

oldUNC-68 1 MADKEEQQGGGEQDDVSEFLRTGDIVCLSCVASHNRDGVLGSERVCLCTEGFGNRMCTLENV
UNC-68 1 MADKEEQQGGGEQDDVSEFLRTGDIVCLSCVASHNRDGVLGSERVCLCTEGFGNRMCTLENV
R1R1_HUMAN 1 -----MGDAEGEDEVQFLRTDDEVVLQCSATVFLKE-----QLKLCCLAAEFGNRLCFLEPT
R1R2_HUMAN 1 ---MADGGEG-EDETQFLRTDDEVVLQCTATIHKE----QOKLCCLAAEFGNRLCFLEST
R1R3_HUMAN 1 ---MAEGGEGGGEDEIQFLRTEDEVVLQCTATIHKE----QRKFCCLAAEGTGNRLCFLEPT

oldUNC-68 61 SD-KDIPPDIAMCMLYIDNALSMRALQEMMSADSDHKS-----SGAGGHKT
UNC-68 61 SD-KDIPPDIAMCMLYIDNALSMRALQEMMSADSDHKS-----SGAGGHKT
R1R1_HUMAN 52 SNAQNVPPDLAICCFVLEQSLSVRALQEMMLANTVEAGVE-----SSQGGGHRT
R1R2_HUMAN 53 SNSKNVPPDLSICTFVLEQSLSVRALQEMMLANTVEKSEQVQDVEKWKFMKTAQGGGHRT
R1R3_HUMAN 54 SEAKYIIPDLCVCFVLEQSLSVRALQEMMLANTGENGGE-----GAAQGGGHRT

oldUNC-68 107 LLYGHAVQLKHVQSEMYLACLSSCSS-NDKLAFDVGVOETNEGEACWWTIHPASKORSEG
UNC-68 107 LLYGHAVQLKHVQSEMYLACLSSCSS-NDKLAFDVGVOETNEGEACWWTIHPASKORSEG
R1R1_HUMAN 100 LLYGHAILLRHAHSRYLSCLTTSRSMTDKLAFDVGLQEDATGEACWWTIHPASKORSEG
R1R2_HUMAN 113 LLYGHAILLRHSYSGMYLCCCLSTSRSSTDKLAFDVGLQEDTGEACWWTIHPASKORSEG
R1R3_HUMAN 103 LLYGHAVLLRHSFSGMYLTCCLTTSRSOTDKLAFDVGLREHATGEACWWTIHPASKORSEG

oldUNC-68 166 EKVRVGGDDVILVSVATERYLHMAYSKG-YMVIASFHQTLWNIQSVSSGSMRTRNMGFLFG
UNC-68 166 EKVRVGGDDVILVSVATERYLHMAYSKG-YMVIASFHQTLWNIQSVSSGSMRTRNMGFLFG
R1R1_HUMAN 160 EKVRVGGDDIILVSVSSERYLHLSSTASGELQVDASFMTLWNNPICS---RCEEGFVTG
R1R2_HUMAN 173 EKVRVGGDDIILVSVSSERYLHLSYNGNSLHVDAAFQOTLWSVAPISSG--SEAAQGYLIG
R1R3_HUMAN 163 EKVRIGDDIILVSVSSERYLHLSVSNGNLQVDASFMTLWNVHPTCSG--SSIEEGYLLG

oldUNC-68 225 NDVLRFLFHGN-DECLTIPENWSEHPQHNMVIYEGGAAVTQARSLWRVELIRMKWHGALVG
UNC-68 225 NDVLRFLFHGN-DECLTIPENWSEHPQHNMVIYEGGAAVTQARSLWRVELIRMKWHGALVG
R1R1_HUMAN 216 GHVLRFLFHGHMDECLTIPSPAD-SDDQRLVYEGGAVCTHARSLWRLEPLRISWSGSHLR
R1R2_HUMAN 231 GDVLRFLFHGHMDECLTIPSEGHGEEQRRTVHYEGGAVSVHARSLWRLETLRVAWSGSHIR
R1R3_HUMAN 221 GHVLRFLFHGH-DECLTIPSTQDNDQSHRRTVYEAAGAGTRARSLWRVEPLRISWSGSNIR

oldUNC-68 284 WEQVFRKHITSGRYLGVLN-SVQLYHKEKADFDLTAEFVMCQNK--DPKKQMLDEKEEE
UNC-68 284 WEQVFRKHITSGRYLGVLN-SVQLYHKEKADFDLTAEFVMCQNK--DPKKQMLDEKEEE
R1R1_HUMAN 275 WGQPFRLRHVTTGQYLALTEDQGLVVDASKAHTKATSECFRIS---KEKLDVAPKRDE
R1R2_HUMAN 291 WGQPFRLRHVTTGKYLSLMDKKNLLMDKEKADVKTAFTRSS---KEKLDVGRKEVD
R1R3_HUMAN 280 WGQAFRLRHLLTTGHYALTEDQGLILODRAKSDTKSTAFSFRASKELKEKLDSSHKRDIE

oldUNC-68 341 GMGNATIRYGETNAFIQHVKTQLWLSYQTEVTKKGLKVEEKKAVALKDGHMDDCYTFF
UNC-68 341 GMGNATIRYGETNAFIQHVKTQLWLSYQTEVTKKGLKVEEKKAVALKDGHMDDCYTFF
R1R1_HUMAN 332 GMGPPEIKYGESLCFVQHVASGLWLTAAAPDPKALRLGVLK-KKAMLHQEGHMDDALSIT
R1R2_HUMAN 348 GMGTSEIKYGDVSVCIQHVDTGLWLTYSVDVKSVMGSIQ-RKAIMHHEGHMDDGISLS
R1R3_HUMAN 340 GMGVPPEIKYGDVSVCFVQHTASGLWLTAKAQDAKTSRLGPIK-RKVILHQEGHMDDGLITLQ

oldUNC-68 401 MALEEESKSARVIRKCSVVLNKFLLKGDALQLEGNQST--DWTRVDLNEVLKLMEDLIEY
UNC-68 401 MALEEESKSARVIRKCSVVLNKFLLKGDALQLEGNQST--DWTRVDLNEVLKLMEDLIEY
R1R1_HUMAN 391 RCQQEESSQAARMIHSTNGLYNQFIKSLDSFGKPRGSGPPAGTALPIEGVILSLQDLIIY
R1R2_HUMAN 407 RSQHESRTARVIRSTVLEENRFIRGLDALSKKAKAST----VDLPIESVLSLQDLIGY
R1R3_HUMAN 399 RCQREESQAARTIRNTTALFSQFVS-----GNNRTAAP----ITLPIEVLQILQDLIAY

oldUNC-68 459 FAQPNDEQDFEEKQNELRALRSQDLFOEEGVLMILDTIDKFSQMEALPDFAGLIGEET
UNC-68 459 FAQPNDEQDFEEKQNELRALRSQDLFOEEGVLMILDTIDKFSQMEALPDFAGLIGEET
R1R1_HUMAN 451 FEPPSEDLQHEEKQSKLRSLRNRQSLFOEEGMLSMVLNCDRLNVYTTAAHFAEFAGEEA
R1R2_HUMAN 463 FHPPDEHLEHEDKQNRRLRALKNRQNLFOEEGMINIVLECIDRLNHVYSSAAHFADVAGREA
R1R3_HUMAN 450 FQPPPEEMRHEDKQNKLRSLKNRQLFKEEGMLALVNLCDRLNVYNSVAHFAGIAREES

oldUNC-68 519 HVKWEQISTYLYLLVAAMIKGNHYNCAQFASARLDWLFGRLSNPQSAEGILDVLYCVLT
UNC-68 519 HVKWEQISTYLYLLVAAMIKGNHYNCAQFASARLDWLFGRLSNPQSAEGILDVLYCVLT
R1R1_HUMAN 511 AESWKEITVNLLEYELLSLRGNRNSCALFS--TNLDWLISKLDRLEASSGILEVLYCVLI
R1R2_HUMAN 523 GESWKSITINSLYELLAALIRGNRKNCAQFS--GSLDWLISRLEASSGILEVLHCVLV
R1R3_HUMAN 510 GMAWKEITLNLLEYKLLAALIRGNRNCAQFS--NNLDWLISKLDRLESSGILEVLHCILT

oldUNC-68 579 ESPEALNMINEGHIRSVISLLEKVGGRDPKVLVDVLSLCEGNGMAVRSSQNLITQYLLPGK
UNC-68 579 ESPEALNMINEGHIRSVISLLEKVGGRDPKVLVDVLSLCEGNGMAVRSSQNLITQYLLPGK
R1_HUMAN 569 ESPEVNLINIQENHIKSIISLLDKHGRNHKVLVDVLCSLCVNGVAVRSNQDLITENLLPGR
R2_HUMAN 581 ESPEALNIIKEGHIKSIISLLDKHGRNHKVLVDVLCSLCVCHGVAVRSNQHLLCDNLLPGR
R3_HUMAN 568 ESPEALNIIAEGHIKSIISLLDKHGRNHKVLVDLCSLCLCNGVAVRANQNLLCDNLLPGR

oldUNC-68 639 DLLLQTSMRDHVSSMMPNVMLGVVEGSALFRKWFYAEVEHIET-MTKQTPYLRIGWANS
UNC-68 639 DLLLQTSMRDHVSSMMPNVMLGVVEGSALFRKWFYAEVEHIET-MTKQTPYLRIGWANS
R1_HUMAN 629 ELLLQTNLINYVTSIRPNIFVGRAEGTQYISKWYFEMVDEVTPFLITACATHLRVGLWT
R2_HUMAN 641 DLLLQTRLNVHVSSMRPNIFLGVSEGSQYKKWYELMVDHTEPFVTAETHLRVGLWAST
R3_HUMAN 628 NLLLQTRLINDVTSIRPNIFLGVAEGSQYKKWYFELIIDQVDPFLTAEPHRLRVGLWAST

oldUNC-68 698 VGFKPFPGSGDKMGCVGDDFYSYGFDGKSMYFSGKSRVGV---HKLLEKGDVIGCSID
UNC-68 698 VGFKPFPGSGDKMGCVGDDFYSYGFDGKSMYFSGKSRVGV---HKLLEKGDVIGCSID
R1_HUMAN 689 EGYTPYPGAGEGWGNGVGDLLYSYGFGLHLWIGHVAREPVTSPGQHLLAPEADVISCCLD
R2_HUMAN 701 EGYSPYPGGGEEWGGNGVGDLLYSYGFGLHLWISGCIARTVSSPNQHLLRTDDVISCCLD
R3_HUMAN 688 SCYAPYPGGGEGWGGNGVGDLLYSYGFGLHLWISGRIPRAVASINQHLLRSDDVVSCCLD

oldUNC-68 755 LTIPEIKFSVNGTYMSGSFKKFNIDGYFFPVMSLSAKVSCRFILGGNQGRLYRGPPTIGFS
UNC-68 755 LTIPEIKFSVNGTYMSGSFKKFNIDGYFFPVMSLSAKVSCRFILGGNQGRLYRGPPTIGFS
R1_HUMAN 749 LSVPSISFRINGCPVQGMFENFNIDGLFFPVVFSAGVKVRFLLGGRHGEFKFLPPGYA
R2_HUMAN 761 LSAFISFRINGQPVQGMFENFNIDGLFFPVVFSAGIKVRFLLGGRHGEFKFLPPGYA
R3_HUMAN 748 LGVPSISFRINGQPVQGMFENFNIDGLFFPVVFSAGVKVRFLLGGRHGEFKFLPPGYA

oldUNC-68 815 AVVEAVN--GELQITDCLSEFDLGNIFSGP-QTIFNNLEFFIPTPIDVSATQLNHHATE
UNC-68 815 AVVEAVN--GELQITDCLSEFDLGNIFSGP-QTIFNNLEFFIPTPIDVSATQLNHHATE
R1_HUMAN 809 PCHEAVLPRERLHLEPIKEYRREGPRGPHLVGSPRCLSHTDVPCPVDVQIVLPPHLER
R2_HUMAN 821 PCYEAFLPKEKLVKVEHSREYKQERTYTRDLLGPTVSLTQAFTPIPVDTSQIVLPPHLER
R3_HUMAN 808 PCYEAFLPKEKMRLEPVKEYKRDADGTRDLLGTTQFLSQASFIPCPVDTSQIVLPPHLER

oldUNC-68 872 MHQKYAENIHELWAMRKIELGWSYGETRSETSRKHPCITKFEYLPETEKKNILIALTTM
UNC-68 872 MHQKYAENIHELWAMRKIELGWSYGETRSETSRKHPCITKFEYLPETEKKNILIALTTM
R1_HUMAN 869 IREKLAENIHELWALTRIEQGWTYGPVRDDNKRLHPCLVDFHSLPEPERNYNLQMSGETL
R2_HUMAN 881 IREKLAENIHELWVMNKIELGWQYGPVRDDNKROHPCLVDFHSLPEQERNYNLQMSLETL
R3_HUMAN 868 IRDRLAENIHELWGMNKIELGWTFGKTRDDNKROHPCLVDFHSLPEKKNYNLQMSLETL

oldUNC-68 932 KTIIEALGYHLITEDPPCR--LRAVRLGPNFQQQNGYKPGPLDTHEIQLPAELQPLTEALA
UNC-68 932 KTIIEALGYHLITEDPPCR--LRAVRLGPNFQQQNGYKPGPLDTHEIQLPAELQPLTEALA
R1_HUMAN 929 KTLALGCHVGMADKEDNLKTKPKTYMMSNGYKPAPLDLSHVRLTFAQTTLVDRLA
R2_HUMAN 941 KTLALGCHVGISDEHAEDKVKMKLPKNYQLTSGYKPAFDLSFIKLPESQEAAMDVCLA
R3_HUMAN 928 KTLALGCHIAHVNPAAEEDLKKVKLPKNYMMSNGYKPAPLDLSVVKLLEPQEIIVDKLA

oldUNC-68 990 RNTHTWAKEKIKRGWTEGLSEHVDATQKRSPHLVPYEQVDERIKQANRESAENIRALQ
UNC-68 990 RNTHTWAKEKIKRGWTEGLSEHVDATQKRSPHLVPYEQVDERIKQANRESAENIRALQ
R1_HUMAN 989 ENGHNVWARDRVGQGSYSAVQDIPA--RRNPRLVPYRLLDEATKRSNRDSLQAVRLL
R2_HUMAN 1001 ENAHNVWARDRIRQGWYGIQODVKN--RRNPRLVPYRLLDRTKKSNDLSIREAVRLL
R3_HUMAN 988 ENAHNVWAKDRIRQGWYGIQODLKN--KRNPRVLYRLLDERTKKSNRDSLIREAVRLL

oldUNC-68 1050 LFGIFLEPPAHEHDEVAEKELRARKDNTRTYRAEATYAVCGGKWFYEFELITAGYMKIGW
UNC-68 1050 LFGIFLEPPAHEHDEVAEKELRARKDNTRTYRAEATYAVCGGKWFYEFELITAGYMKIGW
R1_HUMAN 1047 GYGNLEPPDQ--EPSQVENQSRCDRVRIFRAEKSYTVQSGRWYFEFVAVTIGEMRVGW
R2_HUMAN 1059 GYGNLEAPDQD-HAARAEVCSGTGERIFRAEKTYAVKAGRWYFEFVAVTIGDMRVGW
R3_HUMAN 1046 GYGNLEPESDQ--ELADSAVEKVSIDKIRFRFRVRSYAVRSWKWFYEFVAVTIGDMRVGW

oldUNC-68 1110 MDIGSTPEIQLGADDRSYAFDGYLGRKWHOGAETYGKEWKIGDVGCFLLDLNDRITISFSL
UNC-68 1110 MDIGSTPEIQLGADDRSYAFDGYLGRKWHOGAETYGKEWKIGDVGCFLLDLNDRITISFSL
R1_HUMAN 1104 ARPELRPDVELGADLAVYFNGHRGQRWHLGSEPEGRVQFGDVGCMIDLITENTIIFTL
R2_HUMAN 1118 SRPGCPDQELGSDERAFADGFKARWHOGNEHYGRSQAGDVGCMVDMNEHTMMFTL
R3_HUMAN 1104 ARPGCRPDVELGADDQAFVFEGRNGQRWHOGSGYFGRVQFGDVGCMINLDDASMIFTL

oldUNC-68 1170 NGE~~LL~~LD~~PS~~SGSEMAFDN~~V~~VC~~GD~~GLVPAM~~TL~~GS~~G~~QR~~G~~RLNFG~~Q~~SNSL~~K~~FFT~~TC~~GLQEGYE
UNC-68 1170 NGE~~LL~~LD~~PS~~SGSEMAFDN~~V~~VC~~GD~~GLVPAM~~TL~~GS~~G~~QR~~G~~RLNFG~~Q~~SNSL~~K~~FFT~~TC~~GLQEGYE
R~~Y~~R1_HUMAN 1164 NGE~~V~~LD~~SD~~SGSE~~T~~A~~F~~RE~~L~~E~~I~~IG~~D~~FLP~~V~~CSL~~G~~PG~~Q~~VGH~~L~~N~~L~~G~~O~~DV~~S~~SL~~R~~FA~~I~~C~~G~~LQEG~~F~~E
R~~Y~~R2_HUMAN 1178 NGE~~LL~~LD~~SD~~SGSE~~L~~A~~F~~K~~L~~E~~F~~DV~~G~~DG~~F~~IP~~V~~CSL~~G~~V~~A~~Q~~V~~GR~~M~~N~~F~~G~~K~~DV~~S~~TL~~K~~Y~~F~~TIC~~G~~LQEGYE
R~~Y~~R3_HUMAN 1164 NGE~~LL~~LD~~TK~~NGSE~~L~~A~~F~~A~~D~~Y~~E~~IENG~~F~~V~~P~~IC~~C~~LGL~~S~~Q~~I~~GR~~M~~N~~L~~G~~T~~D~~A~~ST~~F~~K~~F~~Y~~T~~M~~C~~GLQEG~~F~~E

oldUNC-68 1230 PFC~~V~~N~~M~~Y~~R~~T~~M~~P~~M~~W~~F~~A~~K~~Q~~L~~R~~F~~E~~D~~I~~S~~T~~L~~K~~S~~G~~S~~I~~L~~E~~V~~S~~R~~I~~P~~A~~T~~G~~N~~S~~P~~P~~C~~L~~K~~I~~L~~O~~K~~V~~T~~I~~S~~E~~G~~G
UNC-68 1230 PFC~~V~~N~~M~~Y~~R~~T~~M~~P~~M~~W~~F~~A~~K~~Q~~L~~R~~F~~E~~D~~I~~S~~T~~L~~K~~S~~G~~S~~I~~L~~E~~V~~S~~R~~I~~P~~A~~T~~G~~N~~S~~P~~P~~C~~L~~K~~I~~L~~O~~K~~V~~T~~I~~S~~E~~G~~G
R~~Y~~R1_HUMAN 1224 PFA~~I~~N~~M~~Q~~R~~P~~V~~T~~T~~W~~F~~S~~K~~L~~E~~Q~~F~~E~~P~~V~~P~~--L~~E~~H~~P~~H~~Y~~E~~V~~S~~R~~V~~D~~G~~T~~V~~D~~I~~P~~P~~C~~L~~R~~I~~T~~H~~R~~T~~W~~G~~S~~Q--
R~~Y~~R2_HUMAN 1238 PFA~~V~~N~~T~~M~~R~~D~~I~~T~~M~~W~~L~~S~~K~~R~~L~~E~~Q~~F~~L~~Q~~V~~P--S~~N~~H~~E~~H~~I~~E~~V~~T~~R~~I~~D~~G~~T~~I~~D~~S~~S~~P~~C~~L~~K~~V~~T~~Q~~K~~S~~F~~G~~S~~Q--
R~~Y~~R3_HUMAN 1224 PFA~~V~~N~~M~~N~~R~~D~~V~~A~~M~~W~~F~~S~~K~~R~~L~~E~~T~~F~~V~~N~~V~~P--K~~D~~H~~P~~H~~I~~E~~V~~M~~R~~I~~D~~G~~T~~M~~D~~S~~P~~P~~C~~L~~K~~V~~T~~H~~K~~T~~F~~G~~I~~Q--

oldUNC-68 1290 PSE~~K~~A~~R~~M~~E~~Y~~I~~K~~L~~S~~L~~P~~V~~K~~N~~D~~T~~F~~V~~K~~N~~K~~D~~K~~E~~T~~I~~R~~R~~O~~L~~Q~~E~~Y~~K~~P~~R~~S~~Q~~S~~V~~V~~S~~Q~~I~~R~~A~~P~~G~~I~~P~~K~~E~~F~~D~~D
UNC-68 1290 PSE~~K~~A~~R~~M~~E~~Y~~I~~K~~L~~S~~L~~P~~V~~K~~N~~D~~T~~F~~V~~K~~N~~K~~D~~K~~E~~T~~I~~R~~R~~O~~L~~Q~~E~~Y~~K~~P~~R~~S~~Q~~S~~V~~V~~S~~Q~~I~~R~~A~~P~~G~~I~~P~~K~~E~~F~~D~~D
R~~Y~~R1_HUMAN 1280 -NS~~L~~V~~M~~L~~F~~I~~R~~L~~S~~L~~P~~V~~Q~~F~~H~~Q~~H~~F~~R~~C~~T~~A~~G~~A~~T~~P~~L~~A~~P~~P~~G~~L~~Q~~P~~P~~-----
R~~Y~~R2_HUMAN 1294 -NS~~N~~T~~D~~I~~M~~F~~Y~~R~~L~~S~~M~~P~~L~~E~~C~~A~~E~~V~~F~~S~~K~~T~~V~~A~~G~~G~~L~~P~~G~~A~~G~~L~~F~~G~~P~~K-----
R~~Y~~R3_HUMAN 1280 -NS~~N~~A~~D~~M~~T~~Y~~C~~R~~L~~S~~M~~P~~V~~E~~C~~H~~S~~S~~F~~S-----

oldUNC-68 1350 NKE~~K~~K~~G~~F~~L~~R~~S~~M~~L~~G~~S~~K~~D~~S~~H~~E~~S~~DD~~D~~RR~~S~~R~~T~~N~~S~~K~~Q~~P~~S~~V~~D~~G~~D~~E~~P~~P~~A~~V~~R~~R~~S~~L~~L~~E~~L~~P~~H~~D~~E~~R~~Q~~I~~A~~E~~D~~
UNC-68 1350 NKE~~K~~K~~G~~F~~L~~R~~S~~M~~L~~G~~S~~K~~D~~S~~H~~E~~S~~DD~~D~~RR~~S~~R~~T~~N~~S~~K~~Q~~P~~S~~V~~D~~G~~D~~E~~P~~P~~A~~V~~R~~R~~S~~L~~L~~E~~L~~P~~H~~D~~E~~R~~Q~~I~~A~~E~~D~~
R~~Y~~R1_HUMAN 1318 -----A~~E~~D~~E~~A~~R~~A~~A~~E~~P~~D~~D~~Y~~E~~N~~L~~R~~R~~S~~A~~G~~W~~
R~~Y~~R2_HUMAN 1332 -----N~~D~~L~~E~~D~~Y~~D~~A~~D~~S~~D~~F~~E~~V~~L-----
R~~Y~~R3_HUMAN 1302 -----

oldUNC-68 1410 S~~M~~R~~D~~L~~N~~D~~R~~H~~S~~E~~K~~P~~K~~K~~G~~L~~L~~S~~R~~L~~R~~D~~S~~S~~N~~T~~R~~K~~N~~F~~R~~D~~S~~D~~R~~R~~K~~E~~E~~K~~A~~A~~Q~~L~~R~~Q~~M~~K~~A~~N~~S~~R~~S~~F~~D~~A~~G~~S
UNC-68 1410 S~~M~~R~~D~~L~~N~~D~~R~~H~~S~~E~~K~~P~~K~~K~~G~~L~~L~~S~~R~~L~~R~~D~~S~~S~~N~~T~~R~~K~~N~~F~~R~~D~~S~~D~~R~~R~~K~~E~~E~~K~~A~~A~~Q~~L~~R~~Q~~M~~K~~A~~N~~S~~R~~S~~F~~D~~A~~G~~S
R~~Y~~R1_HUMAN 1342 S~~E~~A~~N~~G~~K~~E~~G~~T~~A~~K~~E~~G~~A~~P~~C~~G~~T~~P~~Q~~A~~G~~G~~E~~A~~Q~~P~~A~~R~~A~~E~~N~~E~~K~~D~~A~~T~~T~~E~~K~~N~~K~~R~~G~~F~~L~~E~~K~~A~~K~~V~~A~~M~~M~~T~~Q~~P
R~~Y~~R2_HUMAN 1347 -----M~~K~~T~~A~~H~~G~~H~~L~~M~~P~~D~~R~~V~~D~~K~~D~~K~~E~~A~~T~~K~~P~~E~~F~~N~~N~~H~~K~~D~~Y~~A~~Q~~E~~K~~P~~S~~R~~L~~K~~Q~~R~~F~~L~~L~~R~~R~~T~~K~~P~~D~~
R~~Y~~R3_HUMAN 1302 -----

oldUNC-68 1470 L~~D~~T~~S~~T~~L~~P~~T~~G~~Q~~K~~D~~V~~L~~A~~S~~S~~E~~M~~P~~L~~S~~G~~P~~G~~R~~Q~~L~~T~~I~~K~~R~~S~~S~~I~~K~~N~~K~~K~~G~~K~~A~~E~~I~~A~~L~~E~~K~~M~~E~~R~~E~~K~~K~~S~~I~~I
UNC-68 1470 L~~D~~T~~S~~T~~L~~P~~T~~G~~Q~~K~~D~~V~~L~~A~~S~~S~~E~~M~~P~~L~~S~~G~~P~~G~~R~~Q~~L~~T~~I~~K~~R~~S~~S~~I~~K~~N~~K~~K~~G~~K~~A~~E~~I~~A~~L~~E~~K~~M~~E~~R~~E~~K~~K~~S~~I~~I
R~~Y~~R1_HUMAN 1402 P~~A~~T~~P~~T~~L~~R~~L~~R~~L~~P~~H~~D~~V~~V~~P~~A-----
R~~Y~~R2_HUMAN 1397 Y~~S~~T~~S~~H~~S~~A~~R~~L~~T~~E~~D~~V~~L~~A~~D~~-----
R~~Y~~R3_HUMAN 1302 ----H~~S~~E~~C~~L~~D~~S~~E~~A~~F~~QK-----

oldUNC-68 1530 P~~M~~D~~A~~Q~~L~~D~~V~~L~~Q~~E~~G~~D~~A~~H~~A~~L~~V~~H~~H~~K~~D~~K~~V~~D~~E~~Y~~Y~~Y~~G~~I~~R~~I~~F~~P~~G~~Q~~D~~P~~S~~Q~~V~~W~~V~~G~~W~~V~~T~~I~~Q~~Y~~H~~Y~~N~~V~~N~~F~~D~~G
UNC-68 1530 P~~M~~D~~A~~Q~~L~~D~~V~~L~~Q~~E~~G~~D~~A~~H~~A~~L~~V~~H~~H~~K~~D~~K~~V~~D~~E~~Y~~Y~~Y~~G~~I~~R~~I~~F~~P~~G~~Q~~D~~P~~S~~Q~~V~~W~~V~~G~~W~~V~~T~~I~~Q~~Y~~H~~Y~~N~~V~~N~~F~~D~~G
R~~Y~~R1_HUMAN 1418 -----D~~N~~R~~R~~D~~D~~P~~E~~T~~I~~L~~N~~T~~T~~T~~T~~Y~~Y~~S~~V~~R~~V~~F~~A~~G~~Q~~E~~P~~S~~C~~V~~W~~A~~G~~W~~V~~T~~P~~D~~Y~~H~~Q~~H~~D~~M~~S~~F~~D~~L
R~~Y~~R2_HUMAN 1413 -----D~~R~~D~~D~~Y~~D~~F~~L~~M~~Q~~T~~S~~T~~-~~Y~~Y~~S~~V~~R~~I~~F~~P~~G~~Q~~E~~P~~A~~N~~V~~W~~V~~G~~W~~I~~T~~S~~D~~F~~H~~Q~~Y~~D~~T~~G~~F~~D~~L
R~~Y~~R3_HUMAN 1314 -----R~~K~~Q~~M~~Q~~E~~I~~L~~S~~H~~T~~T~~T~~Q~~C~~Y~~Y~~A~~I~~R~~I~~F~~A~~G~~Q~~D~~P~~S~~Q~~V~~W~~V~~G~~W~~V~~T~~P~~D~~Y~~H~~L~~Y~~S~~E~~K~~F~~D~~L~~

oldUNC-68 1590 S~~Q~~G~~V~~R~~K~~C~~R~~F~~S~~E~~A~~D~~H~~H~~G~~T~~T~~V~~D~~S~~V~~Q~~S~~Q~~N~~C~~Y~~M~~V~~N~~V~~S~~E~~L~~L~~A~~T~~T~~P~~D~~V~~A~~N~~T~~K~~V~~S~~G~~T~~L~~I~~G~~C~~I~~I~~D~~T~~S~~I~~
UNC-68 1590 S~~Q~~G~~V~~R~~K~~C~~R~~F~~S~~E~~A~~D~~H~~H~~G~~T~~T~~V~~D~~S~~V~~Q~~S~~Q~~N~~C~~Y~~M~~V~~N~~V~~S~~E~~L~~L~~A~~T~~T~~P~~D~~V~~A~~N~~T~~K~~V~~S~~G~~T~~L~~I~~G~~C~~I~~I~~D~~T~~S~~I~~
R~~Y~~R1_HUMAN 1466 S~~K~~-V~~R~~V~~V~~T~~V~~T~~M~~G~~D~~E~~Q~~C~~N~~V~~H~~S~~S~~L~~K~~C~~S~~N~~C~~Y~~M~~V~~W~~G~~D~~F~~V~~S~~P~~C~~Q~~Q~~R~~I~~S~~H~~T~~D~~-~~L~~V~~I~~G~~C~~L~~V~~D~~L~~A~~T
R~~Y~~R2_HUMAN 1460 D~~R~~-V~~R~~T~~V~~T~~V~~T~~L~~G~~D~~E~~K~~G~~V~~H~~E~~S~~I~~K~~R~~S~~N~~C~~Y~~M~~V~~C~~A~~G~~E~~S~~M~~S~~P~~Q--G~~R~~N~~N~~N~~G~~-L~~E~~I~~G~~C~~V~~V~~D~~A~~A~~S
R~~Y~~R3_HUMAN 1362 N~~K~~-N~~C~~T~~V~~T~~V~~T~~L~~G~~D~~E~~R~~G~~R~~V~~H~~E~~S~~V~~K~~R~~S~~N~~C~~Y~~M~~V~~W~~G~~D~~I~~V~~A~~S~~S~~Q~~R~~S~~N~~R~~S~~N~~V~~D~~-L~~E~~I~~G~~C~~L~~V~~D~~L~~A~~M

oldUNC-68 1650 G~~E~~L~~S~~F~~Q~~V~~G~~S~~T~~D~~T~~G~~I~~K~~F~~K~~L~~E~~P~~G~~A~~M~~L~~F~~P~~A~~A~~F~~V~~T~~P~~T~~A~~T~~E~~I~~I~~Q~~F~~E~~L~~G~~R~~I~~K~~Y~~T~~F~~P~~L~~S~~A~~A~~M~~F~~K~~S~~C~~E~~
UNC-68 1650 G~~E~~L~~S~~F~~Q~~V~~G~~S~~T~~D~~T~~G~~I~~K~~F~~K~~L~~E~~P~~G~~A~~M~~L~~F~~P~~A~~A~~F~~V~~T~~P~~T~~A~~T~~E~~I~~I~~Q~~F~~E~~L~~G~~R~~I~~K~~Y~~T~~F~~P~~L~~S~~A~~A~~M~~F~~K~~S~~C~~E~~
R~~Y~~R1_HUMAN 1524 G~~L~~M~~T~~F~~T~~A~~N~~G~~K~~E~~S~~N~~T~~F~~F~~Q~~V~~E~~P~~N~~T~~K~~L~~F~~P~~A~~V~~F~~V~~L~~P~~H~~Q~~N~~V~~I~~Q~~F~~E~~L~~G~~K~~Q~~K~~N~~I~~M~~P~~L~~S~~A~~A~~M~~F~~Q~~S~~E~~R
R~~Y~~R2_HUMAN 1516 G~~L~~L~~L~~F~~T~~A~~N~~G~~K~~E~~L~~S~~T~~Y~~Q~~V~~E~~P~~S~~T~~K~~L~~F~~P~~A~~V~~E~~A~~Q~~A~~T~~S~~P~~N~~V~~Q~~F~~E~~L~~G~~R~~I~~K~~N~~V~~M~~P~~L~~S~~A~~G~~I~~F~~K~~S~~E~~H~~
R~~Y~~R3_HUMAN 1420 G~~M~~L~~S~~F~~S~~A~~N~~G~~K~~E~~L~~G~~T~~C~~Y~~Q~~V~~E~~P~~N~~T~~K~~V~~F~~P~~A~~V~~E~~L~~Q~~P~~T~~S~~T~~S~~L~~F~~Q~~F~~E~~L~~G~~K~~L~~K~~N~~A~~M~~P~~L~~S~~A~~A~~I~~F~~R~~S~~E~~E~~

oldUNC-68 1710 K~~S~~L~~V~~P~~F~~C~~P~~P~~R~~L~~T~~V~~E~~Q~~I~~E~~S~~V~~Y~~W~~A~~R~~V~~P~~N~~E~~T~~L~~R~~T~~T~~A~~L~~K~~L~~S~~E~~V~~R~~G~~W~~S~~V~~L~~C~~N~~D~~P~~V~~R~~I~~M~~S~~V~~Y~~I~~P~~E~~K~~
UNC-68 1710 K~~S~~L~~V~~P~~F~~C~~P~~P~~R~~L~~T~~V~~E~~Q~~I~~E~~S~~V~~Y~~W~~A~~R~~V~~P~~N~~E~~T~~L~~R~~T~~T~~A~~L~~K~~L~~S~~E~~V~~R~~G~~W~~S~~V~~L~~C~~N~~D~~P~~V~~R~~I~~M~~S~~V~~Y~~I~~P~~E~~K~~
R~~Y~~R1_HUMAN 1584 K~~N~~P~~A~~Q~~C~~P~~P~~R~~L~~E~~M~~Q~~M~~L~~M~~P~~V~~S~~W~~S~~R~~M~~P~~N~~H~~F~~L~~Q~~V~~E~~T~~R~~R~~A~~G~~E~~R~~L~~G~~W~~A~~V~~Q~~C~~E~~P~~L~~T~~M~~M~~A~~L~~H~~I~~P~~E~~E~~
R~~Y~~R2_HUMAN 1576 K~~N~~P~~V~~Q~~C~~P~~P~~R~~L~~H~~V~~Q~~F~~L~~S~~H~~V~~L~~W~~S~~R~~M~~P~~N~~Q~~F~~L~~K~~V~~D~~V~~S~~R~~I~~S~~E~~R~~Q~~G~~W~~L~~V~~Q~~C~~L~~D~~P~~L~~Q~~F~~M~~S~~L~~H~~I~~P~~E~~E
R~~Y~~R3_HUMAN 1480 K~~N~~P~~V~~Q~~C~~P~~P~~R~~L~~D~~V~~Q~~T~~I~~Q~~P~~V~~L~~W~~S~~R~~M~~P~~N~~S~~F~~L~~K~~V~~E~~T~~E~~R~~V~~S~~E~~R~~H~~G~~W~~V~~Q~~C~~L~~E~~P~~L~~Q~~M~~M~~A~~L~~H~~I~~P~~E~~E~~

oldUNC-68 1770 DQSLDILEMIEMPDMLEFHRQTLNLYCKLASHGNHKVAHTLCQHIDEDQIMYAIKSHYLS
UNC-68 1770 DQSLDILEMIEMPDMLEFHRQTLNLYCKLASHGNHKVAHTLCQHIDEDQIMYAIKSHYLS
R1R1_HUMAN 1644 NRCMDILELSERLDQRFHSHTLRLRYAVCALGNRVAHALCSHVDQAQLLHALEDAHLF
R1R2_HUMAN 1636 NRSVDILELSEQLLELKFHYHTLRLYSAVCALGNRVAHALCSHVDLQFLYAIENKYM
R1R3_HUMAN 1540 NRCVDILELCEQEDLMRFHYHTLRLYSAVCALGNRVAHALCSHVDLSQLFYAIDNKYLP

oldUNC-68 1830 GPMRQGFHDLIGLHLMASHAARNMAKEYVIPLVPQLQIKNVLD-----PDSESRYP
UNC-68 1830 GPMRQGFHDLIGLHLMASHAARNMAKEYVIPLVPQLQIKNVLD-----PDSESRYP
R1R1_HUMAN 1704 GPLRACGYDLLISIHLEFSACRSRRSMLSEYIVPLTPETRAITLFFPPGRSTENGHPRHGLP
R1R2_HUMAN 1696 GLLRACGYDLLIDIHLSYATARLMMNNEYIVPMTEETKSTITLFP-----DENKKHGLP
R1R3_HUMAN 1600 GLLRSGFYDLLISIHLSASAKERKLMKNEYIIPITSTTRNIRLFP-----DESKRHGLP

oldUNC-68 1883 QITGSEVSMSLSQMASEPVKKHVS----REDEMCKLLPPSVDFEALKKHVMESLQSATHHAV
UNC-68 1883 QITGSEVSMSLSQMASEPVKKHVS----REDEMCKLLPPSVDFEALKKHVMESLQSATHHAV
R1R1_HUMAN 1764 GVGRTSLRPPPHFSPECFVAALPAAGAAEAPARLSPAIPLEALRDKALRMLGEAVRDGG
R1R2_HUMAN 1750 GIGLSTSLRPRMQFSSEFSVSTIS-----NECYQYSPEEPLDILKSKTQMLTEAVKEGS
R1R3_HUMAN 1654 GVGRLTCLKPGFRFSTPCFVVTG-----EDHQKQSPETPLESLRTKALSMTEAVQCST

oldUNC-68 1939 MNCRDLLGGDNTNHFEPLFKLFDQLLVIGLINDEELECTLRLIHPQAFDENYETGTTQK-
UNC-68 1939 MNCRDLLGGDNTNHFEPLFKLFDQLLVIGLINDEELECTLRLIHPQAFDENYETGTTQK-
R1R1_HUMAN 1824 QHARDPVGGSVEFQFVPLKLVSTLLVMGIFGDEDVKQLKMIPEPEVTEEEEEEEEEEE
R1R2_HUMAN 1804 LHARDPVGGTTEFLFVPLIKLFYTLTLMGIFHNEDLKHILQLIEPSVFKAAATPEEESDT
R1R3_HUMAN 1708 AHARDPVGGSVEFQFVPLKLVSTLLVMGIFGDEDVKQLKMIPEPEVTEEEEEEEEEEE

oldUNC-68 1998 -----GLTQLELAEPVKIQLVSIIL
UNC-68 1998 -----GLTQLELAEPVKIQLVSIIL
R1R1_HUMAN 1884 GEEDEEEKKEDEEETAQEKKEDEKEEEEEAAEKEKEGLEEGLLQMKLPESVKLQMCHELL
R1R2_HUMAN 1864 LEKELSVDDAKLQGAGEEAKGGKRPKE-----GLLQMKLPEPVKLQMCHELL
R1R3_HUMAN 1768 KEEVTQVEEKAVEAG---EKAGKEAPVK-----GLLQTRLPESVKLQMCCELL

oldUNC-68 2017 DHLCDLQRLRYRIESLVAFTGEGFVGELOSDQCKRY-MEIKQTDMPPEAAAKKTKEFRCPK
UNC-68 2017 DHLCDLQRLRYRIESLVAFTGEGFVGELOSDQCKRY-MEIKQTDMPPEAAAKKTKEFRCPK
R1R1_HUMAN 1944 EYFCQDELQHRVESLAFAAERYVDKLCANQRSRYGLLIKAFSMTAAETARRTREFRSPPQ
R1R2_HUMAN 1911 QYLCDCQVRHRIEATVAFSDDFVAKLQDNQFRYNEVMQALNMSAALTARKTKEFRSPPQ
R1R3_HUMAN 1812 SYLCDCQLQHRVEATVAFSDIYVSKLQANQKFRYNEVMQALNMSAALTARKTKEFRSPPQ

oldUNC-68 2076 EQMFRLLMCKVKEERPELMEEDADVQCPCMAEGLQQQLRDFCELLVVKICNVKEGDSDD
UNC-68 2076 EQMFRLLMCKVKEERPELMEEDADVQCPCMAEGLQQQLRDFCELLVVKICNVKEGDSDD
R1R1_HUMAN 2004 EQINMLLQFKDG-----TDEEDCPLPEEIRQDLDFHQLDLAHCQTQLDGEEE-
R1R2_HUMAN 1971 EQINMLLNFKD-----DKSECPPEEIRQDLDFHEDLMTTCGTELEDGSL
R1R3_HUMAN 1872 EQINMLLNQFL-----GEN-CPPEEIREELYDFHEDLLHCCVPLEEEE--

oldUNC-68 2136 QLALIESEEGSWDSFARIV-VKVPVPLEEGMEMQKKGTONFREIIVTMTREWAQADFI
UNC-68 2136 QLALIESEEGSWDSFARIV-VKVPVPLEEGMEMQKKGTONFREIIVTMTREWAQADFI
R1R1_HUMAN 2052 EPEEETTLGSRMLSLLEKVRVLKKEEKPEEERSAESKPRSLOELVSHMVVRWAQEDFV
R1R2_HUMAN 2018 DGNSDLTIRGRLLSLVEKVTYLLKKQA--EKPVESDSKKSSTLQQLISETMVRWAQESVI
R1R3_HUMAN 1916 EEEEDTSWTGKLCALVYKIKGPPKPEK--EQPTEEEERCPTTLKELISQTMICWAQEDQI

oldUNC-68 2195 ESKSLIRNMFRLLLRQYSGIREIRDAMSQTYVFHERNEKDVDFLVYLIQIRELLTVQFE
UNC-68 2195 ESKSLIRNMFRLLLRQYSGIREIRDAMSQTYVFHERNEKDVDFLVYLIQIRELLTVQFE
R1R1_HUMAN 2112 QSPVLVRAMFSLLRQYDGLGELLRALPFAYTISPSSVEDTMSLLECLGQIRSLIVQMG
R1R2_HUMAN 2076 EDPELVRAMFVLLHRQYDGIIGLVRALPKTYTINGVSVEDTINLLASLGQIRSLLSVRMG
R1R3_HUMAN 1974 QDSELVRMMFNLLRRQYDSIGELLQALRKTYTISHTSVSDTINLLAALGQIRSLLSVRMG

oldUNC-68 2255 HTEEAIIKRWLWKLMMNRIFFOHPDLMRLLSVHENVMSIMMNILTAQQGTVEHEGDELKE
UNC-68 2255 HTEEAIIKRWLWKLMMNRIFFOHPDLMRLLSVHENVMSIMMNILTAQQGTVEHEGDELKE
R1R1_HUMAN 2172 PQEENLMIQSIGNIMNKVVFYQHPNLMRALGMHETVMEVMVNLVGGGSEKAIT-----
R1R2_HUMAN 2136 KEEELMIRGLGDIIMNKVVFYQHPNLMRALGMHETVMEVMVNLVGGGSEKAIT-----
R1R3_HUMAN 2034 KEEELMIRGLGDIIMNKVVFYQHPNLMRALGMHETVMEVMVNLVGGGSEKAIT-----

oldUNC-68 2315 KAPIKDASEM~~VVACS~~RFLCYFCR~~TSR~~Q~~N~~OKAMFEHLS~~FLLDN~~ATMLLAR~~PS~~IRG~~S~~VPLDV
UNC-68 2315 KAPIKDASEM~~VVACS~~RFLCYFCR~~TSR~~Q~~N~~OKAMFEHLS~~FLLDN~~ATMLLAR~~PS~~IRG~~S~~VPLDV
R~~Y~~R1_HUMAN 2225 -----F~~P~~K~~M~~V~~T~~S~~C~~C~~R~~F~~L~~C~~Y~~F~~C~~R~~I~~S~~R~~Q~~N~~O~~K~~A~~M~~F~~E~~H~~L~~S~~Y~~L~~L~~E~~N~~S~~G~~I~~G~~L~~C~~-----M~~Q~~G~~S~~T~~P~~L~~D~~V
R~~Y~~R2_HUMAN 2189 -----F~~P~~K~~M~~V~~A~~N~~C~~C~~R~~F~~L~~C~~Y~~F~~C~~R~~I~~S~~R~~Q~~N~~O~~K~~A~~M~~F~~E~~H~~L~~S~~Y~~L~~L~~E~~N~~S~~S~~V~~G~~L~~A~~S~~E~~A~~M~~R~~G~~S~~T~~P~~L~~D~~V~~
R~~Y~~R3_HUMAN 2086 -----F~~P~~K~~M~~V~~A~~S~~C~~C~~R~~F~~L~~C~~Y~~F~~C~~R~~I~~S~~R~~Q~~N~~O~~K~~A~~M~~F~~E~~H~~L~~S~~Y~~L~~L~~E~~N~~S~~S~~V~~G~~L~~A~~S~~E~~P~~S~~M~~R~~G~~S~~T~~P~~L~~D~~V

oldUNC-68 2375 A~~Y~~S~~S~~F~~M~~D~~N~~N~~E~~L~~A~~L~~A~~L~~K~~E~~E~~L~~D~~K~~V~~A~~V~~Y~~L~~S~~R~~C~~G~~L~~Q~~P~~N~~S~~E~~L~~I~~T~~K~~G~~Y~~P~~D~~I~~G~~W~~D~~P~~V~~E~~G~~E~~R~~Y~~I~~D~~F~~L
UNC-68 2375 A~~Y~~S~~S~~F~~M~~D~~N~~N~~E~~L~~A~~L~~A~~L~~K~~E~~E~~L~~D~~K~~V~~A~~V~~Y~~L~~S~~R~~C~~G~~L~~Q~~P~~N~~S~~E~~L~~I~~T~~K~~G~~Y~~P~~D~~I~~G~~W~~D~~P~~V~~E~~G~~E~~R~~Y~~I~~D~~F~~L
R~~Y~~R1_HUMAN 2276 AAASV~~I~~D~~N~~N~~E~~L~~A~~L~~A~~L~~Q~~E~~D~~L~~E~~K~~V~~V~~S~~Y~~L~~A~~G~~C~~G~~L~~Q~~S~~C~~P~~M~~L~~V~~A~~K~~G~~Y~~P~~D~~I~~G~~W~~N~~P~~C~~G~~G~~E~~R~~Y~~L~~D~~F~~L
R~~Y~~R2_HUMAN 2243 AAASV~~M~~D~~N~~N~~E~~L~~A~~L~~A~~L~~R~~E~~P~~D~~L~~E~~K~~V~~V~~R~~Y~~L~~A~~G~~C~~G~~L~~Q~~S~~C~~Q~~M~~L~~V~~S~~K~~G~~Y~~P~~D~~I~~G~~W~~N~~P~~V~~E~~G~~E~~R~~Y~~L~~D~~F~~L~~
R~~Y~~R3_HUMAN 2140 AAASV~~M~~D~~N~~N~~E~~L~~A~~L~~S~~L~~E~~E~~P~~D~~L~~E~~K~~V~~V~~T~~Y~~L~~A~~G~~C~~G~~L~~Q~~S~~C~~P~~M~~L~~L~~A~~K~~G~~Y~~P~~D~~V~~G~~W~~N~~P~~T~~E~~G~~E~~R~~Y~~L~~S~~F~~L~~

oldUNC-68 2435 R~~F~~C~~V~~W~~I~~N~~G~~E~~N~~V~~E~~E~~N~~A~~N~~L~~V~~I~~R~~L~~L~~I~~R~~R~~P~~E~~C~~L~~G~~V~~A~~L~~K~~G~~E~~G~~-~~Q~~G~~L~~F~~S~~A~~F~~K~~E~~A~~I~~A~~S~~E~~D~~I~~R~~L~~L~~E~~N
UNC-68 2435 R~~F~~C~~V~~W~~I~~N~~G~~E~~N~~V~~E~~E~~N~~A~~N~~L~~V~~I~~R~~L~~L~~I~~R~~R~~P~~E~~C~~L~~G~~V~~A~~L~~K~~G~~E~~G~~-~~Q~~G~~L~~F~~S~~A~~F~~K~~E~~A~~I~~A~~S~~E~~D~~I~~R~~L~~L~~E~~N
R~~Y~~R1_HUMAN 2336 R~~F~~A~~V~~F~~V~~N~~G~~S~~V~~E~~E~~N~~A~~N~~V~~V~~V~~R~~L~~L~~I~~R~~R~~P~~E~~C~~F~~G~~P~~A~~L~~R~~G~~E~~G~~G~~S~~G~~L~~L~~A~~A~~T~~E~~E~~A~~I~~R~~I~~S~~E~~D~~P~~A~~R~~D~~G~~P
R~~Y~~R2_HUMAN 2303 R~~F~~A~~V~~F~~V~~N~~G~~S~~V~~E~~E~~N~~A~~N~~V~~V~~V~~R~~L~~L~~I~~R~~R~~P~~E~~C~~F~~G~~P~~A~~L~~R~~G~~E~~G~~G~~N~~L~~L~~A~~A~~M~~E~~E~~A~~I~~K~~A~~E~~D~~P~~S~~R~~D~~G~~P
R~~Y~~R3_HUMAN 2200 R~~F~~A~~V~~F~~V~~N~~S~~E~~S~~V~~E~~E~~N~~A~~S~~V~~V~~V~~K~~L~~L~~I~~R~~R~~P~~E~~C~~F~~G~~P~~A~~L~~R~~G~~E~~G~~G~~N~~L~~L~~A~~A~~M~~Q~~G~~A~~I~~K~~I~~S~~E~~N~~P~~A~~L~~D~~L~~P

oldUNC-68 2494 D~~S~~H~~P~~S~~L~~L~~S~~S~~G~~L~~L~~G~~E~~N~~P~~T~~Y~~P~~S~~K~~D~~A~~E~~G~~E~~D~~Y~~I~~D~~L~~G~~A~~A~~T~~L~~D~~F~~Y~~S~~S~~L~~V~~D~~L~~L~~A~~K~~C~~A~~P~~D~~P~~M~~A~~I~~Q~~A~~G~~K~~
UNC-68 2494 D~~S~~H~~P~~S~~L~~L~~S~~S~~G~~L~~L~~G~~E~~N~~P~~T~~Y~~P~~S~~K~~D~~A~~E~~G~~E~~D~~Y~~I~~D~~L~~G~~A~~A~~T~~L~~D~~F~~Y~~S~~S~~L~~V~~D~~L~~L~~A~~K~~C~~A~~P~~D~~P~~M~~A~~I~~Q~~A~~G~~K~~
R~~Y~~R1_HUMAN 2396 G~~I~~R~~R~~D~~R~~R~~R~~E-----H~~F~~G~~E~~E~~P~~P~~E~~N~~R~~V~~H~~L~~G~~H~~A~~I~~M~~S~~F~~Y~~A~~A~~L~~I~~D~~L~~L~~G~~R~~C~~A~~P~~E~~M~~H~~L~~I~~Q~~A~~G~~K~~
R~~Y~~R2_HUMAN 2363 -S~~P~~N~~S~~G~~S~~S~~K~~-----T~~L~~D~~T~~E~~E~~E~~E~~D~~T~~I~~H~~M~~G~~N~~A~~I~~M~~T~~F~~Y~~S~~A~~L~~I~~D~~L~~L~~G~~R~~C~~A~~P~~E~~M~~H~~L~~I~~H~~A~~G~~K~~
R~~Y~~R3_HUMAN 2260 -S~~Q~~G~~Y~~K~~R~~E~~V~~-----S~~T~~G~~D~~E~~E~~E~~E~~E~~E~~I~~V~~H~~M~~G~~N~~A~~I~~M~~S~~F~~Y~~A~~L~~I~~D~~L~~L~~G~~R~~C~~A~~P~~E~~M~~H~~L~~I~~Q~~T~~G~~K~~

oldUNC-68 2554 G~~D~~S~~L~~R~~A~~R~~A~~I~~L~~R~~S~~L~~I~~S~~L~~D~~D~~L~~G~~Q~~I~~L~~A~~L~~R~~E~~T~~I~~P~~N~~L~~A~~A~~P~~S~~I~~E~~A~~V~~R~~R~~A~~N~~A~~V~~Q~~A~~S~~H~~T~~Q~~K~~A~~V~~M~~A~~H~~T~~F~~
UNC-68 2554 G~~D~~S~~L~~R~~A~~R~~A~~I~~L~~R~~S~~L~~I~~S~~L~~D~~D~~L~~G~~Q~~I~~L~~A~~L~~R~~E~~T~~I~~P~~N~~L~~A~~A~~P-----
R~~Y~~R1_HUMAN 2448 G~~E~~A~~L~~R~~I~~R~~A~~I~~L~~R~~S~~L~~V~~P~~L~~E~~D~~L~~V~~G~~I~~I~~S~~L~~P~~Q~~I~~P~~T~~L~~G~~K~~D~~G-----
R~~Y~~R2_HUMAN 2414 G~~E~~A~~T~~R~~I~~R~~S~~I~~L~~R~~S~~L~~I~~P~~L~~G~~D~~L~~V~~G~~V~~I~~S~~T~~A~~F~~Q~~M~~P~~T~~I~~A~~K~~D~~G~~-----
R~~Y~~R3_HUMAN 2311 G~~E~~A~~T~~R~~I~~R~~S~~I~~L~~R~~S~~L~~V~~P~~T~~E~~D~~L~~V~~G~~I~~I~~S~~I~~P~~L~~K~~L~~P~~S~~L~~N~~K~~D~~G~~-----

oldUNC-68 2614 A~~M~~V~~A~~S~~L~~A~~S~~E~~V~~S~~N~~T~~R~~R~~S~~Q~~T~~F~~T~~S~~G~~T~~N~~L~~A~~K~~R~~G~~L~~P~~C~~V~~E~~E~~V~~D~~T~~D~~S~~K~~S~~S~~D~~Y~~A~~S~~V~~H~~T~~S~~F~~S~~S~~G~~N~~E~~L~~F
UNC-68 2589 -----
R~~Y~~R1_HUMAN 2484 -----
R~~Y~~R2_HUMAN 2450 -----
R~~Y~~R3_HUMAN 2347 -----

oldUNC-68 2674 A~~P~~K~~A~~E~~K~~E~~K~~V~~D~~V~~L~~K~~L~~N~~E~~N~~K~~Y~~P~~I~~I~~Q~~R~~R~~R~~S~~S~~R~~F~~N~~P~~I~~D~~N~~T~~G~~L~~P~~L~~G~~L~~L~~P~~N~~H~~K~~G~~S~~V~~L~~L~~F~~L~~D~~R~~V~~Y~~G~~I~~
UNC-68 2589 -----S~~I~~E~~D~~T~~G~~P~~L~~E~~G~~L~~L~~P~~N~~H~~K~~G~~S~~V~~L~~L~~F~~L~~D~~R~~V~~Y~~G~~I
R~~Y~~R1_HUMAN 2484 -----A~~L~~V~~Q~~P~~K~~M~~S~~A~~S~~F~~V~~P~~D~~H~~K~~A~~M~~V~~L~~F~~L~~D~~R~~V~~Y~~G~~I~~
R~~Y~~R2_HUMAN 2450 -----N~~V~~V~~E~~P~~D~~M~~S~~A~~G~~F~~C~~P~~D~~H~~K~~A~~M~~V~~L~~F~~L~~D~~R~~V~~Y~~G~~I~~
R~~Y~~R3_HUMAN 2347 -----S~~V~~S~~E~~P~~D~~M~~A~~A~~N~~F~~C~~P~~D~~H~~K~~A~~M~~V~~L~~F~~L~~D~~R~~V~~Y~~G~~I~~

oldUNC-68 2734 D~~Q~~Q~~D~~M~~L~~F~~H~~V~~L~~E~~Q~~S~~F~~L~~P~~D~~L~~R~~A~~A~~T~~M~~D~~S~~P~~R~~A~~L~~E~~S~~D~~T~~A~~L~~A~~L~~N~~R~~Y~~L~~C~~N~~S~~V~~L~~P~~L~~L~~T~~N~~H~~S~~H~~F~~F~~A~~D~~A
UNC-68 2618 D~~Q~~Q~~D~~M~~L~~F~~H~~V~~L~~E~~Q~~S~~F~~L~~P~~D~~L~~R~~A~~A~~T~~M~~D~~S~~P~~R~~A~~L~~E~~S~~D~~T~~A~~L~~A~~L~~N~~R~~Y~~L~~C~~N~~S~~V~~L~~P~~L~~L~~T~~N~~H~~S~~H~~F~~F~~A~~D~~A
R~~Y~~R1_HUMAN 2513 E~~N~~Q~~D~~F~~L~~L~~H~~V~~L~~D~~V~~G~~F~~L~~P~~D~~M~~R~~A~~A~~A~~S~~L~~D~~T~~A~~T~~F~~S~~T~~E~~M~~A~~L~~A~~L~~N~~R~~Y~~L~~C~~L~~A~~V~~L~~P~~L~~T~~K~~C~~A~~P~~L~~F~~A~~G~~T~~
R~~Y~~R2_HUMAN 2479 E~~V~~Q~~D~~F~~L~~L~~H~~L~~E~~V~~G~~F~~L~~P~~D~~L~~R~~A~~A~~S~~L~~D~~T~~A~~A~~L~~S~~A~~T~~D~~M~~A~~L~~A~~L~~N~~R~~Y~~L~~C~~T~~A~~V~~L~~P~~L~~L~~T~~R~~C~~A~~P~~L~~F~~A~~G~~T~~
R~~Y~~R3_HUMAN 2376 K~~D~~Q~~T~~F~~L~~L~~H~~L~~L~~E~~V~~G~~F~~L~~P~~D~~L~~R~~A~~S~~A~~S~~L~~D~~T~~V~~S~~L~~S~~T~~E~~A~~A~~L~~A~~L~~N~~R~~Y~~L~~C~~S~~A~~V~~L~~P~~L~~L~~L~~T~~R~~C~~A~~P~~L~~F~~A~~G~~T~~

oldUNC-68 2794 E~~H~~H~~S~~A~~L~~L~~D~~A~~T~~L~~H~~T~~V~~Y~~R~~M~~N~~R~~L~~K~~S~~L~~T~~K~~N~~Q~~R~~D~~A~~V~~S~~D~~F~~L~~V~~A~~T~~T~~R~~E~~L~~P~~P~~A~~M~~M~~I~~K~~L~~L~~K~~K~~V~~I~~T~~D~~I~~L~~T~~
UNC-68 2678 E~~H~~H~~S~~A~~L~~L~~D~~A~~T~~L~~H~~T~~V~~Y~~R~~M~~N~~R~~L~~K~~S~~L~~T~~K~~N~~Q~~R~~D~~A~~V~~S~~D~~F~~L~~V~~A~~T~~T~~R~~E~~L~~P~~P~~A~~M~~M~~I~~K~~L~~L~~K~~K~~V~~I~~T~~D~~I~~L~~T~~
R~~Y~~R1_HUMAN 2573 E~~H~~R~~A~~I~~M~~V~~D~~S~~M~~L~~H~~T~~V~~Y~~R~~L~~S~~R~~G~~R~~S~~L~~T~~K~~A~~Q~~R~~D~~V~~I~~E~~D~~C~~L~~M~~S~~L~~C~~R~~Y~~I~~R~~P~~S~~M~~L~~Q~~H~~L~~L~~R~~R~~L~~V~~F~~D~~V~~P~~I~~
R~~Y~~R2_HUMAN 2539 E~~H~~H~~A~~S~~L~~L~~D~~S~~L~~L~~H~~T~~V~~Y~~R~~L~~S~~K~~G~~C~~S~~L~~T~~K~~A~~Q~~R~~D~~S~~I~~E~~V~~C~~L~~L~~S~~T~~C~~G~~L~~R~~P~~S~~M~~M~~Q~~H~~L~~L~~R~~R~~L~~V~~F~~D~~V~~P~~L
R~~Y~~R3_HUMAN 2436 E~~H~~C~~T~~S~~L~~L~~D~~S~~T~~L~~Q~~T~~T~~Y~~R~~L~~S~~K~~G~~R~~S~~L~~T~~K~~A~~Q~~R~~D~~T~~I~~E~~E~~C~~L~~L~~A~~I~~C~~N~~H~~L~~R~~P~~S~~M~~L~~Q~~H~~L~~L~~R~~R~~L~~V~~F~~D~~V~~P~~Q~~

oldUNC-68 2854 M~~N~~D~~M~~N~~V~~L~~V~~P~~L~~R~~L~~I~~T~~L~~H~~Y~~E~~R~~C~~G~~K~~Y~~Y~~G~~S~~G~~N~~---H~~Y~~G~~V~~A~~S~~E~~Q~~E~~K~~R~~L~~S~~M~~L~~L~~F~~D~~A~~I~~F~~D~~T~~L~~G~~S~~R~~P~~Y
UNC-68 2738 M~~N~~D~~M~~N~~V~~L~~V~~P~~L~~R~~L~~I~~T~~L~~H~~Y~~E~~R~~C~~G~~K~~Y~~Y~~G~~S~~G~~N~~---H~~Y~~G~~V~~A~~S~~E~~Q~~E~~K~~R~~L~~S~~M~~L~~L~~F~~D~~A~~I~~F~~D~~T~~L~~G~~S~~R~~P~~Y
R~~Y~~R1_HUMAN 2633 L~~N~~E~~F~~-A~~K~~M~~P~~L~~K~~L~~L~~T~~N~~H~~Y~~E~~R~~C~~W~~K~~Y~~Y~~C~~L~~P~~T~~G~~W~~A~~N~~F~~G~~V~~T~~S~~E~~E~~L~~H~~L~~T~~R~~K~~L~~F~~W~~G~~I~~F~~D~~S~~L~~A~~H~~K~~K~~Y~~
R~~Y~~R2_HUMAN 2599 L~~N~~E~~H~~-A~~K~~M~~P~~L~~K~~L~~L~~T~~N~~H~~Y~~E~~R~~C~~W~~K~~Y~~Y~~C~~L~~P~~G~~G~~W~~N~~F~~G~~A~~S~~E~~E~~L~~H~~L~~S~~R~~K~~L~~F~~W~~G~~I~~F~~D~~A~~L~~S~~Q~~K~~K~~Y~~
R~~Y~~R3_HUMAN 2496 L~~N~~E~~Y~~-C~~K~~M~~P~~L~~K~~L~~L~~T~~N~~H~~Y~~E~~Q~~C~~W~~K~~Y~~Y~~C~~L~~P~~S~~G~~W~~G~~S~~Y~~G~~L~~A~~V~~E~~E~~L~~H~~L~~T~~E~~K~~L~~F~~W~~G~~I~~F~~D~~S~~L~~S~~H~~K~~K~~Y~~

oldUNC-68 2911 DPELFGKALPCMTAIGSAISPDYTLTSGLEDVRNK-RRFEEGAWIPRTVDVSRCEINRDL
UNC-68 2795 DPELFGKALPCMTAIGSAISPDYTLTSGLEDVRNK-RRFEEGAWIPRTVDVSRCEINRDL
R1_HUMAN 2692 DPFLYRMAMPCLCAIAGALPPDYVDAISYSSKAEEKATVDAEGNFDPRPVEITLNVIIPEKL
R2_HUMAN 2658 EQELFKIALPCLSAVAGALPPDYMESNYVSMMEKQSSMSEGNFNPQVDTSNITIIPEKL
R3_HUMAN 2555 DPDLFRMALPCLSAIAGALPPDYLDTRITATLEKQISVDADGNFDPKPIINTMNFSLPEKL

oldUNC-68 2970 EKMTTELFAEHFHDSWASRKLEKGVHGDLYSRANFTHPRLKPFALLKDFEKSIFYKERCS
UNC-68 2854 EKMTTELFAEHFHDSWASRKLEKGVHGDLYSRANFTHPRLKPFALLKDFEKSIFYKERCS
R1_HUMAN 2752 DSFTNKFAYETHKWAEDKIQNNWSYGENIDEELKTHPLRPYKTFSEKDKIYRWPIKE
R2_HUMAN 2718 EYFTNKFAYETHKWAEDKIQNNWSYGENIDEELKTHPLRPYKTFSEKDKIYRWPIKE
R3_HUMAN 2615 EYIVTKYAEHSHDKWACDKSQSGWKYGISLDENVKTHPLIRPFKTLTEKEKEIYRWPAE

oldUNC-68 3030 CLKALMAWNYSFEMMDR-----DANDRASAAARTLSGTSISNFAFKPIDLSSMTLEKDM
UNC-68 2914 CLKALMAWNYSFEMMDR-----DANDRASAAARTLSGTSISNFAFKPIDLSSMTLEKDM
R1_HUMAN 2812 SLKAMLAWEWTIEKAREGEEKTEKKKTRKISQSAQYDPREGYNPQPELDSAVTLSREL
R2_HUMAN 2778 SLKMTMLAWGWRIERTREGDSMALYNRTRRISQTSQVSDAAHGYSPRADMSNVTLSRDL
R3_HUMAN 2675 SLKMTMLAVGWIVERTKEGEALVQORENEKLRVSVQANQ--GNSYSPAPLDSNVVLSREL

oldUNC-68 3083 VNAAEKMAEHSHLIWAQKVMNDLNTKGGFMPILVLPWDLTDFERRKDRFRASEIILKFLO
UNC-68 2967 VNAAEKMAEHSHLIWAQKVMNDLNTKGGFMPILVLPWDLTDFERRKDRFRASEIILKFLO
R1_HUMAN 2872 QAMAEOIAENYHNTWGRKKKQELEAKGGGTHPLLVPYDTLTAKEKARDREKAQELLKFLO
R2_HUMAN 2838 HAMAEMMAENYHNTWAKKKKMELESKGGGNHPLLVPYDTLTAKEKARDREKAQDILKFLO
R3_HUMAN 2733 QGMVEVVAENYHNTWAKKKKLELESKGGGSHPPLLVPYDTLTAKEKARDREKAQDILKFLO

oldUNC-68 3143 YHGYHVNCPKDEQSQNDRLKSEGERTSVEKRFAYNLEKLLITYLEQASLKMKSVKPSQEL
UNC-68 3027 YHGYHVNCPKDEQSQNDRLKSEGERTSVEKRFAYNLEKLLITYLEQASLKMKSVKPSQEL
R1_HUMAN 2932 MNGYAVIRGLKDMELDS-----SSEIKRFAGFLQQLLRWMDISQEFIAHLEAVVSS
R2_HUMAN 2898 INGYAVSRGFKDLELDT-----PSEIKRFAYSFLQQLIRYVDEAHQVILEFDG-GSR
R3_HUMAN 2793 VNGIIVSRGMKDMELDA-----SSEIKRFAYKFLKLLKYVDSAQEFIAHLEAIVSS

oldUNC-68 3203 TRRNSFKKEGQDVKFFKVVPLPMHAYFNAHKNYFLEGS--IVQIGTASNKEKEMVANL
UNC-68 3087 TRRNSFKKEGQDVKFFKVVPLPMHAYFNAHKNYFLEGS--IVQIGTASNKEKEMVANL
R1_HUMAN 2984 GRVEXSPHE-QEIKFFAKLILPLINQYFTNHCLYFLSTPAKVLGSGGHASNKEKEMVITSL
R2_HUMAN 2949 GKGEHFPYE-QEIKFFAKVVLPLIDQYFKNHRLYFLSAASRPLCSGGHASNKEKEMVITSL
R3_HUMAN 2845 GKTEKSPRD-QEIKFFAKVLLPLVDQYFTSHCLYFLSSPLKPLSSSGYASHKEKEMVAGL

oldUNC-68 3261 FCRLAALLRIKNRAFGSVAKITVKCLQGLTQALDLRTLKVNSDIVRTSLTFFNNCADD
UNC-68 3145 FCRLAALLRIKNRAFGSVAKITVKCLQGLTQALDLRTLKVNSDIVRTSLTFFNNCADD
R1_HUMAN 3043 FCKLAALVRHRVSLFGTDAPAVVNCLHLARSLDARTVMKSGPEIVKAGLRSFFESASED
R2_HUMAN 3008 FCKLGLVLRHRISLFGNDATSIVNCLHLGQTLDARTVMKTGLSVKSAALRAFLDNAED
R3_HUMAN 2904 FCKLAALVRHRISLFGSDSTTMVSVCLHLAQTLDRTRVMKSGSELVKAALRAFFENAAED

oldUNC-68 3321 LYASVNELKCKIYYSEIEEYDDGGQYSLIRGOALKSWNSFEFANQMIVPVLTTFMFAHLAR
UNC-68 3205 LYASVNELK-----DGQYSLIRGOALKSWNSFEFANQMIVPVLTTFMFAHLAR
R1_HUMAN 3103 IEKMTVENLRL-----GKVSQARTQVKGVGQNTYTTVALLPVLTTLFQHIAQ
R2_HUMAN 3068 LEKTMENLKQ-----GQFTHTRNQPQGVTOILNYTTVALLPMLSSLFEHIGQ
R3_HUMAN 2964 LEKTMENLKL-----GKFTHSRTQIKGVSQNTYTTVALLPILTSIFEHVTQ

oldUNC-68 3381 NHFGTDLLLDDIQAACYKILDSLYMVTGLSSSISHRKSISGSEKHRPGLGQCLAAFASC
UNC-68 3253 NHFGTDLLLDDIQAACYKILDSLYMVTGLSSSISHRKSISGSEKHRPGLGQCLAAFASC
R1_HUMAN 3150 HQFGDDVILDVQVSCYRITLCSIIYSLG-----TKNTYVEKLRPALGECLARLAAA
R2_HUMAN 3115 HQFGEDLILEDVQVSCYRITLCSLYALG-----TSKSIYVERQRSALGECLAAFAGA
R3_HUMAN 3011 HQFGMDLLLDVQVSCYHILCSLYSLG-----TKNIYVERQRPALGECLASLAAA

oldUNC-68 3441 FPVAFLEPEFNKSNKFSVLAQSQDQS---VQVQEMLQNLSTHIPHLEKLLTDLETVANNN
UNC-68 3313 FPVAFLEPEFNKSNKFSVLAQSQDQS---VQVQEMLQNLSTHIPHLEKLLTDLETVANNN
R1_HUMAN 3201 MPVAFLEPEQLNEYNACSVYTTKSPRERAILGLPNSVEEMCFDIPVLERLMADIGGLAESG
R2_HUMAN 3166 FPVAFLETHLDKHNITYSITNTKSSRERAAALSLPTNVEDVCFNIPSLKLMEEIVELAESG
R3_HUMAN 3062 IPVAFLEPTLNRYNPLSVENKTTPRERSILGMPDTEVDMCFDIPQLEGLMKEINDLAESG

oldUNC-68 3498 TMYSDVFNVYDVDLPLMCSYMAHWFVSGPDGKRDKEDQRASVVQTTSVSCDHINRIFNAL
UNC-68 3370 TMYSDVFNVYDVDLPLMCSYMAHWFVSGPDGKRDKEDQRASVVQTTSVSCDHINRIFNAL
R1R1_HUMAN 3261 ARYTEMPHVIEITLPLMCSYLPRWWEERGEAPP-ALPAGAPPCTAVTSDHINSLLGNI
R1R2_HUMAN 3226 IRYTQMPHVMEVILPLMCSYSRWWERGPEN-----NPERAEMCCTAINSEHMNTLLGNI
R1R3_HUMAN 3122 ARYTEMPHVIEVILPLMCLNLSYWWERGPEN-----LPPSTGPCCTKVTSEHLSLLGNI

oldUNC-68 3558 LKMIRNHVGIENAPWLCRVNFFAVQIIONVTSDPVREFVLPFAERLRMSEKAYKEEEHM
UNC-68 3430 LKMIRNHVGIENAPWLCRVNFFAVQIIONVTSDPVREFVLPFAERLRMSEKAYKEEEHM
R1R1_HUMAN 3320 LRIIVNNLGIDEASWMKRLAVFAQPIVSEARPELLQSHFIPITIGRLRKRAGKVVSEEEQL
R1R2_HUMAN 3281 LKIIVNNLGIDEAGWMKRLAVFSQPIINVKVQQLLKHFLPLMEKLLKKAATVVSEEDHL
R1R3_HUMAN 3177 LKIIVNNLGIDEASWMKRLAVYAQPIISKARPDLLRSHFIPITLEKLLKKAATVVSEEEQL

oldUNC-68 3618 RTHP-DDADEG--TV AEDNARLVRDITYAFFPILMKYTDLHRAQWLKIPTWETIDGVYENVA
UNC-68 3490 RTHP-DDADEG--TV AEDNARLVRDITYAFFPILMKYTDLHRAQWLKIPTWETIDGVYENVA
R1R1_HUMAN 3380 RLEAKAEAQEGELLVREDFSVLCRDLYALYPLLIRYVDNRAQWLTEPNPSAEELFRMVG
R1R2_HUMAN 3341 KAEARGDMSEAEELLILDEFITTLARDLYAFYPLLIRFVDYNRAKWLKEPNPEAEELFRMVA
R1R3_HUMAN 3237 KADGKGDTEAEELLILDEFVAVLCRDLYAFYPLMLIRYVDNRRSNWLKSPDADSDQLFRMVA

oldUNC-68 3675 VIFRIVWSQSQHFKREELNYVAQFEEDAAATGGGDMKTGKAAIAERKKKRRFGQDKMKEYF
UNC-68 3547 VIFRIVWSQSQHFKREELNYVAQFEEDAAATGGGDMKTGKAAIAERKKKRRFGQ-----
R1R1_HUMAN 3440 EIFIYWSKSHNFKREEQNFVQNEINNMSELTADNKSMAKAGDIQSGGSDQERTKKKRR
R1R2_HUMAN 3401 EVFIYWSKSHNFKREEQNFVQNEINNMSELTIDTKSKMSKAAVS-----DQERKKMKR
R1R3_HUMAN 3297 EVFIIWCKSHNFKREEQNFVQNEINNLAFITGDSKSKMSKAMQVKSQGGQDQERKKTKR

oldUNC-68 3735 DRNGRPIIKKDKHAASIVIACLKRLLPVGLNVFGGRELDIVQOSKEKFIQKETEELKIREF
UNC-68 3600 -----IKKDKHAASIVIACLKRLLPVGLNVFGGRELDIVQOSKEKFIQKETEELKIREF
R1R1_HUMAN 3500 G-----DRYSVQTSILIVATLKKMLPIGLNMCAPTQDLITLAKTRVAKKDTDEEVREF
R1R2_HUMAN 3456 G-----DRYSMQTSILIVAALKRLLPIGLNICAPGQELIALAKNRFSLKDTDEEVROI
R1R3_HUMAN 3357 G-----DLYSIQTSILIVAALKKMLPIGLNMCTPGDQELISLAKSRVSHEDTDEEVREH

oldUNC-68 3795 IKGLLEIPVKTDPTDKNAWQLSLYRKIKGKSMRGKDEMSQDAVIEKIFNMGQVSAILHTI
UNC-68 3653 IKGLLEIPVKTDPTDKNAWQLSLYRKIKGKSMRGKDEMSQDAVIEKIFNMGQVSAILHTT
R1R1_HUMAN 3553 LHNNLHLQKVEGSPSLRWQMALYRGVPGR---EEDADDPEKIVRRVQEVSAVLYYLDQ-
R1R2_HUMAN 3509 IRSNHLQKLE-DPAIRWQMALYKDLPNR---TDDTSDPEKTVERVLDIANVLFHLEQK
R1R3_HUMAN 3410 LRNNLHLQEKSD-DPAVWQNLNLYKDWLK---SEEPFNPEKTVERVQRISAASFHLEQ-

oldUNC-68 3855 TRTKDRRRRAHHRWKYNRKNINIAQVNHSDRNVLVLSISCVLSHLDGASANATVASMEKS
UNC-68 3713 EHP-----
R1R1_HUMAN 3609 -----
R1R2_HUMAN 3565 SKRVGRRH-----
R1R3_HUMAN 3464 -----

oldUNC-68 3915 GLDATKTCRCGVFPHGSTVWNSKMTSRMEKEDIWKKVLLIQQRKMATSLITASHLYKTEL
UNC-68 3716 -----QMQLSQAWKKVSTQQRKRAVVACFRMVPLYGIPR
R1R1_HUMAN 3609 -----TEHPYKSKKAVVHKLKSKQRRAVVACFRMTPLYNLPT
R1R2_HUMAN 3573 -----YCLVEHPQRSKAVVHKLKSKQRKRAVVACFRMAPLYNLPR
R1R3_HUMAN 3464 -----VEQPLRSKAVVHKLKSKQRKRAVVACFRMAPLYNLPR

oldUNC-68 3975 HRGINFFLPAFSRLWME-EEDAGQDQLIADICSGVEEEE GPRIEIMEEGVPIVASSEDT
UNC-68 3750 HRGINFFLPAFSRLWME-EEDAGQDQLIADICSGVEEEE GPRIEIMEEGVPIVASSEDT
R1R1_HUMAN 3647 HRACNMFLESYKAAWILTEDHSFEDRMIDDLKAGEQEE-----EEE
R1R2_HUMAN 3614 HRAVNLFLQGYEKSWIETEEHYFEDKLIEDLAK-PGAEF-----PEE
R1R3_HUMAN 3502 HRSINLFLHGYSRQFVIETEEYSFEELVQDLAKSPKVEE-----EEE

oldUNC-68 4034 KEKETNPDPKQLIRCFQRAATSEETAASAITHEDSLYIRFADVMAKSIHIEEEDGEDG--
UNC-68 3809 KEKETNPDPKQLIRCFQRAATSEETAASAITHEDSLYIRFADVMAKSIHIEEEDGEDG--
R1R1_HUMAN 3689 EVEEKRPDPLHQLVLFHSRTALTEK---SKLEDDYLYMAYADIMAKSCHLEEGGENGEAE
R1R2_HUMAN 3655 DEGTKRVDPLHQLVLFHSRTALTEK---CKLEEDFLYMAYADIMAKSCHD-EEDDDG---
R1R3_HUMAN 3544 EETEKQDPDPLHQLVLFHSRNALTER---SKLEDDPLYTSYSSMMAKSCQSGEDEEED---

oldUNC-68 4092 EEEGIDQAAKEEQSQAIRGEQAVLASRGAAIMCLMYLSASGGEPNEMVAOTLQLGIHILS
UNC-68 3867 EEEGIDQAAKEEQSQAIRGEQAVLASRGAAIMCLMYLSASGGEPNEMVAOTLQLGIHILS
R1R1_HUMAN 3746 EEVEVSFEEKQMEKQRLLYQOARLHARGAAEMVLOMISACKGETGAMVSSTLKLGISILN
R1R2_HUMAN 3708 EEEVKSFEKEMEKQRLLYQOARLHARGAAEMVLOMISACKGETGPMVAATLKLGIATLN
R1R3_HUMAN 3598 EDKEKTFEEKEMEKQKTLYQOARLHARGAAEMVLOMISACKGEMSPMVVETLKLGIATLN

oldUNC-68 4152 GGNVEIQKMLIEYLQIKKDVRFFFTSMAGLMNKCSVLNLEMFERQIKVPTDTNVDHAGANE
UNC-68 3927 GGNVEIQKMLIEYLQIKKDVRFFFTSMAGLMNKCSVLNLEMFERQIKA-----
R1R1_HUMAN 3806 GGNAEVQOKMLDYLKDKKEVGGFFQSLQALMQTCSVLDLNAFERQNK-----
R1R2_HUMAN 3768 GGNSTVQOKMLDYLKDKKDVGGFFQSLAGLMQSCSVLDLNAFERQNK-----
R1R3_HUMAN 3658 GGNAGVQOKMLDYLKDKKDVGGFFQSLAGLMQSCSVLDLNAFERQNK-----

oldUNC-68 4212 LLLRHLSSKIRHRSRQDRLGAAAEGLGMGAELAS----GDNQNLNDADFTCSLFRFLQL
UNC-68 3974 -----EGLGMGAELAS----GDNQNLNDADFTCSLFRFLQL
R1R1_HUMAN 3853 -----EGLGMVNEEDGTVINRQNGEKVMADDEFTQDLFRFLQL
R1R2_HUMAN 3815 -----EGLGMVTEEG-----SGEKVLQDDEFTCDLFRFLQL
R1R3_HUMAN 3705 -----EGLGMVTEEGTLIVRERGEKVLQDDEFTCDLFRFLQL

oldUNC-68 4267 TCEGHNLEFQNYLRTQPGHNTTSVNLINCTVDYLLRLQESVMDFYWHYSSKEVIDEGGKEY
UNC-68 4006 TCEGHNLEFQNYLRTQPGHNTTSVNLINCTVDYLLRLQESVMDFYWHYSSKEVIDEGGKEY
R1R1_HUMAN 3890 LCEGHNNDFFQNYLRTQPGHNTTSVNLINCTVDYLLRLQESISDFYWYYSKGDVIEEQGKRN
R1R2_HUMAN 3846 LCEGHNSDFQNYLRTQPGHNTTVNIIISTVDYLLRLQESISDFYWYYSKGDVIDEQGQRN
R1R3_HUMAN 3742 LCEGHNSDFQNYLRTQPGHNTTVNIIISTVDYLLRLQESISDFYWYYSKGDVIDEQGQRN

oldUNC-68 4327 FLRAIQVCSQVFNTLTESIQQPCVGNQMTLANSRLWDALNGFFFLFAHMMKLYKNSTQL
UNC-68 4066 FLRAIQVCSQVFNTLTESIQQPCVGNQMTLANSRLWDALNGFFFLFAHMMKLYKNSTQL
R1R1_HUMAN 3950 FSKAIVAKQVFNSLTEYIQGPCTGNQQSLAHSRLWDVAVGFLHVFHMMKLAQDSSQI
R1R2_HUMAN 3906 FSKAIVAKQVFNLTETIYIQGPCTGNQQSLAHSRLWDVAVGFLHVFHMMKLSQDSSQI
R1R3_HUMAN 3802 FSKAIVAKQVFNLTETIYIQGPCTGNQQSLAHSRLWDVAVGFLHVFHMMKLSQDSSQI

oldUNC-68 4387 ELLREFLNQKDMIVMLSMLEGNVNGSIGQMVDALVESQPSVEKILKESDMFLKLD
UNC-68 4126 ELLREFLNQKDMIVMLSMLEGNVNGSIGQMVDALVESQPSVEKILKESDMFLKLD
R1R1_HUMAN 4010 ELLKELLDLQKDMVVMVLLSILEGNVNGMIARQMVDMLVSSSNVEMILKFFDMFLKLD
R1R2_HUMAN 3966 ELLKELLDLQKDMVVMVLLSILEGNVNGTIIGQMVDMLVSSSNVEMILKFFDMFLKLD
R1R3_HUMAN 3862 ELLKELLDLQKDMVVMVLLSILEGNVNGTIIGQMVDMLVSSSNVEMILKFFDMFLKLD

oldUNC-68 4447 LTTISQAFQDFDTNQGWIISPKEFQRAMESQKMYTVEDITYLMMCTDVNNDGKVDYMEFTE
UNC-68 4186 LTTISQAFQDFDTNQGWIISPKEFQRAMESQKMYTVEDITYLMMCTDVNNDGKVDYMEFTE
R1R1_HUMAN 4070 IVGSEAFQDYVTDPRGLISKKDFQKAMDQKQFSGPEIQFLLSCSEADENEMINCEEFAN
R1R2_HUMAN 4026 LTTSSDTEKEYDQDGGKVIISKKDFHKAESHKHHTQSETEFLLSCAETDENETLDYEEFVK
R1R3_HUMAN 3922 LTTSSDTEKEYDQDGGKVIISKKEFQKAMEGOKQYTQSETEFLLSCAETDENEMFNVDYFVD

oldUNC-68 4507 RFHNPARDIGFNVAVLLTNLSEHVPHDPRLHNFLLELAESTILEYFRPYLGRIEIMGASRRV
UNC-68 4246 RFHNPARDIGFNVAVLLTNLSEKHITNDPRLEKITEKAQTILEYFDPPFLGRIEIMGSSKRV
R1R1_HUMAN 4130 RFQEPARDIGFNVAVLLTNLSEHVPHDPRLHNFLLELAESTILEYFRPYLGRIEIMGASRRV
R1R2_HUMAN 4086 RFHEPAKDIGFNVAVLLTNLSEHMPNDTRLQTFLELAESVINYFQPFPLGRIEIMGASAKRI
R1R3_HUMAN 3982 RFHEPAKDIGFNVAVLLTNLSEHMPNDSRLKCLLDPAESVINYFEPYLGRIEIMGGAKKI

oldUNC-68 4567 EKIYFEIQESWLEQWQKQOIRDSKNSFLFNVLQDDGGDQKLEAFINFCEDTIFEMQHAA
UNC-68 4306 EKIYFEIQESWLEQWQKQOIRDSKNSFLFNVLQDDGGDQKLEAFINFCEDTIFEMQHAA
R1R1_HUMAN 4190 ERIYFEISETNRAQWEMPOVKESKRQIFDQVNE--GGEAEKMELVVNFCEDTIFEMQIAA
R1R2_HUMAN 4146 ERVYFEISETSRQWEKQVKESKRQIFDQVNE--GGEAEKMELVVNFCEDTIFEMQIAA
R1R3_HUMAN 4042 ERVYFEISETSRQWEKQVKESKRQIFDQVNE--GGEAEKMELVVNFCEDTIFEMQIAS

oldUNC-68 4627 AISSGDSDTKMERAIKQRDYFLOQTSADHISETFKSGYNYGISAASALSPQNISSITMRNV
UNC-68 4366 AISSGDSDTKMERAIKQRDYFLOQTSADHISETFKSGYNYGISAASALSPQNISSITMRNV
R1R1_HUMAN 4249 QISEPEGEPEDEDEGAGAAEAGAEAGEGAAGLEGTAATAAGATARVVAAGRAIRGL
R1R2_HUMAN 4205 QISESDLNERSANKEESEK-----ERPEEQGPRMAFFSILTQRSALFARYNILTLMRRL
R1R3_HUMAN 4101 QISESDSADRPEEEEEDEDESSVLEIAGEEEEDGSLPASAFAACASVKNRNVTDLFLKRA

oldUNC-68 4687 SSS-----VRQMSWTQLLYAVIILFTRAGLAIGWAGYLLMLTIFRFGYFLTTSSSEE
UNC-68 4426 SSS-----VRQMSWTQLLYAVIILFTRAGLAIGWAGYLLMLTIFRFGYFLTTSSSEE
R1_HUMAN 4309 SYRSLRRRVRRIIRRTAREAATAVAALLWAAVTRAGAAGAGAAAGALGLLWGSIFGGGLV
R2_HUMAN 4260 SLKSLKKQMKKVKMTVKDMVTAFFSSYWSIFMTLLHFVASVFRGFRIICSLLLGGSLV
R3_HUMAN 4161 TLKLNLRKQYRNVKMTAKELVKVLFSEFWMLFVGLFQLLEFTEILGGIFQLLWSTVFGGLV

oldUNC-68 4739 EAARQEKKEQAKMNEHPSFNPIIQEFHSHVGVTAFCVGMNADHLNVN-----
UNC-68 4478 EAARQEKKEQAKMNEHPSFNPIIQEFHSHVGVTAFCVGMNADHLNVN-----
R1_HUMAN 4369 EGAKKVT-VTELLAGMPDPTQDEVHGEQPAQPGGDADGEGASEGAGDAEAGDEEFVH
R2_HUMAN 4320 EGAKKTK-VAELLANMPDPTQDEVHGEQPAQPGGDADGEGASEGAGDAEAGDEEFVH
R3_HUMAN 4221 EGAKNIR-VTKILGMPDPTQFGIHDDTMEAEAEVMEFGITTELVHFVKGEKGDIDIMS

oldUNC-68 4788 -----SLPDFVPPERPETPETVLEEEKP-----L
UNC-68 4527 -----SLPDFVPPERPETPETVLEEEKP-----L
R1_HUMAN 4428 EAGPGGADGAVAVTDGQPFPEGAGGLCDMGDTPAEPEPEGSPIIKRKLGVGDVEEEL
R2_HUMAN 4378 DIF-----GLDLKREGGQYKLIPHPNAGLSDLMSN--FVPMPEVQEKQOE----QKAK
R3_HUMAN 4280 DLF-----GLHPKKEC-SLKHGPEVGLCDLSEILGKDEPTELESTVQKRRK----AQAA

oldUNC-68 4812 NQETSFPPTSPTSPASKAPSIYESIGAP-----QMVQLQSEADFQQGQYEP
UNC-68 4551 NQETSFPPTSPTSPASKAPSIYESIGAP-----QMVQLQSEADFQQGQYEP
R1_HUMAN 4488 PPEPEPEPEPELEPEKADAENGEKEVPEPTP-----EPPKQAPPSPPKKEEAG
R2_HUMAN 4426 EEEKEEKEETKSEPEKAGEDGEKEEKAKEDK-----GKQKLRQLHTRHYGEPEVPE
R3_HUMAN 4329 EMKAANEAEKGVSEKADMEDGEKEDKDKEEEQAEYLWTEVTKKKRRCGQKVEKPEAFT

oldUNC-68 4857 KIAESNSTKSRGSLNMLARNFKTIEKTTLYLAFFINVILLFHRVDISH-----A
UNC-68 4596 KIAESNSTKSRGSLNMLARNFKTIEKTTLYLAFFINVILLFHRVDISH-----A
R1_HUMAN 4539 GEFVGELEVQRVKFLNLYLNRNFYTLRELLALFLAFAINFILLFYKVS DSPGDDMEGSA
R2_HUMAN 4478 SAFVKKTIAYQOKLLNYFARNFYNRMLALFVAFAINFILLFYKVSTSSVVEG-----K
R3_HUMAN 4389 ANFKGHEIYQTKLHLYLARNFYNLRELLALFVAFAINFILLFYKVTEEPLLEE-----T

oldUNC-68 4907 ENAEAASEGDDDEDALLESIFITG-----MQFPYVEYEITGWMLAQILYWISVLHLSTSF
UNC-68 4646 ENAEAASEGDDDEDALLESIFITG-----MQFPYVEYEITGWMLAQILYWISVLHLSTSF
R1_HUMAN 4599 GDVSGAGSGGSSGWL GAGEEAEDEDENMYYFLEESTGYMEP-ALRCLSLHLTLVAF
R2_HUMAN 4532 ELPTRSSSENAKVTSLDSSSHRI-----IAVHYVLEESSGYMEP-TLRILALHTVISF
R3_HUMAN 4443 EDVANLWN-----SFNDEEEEE-----AMVFFVLQESTGYMAP-TLRALALHTIISLV

oldUNC-68 4962 LLVSEYQVKIPLITFKREKEIARKLMFDGCWITEEDSEELGIVDTFMWYLDRIVVSASF
UNC-68 4701 LLVSEYQVKIPLITFKREKEIARKLMFDGCWITEEDSEELGIVDTFMWYLDRIVVSASF
R1_HUMAN 4658 CIIGYVCLKVPLVIFKREKELARKLEFDGLYITEQPED-----DDVKGQWDRVLVNTPSF
R2_HUMAN 4586 CIIGYVCLKVPLVIFKREKELARKLEFDGLYITEQPSE-----DDIKGQWDRLVINTQSF
R3_HUMAN 4491 CVVGYVCLKVPLVIFKREKEIARKLEFDGLYITEQPSE-----DDIKGQWDRLVINTPSF

oldUNC-68 5022 PMMYWDFVRRKTRSKKDKQVDEETLTSILGEEKMSTDS-----S
UNC-68 4761 PMMYWDFVRRKTRSKKDKQVDEETLTSILGEEKMSTDS-----S
R1_HUMAN 4713 PSNYWDFVRRKVLDKHCDIYGRERIAELLGMDLATLEITAHNERK-PNPPGLTLTWLMS
R2_HUMAN 4641 PNNYWDFVRRKVMKYGEFYGRDRISELLGMDKAALDFSDAREKKPKKDDSSLSAVLNS
R3_HUMAN 4546 PNNYWDFVRRKVINKYGDLGAERIAELLGLDKNALDFSPVEETK--AEAASLVSWLS

oldUNC-68 5062 YDYYSCWLVIGVILTNQFLYRVGYLLCSACGVFLSPFFYAFHLIDVLSFPMLKAILQ
UNC-68 4801 YDYYSCWLVIGVILTNQFLYRVGYLLCSACGVFLSPFFYAFHLIDVLSFPMLKAILQ
R1_HUMAN 4772 IDVKYQIWK-FGVIFTDNSFLYLGWYVMSILGHYNN-FFFAAHLLDIAMGVKTLRTILS
R2_HUMAN 4701 IDVKYQIWK-LGVVFTDNSFLYLAWYTTMSVLGHYNN-FFFAAHLLDIAMGVKTLRTILS
R3_HUMAN 4604 IDMKYHIWK-LGVVFTDNSFLYLAWYTTMSVLGHYNN-FFFAAHLLDIAMGVKTLRTILS

oldUNC-68 5122 SVTHNLQQLILTITMTLVVVYLYTVAFNFRK**FYVQEGEGEEDRCKH**NMLTCFIYHF
UNC-68 4861 SVTHNLQQLILTITMTLVVVYLYTVAFNFRK**FYVQEGEGEEDRCKH**NMLTCFIYHF
R1_HUMAN 4830 SVTHNGKQLVMTVGLLAVVVYLYTVAFNFRKFYNK-SEDEDEPDMKCDMMTCYLFHM
R2_HUMAN 4759 SVTHNGKQLVLTVGLLAVVVYLYTVAFNFRK**FYNK-SEDEDEPDMKCD**DMLTCYMFHM
R3_HUMAN 4662 SVTHNGKQLVLTVGLLAVVVYLYTVAFNFRKFYNK-SEDEDEPDMKCDMMTCYLFHM

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oldUNC-68 5182 YAGVRAGGGIGDELESEYGD DLEYP R M F Y D I S F F F F V I I I L L A I M Q G L I D A F G E L R D Q Q
UNC-68 4921 YAGVRAGGGIGDELESEYGD DLEYP R M F Y D I S F F F F V I I I L L A I M Q G L I D A F G E L R D Q Q
R Y R 1 _ H U M A N 4889 YVGV RAGGGIGDEIEDPAGDEYEL Y R V V F D I T F F F F V I V I L L A I I Q G L I D A F G E L R D Q Q
R Y R 2 _ H U M A N 4818 YVGV RAGGGIGDEIEDPAGDEYEL Y R I I F D I T F F F F V I V I L L A I I Q G L I D A F G E L R D Q Q
R Y R 3 _ H U M A N 4721 YVGV RAGGGIGDEIEDPAGD P Y E M Y R I V F D I T F F F F V I V I L L A I I Q G L I D A F G E L R D Q Q

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oldUNC-68 5242 ESAT E K L E S S C F I C D I G K E T F D R M P R G F E I H T T K E H N E F A N Y L F F L Q H L V N K D E T E Y T G Q E
UNC-68 4981 ESAT E K L E S S C F I C D I G K E T F D R M P R G F E I H T T K E H N E F A N Y L F F L Q H L V N K D E T E Y T G Q E
R Y R 1 _ H U M A N 4949 EQV K E D M E T K C F I C G I G S D Y F D T T P H G F E T H T L Q E H N L A N Y M F F L M Y L I N K D E T E H T G Q E
R Y R 2 _ H U M A N 4878 EQV K E D M E T K C F I C G I G N D Y F D T V P H G F E T H T L Q E H N L A N Y L F F L M Y L I N K D E T E H T G Q E
R Y R 3 _ H U M A N 4781 EQV R E D M E T K C F I C G I G N D Y F D T T P H G F E T H T L Q E H N L A N Y L F F L M Y L I N K D E T E H T G Q E

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oldUNC-68 5302 T Y V R E K Y D N R D W D F F P V G E C F V K Q Y E D Q L ---
UNC-68 5041 T Y V R E K Y D N R D W D F F P V G E C F V K Q Y E D Q L L Q S
R Y R 1 _ H U M A N 5009 S Y V W K M Y Q E R C W D F F P A G D C F R K Q Y E D Q L S --
R Y R 2 _ H U M A N 4938 S Y V W K M Y Q E R C W E F F P A G D C F R K Q Y E D Q L N --
R Y R 3 _ H U M A N 4841 S Y V W K M Y Q E R C W D F F P A G D C F R K Q Y E D Q L G -

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CLUSTALX2.1 Multiple Alignment; representation by BoxShade (Fraction of sequence 0.5).

The denotation of the CRISPR-Cas9 mutations is based on an out-dated version of UNC-68 protein (oldUNC-68) while UNC-68 (NCBI Reference Sequence: NP_001343811.1) stands for an actual version of the protein. UniProtKB/Swiss-Prot: P21817 (hRyR1), Q92736 (hRyR2) and Q15413 (hRyR3).

CPVT-related point mutations tested in this manuscript are marked red and the area of the putative CASQ2 interaction site is labelled blue. Similarity is marked by shading.