVLIASIAVLAAGSQGNVFATSALRSLR
FLQILRMIRMDRRGGTWKLLGSVVYAHSKGKRREGSGDEGRPTPLASLGPCVGGDMGVIITLTTIGYGDKYPQTWNGRLLAATFTLIGVSFF
ALPAGILGSGFALKVQEHRQKHFEKRRNPAAGLIQSAWRFYATNLSRTDLHSTWQYYERTVTVPMYRILPPLNQLLELRLNLSKSGLAFRK
EPPPEPSPSQVSLKDRVFSPPRGVAAKKGKSPQAQTVRRSPSADQSLSDSPKVPKSWFSGDRSRARQAFRIKGAASRQNSEEASLPGEDI
VDDKSCPCFVTEDLTPGLKVSIRAVCMRFLVSKRKFESLRPYDMDVIEQYSAGHLDMLSRIKSLQSRVDQIVGRGPAITDKDRTKGPA
EAELEDPSPMMGRLGKVEKQVLSMEKKLDFLVNIYMRMGIPPTETEAYFGAKEPEPAPPYHSPEDSREHVDHRCIVKI VRSSSTGQKNF
SAPPAAPPVQCPPSTSWQPQSHPRQGHGTSVPVDPGSLVRIPPPAPHERSL SAYGGGNRASTEFRLQEDAPGCRPPEGTLRDSDTISISV
DHEELERSFGSFGSISQSKENLDALNSCYAAVAPCAKVRPYIAEGESDSDSLCTPCGPPRSATGEGPFGDVGWAGPRK

>176KV7

MPRHAGGEEGAAGLWVKSAAAAAGGRLGSGMKDVESGRGRVLLNSAAARGDGLLLGTRAAALGGGGGGLRESRRGKQGARMSLLGK
PLSYTSSQSCRNVKYRRVQNYLYNVLERPRGWAFIYHAFVFLVFGCLILSVFSTIPEHTKLASSCLLILEFVMIIVFVGFLEFIIRIWSAGC
CCRYRGWQGRRLRFARKPFCVIDTIVL IASIAVVS AKTQGNIFATSALRSLRFLQILRMVRMDRRGGTWKLLGSVVYAHSKELITAWYIGFLV
LIPSSFLVYLVEKDANKEFSTYADALWWGTITLTTIGYGDKTPTLWGRLLSAGFALLGISFFALPAGILGSGFALKVQEHRQKHFEKRRN
PAANLIQCVWRSYAADEKSVSIATWPKHLKALHTCSPTKKEQGEASSRILSRVTKAKFKETLPSNMDVKDVEIQYSAGHLDMLCRIKSLQ
RVDQILGKGQITSDKKSREKITA EHEHETDDLSMLGRVVKVEKQVQSIESKLDCLLDIYQQVLRKGSASALALASFQIPPFCEQTSDYQSPV
DSKDLGSAQNSGCLSRSTSANISRGLQFILTPNEFSAQTFYALSPTMHSQATQVPI SQSDGSVAATNTIANQINTAPKPAAPTTLQIPPL
LPAIKHLPRPETLHPNAGLQESISDVTTCVLASKENVQVAQSNLTKDRSMRKSFDMMGGETLLSVCMPVPKDLGKSLSVQNLIRSTEELNIQ
LSGSESSGRSGSQDFYPKWRESKLFITDEEVGPEETETDFTDAAPQAPAREAAAFASDSLRTGRSRSSQSIKAGESTDALSLPHVKLN

>178KV7

MGEVQGVVRVMQSCALGVGAGVWGSPPERQSRREWTGVLFPPTGSANADLYFPNPPDVTADTDLCPNPPNPPDADADDFCSPNPPNPPDTV
ADADLCSLNSASYREEFPEAPTAPARAVTWCVSPTCPQPHSPTLAEIVTIVVFGVEYFVRIWAAGCCCRYRGRWRGLKFARKPFCVIDIM
VL IASIAVLAAGSQGNVFATSALRSLRFLQILRMIRMDRRGGTWKLLGSVVYAHSKELITAWYIGFLCLILASFLVYLAEKGENDHFDYAD
ALWWGLITLTTIGYGDKYPQTWNGRLLAATFTLIGVSFFALPAGILGSGFALKVQEHRQKHFEKRRNPAAGLIQSAWRFYATNLSRTDLHS
TWQYYERTVTVPMYRILPPLNQLLELRLNLSKSGLTFRKEPPPEPSPRSVPAPSRPVCCTTCRGGVRASRALPVLPCVTECVSRSLAPGV
SEAEGFCERTPSSCRHIEPTHSWPQLRLAEVKVLRGPLALLLWVQGIWSTWMPACVPV PARALLDFDETLGGSGNHQGGSFILSGRLKDRTR
AQGEPGPHGLCWCCHGRKLRSSASPGCRGVTFSFCHCLPRLPARRLGLAGGVALCPHNGHLSCDLGGLSVLPQVDLQPPIASAGSCVRGC
FEVVTCHVPLLAEGPALRSMGSLAPSTPLLPLGLFSGSHASLVNRDPLAGELGGSSADWFAKRDKCTLSSQMLKAARAEGPCVDAAPD
ALGTAECAVRTDHCTAPLPAPLTTGSGAARGGWRPNPSSDPPTLCLQACAGGSPLLASMAQQGGGICALPTWGPEGGLHAHLHPGRCLR
DPQRQWVWVGLGRLLGLWQVLPFQSI CVQGVSGRRLGAASRQNSEEASLPGEDIVDDKGCPCFVTEDLTPGLKVSIRAVCMRFLVSK
RKFESLRPYDMDVIEQYSAGHLDMLSRIKSLQSRVDQIVGRGPAITDKDRTKGPV EAELEDPSPMMGRLGKVEKQVLSMEKKLDFLVNIY
MRMGIPPTETEAYFGAKEPEPAPPYHSPEDSREHVDHRCIVKI VRSSSTGQKNFSAPPAAPPAQCPPSTSWQPQSHPRLGHTSPVGDH
GSLVRIPPPPTHERSL SAYGGGNRASTEFRLQEDAPGCRPEPALRSDTISISV DHEELERSFGSFGSISQSKENLDALNSCYAAVAPCA
KVRPYIAEGESDSDSLCTPCGPPRSATGEGPFGDVGWAGPRK

>182KV7

MTSGTSSPTPTDPSLSQRPLLTAITP IPKKTVEFETMPAKRSDAAAKDPESLTLRQKGRGLTQPRMSLLGRPLNYRARRDRARYRIQSRV
YNFLERPRGVAIFYHMIIVFLMVFTCLTILSVFSTIETYEDMTVQVLT YMESFVVIWFAIEFSLRLWSSGCRSRYQYIGRLKFLRRPFCIIDV

ITIVASIVVLVMRSRQVLATSALRGLRFFQILRMVMDRRGGTWKLLGSVVYAHRQELITTLYIGFLGLIFASFLVFLAEKDVNKNFSNFA
QALWWGVITLCTVGYGDMVETWQGGKI IASFCALLGISFFALPAGILGSGFALKVQQQQRQKHMIRRRQPAAMLIQSLWRCYAADEHLSVA
TWKIHQVPLPSPSRVSSSFKNASVSRPLTIRRHKSTSLHSPSMHKGPPRSRGSFVDLNASAEENLGGVSNNGSRNLSHSEDSVAETMLSK
KNSDDEDEDEPRYIQLTNQHKGAIRAIRKMKYFVARRKFKALKPYDVKDVEIQSAGHVDLLGRVKNVQARYTLLKYFVARKKFKREALKPYD
VKDVEIQYSSGHADLLNRVKNLQFRLDQILGKQGSKAKDVYASKISLASRVVVERQVDDIESKIDQLELLELMEDRKRFLSLPYIQPSAEKN
TTSSSTTVNLCSNMTNPSSTILKPKPILVEKQSSPSSPITKSFKEHSTAAVTKRPMHRGFSDLGNRIKRVTLRFLWFLHKSAPISPICS
SISSNYVCPDGMYSYDGEVIVVPPINNTPTVGVASAEQEPDLGSPKATATESSGVKCLRNRNCEDEDDAAEKPLLCRSKSTEILITPTTLE
TTREEFYDNKTNQSKNFKLDDV

>183KV7

MAEAPRRRLGLGPSGDAPRAELVALTAVQSEQGEAGGGSPRRRGLLSPLPPGAPLPGLGSGSGSACGQRSSAAHKRYRRLQNVVYNVLE
RPRGWAFVYHVIFLLVFSCLVLSVLSTIQEHQELANECLLILEFVMIIVVFGLEYIVRVWSAGCCRYRGWQGRFRFARKPFVCFIDFIVFVA
SVAVIAAGTQGNIFATSALRSMRFLQILRMVMDRRGGTWKLLGSVVYAHSKELITAWYIGFLVLIIFASFLVFLAEKDANSDFSSYADSLWW
GTITLTTIGYGDKTPHTWLRVLAAGFALLGISFFALPAGILGSGFALKVQEQHRQKHFEKRMPAANLIQAAWRLYSTDMRAYLTATWYY
YDSILPSFREGVDTGHRALVKPRPMAEPRTLECWQCACSPIEAPSEEVAAEKGQYCELTVDVMPAVKTVIRSVRILKFLVAKRKFETLRP
YDVKDVEIQSAGHLDMLGRIKSLQTRVDQIVGRGPGDRKAREKGDGKPSDAEVVDEISMGRVVKVEKQVQSEIHKLDLLGFYSRCLRS
TSASLGTQVPLFDPDITSDYHSPVDHEDISVSAQTLISRSVSTNMD

>192KV7

MNRSEQESLYRTSRKLSLVPISGSSPHAGAPSDLLVLSVLKSPVNHVARDEEAPQVPSEEDCESERLPFLQRLRGRHRPRFGEAHHKRVPTPLK
RKQRFRSHKNDVVQPEDVDEEDVAAPTDEPRGVPDPYPIYLPIDQAFKAKYVFHKKKGTCCQERTYVFLHPPGGWLCFIYHFTVFMVLV
VCLIFSVLSTIDTYQSFANETLFWMEICLVVFFGVEYLRLWSAGCRSKYMGFWGRRLRIRKPICIDLIVVASIVVLTGSGNQVFATSA
IRGIRFLQILRMLHVDROGGTWRLLGSVVFIRHRELITTLYIGFLGLIFSSYFVYLAEKDAGADGKNTGDFSSYADALWWGVIIVTTTIGYG
DTPRTWMGKIVASCFSVFAISFFALPAGILGSGFALKVQQQQRQKHFNRQIPAAAAMLIQCLWRCYAADKSFNSRATWQIYLKDTNGFTNN
SSSGSGTNCNIPLSKVAKKASVLKRRKSRNRMEAPGTPQGDTPVQAVAPNAPSRCESDSDVVFYMEEPKAGTPNRVRRGERESSRGAVTSSQ
TSTVTEAASDDIDDLGELPRVTQLTEAHKNAIRAIRKIKYFVARRKFQARKPYDVRDVEIQYSQGHLLNMMVRIKELQRRLDQTLGKPGSY
LAGIDRVGNVPMPTVGARLYRVEQQLGTMDKKLDALTHILNSLAQKNQAAPLRSIEDDV

>195KV7

MLTTTGYPNGSSLVDDSPQDQDESEHFLLGMVTDGLGKMFNARYRNIKEKKAAMTYRALIYNCLERPTGWKCFLYHFSVFLVLIICLILS
VLSTVEEHSFAEELLYILEIFLVIFFAIEYVRLWSAGCRSKYIGFWGRKFARKPISFIDLVCVVASFTVICFGSEGQVFATSAIRGIRF
LQILRMLHVDROGGTWRLLGSVVFIRHRELITTLYIGFLGLIFSSYFVYLAEKDVGIDGRQAFTSYADALWWGVIIVTTTIGYGDVVPQTM
GRIVASCFSIFAISFFALPAGILGSGFALKVQQQQRQKHFNRQIPAAAAMLIQCLWRCHAAEKRISATWNAHIDPLAHETKETHHGHKHKHQ
SSDDNNVTRKRLFKKQSSLVNTFRKKGSPSADVEMGGINHQRERLLRQERGSDDTDEKRVYRIGTDIEIEYETEEANTPKLRPDTHISHV
CELTEAHRNAIRAIRKVKYFVARRRFQARKPYDVRDVEIQYSQGHLLNMMVRIKELQRRLDQTLGKPGQYDGKSRKGPVITGSRSLRLEL
QMSLDRKVESSNRTLSALYRLMVDNRSLTISPSPPALMSRPVSPANCLSPRDQLSPTSISSQRSGSPSYTLDPNGGWH

>199KV7

MVTDLAHHPLTQKADSELFVVIWFSVEFILRVWSAGCRSRYQGTGRLRFRKPLCLDMIVMAVSVIIAIGTSGQMFASALRGLRFLQI
LRLVRVDRGGTWKLLGSVVWAHRQELITTWYIGFLSLSVLSFLVYNAEMKNEKEDFETADAMWWGLVTLTVGYGDKVPVTVWGLVA
FAIVGISFFALPAGILGSGFALKVQQQQRQKHFLLRRHPAAELIQVSNLSKHGGILGSGFALKVQQQQRQKHFLLRRHPAAQLIQCVWRCYA
ADPCSMVATWPKHLRPVNSPTTNRTPSLISRLSTKRIKIGSPMVRHNPQLQHDALKKSHSHDLVDGDSLKSSLSLHDGNGPLSRNQDSL
YSPKNRDDSDIKEDEPVVPEPQTTEWFTQNTAALKRLLDDDETMGLTRLTEPHKNVRAIRKIKYFVARRKFKAEFRPYDVKDVEIQYSAG
AAEMQFRMKAIQARLDEILGKTEGKNGIELYNTKVPMTIRVIVKVEKNMIDRKLDMLELYREERQEKMKALQQNKHEHDDQNDSDKDTKD
PPSRIRRHGRARLKRKSEGHGAHVDTHEKSERVEFRKLSDSQSPISSSLNLDAPDATTVTVSTALSQPSITTTTESEQGLQLANAKGVG
RGQNIIPDYDSAIDTRV

>200KV7

MSVNEKVIYFGFIHSFAKLNLFASVFGCLILSVLSTINEYAESAGRVLLYMELVILFWFFAEYCLRLWSAGCRSRYQGTWRGRLHFARRPFC
IVDVIIVASVVVLAVDSDRNMFAASALRGLRFFQILRMIRMDRRGGSFKLLASVVWAHRQVYFYSVHFLIFLVEKKENEKIRTYADALWWG
ITLCTVGYGDTVPKTMWGKIIAAFCALAGISFFALPAGILGSGFALKVQQQQRQKHLIRRRVPAATLIQCLWRCYAADPHSSSVATWKIHR
PIRKPVGLTNSYSMTERSGFSRFRFSTLKRRETEKTTSTNTNTNVIPTVSTDYNNETPKSAPVKSEDLVYIYAFINDEDTNELLPI
KVRTPNDRQCATDSLSTSQSEHISISKSGNHSAAQKQNFNSPAMFQHDHPYLCSRGSEVIMHPLTEKEIAVRVIRKMRFFVARRKFKREALR
PYDVKDVEIQSAGHVDMLARVKILQARLDQILGRPGSKGDDVYDHSQCLASRIVKIEHKIDAVEMKLDRLINILKADYMKCYRSQVENTDV
SVKHSLQDSIQYIQQTNCSDKLNHQTCNTLFSPPPRTTGTQYPKVSEDKVFIQRRPCNRYQKQKLTSSERNLTVNFPPLSITERWKSID
TETSTKNDYPNNEKLNDDTIIYNQDNDNRHKVYSKSQFISHSEFPFLTKRRSFPLQSTSSFNILSNKQGLSTYSESCLKTNNNNKDYDNHS
CKSFHNMNQTIDHLKTNQYPINPYTQISLNSNLSKSMNSITIPNRYSSSLKTCLQRQEEINTPLDYGFIEEBEQERKCLLDSTHTNS

>209KV7

MPGDHREGSGNAQAAPASARSFRAKDVETAEEAGNEGFADVFSGPDMMAGMIKIQAIESLAEPTRRFLHINILGKPLTPWMIWDKQPKLNR
NYLMSRLHTFMTDANSSVYAAAVSQFMVASIIISVLSFCLETIPSFQSHRAPVAARVFTWVEAVTIQIFALDYLLRFISAPVKLFTVDPFN
IIDLIAIVPWIITWVGTDFNGTTFVFRVRLRVFRVRLKGGYRSLKLVVLSLRLKSLDMLGLMAFFISLCIVFFATLMYAERGSYDEQLG
ELSELVDVWPMRSRAALGNRGAGAGYVRYEVQIMIDYGVKPSPFESIVSGFWAIVTITMVGYGDTFPVITAGGKAIACVTMLICGLITLA
LPISVIGATFTNDWEAHVVEEKRRITTKKIIITASPLLLQLRLLNRHLEDAETLMLNRNSEVALEEASSELHHTLKSTKHLHTEAKAD
LRLRNLNRNRTAMSADNTPYDQYGYLPMHVKVEKYREQLAMSEAGSLGRRACHVTRMEAVNMHLVDRELEAIVARLAKKHADLAFLA

KHEEKPSPLALLEAEADLKGYVEDCRAANATALSKGPRAHVFTGSSTSKSSFRIGQRIIPLSSTEGWSWLELVGAGWSWLELGPRERVAML
GFQLAGATASLLEVLALLPGCAQQLSFDNSRGAGPLLWDSTHDSRKEFDGGAPFAALQLEACGLVGFAPRTEGGEAKETGKANTAAR